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

methods either because they are widely used or because they have shown their value in tests made by him or under his supervision. Dr. Johansen's experience and his well-known contributions to technique guarantee the value of his recommendations. It is true, of course, in a field in which experience varies so greatly and in which success is dependent upon so many uncontrollable factors, including the personal one, that any experienced technician will find reason to question some of the author's conclusions and to regret certain of his omissions. However, granting limitations of space, no one writer probably could have made a better selection.

The subject-matter is presented clearly and fully enough to be usable by a beginner. On the other hand, so much is included and so many useful hints as to detail are presented that the book will be of value to all workers in its field, however extensive their experience. The author has given us an important and a thoroughly up-to-date contribution.

C. E. ALLEN

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REPORTS

COOPERATIVE INVESTIGATIONS OF THE RELATION BETWEEN MOSQUITO CONTROL AND WILDLIFE CONSERVATION[1]

SINCE the creation of the Tennessee Valley Authority in 1933, the Tennessee River has been converted into a series of large reservoirs. This change from river to lake conditions has necessitated certain major biological readjustments within the area. These adjustments concern not only the valuable wildlife and fisheries of the region, but create potential hazards to the health of man, particularly with regard to increased production of anopheline mosquitoes capable of transmitting malaria. Although these attendant changes are not unique to the Tennessee Valley, but have occurred, or will occur, in other large impoundments in the South, nevertheless the Authority has felt obligated to investigate the possible conflict between malaria control procedures and wildlife conservation.

On February 28, 1939, a meeting was held in Knoxville, Tennessee, which was attended by representatives of the Federal Bureau of Biological Survey, Public Health Service, Bureau of Fisheries, Bureau of Entomology and Plant Quarantine, and departments of the TVA interested in wildlife conservation and mosquito control. A second meeting was held on May 8. After full discussion of mutual interests, a Technical Committee was appointed to carry on a cooperative field study to obtain information on the nature and extent of the effect of mosquito larvicides and of water-level fluctuation upon fish and waterfowl, or upon their food supply; to consider possible substitution or modification of practices where damage was established; and to provide a mechanism for the coordination of the interests of the participating agencies. Representatives of the interested state agencies were invited to participate.

Members of the Technical Committee investigated the various problems jointly in the field, chiefly in Wheeler Reservoir,[2] during the summer of 1939. The continuous fluctuation of the water-level for anopheline control, together with the "over-all" fluctuations for flood control, navigation and other purposes, rendered it extremely difficult to separate the exact influence of these factors from one another and from other malaria control procedures. Variation of water-level results in the invasion of species of vegetation adaptable to such conditions. Certain of these species are undesirable, both from the viewpoint of wildlife conservation and malaria control. Wide variation of water-level inhibits the growth of submerged vegetation and of most of the indigenous emergent species of high value for waterfowl. Fluctuation also has a marked effect upon the qualitative and quantitative distribution of aquatic organisms.

Studies were conducted on the influence upon aquatic fauna and flora of the routine use of Paris green (applied by airplane at the rate of about one pound per acre) for the control of the malaria mosquito, *Anopheles quadrimaculatus*. These treatments showed no deleterious effect upon vegetation, and gave no evidence of a catastrophic destruction of aquatic organisms important as fish food. The great variability of conditions and the complicating factors in the experimental areas rendered these studies extremely difficult. For these reasons the data were inadequate to measure partial changes in the fauna which may have resulted. Chemical analyses of soil samples showed that arsenical residues accumulate in the bottom of the reservoirs in variable amounts.

In a general study, extending beyond the limits of the Tennessee Valley, on the effect of various poisons upon the physiology of fishes, representatives of the Bureau of Fisheries, working more or less independently of the studies of the Technical Committee, showed that, while arsenic accumulates in the fish of TVA reservoirs, the quantities stored to date in fishes are insufficient to be a menace to human consumption. This study is being continued to evaluate any additional storage which may develop. However, fish

[1] Report of the Technical Committee, May 14, 1940.

[2] A wildlife refuge was established in this reservoir by executive order, in August, 1938.