GALT.[1] 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 *suprà*. C. None.

NOTICES OF MEMOIRS.

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,[2] 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.

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

[2] Silliman's Journ., vol. iv. p. 344, Oct. 1872, and vol. v. p. 74, Jan., 1873.

When the remains of this species were first described, the portions of lower jaws found with them were regarded by the writer as reptilian;[1] the possibility of their forming part of the same skeleton, although considered at the time, was not deemed sufficiently strong to be placed on record. On subsequently removing the surrounding shale, the skull and additional portions of both jaws were brought to light, so that there cannot now be a reasonable doubt that all are parts of the same bird. The possession of teeth and biconcave vertebræ, although the rest of the skeleton is entirely avian in type, obviously implies that these remains cannot be placed in the present group of birds, and hence a new sub-class, *Odontornithes*, is proposed for them. The order may be called *Ichthyornithes*.

The species lately described by the writer as *Ichthyornis celer* also had biconcave vertebræ, and probably teeth. It proves to be generically distinct from the type species of this group, and hence may be named *Apatornis celer*, Marsh. It was about the same size as *Ichthyornis dispar*, but of more slender proportions. The geological horizon of both species was essentially the same. The only remains of them at present known are in the museum of Yale College.

The fortunate discovery of these interesting fossils is an important gain to palæontology, and does much to break down the old distinctions between Birds and Reptiles, which the Archæopteryx has so materially diminished. It is quite probable that that bird, likewise, had teeth and biconcave vertebræ, with its free metacarpals and elongated tail. (Appendix to *Silliman's American Journ.*, Feb., 1873, p. 161.)

II.—Vazeeri Rupi, the Silver Country of the Vaeezrs in Kulu; its Beauties, Antiquities, and Silver-mines: including a Trip over the Himalayah Range and Glaciers. By J. Calvert, F.G.S., Mem. Inst. C.E. With numerous Illustrations. 8vo. (London and New York, 1873.)

KULU is the mountainous region drained by the headwaters of the River Beas, and of the Malauna, Parbutti, Harla, and Sainj, its tributaries. These rise partly in the high range (21,772 feet) bounding Spiti on the west, and partly in the Deobita (20,417 feet) and Rohtang (15,506 feet) range. Near to and parallel with the northern and steepest side of the latter runs the Chandra River, receiving the waste of the Shigri, Perad, Sack, and Hamta Glaciers. A portion of Kulu, crossed nearly at its centre by Lat. 32° N. and Long. 77° 30′ E., is "the Silver Country of the Vazeers," with an area of 677 square miles and a population of about 3000. The mines were closed, built up, and planted over some years ago, on the invasion of the Sikhs; and the wealth of silver, copper, and antimony appears to have been nearly forgotten, until the energy of recent speculation once more opened up the mineral riches of this district.

The great Kulu (or Kooloo) valley, noted for its beautiful scenery, about 115 miles north of Simla, is traversed by many, who pass over the Himalayahs on business, or for adventure and sport; and for

[1] Silliman's Journ., vol. iv., p. 406, Nov. 1872.

geologists at home it is pleasant to accompany an intelligent traveller, page by page, who knows not only how to gossip, but how to point out the physical geography, the structure, and mineral characteristics of his route through this interesting region of North India. With a clear map and numerous good illustrations of scenery and of buildings (both old and new), and of the handsome European-like Kulu people, Mr. Calvert materially aids the reader to follow his track by river-side and mountain-pass, through the picturesque villages, and among the mines, and frequent exposures of unworked lodes in this "Silver Country of the Vazeers."—T. R. J.

III.—Transactions of the Newbury District Field-club, Established 1870. 8vo. (Newbury, 1871.)

