standards of the Milton Bradley Co., as contained in this book of Professor Mulliken's, it would be possible to accurately describe and identify the exact shade of the characteristic sample dyeings, without pasting a single sample in the book. And, by a proper system of classification, the chemist attempting to identify a color, after determining its class, and dyeing a sample, would determine its exact place in the color table, and so avoid the necessity of hunting it up in the sample books of the different color houses, or in his own sets of home-made samples.

To be of real value, such a treatise should be written by a well-trained color chemist, thoroughly familiar with the dyestuffs of today, from their practical side, and accustomed to face, in his regular work, the many and varied problems in textiles, paper-making, pigments, food products and the like, which appear every day in a large dyeing laboratory.

The theoretical part of such a book could be easily obtained from the treatises we have at present, including this one of Professor Mulliken's. But the use of the color standard would give opportunity for identifying the shades with a minimum of trouble and expense; and if the writer would incorporate some of the regular laboratory information about methods, and about the practical peculiarities of the different dyestuffs, their ease of dyeing, comparative fastness, special uses, cost prices as compared to others of the same or different classes, and a host of other minor matters of practical interest to users and workers with the dyestuffs, such a book would be hailed with enthusiasm by dyeing chemists from one end of the world to the other.

CHARLES E. PELLEW

October 5, 1910

SCIENTIFIC JOURNALS AND ARTICLES

THE contents of the *American Journal of Mathematics* for October are:

"q-Difference Equations," by Rev. F. H. Jackson.

"On the Relation between the Sum-formulas of Hölder and Cesàro," by Walter B. Ford.

"Sur un Exemple de Fonction Analytique Partout Continue," par D. Pompeiu.

"Symmetric Binary Forms and Involutions," by Arthur B. Coble.

"Systems of Tautochrones in a General Field of Force," by Harry Wilfred Reddick.

"The General Transformation Theory of Differential Elements," by Edward Kasner.

BOTANICAL NOTES

TWO RECENT BOOKS ON LICHENS

WITHIN a few weeks of each other two notable contributions to our knowledge of the lichens of this country have been issued. The first is Albert W. C. T. Herre's "Lichens Flora of the Santa Cruz Peninsula, California," published in the *Proceedings of the Washington Academy of Sciences* (Vol. XII., No. 2) and bearing date of May 15, 1910; while the second is Bruce Fink's "Lichens of Minnesota" published in the Contributions from the United States National Herbarium (Vol. 14, Part 1) and bearing date of June 1, 1910. The first contains 243 pages, and the second 256 pages, with 51 plates and 18 text-figures. They are both nominally local lichen floras, and judged by their titles alone might be supposed to present a similar mode of treatment. However a comparative examination of the two works shows a marked difference between them. Thus while both accept Zahlbruckner's general understanding of the lichens, the first author proceeds at once to the descriptive part of his book, evidently assuming that the reader will bring to its perusal all the necessary knowledge for its full understanding. In Professor Fink's book, on the contrary, there is an explanatory introduction in which there is a discussion of the nature of lichens, and the views that have prevailed during the past two centuries. This is followed by a particular discussion of what is known of their structure and reproduction, including under the latter sexual reproduction. Here he says "the sexual processes have not been studied in very many of the fungi most closely related to the lichens, but recent discoveries seem to indicate that sexuality is common there and in the ascomycetous lichens as well. In Collema, Stahl and others have found that the apothecium is

preceded by an archicarp and a trichogyne which are supposed to constitute a reproductive tract. The more recent researches of Baur, Darbishire, Lindau and Wainio have proved the existence of similar tracts in lichens of several genera, and while there is yet much need of research regarding nuclear behavior, the general presence of sexual organs in lichens can scarcely be questioned longer."

It need scarcely be said that both authors accept the duality of the lichen's structure as no longer to be questioned, which reminds the writer of this review of the complete change of opinion in this regard that has taken place in the past thirty years. Then every American and practically every English lichenologist denounced the "algo-lichen hypothesis" as they styled it, as the height of foolishness, as well as the depth of stupidity. Now one wonders whether there are any botanists who regard lichens as autonomous in the old sense. Are there any who deny that the "gonidia" are algæ? Where are they who so vehemently denounced Schwendener and his little band of followers? Here we have a professed lichenologist uttering such words as these: "Whatever may be the outcome of further study of this question, the conception . . . which is still held by some botanists, that the fungus and the alga together compose an organism or an association which constitutes the lichen need be abandoned before there can be any clear thinking regarding lichens. The lichen is the fungus of the association." In the old days this would have been regarded as a betrayal of lichenology, for logically it reduces all "lichens" to the category of fungi. In the old days the paragraph quoted would have brought down a storm of wrath upon the head of the author, but now no one notices this as at all out of the ordinary. *Tempora mutantur!*

