603 publications, aggregating 26,240 pages. The total number of copies was over 7,000,000; 4,000 volumes were added to the Department library.

SCIENTIFIC BOOKS.

Die Landbauzonen der aussertropischen Länder. By Th. H. Engelbrecht. Three volumes. Berlin, Dietrich Reimer (Ernst Vohsen). 1898. Royal 8vo.

These stately volumes were prompted, as the author's preface states, primarily by the question of American competition with European production; certainly a most timely topic. Vol. I., of 290 pages, contains the explanatory text for the other two, of which one consists of statistical tables of production, while Vol. III is an atlas of 79 colored maps, the graphic representation of results of comparisons made upon a basis somewhat different from the usual ones of total, or cultivated areas, or population. The author's object is to elicit the peculiar tendencies of agricultural production rather than its absolute quantities, and by the discussion of the causes of these tendencies to forecast present and future possibilities. He objects to the method of computation of the 'importance' of the several crops devised by Walker (amount produced divided by area population) as affording no definite clew to any inquiry as to causes.

Adopting for the extra-tropical countries the cereal grains as the fundamentally important product, Engelbrecht compares with the total area occupied by these, both those occupied by each individual kind, and by other crops. Correspondingly, in treating of the animal industries, he assumes neat cattle as the basis of comparison with other domestic animals. On the maps these comparisons are made by means of five, or at times six, shades of color, to which are frequently added important (mostly monthly) isotherms, as well as colored limiting-lines of the occurrence of important trees, of excess of production of one product over another, of limited special cultures, etc., whereby the comparisons are greatly facilitated and many interesting points are brought out. Thus, in Russia, the marked coincidence of the northern limit of the oak forest and of wheat culture is shown; in the United States, the limits between predominance of summer and winter wheat, of rice over wheat culture, etc.

For the Old World, where changes are very slow, the latest census has, as a rule, been utilized, and as there no uniformity of dates exist among the various states, the data represented are frequently of different dates. From the cause just mentioned these discrepancies are of minor importance; yet in the more progressive countries the establishment of new trade routes and connections following lines of railroads and steamships has even in Europe, in many instances, been followed by rapid changes in lines of production. In the case of the United States, with the rapid changes both in population and routes of communication, the comparison of several successive enumerations is given by means of tables.

In the Old World the maps are made to extend to the Ural mountains on the east, and southward so as to embrace Algeria and Tunisia. In America the map colors for the cereals reach a short distance only into Canada; for other products the Dominion is left in blank, although quite fully represented in the tables of Vol. II. In South America the Argentine Republic is included in the graphic presentation, as are, in Australia, the temperate culture belts of the east and west coasts. Cape Colony is also considered in the matter of animal industry.

In the United States the smallest units considered are the single States. In Europe the smaller administrative units—departments in France, 'governments' in Russia, in England, counties, are separately colored on the maps and listed in the tables; the results of several census periods are frequently given, both in tables and maps, and numerous minor cultures are included in detail.

Accustomed as we are to interpret intensity of coloration in statistical maps as a measure of absolute production, at first sight these maps strike one rather oddly. Thus when Ireland and western Lapland bear the same color in respect to the production of the potato, and Nevada and Arizona appear most intensely colored on the score of the production of barley, our geographical and economic consciousness is

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-