

ART LII.—*Discoveries of Moa-bones.*

By H. C. FIELD.

*[Read before the Wellington Philosophical Society, 24th February, 1892.]*

IN October, 1890, when visiting at my eldest son's house, at Waikanae, I found the remains of a very large moa within about six or seven hundred yards of the house. They consisted of the large hinder portion of the back, the tip of the lower jaw, and fourteen vertebræ, as well as the upper bones of the legs. The bones had been exposed by the drifting-away of the sand in which they had been buried, and of the leg-bones only the tops were visible, so that I had to scrape away the sand with my hands to remove them. In fact, the large backbone was held down by them, and thus was much damaged by being trampled on. The rib-bones were also there, but so broken by the feet of the stock, which go to drink at the adjoining lagoon, as not to be worth picking up. The bones were so large that I felt almost doubtful whether they could be those of a bird. The large backbone is  $14\frac{1}{2}$  in. long by  $8\frac{3}{4}$  in. in extreme width, and the leg-bones  $13\frac{1}{4}$  in. long by  $6\frac{3}{4}$  in. in circumference at the smallest part. Along with the bones, and within a yard or two of them, were bits of hoop-iron, broken bottle-glass of two colours, two bits of earthenware of different patterns, and two bits of clay tobacco-pipe. There were also a number of pieces and flakes of stone. Though such things are often found thereabouts in company with moa-bones, it obviously does not follow that they have been deposited at the same time. They may have been dropped when the sand was at a higher level, and have sunk to that of the bones as the sand drifted away. In fact, owing to the long residence of whalers in that locality, the whole ground is more or less strewn with such articles.

On the 9th of this month (October, 1891) I visited the spot again, thinking that possibly the long bones of the legs might have become exposed. I saw that they had evidently been so, and that some one had carried them away; for I found the lower leg-bones, all the toe-bones, and the long thin bones from beside the large bones of the legs. On inquiry of my son and his men, I learnt that Mr. S. H. Drew, of Wanganui, who was at my son's place at Easter, had picked up some large moa-bones, and I naturally supposed that they were the tibiæ of my bird. I learn, however, that his bones belong to a smaller bird, and were found in quite a different direction from the house. Thus there have been the remains of two moas found within a few hundred yards of each other at

Waikanae, in the course of six months. I ascertained subsequently that the tibiae of my bird had been picked up by my second son, who has sent them to me, so that I have now the nearly complete skeleton. In the case of the bones found by myself, their position indicated that the bird had crouched down, with its face towards the west, and had died and been buried in that position. The Waikanae Maoris, however, say that their fathers, up to within the last fifty or sixty years, used to catch young moas and bring them up as pets. If this was so, it seems very likely that the bird whose remains I found may have been one of these pets, and may have been actually interred by its owners. A Maori mode of interment was to place the body in front of an advancing sandhill, and shovel down some of the sand to cover it, leaving the winds to increase the depth of sand over the corpse. The position of the upper bones of the legs showed clearly that the bird had been covered up by sand without falling over on to its side, and this looks as if it had been purposely interred. The position of the lower leg-bones and of the toe-bones also corresponded with that which they would have occupied if this were the case. It was evident, from their relative position, that the bones had never been exposed, until lately, since they were first covered by the sand; yet within about 6ft. of them, and at a slightly lower level, I picked up on the 9th instant a hoop-iron adze  $3\frac{1}{2}$ in. long by  $1\frac{1}{2}$ in. broad. I am quite certain that this tool was still buried in the sand last year, or I should have seen and secured it, and probably it had not become visible even when the finder of the tibiae picked them up, or he would have seen and taken it too. My son would have been sure to do so. This seems to make it certain that the bird was alive after Captain Cook anchored in Queen Charlotte Sound—or how should such a tool be buried at the same level as the bird's leg-bones?—and would even point to a more recent date, when iron adzes became so common as to be dropped about heedlessly. The lower leg-bones are  $15\frac{1}{4}$ in. long,  $5\frac{1}{4}$ in. in circumference at the smallest part, and  $4\frac{3}{8}$ in. across the toe-processes; and the tibiae 27in. long by  $5\frac{3}{4}$ in. at the smallest part. The spot where the bones were found was close to an old Maori burial-place, where, a few years ago, there were human skulls and bones lying about pretty plentifully, owing to the sand having drifted off them.

