

(which I observed in December last, in the excavation for gas-works) at Blowick, near Southport, one would expect varying and alternating conditions, and contemporaneous "Lower Scrobicularia Clay" to alternate, or even entirely take the place of the Lower Cyclas Clay, in any local area.

The following remarks occur in my paper on the "Post-Glacial Deposits," etc. (describing the Leasowe Clays):—"Whilst this deposition went on, freshwater forms might have lived in pools of fresh water in hollows of the Boulder-clay, simultaneously with marine in other pools, filled by high tides a few feet distant;—fluvial and marine forms of life preponderating horizontally and vertically in the silts, according to whether freshets or spring tides happened to be in the ascendent. This state of things is going on at the present time, in the marshes of the Ribble, between Preston and Southport, where, after heavy rains or floods, freshwater shells may be found, during neap tides, in the hollows of the (recent) Scrobicularia mud, and where crabs may be found living in all the ditches for one or two miles inland."

At the close of the Glacial epoch, several alternations of level appear to have taken place; the surface of the Upper Boulder-clay, beneath the Shirdley Hill Sand, is coated with a thin seam of peat, at a little above the present high-water level, formed after much denudation of Boulder-clays in the lowlands had taken place. Over this denuded plain of Boulder-clay the Sands were deposited, and blown from its edges into a line of ancient dunes, equivalents in time of the Presall shingle-beds (Quart. Journ. Geol. Soc., 1870, p. 461), and the Rampside beds described by Miss Hodgson of Ulverstone.

This sea-bottom becoming land, gradually increasing in extent, streams cut channels in the sands, and carried their débris westwards, into the hollows, and swamp basins, in the Boulder-clay, and deposited the Cyclas Clay, which graduates westwards, along a line not exactly corresponding to the present sea-coast, into the Lower Scrobicularia Clay.

Elevation continuing with obstruction of drainage, peat was formed, under continental conditions, which conditions are now being succeeded by a subsidence still in progress.

In the Blowick Clay, a skull and several antlers of Red Deer have been recently discovered at a depth of 16 feet from the surface. One of the latter, procured by my friend the Rev. John Bone, of Southport, has been presented by him to the Museum of Practical Geology, Jermyn Street.

I am glad to see that my suggestion to Mr. Reade, of examining the Grey Clays for *Diatomacea*, has been productive of good results.

GEOLOGICAL SURVEY OFFICE,  
JERMYN STREET, S.W.

C. E. DE RANCE.

#### HUNSTANTON "RED CHALK."

SIR,—Allow me to call your attention to the subjoined extracts from the Survey Catalogue of Rock Specimens apropos of the paragraph on Hunstanton Red Limestone, by W. S. M., at p. 114 of the

GEOLOGICAL MAGAZINE for March, from which it will be seen that Edward Forbes has certainly the priority. H. W. BRISTOW.

Catalogue of Rock Specimens. Second Edition, 1859.

P. 86. No. 102. *Earthy Limestone*, the equivalent, probably, of Upper Greensand. Hunstanton, Norfolk.

No. 103. *Red Chalk, Earthy Red Limestone*, probably equivalent to the Gault. Hunstanton, Norfolk.

Catalogue of Rock Specimens, p. 157. Third Edition, 1862.

98. *Red Earthy Limestone*, Upper Greensand. Hunstanton, Norfolk.

The Red Chalk of Hunstanton, as it is sometimes called, has been referred, by different authors, indifferently, to the Gault, Upper Greensand, and Chalk. Its proper position in the geological scale, is, most probably, that which has been assigned to it by Sir Roderick Murchison, who, in 1836, stated it to be the equivalent of the Upper Greensand. The truth of this is corroborated not only by its lying immediately beneath the Chalk, which rests conformably upon it, but by the evidence of its fossils, the preponderance of those peculiar to each of the three formations being in favour of the Lower Greensand.

Its red colour is attributed to the peroxidation of the green grains of silicate of iron (or glauconite) with which it is charged. By the late Professor Edward Forbes, the Red Chalk was considered to be the equivalent of the Gault.

99. *Earthy Limestone*. Hunstanton, Norfolk.

This deposit was considered by the late Professor Edward Forbes to be, in all probability, the equivalent of the Upper Greensand of the south of England.

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## MISCELLANEOUS.

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### MR. E. RAY LANKESTER ON *SCAPHASPIS* AND *PTERASPIS*.

IN connexion with Magister Schmidt's Note on *Pteraspis Kneri* (see antè, p. 152), we subjoin the following copy of a letter from Mr. Ray Lankester, published in the *Academy* for January 1st, 1873, p. 11, which may serve to show that author's views on the supposed connexion between *Scaphaspis* and *Pteraspis*, and also to refute the late Dr. Künth's theory of the connexion of these anomalous Fishes with the Crustacea.—EDIT. GEOL. MAG.

“In the Notes of Scientific Work of the *Academy* of November 1 (vol. iii., p. 412) there is an abstract of a paper by Dr. A. Künth on *Pteraspis*, in which evidence is brought forward to establish a view as to the nature of the organisms included under that term, contrary to that which I (confirming by more extended study the views of Agassiz, Salter, and Huxley) have put forward in my Monograph of the *Cephalaspidae*, published by the Palæontographical Society. It is to me a cause of twofold regret that Dr. Künth has perished in the Franco-Prussian war, for not only have we thus lost a chance of obtaining additional knowledge of the Berlin *Cyathaspis*, but I shall be unable to obtain from him the admission that his conclusion is not in accordance with the facts. Nevertheless, I am bound to point out how valueless is the evidence of Crustacean affinities for *Cyathaspis* adduced by him, and how firmly, on the other hand, it is established that the *Heterostraci*—or genera *Pteraspis*, *Cyathaspis*, *Scaphaspis*—are the remains of fish. 1st. The