according to Munn and others it does move, or by any other process, it would be trapped in the Ruakituri anticline before it reached the Mangapahi and Morere anticlines, which are now being drilled for oil.

Stone.—The best stone mentioned last year—the limestone at Long Point, on Mahia Peninsula—was followed on the mainland from Whakapunake south-east for twenty miles to the coast four miles west of Nuhaka, where it forms a cliff, 100 ft. high, within 6 chains of the railway-line.

This limestone could be used in agriculture, and quarries could be opened in it in any convenient place. Other outcrops of limestone occur in the hills east of the Wairoa Valley, where they form the Marumaru caves and other smaller rock shelters. A more accessible limestone crops out in Taramarama Survey District, on the south side of the Waikare Taheke-Valley, on Trig. K hill, three and a half miles west of Frasertown.

4. ROTORUA–TAUPO SUBDIVISION.

(By L. I. Grange.)

Introduction.

During the field season, which lasted from August, 1927, to May, 1928, the geological survey of the Rotorua district was completed and work in the Taupo district well advanced. Except for relatively small areas near Reporoa and Ohaki, a strip of the Ruapehu – Taupo – Rotorua – White Island active volcanic belt, sixty-nine miles long, has now been surveyed in detail. This season about 1,100 square miles was examined.

In addition, visits were made to White Island, Ngauruhoe, and the head of the Mangatu Stream west of Lake Taupo. A report on the sulphur deposits at Rotokaua was also prepared.

The writer was assisted in the field by Messrs. S. J. H. Sylvester, B.Sc., Lecturer, Canterbury College; L. W. Stevens, Otago University; and W. M. Jones, M.Sc. In the Rotorua district the 20-chain contour maps of the Lands and Survey Department greatly facilitated the work. The Perpetual Forestry Co. kindly allowed the writer to use copies of their detailed map of the district around Atiamuri and Tokoroa.

The rocks of the subdivision are rhyolite, dacite, and basic-andesite tuffs and flows, and lake and fluviatile beds of late Tertiary to Recent age. Of the volcanic rocks much the most abundant are the acid rocks.

Physiography.

The earliest eruptions built up hills of rhyolite. Then came explosive eruptions on a grand scale, which covered the whole subdivision with a thick coating of rhyolite tuff. Since the surface of this deposit, except where disturbed by later movements, is almost flat, it is thought that the fragmental material was laid down in water. Faulting broke up this land surface, and an elongated depression was formed, trending north-north-east, between the little-disturbed upland areas of the Kaingaroa Plains and Mamaku Plateau. The faults bounding the depression are irregular, and southward near Atiamuri are not well defined. Later faulting, eruptions, and thermal activity have been confined to the depressed area. The strong fault on the western side of the Paeroa Range crosses the Waikato River at Orakei Korako and can be traced as far as Oruanui. Southward, late lava-flows obscure the older surface, but this fault probably extends as far as Taupo. Faults appear to determine the course of the Waikato River; one extends from Taupo north-eastward to the mouth of Orakonui Stream, and another follows the Waikato in its westerly course from Whirinaki junction.

After the main faulting, a lake covering an area of fully 300 square miles stretched between Taupo and Rotorua. Between Taupo and Atiamuri it covered the flats in which the Waikato is now entrenched, and in places was more than six miles wide. For a few miles up the Whirinaki Valley from the Waikato River the lake was about three-quarters of a mile wide, but northward opened out to eight miles. At the time the lake was drained it had been fairly well filled with sediments and fragmental material, though earth-movements and volcanic eruptions were most likely the main causes of its final disappearance. Over most parts the lake-beds lie flat at 1,260 ft. above sea-level. South of Hemo Gorge they have been tilted, and on the side of Haparangi Mountain—a late rhyolite volcano—they are above 1,600 ft.

Lake Taupo is believed to have been formed in late Tertiary times, mainly by subsidence and partly by explosions contemporaneous with the tilting of the beds of the former lake between Taupo and Rotorua. Explosions and faulting movements occurring in recent times have altered its outline somewhat. Whangamata and Whakaipo bays are in fault gräben trending north-north-east. Some of the faults of the gräben are still active, and movements along them caused the remarkable swarm of earthquakes between April and December, 1922.* The block between Kaiapo and Whangamata bays was depressed several feet; on the eastern side a series of earthquake rents was opened for seven miles, the throw of the individual rents in places amounting to 3 ft. The western bounding fault, which strikes north-north-east from the mouth of Okaia Creek in Whangamata Bay, has been followed for six miles; in places there are surface steps up to 6 ft. high. Smaller breaks, downthrowing to the west, occur in the depressed block; one extends north-north-east from the mouth of Mapara Stream in Whakaipo Bay, and another follows the cliffs on the eastern side of Whangamata Bay. In Whangamata Bay the old strand-line is now about 12 ft. below normal lake-level.

* See P. G. Morgan: N.Z. Geol. Surv. 17th Ann. Rep., C.-2c, pp. 10–11, 1923.