

Geology and Palaeontology



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ANTHROPOLOGY IN FRANCE.—The unusual amount of matter relating to our own country precludes giving more than a brief outline of what is doing abroad. The *Bulletins de la Société d'Anthropologie de Paris* reports the following discussions in the 1st fasciculus for 1881 :

- Bordier, M.—Calotte cérébrale d'un Esquimau, p. 16.
 Chudzinski, M.—Splanchnologie d'un orang, p. 19.
 Vinson, Jules.—Procédé de calcul du jeune Jacques Inaudi.
 Soldi, Emile.—De l'emploi du fer en Egypte pendant les premières dynasties, p. 34.
 Tenkate, H. F. C.—Crânes de musée de Leyde, p. 37.
 De Torok, A.—Crâne du jeune gorille de musée Broca, p. 46.
 Bordier, A.—Rapport sur un mémoire de M. Petitot, p. 57.
 Hayem, Professor.—Du sang au point de vue anthropologique, p. 72.
 Millet, —.—Menhirs et bassins taillés dans le grès en Algérie.
 Rabourdin, Lucien.—Age de pierre dans le Sahara central, pp. 115-160.

The *Revue d'Anthropologie*, vol. iv., part iv., contains the following original papers and reviews :

- Broca, Paul.—La torsion de l'Humerus et le tropomètre, p. 577.
 Quatrefages, M. de.—Les voyages de Moncatch-Apé, p. 593.
 Ledouble, M.—Sur certain muscles communs aux animaux et à l'homme, p. 635.
 Nadaillac, M. de.—La poterie chez les anciens habitants de l'Amérique, p. 639.
 Hervé, Georges.—Du poids de l'encéphale, pp. 681-698. [A review of "Das Hirngewicht des Menschen; eine Studie," von Th. von Bischoff, Bonn, 1880, and "Sul peso del cervello dell'uomo," studio di Giustiniano Nicolucci, Napoli, 1881.]
 Zabarowski, —.—Revue préhistorique. [Includes the following works: Emile Soldi's "Les arts méconnus;" Dr. Nehrings's "Nouvelles fouilles dans le diluvium de Thiede," and other works of a more local character.]
 Topinard, Paul.—Revue des livres. [Résumé of recent literature upon the aborigines of Australia.]
 Manouvrier, L.—Review of French and Italian journals.
 Deniker, —.—Review of Dr. Hortel's "De la queue chez l'homme."
 Vars, Ed.—Revue russe. [Examines M. Bogdanoff's craniological works.]

At the close of the number is an extended bibliography, too long to be reproduced here; but the important titles will appear in the next Smithsonian Annual Report.

CORRECTION.—By an oversight, for which we are extremely sorry, the title of the paper by Professor Cyrus Thomas on the Manuscript Troano, read at the American Association, was omitted from the list.

GEOLOGY AND PALÆONTOLOGY.

MARSH ON THE CLASSIFICATION OF THE DINOSAURIA. — Professor Marsh regards the group as a sub-class, and divides it into five orders, viz.; *Sauropoda*, *Stegosauria*, *Ornithopoda*, *Theropoda* and *Hallopoda*; the first three herbivorous, the last carnivorous. The *Sauropoda* include *Atlantosaurus*, *Camarasaurus*, *Cetiosaurus* and other forms having five digits on each of the limbs, and limbs nearly equal; *Scelidosaurus*, *Hylæosaurus* and others having also twenty digits, but with small fore limbs and a post-pubis, form the order *Stegosauria*; *Camptonotus*, *Laosaurus*, *Iguanodon*, etc., having five digits in manus and three in pes, with small fore limbs, are included in the *Ornithopoda*; while *Megalosaurus*, *Altosaurus*, *Zanc-*

Iodon, *Amphisaurus*, and other species with digitigrade feet, small fore limbs, and prehensile claws, form the order *Theropoda*, which has also two sub-orders—*Cœuria* and *Campsognatha*. The *Hallopoda* are doubtfully referred to the sub-class, and have the hind feet specially adapted for leaping.

