

## GENERAL GEOLOGY.

Below is shown in downward order, what is thought to be the sequence of rocks of the subdivision:—

11. Tarawera basic-andesite shower.
10. Thermally altered tuffs from explosion craters on Maungakakamea.
9. Pumiceous rhyolite showers: one at Rotorua and one at Taupo.
8. Rotokawau basic-andesite shower.
7. Several showers of pumice.
6. Basic andesite of Karangahape Cliffs, &c.
5. Vesicular hornblende rhyolite (variations spherulitic, lithoidal, and banded rhyolite and spherulitic obsidian), Tauhara dacite.
4. Rhyolite tuff and breccia.
3. Basic-andesite flows and lapilli and pumice contemporaneous with lake-beds.
2. Rhyolite tuff at Mamaku, basic andesite near the top.
1. Spherulitic rhyolite.

1. Only in one place—at the foot of the Paeroa fault-scarp—is the spherulitic rhyolite seen underlying the rhyolite tuff (No. 2). Since it resembles the spherulitic rhyolite associated with the vesicular hornblende rhyolite that was undoubtedly poured out after the main faulting, it is difficult to fix certainly the age of some of the rhyolite masses.

2. The rhyolite tuff that is the predominant rock of the subdivision is undoubtedly sorted only near Atiamuri and east of Tokoroa. The material is widespread and must have been blown from many vents, but in only a few localities is there definite evidence that these were close at hand. A tuff at Te Karaka Point, Lake Taupo, with long silky shreds of pumice grading into the groundmass and reminding one of the “wilsonite” at Waihi, evidently came from a vent near by. Round vesicular bombs of obsidian of the “bread-crust” type up to 5 in. in diameter, in the tuff near Atiamuri, point to vents not far distant. The tuff seems to be similar in mineral composition to the rhyolite-lava flows. Unlike the tuff of No. 4, it is cemented and well jointed. Bombs and lapilli of basic andesite closely resembling those thrown from Tarawera Mountain in 1886 occur near the top of the tuff in the Whangapoa Valley near Atiamuri. Reddish basic-andesite scoria overlain by rhyolite tuff is exposed on Johnson Road, in the Perpetual Forestry plantation, north of Atiamuri. Lapilli from the same source are scattered through a dark band of rhyolite tuff 12 ft. thick in this locality.

3. The beds deposited in the former lake that stretched from Taupo to Rotorua are thin-bedded silts, sands, gravels, tuff, and breccia. In places the silts have small overturned folds due to slumping while the beds were still soft. Beds of diatomite outcrop in the Whirinaki Valley and alongside the Waikato River between Orakei Korako and Whakapapataranga Trig. Station. The gravels are made up of pebbles of rhyolite tuff, silicified silts, and rhyolite. The pumice breccia on the bank of the Waikato two miles below Orakei Korako contains bombs of basic andesite identical with the Tarawera basic andesite. Thick bands of basic-andesite lapilli in the lake-beds at Waikeruru Point, Lake Taupo, evidently came from the old volcano on which Trig. Station K is placed. Thin sections of the flow rock examined under the microscope were seen to contain phenocrysts of basic feldspar, much olivine, and a little augite. Possibly this and other basic andesites mentioned in this report should more correctly be termed basalts. Bombs of basic andesite in fragmental material underlying banded rhyolite at Karangahape Cliffs, Lake Taupo, came from an eruption simultaneous with or a little later than that at Trig. Station K.

4. Thick loose beds of pumice tuff and breccia occur in the depression north of Rotoiti, Rotoehu, and Rotoma, in the Tarawera Valley, between Hemo Gorge and Waiotapu, and in the Waikato Valley in its course northward from Lake Taupo. They rest on lake-beds in the basin south-east of Hemo Gorge and at Taupo. North of Rotoma, in the Pikowai Valley, these tuffs overlie unconformably the hard rhyolite tuff (No. 2). In Stowell Creek, a branch of the Tarawera River four miles downstream from Lake Tarawera, they are overlain by vesicular hornblende rhyolite. The breccias contain lumps of highly vesicular rhyolite, showing big crystals of hornblende and mica, and rhyolite similar to that of No. 5. No doubt in some localities flows of the vesicular hornblende rhyolite preceded the tuff eruptions.

5. The rhyolite volcanoes that were formed after the main faulting—Ngatuku, near Atiamuri, Pukemoremore, Kaimanawa, Ngangiho, and those in Whakaipo Bay—are more or less dome-shaped, and resemble some of the puyes of the Auvergne and Hungary. The sides are steep, the top flattish, and some of them carry several small peaks. Hand-specimens of the rock differ considerably: there is vesicular hornblende rhyolite, spherulitic rhyolite, banded rhyolite, lithoidal rhyolite, and black spherulitic obsidian. Several of the variations may be seen on one volcano. Ordinary hornblende, cossyrite or near ally, augite, hypersthene, and possibly enstatite, occur. The feldspars seem to range from albite-oligoclase to andesine. Orthoclase was not recognized with certainty in the thin sections, but the analyses show some to be present. The rocks containing cossyrite or other closely allied soda-hornblende approach the pantellerites. Some of the flows—*e.g.*, that overlying the rhyolite tuff west of Ngongotaha Mountain—may be of dacite.

6. A basic-andesite flow, about 20 ft. thick (Trig. K type) forms the top of Karangahape Cliffs. It came from a wide crater south-east of the cliffs. Only half of this crater is now seen, the other half having subsided below lake-level. Probably the basic-andesite outcropping on the Taupo Totara Timber Co.'s railway one mile north of the bridge over the Waikato, that of Te Apuahoe volcano two miles north-east of Tauhara Mountain, and that exposed in the gorge of the Waikato River a quarter of a mile below the junction of Orakonui Stream are best correlated with the andesite of Trig. K or Karangahape eruptions. The position of the acid hypersthene andesite of Mount Edgecumbe in the sequence is not known, but it is certainly younger than the tuffs of the Kaingaroa Plains, for a dyke of this rock intrudes the tuff close to the Tarawera River on the eastern