

from Orkney and from the Moray Frith beds, namely, *Ch. Trailli*, Ag., *Ch. uragus*, Ag., *Ch. Cummingiæ*, Ag., *Ch. curtus*, McCoy, *Ch. macrocephalus*, McCoy, and *Ch. velox*, McCoy. Most patient observation has however years ago convinced me that there is only one species of *Cheirolepis* as yet known from the British Old Red Sandstone, and that all the differences noted are entirely due to different modes of preservation and crushing. A similar view was long ago expressed by Mr. Powrie (GEOL. MAG. Vol. IV. 1867, pp. 147–152).

NOTICES OF MEMOIRS.

I.—NOTE ON THE RELATION OF THE PERCENTAGE OF CARBONIC ACID IN THE ATMOSPHERE TO THE LIFE AND GROWTH OF PLANTS. By Rev. A. IRVING, D.Sc., B.A., F.C.S.<sup>1</sup>

THE author refers to the discussion raised recently on this question in the pages of the GEOLOGICAL MAGAZINE. In order to test the hypothesis adopted by Professor Prestwich, three series of observations have been made during the past summer on plants exposed, under similar physical conditions, to atmospheres of different compositions. The evidence obtained all points in one direction, and goes to show that, with an increase of the percentage of carbonic acid up to about that of the free oxygen present, the vigour of plant life and growth is also increased, so long as the plants are freely supplied at their roots with water, as we have good reason to suppose was the case with the vascular cryptogams from which the carbonized materials of the Coal-measures are for the most part derived. The author further considers the theory as throwing some light upon a certain stage of development of life upon the earth in later Palæozoic time; the great development of plant growth in the Carboniferous age having served as the means of storage of carbon in the earth's lithosphere, and thus purified the atmosphere so as to render it fit for the development of air-breathing forms of life in the Mesozoic age.

II.—ON THE OCCURRENCE OF IOLITE IN THE GRANITE OF COUNTY DUBLIN. By J. JOLY, M.A., B.E.<sup>1</sup>

IOLITE, not previously noticed in Irish granite, has been found by the author in the granite of Glencullen. It occurs as a microscopical but abundant inclusion in a substance of felspathic nature which is to be found interpenetrating prisms of beryl. Its presence is confined, apparently, to the felspar so intermixed with beryl. The iolite is in twelve-sided basal prisms, showing the faces *I*, *i-1*, *i-2*, *i-1*, *O*. In size up to 0.1 mm. in length, transparent, colourless viewed singly, and presents a vivid and beautiful object in the polarizing microscope. Characteristic features are the basal angles of 150°, 120° or 60°; its generally symmetrical extinction on elongated rectangular sections and the transverse cleavage on such sections. A foliation or plating on *O*, and an oblique twinning-line parallel to *I*, are also frequently met with. Occasionally the crystals occur in radiating groups. Inclusions are rare, generally glass.

<sup>1</sup> Read before Section C. British Association, Bath, September, 1888.

III.—ARCHEAN CHARACTERS OF THE ROCKS OF THE NUCLEAL RANGES OF THE ANTILLES. By Dr. PERSIFOR FRAZER.<sup>1</sup>

**D**URING a visit this year to the south-eastern part of the island of Cuba, the speaker had made some examinations of the rocks which form the nucleus of the spurs of the Sierra Maestra, and there is strong reason to believe of the axial range of the entire island and of Jamaica, Santo Domingo, Puerto Rico, and the Windward Islands as well. From the field observations there made, and an examination of the specimens under the microscope, it seems highly probable that these rocks, instead of being igneous extensions of the Tertiary period and later, are in reality of much earlier date, and may not be entirely volcanic.

The considerations which support this view are—

1. Microscopic analysis shows immense alteration to have taken place, and consequently a very long period to have elapsed.

2. The complexity of the congeries of rocks forbids the hypothesis of their having been derived from one mass. Where this congeries, therefore, is unconformably adjacent to the Tertiary, there can be no reasonable doubt that the crystalline rocks are the elder. This point of view was suggested by Mr. Teall, who would consider the argument valid also for the contact with the Cretaceous, and perhaps older series. It is difficult to see why it should not hold equally good for the contact between these crystalline and the Palæozoic rocks as made out by De Castro near Cienfuegos, etc.

3. The characters of the several associated rocks are those which one finds united in very many Archean regions throughout the world.

4. The products of alteration of these rocks are similar to those which one finds in the districts just alluded to.

5. The chemical peculiarities of the iron ores found in contact with these rocks are similar to those which one finds in the ores of the Archean regions, both in the low percentage of phosphorus and in the pyrite and (more sparingly) chalcopyrite disseminated through the ore, and in other respects.

6. If this nucleal mass had been forced up from the earth's interior in a state of igneous fusion, there would not be now (as there are) abundant traces of stratification and structure, implying an original sedimentation.

7. If this mass had resulted from volcanic outflow, there must have been contact-phenomena, and changes induced on the surfaces of the rocks with which it was brought in contact. No such contact-alteration has been observed between these rocks and either of the three groups which meet them.

8. The direction of the range, considered as a whole, lends support to the hypothesis that it is a fork of the Andes which, diverging from the main axis in Guatemala, traverses the peninsula of Yucatan, and in a symmetrical curve sweeps through the highlands of Cuba and Jamaica, Hayti, Puerto Rico, the Windward Islands, and the N.E. coast of Venezuela. This run of high land once inclosed the Caribbean as another Mediterranean Sea.

<sup>1</sup> Read before Section C, British Association, Bath, September, 1888.

9. The shapes of the hills of this range, produced by weathering, are not those usually visible in regions of volcanic, but rather of metamorphic rocks.

