

which is observed in *O. conica*, a point of generic distinction,—that structure being wanting in both *O. minor* and the Carboniferous form.

This species, for which I would propose the name *Ortonia carbonaria*, may be briefly described as follows.—Tube circular, conical, calcareous in structure, solitary; generally found attached by their whole length to the spines of *Productæ*, straight, or slightly curved, or flexuous. Ornamented with sharp annulations or transverse ridges, the interspaces being rather wider than the ridges. Marked longitudinally with microscopic striae. Length  $\frac{1}{8}$  to  $\frac{1}{4}$  inch; diameter of tube at mouth  $\frac{1}{80}$  to  $\frac{1}{30}$  inch; 35 annulations in  $\frac{1}{4}$  inch.

This species I have found to be somewhat rare when searching our Limestone shales for Foraminifera and Entomostraca. It occurs in both the Lower and Upper Limestone series at several localities near Glasgow; but I have found it most numerous in the Lower Limestone shales at Brockley, near Lesmahagow. The great majority of the specimens are, or show that they have been, attached to the slender spines of *Productæ*, sometimes two or more being found upon a fragment of the same spine, but more often occurring singly.

The enlarged figure of *Ortonia minor*, Pl. IV., Fig. 2a, fairly represents the external form of the Carboniferous species, as seen in many of the specimens, and might serve for an illustration, if we excepted the more minute markings which distinguish it from the Silurian form.

#### VII.—NOTES AND QUERIES ON THE CLASSIFICATION AND NOMENCLATURE OF THE ENGLISH STRATA.

(Communicated by W. S. M.)

*Abbreviations.*—A. a.—Recognized as a separate formation with definite limits, by

- b.—In the year
- c.—Where published
- d.—Under the name
- e.—Origin of name

- B.—Changes on previous grouping or name
- C.—Subsequent changes

CHALK. A. (a) William Smith. (b) 1799. (c) In his first table. (d) Chalk. (e) Adopted general name.

B. None.

C. In 1816 he divided it into Upper and Lower.

Con. and Phil. in 1822 divided into “with flints,” “with few flints,” “without flints,” and recognized the underlying “Grey Chalk,” which they state might more properly be designated “Chalk Marle.” The term Chloritic Marl (a division underlying the Chalk Marl) originated in

UPPER GREENSAND. A. (a) Fitton. (b) 1824. (c) An. Phil., vol. viii. p. 365. (d) Firestone. (e) Adopted the local Isle of Wight name. [Query—Only I. of W.?]

... from the time of Smith's maps<sup>1</sup> of England, and of  
ster's letters to Englefield (1816), the deposits between the  
Portland beds and the Chalk were regarded as naturally  
divided thus:—1. Greensand; 2. An argillaceous deposit  
(Tetsworth Clay of Greenough); 3. Ironsand.

Conybeare and Phillips (1822) followed this division, giving  
No. 2 the name "Weald Clay" which had been suggested  
by P. J. Martin.

In mapping they grouped the "Chalk Marle" with the  
Greensand. Their small map, based on a reduction of the  
Greenough map, published three years earlier, shows that  
while in some districts advance had been made in recogniz-  
ing the distinctiveness of formations which Smith had con-  
founded together, yet that in other districts they still mistook  
Lower Greensand for Hastings sand, Galt for Weald Clay,  
and even Kimmeridge Clay for Weald Clay. The first who  
pointed out the existence of Upper Greensand, Galt, and  
Lower Greensand, as apart and quite distinct from Weald  
Clay and Hastings sand, was Fitton, in a paper in the *An.*  
*Phil.*, 1824, vol. viii., "On the Beds between Chalk and  
Purbeck." [Sedgwick had, in 1822, in the *An. Phil.*, pointed  
out that in the Cambridge district the Greensand above the  
tenacious Blue Clay which rests on the "Ironsand" is not  
the same as the beds so named elsewhere, *i.e.* the (Lower)  
Greensand.] He shows this to be so in the I. of W. and  
S. E. of England, and gives evidence in favour of the Galt,  
his "Marl of Folkestone" and "Clay of Undercliff" being  
identical with the Galt of Cambridge, and adds that the  
greater part of England has not been examined with  
sufficient care to admit of correlation.