DESIGNED to promote the knowledge of the Natural History and Antiquities of the neighbourhood, this Society has already applied itself with industry and acumen to the cultivation of the rich fields of natural science around Newbury, in both Berks and Hants. The current evidences of its activity, since 1870, have been the well-arranged excursions to points of interest, and the social discussion of new and old facts, and of matured and nascent opinions. The more lasting and tangible results are visible in the handsome and well-printed volume before us, with its woodcuts, lithographs, and photographic illustrations. For Geologists it offers papers on the Geology of the Kennet Valley, of North Hampshire, and of the Kingsclere Valley; and on the nature and origin of the well-known Sarsen stones. The Botanist, Ornithologist, and Entomologist have excellent matter given them. The Antiquarian and the Scholar are also largely supplied with facts and thoughts relating to the history of this richly-storied region.—T. R. J.

IV.—Ninth Annual Report of the Belfast Naturalists' Field-club, 1871-72. 8vo. 65 pages. (Belfast, 1872. Printed for the Members only.)

BESIDES cursory notices of points of geological interest near Belfast, at Woodburn Glen, and elsewhere, and in South Donegal, visited by the Club in Summer excursions, this Report contains a paper by Mr. W. Gray, on the very slight probability of coal being found in the neighbourhood of Belfast; and a paper by Mr. Joseph Wright, on the geology of Cultra in County Down, in which he shows that some of the so-called Permian beds there are really of Carboniferous age.

The Naturalists and Antiquaries are evidently active at Belfast, for this Report contains many interesting and thoughtful notices of the botany, zoology, and antiquities of the vicinity.—T. R. J.

V.—Cephalopoda of the Cretaceous Formation of Bohemia. By Dr. Anton Fritsch. (Cephalopoden der böhmischen Kreide-Formation, etc.) 4to. Prague, 1872.

THIS elegant and well-printed Monograph has been brought out under the auspices of the Geological Survey of Bohemia. Dr.

Urb. Schlönbach, who worked with Dr. A. Fritsch in field and cabinet, from 1867 to 1870, on the subject-matters of this Monograph, unfortunately died before its completion.

Bibliography, characterization and comparison of species, their local occurrence and distribution, are carefully treated of; and sixteen plates of full, clear, and artistic lithographs of thirty-nine out of fifty-five species described, of which seventeen are new, complete this welcome addition to Cretaceous Palæography. The genera affording the Bohemian species are *Glyphiteuthis, Belemnites, Nautilus, Rhyncholithus, Ammonites, Scaphites, Hamites, Helicoceras, Baculites,* and *Aptychus.* T. R. J.

VI.—Short Notices.

Fossil Myriopods, etc.—In the Proceedings of the Dresden "Isis" Society, 1872, p. 125, Prof. Dr. H. B. Geinitz describes some interesting fossils from Saxony. (1) A Calamite-like fossil from the very old (perhaps Cambrian) schists of Weesenstein (pl. 1, fig. 1); (2) *Lingula Rouaulti,* Salter, in quartzite from the Upper Lansitz (fig. 2); (3) a group of fossil Myriopods, with Wood (*Araucarites*), in a siliceous fragment from the Rothliegende, near Chemnitz (*Palæojulus dyadicus,* Geinitz, fig. 4-7). Can Fischer de Waldheim's "Spirolinites," in a piece of gravel flint, figured in his "Oryctologie de Moscou," pl. 12, fig. 4, be related to Prof. Geinitz's fossil, or to other *Julidæ*?

