

of clay and gravel was laid until it was raised to the required height, on which the houses were then erected, and the pa surrounded with the usual fence. The only approach being by canoe they were secure from any sudden attack. Rauparaha and his tribe took them. Such a dread of that redoubted warrior seized their inhabitants that when they saw his fleet approaching they lost no time in making their escape to the surrounding forest. Rauparaha landed and burnt them all. This was about the year 1825.

These lake villages differ from the Swiss ones, which were built upon platforms resting on posts driven into the lake, and connected with the shore by a pier, having a rude drawbridge in the centre, which could be drawn up at night, or on the approach of an enemy, but the crannogues of the Irish lakes, on the contrary, were artificial islands closely resembling in their construction those of the Horowhenua Lake. They were formed by sinking beams and logs, and then erecting walls of large stones upon them, filling up the centre with stones and clay. This was by no means an uncommon mode of defence amongst the Maoris. In the Papaetonga, a neighbouring lake to that of Horowhenua, there were two pas of a similar kind. On Motutaiko, a small island in the centre of Taupo Lake, there was a formidable pa, to which there was only one landing place, and that was strongly defended. Another existed on an island in Rotokakahi Lake, and perhaps the most celebrated of all was that of Mokoia, in the centre of Rotorua Lake, where their most venerated idols were kept, and the only resemblance of a temple found; there also their greatest warriors were buried.

Probably the idea of making artificial islands for defence may have originated from these natural islands being used for that purpose.

ART. V.—*A Description of the Earnsclough Moa Cave.* By the Hon. Captain FRASER, F.R.G.S.

[Read before the Wellington Philosophical Society, 4th September, 1872.]

THIS cave was accidentally discovered by a young lad named Weir, who was taking a short cut to his father's claim.

The boy mentioned the discovery to his father, who visited the cave, and carried away with him that which he considered the most interesting object. This he sold to Dr. Thomson, of Clyde. I allude to the skin-covered neck of the Moa, which is at present on exhibition in the Colonial Museum. I was in Dunedin when I heard of the discovery, and it was my intention to have made an exhaustive examination of the cave, which is on a run in which I have an interest, but, unfortunately, before I arrived at Earnsclough, Mr. Arthur, surveyor, and Dr. Thomson, of Clyde, made a *razzia* on the cave, and

carried away a very large collection of the best preserved Moa bones I have ever seen, and I have been a collector for many years. Several of these bones have bunches of sinews attached to them, and are in other respects so perfect, showing neither abrasion nor the slightest indication of having travelled even the shortest distance, that I could come to no other conclusion than that the gigantic birds to which these various sized bones belonged must have perished within the cave.

Very shortly after my arrival at Earnsclough I proceeded to visit the cave, accompanied by my son. We crossed the lower end of the Dunstan basin, and entered by a narrow gorge the once beautiful valley of the Conroy, now a hideous chaotic mass of alluvial workings. This valley contained rich auriferous deposits, and in course of the workings vast quantities of Moa bones were discovered at varying depths, from one to fifteen feet.

We passed Pipeclay Gully, in which was found the lower jaw of a Saurian in a perfect state of preservation. It is now in the possession of Dr. Thomson, of Clyde. The jaw is somewhat larger than, but in other respects similar to that which was found in the Glenmark swamp, and at present in the Canterbury Museum. About four miles from the gorge we turned suddenly to the right, and crossing the Conroy we commenced a gradual but oblique ascent of a spur of the Umbrellas. After attaining a height of about 800 feet above the Conroy we found our further course in this direction stopped by a wide and deep gully, the edge of which bristled with huge castellated-looking dark rocks, large slabs from which had slipped down and lay on the side of the gully. At the foot of one of the largest of these rocks, and in the centre of a platform about twenty yards square, one side of which formed the edge of the gully, we found the entrances to the cave, which are about twenty feet apart. We lighted our lamp, and descended by the perpendicular entrance, and, after some scrambling, we found ourselves on a landing place which was lighted from the other entrance, which was of an easy gradient, but so low that when we made our exit from it we were compelled to go on all fours. The roof between the entrances is composed of a rock, the upper surface of which is covered with a well-grassed turf. The stone shows no sign of recent displacement, and may have been in its present position for a thousand years. The floor of the landing place is composed of rubbish of various kinds, including partially charred Moa bones. It was not difficult to account for the charred bones; the shed from the scrub at the entrances had accumulated in the dry cave until such time as it fell a prey to our great grass fires. There was not the slightest indication of man having inhabited the cave. After leaving the landing place we entered what I may call the true cave. Here we found the gradient so steep that the fine dust which covered the floor of the cave to a considerable depth slipped down from under our feet like sand. And I may here remark

that each visit to the cave assists in choking up the lower part of the cave with this impalpable dust, which will yet have to be carefully removed and examined. Groping in this dust with my hands I found several bones and rolls of what I imagined to be the inner bark of a tree. I put a small piece of this in my pocket for examination, and on coming to daylight I was surprised to find that what I took for bark was reddish-brown Moa skin.

