

acteristic of all vascular plants. In this connection he definitely homologizes the moss sporogonium with the sporophyte of ferns. Obviously he entertains the view that *Ophioglossum* among the Ophioglossaceæ is probably the most primitive representative of the fern stock. There appears to be little support for the correctness of this view and it entirely lacks the confirmation of fossil evidence, which in this case is unfortunately lacking. Logically in accordance with the general attitude just indicated, the author derives the Marattiaceæ from ancestors allied to the Ophioglossaceæ. He acknowledges in this connection the serious difficulty of bridging over the morphological gap, between the dorsisporangiate foliar organs of the Marattiales and the so-called sporangiophore of the Ophioglossales. This difficulty appears to the reviewer to be very great indeed, especially in view of the known antiquity of the Marattiales and the apparently recent origin of the Ophioglossales. It further appears from a consideration of the reproductive parts and anatomy of the sporophytes as well as of the gametophytes, that it is much easier to derive the Ophioglossaceæ from typical ferns such as the Marattiaceæ, than it is to entertain the possibility of a reverse course of evolution.

The Morphology of Gymnosperms. By COULTER and CHAMBERLAIN. University of Chicago Press. 1911. Postpaid, \$4.22.

The present volume is undoubtedly the most important general work on the gymnosperms which has ever appeared and is highly creditable to American science. It consists of four hundred and fifty pages and of an equal number of, for the most part, original and remarkably good illustrations. The book is characterized throughout by a sane, broad and withal interesting treatment. The views expressed as to affinities and evolutionary sequence are for the most part clearly, logically and convincingly stated.

The volume is modeled on evolutionary lines, grounded on the solid foundation of the testimony afforded by the rocks, and in this respect presents an agreeable contrast to most

botanical works on plant evolution, which are too often written by persons who have no knowledge or appreciation of the past history of plants. In accordance with this feature, it begins with the oldest known seed-plants, the Cycadofilicales as the authors more logically term the Cycadofilices of Potonie and the Pteridospermeæ of Oliver and Scott. The enormous progress made in our knowledge of the evolution of the gymnosperms is nowhere better illustrated than in this chapter, which may be instructively compared with the meager amount of information supplied on the same subject in the first edition published ten years ago. Here we find an extremely good account of this fascinating primitive group of gymnosperms, long mistaken for ferns, whose true affinities were guessed at by the German paleobotanist Potonie and proved by Oliver, Scott, Grand'Eury and David White.

Logically following the Cycadofilicales, with the interposition of the Cordaitales, which need not be specially referred to in this connection, come the true Cycads and their allies the Bennettiales. The Chicago laboratories have added much to our knowledge of the Cycadales, and the chapter on this group of gymnosperms, now confined to the warmer regions near the equator, is one of the strongest in the book. The Bennettiales, the Cycads of the earlier Mesozoic, owe their elucidation to a large extent to the striking investigations of Dr. Wieland, of Yale University. We find them treated with the fulness which their importance demands.

Next to the Cycad-like gymnosperms come the relatives of the maidenhair tree, Ginkgo, sole survivor, through the pious care of the Japanese priests, of a stock which in the Mesozoic flourished abundantly throughout the northern hemisphere.

The Conifers, the most abundant and important gymnosperms of our existing flora and of great evolutionary importance on account of their extension into the remote past, appropriately occupy about one third of the volume. The gametophytes of this group, which have been particularly the subject of

investigation at Chicago, naturally come in for full consideration, but the past history and the important anatomical features of the Coniferales have not been overlooked. The great influence of modern anatomical and paleobotanical work is nowhere more clearly shown than in the systematic grouping of the Conifers along evolutionary lines. One illustration will serve to make this clear. In the first edition of the present work, which appeared ten years ago, the pine was considered to represent the highest member of the Conifers on account of the complexity of its vegetative and reproductive structures. In the present edition, it is put near the bottom, if not at the very bottom, of the coniferous series, since recent investigations, paleobotanical and anatomical, have demonstrated its great antiquity and at the same time the truth of the general proposition that the Conifers are a reduction series in which the simplest members are most modern and not an ascending one, in which the most complex representatives are the highest.

The Gnetales, which on account of their supposed affinities with the angiosperms are of great botanical interest, are adequately treated. The riddle of their existence is discussed in an entirely unpartisan manner. Following this chapter is one on evolutionary tendencies among the Gymnosperms. This part of the volume is naturally the one about which there is the greatest room for difference of opinion, and it is precisely here that the authors deserve the highest praise. At the present moment the older morphology is in process of resolution under the influence of experimental and paleobotanical activities. For that reason a clear expression of evolutionary sequence, even of groups concerning the past history of which we are well informed, as is relatively true of the Gymnosperms, is extremely difficult. Notwithstanding, in the present volume, we find a remarkably clear position taken, although not entirely unaffected by the back eddies resulting from the partial persistence of the older standpoints.

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Pharmaceutical Bacteria, with Special Reference to Disinfection and Sterilization. By ALBERT SCHNEIDER, M.D., Ph.D. Published by P. Blakiston's Son & Co., Philadelphia, Pa. Price \$2.00.

The rapid development of bacteriology in various directions has led to the publication of books in considerable number, showing the application of bacteriology to different phases of modern life. Medical bacteriology, agricultural bacteriology, industrial bacteriology and various other aspects of this new science have been fairly well exploited. The present book is in a new line, and is designed simply to cover the relations of bacteriology to pharmacy—being intended primarily for students in college of pharmacy and incidentally to pharmacists in general. The subjects that are treated in the work are only those which have some practical relation to this business. After a general introduction there is a brief but comprehensive historical survey of the development of bacteriology, divided into periods and bringing the subject up to date. This is followed by a general description and classification of bacteria, with the method of bacteriological technique, and then brief considerations of the relation of the bacteria to a few industries, like agriculture in general, dairying, the extermination of pests, canning, cider-making, etc. A somewhat extended discussion of the problems of immunity and the activities of bacterial products, together with a discussion of the manufacture of sera and vaccines, is naturally given in a book of this nature, the subject being treated from both a theoretical and a practical standpoint. Disinfection and the use of various disinfectants are discussed quite extensively, the subject being considered from the standpoint of the disinfection of water, of food, of dwelling houses, of surgeons' supplies, of various chemicals that are liable to be handled in the pharmacy; in short, all relations of disinfection which have a bearing upon the problems of the pharmacy, are carefully considered. A chapter upon communicable diseases and their prevention treats very briefly of the