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### ‘The Relation of Man to the Ice-Sheet in the North of England’

In the interesting review of Sir Charles Lyell’s “Antiquity of Man,” communicated to *Nature* of Oct. 2, Mr. A. R. Wallace mentions the fact that “there is as yet no clear evidence that man lived in Europe before the Glacial Epoch, and even if he did so, the action of the ice-sheet would probably have obliterated all records of his existence.” The fact was true when it appeared, but both the fact and the remark which follows it, may now have to undergo considerable modification. The Committee for the Exploration of the Victoria Cave, near Settle, Yorkshire, assisted by a grant from the British Association, have just made a discovery which may prove to be of the greatest importance not only to the geologists of Europe, but to all those who take an interest in the origin and early history of man.

In May 1872 the Committee were exploring a bone bed in the cave, which occurred at a considerable depth beneath other deposits. It was full of hyæna-dung, broken bones, and teeth. A quantity of these were sent to Mr. Busk for determination, and he kindly returned the following list:—

<i>Elephas primigenius</i>	<i>Rhinoceros tichorinus</i>
<i>Ursus spelæus</i>	<i>Bison</i>
<i>Ursus priscus</i>	<i>Cervus elaphus</i>
<i>Hyæna spelæa</i>	

These are well known to represent the fauna of the river gravels in the south of England. Among them was a bone which puzzled even Mr. Busk, and he has only now given his mature and definite opinion on the subject. He writes: “The bone is, I have now no doubt, human; a portion of an unusually clumsy fibula, and in that respect not unlike the same bone in the Mentone skeleton.” When Mr. Busk has taken some time to consider the question there are few scientific men who will dispute his verdict. The occurrence of the bones of man with this group of animals is a new fact for this part of the kingdom, but one that might be expected from a similar co-existence in the south of England, in Kent’s Cavern, Wookey Hole, and elsewhere.

But at Settle this discovery possesses a far greater

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interest from the evidence there of the relation of these animals and man to the great ice-sheet. This hyæna-bed dips into the cave, and has been worked only a short distance from its mouth; but at the mouth itself, vertically under the farthest projection of the overhanging cliff, lies a bed of stiff glacial clay containing ice-scratched boulders. This bed dips outwards at an angle of about 40°, and evidently lies on the edges of the beds containing man and the older mammals. It has been suggested that it may have fallen from the cliff above, and therefore may not necessarily have come into its position in glacial times, but, on a careful consideration, this is quite impossible. Upon it lies a great thickness of talus or scree, which is made up of fragments of limestone split off from the cliff above by the frosts of successive winters. If all this were now removed it would be barely possible for the glacial drift to fall from the cliff above to its present position, but if all the talus were restored to the cliff, of which it forms the waste, such a fall would be impossible. It is quite clear, from the waste of the cliffs which has taken place since the glacial drift came where it now lies, that the cliff then projected many feet farther out and would prevent such a fall.

A strong argument lies also in the fact that the loose talus all lies above the drift and is quite free from mud, whereas all the deposits below it are heavily charged with it, and the mud is just such a

fine impalpable stiff mud as would result from the grinding of glaciers and the flow of glacier water. It seems probable that the drift is really the remnant of a moraine lateral or *profonde*, left by a glacier or an ice-sheet, and that the remains of the older mammals and of man disinterred from beneath it are of an age at any rate previous to the great ice-sheet of the Irish Sea basin. But there is another line of argument which tends to the same conclusion. Three years ago it was believed by most geologists that the fauna here disinterred had never existed in this particular area—and why? because their remains had never been found in any of the river deposits of the district. It was supposed that the great extension of the ice prevented their migration hither. It is clear, now that we have found these remains in caves, that they must have peopled the northern district at one time as thickly as they did the south of England, where their bones are so common in river gravel. But their remains in the northern district occur now only in caverns, and have been removed from the open country. When we compare this removal of the mammoth-fauna over certain districts with the presence of evidence of land glaciation on a great scale, we begin to see that they bear a definite relation to one another, and that the ice-sheet was the great “besom of destruction” which swept away all remains of the older inhabitants from those portions of the country adjacent to the great ice centres.<sup>1</sup>

Again there is another matter relating to this question which has hardly received the attention which it deserves. This is the complete absence of palæolithic implements and the fauna which is usually associated with them in the river gravels of the south, over co-extensive areas of the north of England, indicating the removal of palæolithic man from those areas by the ice-sheet. If I am not much mistaken, this discovery at Settle may have an important bearing in several ways. It will carry back the proofs of the antiquity of man to a time previous to the ice-sheet, that is to interglacial if not to preglacial times. It will corroborate the opinions expressed by Mr. Godwin Austen, Mr. James Geikie, and others, that the older valley gravels of the south of England are not of an age subsequent to the Till of the North. And it will give some support to the views of Messrs. Searles Wood and Harmer, that the Till of the north-west of England, though older than the great submergence, is probably of younger date than the greater part of the drifts of the east coast.

The Cave Committee will continue their work with redoubled vigour. It is much to be hoped that the scientific public will come to their assistance, and not let the expense of the undertaking fall, as now, almost entirely on the district of Craven.<sup>2</sup>

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*Notes Appearing in the Original Work*

<sup>1</sup>Geological Magazine, vol. x. p. 140.

<sup>2</sup>Messrs. Birkbeck and Co., Craven Bank, Settle, have kindly consented to receive subscriptions.