

absence of marine organisms, or any traces of them, over the country generally, in the "Upper Boulder-clay," said to have been the product of this "post-submergence glaciation," when the ice must have passed over hundreds of square miles of former sea-bottom. These and similar difficulties led to the consideration of the hypothesis that the shells, or masses of shelly clay, may have been transported inland from a former sea-bed by the ice, as in many instances which had been proved and were well known. The ice-blocked condition of the North Sea, during the Glacial period, had been demonstrated by Messrs Peach and Horne and the late Dr. Croll, in their admirable papers on the "shelly till" of Caithness. This, combined with the pressure of ice from the adjacent mountainous region of Inverness and Ross-shires, forced the great ice-stream issuing from Loch Ness to turn eastwards, and to some extent upwards, along the base of the hills to the south of Inverness, in the direction of Forres and Elgin. The striæ and the distribution of boulders over the district abundantly proved this; and it was also clear that the ice must have passed over part of the former sea-bed in its progress. Other evidences from that part of the country of the transport inland of materials from the sea-bottom (as fragments of chalk, the limestone near Elgin, etc.) were alluded to; and the author held that, on the whole, till clear proof be obtained, doubts were justified as to this shelly-clay at Clava being really in place. In the concluding part of his paper the author referred to the "red clay," with a few fragments of shells, described by Mr. Jamieson, of Ellon, as occurring in hollows and patches along the north-east of Aberdeenshire up to about 300 feet.<sup>1</sup> For reasons similar and additional to those already stated, he thought this clay could not be accepted as a satisfactory proof of submergence. It could be accounted for by the agencies which Mr. Jamieson had indicated, without submergence; and indeed, its characteristics seemed to be, in several respects, opposed to that theory.

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#### CORRESPONDENCE.

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##### "THE TRUE HORIZON OF THE MAMMOTH."

SIR,—As Sir Henry Howorth asks me to explain some of the remarks that I ventured to make against the cogency of his *foreign* evidence in favour of the pre-Glacial age of the Mammoth, I may premise, contrary to Sir Henry's assumption of my *recent* acquaintance with the subject under discussion, that I have long taken an interest in the many problems that surround the question of the Mammoth and its times, and think that I have read, not without interest and appreciation, most of Sir Henry's writings on this matter, but I must say that the reading has not always brought me to the same conclusions as the author.

I have no pre-conceived views to support and endeavour to bear an open mind on the subject, and most certainly I had no idea of indulging in the dogmatism with which I am charged, for in

<sup>1</sup> Quar. Jour. Geol. Soc. vol. xxxviii.

my innocence, I thought that burden lay heavily on Sir Henry's shoulders.

Now to the argument,—first comes the evidence of the Lignite beds at Dürnten and Uznach, in which Sir Henry says he cannot quite follow me when I referred to the difficulties of proving the age of the beds by their contained animal remains, consisting of an association and mixture of pre-Glacial and post-Glacial forms of extinct and living species, which can scarcely have been contemporaneous.

Doubtless, the stratigraphical position and assumed age of these Zurich beds was determined by their fossil contents, but the evidence does not appear to me conclusive on this point, and certainly Sir Chas. Lyell speaks much more guardedly than Sir Henry, and Heer himself does not claim a pre-Glacial antiquity for the Mammoth. Professor Heer, summarising the evidence on this question, says (*vide* Heer's *Primeval World of Switzerland*, Vol. II, p. 217, English Edition), "From the facts hitherto ascertained we learn that the Mammoth appeared in Switzerland at the *end* of the *second* glacial epoch" (the italics are mine).

Moreover, in the Professor's Chronological Table of the Quaternary Period (*op. cit.* p. 203) the true horizon of the Mammoth is evidently undetermined by him, as a point of interrogation is affixed to its first appearance.

