treatment is difficult to follow in places and is certainly not suitable for most as a general introduction. Another problem is coverage. Most of the results discussed apply to a one-locus two-allele model under pure drift or drift and mutation. Several important classical applications have been left out, such as Wright's multiple allele stationary distribution under rift, mutation and selection, and Alan Robertson's work on limits to artificial selection in finite populations. More recent applications to problems of genome evolution are only briefly discussed, and the powerful method of coalescents is not even mentioned.

True to his title, Gale goes into great detail on rather fine mathematical details while covering very little basic biology. His discussions of implication of theory for the neutralist/selectionist debate are very short, but even-handed. His main comment on the debate is that if effective population sizes are very large in nature, the neutral theory has difficulty because of the very long time required for substitution of new alleles. There are certainly a variety of mechanisms to keep effective population size orders of magnitude below the observed population size (such as rare, but severe, bottlenecks). An interesting mechanism, often overlooked, is that directional selection reduces the effective population size acting on loci linked to the site under selection (Hill & Robertson, 1966; Birky & Walsh, 1988). Thus, rather ironically, selective substitutions can increase the effects of neutrality at linked loci by lowering effective population size.

In summary, this book is a near miss. Gale provides a nice review of much of the classical literature on probabilistic modelling in genetics and is quite useful to someone with a background in stochastic processes. This book is especially useful if the reader wants to improve his/her appreciation of Fisher's genius for finding clever solutions to difficult problems. For the beginner wanting an introduction to stochastic modelling, Gale's book is a bit much. A second edition with more attention to recent applications and toned down a bit in places would be very welcome.

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J. BRUCE WALSH

Department of Ecology and Evolutionary Biology
University of Arizona,
Tucson AZ 85721, USA

A Dictionary of Genetics, 4th Edition. By ROBERT C. KING and WILLIAM D. STANSFIELD. Oxford University Press. 1990. 406 pages. Paperback £16.00, ISBN 0 19 506371 6.

Scientific dictionaries have been appearing in such abundance in recent years (see reviews in *Genetical Research* (1989), **54**, 164; (1990), **55**, 135 and **57**, 95; and that omits at least two not sent for review) that I said to myself 'Oh No! Not another'. But it is the most recent and is also (I think) the only dictionary dedicated specifically to the subject matter of genetics, so it deserves our attention.

It is the new edition of a dictionary last revised in 1985, and now has 7000 definitions with a good deal of cross-referencing, and various useful appendices. The terms and concepts defined cover the different branches of genetics and ancillary topics well, so that it will make a very useful addition to the library shelves and will particularly help students and those moving from one branch of genetics to another; and it is perhaps cheap enough to buy for one's own shelves.

The cross-referencing is of course necessary to fill out the information on a particular term; but this is often at the expense of forcing us to jump back and forth among the pages in order to grasp a single concept. As an example of this problem, I found *Shigella dysenteriae* defined as 'the dysentery bacillus. Many *E. coli* phages also attack this species.' *E. coli* is, surprisingly, not listed, so we look under 'phage', which leads us to 'bacteriophage', and there we find that three phages (P1, P2 and P4) attack *Escherichia coli* and *Shigella dysenteriae*. So we deduce that *E. coli* is short for *Escherichia coli.* The authors would say 'That should be obvious to everyone', which I doubt. However, there is another connexion here which seems to be missing in spite of its historical importance. *Shigella* should have referred us to R factors, since it was the new antibiotics made available to Japanese doctors at the end of the 1939–1945 war, for over-use against bacillary dysentery, which led to the development and spread of R factors carrying multiple (and multiply transferable) antibiotic resistance, and since then R factors have never lost their grip. We do find 'R factor' and have to look up 'resistance factor', defined as 'a class of episomes that confer antibiotic resistance to the recipient bacterium. See R plasmid.' R plasmid takes us to transposon and thence to retroposon and thence to retrovirus, which takes us to reverse transcriptase, oncogene, HIV and the central dogma. So we find ourselves deep in several major topics of molecular genetics. The term 'episome' gets its own definition, but I thought it had become obsolete because it does not have a useful place in modern plasmid biology.

