

they are much obscured by a heavy covering of trachyte tuffs and lavas, which occupy all the higher parts of this watershed, and descend in many places to the sea.

"In the month of January, 1885, I geologically examined the whole of the country lying between the Waipa and Pirongia, including the district around Hikurangi and the north end of the Hauturu Range, which was as far south as I reached on that occasion on account of the obstruction of the Natives, who at that time exhibited great jealousy of the excursions of Europeans in their country. I also examined the coal outcrops on the Moakurua and Okoko Streams and found the coal measures resting hard on an old rocky floor of argillaceous sandstones and grey cherts at Okoko and Ngutunui.

"The formations represented in this district may now be tabulated as follow :—

- "I. *Recent*.—(a.) Alluvial flats and river beds,
- II. *Pleistocene*.—(a.) Pumice sands and gravels.
- III. *Pliocene*.—(a.) Trachyte tuffs and lavas.
- IV. *Cretaceous-tertiary*.—
 - (a.) Marly greensands and clays.
 - (b.) Calcareous sandstones passing into hard semi-crystalline limestone.
 - (c.) Yellow and brown sandstones with coal seams.
 - (d.) Sandstone and granite conglomerate.
- V. *Old floor or Basement Rock*.

"The chief interest centres round the sandstone and granite conglomerate, and the probable nature of the rocky floor of the district.

"Proceeding up the Mangaone Stream from the point where it joins the Turitea River are first seen tough grey vesicular trachytes, and trachyte tuffs which crown the narrow ridge dividing the Mangaone and Moakurua, presenting to both streams a long line of steep escarpment, varying from 12ft. to 80ft. in height. About 18 chains higher up the valley the trachytes are succeeded by the underlying calcareous sandstones which first appear in the bed of the stream, lying almost horizontal; but proceeding up the valley they are found tilted to the north-west at a low angle, and are seen to pass downwards into an impure limestone, which in its turn becomes first gritty then pebbly, and immediately passes into a coarse conglomerate, composed principally of hard, somewhat flaggy argillaceous green-coloured sandstones and granite. Where the limestone is pebbly the fragments of included rock are chiefly sandstone, but sub-angular pieces of granite are not uncommon.

"The granite element of the conglomerate reaches its greatest development a few chains past the outcrop of limestone in a rounded spur which terminates abruptly at the stream. Beyond this point the granite boulders become fewer, and are rapidly replaced by those of sandstone, soon disappearing altogether.

"The section for the next few chains, in following up the stream, is somewhat obscured by the trachytes, but at the falls a little distance above this the hard argillaceous sandstones contained in the conglomerate are well exposed *in situ*. Here they alternate with crumbling mudstones, and also exhibit a marked tendency to weather in rounded concretions or nodules formed of thin, easily-separated concentric layers, enclosing a hard central nucleus. At a point about 5 chains above the falls they possess a more flaggy character, and contain a thin, irregular streak of fine bituminous coal, and are themselves of a finely micaceous nature. They strike north-south (magnetic), and dip west at an angle of 45°. Higher up the valley the soft brown sandstones of the coal measures now wrap over the outcrop of the older sandstones, and close the section in this direction.

"The annexed sketch illustrates the position and relation of the rocks met with in the line of section just described, to which the following refer to :—

A. Mangaone Falls. B. King's Hutt. 1. Trachyte tuffs. 2. Trachyte lavas. 3. Impure limestone. 4. Pebbly limestone. 5. Sandstone and granite conglomerate. 6. Argillaceous sandstones.

"Returning to the conglomerate, a close examination showed that the fragments of sandstone and granite were generally well water-worn, rounded, or sub-angular, but large angular blocks, of granite sometimes over a foot in diameter, were found in the bed of the stream, and pointed to the close proximity of that rock *in situ*.

"A collection of rocks composing the conglomerate comprised, besides the sandstones, granites of all degrees of texture from very coarse-grained, like those of Mount Olympus, in Collingwood, down to the finest known varieties. The coarse, decomposing, grey granite seemed to predominate; but examples of gneissic granite, greisen, hornblende gneiss or syenite, and quartzite were also found. In the granitic gneiss the laminated structure of the constituent minerals was well exhibited, the mica being chiefly biotite. In the hornblende gneiss, which would be difficult to distinguish from the hornblende rocks associated with the lower Silurian strata at the Baton and Graham Rivers, Pikikiruna Range, and Upper Aorere Valley, the hornblende is conspicuously developed, and of a dark green colour.

"No fossils were seen in the conglomerate, but in the pebbly beds immediately overlying marine forms, chiefly corals, were abundant. Judging from the character of the associated strata and their embedded life, it may be inferred that the materials forming the conglomerate accumulated on the shores of a sea bounded by a broken rocky coast-line, being transported by a Cretaceous torrent, which scoured its deep channels in the slopes of mountains composed of Silurian granites and crystalline rocks, and flanked by sandstones of Jurassic and Triassic age. Then followed a gradual but general subsidence of the land, thus permitting the coarse materials to be followed or succeeded by a series of finer deposits, and then limestones or calcareous sandstones.

"The argillaceous sandstones and mudstones appear to contain no fossils, and there is nothing to indicate their age with any degree of certainty, but the direction of their strike and their close