Turning now to Sir H. Howorth's strictures on the Russian evidence which I adduced as opposed to his reasoning, and the relevancy of which he says he cannot understand, possibly so, seeing that he is apparently referring to a quite different expedition to the one I cited. The Bear Islands expedition, of which he speaks with that fulness of knowledge so characteristic of him, I never mentioned, as I had no facts before me with regard to it bearing on the question at issue.

If Sir Henry will refer to my paper he will see that it was an expedition to the New Siberian or Liakov Islands of which I was speaking, and which are separated from the Bear Islands by three or four degrees of longitude.

The results of that expedition, so far as regards the Mammoth problem, is only known to the general public through M. Schmidt's brief analysis of Baron Toll's book to which I referred, and which has apparently been ignored by Sir Henry Howorth. Is it too much to ask of Sir Henry to read what he is supposed to be replying to, before indulging in somewhat acrid criticism?

I have a letter from M. Schmidt, who is a member of the Academy of Sciences of St. Petersburg and a foreign correspondent of the London Geological Society, dated in the early part of February last, in which he says Baron Toll's book is not yet fully printed, and that the Baron has left St. Petersburg on another Mammoth quest and will probably be absent about a year.

It is from special explorations such as those of Baron Toll in the so-called "Home of the Mammoth" that its true horizon, so far at least as its Asiatic home, is to be predicated.

According to Baron Toll, and contrary to Sir Henry's assertion, traces of an Ice Age are present in Siberia—beds of fossil and more recent ice, ridges of rolled gravel, the moraine débris of an ancient glacier as seen in the island of Kotelnyi, upon which are said to rest the beds containing the bones and carcasses of the Mammoth. Is not this the kind of evidence which Sir H. Howorth is so anxious to secure, and is it not subversive of that assertion of Cuvier that I quoted, and for which Sir Henry reproves me *more suo*?

I have a great respect for such honoured names as Cuvier and D'Archiac, and should think it an injustice to their logical faculties and acumen to presume that their conclusions upon this question would still be the same, notwithstanding that a modified and more natural reading of the evidence was forthcoming than the one that called forth Cuvier's famous dictum.

These are, I think, the principal points of Sir Henry Howorth's rejoinder which call for remark from me, some of the others partaking more of the character of Sir Henry's simile of the Spanish Knight tilting at a figurative windmill, with this difference: that the Spanish Knight is replaced by an English one.

BowDON, April 18th, 1893.

MARK STIRUP.

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#### MISCELLANEOUS.

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A NEW LEMUROID MAMMAL FROM MADAGASCAR.—There has lately been sent to the British Museum (Nat. Hist.), a large collection of remains of Vertebrates from the South-west coast of Madagascar, comprising bones of *Aepyornis*, remains of *Hippopotamus*, of *Potamocheirus*, sp. of *Crocodylus robustus*, and of two giant tortoises (*Testudo*). Amongst these were discovered a somewhat imperfect Mammalian skull and lower jaw. They were obtained by Mr. J. T. Last, from a marsh at Ambolisatra, beneath a stratum of a white clayey substance (shell-marl) about two feet in thickness. The skull was placed in the hands of Dr. C. J. Forsyth Major, well-known for his researches in the fossil Mammalia of Samos and various European localities, and has been determined by him to be that of a gigantic form of fossil Lemuroid, related to the extinct genus *Adapis* as well as to existing Lemurids. The brain-case is remarkably small in size; the craniofacial angle extremely obtuse, as in most of the lower Mammals. There is an enormous lateral development of the anterior inter-orbital portion of the frontals extending over the small thick-walled orbits, a thick and flattened sagittal, and a strongly developed occipital crest. The Gygomatic arch is high and projects moderately outwards. The thickening (pachyostosis) of all the bones of the skull is very remarkable. The molars and premolars approach closely some Malagasy Lemurids (the canines and incisors are not preserved). Dr. Major names this new form *Megaladapis madagascariensis*.—Proc. Roy. Soc. June 15th, 1893.