

the Post-office tried to crush the box to the thickness of silver-paper. The bit contains no spicules, nothing but a mass of contorted tubes filled with small nuclei like ova. "The nuclei are about 1-600th of an inch in diameter, and I suppose they are in tubes. The part you sent was boiled in *Liquor potassæ*; that is how the structure alone came out, but there were no spicules in it, examined in this way or in water alone, but many fat globules, and a few sheaf-shaped calcareous concretions, common in all preparations of animal matter."—September 5, 1873.

The habits of *Pennatulidæ* are very imperfectly known and not at all understood. Dr. Johnston observes in the "British Zoophytes," vol. i. p. 160, that the fishermen believe that the common Sea Pens, which they call Coxcombs, "are fixed to the bottom with their ends immersed in the mud." The *Virgularia mirabilis* are believed by the fishermen to have one end erect in the mud, and *Pavonaria quadrangularis*, according to Professor Forbes, "lives erect, its lower extremity, as it were, rooted in the slimy mud at a depth of from twelve to fifteen fathoms." Mr. Darwin, who observed a species on the coast of Patagonia, which he called *Virgularia patagonica*, says: "At low water hundreds of these zoophytes may be seen projecting like stubble, with the truncate end upwards a few inches above the surface of the muddy sand. When touched or pulled they suddenly drew themselves in with force so as nearly or quite to disappear. By this action the highly elastic axis must be bent at the lower extremity, where it is naturally slightly curved, and I imagine it is by this elasticity alone that the zoophyte is enabled to rise again through the mud."

Bohadsch, as quoted by Johnston, says that the *Pennatula* swim by means of their *pinnae*, which they use in the same manner that fishes do their fins. Ellis says: "It is an animal that swims freely about in the sea, many of them having a muscular motion as they swim along." And in another place he tells us, that "these motions are effected by means of the pinnules or feather-like fins, these are evidently designed by nature to move the animal backwards and forwards in the sea, consequently to do the office of fins." Mr. Clifton describes the Australian species as swimming rapidly in shallow water; and the American naturalists all seem to agree that the Stick Fish, *Osteocella septentrionalis* of Burrard Inlet, which has only a slight crest of polyps, and not *pinnae*, or fins, as Ellis calls them, swims about like a fish, and is eaten by the dog-fish.

There seems to be no doubt that the Sea-Pens and Sea-Rushes do live in groups together, erect, and sunk in the mud, and that they are sometimes found swimming free in the sea, but the question is, are the free specimens those that have been disturbed by the waves and currents, and do they afterwards affix themselves in the mud, or are they vagrant specimens that live for a time and then die or are eaten by fish, their struggling being mistaken for swimming? Dr. Johnston observes, that when the Sea-Pens are placed in a basin or plate of water, he never observed a change of position, but they remain in the same place and lie with the same side up or down just as they have been put in. That is my own experience even when they are placed in a deeper vessel, but this may arise from the animal having lost part of its vitality before it was taken.

It may be useful to give the synonyma of these animals.

*Osteocella*, Gray, Cat. Pennatulidæ, 1870, p. 40. Ann. and Mag. Nat. Hist. 1872, ix. p. 405.

*Pavonaria*, sp. Stearns, *Mining and Scientific Press*. San Francisco, Aug. 9, 1873.

*Verrillia*, Stearns, Californian Acad. Sci., Aug. 18, 1873.

1. *Osteocella cliftoni*, Gray, Cat. Pennatulidæ, 1870, p. 40; Ann. and Mag. Nat. Hist. 1872, ix. p. 406.

Hab., Western Australia (G. Clifton, Esq.), B.M.

2. *Osteocella septentrionalis*, Gray, Ann. and Mag. Nat. Hist. 1873, ix. p. 406 (style only).

"New Marine Animal," Sclater, Brit. Assoc., Aug. 20

1872; NATURE, vol. vi. p. 436 (with figure of fish, of which it is said to be the notochord).

"Axis of Pennatulid," H. N. Moseley, NATURE, Sept. 26, 1872, vol. vi. p. 432.

"Pennatulid," Dawson, NATURE, Oct. 24, 1872, vol. vi. p. 516; Whiteaves, Nat. Hist. Soc. Montreal, 1872.

