

at Whitecliff Bay, but much thicker at Headon Hill and Hordwell Cliff. These sands and clays form the Headon group; they consist of freshwater strata with bands of limestone and lignite, but including numerous inconstant intercalations of layers containing marine shells, for the most part much dwarfed. The age of the Headon group, as shown by the fossils which it contains, is that of "the zone of *Cerithium concavum*" of continental authors.

The brackish-water Headon group is succeeded at Whitecliff Bay by nearly 100 feet of purely marine strata. These marine beds, which had been shown to rest on an eroded surface of the Headon beds, contain the remarkable fauna which had been recognized by many British and foreign geologists as that of the Lower Oligocene. Similar strata with the same fossils are found in the New Forest, at Lyndhurst, Brockenhurst, Roydon, and other points, and there also attain a considerable thickness. It was pointed out that this marine series is quite distinct from the Headon, or zone of *Cerithium concavum*, with which it had been confounded.

The author had been severely criticized for the views which he had put forward in a former paper as to the manner in which the Brockenhurst series is represented in the section at the west end of the Isle of Wight. There was much difficulty in these variable estuarine beds in correlating the beds seen in Colwell Bay with those exposed in the cliffs of Headon Hill. With several previous authors on the subject, he maintained that the great series of sandstones and limestones forming Warden Point and How Ledge are continuous with those exposed in the face of Headon Hill, and, consequently, that the marine beds of Colwell Bay overlying these limestone series are younger than the brackish-water bands interstratified with the Headon beds of Headon Hill. His critics, however, insisted that these two beds agreed with one another in such a manner that they must be regarded as parts of the same bed, separated by denudation. In opposition to this view it was pointed out that the Colwell-Bay bed is of the most inconstant character, and long before reaching Headon Hill is seen to be on the point of thinning out and disappearing altogether.

In conclusion, the author pointed out that his own interpretation of the succession and correlation of the strata in the Hampshire basin brings them into complete harmony with that which is maintained by the great majority of continental geologists, while that of his critics appeared to be hopelessly irreconcilable with their views.

CORRESPONDENCE.

FARTHER DISCOVERY OF MAMMOTH REMAINS AND ARCTIC SHELLS, BELOW BOULDER-CLAY, NEAR KILMARNOCK.

SIR,—In the GEOLOGICAL MAGAZINE, Vol. VI. p. 525, I reported a find of Arctic shells, below 48 feet of Boulder-clay, in sinking a pit, near to the old quarry, at Greenhill, Kilmaurs, where so many Mammoth and Elk remains have been discovered. A like discovery, of a Mammoth tusk, and Arctic shells, have just been made in a bed

of muddy sand, below 70 feet of surface and Boulder-clay, in sinking a pit $2\frac{1}{2}$ miles west, or down the valley, from the above quarry. The tusk was broken up and destroyed, the workmen mistaking it for wood; a fragment was procured and lodged in the Hunterian Museum, Glasgow, for preservation. The shells were identified by Mr. John Young, F.G.S., of this museum, as follows:—*Astarte compressa*, *Cyprina Islandica*, *Fusus?* a fragment, *Mya truncata*, *Nucula tenuis*, *Tellina balthica*, *Natica Grælandica*, *Turritella terebra*. Some of these, and other fragments of shells found, had a water-worn appearance. The section taken downwards is as follows:—surface and Boulder-clay 78 feet, muddy sand, the mud and sand finely laminated in alternate layers, about two feet, soft sand one foot, gravelly sand (fossiliferous) 20 feet, resting on the Carboniferous strata. This section is interesting, by throwing light upon the position, and age, of these fossiliferous beds, as well as evidence of their extent. Dr. Bryce makes them Pre-Glacial, and of the age of the Upper Crag (Quarterly Journal, vol. xxi. p. 213). From an examination of the rock specimens in the 20 feet bed of sand underlying the fossiliferous beds, they are largely made up of erratics, highland schists, gneiss, granite, Old Red Sandstone, quartz, etc. These erratics are greatly in excess in this bed of sand, to what they are in the Boulder-clay of the district, that overlies the fossiliferous beds. At one time I made a minute examination of the rocks in the Boulder-clay of this district, and found the erratics small, about 4 per cent.; but in this bed they are nearly 30 per cent. of the whole rock contents. This is certainly against the Pre-Glacial age of the beds.

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LANGSIDE, BETH.

THE DISTURBANCES AT VOBSTER IN SOMERSET.

SIR,—The announcement of the discovery of Millstone Grit at Vobster, made in your last NUMBER by the Rev. H. H. Winwood, is so interesting that I hope he will give further particulars, and publish a section of the facts observed. In my diagram-section (GEOL. MAG. Vol. VIII. p. 153) I have inserted the Millstone Grit at Upper Vobster, but not at Lower Vobster (to which Mr. Winwood, I presume, refers): its presence at this latter place will simplify the explanations, and dispose of one argument against the “overthrow theory.” To that theory, which supposes that the Limestone masses of Vobster were portions of rocks “squeezed together, thrown up, and finally folded over from the main ridge” (*i.e.* the Downhead Anticlinal), my chief objection is that I can discern no evidence in the structure or lie of the Lower Carboniferous rocks and Old Red Sandstone to favour the notion. Why not take into account the ascertained structure in these hard and well-marked rocks, and not rely simply on the evidence in the neighbourhood of Vobster, where in the comparatively soft and yielding Coal-measures (to quote the words of Mr. McMurtrie) “we find an amount of confusion and distortion which literally baffles description”?

We have actual evidence of a faulted-anticlinal at Penhill House,