

of shelly limestone are found resting on the older slate and sandstone rocks, as at Kuripapanga and more to the north-east. These beds show as nearly horizontal strata on the table-land west of Taruarau Gorge.

3, c. *Lower or Pohui Limestone*.—These limestones are found in the western part of the district under conditions described above in the extract made from Sir James Hector's report. They show on the northern side of the high downs west of the Taruarau Gorge, but are more fully developed to the west and south-west, towards the Rangitikei. However, the principal development is to the eastward of the Kaweka Range, in the Blowhard Range, and in Cattle Hill and Bonnie Mary, nearer the Ngaruroro. In the Blowhard Range a variable thickness of 3, d, underlies the limestone, resting on slates and sandstone rocks of the age of those forming the Kaweka Range, the lower beds (3, e) being absent. The limestones are variable in thickness, sometimes in one thick stratum and sometimes sandy beds between divide it into an upper and a lower limestone. This limestone is shelly, chiefly formed of oysters; large pectens are said also to occur, but I saw none of the latter along the line of the coach-road to Kuripapanga. This limestone strikes in the direction of Puhoi and the Mangaharuru Range, in which latter it attains a height of 4,000 ft. above the sea. It is most likely, also, the equivalent of the lower limestone in Scinde Island, and it is lower in the sequence than the Puketapu limestone, the section along the Tutikuri Valley showing this clearly. Some years ago Mr. A. Hamilton collected the fossils of the Blowhard Range, and, if I remember aright, he at the time informed me that he found many of the larger pectens of Scinde Island and *Ostrea ingens* in this limestone. Thus the evidence as to position, and the fossil contents, favour its correlation both with the Scinde Island and Te Aute limestones.

3, b. *Sandy Clays and Pumice Sands*.—The limestones of the Blowhard dip east, and at the foot of the range pass under a series of sandy clays, conglomerates, and pumice sands that, forming a belt of country that extends about six miles east to west, and stretches south across the Ngaruroro into the Kereru district and north to the Esk River and Rangipapa Hill. The middle and higher parts of these rocks are decidedly pumiceous, as shown in Kereru Stream, in the Tutaekuri and the Esk Valleys. In the Tutaekuri Valley thick beds of sandstone conglomerates occur in the middle part of the section. These correspond with the conglomerates of Rangipapa Hill, which in the Esk Valley are overlain by beds of clay and sandy clay rich in a great variety of Younger Pliocene fossils. They are also richly fossiliferous in Kereru Creek and at Petane, in which latter locality exhaustive collections were made by Mr. Hamilton.

In the Tutaekuri Valley the beds are also rich in fossils, but these have yet to be collected. To do so is scarcely needful, as there can be no doubt as to the identity and correlation of the beds in question in the localities named. The importance of the Tutaekuri section lies less in the abundance of the fossil contents of the rocks than in the clear and decisive manner in which they are seen to overlie the Blowhard limestones on the one hand, and underlie the Puketapu limestones on the other hand.

3, a. *Upper or Puketapu Limestone*.—These rocks from Puketapu stretch westward along the higher lands on each side of the Tutaekuri Valley for a distance of ten miles. The western exposure forms a bold scarp stretching away to the north, and which is less marked on the south side of the valley. The sides of the valley show this limestone covering up the pumice sands and fossiliferous clays that underlie it, and leaves no doubt as to the relative position of the two underlying rocks to the limestone above.

South, the Puketapu limestone is continued through the hills across and beyond the Ngaruroro into the Maraekakaho watershed, within, or beyond which, by the thinning-out of the sands and fossiliferous clays, it coalesces with the Te Aute limestone.

To the north it extends through Petane and east of the Lower Esk into the Mohaka watershed. It probably also constitutes the upper limestone in Scinde Island. The fossils of this limestone are almost wholly recent species, but they have not been specially collected to show this. As the lower limestone contains almost no extinct species, except *Ostrea ingens* and the group of larger pectens for which that horizon is famous, only recent forms could be expected from the upper limestone.

#### *Pleistocene.*

2, b. *Volcanic Rocks at the Source of the Rangitikei River*.—These I did not examine *in situ*. In the Upper Ngaruroro I found boulders of a rhyolite tuffs, none of which could be found among the pumice and rhyolite fragments covering the flatter parts of the mountain-tops. The same material was also found in the bed of the Mangamaire Stream, and more plentifully than in the Ngaruroro, while it was equally absent from the pumice deposits of the mountain-tops in that neighbourhood. On making inquiries, I learned from Mr. Macdonald, of Owhakao Station, that the material in question occurred in the solid in a western source branch of the Mangamaire Stream, close to the watershed leading into the main source of the Rangitikei River. This I intended to visit, but owing to the inclemency of the weather and other causes was unable to do so; but before leaving the district I requested Mr. Macdonald to forward to Wellington samples of the rocks, described by him, and these have since been received.

The samples forwarded consist of fluidal rhyolite, such as is common on the east shore of Lake Taupo, and forming a large part of the great breccia that on the east side of the lake overlies the finer pumice sands and sediment. With these were also a pitchstone, containing crystals and blebs of sanadine feldspar, and the rhyolite tuff in question. These rocks do not cover any considerable area, but form a number of low rounded hills to the north of the creek-channel, and, as parti-coloured rocks, show in the bed and banks of the stream, and where exposed are partly decomposed, and so soft, barring the harder kernels present, that an ordinary walking-stick may be with but little effort pushed almost out of sight into these rocks.

There is thus here a deposit of rock that, consisting of rhyolite lava, rhyolite tuff, and pitchstone, must be considered as *in situ*, and occurs as a sort of outlier from the great development of