The book also considers the various attempts that have been made to improve the equation of van der Waals, and the equations of state proposed by others. The last chapter gives the mathematical methods by which the equation of van der Waals may be deduced.

The book is a valuable monograph on the subject of which it treats and brings together a large amount of information that otherwise could be found only by a laborious search through journals. At the end of each chapter, and in footnotes, are given full references to the literature of the subject treated of in the chapter. At the end of the book there is an index of names but not of subjects. The need of a subject index is satisfied in part by a full table of contents in the front of the book. A book of this kind, however, has a valuable use as a reference book, and for such a use the lack of a good subject index is a serious shortcoming, which is felt keenly in proportion to the value of what the book contains. It is only a book to which no one wishes to refer that does not need a subject index. W. S. D.

Plant Anatomy from the Standpoint of the Development and Functions of the Tissues and Handbook of Micro-technic. By W. C. STEVENS. 8vo. Pp. xii + 349. With 136 illustrations. Philadelphia, P. Blakiston's Son & Co. 1907.

As is indicated by the title of this book, the standpoint adopted is the physiological one; in fact, the book might have been named Anatomical or Structural Physiology. The titles of many of the chapters indicate this, *e. g.,* Construction of the Plant's Food, Secretion and Excretion, and the general method of discussion is to describe the process, then the structures concerned. No doubt this is a useful standpoint, and the method of treatment is appropriate, but it seems a pity that the bearing of anatomy on the great problems of morphology should be altogether ignored. Since the book is in no sense a work on comparative anatomy, we find no reference to the structure of fossil plants.

Within the scope of 217 pages the author gives a clear though necessarily brief and elementary account of the main processes and structures of the so-called vegetative parts of a higher plant. The first three chapters describe the development of the tissues from the undifferentiated cell, through the stages of meristem, primary structure and secondary growth. In the main the account is clear and accurate as far as it goes, and is much aided by the carefully executed and elaborate diagrams which illustrate such features as the primary and secondary structure of stems. The diagrams throughout the book are in fact one of its most noteworthy and valuable features. The description of vascular bundles may be adequate from the author's standpoint, but it seems strange to see no reference to protoxylem, nor figures of amphicribral and bicollateral bundles. Several well-chosen "illustrative studies" conclude each chapter.

Protection from Injuries and Loss of Water and The Plant Skeleton are next considered. The treatment here is too brief and incomplete to give the student an intelligent idea of the important ecological adaptations which might be discussed under these heads. Loss of water through stomata is not treated here, as one might expect, but is deferred to a later chapter.

The absorption, circulation and storage of water, gases and foods are the topics discussed in chapters VI. to XI. By means of numerous ingenious diagrams the leading facts are presented in so lucid a way that he who runs may read. A possible exception to this statement may be found in Fig. 94, in which the perspective is faulty. Moreover, it may be questioned whether this diagram as well as some others does not try to show too much. Owing to the standpoint of the book we might expect to find under the heading of circulatory tissues some reference to Strasburger's brilliant discovery of the substitutes for companion cells in the phloem of *Pinus,* but instead of this we find the erroneous statement (p. 162): "In gymnosperms and vascular cryptogams the companion cells do not occur, and their place is taken by vertical rows of parenchyma cells." A series of illustrative studies concludes each chapter of this section.

A chapter on Secretion and Excretion con-

cludes the descriptive part of the book. In this as in other chapters extensive use is made of the classic work of Haberlandt.

The remaining 125 pages are devoted to the subject of technique and the micro-chemistry of plant products, added to which is an introduction to the study of adulterations in foods and drugs. The section on technique contains concise and clear directions for fixing, imbedding and staining, but unfortunately can not be regarded as up to date in all respects. Celloidin is undoubtedly the best imbedding material for the very tissues studied in this book, yet the author says "celloidin is to be looked upon as a last resort in a difficult situation." He says, moreover, "It is difficult to get sections as thin as ten mikrons." These statements can be easily accounted for by the celloidin method which he advocates and which has been greatly improved by Jeffrey. The method of applying the hematoxylin-safranin stain described on page 235 would be made more manageable by using the hematoxylin first, and improved by substituting Ehrlich's for Delafield's hematoxylin.

The chapter on reagents contains some useful recipes, and the directions are concise and to the point. A few inaccuracies occur, *e. g.*, on page 257 "vapor of sulphuric acid" evidently means sulphur dioxide. Further, it is not necessary to ripen aqueous solution of hematoxylin for two months, as stated on page 233.

In a general way the book has much to commend it. The freedom from typographical errors is agreeable ("gram" is printed "grain" on page 227), the typography is excellent, and the large number of new figures is refreshing. In this connection it is unfortunate that Vines's poor figure of a root should have been copied for Fig. 26. Reference has already been made to the diagrams, which are a distinct feature of the book. An index is provided, but the only hint of a bibliography is in the preface. A few terms of doubtful utility have been introduced, *e. g.*, the borrowing of the German word "Borke," and the use of "fixative" for fixing fluid.

To those who consider anatomy as an adjunct of physiology rather than the handmaid of phylogeny the book will form a valuable text for class use, and to all working botanists the book may well find a place on the laboratory shelf.

M. A. Chrysler

SCIENTIFIC JOURNALS AND ARTICLES

The American Naturalist for December contains "Preliminary Notes on Some American Chalicotheres," by O. A. Peterson, based on some fine specimens of *Moropus elatus* in the Carnegie Museum. The author concludes that *Moropus* is essentially a perissodactyl, save in its unguiculate feet, and that the evidence points to an European ancestry. Charles R. Stockhard presents some "Observations on the Natural History of *Polyodon spathula*." The fish has become of considerable importance for food and will probably soon be greatly reduced in numbers. It is fished for with seines running up to one and two miles in length, and on one occasion more than 150 barrels were taken at a single haul. C. H. Eigenmann reviews "Fowler's 'Heterognathous Fishes' with a Note on the Stethaprioninæ," noting that while certain genera and species have been well established new names have been added that in many instances are synonyms. William M. Wheeler discusses "Pink Insect Mutants," considering that they, as well as many brown individuals, are simply sports and belong in the same category as albinos.

Bird Lore for January-February contains articles on the "American Dipper in Colorado," by Junius Henderson; the Canada jay, "The Bird that Nests in the Snow," S. S. Stansell; "Redpoll Linnets," by Lottie A. Lacey; the second paper on "The Migration of Flycatchers," by W. W. Cooke, accompanied by a fine colored plate. There is a list of the members of "Bird Lore's Advisory Council," and "The Eighth Christmas Bird Census," representing the work of a large number of observers from Maine to Oregon, though mainly in the eastern states. In general birds are reported as scarce. The Audubon leaflet is devoted to the snowflake and it