Insect biochemistry

Biochemistry of Insects. Edited by M. Rockstein. Pp. 649. (Academic: New York, San Francisco and London, 1978.) $29.50; £19.15.

IN 1961 Darcy Gilmour's book *The Biochemistry of Insects* (Academic: London) was published and in a text of under 300 pages it covered the available information on insect biochemistry, and included a generous amount of background information on general biochemical principles. The growth of the subject in the intervening years has been prodigious and to effectively review the field in a book that is little more than twice the size of Gilmour's is no mean achievement. The book that Morris Rockstein has edited covers the ground admirably. Its production and format closely resembles the six-volume revision of *The Physiology of the Insecta* produced by the same editor and publisher in 1974, and these two works will stand as a major source for entomology students for many years to come.

The majority of undergraduates who undertake specialist entomology courses these days will have received some basic biochemical training and this is essential if maximum benefit is to be derived from this book. However, it is not simply an exposition of the biochemical specialisations to be found in the Insecta. The authors have each taken the trouble to fit the biochemical facts into the wider biological picture and no matter what aspect of entomology interests the reader, he or she will find valuable facts and ideas within this book.

Inevitably, in any work which is compiled from several contributing authors there is some lack of uniformity in approach. To quote one example, the chapters on carbohydrates and lipids deal with the nutritional requirements for these compounds, and with their digestion and absorption, but no corresponding information is available in the chapters on proteins and amino acids. A lack of uniformity is also evident in the references to original literature, the chapter on insect biochromes having a bibliography of more than 30 general references and about 140 specialist references, whereas that on the toxic action of insecticides has only five general references. The separate listing of general works in the bibliographies is an admirable idea for the undergraduate reader interested solely in reviewing a particular topic. On the other hand the postgraduate reader who consults those chapters where specialist references are lacking, will require access to several other reference works before the original papers can be tracked down.

This very readable book is a valuable and significant contribution to the entomological literature. It provides important background information for undergraduate courses and will be a standard reference work for a wide range of professional entomologists.

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Biochemistry of viruses

The Biochemistry of Viruses. By S. J. Martin. Pp. 145. (Cambridge University Press: Cambridge, 1978.) Hardback £10.50; paperback £3.95.

KNOWLEDGE of the nature and biosynthesis of viruses has progressed to a stage where it is clearly impossible to encompass all aspects of the biochemistry of viruses in the space of 145 pages. The author of this latest volume in the series *Cambridge Texts in Chemistry and Biochemistry* has adopted a sensible compromise presenting a coherent survey of the subject based largely on his own experience and interests. The text progresses from a brief but adequate review of the history of virology through chapters on classification, assay, purification, structure, strategy of infection (that is, transcription, replication, maturation, defectiveness), therapeutic and prophylactic agents, and evolution. The book begins and ends on a philosophical note contrasting the virus as the invader of the genosphere with man as the invader of the biosphere.

The best and most comprehensive portion of the book is the chapter on virus architecture. The chapter on strategy of infection, which takes up 54 of the 145 pages, is well written but is less satisfactory, as it fails to deal adequately with the animal DNA viruses and the RNA tumour viruses. The text also suffers from having been prepared before the application of restriction endonucleases to analysis of the structure of the genomes of DNA viruses. In my view these deficiencies, together with the virtual exclusion of genetics, will limit the usefulness of this book as a course textbook. It can be recommended, however, as supplementary reading because Dr Martin has a lucid and simple style of writing which provides the hard-pressed student with an excellent example of the organisation and presentation of information in essay form.

Over-simplification occasionally generates inaccuracies such as "all RNA tumour viruses . . . appear to have similar base sequences" (p123); "most DNA viruses contain circular DNA molecules" (p44); and the like. Also a number of errors have slipped through. For instance, part of Figure 5.26 is missing; two eminent virologists have their names mis-spelt; the molecular weight of herpes simplex virus DNA is given variously as 54.92 (Fig. 2.4), 75 (p92) and 80-100 (Appendix) million and that of oncornavirus RNA as 10 million (Fig. 2.5). The retroviruses do not appear in the virus classification in the Appendix, apart from Rous Sarcoma virus which is listed as the prototype of the genus coronavirus of the family rhabdoviridae!

These imperfections will be sufficiently obvious to most readers not to detract from the basic worth of the book as a simple introduction to the biochemistry of viruses.

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Molecular genetics

THERE have been three exceptional textbooks written about microbial genetics. These are *The Genetics of Bacteria and their Viruses* by W. Hayes first published in 1964, *The Molecular Biology of the Gene* by J. Watson first published in 1968, and *Molecular Genetics* by G. Stent which was first published in 1971. These books cover a lot of similar territory, but each has a distinctive flavour. In Hayes' treatment the development of the subject seems a trifle disorganised in places, but the book is written with a sense of enthusiasm and wonder which is quite infectious. Watson's approach is autocratic, or "sovereign didactic" to quote the felicitous if somewhat ambiguous description from Stent. One has the feeling that no matter how cells originally functioned that after reading Watson's book they would have considered it advisable to conform to the royal dogma. Stent's book is undoubtedly the most literary of the three. He set out to write an introductory narrative and the book tells the story superlatively well.

