

are other streamers, pointing obliquely to planets or comets; that the zodiacal light is the general stream of electrical influence emanating from the sun and embracing all his planetary children; and that the sun-spots and the hydrogen prominences are due to electrical outbursts. We have had similar hypotheses put forth in England, but not so well argued as by Prof. Serpieri. Like the rest, he fails, however, to supply us with any explanation of the source of such tremendous electric energy. We may have the cylinder, the prime conductors, the insulators, the Leyden jars, and all the apparatus of a fine electrical machine; but we shall get no sparks unless somebody turns the handle. We obtain no electrical force without an expenditure of equivalent mechanical power. In the battery we must oxidise an equivalent of zinc for each equivalent of electricity produced. We know something about the laws of electrical excitation; and those who assume the existence of such huge electrical forces without indicating their origin in accordance with these known laws, only carry the problem of the source of solar energy one stage further back without advancing a single step towards its solution. Among the other papers are Lannetti on Etruscan Crania, and some on Pathology and pure Mathematics.

The Annals of Chemistry, compiled by Dr. Polli, is a carefully collected and valuable record of the progress of Chemistry, in which the subjects are classified under the heads of Pharmacy, Hygiene, Dietetics, Physiology, Toxicology, Pathology, Therapeutics, and Miscellaneous. It is published monthly in octavo fasciculi of sixty-four pages, each containing abstracts of papers from native and foreign journals. It sells at rather less than one shilling. As our *Philosophical Magazine*, with eighty pages of the same size, scarcely pays expenses at 2s. 6d., we may infer that the *Annali di Chimica*, of Milan, has a better circulation than its old-established scientific contemporary of "London, Edinburgh, and Dublin."

W. MATTIEU WILLIAMS

SEELEY ON THE ORNITHOSAURIA

Index to the Fossil Remains of Ornithosauria, Aves, and Reptilia from the Secondary Strata, arranged in the Woodwardian Museum, Cambridge. By Harry Govier Seeley. 8vo. pp. 144. (1869. Cambridge: Deighton.)

The Ornithosauria, an Elementary Study of the Bones of Pterodactyles. By Harry Govier Seeley. With 12 plates. 8vo. pp. 136. (1870. Cambridge: Deighton.)

THANKS to the activity of the "Coprolite" workings in the Upper Greensand around Cambridge, the Woodwardian Museum possesses particularly rich series of interesting reptilian remains, especially those belonging to the *Ornithosauria* or Pterodactyles (Flying Lizards) of the Secondary rocks; to which the second work with its twelve plates is entirely devoted, as is also a large part of the Catalogue first published.

The "Index to the Fossil Remains" is introduced to the attention of the student and anatomist by a prefatory notice from the Rev. Adam Sedgwick, Woodwardian Professor, who, although in his eighty-fifth year, evinces still considerable remains of his wonted fire, when taking up his pen to write of the treasures contained in the Museum of his Alma Mater. The cost of preparing these works has been borne by Prof. Sedgwick, but the printing of both

books has been defrayed out of the funds of the Syndics of the University Press.

1. The first book is intended to serve as a guide to the student in the examination of the remains of the extinct birds and reptiles preserved in the Woodwardian Museum, each case, shelf, and bone being numbered so as to correspond with the catalogue in which it is described. The list of specimens from the Cambridge coprolite bed occupies about half the book.

Many new forms are here announced by the author for the first time, as *Enaliornis* (a new bird) several new *Ichthyosaurs*, a new Crocodile, 3 species of *Stereosaurus*, 2 new Chelonians; so that we have altogether 70 species from the Cambridge Greensand. There are also Chalk (8 sp.), Gault (2), Wealden (12), Purbeck (7), Potton beds (18), Portland (1), Kimmeridgian (10), Coral rag (3), Oxford clay (8), Oolites (4), Lias (20), foreign reptiles (24), making a total of 187 species.

2. In the second work, that on the Ornithosauria, the author enumerates the materials at his disposal, namely, 500 bones in one collection, and 400 in another, probably representing not fewer than 150 individuals, which well displays the richness of the area.

The bones from the coprolite diggings are much broken, but they retain sufficient character to be readily determined by the comparative anatomist.

Probably, no group of animals have caused more contention between Naturalists than the Ornithosaurians. They have been regarded as bats (Sömmering), as intermediate between birds and reptiles (Goldfuss), amphibians (Wagner), and so on. Herman von Meyer, who has paid more attention to them than any other anatomist, concludes them to be reptiles, though with strong avian affinities. Prof. Owen maintains that they are Saurians.

Mr. Seeley combats these views, and contends that the Pterodactyles were more nearly allied to birds than reptiles, and he refers them all to a new genus, *Ornithocheirus*.

He contends against the cold-blooded view taken of them by Prof. Owen, and asserts that they were warm-blooded, chiefly founding his opinion on the form of the brain. There is a very strong objection to be made against the retention of the terms "cold-blooded," and "warm-blooded," for it seems to us that the heat developed by the animal's body is in direct proportion to the work to be performed. Thus, in aerial locomotion, the efforts of the pectoral muscles to sustain the body in the air, necessitate also a correspondingly more rapid action of the heart and lungs, producing, therefore, more rapid circulation, and an increased bodily temperature. We are therefore inclined to agree with Mr. Seeley on the grounds that, in proportion to the rapidity and the sustained action of the great motor muscles of the body (whether of legs or wing) so will be the rapidity of the action of the heart and lungs, and consequently the acceleration of the temperature of the whole body.

The bones from the Cambridgeshire Greensand are very often so fragmentary that their determination requires the most exact anatomical skill, and we think the plates would have been more useful if in a few instances (perhaps in all) the missing parts and processes had been indicated in outline, so as to help to the better understanding thereof by the student.

H. WOODWARD