possible general basis of classification for all chemical phenomena. Its results are purely qualitative, but they are absolute.

There has been a feeling that there was something antagonistic between the qualitative classification of equilibria and the quantitative study of equilibria. When put in this way, the feeling is seen to be absurd, since the two things supplement each other. It is only by combining the two that we can hope to attain to a quantitative theory of all chemical phenomena.

Mr. Findlay gives a very clear and elementary statement of the phase rule and its applications. The book can be recommended most heartily. There are a few mistakes here and there, but they are not of serious importance. We have here a most satisfactory introduction to the phase rule. It should not be forgotten that the phase rule is valuable in two ways, as a basis of classification and as an instrument of research. It is only the first aspect which has been considered in this volume. This is quite right and proper; but it is as an instrument of research that the phase rule is to come more and more prominently to the front in the next decade. The time has not yet come when a book can be written on this; but such a book will be necessary before very long, and it is to be hoped that Mr. Findlay may see his way clear to writing it.

WILDER D. BANCROFT.

CZAPEK'S BIOCHEMIE DER PFLANZEN, VOL. I.

ONE of the most unsatisfactory chapters on the subject of plant physiology is that relating to the chemical nature of plant substances and the reactions involved in their production and utilization. This situation has been due, not only to the intrinsic difficulties of the problems involved, but also to the unsatisfactory condition of the literature on the subject. While the handbook of Pfeffer has given the latitude and longitude of these problems to the student undertaking a serious study of the chemical aspect of plant physiology, the more detailed account of this phase of the science prepared by Czapek will be a most highly appreciated resource.

The first volume of the work under discussion reveals the scope of the undertaking. The preface indicates that the author has not proposed to write a text-book introducing the beginner to the subject, but rather to prepare a reference work which shall aid the more advanced investigator to use conveniently the work of his predecessors. This object has been most successfully accomplished, and no student of plant physiology can afford to miss this book from his list of immediately available helps.

Czapek's services have not been enumerated, however, when the results of his wide reading and patient summarizing have been recognized, since the work in question is vastly more than a mere compilation. In these days when the democratic spirit of science opens the door of public expression to men of all ranks of scholarship, the task of discriminating accurately the raw from the ripe and the hasty from the well wrought is not always readily accomplished, and a proper sorting of the material at hand by one so well qualified is a genuine service to science.

Then, again, in this eager time when so many men are straining to get the first glimpse of the real solution of fundamental problems, some are bound to guess shrewdly while others are endeavoring to be sure before speaking. To wisely divide this shrewd guess work from the solid fabric is the work of no mere compiler. In this direction, Czapek has rendered good service.

The general chapters introducing the book are all worthy, but of the various subjects treated an especial interest at present attaches to the discussion of the fundamental facts of enzyme action, of the bearing of the theory of ionization on physiological processes and the significance of colloids and the colloidal condition. These subjects are here treated in an illuminating way.

The special part discusses in detail fats, lecithins, physosterin and related compounds, carbohydrates and the bodies forming the cell membranes. On the subjects covered by this volume, the student is given a practically complete citation of the literature appearing prior to June, 1904.

The second volume, the printing of which has been begun, will appear in the near future and conclude this most important contribution of the working student of vegetable physiology. RODNEY H. TRUE.

BUREAU OF PLANT INDUSTRY,
U. S. DEPARTMENT OF AGRICULTURE.

SCIENTIFIC JOURNALS AND ARTICLES.

The American Naturalist for May brings this journal up to date. It contains articles on the 'Affinities of the Genus *Equisetum*,' by D. H. Campbell; 'Movements of Diatoms and Other Microscopic Plants,' by D. D. Jackson, and, after a long interval, another of the valuable 'Synopses of North American Invertebrates, XX., Families and Genera of Araneida,' by Nathan Banks; 'Biology of *Acmœa testudinalis* Miller,' M. A. Willcox; 'Habits of the West Indian Whitebait,' A. H. Clark, and notes and reviews.

THE May number (volume 11, number 8) of the *Bulletin of the American Mathematical Society* contains: Report of the February meeting of the San Francisco Section, by G. A. Miller; 'On the development of mathematical analysis and its relation to certain other sciences,' by Emile Picard (St. Louis address), translated by M. W. Haskell; 'On the class of the substitutions of various linear groups,' by L. E. Dickson; 'Note on a problem in mechanics,' by A. M. Hiltebeitel; 'A geometric construction for quaternion products,' by Irving Stringham; Reviews of Lechalas's Géometrie générale, by Oswald Veblen; Netto's Elementare Algebra, by J. H. Tanner; Murray's Infinitesimal analysis, by W. B. Fite; Tanner's Elementary algebra, by James Pierpont; Annuaire du Bureau des Longitudes, by E. W. Brown; Gibbs-Roy's Diagrammes et surfaces thermodynamiques, by W. F. Durand; 'Notes'; and 'New Publications.'

SOCIETIES AND ACADEMIES.

THE MICHIGAN ACADEMY OF SCIENCE.

THE annual meeting of the Michigan Academy of Science took place at Ann Arbor, March 30, 31 and April 1. The programs of papers were good, and the meetings well attended by members and others from all parts of the state. On the evening of March 30 the annual address was delivered in University Hall before an audience of two thousand by Professor T. C. Chamberlin, of the University of Chicago, the topic being 'Old and New Hypotheses of the Earth's Origin.' The evening of the thirtieth was spent in a social smoker tendered by the University Research Club; and the excellent address of the retiring president of the academy, Dr. A. C. Lane, state geologist of Michigan, was delivered the afternoon of April 1, the topic being 'Natural Resources, their Conservation and Compensation for Necessary Consumption, one Feature of which is a Scientific Search for Substitutes.'

The academy has had introduced into the state legislature a bill for a topographic survey, and another bill for a natural history survey. The prospect for the passage of these bills seems good, and the academy decided to engage in a vigorous campaign to effect that end.

Papers were read as shown by the following programs:

SECTION OF AGRICULTURE.

Vice-President, W. J. Beal, Agricultural College.

KENYON L. BUTTERFIELD, president of State Agricultural College, Rhode Island: 'Outline of a Course in Rural Sociology.'

W. O. HEDRICK, Agricultural College: 'Syllabus for an Elementary Course in Economics.'

R. S. SHAW, Agricultural College: 'Syllabus for a Four-year Course in Live-stock Husbandry.'

U. P. HEDRICK, Agricultural College: 'Syllabus for a Four-year Course in Horticulture.'

J. L. SNYDER, president of Agricultural College: 'Social Phases of Agricultural Education.'

U. P. HEDRICK, Agricultural College: 'Outline of Topics in Horticulture for some Grades of Common Schools.'

CLARENCE E. HOLMES, superintendent of State School for Blind, Lansing: 'The Place of Agriculture in the Rural Schools.'

F. L. KEELER, Mt. Pleasant: 'School Gardens.'

J. B. DANDENO, Agricultural College: 'Some Experience in the Management of School Gardens.'

ERNEST BURNHAM, Kalamazoo: 'The Preparation of Teachers for the Rural Common Schools.'