

FOSSIL BOTANY.

Cours de botanique fossile fait au Muséum d'histoire naturelle. Par M. B. RENAULT. 2ème année. Paris, Masson, 1881. 194 p., 24 pl. 8°.

IN the first volume of this remarkable work, which was reviewed in this country a year since (*Proc. Amer. phil. soc.*), the author has exclusively considered the Diploxyleae, and given the history of each of the families of that class, — the Cycadeae, Zamiae, Cycadoxyleae, Cordaiteae, Paroxyleae, and Sigillariae. As the question of the relation of the Paroxyleae and Sigillariae is of the greatest importance for the history of the evolution of plants, it has been considered again in this year's course, though, in the preceding, the structure of the Sigillariae had been already examined. The author therefore proposes to study the most highly organized vascular cryptogams, and to search by studying the anatomy of the stems, the branches, and the roots, if, as has been asserted, any of them, at a certain point of their existence, take on the phenogamic character so distinctly that a separation of these two great divisions becomes impossible.

The essential characters of the vascular cryptogams to be examined are presented in a table. They are divisible into two prominent groups: 1°. The Lycopodiaceae and the Rhizocarpeae, which are heterospores, though some Lycopodiaceae are both heterospores and isospores; 2°. The Ophioglossae, the Equisetaceae, and the ferns, which are isospores.

The first group of the Lycopodiaceae is that of the Lepidodendreae, beginning in the first chapter with the genera Psilophiton and Lepidodendron. Chapter 2 examines in detail the anatomical structure of three types of Lepidodendron; viz., *L. Rhodumnense*, *L. Harcourtii*, and *L. Justieri*. Chapter 3 relates to the anatomy of the fructification of Lepidodendron or to the Lepidostrobi. Chapter 4 gives a brief examination of the characters of the other genera referred to the Lycopodiaceae. Chapter 5 compares the distinctive characters of Sigillaria and Lepidodendron, the differences, after discussion, being set forth in a comparative table; the Sigillariae being recognized as related to the phenogamous plants, and the Lepidodendreae to the Lycopodiaceae.

To the Rhizocarpeae belong, at the present epoch, the genera Pilularia, Marsilia, Salvinia, and Azolla. Of these, no remains have been found in the carboniferous; but species of the genera Sagenaria and Sphenophyllum seem to be related to this family. The history of the genus Sphenophyllum, as heretofore known,

and the description of the species, are given in chapter 6. The anatomical structure of Sphenophyllum is discussed in chapter 7; the woody axis is always full, not hollow, and inflated at the articulations only when a branch is formed; the stems, the leaves, the bark, the roots, the fructification, are treated.

With chapter 8 begins the treatment of the cryptogamous isospores, which may be summarized as follows: Equisetaceae. — The living plants of this family have only one kind of spores; examination of the stems and other organs. Asterophyllites. — Tiges, branches, and principal species described; two forms of fructification described (*Wolkmannia* and *Macrostachya*). Chapter 9. Annulariae. — Description of the different organs; stems, branches, and fructification; and of the species. Chapter 10. Fructification of Annularia, considered with species of uncertain relation (*Bruckmannia* and *Cingularia*). This chapter ends with a comparative table exposing the characters of the Asterophylliteae and the Annulariae. Chapter 11 contains descriptions of the genera *Schizoneura*, *Phyllothea*, and *Equisetum*. Nine species of *Schizoneura* and twenty of *Equisetum* are described, none from the paleozoic formations. The genus *Calamites* and its different organs are described in chapter 12.

The concluding chapter contains a table showing the different formations where the plants described in the volume have been obtained. The true Equisetaceae do not appear lower than the trias. The range of Asterophyllites, Annularia, Calamites, and the Lycopodiaceae, is from the upper Permian to the culm or subcarboniferous measures; that of Psilophiton is in the Devonian and upper Silurian. The volume ends with considerations on the distribution of the plants, on the climate as indicated by their nature, and on certain organs which may be useful in classifications. It would be useless to eulogize this excellent work, which is illustrated with twenty-three splendid plates. The above summary sufficiently shows its importance.

A NEW CALCULATION OF THE ATOMIC WEIGHTS.

Die atomgewichte der elemente, aus den originalzahlen neu berechnet. Von Dr. LOTHAR MEYER und Dr. KARL SEUBERT. Leipzig, 1883, Breitkopf & Härtel. 246 p. 8°.

THE great importance to chemistry of an exact knowledge of the atomic weights is well illustrated by the recent activity of chemists in