In the preparation of his papers on this subject Professor Marsh has had very extensive material, and has had excellent opportunities for investigation. He had added more to our knowledge of this division of reptiles than perhaps any other single person. His demonstration of the structure of the pelvis in various genera, of the feet in many forms, including *Campsognathus*, and the discovery of the clavicle in *Iguanodon* and other genera, are among the most important points gained. It is, however, not evident that the Dinosauria constitute a group of higher rank than an order, or that the subdivisions proposed by Professor Marsh are of higher rank than sub-orders or families.

The "personal equation" is observable in this work, in as marked a degree as in any of Professor Marsh's papers. This is seen—

First. In his failure to characterize his genera on first publishing them—a proceeding which is apparently intended to warn others off the field. The publication of *nomina nuda*, without the definitions which enable others to use them, is, to say the least, very inconvenient to cotemporary students.

Second. In his failure to recognize the labors of others, except to point out supposed errors. Thus three of his orders had received names long before Professor Marsh wrote, and had been defined, less completely, it is true, but, as far as the material went, correctly. Thus his Sauropoda was named by Owen, in 1841, *Opisthocæla*; his Ornithopoda by Cope, in 1869, *Orthopoda*; and his Theropoda by Cope, in 1869, *Goniopoda*. The numerous genera described from the American Jurassic by American authors, are all ignored or stated to be founded on error.¹ Some of them are identical with those proposed by Marsh, and of earlier date.

Thirdly. In his failure to credit others with their discoveries, and permission of the inference that they are his own. Such is the discovery of the hyposphen articulation, by Cope, which he re-names the diplosphen. Such is the discovery of the sternum in the Dinosauria, which was made by Cope in the Laramie genus *Monoclonius* in 1877 (Proceedings Philadelphia Academy). His reference of some discoveries to other than their authors is not less frequent. Thus it is well known that Professor Cope first showed the bird-like affinities of some of the Dinosauria, and affirmed

¹As e. g., *Amphicalias* Cope, which Marsh states, in effect, was founded on the characters which belong to lumbar vertebræ of other genera, ignoring the fact that other distinctive characters were given at the same time, which are entirely sufficient.

that the bird-like tracks of the Triassic formation were made by Dinosauria, at least a year before Professor Huxley; yet these observations are credited to the latter writer.

It cannot be said in defence of these defects in an otherwise excellent memoir, that the papers in question have been written by Professor Marsh's assistants, since the latter are not made responsible on the title-page.—*E. D. Cope.*

THE DINOSAURS OF BERNISSART¹.—In the year 1878 numerous bones of fossil reptilia were discovered in the St. Barbe mine of the Bernissart coal district, and ultimately several Iguanodon skeletons were taken out from a depth of three hundred and fifty metres, as complete and almost as well preserved as though they had come straight from a slaughter-house. In a notice submitted to the Royal Academy of Belgium, M. Boulenger founds a new species on these skeletons, on account of their possession of six sacral vertebræ instead of five, the number possessed by that in the British Museum. M. P.-J. Van Beneden, however, in reviewing M. Boulenger's work, states his belief that the remains belong to the well-known *I. mantelli* of England and Western Europe, and that the difference in the number of sacral vertebræ is merely an individual one. In support of this opinion he cites the facts that another Iguanodon, described by M. Hulke, has only four sacrals, and that the number of sacrals is subject to variation in many animals, especially in birds, the additional ones being taken from the caudal or the lumbar series.

M. Dupont has also written upon the Bernissart Iguanodons, and agrees with M. Van Beneden in referring them to *I. mantelli*. M. Van Beneden adds some interesting particulars relating to the limbs and pelvic arch of Iguanodon.

All palæontologists agree that the Iguanodons had on the hind feet three toes used in walking, but it is not generally known that the metatarsal bones of these three toes were completely separate, alike at both ends, and capable of leaving their imprint upon the soil behind the toes, so that the Iguanodons were plantigrade when compared with most birds, or, to speak more accurately, were *herpetigrade*, like the penguin's.

The fore limbs, which are as little developed as in kangaroos, have five fingers; three middle ones equally developed and having three phalanges, as also has the fifth, and a thumb consisting of a single large phalanx and a rudimentary metacarpal. The fifth finger is small, and opposable to the thumb, so that the Iguanodons had two hands with which to gather the fruits of the cycads and conifers that flourished in the same epoch.