The rocks which furnished the basis for the above conclusions are all, or nearly all, alteration-products. In some cases they appeared to be the results of a second, third, or even greater number of metamorphoses, some of their constituents seeming to pass through cycles of change, ending in the mineral with which the alteration began after a number of intermediate stages. The rocks are Diorites, with Epidote, Porphyritic Dolerites, which resemble and have been taken for Syenites; Garnet rock; Actinolite; Felsite and Orthofelsite Porphyry, like that of the South Mountain of South-eastern Pennsylvania, of St. David's Head in Wales, and elsewhere. To these are added Pyrite and iron ores. Copper and manganese ores are not rare, but their relations to the rocks under consideration have not been made out.

IV.—SUR LE GENRE *EUCLASTES*. By LOUIS DOLLO. Ann. Soc. Géol. du Nord, vol. xv. (1888), pp. 114–122.

A DETAILED discussion results in the conclusion that to the synonymy of the Chelonian *Euclastes* (Cope, 1867), must be relegated the generic names *Lytoloma* (Cope, 1871), *Puppigerus* (Cope, 1871), *Glossochelys* (Seeley, 1871), *Pachyrhynchus* (Dollo, 1886), and *Erquelinnesia* (Dollo, 1887). The genus is thus defined as follows:—Skull very broad and flat. Supratemporal fossæ completely closed by a bony roof. Orbits more or less directed upwards. Nasals distinct. A lateral temporal notch well marked. Palatine expansion triangular, very thick, and almost on the level of the alveolar border. Vomer very long, extending towards the occiput, and separating the submaxillaries and the palatines for a considerable distance. Posterior nares situated much nearer the occiput than in the Chelonidæ. Palatal vacuities for the passage of the temporal muscles extraordinarily broad. Mandible massive, with a very long symphysis. Carapace rounded behind. The Chalk fossil shown in fig. 4, plate vii. A of Owen's "Mon. Foss. Rept. Cret. Form." (Mon. Pal. Soc. 1851) is considered to belong to *Euclastes*; and the genus is also represented in the Upper Cretaceous of the United States, and the Lower Eocene of Belgium and England.

V.—SUR LE CRÂNE DES MOSASAURIENS. By LOUIS DOLLO. Bull. Scientifique France et Belgique, 1888, pp. 1–11, pl. i.

THE fine double plate accompanying this paper is occupied by a profile view of the skull of *Hainosaurus* and another of a less complete skull of *Mosasaurus*, each with an osteological explanation, and the two placed together for comparison. M. Dollo also investigates an interesting minute point in the osteology of the Mosasaurian skull, namely, the significance of the shallow rounded pit upon the proximal half of the quadrate bone. The feature was first noticed by Prof. E. D. Cope, who considered that it probably "received the extremity of an osseous or cartilaginous styloid stapes;" and Sir Richard Owen afterwards suggested that it might have received

“the end of a long outstanding paroccipital process, as in the *Lacertilia*.” The discovery of the actual styloid bone in *Plioplatecarpus* leads to a different conclusion; and M. Dollo considers that the element corresponds to that termed suprastapedial by Parker, the cavity thus receiving the appropriate name of “fossette suprastapediale.”

VI.—*IGUANODONTIDÆ ET CAMPTONOTIDÆ*. By LOUIS DOLLO. Comptes Rendus, March 12th, 1888, pp. 775-777.

IN 1882 Professor Marsh defined the two Dinosaurian families under discussion as follows:—

CAMPTONOTIDÆ.—Clavicles absent; post-pubis complete (*Camptonotus*, *Hypsilophodon*, *Laosaurus*, *Nanosaurus*).

IGUANODONTIDÆ.—Clavicles present; post-pubis incomplete (*Iguanodon*, *Vectisaurus*).

In the same year, M. Dollo attempted to show that the supposed clavicles were really sternal bones, and proposed a rearrangement thus:—

HYPsilOPHODONTIDÆ.—Four functional toes. Sternum consisting of a simple rhomboidal bony plate (*Hypsilophodon*).

IGUANODONTIDÆ.—Three functional toes. Sternum consisting of two bony plates, one left and one right (*Camptonotus*, *Iguanodon*, *Laosaurus*, *Nanosaurus*, *Vectisaurus*).

A reconsideration of the subject now induces the Belgian Palæontologist to return to Professor Marsh's original arrangement, with amended definitions, thus:—

CAMPTONOTIDÆ.—Premaxillæ toothed. Sternum unpaired, manus morphologically pentadactyle, and reduced on the ulnar border and in the centripetal direction. Thumb normal. Ossification of the pubis extending to the extremity of the ischium. Fourth trochanter pendent. Four functional pes-digits.

(a.) Two phalanges in manus-digit v. Preacetabular process of the ilium slight. No rudiment of pes-digit v. (*Camptonotus*.)

(b.) No phalange in manus-digit v. Preacetabular process of the ilium long. A rudiment of pes-digit v. (*Hypsilophodon*.)

IGUANODONTIDÆ.—Premaxillæ edentulous. Sternum paired. Manus morphologically pentadactyle, and reduced on the radial border and in the centrifugal direction. Digit v. normal. Pubis only extending to the distal extremity of the ischium in a ligamentous state. Fourth trochanter crest-like. Three functional pes-digits. (*Iguanodon*.)

A.S.W.

VII.—LIST OF FOSSIL MAMMALIA. By Dr. OTTO ROGER. Bericht Naturw. Vereins Schwaben u. Neuburg in Augsburg, vol. xxix. (1887), pp. 1-162.

THIS important work of reference is a new edition of Dr. Roger's list of known fossil mammalia published in the Correspondenzblatt Regensburg. zool.-min. Verein, 1879-82. It incorporates the recent results of Schlosser, Lydekker, Trouessart, and the American palæontologists, and is thus brought well up to date.