P.S.—24th February, 1892.—As Mr. Drew knew that I should be sure to go to Waikanae during my present visit to Wellington, he asked me to examine the spot where he obtained his moa-bones, and bring him any others that might be now exposed. I accordingly visited the spot on Monday, and found it to be an old kitchen-midden, which was being exposed by the drifting-away of the sand. The bones, of

which I found several, are those of a bird which had been cooked and eaten, and they are much broken, and far more decayed than those of my bird. Some of them, however, seem to have been cut to pieces with a sharp implement like a tomahawk, as I do not think breaking the bones with a stone club would have fractured them so cleanly, and stone tools of other kinds would hardly have broken the bones at all. Along with the bones, too, I found broken bottle-glass of two colours, and two pieces of bones of animals, which would indicate that the remains were of comparatively recent date, though both bones are much decayed.

In the afternoon I passed by the place where my moa-bones were found, and my companion, Mr. L. Anderson, picked up a portion of some large animal's jawbone (apparently that of a young ox or horse, as the bone is much decayed), containing three molar teeth, within a few feet of where I had found the bones. A large series of kitchen-middens extends for fully a mile south of the Waikanae River, and these are constantly being disturbed by the wind, so that their contents are scattered over probably twenty or thirty acres of ground. Most of these middens were certainly in use during the whaling days, as all sorts of European articles are found in them. For example, we found on Monday part of a school slate, no doubt imported by the missionaries, and a pair of scissors—articles which indicate a date certainly subsequent to 1830, and probably some years later—as well as hoop-iron, iron bolts, sheet-copper, and fragments of broken glass, crockery, and clay pipes. My eldest son, who has lived at Waikanae for many years, and taken notice of the drifting of the sandhills, regards the shifting of their position there as much more rapid than at Wanganui, and the date at which the kitchen-middens went out of use as very recent indeed. There was a great native-fight at a place called Te Uruhi, a little south of the mouth of the Waikanae River, between the years 1835 and 1840; and up to that time many Maoris resided there, and no doubt helped to form the middens, which contain a curious mixture of European articles with old Maori ones, such as stone tools, obsidian flakes, and bits of carving.

Moa-bones have within the last few years been found in the bush ten miles inland of Hawera, and in the Momahaki, Mangawhera, and Kiwitea valleys, proving that these birds were not confined to open country, but penetrated far into the forests. At Upokongaro, near Wanganui, a large number of bones were lately found in draining a boggy spring, in which the birds had evidently sunk and been smothered. The bones must have belonged to at least a dozen birds, as the tibiae vary in length from 34½ in. to about 9 in.; and the difference in

the relative length and thickness of corresponding bones shows that the birds must have been of at least two varieties. Among the bones are a lower jaw and part of the upper one of the same bird. Moa-bones have also just been found among the sandhills near Nukumarū, but so decayed that they would not bear handling. In fact, people are hardly aware how common such bones are, as they mistake them for those of cattle or horses, and thus many finds are never reported.

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ART. LIII.—*On the Shifting of Sand-dunes.*

By H. C. FIELD.

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IN reading the Transactions of the New Zealand Institute, one often sees mention made of the shifting of sand-dunes through the action of the wind; but, except in a paper by myself, read in Wellington in December, 1876, I have never observed any estimate of the rate of such movements. I then judged the rate to be about a chain in ten years on the north side of Cook Strait, but it probably varies in different parts of the colony; and I think it would be well if persons in various localities would note the rates which they have had opportunities of observing, as we might thus get tolerably accurate data from which to estimate the dates of past events, particularly that of the extinction of the moa, which, so far as I can judge, has varied very greatly in the several districts. Possibly, therefore, the following results of forty years' observation on the coast from Paikakariki to Patea may be worth recording.

My first experience of sandhills, on any scale, was when I walked from Wellington to Wanganui in 1851. I had seen such hills on a small scale in several parts of England, but had no conception of their ever attaining the dimensions which they do in New Zealand. As, however, I was a new-comer, and there were so many novelties, in the way of strange birds, shells, fish, vegetation, scenery, &c., to engage my attention, the extent of the sandhills was the only thing which I particularly noticed. When I again travelled by the same route, in the following year, I found a very noticeable change at one point—viz., Otaki. In 1851 the river had run northwards, parallel with the beach, for about a quarter of a mile, before it entered the sea, and the accommodation-house kept by the ferryman was on the south or Wellington side of the river.