In Mr. Herre's book 307 species and subspecies are described from a peninsula 90 miles long and including perhaps no more than 1,800 to 2,000 square miles, and ranging from sea level to a maximum elevation of 3,793 feet. In Professor Fink's book which covers an area more than forty times as large, the number of species and subspecies is 441. We have no means for comparing the treatment of species and lower groups by the two authors, but from "the face of the returns" as here given it appears that the Santa Cruz peninsula must be more than ordinarily rich in lichen forms.

Mr. Herre's book includes one new genus and eleven new species, certainly not a great number for such an area, or such a total number of forms. In Professor Fink's book we have been unable to find a single new species. These are encouraging signs. In some other departments of systematic botany two such books as these could have been depended upon to yield from 50 to 100 new species at the very least!

In both books all specific names are decapitalized. Professor Fink's book is richly illustrated by 52 plates (mostly reproductions of photographs) and 18 text figures. Some of these are exceptionally fine.

THREE PATHOLOGICAL BOOKS

It is not so very long since there were no plant pathologists in the United States. At least there were none known by that name. There were a few botanists who began to realize that plants were subject to diseases, but the United States Department of Agriculture had as yet given no attention to the subject, and this was before the inception of the experiment stations. At one time several botanists united in a memorial to the Department of Agriculture calling attention to the desirability of beginning work in plant pathology, and what was their astonishment when the secretary very promptly appointed Professor Scribner, until then a student of the grasses, to be the pathologist. And no one was more astonished than the professor himself, but at that time secretaries of agriculture knew little or nothing as to the qualifications of a pathologist. And it is greatly to the credit of the graminologist so suddenly torn from his chosen speciality and thrust into a new field, that he started the work in a creditable manner, and laid a good founda-

tion for the excellent work that for many years has been done in the department.

These thoughts are suggested by the fact that there lie before the writer three notable recent books on plant diseases, by American authors. They are Duggar's "Fungous Diseases of Plants" (Ginn), Selby's "Handbook of the Diseases of Cultivated Plants in Ohio" (Ohio Expt. Stn.), and Stevens and Hall's "Diseases of Economic Plants" (Macmillan). The first of these treats the subject from the standpoint of the parasite, so that in it the student of the fungi may learn what injury, if any, is wrought by any fungus, or group of fungi. Two hundred and forty illustrations, many reproductions of photographs, help to make the text clearer for the beginner. A "host index" brings together the various parasites that affect particular hosts.

The second book is a revision and enlargement of a most useful bulletin (121) issued several years ago. In it, after an introduction treating of plant diseases in general, the subject is treated from the standpoint of the hosts alphabetically arranged. Thus we have alder diseases, alfalfa diseases, apple diseases, and so on throughout the alphabet, to watermelon and wheat diseases. Good illustrations (105) are scattered through the text.

The last book to appear is the result of many years of work by the senior author. Here the treatment is from the standpoint of the hosts, but instead of taking these up in a simple alphabetical order, they are alphabetically arranged under certain general heads, as pomaceous fruits, drupaceous fruits, small fruits, tropical fruits, vegetable and field crops, cereals, forage crops, fiber plants, trees and timber and ornamental plants. More than two hundred text figures add greatly to the usefulness of the book. Some of these are exceptionally fine reproductions of photographs.

American botanists are to be congratulated upon the publication of these three books. They will serve as most valuable helps in introducing students to the outlines of plant pathology. Selby's book is the most "popular" and will be most easily understood by farmers, and general students; Stevens and Hall's book also will be quite easily understood, especially by farmers of some botanical education. Its classified host arrangement will prove especially helpful to this class of readers, and will appeal to many students also. Duggar's book is especially a mycologist's book, since the fungous parasites are taken up in their natural sequence. It is the most technical of the three books, and for that reason will appeal most strongly to the teacher and student who approach the subject from the mycological rather than from the agricultural or horticultural side.

