

*THE COMPLETE BOTANY-TEACHER.*

*The Teaching Botanist. A Manual of Information upon Botanical Instruction, including Outlines and Directions for a Synthetic General Course.* By Prof. W. F. Ganong. Second edition, revised. Pp. xi+439. (New York: The Macmillan Company; London: Macmillan and Co., Ltd., 1910.) Price 5s. net.

THE first edition of Prof. Ganong's book received a welcome on this side the Atlantic such as is accorded to few elementary botanical works produced in America, and it has proved of the greatest value to many engaged in the teaching of elementary botany, or in training as future teachers of the subject. The second edition, lately published, has been thoroughly revised, and, indeed, re-written almost throughout, besides being considerably enlarged, though the general plan, and, above all, the animating spirit of the book, not to mention the very moderate price, remain unchanged. To all intents and purposes this edition is a new work, and should be in the hands of all botanical teachers, both *in esse* and *in posse*, whether or not they already possess the first edition.

In part i., occupying, roughly, half of the book, the author deals in a practical, yet philosophic and stimulating, manner with the place of the sciences in education and of botany among the sciences, followed by a thoughtful and vigorous discussion of the pertinent question, "What botany is most worth?" and proceeds to the consideration of the training of the good botanical teacher, the methods of good botanical teaching, botanical drawings and descriptions, the equipment of laboratories, and the arrangement of collections. A valuable chapter follows on botanical books and their use, with a bibliography—by no means exclusively American—which, with a few deletions, would serve as the catalogue of an ideal library for any institution in which the subject is taught. One is inclined to wonder when there will be found an author—and publisher—courageous enough to publish a "black list" of undesirable books on botany and nature-study generally; but, after all, this would merely postpone for a time the oblivion into which bad books are bound to sink sooner or later.

As is well known, Prof. Ganong has shown himself, especially in his valuable "Plant Physiology," to be an acute critic of many erroneous facts and ideas, and of faulty methods of experimentation, which are only too common in botanical literature, not only in books of the baser sort, but even in standard and authoritative works. In the present work he ends part i. with a breezy and delightful chapter—only too short—on some common errors prejudicial to good botanical teaching, which will bring some discomfort to conscientious teachers, while pointing out to them the better way. Such teachers will, however, be to some extent consoled by the author's candid confession that he, too, has occasionally perpetuated, and even originated, ideas and phrases which are "unfortunate if not erroneous." This chapter is certainly deserving of most careful study by all teaching botanists.

In part ii. Prof. Ganong outlines a general course in elementary botany—not a mere skeleton or series of headings, but a thoroughly practical, fairly detailed, and altogether excellent syllabus of instructions for the carrying out of a very full year's work in the morphology and physiology of plants. It would be difficult to devise a better guide to the elements of botany for those who may go no farther with the subject, or a more suitable first-year course for those who intend to proceed to more advanced work in botany. This admirable and wisely designed course of instruction may be warmly commended, not only to teachers of botany, but to those who are responsible for the drafting of examination syllabuses in the subject in this country.

F. C.

*CLIMATIC CONDITIONS AND ORGANIC EVOLUTION.*

*Die klimatischen Verhältnisse der geologischen Vorzeit vom Praecambrium an bis zur Jetztzeit und ihr Einfluss auf die Entwicklung der Haupttypen des Tier- und Pflanzenreiches.* By Dr. Emil Carthaus. Pp. v+256. (Berlin: R. Friedländer und Sohn, 1910.) Price 8 marks.

THIS treatise commences with a consideration of the views of different authors upon the early evolution of the earth. Of the rocks in the earth's crust, Olivine rock (Dunite) is considered by the author to be the most primitive, its formation having taken place before the condensation of the water-vapour contained in the very earliest atmosphere. The gneisses, however, were formed after such condensation had occurred. The beginnings of organic life were present in the original atmosphere of water-vapour, but the author doubts the view of Arrhenius that the early spores could have reached the earth from other heavenly bodies. The period between the Upper Cambrian and Purbeckian was one of little rain, the existence of salt deposits in the early formations at various places widely separated from one another, and the complete absence of real freshwater calcareous deposits prior to the Jurassic being cited as evidence in support of that view. In this connection the interesting questions are propounded: Why have no remains older than the fauna of late Tertiary or diluvial times been found in the caves of Devonian, Carboniferous, Triassic, and Jurassic limestones? Why did cave formation thus probably begin first in Tertiary times?

The occurrence of forests of Rhizophora (Dicotyledons) in the sea of the Malay Archipelago is instanced as a reason against the assumption of the necessarily freshwater origin of the Ferns, Sigillaria, Lepidodendron, Equisetites, Conifers, and Cycads of the older geological formations. Great stress is laid upon the difference in the movements of the sea-water as affecting the forms of life at different times. The increase of these movements in later geological periods tended to destroy the brachiopods, the bilateral symmetry of the Tetracoralla gave way to the radial symmetry of the Hexacoralla, while the later Echinoidea, as compared with the earlier, underwent