course is most unfortunate. It is in this respect that the reviewer most questions the value of the purely pictorial mode of approach. In part, of course, this lack of coordination is the consequence of the necessary condensation of the topic. Perhaps the weakest chapters are those on electrical phenomena, owing undoubtedly to the great difficulty which one has in depicting the involved nature of electrical phenomena especially without adequate space in which to develop the concepts. Both this section and that on light suffer in that they tend to stress the *applications* of the phenomena perhaps too much at the expense of the fundamental concepts.

Concerning the presentation of the modern physics the author states as follows: "The treatment of modern physics here is given more or less in its historical development. Wherever feasible the presentation of each new subject includes first a brief historical account of the discovery, second an experimental demonstration of the phenomenon, third a discussion of practical applications accompanied by one or more experiments, and fourth a brief account of the accepted theory and its experimental confirmation." In this later procedure the author is far more successful in the second half of the book than in the first, for more space is allotted to the development of each topic. For a book of this type the text is remarkably free from the dogmatism that can so readily creep into such a text.

The drawings are exceptionally fine, and the make-up and printing of the book are excellent. The short biographical sketches of the various contributors to physics appearing as footnotes are a most fortunate addition. As a whole the book is conventional enough to be widely used in survey courses, while its original and vivid, yet dignified pictorialization lends it an air differing quite markedly from the usual college texts.

LEONARD B. LOEB

SMASHING ATOMS

Why Smash Atoms? By ARTHUR K. SOLOMON. 174 pp. Cambridge: Harvard University Press. 1940. $2.50.

OF the many books attempting to popularize modern physical advances this book presents an interesting innovation: In the first place it confines itself to a limited field, *viz.*, atomic disintegration. In the second place it strives to lay an adequate scientific background for the discussion before attempting it. In clear, simple and elegant English it develops a layman's picture of the atom and its constituents, proceeding in a logical and somewhat historical manner. This being accomplished in the first fifty pages, the author then proceeds to discuss nuclear transmutations and smashing devices, as well as the detecting instruments used. In the third portion of the book in some 30 pages the results of nuclear reactions, including uranium fission, are presented. The applications of the nuclear disintegrations to medicine and other fields are also briefly given. The presentation of the principles of high energy particle production, as well as the difficulties of cyclotron operation with which the author is familiar, are particularly good. The author must, however, be congratulated in general for the facility of presentation of scientific material to the lay public which is in evidence throughout.

To the reviewer who grew up with the development of this subject and who, together with Marsden in 1919, was the first to check the artificial disintegration of N by α-particles in Rutherford's laboratory before the results were published, the liberties taken by the author with scientific history are particularly irritating. In a measure some of these difficulties are to be ascribed to the author's avowed policy, "I have deliberately omitted the names of many whose work is fundamental to nuclear physics, not because I do not appreciate the nature of their contributions, but for the more practical reason that too many names would confuse the reader." Whether this confusion would result or not were more names included is in itself highly debatable. Leaving this aside, however, there is no justification whatsoever for bringing Franklin's name preeminently into the fundamentals of the early discoveries of static electricity. Much as we revere our Franklin, his contributions to the subject were negligible except for proposing the single fluid theory of electricity. The implication to an uninstructed public that these advances were due to Franklin is most misleading. Either *no* names should have been mentioned or *more* names should have been mentioned. Misconceptions of this character are frequently invoked in sections of the book. There are other errors of omission equally annoying, such as the omission of all mention that prior to Moseley in 1913 the concept of nuclear charge and atomic number had clearly been put forward by Van den Broek, Soddy and Fajans on the basis of the chemistry of the radio elements. The descriptions in the first portion of the book are clarified through the use of simple but unnecessarily crude line drawings. One wonders, however, why the dignity of an otherwise good lay presentation of a scientific subject must be marred by irrelevant animal cartoons such as the black and white birds on page 37, representing α and β-particles supposedly emitted in the uranium series. On the other hand, the photographs of the various sources of high energy particles as well as those of cloud tracks are among the best so far reproduced in texts. It would, however, have been better for the reader if more accurate descriptions of these figures could have been embodied in and correlated

with the text. Aside from these marring features the book constitutes a real contribution to the popularization of modern physics.

