

ART. XXXIX.—*Note on Remains of some of the Extinct Birds of New Zealand found near Ngapara.*

By A. HAMILTON.

[Read before the Otago Institute, 3rd December, 1903.]

A SHORT time ago Professor Benham, the Curator of the Otago University Museum, brought under my notice some bird-bones which had been sent to him for identification by the Rev. Jas. Standring, of Enfield, a small settlement eight miles inland from Oamaru.

The bones were in a very good state of preservation, and included bones of the *Harpagornis*, *Cnemidornis*, and several other smaller birds. One small metatarsal was shown to me as something strange, and at first I thought the bone was that of one of the hawks. Closer examination, however, enabled us to identify it as belonging to a bird closely allied to *Corvus corax*. There was also a metacarpal of the same bird.

It then became highly probable that this must be the same genus, at any rate, as *Corvus moriorum*, described, or, rather, named, by Forbes from collections made in the Chatham Island. On borrowing from Mr. Kinsey, in Christchurch, who possesses a magnificent skeleton of this very rare bird, a bone of the *Corvus moriorum* the identification was assured.

It is a matter of extreme interest to find this bird in New Zealand, and, as I have already found another of Mr. Forbes's species, a *Fulca*, in the deposit of bird-bones at Castle Rock, in Southland,* it was of special interest to me.

Professor Benham kindly arranged with Mr. Standring so that we could visit the locality in which the bones were found, but, unfortunately, he was prevented from going at the last moment, so it fell to me to make an examination of the locality, and, if possible, to ascertain how the bones came into the position in which they are found.

Mr. Standring was kind enough to meet me at the Windsor Station, and had arranged that we should be driven by Mr. McCulloch, the owner of the property on which the bones are found, to the place, which is about two miles and a half from the terminus of the line at Ngapara, or about twenty miles from Oamaru.

The road passes up a valley cut through a succession of sandy clays and gravels capped by a bed of limestone.

Mr. McCulloch's house is situated in the midst of most

* Trans. N.Z. Inst., vol. xxv., p. 88.

picturesque masses of this band of limestone which have broken away from the main body of rock and slid or rolled towards the centre of the valley. All round the valley and its branches appear the vertical limestone cliffs, averaging about 100 ft. in height, and are about 800 ft. above sea-level. The spot where the bone of the crow was found was first examined, and proved to be very limited in area and poor in bones, although I commenced by digging up a fine calvarium of *Cnemidornis* just below the surface, and therefore expected great things. We then proceeded to examine a cave some distance further from the house. Here we had to descend about 25 ft. through a narrow crack in the rock parallel with the general direction of the face of the cliff. These narrow cracks are very numerous, and if they could be examined to a considerable depth I have no doubt would yield many treasures. Proceeding a short distance along the bottom of the fissure, it presently dipped deeper, and it became necessary to light a candle. The fissure here expanded into a small cave, with remains of small stalactites on the roof and a thin layer of stalagmite on the undisturbed portion of the floor. The centre of the floor had evidently been dug over, and we were informed that some sackfuls of bones had been taken out. One or two places near the walls yielded a good many imperfect moa-bones, mainly *Pachyornis* and a few bones of *Cnemidornis*. I did not notice any small-birds' bones. The cave was dry save for some percolation from above.

On getting out of this cave we commenced an examination of the talus slope at the base of the wall of limestone, pushing our way through a dense growth of native shrubs and creepers, with here and there a large broadleaf (*Grisebina*). Wherever the ground was exposed we found traces more or less plentiful of small-bird bones, and here and there remains of large moas.

The stiff bushes of matakouri and a dense growth of horehound rendered a thorough inspection difficult. After having examined the whole of the area covered by the fallen rocks, and having walked along the edge of the cliffs on the grassy plateau above, I think that the following suggestions will be found to meet the facts of the case.

There is an almost unbroken line of cliffs for nearly three-quarters of a mile; below these, at an average distance of a chain or two, is an irregular line of rocks at all angles, which have split off and fallen away from the main mass. Below these are other rocks which have broken off at an earlier date, and which have slipped and slid further, but are still roughly parallel with the main cliff. Between the cliff and the last split-off rocks is an irregular sloping mass of soil, stones, and

vegetable *débris*, a foot or more in thickness, resting on the sandy clay underlying the limestone, and out of which the valley is excavated.