Observing a lateral passage, through which the wind was blowing freely, my son followed it in the hopes of finding an exit in the face of the gully. This horizontal passage led into the solid rock, and at right angles to the cave. My son was absent so long that I ceased to hear his voice. On his return he reported to me that he saw no bones, the floor of the passage being hard rock.

From the junction of this passage the cave descended at a very steep gradient, and at one place a wedge-shaped narrow rock compelled us to creep underneath, which was not difficult, as the floor was well covered with the fine dust which followed us as we advanced, filling up all interstices, and no doubt hiding many interesting objects from our view.

Soon afterwards we found ourselves at the bottom of the cave, and here I much regretted that I was not provided with a few inches of magnesium wire, as not only sound but light was absorbed in this den, so that I could hardly see a yard from the lamp.

My son, who was fossicking about with a piece of totara which he picked up in the cave, suddenly exclaimed, "I have found a nest," and, true enough, from under a ledge he drew out grass and the remains of the eggs and birds, which are at present in the Museum on exhibition.

I remarked several pieces of totara in the cave, which would lead one to suppose that the totara tree grew on the platform, before the original mouth of the cave was closed by the rock which forms the roof of the present landing-place.

The neck of the Moa was found in that part of the cave above the junction with the lateral passage, and as there was always a current of dry air there, it may account for the neck being so well preserved.

On leaving the cave we proceeded to search the gully face of the rock for the ventilator. We were not long in finding a weather-worn funnel-shaped cave; the back orifice of this funnel was six inches in diameter; there was a strong in-draught through this aperture, which carried grass and light objects into the cave. We found a sound stick of totara in this cave, which is at least forty feet below the level of the platform. Above the ventilator, and on an inaccessible ledge of the rock, we saw a large piece of totara which had been left there since the parent tree had crashed in its fall against the face of the rock. With some difficulty we dislodged it by throwing large stones on it

from above. It was so hard and tough that we could not break off the smallest piece of it.

As I could not divest my mind of the impression that the original entrance to the cave was in the face of the gully, I narrowly examined the ground opposite to what I judged to be the bottom of the cave, and found that a vast detritus had fallen from above which might well have crushed in the mouth of the cave and buried it from view. I have shown that a long slope leads up to the cave, which is bounded on the other side by the deep gully. Storm-water coming from the mountain would naturally run down the slope or into the gully. It certainly could not come on the platform bearing Moa bones with it.

The platform could never have been the camping ground of anything living, as the wind blows so fiercely across it as to tear up large sheets of mica schist from the exposed edge of the gully.

On returning from the cave we examined what we considered, on our ascent, might be the entrance to another cave. The aperture was narrow, and choked up with growing scrub. Having broken this down, and tied our bridles together, my son dropped into the darkness and struck the ground at about twelve feet. Having no light he could not explore the cave, which appeared to be of considerable size, and dangerously precipitous. He sent up by means of the bridle a large pelvis of a Moa, which I left on the rock to mark the cave.

ART. VI.—*On the Effect of Wind-driven Sand as a Cutting Agent.*
By EDWIN STOWE.

[*Read before the Wellington Philosophical Society, 25th September, 1872.*]

IT may be interesting to those who are acquainted with the sand-worn stones of Lyall Bay, either from personal observation, or from Plate XVII., in the second volume of the *Transactions*, and the description there given by Mr. W. T. L. Travers, to know that on another part of our coast effects similar to those thus far observed are being produced by somewhat similar action.

The southern bank of the Waikato river for the last few miles of its course is formed by a range of sandstone, for the most part still covered by the natural vegetation of the district. But northwards from the point where this range, meeting the sea, forms a line of abrupt cliff making away to the south, there extends for a distance of about a mile, up to the actual river mouth, a long bank of considerable elevation, composed of fine sea-sand. This is entirely devoid of the vegetation usually found upon sand-dunes, and lies fully exposed to the action of the S.W. gales, which blow with such force on this part of the coast. The landward, or eastern slope of this sandy elevation, is for the most part exceedingly abrupt—as abrupt as it is possible for loose sand to be—so much so, indeed, that at a distance it appears to be a