LEONARD B. LOEB

PHYTOPATHOGENIC VIRUSES

Handbook of Phytopathogenic Viruses. By FRANCIS O. HOLMES. vii + 221 pp. Minneapolis: Burgess Publishing Company. 1939. $2.00.

THE virous nature of certain diseases of plants has been known since 1892, when Iwanowski described the filterable nature of tobacco mosaic which Beijerinck confirmed in 1898 and interpreted as being a "contagium virum fluidum." Since then many virous diseases of plants have been described, and numerous attempts have been made to roughly classify them.

The present effort of Dr. Holmes to bring out an orderly presentation of these diseases carries far beyond any previous attempt at nomenclatorial classification. He has adopted the Linnean system in common use for the higher biologic forms, applying Latin binomials for virous names. He has also applied common names in accordance and has included the recognized vulgar synonyms.

The author has included as separate entities in this work 129 viruses of seed plants which he considers to be sufficiently distinctive to deserve specific binomial or trinomial designation. In addition he has described under Latin binomials those bacteriophages which can be recognized as distinctive.

Specifically this work treats only those virous entities known to attack plants, including bacteria, under the division Phytophagi. This division is separated into two classes, Schizophytophagi and Spermatophytophagi. The former embraces one family, Phagaceae, in which 40 bacteriophagic species and two varieties are recognized under one genus *Phagus,* of which the type is *P. minimus* (Bacteriophage S13 of the colon and dysentery bacteria).

The Spermatophytophagi contains ten families based largely on symptoms produced on typical host plants.

Family 1. Chlorogenaceae, which is typified by *Chlorogenus callistephi,* the aster yellow virus. The author recognizes nine species and five varieties in this genus.

Family 2. Marmoraceae likewise contains one genus *Marmor* with 53 species and 26 varieties, of which *M. tabaci,* the tobacco mosaic virus, is the type. This largest family contains the more commonly recognized virous diseases which produce mottling or mosaic symptoms.

The remaining eight families are small but distinctive. The Annulaceae embraces four species and three varieties characterized as the ringspot family, of which *Annulus tabaci* causing tobacco ringspot is the type. The Gallaceae or Fiji-disease group with four species is characterized by vascular proliferations of which *Galla Fijiensis* causing Fiji disease of sugar-cane is the type. The Acrogenaceae (spindle-tuber group); Rugaceae (leaf-curl group); Coriaceae (leaf-roll group); Nanaceae (dwarf-disease group) complete the families of the Spermatophytophagi. Each species is treated in a systematic manner under synonyms, suscepts, immunes, geographical distribution, induced disease, transmission, serology, immunology, thermal inactivation, filterability, other properties such as crystallization, sedimentation, molecular weights, etc., control and literature.

The two supplements contain respectively a list of susceptible and insusceptible plants and a list of viruses not treated in the book and about which too little is known for classification. The work is concluded with an adequate index.

The author has stepped out and given his colleagues in the virous field a conception of these entities which must be taken seriously. Whatever is the final decision regarding the nature of viruses, his method of classification is certainly scientific and will appeal to those of us who can not remember whether aucuba-mosaic virus is the same as tobacco virus 6 and nicotiana virus 10. Furthermore, Dr. Holmes has brought together in a convenient form the most accurate information extant on these most interesting and important entities and thus has performed a real service to phytopathology.

As a novelty the book is lithoprinted and loose-leaved and has a spiral metal binding which opens flat, with cardboard covers.

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PLANT MICROTECHNIQUE

Plant Microtechnique. By DONALD A. JOHANSEN. xi + 523 pp. New York: McGraw-Hill Book Company. 1940. $4.50.

THIS is the most extensive review of microtechnical methods as applied to botanical materials that has yet appeared, at least in English. In addition to the space devoted to the more familiar problems of fixation, dehydration, imbedding, sectioning, staining and the preparation of whole mounts, one chapter discusses with satisfying fullness the recently developed smear methods, and another outlines some of the most useful microchemical manipulations. More than 200 pages are devoted to a systematic discussion of special details of culture, preservation for morphological purposes and the cytological treatment of members of all the plant groups from Schizophyta to Anthophyta.

The book, as the preface points out, does not attempt the impossible task of being encyclopedic. In the course of the necessary selection, the author has chosen