

If there be difficulty in reaching Manaroa, the best plan will be to consult John Duncan, of the Grove, at the head of Queen Charlotte Sound. A letter of introduction will be given you, and as he knows all about the different arms and bays in both sounds, his advice should be followed. Probably you must reach Manaroa by boat from Mahakipawa or Havelock. Mr. Williams probably avails himself of small vessels trading to Havelock. In any case, there is some ready means of reaching the place.

In as far as you can, make your examinations complete. If you find marine shells in the formation affording the foot-prints, it will not be needful that a further and more rigorous examination be made, as the fossils will determine the age and the rock-collections will show the character of the strata.

ALEXR. MCKAY.

12th November, 1898.

REPORT ON THE DISTRICT EAST AND SOUTH OF CLOVA BAY, PELORUS SOUND.

By W. A. MCKAY, Assistant Geologist.

SIR,—

8th December, 1898.

In accordance with your instructions dated the 12th November, I proceeded to Manaroa, Pelorus Sound, for the purpose of examining certain strata from which have been obtained rock-specimens carrying impressions considered to be the foot-prints of struthious birds, as indicated in your memorandum of instructions.

I left Wellington on the 16th November and arrived at Manaroa on the 19th, and on the following day saw Mr. Wynn Williams, who forwarded to Professor Hutton the original specimen of supposed foot-print of a bird, and to whom, therefore, I have to be indebted for pointing out the exact locality whence the specimen was obtained. As described by Mr. Wynn Williams, the specimen forwarded to Christchurch occurred as a loose boulder on the left bank of a moderately-sized stream that drains from the western slopes of Mount Stokes into Clova Bay, an arm of Pelorus Sound. The deposits of which the boulder formed a part consist of ordinary detritus brought down from higher levels and deposited, as is usual by mountain torrents, on each side, or alternately on one or other side of their valleys. The material is therefore coarse, and scarcely, if at all, stratified, and there are no beds of finer grain associated with the coarse angular bouldery deposit that obscures the fundamental rocks of the creek-valley. The stream at the present runs in a channel lower and at some distance from where the specimen was found.

The character of the country surrounding Clova Bay is of extreme ruggedness, and, except the lower shingle-flats of the creek valleys, the district is heavily bushed. Geographically the northernmost portion of the peninsula (which includes Manaroa) is but the ramifications of Mount Stokes. The only flats in the district are the areas formed by the alluvial of the creeks, which, however, are considerable, considering the size and drainage-area of the creeks. It was on one of these alluvial deposits that the imprint was found as a loose boulder by Mr. Wynn Williams. Geologically the country around Manaroa consists of a sandstone of a tough, fine-grained character, which in places contains much quartz in the form of stringers. The formation must go back for a considerable distance in the direction of Mount Stokes, for in none of the creeks around is there any sign of the underlying schist, and it is not until the outer heads of Clova Bay are reached that the older formation outcrops. The general strike of the sandstone is very regular, being east and west, while the dip is to the south at angles varying from 45° to 20° from the horizontal. It does not, however, give a very good example of stratification, the beds being thick and much broken up by joints.

In a section taken from the head of Clova Bay, along the eastern shore, a considerable development of recent deposit is shown in the form of raised beaches. The thickness of these beds is variable, ranging from a few feet to 20 ft. or 30 ft. The beds persist for fully a couple of miles, but in no case reach very far back from the water-line, and in places they are denuded, exposing the underlying beds to view. These deposits do not differ in their component materials from the present beaches in the vicinity, which consist of large blocks of stone, more or less angular, together with much smaller material, and the whole held loosely together in a matrix of sandy material. At some places the large blocks are absent, the smaller material being present with its matrix. The material of this conglomerate is made up of the detritus of the surrounding formations, being sandstone, brecciated sandstone, and schist. As aforementioned, these deposits—these beaches—expose between them the underlying sandstone. In the section under consideration these beds on the water's edge are always in a condition of far-gone decomposition, although the same rocks higher up on the hill-sides are perfectly sound.

At a point about half a mile to the south of Harvey's homestead, under and in direct contact with these younger sedimentary strata, is a rock which I consider a schist, the area of which is small, and the overlying rocks predominate. This rock is much contorted, possesses distinct lines of foliation, and is apparently conformable with the overlying formation. It is, I believe, the uppermost bed of the schist formation outcropping about one mile to the northward. In character they do not correspond, the uppermost beds being much more contorted, while the lower bed is a fine-grained rock, having a silky appearance, with a greasy touch. The foliæ is well shown, while the whole of the beds are slightly contorted. The quartz contained is chiefly in small stringers and veins, crossing and recrossing, the whole forming quite a network. The strike and dip is very decided and regular, the former being 10° east of north and the dip to the east at an angle of 45° . This older formation I traced for a considerable distance northward. The strike carries these beds to the westerly head of Clova Bay. It does not proceed inland any distance on this shore, for its dip carries it under the greater development of sandstone. It occupies a narrow strip at the water's edge, and from the contour of the coast should again disappear at Hopai homestead, about one mile distant to the westward. The foliæ and the contortion are very well developed.