The impressions of the footsteps of these animals, well preserved

¹Sur l'Arc Pelvien des Dinosauriens de Bernissart; par M. G. A. Boulenger. Rapport de M. P.-J. Van Beneden. Bruxelles. Imprimerie de l'Académie Royale de Belgique, 1881.

both in England and in Hanover, teach us that they did not make use of their tail for support, either when walking or when at rest, since up to this time no trace of a caudal impression has been found. This is also what might be inferred from the structure of the processes of the caudal vertebræ and from the tendons, which are so distinctly ossified that with a little trouble the myology of the tail could be made out.

There has been considerable difference of opinion among naturalists as to the homologies of the pelvic bones of saurians, especially with regard to the pubis, which is incomplete and does not take part in the formation of the cotyloid cavity. The pelvic basin of *Comptonotus dispar* (Marsh) is, according to that author, nearest to that of the Iguanodon, but has the post-pubis more bird-like than in the latter.

HULKE ON POLACANTHUS FOXI¹.—Dr. J. M. Hulke has at last given us a description of this species, whose name has been on our lists for some years, but of which it has been impossible to get any information. In proper concession to mnemonic convenience Dr. Hulke has adopted the name given without description by Professor Owen, but the species will stand *Polacanthus foxi* Hulke. The animal is nearly allied to *Hylæosaurus*, and is one of the most thoroughly defended of the Dinosauria. Its body supported huge spines, and its tail was enclosed in an armor of bony plates. The species was large and powerful, but not one of the gigantic forms of the order. It was found in the Wealden of the Isle of Wight by Dr. Fox, who has made so many important discoveries in that region.

RUSSIAN SAUROPTERYGIA.—M. Kiprijanoff has communicated an important memoir on the genus *Ichthyosaurus* to the Imperial Academy of St. Petersburg². The motive for the memoir was found in the discovery of the genus in the Cretaceous greensand of European Russia. This threw the genus into a later geological epoch than its range in Continental Europe had included. The author takes occasion to analyze the species of the genus, a work which will be of great service to extra-European palæontologists in their studies. The Russian species is the *I. campylodon* of Carter. Besides describing the bones of the skeleton, M. Kiprijanoff investigates their histology, and especially the minute structure of the teeth. The plates illustrating this part of the subject are beautiful specimens of art.

THE GEOLOGY OF FLORIDA.—Prof. E. A. Smith, of Alabama, summarizes the geological history of the Peninsula of Florida as follows:

(1.) Since no rocks have been found in Florida older than the

¹From the Transactions of the Royal Society, London. Part III, 1881.

²Studien ueber die Fossilien Reptilien, Russlands von M. Kiprijanoff. 1 Theil, Galtien Ichthyosaurus. Mem. de l'Academie Imperiale de Sciences de St. Petersburg. 1881.

Vicksburg limestone, it follows that until the end of the Eocene period, this part of our country had not yet been added to the firm lands of the continent, but was still submerged.

(2.) During the period of disturbance which followed the deposition of the Vicksburg limestone, Florida was elevated nearly to its present height above the sea-level, which elevation was maintained without material interruption until the Champlain period.

(3.) In this upward movement the axis of elevation did not coincide with the present main dividing ridge of the peninsula, but lay considerably to the westward, probably occupying the position very nearly of the western coast of to-day.

(4.) After the Miocene (or possibly the Pliocene) period, there was again an elevation of Florida, as is shown by the presence of a Miocene limestone of the eastern slope of the peninsula, some distance (not less than thirty feet) above the present sea-level.

(5.) We have evidence in the distribution of the beds of the Champlain period (stratified drift of orange sand) that Florida and parts of the adjacent States were during this time submerged sufficiently to allow the deposition over them of a mass of pebbles, sand and clay, varying in thickness from a few feet to two hundred. From the peculiar mode of stratification of most of these beds, it is concluded, with reason, that they were sediments from rapidly-flowing, ever-varying currents. In the State, the beds of yellow and red loam lie directly upon the stratified drift. These beds of loam are devoid of stratified structure, as well as of fossils, and were probably deposited from slowly running or nearly stagnant waters.

