

1879. (D. Appleton & Co.)—The scope and general object of this work are well stated in the above title. It occupies a decidedly new place among handbooks of travel and contains a great amount of information in a very condensed form.

7. *Essentials of Chemistry, Inorganic and Organic, for the use of Students in Medicine*; by R. A. WITTHAUS. New York, 1879. 18mo, pp. 257. (William Wood & Co.)—The author has skillfully condensed the "Essentials of Chemistry," for the Medical student, into a vest-pocket catechism, which fulfills well the object for which his little volume has been prepared.

8. *Handbook of Alabama*: A complete index to the State; with a geological map and an Appendix of useful tables, by SAFFOLD BERNÉY.—This volume contains a valuable outline of the geology of Alabama, with a geological map of the State, by Eugene A. Smith, Ph.D., State Geologist.

The Amateur's Handbook of practical Information for the Workshop and the Laboratory: containing directions for bronzing, lacquering, polishing metal, etc. 44 pp. 12mo. New York, 1878. (The Industrial Publication Company).

On the Structure of the Stylasteridæ. A family of Hydroid Stony Corals, by H. N. Moseley, F.R.S., late Naturalist on board H. M. S. Challenger. (From the Philosophical Transactions of the Royal Society, Part II, 1878.

Annual Report of the Chief Signal Officer to the Secretary of War for the year 1877. 570 pp. 8vo, with 34 maps and 18 charts. Washington, 1877.

Description of eight new species of Holocystites from the Niagara Group, by S. A. Miller. The new species are: *H. Brauni*, *H. Wetherbyi*, *H. ornatus*, *H. perlongus*, *H. globosus*, *H. pustulosus*, *H. plenus*, *H. elegans*; they are from Jefferson and Ripley counties, Indiana.

Remarks on some Lamellibranchiate Shells of the Hudson River Group by R. P. Whitfield. The new species are: *Cypricardites quadrangularis*, *Cuneamya curta*, *Orthodesma Mickleboroughi*, *Sedgwickia (?) lunulata*; locality, Clinton Co., Ohio.

A Handbook of the Electric Telegraph, by A. E. Loring. 98 pp. 12mo. New York, 1878 (Van Nostrand's Science Series).

Statistical Sketch of South Australia, by Josiah Boothby. 86 pp. 8vo. London, 1876. Published by authority of the Government. (Sampson Low, Marston, Searle, & Rivington, London.)

The American Antiquarian: a Quarterly Journal devoted to Early American History, Ethnology, and Archæology. Edited by Rev. Stephen D. Peet, of Unionville, Ohio. Published by Brooks, Schinkel & Co., Cleveland, Ohio.—Vol. i, No. 2, July, August and September, 1878.

A Monograph of the Silurian Forests of the Girvan District in Ayrshire, by H. Alleyne Nicholson and Robert Etheridge, Jr. Fasciculus I. Rhizopoda, Actinozoa, Trilobita. 135 pp. 8vo, with ix plates. Edinburgh and London, 1878. (William Blackwood & Sons.)

Report on the Meteorological Service of the Dominion of Canada, by the Superintendent; to which is appended the Report of the Directors of the Magnetic and other Observatories, for the year ending December 31st, 1877. Ottawa, 1879.

## APPENDIX.

ART. IX.—*A new Order of Extinct Reptiles (SAURANODONTA), from the Jurassic Formation of the Rocky Mountains*; by Professor O. C. MARSH.

THE absence of the genus *Ichthyosaurus* in the extinct fauna of this country has long been a noteworthy feature, for up to the present time no traces of it have been detected, although its remains are especially abundant in Europe. An interesting specimen recently discovered in the Rocky Mountain region presents, in most of its skeleton, the characteristics of that genus, but is *without teeth*. The vertebræ, ribs, and other portions of the skeleton preserved, cannot be distinguished from the corresponding parts of *Ichthyosaurus*, and many features of the skull show a strong resemblance. The general form of the skull is the same. The great development of the premaxillaries; the reduced maxillaries; the huge orbit defended by a ring of bony plates, are all present, but the jaws appear entirely edentulous, and destitute even of a dentary groove.

The proportions of this reptile were very similar to those of *Ichthyosaurus*. The skull is about two feet (600<sup>mm</sup>) in length, and the facial portion especially produced. The orbits are very large, and the space between them is 140<sup>mm</sup>. The sclerotic ring is composed of only eight plates. Its diameter at the base is 106<sup>mm</sup>, and at the apex 58<sup>mm</sup>. These plates are not arranged in a nearly flat ring, as in *Ichthyosaurus*, but form the basal segment of an elongated cone, as in the eyes of some birds. The vertebræ are short, and deeply bi-concave. The neural arch is articulated to the centrum. One trunk vertebra measures 85<sup>mm</sup> in width, 38<sup>mm</sup> in length on the floor of the neural canal, and 21<sup>mm</sup> between the centers of the two rib articular faces of the same side. The length of the entire animal was about eight or nine feet. The remains at present known are all in the Museum of Yale College.

