in the field has been the originator of much of its currently accepted theory. The resulting book is far more than a mere review of the literature—it contains a wide-ranging and critical evaluation of the experimental foundation of the episome concept not to be found anywhere else. Dr. Campbell devotes a major part of this book to the bacteriophage *lambda*, which has been the main subject of his own research. Indeed, *lambda* is by far the best known model of an episome yet available. However, detailed attention is also given to the F (fertility) factor of *Escherichia coli*, to the extrachromosomal determinants of colicinogeny in *Esch. coli* and *salmonella*, and to the R (resistance transfer) factors. The similarities and differences between these various elements are fully discussed in a very illuminating way. They all have in common the basic property of being able to replicate independently of the chromosome, and most of them have some means of spreading in infective fashion from one bacterial cell to another. The capacity for chromosomal integration, the distinctive feature of an episome, is possessed by only some of these elements, and to this extent Campbell's title, as he himself recognizes, focuses attention on only one property of the general class of *plasmids*, to use Hayes' term.

The book is not a long one, but the writing is concise and the information content high. Little time is spent on introducing the reader to terminology, and only those already partly familiar with microbial genetics will find the book easy going. Even the comparatively well-prepared reader may find that some of the later chapters require frequent pauses for thought. In discussing the famous 'Campbell model' of the mode of integration of episome into chromosome the author comments that he was by no means convinced of its truth when he first proposed it. He goes on to remark that in the early days of a new hypothesis it may be necessary to look at the facts with a good deal of optimism in the hope that apparently contrary evidence will be shown to be invalid; subsequently, if the theory becomes well established, there comes a time for criticism and for the rigorous testing of its consequences in all possible ways. In this book there is a measure of hopeful and enlivening speculation more than balanced by a very critical examination of the logic of the arguments used. It requires, and more than repays, careful reading.

J. R. S. FINCHAM

The Genetics of Bacteria and their Viruses. Studies in Basic Genetics and Molecular Biology, 2nd ed. By William Hayes. (Pp. xvi+925; 142 figures+26 tables. 95s.) Oxford & Edinburgh: Blackwell Scientific Publications. 1968.

The first edition of this book, published in 1964, was greeted with enthusiasm and enjoyed a great success. It was almost unique in being scholarly, comprehensive, and readable. With the second edition the general character of the book has not changed; many passages stand unaltered and the newly written sections, which demonstrate again the lucidity and grace of the author's style, fit easily into the existing framework. Neverthe-

less, Professor Hayes has managed to take account of a large amount of new material published during the past five years. The bibliography has been expanded from 46 to 84 pages, with a great many new references added and only a very few of the old ones deleted. The text has grown from 667 to 804 pages and the author has done well to keep the increase down to so modest a figure. New growth has been kept within bounds by judicious pruning of the previous text. Here and there space has been saved by omitting or reducing discussion of a not-so-fruitful hypothesis or of a controversy now more or less settled (as in the case of the mode of integration of *lambda* prophage). But no important issue is evaded and the author is, as always, very fair in his presentation of conflicting lines of evidence on questions still undecided.

There are a considerable number of new illustrations and some of the old ones have been redrawn. To judge from my copies, the two-colour printing, which is a great help in the understanding of some of the diagrams, has been done more neatly in this edition (the second colour has changed from red to green to match the new dust cover). There are also several new photographic plates, mostly showing electron-micrographs and all very beautiful. When one adds that the price has been increased only 12% from 84s. to 95s. it will be seen that the second edition is an even better buy than the first.

It might seem that Professor Hayes has taken on a heroic task which will soon become impossible. In another four or five years the growth of the literature may have outstripped the capacity of any one man to cover it. I am inclined to believe, however, that though important new advances may be expected soon in some areas, notably, perhaps, in our understanding of the mechanism of recombination, Professor Hayes may well relax for a while before thinking about a third edition. A great deal of our knowledge of microbial genetics is now established on a very sound basis, and this book should stand as a definitive guide to many aspects of the subject for many years to come.

J. R. S. FINCHAM

Selected Topics in Medical Genetics. A Review from the Nuffield Unit of Medical Genetics, Liverpool University. Edited by Cyril A. Clarke. (Pp. x+282; illustrated+tables. 80s.) London: Oxford University Press. 1969.

This book, as the Editor explains, is an anthology of essays on topics in which he and his colleagues have been particularly interested and fields in which their own original researches have been conducted. While, therefore, the book does not make a harmonious whole, and is far from constituting a comprehensive if short textbook for students, every part of it is written with freshness and personal involvement. Apart from the Editor himself, there are contributions from R. B. McConnell, A. L. Jones, D. A. Price Evans, D. J. Weatherall, J. B. Clegg, R. Harris, J. Price, S. Walker, and G. S. Thompson, as one sees a list combining distinction with modesty since they offer hardly a first name among them.

