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.

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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 role that selection plays. Selection is not irrelevant, but is one-sided: deleterious mutations are eliminated but favourable ones of sufficient selective advantage occur so rarely as to comprise only a small fraction of the observed substitutions. This view conforms with the higher rate of substitution in non-coding sequences or redundant bases, but it is strange that most of the changes we observe at the molecular level have not aided adaptation at all.

There remain some problems with the neutral theory, but these are not ignored by Kimura. Perhaps the single most elegant result of the neutral theory is that the rate of fixation of new neutral mutants is equal to their rate of mutation, which accords with the observed molecular clock of species differences. Unfortunately one rate is in generations, the other in years, so the neutral theory predicts the steady progress of the clock among species with wide differences in generation interval only if mutation rates are proportional to generation intervals. The neutralists have to wriggle to get round this problem: a nice but somewhat unconvincing balance between population size and fixation rates of slightly deleterious mutants is required. Whilst Kimura shows that the level of heterozygosity does not span as narrow a range as Lewontin had originally argued, it is still a little too narrow a range of effective population size for comfort. It will be interesting to see what light new sequence polymorphism data will shed on this. Nevertheless I think Kimura tries too hard to dispose of quite good selective evidence, e.g. on Drosophila ADH he has no need to: there must obviously have been some positive selection in evolution, and presumably there must be some in our current populations.

Overall, this is a most impressive piece of work. It presents the formal theory, but Kimura's powerful mathematics are summarized or removed so as to make it understandable to a wide audience, and it contains an extensive review of the relevant data. It is almost free of unnecessary polemics. The book should be required reading for all geneticists, both those concerned with molecular structure (who are wont to construct elaborate hypotheses on the basis of a few kb sequences on two or three species) and those who deal with ecological genetics (who are wont to construct elaborate hypotheses on the basis of some electrophoretic or structural polymorphism). It is undoubtedly the most important book on evolution to come out for many years. My only regret is that its price puts it beyond the range of students, for it can serve not only as a reference but as a text for courses on molecular aspects of evolution.

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Recombinant DNA Techniques: An Introduction. By RAYMOND L. RODRIGUEZ and ROBERT C. TAIT. London: Addison-Wesley. 1983. xviii + 236 pages. £16.95. ISBN 0 201 10870 4.

Many geneticists may have reached a stage in their work where studies at the DNA level would be the next logical step. However, they may be so intimidated by the prospect of recombinant DNA technology that this next phase never takes place unless an able and willing molecular biologist is nearby. There is no need to fear recombinant DNA when such books as the well known Cold Spring Harbor manual and *Recombinant DNA Techniques* are available. The latter is based on a laboratory course and is written in the form of a teaching manual with specific, detailed practical exercises. This book by Rodriguez and Tait contains sections on vectors and cloning strategies, microbiological technique, DNA isolation, restriction endonucleases, gel electrophoresis, ligation of DNA, bacterial transformation, identification and characterization of recombinant transformants and cloning regulatory DNA sequences. These are all the procedures necessary to obtain a cloned DNA segment of interest from a mixture of genomic sequences. In