Of these books Hayes came out in a

second edition in 1968 so is now in need of revision, Watson had a third edition published in 1976, and a second edition of *Molecular Genetics* (Freeman: San Francisco and Reading; hardback £14, paperback £9.70 has been prepared by Stent in collaboration with R. Calendar. The new edition retains the greater part of the original text (605 pages) and adds to it about 150 pages of new material either in the form of extra paragraphs or plates inserted at strategic places in the narrative, or by completely new sections added to relevant chapters. An examination of the small modifications which have occurred to the old text gives a fascinating insight into some alterations which have happened over the years to scientific language interpretation and technique. For example, the heading "The sex factor as an episome" has become "The fertility factor as a plasmid" and in the same vein "The conjugal tube and mobilisation" is now "The conjugal bridge and mobilisation". Also, the classic autoradiograph of a bacterial chromosome by Cairns has been re-interpreted to allow for bidirectional replication, and some unspecified development has introduced substantial changes to the curve depicting the kinetics of ONPG hydrolysis by ß-galactosidase resulting in a threefold drop in affinity constant. One sad loss, no doubt inevitable because of cost considerations, is the four colour plates of the original edition, particularly that by I. M. Wallace of eye-coloured mutants in *Drosophila*, which is a work of art in its own right. A less comprehensible omission is that of the Newcombe respreading experiment. This is the example I would propose to students if asked to name a single experiment as an ideal they should aim for in their research. It is ingenious, simple in principle and practice, and unambiguously proves its point. When this edition is reprinted perhaps the missing two pages could be added as a supplement by way of expiation.

The more extensive new sections are written in the same style as the original and have up-dated the text on a selection of topics including DNA replication, gene expression, RNA phages, genetic engineering, transcription and translation. However, the limited scale of the revision couldn't hope to do justice to all the advances that have occurred in the past 8 years, so there is little discussion of recent developments in a number of other areas—for instance, in DNA repair, plasmids or transposons. Nevertheless this edition is the most useful text available at present for teaching introductory courses in molecular biology. It is not, however, a contemporary classic like its progenitor was in its time. There is still a real need for a completely new and comprehensive treatment of the subject.

Two books by D. Freifelder are more specialised aids to teaching. *Molecular Biology and Biochemistry: Problems and Applications* (Freeman: San Francisco and London; paperback £4.10) is a useful text in the manner of *Biochemistry: A Problems Approach* by Wood, Wilson, Benbow and Hood (W. A. Benjamin: New York). Each of 17 chapters starts with a concise introduction to a particular topic, and this is followed by some references and a collection of relevant problems. Answers to the 550 problems are supplied at the back. The book will be of considerable use to both elementary and advanced students.

The DNA Molecule: (Freeman: hardback £13.40, paperback £7.40) contains a collection of 44 original articles arranged in sections, each of which has a short preface and is concluded with some pertinent questions and references. The collection has a structural rather than genetic bias and although it will be a useful reference book for microbial geneticists its role in teaching is more likely to be in courses of biophysics or structural molecular biology.

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Textbooks of genetics

Most textbooks of genetics seem to fall into three main categories: those designed for an educated general readership, those designed for university students taking courses in which genetics is not a major topic (for example, social sciences and medicine) and those designed for students with a specific interest in genetics. However, Sam Singer's slim (139 pages) *Human Genetics: An Introduction to the Principles of Heredity* (Freeman: San Francisco; paperback £3.10) does not fit easily into any of these categories. It is a very nicely presented summary of some of the essentials of human genetics, but it is difficult to know for whom it might be of value. It is too technical for the general reader or advanced school student and yet would be inadequate for an undergraduate course in human genetics. This is a pity because the author is clearly equipped to write a fuller text which undoubtedly would be very appealing to undergraduates. On the credit side I would rank it highly in being remarkably up-to-date, accurate and very readable. The illustrations are simple but of a particularly high quality. This is presumably a reflection of the publishers association with *Scientific American* which features prominently among the suggested readings at the end of each chapter each of which also concludes with a summary. There is an Appendix of 25 problems (with answers) mainly concerned with what is often loosely referred to as "pedigree genetics".

Two recently published books on population genetics illustrate very well the differing approaches to the subject. One is designed for the relatively non-specialist undergraduate (Bryan Shorrocks; *The Genesis of Diversity;* Hodder and Stoughton: London; hardback £5.75, paperback £2.95), the other for the specialist undergraduate or postgraduate (Eliot B. Spiess; *Genes in Populations;* Wiley: Chichester, UK, and New York; £13.95). I would warmly recommend both of these books to the readership to which they are directed. Both deal with factors affecting gene frequencies in populations, natural selection, polymorphisms and the underlying genetic basis of individual variations. But whereas Shorrocks concentrates more on the biological aspects of variation and requires no more than a basic knowledge of simple algebra, Spiess' approach is largely based on mathematical reasoning. Regarding the *Genesis of Diversity* most examples are chosen from *Drosophila*, a field in which the author has made his own contributions. Industrial melanism in moths (*Biston betularia*) is also given special attention. It seems odd that there is no mention of Clarke's work on frequency-dependent selection (though the subject itself is discussed), and there is very little about the population genetics of man. The latter is particularly unfortunate because this is an aspect of the subject which is rapidly growing in interest and importance. The presentation is clear and is well illustrated with line drawings and graphs. There is a list of well chosen references and an index. In its field it will have a number of competitors but as a straightforward and well written introduction to the subject it will no doubt be welcomed by many students and their teachers.

Whereas Shorrocks' book can be read from cover to cover in a couple of evenings, Spiess' book would defy any such approach. It is, at least to me, a book to dip into. A knowledge of differential calculus and matrix algebra, though not essential, would certainly make for a fuller appreciation and understanding of the text. There is, however, a very helpful appendix of various mathematical and statistical formulae used in the text. This too is a very attractive book and the way the material is clearly divided into well defined sections is very helpful to the reader. Also, examples are chosen from a wide range of organisms including man. Unfortunately, though each chapter concludes with a number of questions, no answers are provided, which is unhelpful to students and a possible source of embarrassment to teachers.

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