

that the Maoris," from the absence of all mention of the bird from their songs and traditions, "never had any personal knowledge of the Moa." Major Mair so intimately knows the history and literature of the Maoris, and their habits and modes of thought, that one—especially one like myself who has had time as yet to acquire only a small amount of experience of New Zealand things—can scarcely hope to contribute any suggestion on the subject of the history of the Moa which has not occurred to this specialist.

Still, the following observations, made last year during a very complete exploration of a recently discovered cave in the property of Mr. Monck, near Sumner, lead me to think that the Maoris must have been personally acquainted with the *Dinornis*. The exploration was conducted under my own direction by two very trustworthy workmen, and the more important finds in it have been described in a paper read before the Institute last session by the President. The cave, it is certainly known, has been closed since before the advent of Europeans to Canterbury, but for how long before it is impossible to determine. The condition of the cave on entry gave all the appearance of having been untouched since the last dwellers in it left it. Its entrance was covered over by a very extensive landslip, which evidently fell during the absence of its frequenters, as no human bones were discovered in it. Quarrying occupations have been carried on amid the material of this landslip for between twenty and thirty years. These operations, on reaching last year the live rock of the hills, disclosed an aperture through which a lad squeezed himself into the cave. On its floor were found implements in wood and in greenstone, half-burned pieces of timber and fire-making apparatus, so lying as to give the doubtless correct impression that its occupiers intended to return. The greenstone objects were beautifully made, some of them; while the implements of wood, such as the canoe bailer, the paddle, and the fragment of a paddle handle, exhibit ornamentation characteristic of the Maoris. On the floor of the cave were found also numerous largish fragments of Moa bones, partly burned and partly broken, scattered round the last fireplace, or lying on the surface of the ground in the inner caves. In the kitchen-midden in front of the cave were found many fish-hooks and barbed spear tips, made of bone from the same birds. On the surface I picked up several bones of more than one individual of a species of swan, which I described to the Institute last year under the name of *Chenopsis sumnerensis*. Just below the surface of an untouched part of the midden, I myself picked out pieces of Moa egg-shell, each with its shell membrane perfectly preserved. The question, therefore, stands thus: The Moa egg-shells, being among the refuse of the feasts of the occupants of the cave, who used the carved bailer, are the remains, it is legitimate to argue, of the eggs they used for food. There is no purpose I can think of for which pieces of shells of rotten eggs could be used; for eggs exposed on the ground, or buried under the soil, with their contents, would soon burst or disintegrate into fragments. It may be inferred, consequently, that these eggs were found in a more or less fresh condition, and were brought into the cave for food purposes. If they were sufficiently fresh for food, it is obvious that the birds that laid them could have been then still living, and probably were so; and that the bones from which the frequenters of this cave made their implements were as likely to be obtained directly from birds which they killed or might have killed. It may be suggested that eggs of Moas might have been found sufficiently whole to be used for utensils. The fragments that I found could not have been so used, as demonstrated by the condition of the membrane lining the interior. In the Sumner caves explored by Sir Julius von Haast, and at many Maori encampments, the remains of Moa eggs have been found abundantly in the kitchen-

middens, and in such positions among the *debris* of their meals as to suggest that they had been used for food.

The black swan (*Chenopsis atrata*), the only undomesticated swan in the country, was introduced into New Zealand from Australia a number of years after the settlement of Canterbury. The bones of the swans found in the Sumner cave were consequently also brought there by the feasters who ate the Moa eggs, and they, too, must have been, therefore, contemporaries of the Moa.

The figure of a dog carved out in wood was also discovered in the cave. It probably formed the termination of the handle of a paddle. A good figure of it may be found in the President's paper to which I have already referred. The Maori dog must, therefore, also have been contemporaneous with the Moa, and with the now, in New Zealand, non-indigenous (if not altogether extinct) swan *Chenopsis sumnerensis*.

The fishing family, or families, who fed on the Moa eggs, and who last occupied the Sumner cave, were, as far as the style of their ornamentation and handiwork can decide for us, as much Maoris as those who carved the woodwork of the typical Maori dwellings of the King Country, or executed the ornamentation of which our museums exhibit specimens labelled "Maori"; and they were Maori in contradistinction to an earlier more primitive people who have been named "Moa-hunters," as is testified by their highly-executed and polished greenstone work.