It is in this talus that the bones are found, sometimes in numbers near the top, sometimes deeply buried. An examination of the top of the cliff shows that at various distances from the edge along the whole line of cliffs are crevices

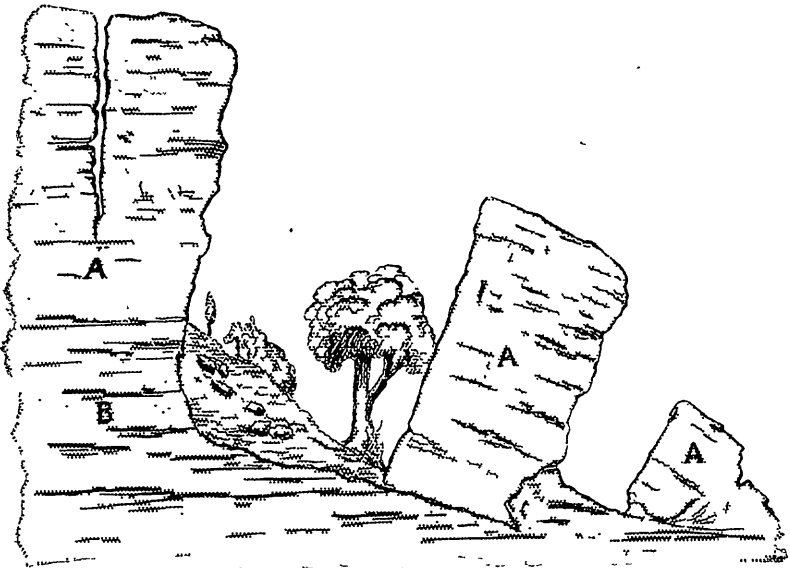


DIAGRAM OF THE MODE OF OCCURRENCE OF THE BIRD-BONES AT NGAPARA.

A. Limestone.

B. Sands and clays.

two or three feet in width—sometimes more—and these, I believe, give the key to the question. It must be recollected that before the advent of civilisation the country was covered with dense masses of bushes and trees, and that birds were numerous, so that open narrow fissures would in many cases form efficient traps for ground-birds. Let us suppose that as soon as a crack opens (owing to the denudation of the sandy clay underlying the stone) earth, leaves, and a few birds drop in, together with sticks, leaves, and vegetable *débris*, until the fissure in course of time is full, when the final slip happens, and the mass of limestone slips two or three chains down the slope; the contents of the fissure will gradually be distributed over the intervening space, a wide part of the crack contributing more than a narrow part. Vegetation

soon springs up, and assists to preserve the bones. Large broadleaf-trees more than 2 ft. in diameter are growing over the bones in some places.

A large number of the bones that I was able to dig up were broken, which is probably accounted for by the rooting of wild pigs in former days and by the rooting of domestic pigs at the present time, as the space between the rocks and the cliff is utilised as a large pig-paddock.

I dug for bones on the afternoon of one day and the morning of the next, and altogether brought back about a thousand specimens, the result of the examination of which is given below.

I am much indebted to Mr. McCulloch for his hearty assistance, and to the Rev. Mr. Standing for information concerning the locality.

<i>Corvus moriorum</i> (right and left metatarsi).	<i>Anas finschii.</i>
<i>Notornis hochstetteri.</i>	<i>Cnemiornis.</i>
<i>Fulca prisca.</i>	<i>Harpagornis.</i>
<i>Aptornis.</i>	<i>Carpophaga.</i>
<i>Apteryx</i> (two sp.).	<i>Ocydromus.</i>

And bones of a few small birds not yet worked out.

ART. XL.—*Note on a Dyke at Nugget Point.*

By R. SPEIGHT, M.A., B.Sc.

[*Read before the Philosophical Institute of Canterbury, 4th November, 1903.*]

THIS dyke is mentioned by Captain Hutton in the "Geology of Otago," pages 41 and 42, and also by the Geological Survey in several reports on the district. My attention was drawn to it during a visit to Nugget Point in January, 1903. On examining hand-specimens subsequently one or two features of the rock attracted my notice. It belongs to a division of the syenite group not common in New Zealand—viz., feldspar porphyry. This is evident from the inspection of hand-specimens. The porphyritic feldspars constitute the bulk of the rock, the size of the crystals ranging up to 5 mm. in length. They show the characteristic shapes due to pinacoidal cleavages, and from the absence of twin striation they are most probably to be classed as orthoclase. This is confirmed by flame tests. No other porphyritic mineral could be observed in a macroscopic examination, but a number of inclusions of foreign material occur. These I took at first for altered feldspars, but I believe they have been caught up