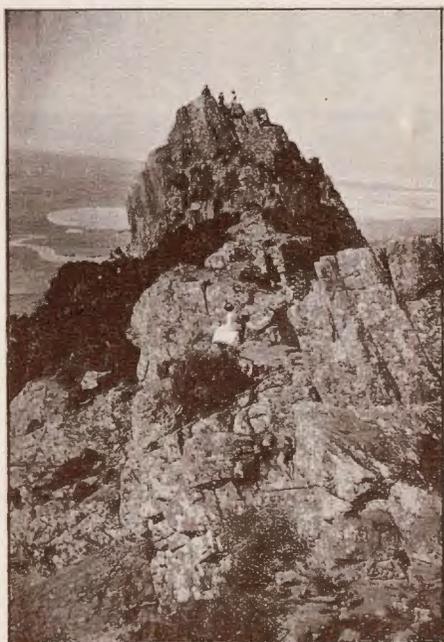


Such can be seen in the small hill below Cooper's Knob, on one side of the valley leading to Colonel Heaton Rhodes' house, while, on the other side of the valley, exactly opposite it, there is another cone forming its counterpart in shape and the character of its lava.

By these outpourings from the interior of the earth, the mountain was built up, slowly, in all probability, destruction alternating with construction, till a giant cone was raised,

rivalling Ruapehu or Egmont in size and form, while from a neighbouring centre near Akaroa a similar mountain arose. But the usual fate of loftily built volcanoes overtook these two. As building proceeded, the expansive force of the steam included in the lava was not equal to raising it to a great height unless under specially active conditions, and the volcano grew quieter and quieter. The crater at the top, with the pipe leading down from it, became choked up and this checked for a time the volcanic forces. But it was like tying down the safety valve of a boiler and stoking up the fires. The strength

of the mountain was, for a time, more than sufficient, but at length it was not competent to resist the ever increasing strain. A mighty explosion took place, blowing away the top of the cone and leaving a gaping chasm now forming the harbour. The ragged ring of cliffs marking the edge of this great cavity can be well seen from Mount Pleasant, and, on looking west, from Cooper's Knob, the marked contrasts between the precipitous interior slopes and the long gentle slope facing the Plains producing a striking contrast, and furnishing one of the best scenic effects to be observed from the track.



Beken.]

[Photo.

Castle Rock—Te Titi o Kahukura.

### MOUNT HERBERT AND QUAIL ISLAND.

After this great outburst, the centre of activity appears to have moved to the eastern side of the Harbour, and eruptions took place from the neighbourhood of Mount Herbert. On the edge of the crater ring a mountain was constructed, chiefly of flows of lava, which ran down in all directions and formed, to the north, the long gentle slope which reaches the sea at Diamond Harbour. The contrast between the easy gradient by which Mount Herbert is approached from this side, and the precipitous faces on the northern shore of the harbour is most marked. These eruptions do not appear to have been of a violent character, and they are not associated in any way with the formation of dykes. Stretching further to the southeast, past the shoulder of Mount Herbert, lie Mount Fitzgerald and Mount Sinclair, which were formed about the same time and in a similar manner.

The last dying flicker of volcanic action took place in all probability from Quail Island, although this may have been partly contemporaneous with the eruptions from Mount Herbert. On the island are the remains of a small crater partly filled with a level sheet of columnar basalt, lying over fragmentary material and layers of volcanic mud. This appears to have closed the history of Lyttelton as a volcano.

### SUBSEQUENT HISTORY.

Its subsequent story deals with the degradation and dissection of the cone by water and other denuding agents. Attacks were made by the sea along the outer edge, and the wall, already weakened in all probability by the great explosion, was completely reduced in one place which allowed the sea to enter the floor of the crater. The ring was also broken at Gebbie's Valley, and deep gullies were eaten out on the flanks of the cone so that the wall which separates their heads from the slopes facing the harbour is at times of the narrowest width. In all probability the land has experienced a gradual settling down owing to the abstraction of material from beneath, and the loading of the surface with an enormous weight of volcanic matter, but numerous ups and downs have undoubtedly occurred before the present level has been reached, and even now there are signs that the crust is not really stable, and that just at the present a slight upward movement is taking place.

During times of elevation, the enlargement of the crater and the formation of spurs and valleys would proceed apace, and now, during a time of relative depression, the lower