"New Aicyonoid," Stearns, Proc. Cal. Acad. Sci., Feb. 1873, v. part 1, p. 7.

*Pavonaria blakei*, Stearns, *Mining and Scientific Press*, San Francisco, Aug. 9, 1873.

*Verrillia blakei*, Stearns, Proc. Acad. Cal. Acad. Sci., Aug. 18, 1873.

Hab., Gulf of Georgia, Barraud's Creek, near New Westminster, Washington Territory: Herd, Claudet, Doane, Stearns, Chambers. Fraser's River: Dick and Nelson. B.M.

Mr. Stearns's paper in the Proceedings of the Californian Academy of Sciences is a reprint of the paper in the San Francisco *Mining and Scientific Press*, with a few additions, and the addition of a new sub-genus, *Verrillia*, although he quotes *Osteocella*.

Since I have seen the proof of this paper, the Hon. Justice Crease has informed me that he has forwarded to me a series of the animals of *Osteocella*, and also an account of the animal from an examination of fresh examples by Dr. Moss; the latter has arrived, and I communicated it on September 25 to the Zoological Society; it is illustrated by figures. J. E. GRAY

#### 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 prisæus</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

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 here 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.\*

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.

\* *Geological Magazine*, vol. x. p. 140.

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.†

R. H. TIDDEMAN

#### ATLANTIC FAUNA

LAST May the s.s. *Hibernia* belonging to the Telegraph Construction and Maintenance Company, was despatched to repair the French Atlantic Cable, in which a fault was indicated some 200 miles from Brest. A brief account of some of the animal forms obtained by me in that expedition may not be without interest to some of the readers of NATURE.

To Mr. R. London, superintending the expedition, I am greatly indebted for the many facilities that he afforded me, of obtaining specimens of the deep-sea fauna. The first cast was made about 100 miles nearly due west of Brest, at a depth of 83 fathoms. Here we found numerous valves of *Pecten*, a fine *Ophiocoma*, with rays nine inches in length, which when handled broke itself into numerous fragments, *Echinus lividus*, *Spatangus purpureus*, &c.

At the surface we obtained by means of a towing-net a great abundance of a minute Entomostracous crustacean of a greenish-blue colour, with deep sapphire eyes, a *Cydippe*, two species of *Idotea* and *Polybius Henslowii*.

On the Atlantic cable, which was raised to the surface at a point 112 miles west of Brest, were found numerous shells of a small boring mollusc, one of the *Pholadidæ*, apparently *Xylophaga*. The outer covering of the cable, consisting of tarred manilla hemp, was perforated in many places by the round holes which they had formed and in which their shells were found. In places they had penetrated the outer covering, and had passed between the iron wires to the gutta percha core, in which they had made numerous shallow indentations, but in no case had they penetrated this to any depth. This cable, it will be remembered, was laid in 1869.

We now steamed about 87 miles westward to the edge of the Little Sole Banks, where the water deepens from 90 to 480 fathoms within a distance of a few miles. Here the cable was again hooked and brought to the surface from a depth of about 300 fathoms. Adhering to its surface was a species of *Pycnogonum* in great abundance. The specimens lived for some time after being brought to the surface, and moved about sluggishly.

A few bright red anomalous crustaceans were also obtained. These were very active, and lived for some days in a bucket of water.

They had, while in confinement, a peculiar habit of drawing their claws over their head, antennæ, and eyes, which suggested the idea that they were confused and dazzled by the extraordinary amount of light to which they were exposed.

A species of *Tubularia* of great beauty grew abundantly in clusters on the cable, and thrived well in confinement. The cable was thickly overgrown with *Sertularias* of various species, moored to which by their hinder legs a species of *Caprella*, diabolic in appearance, but sluggish and inactive in nature, abounded.

A few miles farther westward the cable was raised from a depth of 480 fathoms. *Sertularias*, *Tubularias*, *Caprella*, &c., were still abundant; but the *Pycnogonum* was conspicuous from its absence.

In the recent expedition in which the *Great Eastern* and *Hibernia* have been employed in endeavouring to repair the Atlantic Cable of 1865, the natural history results have been much more meagre. Perhaps the most interesting objects obtained are some fragments of rock,

† Messrs. Birkbeck and Co., Craven Bank, Settle, have kindly consented to receive subscriptions.