(6.) Following the submergence during the Champlain period, was a re-elevation, which brought the peninsula to approximately its present configuration.—*Scientific News*.

GEOLOGICAL NEWS.—The Trans. N. Y. Acad. of Sciences contain a paper by Mr. J. H. Purman upon the "Geology of the Copper Region of Northern Texas and the Indian Territory," giving the first accurate description of the geological structure of the district.—S. A. Miller (*Jour. Cincin. Soc. Nat. Hist.*) concludes his article on Mesozoic and Cænozoic Geology by considering the "Drift of the Central Part of the Continent." He describes the character of these deposits, their situation, altitude, magnetic bearings, fossils, etc., and concludes by the assertion that the facts collected tend to prove that "there is no marine or other deposit which represents a glacial period." In a second paper he describes two new crinoids from the Niagara group, and two new shells.—In the Geneva Archives des Sci. Phys. et Nat., July, 1881, Mr. F. A. Forel has an important article on the periodical variations of glaciers, based upon observations in the Alps. The Rhone glacier has retreated from 1857 to 1880 at a rate varying from twenty-

three to seventy-one metres annually. The retreat or advance of a glacier depends "on changes of long periodicity in meteorological conditions—heat, moisture, winds."—In the *Am. Journal of Science* Dr. R. W. Coppinger has some interesting observations upon the movement of the soil-cap on the shores of Western Patagonia. Evergreen forests and brushwood cover the shore hills to a height of one thousand feet, and gravitation, acting on this mass of vegetation and the soil beneath, resting on a surface already planed by ice-action, causes the whole to slide downward to the water, which removes its free edge in much the same way that the end of a Greenland glacier is removed.—The Report on the Geological and Natural History Survey of Minnesota, for 1880, contains a descriptive list of rocks, descriptions of three new Lower Silurian Brachiopods, and a note on the Cupriferous series by Professor Winchell; also an account of the Glacial phenomena of the State and the district north and west of it, by Warren Upham.

GEOGRAPHY AND TRAVELS.¹

DR. LENZ ON THE SAHARA.—Dr. Oscar Lenz gives in the last number of the *Zeitschrift* of the Berlin Geographical Society² an account of the results of his journey across the Sahara, from Tanger to Timbuktu, and thence to Senegambia. The following good abridgement of his paper we take from the *Nature*:

"The real journey was begun at Marrakesh, at the northern foot of the Atlas mountains, where Dr. Lenz laid in his store of provisions and changed his name and dress, traveling further under the disguise of a Turkish military surgeon. He crossed the Atlas and the Anti-Atlas in a south-western direction. The Atlas consists, first, of a series of low hills belonging to the Tertiary and Cretaceous formations, then of a wide plateau of red sandstone, probably Triassic, and of the chief range, which consists of clay-slates with extensive iron ores. The pass of Bibanan is 1250 metres above the sea-level, and it is surrounded with peaks about 4000 metres high, whilst the Wad Sus valley at its foot is but 150 metres above the sea. The Anti-Atlas consists of Palæozoic strata. On May 5, 1880, Dr. Lenz reached Tenduf, a small town founded some thirty years ago, and promising to acquire great importance as a station for caravans. The northern part of the Sahara is a plateau 400 metres high, consisting of horizontal Devonian strata which contain numerous fossils. On May 15 Dr. Lenz crossed the moving sand-dunes of Igidi, a wide tract where he observed the interesting phenomenon of musical sand, a sound like that of a trumpet being produced by the friction of the small grains of quartz. But amidst these moving dunes it is

¹ Edited by ELLIS H. YARNALL, Philadelphia.

² Kurzer Bericht über meine Reise von Tanger nach Timbuktu und Senegambien. Von Dr. Oscar Lenz. *Zeitschrift der Gesellschaft für Erdkunde zu Berlin*. Nos. 94, 95, p. 272. It is accompanied by a large map of his route. Scale 1 : 1,500,000. Drawn by Dr. R. Kiepert.