shocked. But when we find that, rightly interpreted, these colors mean that in these cases the crops mentioned occupy areas in the ratio of 40% and 30%, respectively, to the total area of grain culture, we obtain unexpected information of a very definite character, which is at once complemented by an inspection of the maps showing the ratios of other crops, into a very fair picture of the agricultural adaptations and possibilities of these unfamiliar regions. On the map of Europe, we at once see the predominance of the most rapidly maturing grain, barley, in the north, while to southward oats become predominant, and finally maize. The discussion in Vol I. of the complex topographic, climatic, ethnologic and commercial conditions which bring about the existing state of production in the various countries included, is able and very interesting. But the author does not, apparently, trust himself to make any definite summary forecast of the future development of competitive production as between Europe and America; doubtless because in the detailed discussions he finds the determining factors to be numerous and so complicated with unforeseeable contingencies, especially in view of the phenomenal progress of transportation facilities and other consequences of industrial and technical progress, that he rests content with the presentation to the student of economics of a host of valuable facts and suggestions from which he may draw material for his own conclusions. It is noteworthy that, as the author admits, the United States maintains the most complete system of statistical enumeration, and thus, despite the mutability of its population, supply already at least as complete a picture of the climatic adaptations of production as does the more ancient but politically disjointed continent of Europe, with its multifarious methods of enumeration and numerous artificial barriers to development.

Engelbrecht's work is certainly of high interest to all students of the economics of agricultural production and commerce; and should find a prominent place in public libraries especially.

E. W. HILGARD.

Plant Relations. A first book of Botany. By JOHN M. COULTER, A.M., Ph.D., Head Professor of Botany in the University of Chicago. Twentieth Century Text-books. New York, D. Appleton & Company. 1899. Pp. ix + 264. 12mo.

In this pretty book, with its beautiful illustrations, the author presents 'a connected, readable account of some of the fundamental facts of botany,' in such a form as 'to give a certain amount of information.' The phase of botany to which attention is directed, is mainly that which in these later years we are calling ecology, and which hitherto has, to a large degree, been reserved for the later years of study in extended botanical courses in our universities. Dr. Coulter believes that the ecological view of the plant kingdom gives a proper conception of the place of plants in Nature, and is of more value to those who give but little time to the subject, while it serves as a fitting foundation for subsequent botanical studies.

After a short introductory chapter the foliage leaf is taken up and studied as an organ of the plant whose position, color, shape and structure are controlled by its light relations. The reader's attention is directed to many interesting phenomena, as the diurnal positions of leaves, sensitiveness of leaves, polarity, heliotropism, the relation of leaves to one another on erect and horizontal stems, etc. In the next chapter this is continued in a brief and summary discussion of the functions (photosynthesis, transpiration and respiration) and structure (gross structure, epidermis, stomata, mesophyll and veins) and protective devices (hairs, diminution of surface, rosette arrangement, profile position, etc.) of foliage leaves. Then follows a chapter on shoots, noting stems bearing foliage leaves (subterranean, procumbent, floating, climbing and erect), stems bearing scale leaves (buds, tubers and rootstocks), stems bearing floral leaves (life relations, structures, sepals, petals, stamens, etc.), and very briefly the structure of stems (dicotyledons and conifers, monocotyledons, ferns and 'lower plants'). In the chapter on roots the treatment is much the same (soil roots, water roots, air roots, clinging roots, prop roots, parasites, and a page on root structure). The reproductive organs are discussed under vegetative multiplication, spore reproduction, germination, dispersal of repro-

ductive bodies (by locomotion, water, air, forcible discharge, larger animals and insects). In like summary and interesting fashion the relations of flowers and insects are pointed out, the treatment being much too brief for the average reader with the limited acquaintance with flowers and flower structure which he is supposed to possess.

Half a dozen pages are given to a discussion of the struggle for existence among plants, the factors noted being decrease of water and light, changes in temperature and soil composition, devastating animals, plant rivalry, adaptation, migration and destruction. A dozen pages are taken up with the nutrition of plants, the principal topics being photosynthesis, the manufacture of proteids, digestion (14 lines), assimilation (5 lines), respiration and 'carnivorous plants.'

The remaining chapters (XI. to XV.) are given to a discussion of plant societies, in which the factors (water, heat, soil, light and wind) are first pointed out, followed by citations of examples of hydrophyte xerophyte, mesophyte, and halophyte societies, with suggestions as to their significance. Throughout the book the illustrations are superb, and add much to its value and interest.

As a summary of the ecological view of plant life for those already well grounded in botany, the book leaves little to be desired. It will be profitable reading for the student who has had what may be called General Botany in colleges and universities, but as a first book to be used by pupils in the secondary schools it will prove to be too difficult where thoroughness and accuracy are desired, otherwise it will be found too superficial. As a book for secondary schools it calls the attention of the pupil to many interesting phenomena, whose significance he can but vaguely comprehend because of his unfamiliarity with different types of plants. It is probable that the author recognized some of these difficulties after completing the book, as in the accompanying pamphlet of 'suggestions to teachers,' he says (p. 3) "if there has been no previous study of plants it will be necessary for the teacher at the outset, to train the pupils to recognize the great groups. This may be done in a series of laboratory exercises, which include comparison and drawing." Any teacher who has tried it, will say that the training of pupils 'to recognize the great groups' of plants ('algæ, mushrooms, lichens, mosses, ferns, gymnosperms, monocotyls and dicotyls, and if possible, liverworts, equisetums and club-mosses') is a pretty large undertaking for a half year's work, and if done well there will be little time left for the subject-matter of this book. Thus the author's own suggestions require a previous study of plants, and the book is therefore *not* a 'first book of botany.'

Charles E. Bessey.
The University of Nebraska.

SCIENTIFIC JOURNALS AND ARTICLES.

American Chemical Journal, October. 'On Potassium Cyanide as a Condensing Agent,' by A. Smith; 'Camphoric Acid,' by W. Noyes; 'The Action of Bromine on Metachlor-, Metabrom-, and Metaiodanilines,' by H. L. Wheeler and Wm. Valentine; 'A Simplification of Beckmann's Boiling point Apparatus,' by S. L. Bigelow. The liquid is heated by passing a current of electricity through a platinum wire immersed in the liquid. 'A Contribution to our Knowledge of Dicarbonyl Cuprous Chloride,' by W. A. Jones.

November: 'The Rate of Action of Water on Certain α-, β-, and γ-Halogen Substituted Fatty Acids,' by E. De Barr; 'The Occlusion of Hydrogen by Metallic Cobalt and other Metals,' by G. P. Baxter; 'On the Nature of the Oxyazo Compounds,' by W. McPherson; 'A Contribution to the Study of Liquid Mixtures of Constant Boiling point,' by G. Ryland; 'The Action of Benzoyl Chloride on the Phenylhydrazones of Benzoin,' by P. C. Freer; 'Notes on the Space Isomerism of the Toluquinoneoxime Ethers,' by W. C. Morgan; 'A Dissolver,' by A. J. Hopkins. The author has devised a simple device for rapidly dissolving salts. J. E. G.

In *The American Naturalist* for November, J. H. Comstock and J. D. Needham continue the series on 'The Wings of Insects,' with an interesting account of the development of wings containing a discussion of the origin of the tracheation of the wing. 'A Contribution to the Morphology of *Pennaria tiarella*' McCrady,