

looked. It is hoped that these will be corrected in later editions.

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BOTANICAL NOTES

GANONG'S PLANT PHYSIOLOGY

SEVERAL years ago Professor Ganong wrote a very useful little book on plant physiology, which is now expanded into an octavo volume of 265 pages under the title of "A Laboratory Course in Plant Physiology," brought out by Holt in a very handy form for laboratory use (\$1.75). The author tells us that the book has a threefold purpose, namely, (1) "to lead students through a good laboratory course in plant physiology"; (2) "to provide a handbook of information upon all phases of plant physiology having any educational interest"; (3) to serve "as a guide to self-education by ambitious teachers or students, who, unable to obtain regular instruction, yet wish to advance themselves in this attractive and important subject."

In pursuance of these objects the author devotes about fifty pages to helpful discussions on the place of plant physiology in botanical education, methods of teaching and study, greenhouse and laboratory plans, apparatus and material. This is followed by the book proper, in which the sequence of subjects is (1) the structure and properties of the protoplasm of plants; (2) the physiological processes of plants, the latter including (a) the processes of nutrition (photosynthesis, chemosynthesis, synthesis of proteids, conversion, respiration, absorption, transport, elimination); (b) the processes of increase (growth, reproduction); (c) the processes of adjustment (irritable response, adaptation). A closing chapter of a dozen or so pages is devoted to methods of manipulation, and to convenient tables and lists.

Looking over the pages of the book, the reader is impressed with the practicability of the suggestions made by the author. They impress one as being based upon much experience, and this is actually the case, for the book is a growth from Professor Ganong's long and successful experience with students

in his own classes in plant physiology. The illustrations (68 in number) and full-page plates (4) are especially helpful, and yet not an illustration or plate has been given merely to make the book appear more attractive; every one is needed; every one helps to make some part of the subject more clearly understood. Altogether this is one of the most satisfactory botanical text-books in any department of the science that has come to our notice.

ECONOMIC BOTANY

THE Report of the Chief of the Bureau of Plant Industry of the United States Department of Agriculture for 1908 is an encouraging paper, showing as it does the steady enlargement of the scientific study of plant problems. A full enumeration of all of the work carried forward is impossible here, but the following general outline may give some notion of its extent: Field and laboratory work in pathology and bacteriology; plant life-history investigations; investigations of drug and other special crops, and of poisonous plants; crop technology, cotton standardization and fiber investigations; grain standardization; seed laboratory; physical laboratory; investigations and experiments in the semi-arid west and southwest; demonstrations and experiments with field crops; Arlington experimental farm and truck-crop investigations; investigations in pomology; greenhouses, gardens and grounds; farm management investigations; farmers' cooperative demonstration work; work connected with the purchase and distribution of seeds; special testing gardens in the field. Under each of these heads are details of many experiments and studies of great botanical interest, and of still greater interest to farmers, gardeners and other growers of plants. Indeed, one can scarcely open a page of this pamphlet of 135 pages without finding an interesting and suggestive paragraph. The people of the country have reason to be proud of this bureau of our National Department of Agriculture.

Another paper which appeals to the economic botanist is one from the New York Agricultural Experiment Station, entitled

"Troubles of Alfalfa in New York" (Bull. 305), in which are taken up such things as: uncongenial soil conditions; winter injury; dodder; weeds; fungus diseases; root-knot; diseases of unknown cause, etc. The whole paper is full of interesting facts for the grower of alfalfa, and most of it should interest the general botanist. The portion dealing with dodder (*Cuscuta*) is especially interesting. A valuable bibliography including 115 titles closes the bulletin.

In a recent number of the Kew Bulletin of Miscellaneous Information Mr. Fred Turner's paper on "The Economic Value of the Australian Pasture Herbs" is interesting to American botanists as showing the great differences between the two countries. His list includes a *Trigonella*, *Erodium*, *Geranium*, *Boerhaavia*, *Blennodia lepidium*, *Marsilia*, *Daucus*, *Psoralea*, *Swainsona*, *Plantago*, *Calandrinia*, *Portulaca* and *Tetragonia*. Of the *Marsilia* (*M. drummondii*) he says:

This dwarf, clover-like plant, occurs in the interior of all the Australian states, generally on the margins of swamps or where water collects in shallow pools after rain. When the water subsides the young plants grow rapidly in the mud, and eventually cover the ground with dense vegetation, reminding one of cultivated clover. All kinds of stock are extremely fond of this plant, which is regarded as nutritious food.

PAPERS ON FUNGI

An important paper on the "Geoglossaceae of North America," by Mr. E. J. Durand, appeared recently in "Annales Mycologici" as one of the contributions from the department of botany of Cornell University. These plants are discomycetous fungi of somewhat doubtful affinities, Shroeter associating them with *Rhiziniaceae* on the one hand, and *Helvellaceae* on the other in the order *Helvetiales*, while Boudier places them near *Helotiaceae* and *Mollisiaceae* in *Pezizales*. With the latter view Mr. Durand agrees. In his paper, after an interesting introduction of nine or ten pages, the author makes a synopsis of the eleven genera considered, and then follows with full generic and specific descriptions, with exact citations of all the material

examined in every instance. This portion of the paper, with index and explanations of the plates, fills eighty pages, and these are followed by eighteen plates, nearly one half being made from photographs. Forty-two species are recognized, and of these nine are here described for the first time. The paper should do much to stimulate the search for the plants of this group of fungi.

A recent number of the *Bulletin* of the College of Agriculture, of the Tokyo Imperial University of Japan, contains two important papers on fungi by the Japanese botanist, S. Kusano. One of these is entitled the "Biology of Chrysanthemum Rust," and discusses "black rust" (*Puccinia chrysanthemi*), "white rust" (*P. horiana*) and "brown rust" (*Uredo autumnalis*). The exact relationship of the latter has not yet been determined. The opinion is expressed that the rusts occurring on cultivated species of *Chrysanthemum* in Japan originated upon the wild *Chrysanthemum* of that country (*C. decaisneanum*).

The second paper by Kusano, under the title of "Notes on Japanese Fungi," is in continuation of a series of articles on this subject, the present one being devoted to species of *Puccinia* known to occur on the leaves of bamboo plants. Five species are enumerated, viz.: *P. phyllostachydis* (on *Phyllostachys bambusoides*); *P. longicornis* (on *Sasa paniculata* and *Arundinaria japonica*); *P. kusanoi* and its variety *azuma* (on *Arundinaria simoni*, *A. variabilis*, *A. naharia* and *Sasa* spp.); *P. sasae* (on *Sasa borealis*). From observations on these rusts the author concludes that "it is highly probable that the uredosori originate from the sporidia," that is, without the intervention of the aecidial stage.

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SPECIAL ARTICLES

THE OTTER IN EASTERN MASSACHUSETTS

In a recent number of SCIENCE¹ Mr. C. E. Gordon reports that otters have been repeat-

¹ Vol. XXVIII., No. 726, November 27, 1908, pp. 772-775.