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SCIENTIFIC BOOKS.

A Laboratory Course in Plant Physiology, especially as a basis for ecology. By WILLIAM F. GANONG, Ph.D., Professor of Botany in Smith College. New York, Henry Holt and Company. 1901. Octavo, cloth. Pp. vi + 147.

Practical Text-book of Plant Physiology. By DANIEL TREMBLY MACDOUGAL, Ph.D., Director of the Laboratories of the New York Botanical Garden. With one hundred and fifty illustrations. New York, Longmans, Green and Co. 1901. Octavo, cloth. Pp. xiv + 352.

Professor Ganong's little book is a product of his laboratory, and therefore has the merit of practicality. The illustrations of apparatus (about thirty) are from photographs of the appliances actually used, and the text consists of descriptions of experiments which the author has repeatedly made. The book is in two parts, in the first of which the author discusses methods of study and the necessary equipment, while in the second is given an outline of a course of experiments in the laboratory on protoplasm, nutrition, growth, reproduction and irritability. The author says (p. 23), 'It goes without saying that a greenhouse and a laboratory are indispensable for a course in physiology,' and naturally gives a good deal of attention to the plans and equipment of both. These sections of the book will prove very helpful to those who are building up their facilities for physiological work. The experiments, of which nearly one hundred are specifically indicated, are selected with reference to their availability and practicability in an elementary course. The treatment here is such as to make investigators. The author does not ask numberless leading questions of the 'kindergarten order,' nor does he leave the student without any guide, but wisely follows a middle

path suggested no doubt by his long and successful experience as a teacher.

We would call especial attention to the fact that the author has planned this course 'especially as a basis for ecology.' In some quarters there is a feeling that ecology should be one of the first things brought to the young student's attention, and so we have a swarm of elementary books for secondary school children in which 'ecology' figures prominently. We are in full sympathy with the author when he says, "More than one recent writer has described ecology as at present mostly a series of guesses; and so will much of it continue to be until given logical precision and a firm foundation in exact physiology." Evidently ecology must come *after* the student has prepared himself for it, and *not* as an introduction to botany.

Dr. MacDougal's work is the first American text-book of plant physiology of advanced grade to be published. It is intended for and adapted to the demands of such students as have already made considerable progress in the study of plant activities. In fact, we apprehend that to a large extent it will be the hand-book for the teacher, rather than for the student. However used, it must do much to stimulate physiological inquiry in colleges and universities. The aim of the work is thus defined in the preface, "The chief purpose of the author is to present practical directions for the demonstration of the principal phenomena of the physiology of the plant, and also details of experimental methods suitable for the exact analyses requisite in research work."

The sequence of topics is considerably different from that usual in works on the physiology of plants. Thus the author takes up in order, 'The Nature and Relations of an Organism,' 'Relations of Plants to Mechanical Forces,' 'Influence of Chemicals upon Plants,' 'Relations of Plants to Water,' 'Relations of Plants to Gravitation,' 'Relations of Plants to Temperature,' 'Relations of Plants to Electricity,' and other forms of energy, 'Relations of Plants to Light,' 'Composition of the Body,' 'Exchanges and Movements of Fluids,' 'Nutritive Metabolism,' 'Respiration,' 'Fermentation and Digestion,' 'Growth,' 'Reproduction.' It

is difficult to specify chapters in a work in which there is so much to commend, but to us the most interesting is that on the 'Composition of the Body' (IX.), in which the treatment, though not extended, is especially satisfactory. Here the principal topics are 'Substances found in Plants,' 'Carbohydrates,' 'Fractional Extractions,' 'Estimation of Tannins and Glucosides,' 'Determination of Sugars and Dextrins,' 'Starch,' 'Cellulose,' 'Proteids,' 'The Fats,' 'Determination of Organic and Inorganic Matter,' 'Enzymes.' We venture to say that the general introduction of the matter of this chapter into plant physiology will revolutionize much of the teaching of this subject in this country. There has been too little of the study of what plants actually are in the physiology of the past, so far as this country is concerned, and it is just here that American botanists have been weakest. This book will serve as a corrective, and it is to be hoped that it will turn the attention of students in physiological laboratories to this much-neglected aspect of their work.

CHARLES E. BESSEY.

NOTES.

THE American Institute of Mining Engineers will, as we learn from the *Railway and Engineering Review*, publish two volumes as follows:

1. 'The Genesis of Ore-Deposits,' comprising the famous treatise of the late Professor Franz Posepny, with the successive discussions thereof by Le Conte, Blake, Winchell, Church, Emmons, Becker, Cazin, Rickard and Raymond (all of which were published in Volumes XXIII. and XXIV. of the *Transactions* of the Institute, and subsequently in the special 'Posepny Volume,' issued by the Institute); also, later, papers by Van Hise, Emmons, Weed, Lindgren, Vogt, Kemp, Blake, Rickard and others, and the discussion of these papers by De Launay, Beck and many others (all of which will be published in Volumes XXX. and XXXI.); also a complete bibliography of the Institute papers and discussions on this subject from 1871 to the present time. The volume now in press will be an octavo of about 825 pages, bound in 'book-linen.' This book will be sent, postpaid,