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This reptile may be called *Sauranodon natans*, and the order it represents *Sauranodonta*. This genus bears a similar relation to the Ichthyosaurs that *Pteranodon* does to the true Pterodactyls, and it is interesting to find the two highly specialized forms preserved in the same region.

The geological horizon of the *Sauranodontidæ*, so far as now known, is in the Jurassic, immediately below the *Atlantosaurus* beds. The accompanying fossils are Ammonites and Belemnites, showing more distinctly marine deposits, which may be called the *Sauranodon* beds.

Yale College, New Haven, December 27, 1878.

ART. X.—*Principal Characters of American Jurassic Dinosaurs*; by Professor O. C. MARSH. Part II. With eight Plates.

IN a previous article (vol. xvi, p. 411, Nov., 1878), the writer gave a short account of the geological horizon and accompanying fossils of the Jurassic Dinosaurs recently found in the Rocky Mountains; and also stated the more important characters of the gigantic *Sauropoda*, as illustrated mainly by the genus *Morosaurus*. In the present communication, this group is further elucidated by a comparison of the structure in some other American genera, especially *Apatosaurus* and *Allantosaurus*, to which belong the largest reptiles hitherto discovered. The carnivorous enemies of this group are also briefly described. The pelvis of Dinosaurians, hitherto so little known, is illustrated by new examples, and by the corresponding parts in some recent birds.

*Apatosaurus* Marsh, 1877.\*

The genus *Apatosaurus* may be readily distinguished from *Morosaurus* by the sacrum, which consists of only three vertebræ instead of four (Plates V and VI, figures 1 and 2.) The ischium, also, has its distal end expanded. The scapula, likewise, is quite different, its superior extremity, being without the anterior extension seen in *Morosaurus* (Plate IV.) So far as at present known, the latter character, together with the form of the sacrum, separates it from the allied genus *Allantosaurus*.

The cervical vertebræ of *Apatosaurus* are strongly opisthocœlian, and of moderate length. (Plate III, figures 1 and 2.) The dorsals have their centra similar, and both have deep cavities in the sides and in the neural arch resembling those in the corresponding vertebræ of *Morosaurus*. The lumbar vertebræ have their articular faces more nearly plane, and the last lumbar

\* This Journal, vol. xiv, p. 514.

is expanded transversely. The sacrum is characteristic of the genus, and quite unlike any hitherto known. The type specimen on which the genus was established is well shown in Plate VI, figure 1. It is short and massive, and the three vertebræ which form it are nearly equal in size and general proportions. They are firmly coössified, and their transverse processes are ankylosed to the centra. Those on each side are united distally into a solid mass, which rests on the short ilium. The articular faces of the sacral vertebræ are nearly plane. That of the anterior centrum is a transverse oval in outline, and the posterior face is more nearly round. The centra and their processes are somewhat lightened by cavities, as in the sacra of *Allantosaurus* and *Morosaurus*. The sacrum of the latter genus, shown in figure 2 of Plate V, is built upon the same general plan, characteristic of the *Sauropoda*, but the transverse processes are less massive, and have a greater vertical elevation. The same sacrum is shown in position in Plate V, figure 1. A striking feature of this sacrum is seen in the large size of the neural canal (*nc*), which, strange to say, is here two or three times the diameter of the brain cavity. This is a most suggestive fact, and without parallel in known vertebrates.

The scapula of *Apatosaurus* is large (Plate IV), and has in its lower portion an anterior projection similar to that in *Morosaurus*.\* Above this, the shaft continues about the same width to the upper end, which is comparatively thin. The coracoid is small in proportion to the scapula, and subquadrate in outline, thus differing in form from that of *Morosaurus*. The foramen is large, and near the superior border.

There is at present some difficulty in separating the limb bones and various other parts of the skeleton of *Apatosaurus* from the corresponding portions of *Allantosaurus*, especially as the type species of each are nearly equal in size, and their remains are found in the same localities. The sacra show the genera to be quite distinct, and the abundant material now in the Yale Museum, when carefully collated, will enable other parts of the structure to be compared. The teeth in all the herbivorous genera of the *Sauropoda* from the *Atlantosaurus* beds, so far as now known, appear to be very similar, and hence do not afford generic characters.

The type species of the present genus is *Apatosaurus ajax* Marsh, and the known remains indicate a reptile at least fifty feet in length. A much larger species is indicated by various remains from the same locality in Colorado, among which is the huge cervical vertebra represented in Plate III, figures 1 and 2. This species had a short massive neck, and hence may be

\* This Journal, vol. xvi, Plate VI.