be ill-received by taxonomists and etymologists alike. That misleading technical term 'type' occurs repeatedly in the addenda though not in the glossary, but will not entrap those who read the suggested works on taxonomic practice. However, the discussion on the name *Mitra sulcata* is comprehensible only, and with difficulty, in the light of a new provision on the status of junior primary homonyms, which many will be surprised to find in the forthcoming edition of the International Rules of Zoological Nomenclature.

The addenda, in fact, are intended not for the general reader but for the systematic malacologist; who should acquire three additional pages, issued separately. They reinforce a bibliography of nearly six hundred titles, with every original reference to an included species, and a large number of original figures reproduced from inaccessible works, to make the handbook invaluable, especially to the isolated worker. Relatively few additional titles would be needed to provide references to the genera also, and publications of one author in one year could be distinguished in the text by means of the letters used in the bibliography. Perhaps these minor improvements may be incorporated in the successive editions which will certainly and deservedly be demanded.

I. C. J. Galbraith

BACTERIOPHAGES

Bacteriophages

By Mark H. Adams. With chapters by E. S. Anderson, J. S. Gots, F. Jacob and E.-L. Wollman. Pp. xviii+592. (New York: Interscience Publishers, Inc.; London: Interscience Publishers, Ltd., 1959.) 115*s*.

BACTERIOPHAGES are viruses made up of genetically active deoxyribonucleic acid enclosed within a protein shell, which seem to have no enzymes of their own, with the exception of some forming part of the specialized apparatus, the phage tail, concerned with their attachment to and penetration of the host. Yet the entry of the phage nucleic acid into a susceptible bacterium results in a complete change-over in the metabolism of the host, with synthesis of new enzymes, proteins and nucleic acids.

The advantages of such a system for the investigation of the mechanisms by which specific biosyntheses are controlled and performed are evident. Furthermore, phages, from the technical point of view, are much more convenient to work with than any of the other known classes of virus. It is therefore not surprising that in recent years the phage-infected bacterium has become a favourite experimental material for fundamental research in cell physiology, biochemistry and, perhaps most important, in physiological genetics, and that our knowledge of phages has increased enormously. Phage has been used as experimental material in such a variety of fields that the reports are scattered to an exceptional degree. The first text-book on phage to appear in English for many years has therefore been eagerly awaited. The work in question was begun some years ago by Dr. Mark Adams, of New York University College of Medicine, well known for his own researches on phage, particularly in the neglected field of their taxonomy, and for the course which he taught at Cold Spring Harbor for many summers; a course which served as an introduction to phage for many biologists and workers from other fields who have since contributed largely to our increasing knowledge of this subject.

At the time of Mark Adams's untimely death in 1956, his manuscript was unfinished. It has been completed by the addition of four chapters, planned but not drafted by Adams: on "Chemical Interference with Phage Growth", by J. S. Gots; on "Lysogeny" and on "Colicins", by F. Jacob and E.-L. Wollman; and on "Use of Phages in Epidemiological Studies", by E. S. Anderson. The eighteen chapters finished or partly written by Adams have been revised, brought up to date and completed by a panel of distinguished workers in phage research, the whole work being under the general editorship of A. D. Hershey.

The book as thus completed forms an excellent and reasonably detailed account of our knowledge of phage. The style and presentation are satisfactory, and even those without previous knowledge of the subject should have no difficulty in following the argument. Indeed, it may perhaps be said that at some points simplification has been carried too far; for example, the equation derived by Visconti and Delbrück for the frequency of a recombinant class among the progeny phage released after infection of bacteria by a mixture of phages of differing genotypes is given, but not its derivation. However, the qualitative treatment given will probably suffice for most readers. Those requiring more detail will find themselves well served by the extensive bibliography (some 900 references); it is to be regretted that not all the citations include the titles of papers. A glossary of terms used in the literature is also included in the volume.

Despite the rapid progress of research on phage, most experiments even now make use of a rather limited number of more or less standard techniques. One of Mark Adams's most useful services to the phage world was the publication in 1950 of a review entitled "Methods of Study of Bacterial Viruses", in which all these indispensable experiments and techniques were described and discussed. This most valuable compendium has been included as an appendix, with such additions and amendments as were needed to bring it up to date.

All the principal aspects of phage are dealt with, and it is satisfactory to be able to record that the earlier literature, mainly European, has not been neglected. The use of phages in epidemiology is the only application of phage described; their use in the treatment of bacterial infections, to which so much attention was given in the years immediately following the discovery of phage, is scarcely mentioned, an omission perhaps justified by the disappointing or equivocal results obtained, both in experimental and natural infections. In general, it may be said that the selection of results from the extensive literature has been admirably made, for while nearly every report of general importance is discussed or mentioned, the very large number of papers of only ephemeral or specialized interest are not referred to.

This work can therefore be warmly recommended (and indeed its high price seems to me its only major fault). It will certainly become, and long remain, the standard source of information on phage. It forms a worthy memorial to its principal author, both as scientist and teacher.

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