POISONOUS PLANTS

PROFESSOR DOCTOR PAMMEL has brought out a most useful book under the title of "A Manual of Poisonous Plants" (Torch Press, Cedar Rapids, Iowa). After a general discussion of the nature and action of poisons the author presents a systematic catalogue of the plants that are poisonous, beginning with the bacteria and blue-green algae, and running up through the flowering plants. The illustrations, of which there are a hundred or more, will prove helpful, especially for the non-botanical reader. The book will be useful to physicians and medical students, as well as to farmers who may wish a guide as to the nature of many of the plants about them, while it will be interesting and helpful to the general botanist also.

A NEW MUSHROOM BOOK

A NEW type of mushroom book has just been brought out by Professor Doctor Clements under the title of "Minnesota Mushrooms." It is the fourth of a series of popular guides to the plants of Minnesota to appear in the well-known Minnesota Plant Studies, and is designed for the use of classes in the high schools, and as a guide to make available the edible species by distinguishing them with certainty from those which are harmful. Copies of the book "are furnished free to citizens of Minnesota upon request" and "ten copies are sent free to each high school, academy, or college within the state." Certainly

the inhabitants of Minnesota ought not to be in ignorance hereafter as to the mushroom species of that state.

The book opens with an introductory page of generalities regarding fungi, among which we are glad to find that the Roman pronunciation of the Latin names of families, genera and species is given as the proper one to be used. Then follows keys and descriptions, accompanied by 124 reproductions of photographs. The attempt has been made by the author to write his descriptions in such non-technical language as will render them intelligible to the reader who is not an expert in mycology. Even the non-botanical reader will be able to master the necessary terms by referring to the glossary at the end of the volume. Four color plates add to the interest of the book. The last chapter deals with collecting and cooking mushrooms. Enough advice is given here to prevent any danger from the use of poisonous species, and there are enough recipes to start out the neophyte mycophagist happily and safely.

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THE SCIENTIFIC RESULTS OF THE FIRST CRUISE OF THE "CARNEGIE" IN MAGNETISM, ELECTRICITY, ATMOSPHERIC REFRACTION AND GRAVITY[1]

The first cruise of the *Carnegie* began at Brooklyn in August, 1909, and ended at the same place in February of the present year. During this period of about six months, a total distance of 8,000 nautical miles was covered in the north Atlantic Ocean between the parallels 51° north and 19° north and the following ports were visited: Greenport (Long Island), St. John's (Newfoundland), Falmouth (England), Funchal (Madeira), Hamilton (Bermuda) and Brooklyn (New York). Last June the vessel started out once more, this time on a circumnavigation cruise of 65,000 miles to extend over a period of three years and to embrace the Atlantic, Indian and Pacific Oceans. The vessel has already completed a voyage of nearly 7,000 miles since she left last June and is now at the mouth of the Amazon River. The present voyage has not only cut across our first cruise, but is so arranged, by the introduction of loops, as to intersect itself also at various points. We are thus enabled to apply numerous checks.

In addition, special observations have been made in Gardiner's Bay, off Long Island, and on the neighboring islands at the beginning of the first cruise in September, 1909, and again at the beginning of the present cruise in June of this year. The results of all these elaborate tests have shown conclusively that, with a non-magnetic vessel like the *Carnegie* and with the instrumental appliances and methods used, it is possible to secure an accuracy in the magnetic results approaching that of land observations.

As I am to cover four lines of activity on this vessel in the space of a quarter of an hour, it will not be possible to go into further detail and I shall have to content myself with stating at once the main conclusions reached.

A. *Terrestrial Magnetism.*—Except for the portion of the cruise from 48°.5 N., 47° W. to Falmouth Bay and thence to Madeira, all charts show too low west magnetic declination over the portion of the Atlantic Ocean covered by the *Carnegie*. While the correction is in general less than a degree, it is unfortunately in the same direction for about 5,000 miles, and hence the resulting error in a ship's course based on the present mariner's charts may be accumulative and ultimately reach a considerable amount. The maximum chart error at any one point may be from 1°.3 to 2°.6 according to the chart used.

The chart corrections both for magnetic inclination and horizontal intensity, often being of opposite signs on the portion of the *Carnegie's* first cruise, the average algebraic correction is in consequence at times greatly reduced. The average chart correction (sign not being considered) for magnetic dip approximates 1°.5 to 2°; the maximum correction for the British chart is 2°.5 and that of the German 4°.4. It is also seen from the values of the average algebraic dip correction,

[1] Read at the meeting of the American Physical Society, New York, October 15, 1910.