This jumping back and forth in the dictionary is rather tiresome, and suggests to me that, when a number of terms are connected, one of the terms

defined could have been given a more detailed explanation with all others referred to the same place, to the reader's advantage.

One aspect of the cross-referencing that I find irritating is the frequent references to Appendix C, which include one or more years and authors' names. It turns out that these refer not to books or review papers in which the reader can find additional up-to-date information on the terms defined, but to a kind of Hall of Fame, defined by what the dictionary's authors consider the most significant genetic discoveries from 1590 to 1989 and the papers in which these advances were described. The list of these references is ameliorated by some books of scientific history dealing with genetics; but whether these history books are reliable and balanced is a question on which the authors of the dictionary might have risked an opinion. It is suggested that students should spend some time reading both the classical papers and some of the history books, but I doubt whether students will pay much attention to this list unless forced to do so by their teachers.

I have nothing against all the listing in Appendix C, except that the book buyer will have to pay for it, but I think it should have been kept out of the body of the book, where it continually catches the eye and holds up the action. More valuable would have been references to recent books filling out the picture of recent research and gene lists for organisms of particular current genetic interest. Suitable candidates would be *Genetic Maps*, 4th Edition (1987), edited by S. J. O'Brien (the fifth, even larger, edition of this great compendium has now been published), *Genetic Strains and Variants of the Laboratory Mouse* (1989) edited by Lyon & Searle, Michael Ashburner's remarkable *Drosophila: A Laboratory Handbook* (1989), *The Nematode* Caenorhabditis elegans (1988), edited by William B. Wood and others, and so on.

Finally, there are quite a few scientific terms included which I think we could throw away. The reader of the dictionary will soon light upon some, but a few examples are: *aptitude*, *arrhenotokous parthenogenesis*, *breathing*, *breakthrough*, *genopathy*, *genetic surgery*, and *myria-*, defined as 'a rarely used prefix meaning ten thousand'. How many legs does that mean we should expect to find on a myriapod, i.e. the group containing the centipedes and millipedes?

ERIC REEVE
Institute of Animal Genetics
University of Edinburgh

Protein Engineering: In Focus. By P. C. E. MOODY and A. J. WILKINSON. IRL Press, 85 pages. Paper £6.50. ISBN 0 19 963194 8.

This is an attractively produced, readable and cheap little book. Unfortunately it cannot be recommended. It is doubtful if there is any substantial group of students for whom the book would make useful reading.

The problem really arises with the term 'Protein Engineering'. Trying to understand the structure and function of proteins makes up a large part of modern biochemistry. Steady and substantial progress has been made with the problem since the mid-fifties, and now involves a formidable battery of techniques from physical and theoretical structural studies through enzyme kinetics and protein chemistry to genetic methods. The ability to generate specific mutants by oligonucleotide-directed mutagenesis has been a useful addition, but has not revolutionized the subject. Claims that it would do so were largely a partly successful attempt to get a funding bandwagon rolling under the catchy name.

But it was quickly discovered that the effort to make mutants is largely wasted unless the framework of these other methods exists to provide support for both the design and interpretation of experiments. Anybody could expect to fail to do justice to such a large subject in the (generously illustrated) 20 pages given to it here, and these authors duly fail. A mere 9 pages at the start of the second substantial chapter are used to describe the technology of making mutants. The treatment is out of date and incomplete, and does not provide recent references which might allow a reader to gain some insight into the practicalities of the technique.

The remaining two chapters, and over half the book, are devoted to 'case-study' descriptions of work on half-a-dozen proteins, which makes use of site-directed mutagenesis. The cases are clearly presented, but the absence of a wider background understanding of protein behaviour means that the treatment is quite uncritical.

There are two well-known short reviews of the use of site-directed mutagenesis in studying protein structure and function, by Knowles and by Shaw (in *Science* 1987, **236**, 1252 and *Biochemical Journal* 1987, **246**, 1, respectively). These are now several years old, but any student wanting to understand the possibilities and limitations of this technique would do better to spend an hour or so reading them in the library than to buy this book.

ANDREW COULSON
Institute of Cell and Molecular Biology
Darwin Building, University of Edinburgh