- C. Fitton's position for his Firestone has remained unaltered,  
but the name was changed to Upper Greensand. [I cannot be  
sure who made the change in the first place. Firestone was  
inapplicable in a large portion of England, and the change  
was but a restoration of Smith's name (which Sedgwick  
insisted on in 1826, *An. Phil.* p. 343). Query—When was  
"Upper" added?]

HUNSTANTON RED LIMESTONE. A. (a) Seeley. (b) 1861. (c) *An.*  
*Mag. Nat. Hist. Ap.*, 1861. (d) Hunstanton Red Limestone.  
(e) Hunstanton being the typical locality.

- B. Sedgwick, in the *An. Phil.*, 1822, hinted that it was  
distinct from Chalk. Wiltshire, in 1859, *Proc. Geol. Assoc.*,  
suggested, amongst other hypotheses, that it was a formation  
intermediate between the Chalk and Lower Greensand.

- C. Clearly separated from Red Chalk in 1864. (*Quart. Journ.*  
*Geol. Soc.*, November, 1864.)

<sup>1</sup> I have used the word in the plural with an intention. Many modifications  
were made in the mapping during the period of the issue of the different copies.  
They were not called separate editions, but containing such differences they can

GALT.<sup>1</sup> A. (a) Fitton. (b) 1824. (c) An. Phil., vol. viii. p. 365. (d) Clay of the Undercliff or Gault. (e) Galt is said to be a local name. [Query—In what county or counties is it used and in what sense? See Fitton, Geol. Journ., 2 ser. vol. iv. p. 306, 1836.]

B. See *supra*.

C. None.

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## NOTICES OF MEMOIRS.

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I.—ON A NEW SUB-CLASS OF FOSSIL BIRDS (*Odontornithes*). By Prof. O. C. MARSH, Yale College, Ct., U.S.A.

THE remarkable extinct birds with biconcave vertebræ (*Ichthyornidæ*), recently described by the writer from the upper Cretaceous shale of Kansas,<sup>2</sup> prove on further investigation to possess some additional characters, which separate them still more widely from all known recent and fossil forms. The type species of this group, *Ichthyornis dispar*, Marsh, had well developed teeth in both jaws. These teeth were quite numerous, and implanted in distinct sockets. They were small, compressed and pointed, and all of those preserved are similar. Those in the lower jaws number about twenty in each ramus, and are all more or less inclined backward. The series extends over the entire upper margin of the dentary bone, the front tooth being very near the extremity. The maxillary teeth appear to have been equally numerous, and essentially the same as those in the mandible.

The skull was of moderate size, and the eyes were placed well forward. The lower jaws are long and slender, and the rami were not closely united at the symphysis. They are abruptly truncated just behind the articulation for the quadrate. This extremity, and especially its articulation, is very similar to that in some recent aquatic birds. The jaws were apparently not encased in a horny sheath.

The scapular arch, and the bones of the wings and legs, all conform closely to the true ornithic type. The sternum has a prominent keel, and elongated grooves for the expanded coracoids. The wings were large in proportion to the legs, and the humerus had an extended radial crest. The metacarpals are united, as in ordinary birds. The bones of the posterior extremities resemble those in swimming birds. The vertebræ were all biconcave, the concavities at each end of the centra being distinct, and nearly alike. Whether the tail was elongated cannot at present be determined, but the last vertebræ of the sacrum was unusually large.

The bird was fully adult, and about as large as a pigeon. With the exception of the skull, the bones do not appear to have been pneumatic, although most of them are hollow. The species was carnivorous, and probably aquatic.

<sup>1</sup> This is sometimes spelt Golt (as by Rev. J. Mitchell in his Table of Sequence, 1788) and Gault. I believe Galt to be correct.

<sup>2</sup> Silliman's Journ., vol. iv. p. 344, Oct. 1872, and vol. v. p. 74, Jan., 1873.