chloride. The circulation of this water in the anticline and its relation to the gas and the oil-sands are not known. The investigation of these points will be important.

Stone.—As large blocks of hard stone are required for harbour-works on the east coast of the North Island, the location of suitable stone is desirable. During the past season many thick beds of sandstone were observed along the coast and inland, but none both easy of access and handy for water transport. No first-class sandstone was seen. Beds of brown sandstone 10 ft. to 20 ft. thick occur in many places on the coasts of Mahanga and Paritu survey districts, but no sheltered working-place was seen. The most promising place for working appears to be at Onepoto Bay, on the south coast of Mahanga Survey District. Large concretions, up to 6 ft. long, form the hardest parts of these rocks, and as the softer material is worn away the concretions form the boulder-beaches previously mentioned. At Waikokopu they are being used to support the piles of the wharf.

On the east and north sides of Mahia Peninsula and in Paritu Survey District thick beds of white pumiceous sandstone crop out on the coast. This sandstone is described by Hector* as sufficiently indurated to form a good building-stone, and in its colour and fineness of grain not second to any building-stone in the country.

Limestone 100 ft. to 200 ft. thick forms the west coast of Mahia Peninsula from Black Reef to Long Point, and is shedding large blocks into the sea. Suitable stone for harbour-works can be procured there. The same bed of limestone, 100 ft. thick, forms the flat top of Moumoukai Hill, in Nuhaka North Survey District, where it covers over half a square mile, and is being quarried and crushed for road-metal. It could be ground for use as agricultural limestone, or, along with the abundant mudstone which underlies it, could be used to make cement; but there is as yet no local demand of importance for either of these products.

Sand.—On the Mahia Isthmus is a huge deposit of nearly white quartzose sand suitable for the surfacing of bitumen roads. The beach on the north side of Mahia Peninsula from three miles to four miles and a half west of the mouth of Whangawehi Stream is formed of broken shell ready to be used as agricultural limestone.

5. ROTORUA DISTRICT.

(By L. I. Grange.)

Introduction.

In November, 1926, a start was made on the geological survey of the active volcanic belt of the North Island of New Zealand, extending from Ruapehu north-east to Taupo, Rotorua, and White Island, in the Bay of Plenty. By May, 1927, about 500 square miles of the Rotorua district had been examined. A visit was made to White Island at the end of March. The survey of the district has been undertaken (1) as part of the areal geological survey of the Dominion, and (2) to ascertain where it will be advisable to set up an observatory to make continuous observations of the volcanoes and hot springs in order to forecast volcanic eruptions. The results already obtained indicate some of the exact and continuous work that should be undertaken.

General Geology.

Apart from lacustrine and fluviatile deposits of minor importance, the rocks of the Rotorua district are all volcanic, and consist of rhyolitic and andesitic tuffs and flows, ranging in age from late Tertiary to Recent. The spherulitic rhyolites and rhyolitic tuffs that form the higher country appear to be the oldest of these rocks. Spherulitic rhyolite forms Ngongotaha (2,554 ft.), Moerangi (2,440 ft.), Whakapoungakau (2,524 ft.), and the lower part of the Paeroa Range. Rhyolitic tuffs are well developed on Mamaku Plateau, on the Paeroa Range, and in the hilly country east of Lake Rotorua. Though well consolidated, they are so porous that rain-water quickly soaks in, and much of the drainage is underground.

Faulting movements that commenced near the close of the Tertiary and continued to the Recent have tilted, broken, and warped the land-surface. The earliest faults, which are the strongest, mostly strike north-east and east-north-east, and flank wide depressions. The Rotorua–Atiamuri Road lies in a downfaulted area between Paeroa Range and Horahora Cliffs; the Kaingaroa Plains are bounded on the east and west by strong faults. At this time Mamaku Plateau was gently warped. It rises gradually from Rotorua (915 ft.) to Mamaku (1,884 ft.) and falls gently towards Putaruru. Faults striking east and west along the southern shores of the lakes, Rotoiti, Rotochu, and Rotoma, have a total downthrow to the north of more than 1,000 ft. Rotorua, the largest lake of the district, owes its origin mainly to faulting. Recent faults showing excellent scarps are found near the Rotorua–Waiotapu Road. Their throws range from a foot or so to about 75 ft., and their general direction is parallel to that of the main faults in this locality. Conical holes occur at the foot of several of the scarps. Some of the faults, where they cross dry valley-floors, show small steps of less height than the throw seen along other parts of the faults, thus indicating renewed movement along the same planes. Tarawera-Rotomahana Chasm, formed in 1886, is a series of explosion craters, in places separated by narrow bridges, 9½ miles long. It trends east-north-east, following the strike of some of the faults near it, but no displacement can be detected.

While these earth-movements were taking place, there were many eruptions, most of an explosive nature, but in some lavas were emitted. Probably the first were those that built up Maungaongaonga (2,764 ft.) and Maungakakaramea (2,494 ft.), north of Waiotapu, which are formed of dacite or acid andesite. Deposits of little consolidated rhyolitic tuff and agglomerate, more than 500 ft. thick, and containing many fragments of andesite, underlie the Kaingaroa

* Rep. Geol. Explor. during 1886–87, No. 18, p. xxxviii; 1887.