with his chivalrous devotion to a "complete mental system," and with his courage in the use of his speculative imagination—he is a veritable knight errant in petrology.

J. P. IDDINGS

BATAVIA, JAVA,
August 3, 1914

Bacteria in Relation to Plant Diseases. By ERWIN F. SMITH, in charge of Laboratory of Plant Pathology, Bureau of Plant Industry, U. S. Department of Agriculture. Volume three. Vascular Diseases (Continued). Washington, D. C. Published by the Carnegie Institution of Washington, 1914. Quarto, viii + 309 pp.

It is not so many years since we were assured by some foreign bacteriologists that bacteria did not and could not produce diseases of plants. Less than a dozen years ago the writer of this review took part in an impromptu discussion in the bacteriological laboratory of one of the German universities in which it was vehemently contended on the one side that American bacteriologists showed their incompetence by thinking that the bacteria they found in plants had any pathological significance. Even pear blight was held to be due to some other than bacterial action. The sweeping assertion was made that no plant diseases whatever were due to the presence of bacteria.

The three stately volumes which Dr. Smith has already issued remind one of these recent opinions, and one wonders what can now be said by these same disbelievers in the pathogenic relation of bacteria to the diseases of plants. At any rate, Dr. Smith has here marshaled an array of facts that must be staggering to one who still feels that bacteria do not cause plant diseases.

The present volume deals about equally with diseases of monocotyledons and dicotyledons, principally with diseases of sugar-cane and maize, and with those of potato, tomato and tobacco. A full account is given of Stewart's disease of sweet corn and all the evidence going to show that it is disseminated on the seed. The morphology and cultural characters of *Bacterium solanacearum* which produces the "Brown Rot" of potatoes and other related plants are given in full. The destructive tomato disease, due to *Aplanobacter michiganense,* is also illustrated and distinguished from that due to *Bacterium solanacearum.* Growers of tobacco will find a separate chapter on the bacterial wilts of tobacco.

Throughout the book are found more than 150 text illustrations, and 47 full-page plates, some of the latter colored. The reader will share the author's satisfaction with the way that the printer has been able by the use of excellent paper and ink, and carefully selected type, to bring out the text and the illustrations. In passing it should be noted that only twenty-nine of the illustrations are borrowed from other authors, so that in this regard also this book is a contribution to the literature of plant pathology.

Although this volume was issued in the early part of August, 1914, it is known that the manuscript left the author's hands about two years earlier. During its slow progress through the printer's hands Dr. Smith has added many a paragraph and illustration, so that in fact the volume has been brought down as close as possible to its date of issue.

We need only pause a moment to call attention to the admirable index, which is all that an index should be. It is first of all an alphabetical index of the topics treated and the terms used, but, in addition, these are so systematically arranged that the index is a conspectus of the whole volume, and especially of its various sections.

As the writer of this review runs over this volume and its predecessors he is still more impressed with the feeling that some of these days the botanists of this country must ask very emphatically for a text-book on plant diseases prepared by Dr. Smith. A text-book from his hand could do much to place plant pathology on a truly scientific basis.

CHARLES E. BESSEY
THE UNIVERSITY OF NEBRASKA

The Bacteriological Examination of Food and Water. By W. G. SAVAGE. Cambridge, England, University Press.

Dr. Savage has prepared this volume of 170 pages as "a practical manual" dealing with the bacteriology of water, milk and other food products and air. It begins with two introductory chapters dealing in particular with the significance of colon bacilli, streptococci and anaerobic spore formers as "indicator organisms." Then follow chapters on Water, Soil and Sewage, Shellfish, Milk, Modified Milk and Milk Products, Bacteriology of Meat and Meat Products, Air and the Determination of Antiseptic and Germicidal Power.

A book of this size covering so wide a field can not from the nature of the case give a complete and authoritative treatment of the various subjects under discussion—such a treatment for example, as Dr. Savage has given to the problems of water bacteriology in his excellent "Bacteriological Examination of Water." On the other hand the discussion seems somewhat too discursive and the procedures and standards of interpretation are stated with insufficient clearness and definiteness to make the book altogether satisfactory as a student's text-book or a practical manual for the laboratory worker. Dr. Savage does, however, give an excellent summary of recent English discussions in regard to the subjects treated, with a good list of reference to original sources which will make the book valuable for advanced students.

From an American standpoint the most serious defect in this work is the almost complete lack of acquaintance with the progress which has been made along these lines on this side of the water. It seems strange, indeed, to find a book on the bacteriology of milk, water, air and food with no reference to American investigations on the direct microscopic examination of milk, on the lactose bile presumptive test, on the bacteriology of sewer air and on the bacteriological examination of shellfish.

C.-E. A. Winslow
The American Museum of Natural History

Molecular Physics. By James Arnold Crowther. Philadelphia, P. Blakiston's Son & Co.

This little book of 175 pages, though entitled "Molecular Physics," contains in reality only such material as is usually found classified under the general head "Electronics." It represents an attempt to present in elementary, almost in popular, form the recent developments in physics which center around X-rays, the electrical phenomena observable in exhausted tubes and radioactivity. The author is himself Fellow of St. John's College and demonstrator in physics at the Cavendish Laboratory. The points of view taken are then those which have grown up in that inspiring atmosphere out of which have unquestionably come more of the influences which have molded modern physics than from any other two places in the world combined. Freshness and originality of treatment are to be expected from such an author, and the expectation is not disappointed. The first two chapters deal with the determination of e/m and e, the third and fourth with the work on positive rays, J. J. Thomson's beautiful photographs being given especial attention. The fifth chapter gives the usual deductions found in a chapter on the nature and size of an electron. The sixth and seventh chapters are entitled the Chemistry of the Model Atom and the Atom in Vibration and represent the best elementary treatment I have seen of atomic models in relation to spectroscopy.

The eighth chapter presents just a touch of the conventional molecular physics in the discussion of Van der Waal's equation, but the last half of the chapter returns to the electron theory of metallic conduction. This subject is treated in the usual way, but unfortunately, I think, without any attempt to explain, or even to state the serious difficulties which the theory encounters. This is the one place in the book where the untrained reader will perhaps obtain a somewhat erroneous impression. The last chapter on the Atom in Dissolution is a very brief survey of the subject of radioactivity. Altogether the book is admirable and contains elements of interest for both the physicist and the general reader.

R. A. Millikan