

masses evidently derived from the sinter of the terraces, and, from the manner in which these fragments appeared to occur in quantities where the finer dust had been blown from the surface, it is probable that the lower layer of the deposit will prove to be composed of coarser material than the upper. The boundary-line of this dazzling white deposit is very distinctly marked. It can be well seen where it passes over Kakaramea Mountain, dividing it, as it were, into two portions, one white and the other green. While traversing it we experienced a great downpour of rain, which formed the powdery material of the surface into little pellets; but it did not appear to be very absorbent, or to show any tendency to work up into an adhesive material. This is very different from what may be termed "the grey deposit" which is next to be mentioned, and which covers the country, from about two miles south of Wairoa, in a northerly direction towards the Bay of Plenty, as far as the Te Puke Settlement (Plan I.). This is the mud-forming deposit, and wherever it appears to have descended in a thoroughly pasty condition it coated the vegetation so heavily as to break limbs off lofty trees and to crush the smaller scrub flat simply by its weight. The sand, as already stated, appears to have fallen hot, so hot, indeed, as to set fire to the trees, the stumps of which were seen burning in many places; but there is nothing to lead us to suppose that this grey mud when it fell was even warm.

It has been suggested by some that this moist deposit was mud thrown out from the bottom of Rotomahana Lake; but it is difficult to conceive how, in that case, it should have overleapt a strip of country four or five miles wide, where there is nothing but dry sand, before it reached Wairoa; and I think that a more likely source for its origin is to be found in the sudden condensation of the front edge of the great vapour-and-dust cloud when it suddenly met the violent cold south-west gale which averted it from Rotorua and directed it towards the sea-coast, where it spread over the sky and caused the darkness that was experienced at Tauranga and all over the country to the eastward. The great volume of this dust-cloud was directed towards the East Cape, dropping over the country in that direction a comparatively heavy deposit of brownish-black dust, so coarse as almost to be sand; while on its northern edge, as far east as Tauranga, the dust is of a light grey colour, and excessively fine in grain. A collection of all these different deposits has been obtained, and will be reported on as soon as the chemical analysis is complete. The impact of the moist deposit when it fell must have been very great, from the effects which it produced at Wairoa, where it appears to have attained its maximum thickness of about 12in. in open level places free from any influence that would cause it to drift; on the flat spur above the bridge at the outlet of Rotokakahi its depth was found to be 9in., and in the Tikitapu Bush, 4in.; and from that point it gradually decreased towards the north. The action of rain upon this mud rapidly converts it into a semi-fluid condition, in which state it slides off the hill-slopes and fills the low grounds and water-courses; and where it has been thickly deposited it will thus be a constant source of danger for some time to come, but where only an inch or so in thickness it will, I believe, rapidly disappear, and, excepting that it may for a time deteriorate the pasture and destroy the existing vegetation, it will in the long run be an advantageous addition to the light pumice soils upon which it has been deposited, owing to its slightly absorbent properties. As for the light deposit of dust, which fell in a dry state, there is very little doubt that it will be all washed off into the soil with the first heavy rains that come. The distance to which this fine dust was carried was very great, exceeding at least 120 miles from the focus, in a direction between north and east; and the time it remained suspended in the atmosphere was at least eighty-four hours, as we passed through it in the "Hinemoa" when crossing the Bay of Plenty on the Saturday afternoon, as a peculiar yellowish fog, charged with pungent acid vapour, and dust; and on the following afternoon we recognized the same fog-cloud still suspended in the atmosphere towards the north-east.

V. THE EVOLUTION OF STEAM.

The enormous volume of steam rising from the site of Rotomahana Lake gave rise to a pillar of cloud that is visible in all directions over the country, having a diameter of about an eighth of a mile, and rising to a height of not less than 12,000ft. Its effect is most impressive, especially in the morning and evening, when it is lighted up with gorgeous tints by the slanting rays of the sun when it is below the horizon, and all the surrounding landscape is in twilight. Although this steam-cloud receives rapid additions in its lower part from successive explosions, these do not generate any rapid movement through the mass of this cloud, so that, if viewed from a distance, it appears to be almost solid and immovable, except the changes that are gradually effected upon its lower portion by the movements of the atmosphere.

VI. THE PROPAGATION OF THE EARTHQUAKE TREMORS.

Earthquakes are the usual results of the violent concussions attendant upon violent outburst, and they afford the only clue which we can possibly have as to the depth below the surface of the earth at which the volcanic energy has been exerted. Thus, if the earthquakes are felt with only slightly-decreased violence to great distances from the focus of disturbance, it would indicate that the disturbance is a deep-seated one. On the other hand, if the earthquakes, although extremely violent close to the focus, are only felt to a moderate distance, the conclusion to be drawn is that the forces at work are only superficial. All reports agree that at the Wairoa, about four miles distant, which is the nearest point to the eruption from which any persons have survived, the shocks of earthquake during the first phase were violent and continuous; whereas at Rotorua, twelve miles distant, they were comparatively slight. The great earthquake at the commencement of the second phase appears to have been felt with considerable violence at Rotorua, and distinctly arrested attention for a distance of at least from sixty to seventy miles, but does not appear to have done any damage.

During our visit the earthquake shocks in the vicinity of Rotomahana were still frequent and violent, but at Rotorua they were only experienced as gentle undulations; and I ascertained that they proceeded from the effects of the explosion from the Rotomahana fissure, and that the eruptions