Another aspect of the relationship between the old and new genetics can be seen in those topics where the new genetics has still to provide answers to some questions raised by the traditional approach. For example, McClintock, in describing controlling elements, emphasized the important role which she considered they had in the control of normal development. Although in particular cases, such as yeast mating-type switch, the role of movable sequences in gene regulation has been recognized, it remains to be seen whether or not controlling elements do play a major role in development. The approach to controlling elements adopted in this book emphasizes their known mutational role, but remains agnostic on their putative developmental role. In this respect the approach contrasts with Federoff's review in *Mobile Genetic Elements* (ed. Shapiro), which stresses the McClintock view. It will be interesting to see whether the accumulation of new evidence will require a change of emphasis in future editions.

I do have minor criticisms of the book. Chapter 1 is not a very sound chapter, perpetuating some common errors and ambiguities, and students would be advised to start reading at chapter 2; there are also a number of typographical errors; but these criticisms should be considered in the light that all reviewers like to think themselves critical! – I looked hard for faults but at the finish found I had enjoyed a very readable and thoroughly recommendable book.

JEFF BOND
Institute of Animal Genetics
University of Edinburgh

Lambda II Monograph 13. Edited by ROGER W. HENDRIX, JEFFREY W. ROBERTS, FRANKLIN W. STAHL and ROBERT A. WEISBERG. Cold Spring Harbor Laboratory, Cold Spring Harbor, NY 11724. 1983. About 700 pages. Cloth: U.S.A. $68, elsewhere $81.60. ISBN 0 87969 150 6.

Due to a happy conjunction of circumstances, this is a quite outstanding book, which should find a much wider readership than its 1971 predecessor, the now classical monograph: *The Bacteriophage Lambda*. These circumstances include the remarkable sophistication of the control system which channels lambda into a lysogenic or lytic cycle, the fact that the last thirteen years have seen the solution of most of the major problems left by the 1971 volume and have begun to focus attention on the interactions of regulatory proteins with their DNA sites of action, the many ingenious techniques used to solve these lambda mysteries, and finally the generally high quality and clarity of the articles in the book, which make it a pleasure to read.

The 1971 volume was a half-and-half mixture of state-of-the-art reviews (and the art was still difficult to grasp for outsiders) and papers on current research. Lambda II differs in being essentially a series of reviews in depth of current understanding of all aspects of lambda biology, plus additional papers aimed at the beginner, the evolutionist and the biotechnologist, and ending with 141 pages giving the complete (annotated) DNA sequence of the 48514 base pairs of the phage. Much additional information is also given in appendix tables, including a molecular map and a list of the restriction sites for 96 enzymes. In general, these articles are written with the not-so-expert reader in mind, though the improved understanding of all aspects of the lambda lifestyle certainly makes the reader's task easier.

For the beginner, Arber's article, 'A beginner's guide to lambda biology', tucked away near the end of the book, is very clear and will help in following the more difficult review articles. I also think that 'Experimental methods for use with lambda', by Arber *et al.*, is a valuable inclusion, taking trouble to explain the basis of particular technical details. Murray's article on molecular cloning with lambda derivatives I found difficult, and think this large and highly technical subject needs more space, for the benefit of those who

are not already cloning with lambda, cosmids or phasmids. But it will certainly repay study.

Anyone interested in evolution will find Campbell and Botstein's article 'Evolution of the lambdoid phages' of considerable interest. In view of its sophisticated system for deciding between lysis and lysogeny, apparently designed to minimize the damage to its host (which puts it almost into the class of commensals), lambda must surely be approaching the limit of its evolutionary possibilities. But there are in fact a whole group of related phages, the lambdoid phages, which include P22 and its large family of related *Salmonella* phages. These can all exchange information with lambda by homologous recombination, without becoming thereby inactivated: exchange occurs in functional units of groups of genes, made possible by the similar modular organization of their genomes. This even suggests that the whole group of the lambdoid phages could be considered as a continually interbreeding family rather than as a series of related species. The comparison between P22 and lambda in the article by Susskind and Youderian on Bacteriophage P22 antirepressor and its control is of particular interest in this evolutionary context.

The main review articles on the different aspects of lambda biology can be left to speak for themselves, since the reader will rapidly become absorbed in whichever one he starts with. They cover lytic development, repressor synthesis, control of integration and excision, repressor and *cro* protein (essentially the battle between the *c*I and *cro* gene products for occupancy of the triple operator sites between the R and RM promoters, which determines lysogeny or lytic development), lysogenic induction (including the recently analysed role of the *recA* protein), DNA replication, general and site specific recombination, lambda's accessory genes (are they or are they not dispensable?), and the several processes and many genes involved in manufacture of the mature phage particle.

In conclusion, dear reader, I suggest that you ask your favourite aunt or uncle to buy you a copy of this book.

ERIC REEVE
Institute of Animal Genetics
University of Edinburgh

The Neutral Theory of Molecular Evolution. By MOTOO KIMURA. Cambridge University Press. 1983. xv + 367 pages. £35.00 ($69.50) ISBN 0 521 23109 4

Not long ago we were commemorating the centenary of Darwin's death and the immense influence that his theory of evolution by natural selection, proposed and argued in the face of scepticism and hostility, has had on our science and culture. In contrast Kimura argues that, at the molecular level, evolution occurs largely by the random processes of mutation and drift. Darwin need not turn in his grave: the neutral arguments are well founded on data and genetical and statistical principles; and in any case do not encompass the process of adaptation.

Information at the molecular level first came from analysis of protein sequence divergence between species and from electrophoretic variation within populations. It is now coming in a rapidly increasing flow on DNA sequence evolution, whilst that on variation at the DNA level within species is accumulating slowly because of the labour involved. At the time the neutral theory was first proposed by Kimura in 1968, the DNA sequence and restriction enzyme variant data were not available. Yet some of the recent findings, of increased evolutionary rate of third bases in codons and of pseudogenes, for example, and Kreitman's finding of substantial silent polymorphism in Drosophila, accords entirely with the theory.

There has been much misunderstanding about the neutral theory, particularly in the