How long ago it is since the Maori and the Moa were living together no evidence has yet been afforded by the Sumner cave explorations. A very great deal still remains to be done in the determination of the extensive osteological and other material obtained. It is being slowly examined; and when this work has been accomplished, some more light may possibly be thrown on the question of which this note forms the subject.

GLACIAL STRIÆ AND MORAINIC GRAVEL IN NORWEGIAN LAPLAND FAR OLDER THAN "THE ICE AGE."

AROUND the inner part of the Varanger Fjord, the mountains are low, and consist chiefly of sandstone and conglomerate, the strata of which lie in a nearly horizontal position. Between the village of Nesseby and the farm, Mortensnes, a mass of unstratified conglomerate or breccia occurs at least 50m. thick. Its component stones, which have been mostly derived from Archæan rocks (gneiss, &c.) are not properly water-worn pebbles, but have only their edges rounded, while flat faces may often be observed among them. A few of them consist of dolomite. On some of these fragments very distinct striæ occur, while similar markings may occasionally be detected on other kinds of material among the included stones. As in recent moraines, it would seem that here also the depth and distinctness of the engraving have had some relation to the relative hardness of the material. Not far from this conglomerate a smaller layer of a similar rock lies in the sandstone. The conglomerate is here very friable, and by its weathering a part of the upper surface of the hard sandstone under it has been laid bare. On this surface some excellent glacial furrows have been preserved. I had the pleasure of laying before a meeting of my geological colleagues on October 27 my specimens and diagrams. They all agreed with me in believing that in this deposit we have evidence of glacier-action dating back to the time of the sandstone and conglomerate of Lapland. The geological age of these strata is not yet settled, as no fossils have been found in them. Dr. Dahll has referred the formation to the Permian period. I think it not improbable that it belongs to the Cambrian or Silurian

series, which in other parts of Scandinavia play so large a part in our mountain system.

Further details will be published in the year-book (*Aarbog*) of the Geological Survey of Norway for 1890.

Kristiania, November 29.

HANS REUSCH.

NOTES.

THE anniversary meeting of the Royal Society was held on Monday at Burlington House. Sir G. Stokes resigned the presidency in favour of Sir William Thomson. The new Council was elected, and Sir G. Stokes presented the medals, a list of which we have already published. The official report of the proceedings is not yet ready. The annual dinner was held at the Hôtel Métropole in the evening, and, as usual, it was very numerously attended. Many of the speeches were so long that it is impossible to reproduce them here, but it is fitting that Dr. Hopkinson's reply for the medallists should be put on record. He said:—"You have done me great honour in asking me to respond to this toast, but the honour carries its burden with it. I could have wished for your sakes that the duty had been in hands abler for its performance. In matters of science, so far as nationality exists at all, it must be held to depend not upon the accidents of government, but upon community of descent and community of language. If you were to ask Prof. Newcomb, I have no doubt he would tell you that he was of the same nation as Bacon and Newton. We are undoubtedly of that nation, it therefore follows that Prof. Newcomb is our fellow-countryman. But intellectually Newcomb is a descendant of Newton in a peculiar sense. Newton not only originated that greatest of all scientific generalizations, the law of universal gravitation, but followed out in some measure its effects in the perturbation of the bodies of the solar system. Newcomb has attained to the proud position he now holds by advancing the theory of gravitation in its application to the details of the motion of the moon and some other of the planetary bodies. When Prof. Newcomb visited Birmingham some 16 years ago, he did me the honour of being my guest. He had then attained a high reputation. I little thought that on the day on which he should receive the highest honour the Royal Society has to bestow, I should myself receive a Royal Medal. Of Prof. Hertz and his work, I could say much of its connection with our own Maxwell, and of its immediate and enthusiastic appreciation in this country; but Prof. Hertz is here to-day, and can answer for himself far better than I could have answered for him. It is one of the boasts of modern science that she can accomplish by inanimate means many results which it was supposed that Nature had reserved for the laboratory of the living body. The work of Prof. Fischer belongs in part to this class; amongst other work he has produced by synthesis from inorganic sources many definite sugars, and in so doing has greatly extended the territory of chemistry into the domain of physiology. Rather than speak of Mr. Wallace's work, I would set him forth as an example of that chivalrous feeling which one would wish men of science should always exhibit. You all know the story of how Wallace had worked out the theory of natural selection and was ready to publish; of how he learnt that Darwin had worked it out further and worked at it earlier, and how he postponed his own publication till Darwin had time to take the first place. When we read of the noble work which is being done in France and in Germany by Pasteur and by Koch, and others, we feel with much bitterness that we do not live in a free country. The work which Dr. Ferrier has done on the brain proves that we have men here as capable of physiological discovery by experiment as anywhere abroad, and that, if there is fear that we may fall behind, it is because our investigators are unnecessarily hampered in their work. My own case in physics is very analogous to Dr. Ferrier's in physiology—we are both of us

