CURRENT LITERATURE

BOOK REVIEWS

Fossil plants

The third volume of SEWARD'S *Fossil plants*[1] will be welcomed alike by students of paleobotany and by those whose primary interest is in the morphology and phylogeny of the living vascular plants. The volume, comprising chapters xxvii–xxxix of the complete work, is devoted to Gymnosperms, the space being distributed as follows: Cycadales (recent) 34 pages, Pteridospermae 140, Cycadofilices 39, Cordaitales 86, Paleozoic gymnospermous seeds 66, Cycadophyta (fossil) 226, Bibliography of Vols. III and IV 48, Index 17, making a total of 656 pages. There are 252 figures, many of which are original.

The account of the living cycads, from the standpoint of a competent paleontologist, is particularly interesting and suggestive to one who, like the reviewer, is somewhat familiar with those forms, but is dependent upon investigators like SEWARD for descriptions of their extinct predecessors. This introductory chapter is a fitting introduction to the more detailed treatment of paleozoic and mesozoic members of the phylum. The practical advantage of such an introduction is sufficient excuse for treating the living cycads first instead of considering them in their natural place at the end of their phylum. The author believes the antiquity of that part of the cycadophyte phylum represented by the living cycads cannot be determined, but it is probable that if cycads, apart from Bennettitales, existed in the Jurassic and lower Cretaceous beds, they occupied a very subordinate place in comparison with the Bennettitales. While the living cycads resemble the Bennettitales in many vegetative features, we believe that the reproductive structures show a kind of difference which would make it impossible to derive the living cycads from any forms of the Cycadeoidea type; while, on the other hand, the Cycadofilicales, which SEWARD prefers to call Pteridospermae, have reproductive structures from which the cones of living cycads might easily be derived. If the living cycads have come from Bennettitales, they must have come from ancient types in which the megasporophylls still retained a distinct leaflike character. Whether they have come from the Bennettitales or directly from the Cycadofilicales, they must have greater antiquity than is indicated by any material yet discovered. We agree with SEWARD that the affinities are still in doubt, but we hope that Triassic material which can be sectioned will be found and that it will clear up relationships, for, it seems to us, the differentiation must have taken place long ago.

[1] SEWARD, A. C., Fossil plants, a textbook for students of botany and geology. Vol. III. Pteridospermae, Cycadofilices, Cordaitales, Cycadophyta. 8vo. pp. xviii+656. *figs. 253*. Cambridge University Press. 1917.

We should have treated the Pteridospermae, Cycadophyta, and Cycadales together as a cycadophyte phylum. The Cycadofilices, including fernlike plants which may belong to the Pteridospermae but in which seeds have not yet been discovered, naturally follow the known Pteridospermae; but it does not seem natural to treat the Cordaitales between the Pteridospermae and the Cycadophyta. After a careful reading of the Pteridospermae, we still fail to see why they should not be regarded as an order of the gymnosperms rather than as a group of equal rank. However, these are minor and very insignificant objections. The book is full of detailed descriptions and critical discussions which will make it possible for investigators with far less training than SEWARD to make valuable studies of such material as may fall into their hands.

The Pteridospermae are introduced by an excellent description of *Lyginopteris*, the name applied to the plant whose various fragments have been described under the names *Lyginodendron* (stem), *Sphenopteris* (leaf), *Lagenostoma* (seed), *Crossotheca* (microsporophylls), and *Kaloxylon* (root). The descriptions of *Heterangium* and *Medullosa*, while less complete, give a critical account of what is known up to date. The presentation of these 3 forms, with comparatively fragmentary accounts of others, shows where research is needed, and will enable students to fill in missing phases of life histories as material becomes available. In all the paleozoic forms of the cycadophyte phylum, information in regard to to the gametophytes and embryo, although very desirable, is very scant; but if attached seeds could be found and sectioned, the preservation seems good enough to show the desired features.

The treatment of the Bennettitales (Cycadophyta), although it occupies 226 pages, seems short in comparison with the big volumes of WIELAND. The English and French contributions to our knowledge of this group are presented in considerable detail, and the author has drawn upon WIELAND for numerous excellent figures. If well-preserved reproductive structures of the lower members of this group, especially *Williamsonia*, could be found and sectioned, the results could not fail to be important, for they would almost certainly throw light upon the origin of the living cycads.

The Cordaitales, representing the coniferophyte phylum, do not occupy so much space, but comparatively little is known about the group. If our knowledge of these forms were as complete as in case of the Bennettitales, a treatment of the Coniferales would be much simplified. As it is, the various stems, leaves, and reproductive organs referred to this group are described under their respective categories, and material is thus accumulating for a connected life history.

The chapter on paleozoic gymnospermous seeds is particularly conservative and interesting. Many morphologists would have felt little hesitation in assigning most of these seeds to one group or to another, but SEWARD, throughout the work, recognizes the danger of being too positive when dealing with unattached fragments. The characters of the various types of seeds are described and discussed. Although some knowledge of the internal structure is available, it is very evident that little is known in regard to the gametophyte. A knowledge of

the internal structure of the seeds, especially the smaller seeds, might help to connect the Cordaitales with the Pteridophytes.

The fact that the geographical distribution of plants at different stages in the development of the earth receives only disconnected treatment is excused by the plea that the space needed for Vols. III and IV (now in press) was underestimated, the original plan providing for a treatment of geographical distribution at the end of Vol. IV. However, SEWARD promises an entire volume devoted to this subject. Such a work would be welcomed by all students of morphology and phylogeny, and we hope that the volume will make its appearance at an early date.

The complete bibliography and index, together with the critical and conservative presentation of the entire subject, make the work indispensable to those engaged in research upon fossil plants.—C. J. CHAMBERLAIN.

NOTES FOR STUDENTS

Chlorophyll inheritance.—This subject seems to be a stumbling-block both for plant geneticists and cytologists. In 1913 EMERSON and EAST[2] stated that there were on record only two indisputable cases of non-Mendelian inheritance. Both of these were cases of chlorophyll inheritance. CORRENS[3] made reciprocal crosses of a variegated *Mirabilis* (*albomaculata*) with normal green plants, and discovered that in this case inheritance was strictly maternal, the pollen evidently contributing nothing. He explained this by assuming that the variegation was due to a disease of the cytoplasm which destroyed many of the chloroplasts, and that nuclei were immune to this disease. Thus the disease could be transmitted to progeny by the female parent only, since the male is supposed by cytologists to contribute only a nucleus stripped free from its cytoplasm. If one grants CORRENS' assumptions, the mechanism provided will explain this case of maternal inheritance without any violation of MENDEL'S law, for here there would be no true inheritance, but merely reinfection.

BAUR,[4] working with a *Pelargonium* which had white-margined leaves, observed an occasional pure green branch and an occasional pure white branch. Flowers on these branches when self-fertilized gave respectively pure green and pure white progeny (the latter, of course, dying in the seedling stage). A cross either way between the two branches resulted in progeny which were a mosaic of green and white. Such behavior can be accounted for by either of two explanations, but each involves a very bold assumption. If there is a Mendelian determiner responsible for the full green development, and a white

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[2] EMERSON, R. A., and EAST, E. M., Inheritance of quantitative characters in maize. Bull. Agric. Exper. Sta. Nebr. no. 2. pp. 120. *figs. 21.* 1913.

[3] CORRENS, C. E., Zeitschr. Ind. Abstamm. Vererb. 2:331–340. 1909.

[4] BAUR, ERWIN, Zeitschr. Ind. Abstamm. Vererb. 1:330. 1909.