The subjects covered include general themes (pitfalls and problems, polymorphism, linkage, and association) and solid reviews of pharmacogenetics, disorders of protein synthesis, and cellular immunity. There are rather scrappier bits brought together under the general heading of 'expanding areas', but among these is an excellent section on the porphyrias by Price Evans. About half the book came within the reviewer's field of interest, and he enjoyed it very much. There are some mysteries. On page 62 is shown a pedigree of a family of sufferers from tylosis, in which in successive generations the ratio of affected to unaffected among children of gene carriers is 5:1, 14:4, 19:5, and 2:0. On a hypothesis of simple dominance one might expect a 25:25 ratio, and a ratio of 40:10 or better only a little more often than 1 in 100,000 times. So very rare events do occur, in medical genetics, even as in E.S.P.!

ELIOT SLATER

Human Developmental Genetics. By David Yiyung Hsia. (Pp. 400; 153 illustrations. 136s.) Chicago: Year Book Medical Publishers. 1968.

In recent years embryology has changed from a descriptive subject into an experimental science—a transformation that has led to extensive studies on the significance of inherent as against environmental factors. Studies of this type supported by clinical observations on lethal and sublethal defects have in turn led to the emergence of Developmental Genetics as an independent discipline with ramifications almost as wide as those of Genetics in general.

Dr. David Hsia has contributed extensively to these developments and his book is particularly welcome as the first systematic treatise on this growing subject. Of necessity it contains much that is familiar to human geneticists, but he has organized his analysis of an extensive and diffuse literature so adequately that a great deal of little known and abstruse information becomes readily assimilated and appreciated. The book does in fact add a new dimension to the monograph literature on human genetics.

The first of the six sections of his book, devoted to general considerations, draws mostly on unsystematized general embryological and genetic studies in a most illuminating way. Equally illuminating is the succeeding section on prenatal growth—both normal and abnormal. The two subsequent sections—one on cytogenetics and the other on biochemical genetics—cover material that is well defined and fairly readily available. The more difficult field of immunogenetics is briefly but adequately discussed in the penultimate section in relation to both the immune mechanism in general and the maternal-foetal reactions in particular. The concluding section deals with the relevant aspects of environmental pathogens affecting development—radiation, infections, and drugs are all considered. Informed and well balanced, this book is as much a contribution to paediatrics as to genetics.

ARNOLD SORSBY

Late Somatic Effects of Ionizing Radiation. By Charles D. Van Cleave. (Pp. vii + 310; illustrated +

tables. \$3.00.) U.S. Atomic Energy Commission: Division of Technical Information. Available from: Clearinghouse for Federal Scientific and Technical Information, National Bureau of Standards, U.S. Department of Commerce, Springfield, Virginia 22151, U.S.A. 1968.

This is very useful (and cheap) review of the field of the long-term somatic effects of ionizing radiation. The author assumes little knowledge on the part of the reader and gives a useful introduction on both the physical and biological aspects of the problem together with some of the basic concepts current in radiobiology. The book is clearly orientated towards the study of higher organisms including man, but reference is made to lower organisms when this is appropriate.

The main part of the book deals with effects on the whole organism, and there are chapters on life shortening, tumorigenesis, non-neoplastic effects, and prenatal irradiation. The second section deals with effects on tissue cells and macromolecular assemblies, and a short third section deals with the subject of degradative change and ageing.

The author displays a quite unusually wide knowledge of experimental studies with laboratory animals and cultured cells and of the relevant clinical studies. This is one of the most pleasing features of the book. Another is that when describing experiments carried out by others he includes enough of the basic information for the reader to be able to judge for himself whether the conclusions drawn are justified. The review is however a critical review and not merely a compendium of previous work. Perhaps one could criticize the author on occasion for keeping his own comments on the brief side and sometimes for drawing conclusions that seem difficult to justify from the foregoing text. For example in summarizing the life-shortening effects, the conclusion is drawn that, 'studies on the effect of age at the time of exposure show significantly less life shortening at later ages or even none at all'. It seems fairly convincing from the text that if one makes an appropriate allowance for the amount of remaining life expectation, then sensitivity to this effect of radiation increases with increasing age just as do other short- and long-term effects.

Sometimes in the discussion of a particular area where rapid advances are being made the text seems a little out of date, as with, for example, the discussion of the relation between radiation and viruses in the induction of leukaemia. This is not a serious criticism—it does however serve to make one conscious of the achievement of the author in covering on his own so many different approaches so thoroughly.

The text is well written, being both clear and concise. Good reference lists are given at the end of each chapter and the index is short but adequate.

On the whole a useful book for both the specialist and for those who might read it for interest alone. It is emphasized that the title is precise and accurate; the book does not attempt to deal with genetic effects of radiation,

D. G. HARDEN