Cretaceous Polyzoa and Foraminifera.—In the 4th No. of Part I. of Geinitz's "Das Elbthalgebirge in Sachsen" (Rocks of the Elbe Valley in Saxony, 1872), pp. 97-134, Dr. A. E. Von Reuss describes numerous Bryozoa (*Polyzoa*) from the Lower Quader (Cretaceous), illustrated in ten beautiful lithographic quarto plates, from the Vienna State Printing-office; also at pp. 134-140, some of the Foraminifera from these beds, especially a fine Lituoline form (*Polyphragma cribrosum,* p. 139, pl. 33, fig. 8 *a-c*); and a remarkably large and interesting Foraminifer, which, long regarded as a Polyzoa, has passed under various names in books, as "Ceriopora," "Thalamopora," and "Monticulipora," but which Von Reuss now carefully works out (*Thalmopora cribrosa,* Goldf. sp., p. 137, pl. 33, figs. 11-15), and recognizes as the type of a new Foraminiferal family. Indeed this species is not only of interest as attaining a length of an inch and more, with proportionate thickness, but as exhibiting characters of alliance with so many other genera, as *Polytrema, Carpenteria,* and especially *Cymbelopora,* and through it with *Planorbulina* and other *Rotalinæ.* The author points out that *Thalamopora* is among the "perforate," what *Dactylopora* is among the "imperforate" Foraminifera.

Æpyornis.—In the Transactions of the Bologna Academy of Sciences, 1872, series 3rd, vol. ii. (pp. 141-165, plates xix.-xxiv.), Prof. J. J. Bianconi gives further information on the femur, tibia,

and metatarsus of *Æpyornis*, corroborative of his views of *Æp. maximus* having been an immense vulturine bird—the "Roc" of Marco Polo.

H. B. Geinitz on the Cretaceous Inocerami.—In working out the *Inocerami* for his work on the Geology of the Elbe Valley in Saxony, Prof. Geinitz has had to study these shells very closely. He reduces the species to eleven; and, commencing with *Inoceramus concentricus*, Sowerby, of the Gault (which points with others, he thinks, to a Liassic origin), he passes to *I. striatus*, Mantell, of the Cenomian stage (Lower Quader and Lower Pläner). This species gives off, as it were, in the same stage, *I. latus*, Mantell, which becomes in the next (Turonian or Middle Quader, Middle Pläner, and Pläner limestone) *I. labiatus*, Schl., and *I. Cuvieri*, Sow.; whilst the Turonian *I. Brongniarti*, Sow., is another branch, and *I. striatoconcentricus*, Gümbel, of the same stage, is in the straight line of development. In the Senonian, or Upper Quader and Upper Chalk, *I. planus*, Münster, and *I. Cripsi*, Mantell, continue from the *Cuvieri*-branch; and *I. Lamarcki*, Park., from the parallel *Brongniarti*-branch; and all point towards the highest, namely, *I. involutus*, Sow.

Some Gigantic Fossil Mammals.—Among the huge fossil mammals obtained from the Lower Tertiary beds of Wyoming, the *Dinocerata*, Marsh, are very remarkable. The long narrow cranium bears three pairs of horn-cores, rising one pair above another, from the low nasal pair, to the higher conical maxillary pair, and to the posterior highest and broadest pair, which may have borne expanded and possibly branching antlers. These last horn-cores slope down in front into a pair of lateral coronal ridges, dominating over the great temporal fossæ. The attenuated nasal bones overlap a deep narial cavity. The premaxillaries are slender and toothless. In each maxillary is a great canine tooth, long, sharp, and decurved, with their roots running up into the middle horn-cores. Six small premolar and molar teeth on either side, with transversely ridged crowns, form another peculiar feature in this wonderful beast. Already various specimens, representing parts of the skeleton of several species of this genus, appear to have received different generic names—as *Loxolophodon*, Cope; *Uintatherium* and *Uintamastrix*, Leidy; *Dinocera*, Marsh; *Eobasileus*, Cope. Of their relative claims to priority and use, Prof. Marsh treats in the illustrated reprint before us, from "Americ. Journ. Sc." for Feb., 1873, p. 117, published in advance Jan. 28, 1873.

In his *Anniversary Address* to the Royal Society of New South Wales, May 22nd, 1872, the Rev. W. B. Clarke, M.A., F.G.S, etc., gives a valuable summary of facts and opinions relating to the natural history of the diamond and diamond fields in Brazil, South Africa, India, and Australia, in amplification of the very useful observations he offered on the same subject in his Anniversary Address of May 25th, 1870 (1871). T. R. J.