professional men, we both of us desire to further the pure science of our subjects on lines suggested by our professional work. I say deliberately that if I had been obliged to obtain the sanction of a Government Department to make experiments or to make them in a licensed place it is very little experimental work I could have done; I should not have been in the proud position of one of your medallists to-day. Neither physics nor physiology can be efficiently advanced by mere observation: the more powerful method of experiment is necessary. If we must have laws restraining our best men, let us at least admit what it costs us. Speaking for myself, looking back, I have been fortunate in my surroundings. My father cultivated in me a taste for science from a time before I can remember, my mother gave me the first systematic instruction of which I have any recollections. If my father gave me my first taste for science, you may be sure that taste was encouraged at Owens College. Mathematics is the most essential weapon of the physicist, and nowhere can mathematics be learned as at Cambridge. I owe to Sir William Thomson the first impulse to experimental work in electricity and magnetism. He has been to me for many years the kindest of friends, always ready to encourage and to help. Looking at the present, I admit that your Council, in awarding me a Royal Medal, have raised me not a little in my own estimation. There is one point of view from which this cannot be regretted, if a man's past work obtains for him honour from the highest and most competent tribunal: surely that should make him feel that it is incumbent upon him to endeavour to do more and better work of the same kind. This, gentlemen, speaking for the other medallists and for myself, is the best thanks we can return you—to endeavour to justify you in the future in giving us these honours to-day."

LETTERS have been received from Mr. J. Graham Kerr, Naturalist to the Pilcomayo Expedition, dated from the s.s. *Bolivia* on that river, in lat. 24° 58' S., long. 58° 40' W., on October 4 last. The vessel had got so far up the Pilcomayo with great difficulty, owing to the extreme shallowness of the water, and had stuck exactly in the same spot since June 14. They had almost given up all hope of ever getting out, when on October 4 a relief party of twenty soldiers reached them and brought assistance. Some of the soldiers and Captain Page's son (Captain Page himself having died on August 2, whilst proceeding to Corrientes for medical advice) came back immediately by land, while Mr. Graham Kerr and the remainder of the party proposed to return down stream in the *Bolivia*. If that turned out to be impossible, it had been determined to burn the boat, and return to the La Plata overland. The Pilcomayo Expedition must therefore be considered to be at an end.

THE Scientific Committee of the Royal Horticultural Society have undertaken, under the direction of Dr. D. H. Scott and Dr. Francis Oliver, to investigate the effects of London fogs on cultivated plants. The Royal Society has granted £100 in aid of the experiments.

MANY horticulturists feel that there should be some permanent memorial of the services rendered by the late Mr. Hibberd to horticulture. A meeting, therefore, will be held to take the matter into consideration.

THE authorities of the Natural History Museum have placed in the Central Hall of that institution a small temporary exhibit, consisting of a set of highly magnified drawings of Bacteria. It includes such prominent forms as *Bacillus tuberculosis*, Koch, and the *Bacillus* of fowl cholera, and is the work of Dr. W. Migula.

THE Board of Agriculture proposes the appointment of a widely representative body under whose direction all examinations in dairy work shall in future be held.