

fumaroles, which still abound in the district. Certain classes of these may be termed migratory, disappearing in one place to appear in another; and in places they pull down and destroy terrace-lands, as though they were maintained by the continued combustion of a layer of decomposable substance not far from the surface.

As an instance of this, outside the west border of the Kaingaroa Plain, north of Tauhara, is situated Rotokawa Hot Lake. This lies in a depression, which at first sight appears to be due to subsidence, and though in part this may be so, yet the terrace-lands to the north, outlying fragments of the Kaingaroa Plain, are being continually eaten away and lowered in level by the action of boiling pools and steam and sulphurous emanations. On the north side of the lake this action now going on has broken up and lowered the original terrace over an area of fully half a mile square; and beyond this, another group of boiling springs and steam-holes is gradually eating away the terrace-lands to the south of them, and now but a narrow strip of original terrace is left between the two areas of action. How the material of the terrace-lands is disposed of is a mystery, but the operation and the evident lowering of the ground can be seen in process at the present time. But whether lowered or not by such action, the surface of the ground is broken up and the rocks reduced to a pulpy state, easily carried away by running water. And by the aid of these two agents the western part of the Kaingaroa Plain has been carried away, and a long line of escarpment indicates the limits to which such action has been carried. Otherwise, the general level of the plain is but little affected by the action of water on its surface further than the formation of many deep ravines, which in the general view from south to north are not observable.

As seen between the outlet of Lake Taupo and the Tauranga River, which from the east falls into the upper part of the lake, the thickness of the pumiceous deposit above the level of the lake is in places not less than 800 ft. And this constitutes a continuation south of the Kaingaroa Plain. Over this part this continuation is broken through by three or four considerable rivers taking their rise among the mountains to the east and thence flowing west to the lake. These have cut deep narrow valleys through the pumice-deposits, and show well the nature of the material and the manner of its arrangement. Ten to twelve miles east of the lake, owing to the convergence of the several branches of the rivers, the whole of the high levels have been worked over and reduced considerably, if not totally reduced, to the rhyolite rock that forms the basement rock of the country. This is especially the case in the upper valley of the Hinemaia River.

Along the east shore of Lake Taupo these pumice-deposits also form high vertical cliffs, which also descend below the level of the lake, and in general do not, although well stratified, convey the idea of having been deposited in an extension of the lake. That the pumiceous accumulations over this part are lacustrine and deposits within Lake Taupo at a time when its area was much greater than at present, is the prevailing idea. But it is not appreciated that neither to the north nor the north-east are there bounding heights that could have retained the waters of the lake at the levels required, and in the case of the Kaingaroa Plain none such could at any time have existed.

Lake Taupo is popularly supposed to be the source of most, if not all, the pumice that forms the surface of the adjacent country; but the cubic contents of the lake-basin, to a considerably higher level than that at which the waters now stand, would not equal in measurement even a part of the pumice that has to be accounted for. The pumice-stone deposits on the east side of the lake give little evidence of ever having proceeded from it. The lowest deposits seen are fine-grained pumice-sands, clearly stratified, and resting in a nearly horizontal position. Between the Hinemaia and the next river to the north these deposits specially show as cliffs on the shore of the lake, rising, bare of vegetation, to a height of 300 ft. or 400 ft. above the level of the lake.

Towards the upper part, the pumice-sands have bands of well-rolled gravels, mostly composed of volcanic rocks. At places deposits of black sand (magnetic iron-sand) have been formed, and the whole is finally covered by a very coarse breccia of volcanic rocks, consisting of dark rhyolite and glassy obsidian. This remarkable deposit abounds in blocks, 6 ft. to 10 ft. or 12 ft. in diameter, and for the most part even the smallest fragments show no sign of being water-worn. Yet the rocks have evidently consolidated elsewhere, been broken up in their original position, and from a distance been conveyed to their present position by some agency that did not involve grinding and trituration, and the production of rounded boulders, gravels, and sand.

Except where covered locally by loamy deposits, this coarse breccia, rightly spoken of as an agglomerate, extends over all the high lands to the east of Lake Taupo north of the Tauranga River. I could not determine the whence of the material. In different localities there is a variation in the nature of the material, but in every case more than 90 per cent. of it is volcanic and volcanic rocks of the character described. It suggests, by the angular character of the material, a possible morainic origin, or more probably berg-matter from floating ice. It cannot have been due to explosive violence of a volcanic nature breaking up consolidated lavas and scattering the material thus produced to great distances over the country, because not even the rudest arrangement of the material has been effected, and such, to some extent, must have happened should these breccias have been due to the latter cause.

The higher levels east of the lake, formed at the surface of the breccia-agglomerates just described, are from 2,000 ft. to 2,300 ft. above the level of the sea, and, as before stated, their height is such that it is difficult to imagine these can be deposits in any conceivable extension of Lake Taupo. The lake has certainly stood at a considerably higher level than at present. The bench-terraces conclusively show this to have been the case, and the erosion of the valley of the Waikato gives a sufficient explanation of the lowering of the lake to the present level of its waters.

The area to the east of Lake Taupo is the source of the fields of coarse pumice that now lie stranded over the lower terraces of the lake or in places are piled upon the beaches of the south-eastern shore. The Hinemaia River brings into the lake great quantities of such coarse