These are also separated, I believe, by washing; and the water used in the process, containing a large quantity of yellow or red ochre, is collected in a reservoir, where the ochre subsides, and, when accumulated in sufficient quantity, it is smelted for iron in small furnaces on the spot. Hence it will be seen that nothing is allowed to run to waste; and on this, in some measure, depends the economic success of the undertaking.

The process by which the copper is separated from the sand, and thrown down in a metallic state, is very beautiful, and probably the only one by which the result could be accomplished successfully in a commercial point of view, as its average percentage of ore is not more than 2·5. The rock is macerated in a solution of muriatic acid, filtered, and ‘the copper-liquor,’ of a rich sap-green colour, is pumped into reservoirs of wood. Into these old scrap-iron is thrown, and the acid, leaving the copper, seizes the iron, which it dissolves, while the copper is precipitated in a metallic state. On the completion of the process, the residuum, consisting of 80 parts of copper and 20 of iron, is collected and sent in sacks to St. Helen’s and Swansea to be smelted.

Alderley is not the only district where the New Red Sandstone produces copper; but it is the only place, I believe, where it has been worked in that rock with profit. The ore has been extracted along the east side of the Peckforton Hills, at Grinshill, and near Ashbourn; but in none of these places is there such a variety or richness of mineral products as at Alderley.

V. ON SOME EVIDENCE OF THERE BEING A REVERSAL OF THE BEDS NEAR WHITECLIFF BAY, ISLE OF WIGHT.

By WILLIAM WHITAKER, B.A., F.G.S., of the Geological Survey of Great Britain.

IN the well-known section at Whitecliff Bay the Chalk and the various Tertiary beds are seen to succeed one another in regular order northwards; and the dip, at first very high, so that the beds are almost vertical, decreases in that direction.

The Reading Beds, which here come next to the Chalk and consist wholly of brightly-coloured plastic clays of far more than the usual thickness, are followed by the brown London Clay, with its more sandy basement-bed. This last formation is also sandy towards the top, and indeed passes upwards into the grey loamy base of the Lower Bagshot Sand. Further up in the Lower Bagshot there is some brown finely bedded clay, not so stiff as the London Clay however.

This short description of part of the cliff-section is enough

for my present purpose. Those who wish for details can find them, and in plenty, in the papers of Mr. Prestwich* and the Rev. O. Fisher,† and in the Geological Survey Memoir on the Isle of Wight by my colleague, Mr. Bristow.

When in the Island last autumn, after thoroughly observing the cliffs of Whitecliff Bay, I gave an hour or so to an examination of the new brickyard, but a little way inland, opened for the supply of the fort that is being built on Bembridge Down. I found that the pits were all small, and that none of them showed a perfect section of the beds worked: this, however, did not matter, as they were close enough to give a continuous section, and that at more than one part of the yard. The order of the beds thus shown was the same everywhere, and as follows, beginning from the south:—

- A. Light grey buff and yellow sand, clayey at its northern boundary, where it is succeeded by
- B. Brown sandy clay, passing up into
- C. Stiff brown clay with *septaria* (roundish masses of clayey limestone with *septa*, or divisions, of crystalline carbonate of lime).

The bed A must belong to the Lower Bagshot Sand; for, as noted above, the Reading Beds are all clay here: indeed, by the lane just to the south, at the foot of the Chalk ridge, there were two small pits in the mottled plastic clay. The beds B and C, therefore, should be higher beds, for they are further to the north, the direction in which higher beds come on; but C is exactly like the London Clay, and not like any higher bed. Unfortunately, I could not find a single fossil, either in the clay or in the *septaria*, which again are not to be known from those so common in the London Clay. However, from a fairly long and close acquaintance with that formation, I could hardly feel any doubt that the bed C belonged to it: the mineral character and the general look would have settled the matter at once in other circumstances.

Moreover, the bed B is like the upper part of the London Clay, when it is passing up into the Bagshot Sand; and A is clayey towards B, just as the lowest part of the Bagshot Sand is mostly clayey in its passage down into the London Clay.

Now, if C, the most southerly bed, should turn out to be London Clay, as I think it is, there must be some disturbance here, and that hardly a mere fault, for the beds being nearly vertical, it would need a fault of very great upcast to bring a mass of London Clay to the surface within the outcrop of the Lower Bagshot Sand, and there is no sign of a fault in the cliff-section close by. I am led to think, therefore, that there may

* Journ. Geol. Soc. vol. ii. pp. 252-5.

† Ibid. vol. xviii. pp. 70-73.

be a reversal of the beds, and that if there were a larger and clearer section, the Bagshot Sand would be seen to dip below the London Clay.

In the pits in that part of the brickyard nearer to the sea the clay c is rather sandy and finely bedded, perhaps because there the upper part only of the London Clay is shown. At one of

Section in Brick-yard, just West of Whitecliff Bay.

a. Soil.

b. Bedded sandy clay.

them the shallow section is as in the figure, from which it will be seen that the thin beds of sandy clay are folded over and squeezed up to the north. It may be observed also that the dip is to the south, and therefore disagrees with that of the coast-section close by, which is to the north.

Further north from the section shown in the figure, there is light-coloured and iron-shot sand; then a little brown clay; then a little greenish-grey clay; and then brown and buff sand up to the northern edge of the brickyard. A line of pebbles near the southern boundary of the last bed, as well as sundry layers of pipe-clay, show the dip to be still slightly inclined southwards. All these beds of course belong to the Lower Bagshot.

There may now perhaps be some clearer section in this brickyard; and if so, it would be worth the while of any geologist who might chance to be in the neighbourhood to pay it a visit, and try to make out the arrangement of the beds.

ABSTRACTS OF FOREIGN MEMOIRS.

MÉMOIRE SUR LA DISTRIBUTION GÉOLOGIQUE DES OISEAUX FOSSILES, ET DESCRIPTION DE QUELQUES ESPÈCES NOUVELLES. Par M. ALPHONSE MILNE-EDWARDS. Paris, 8vo. pp. 133-176.

IN the introductory remarks the author observes that it is very probable that both Mammals and Birds made their appearance on the earth for the first time during the Triassic period, although the only evidence in favour of the existence of the latter class at that time consists of the footprints of the Connecticut Valley.* He then discusses the probability of these footsteps being really ornithic, and notices the distinctive characters of the several genera—*Bron-*

* Dr. Emmons' fossil Bird-bone from the probably Triassic coal-beds of North Carolina should not be lost sight of.