amphibians. Chapter 3 is on 'Embryonic induction', a key concept as it emerges in the author's argument. Chapter 4 is on 'Cytoplasmic and extracellular controls'. Chapter 5 is on the 'Establishment of invertebrate body patterns' and here it must be said that, in view of current interest in them and of their likely importance in the light they will throw on fundamental problems of pattern development, the treatment of homoeotic mutations is too brief. The author regards the idea that body patterning in vertebrates and insects may be defined in a similar way as a highly dubious notion. This may be true, but the notion deserves a more extended discussion. In Chapter 6, 'The establishment of vertebrate body patterns', the question of segmentation is rapidly passed over, and the rest is given over to an interesting analysis of models of limb development. Chapter 7 is on 'Unstable differentiation', treating of, particularly, transdetermination in insect imaginal discs and transdifferentiation in vertebrate eye tissues, a subject to which the author has made important contributions and discussed authoritatively here.

Chapters 8–12 are clear, well-illustrated and thoroughly readable accounts of the chief topics of molecular genetics – 'Proteins and translation', 'RNA', 'Chromosomal proteins', 'DNA', 'Transcription and its control'. Chapter 13 returns to embryology with an account of various aspects of 'Growth and morphogenesis' and Chapter 14 – 'The principles of animal development' draws many strands together from the rest of the book. In the last chapter, 'An epigenetic theory of evolution', the most original in the book, the author considers what he takes to be the inadequacy of conventional theory in explaining how evolution takes place. He develops a complementary theory of his own, based upon an extension of Waddington's concept of genetic assimilation and an analysis of the relation between functional adaptations to external conditions and embryonic induction: external adaptive controls tend to become replaced by internal extracellular ones and then by intracellular ones, so that an important evolutionary role is given to adaptation to the environment. This may not be well received by strict neo-Darwinians, but in any event the author has produced a book which is interesting from the first page to the last as well as being an excellent introduction to its subject.

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*Genetics of Bacteria.* Edited by JOHN SCAIFE, DAVID LEACH AND A. GALIZZI. Academic Press. 1985. 286 pages. Hard, £45.00, $59.00. Paper, £12.00, $19.50. ISBN 0 12 621180 9.

One criticism I have of this book is the title, which may well lead school Biology teachers and general Biologists, professional and amateur, to buy, as they think, the latest simple textbook on a fashionable topic of wide interest. If so, their reaction on getting their teeth into it will be much like that of most purchasers of Lancelot Hogben's famous book *Mathematics for the Million* when it first appeared – terrible frustration that they found it so difficult ('surely I am in the top million!'). The title of the book under review might have included the word 'advanced', and a paragraph should have been printed on the back cover of the paperback edition to indicate the nature of the book (this is made fairly clear in the preface, but who reads a preface?).

The book is in fact designed for 'advanced students and new recruits using bacterial systems', and 'should be particularly valuable for gene cloners, as an account of the basic biology of the bacteria, phages and plasmids commonly used in their work'. So now you have been warned. Actually, the book is rather narrower than that quotation implies, since it concentrates on *Escheria coli* K12 (apart from a brief side-step to *Bacillus subtilis*, and follows a rather classical and conservative approach, concentrating on *in vivo* genetic analysis.

The 13 chapters on particular topics are in the form of brief reviews (average 20 pages) with some helpful background information, on the following: insertion elements, transposons and plasmids, mutations and mutagenesis, informational suppression, gene fusions and their uses, recombination (homologous and site-specific), control of gene expression, and phages Mu, P1 and P22 – their life-styles and uses for transduction, minimuduction, transposition, deletion and mutation. Key references and further reading material are listed at the end of each chapter.

One could doubtless collect all the information given in this book by digging through recent literature – papers, reviews and symposium volumes (often very expensive and not easy to come by in these hard times). However, the authors assembled here are all experts in their fields and, even more important, manage to write well and clearly (not the same thing), and to bear the problems of the intelligent newcomer to their subjects in mind. Moreover, numerous examples are given of the power and elegance to be found in the conservative *in vivo* approach (helped by a little of the new molecular genetics when needed), e.g. in squeezing an amazing amount of information from study of mutations in the *lac* repressor gene, in following up the intriguing mysteries of the little Chi sequence (does it have a secret and perhaps illegitimate affair with the *recBC* protein?), in putting the curious characteristics of phage Mu to useful work, and so on and so on. On the DNA manipulation–Genetic Engineering–Biotechnology front there is an ever-increasing output of text-books and recipe manuals competing for our attention; but none of these cover most of the ground covered in the book under review here. So this book does, in my opinion, satisfy an important need: it also makes stimulating reading, and it should be on the library shelves of all genetics and microbiology departments/laboratories. The paperback edition is also cheap enough to find its way into many pockets, haversacks or briefcases.

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*A Genetic Switch: Gene Control and Phage.* By MARK PTASHNE. Oxford: Blackwell Scientific Publications. 1986. 128 pages. £12.95. ISBN 0 86542 3156.

Phage lambda has been the subject of intense interest since the early 1950's, after its happy discovery as a resident of *E. coli* K12. A flood of papers followed, culminating in the famous 1971 book *The Bacteriophage Lambda*, which left many of us floundering in the complexities and mysteries of its terminology and dual life-style; until an equally important book, *Lambda II,* appeared in 1983, cleared up most of these mysteries, and added the complete DNA sequence (48,514 b.p.) and much associated information for us to brood upon. Since then, research on lambda has eased off a little, though the phage has meanwhile acquired a vivid new life-style as a cloning vehicle. One may hope that Lambda III will appear in 5–10 years with solutions of all the remaining mysteries; but in the mean time one of the leading contributors to lambda biology, Mark Ptashne, has produced the book under review.

Lambda possesses a complex and subtle switch mechanism to determine its choice of path towards lysis or lysogeny after infection, and the author thinks that an understanding of this biochemical apparatus may be relevant to the problems of cell differentiation in higher organisms, where genetic switch mechanisms must also be operative. His book, then, concentrates on the present view of the lambda switch mechanism, and describes this system in a novel way that makes it comparatively easy to understand for the newcomer to this branch of biology (and for dippers into the area like myself). After introducing some basic facts about genes and how they work, the book's first three chapters describe lambda's development 'from three perspectives: from a distance, showing the overall pattern of events involved in the interaction between virus and host; more closely, describing in coarse molecular terms a key event in the process; and very closely, showing precise molecular interactions'. These chapters give no experimental justification for the processes as described, but chapter 4 explains the principles of some of the key experiments leading to the present view, and gives a number of references to both research articles and reviews. Three appendices then discuss 'Designing an efficient DNA-binding protein', 'Strong and weak interactions', and 'Control of transcription in eukaryotes and prokaryotes – a common mechanism'.

This book is a welcome addition to the lambda literature. It is very lucidly written and extremely well illustrated, so that the essentials of the switch mechanism become very clear; and it is both a pleasure to read and a most helpful introduction to the complexities of the complete lambda biology described and speculated on in *Lambda II* (edited by Hendrix, Roberts, Stahl and Weisberg, Cold Spring Harbor Laboratory, 1983). The Lambda switch mechanism is very complicated, involving not only the DNA-protein interactions of the cI and Cro proteins and the tripartite operator site separating the *cI* and *cro* genes and overlapped by their promoters, but a number of other genes and their products – *N*, *Q*, *cII* and *cIII* – and a confusion of promoters and terminator sites which can be overridden when convenient by the N or Q proteins. The choice of switch setting seems to depend on the concentration of the unstable cII protein and the backup it gets from cIII (if I understand it correctly).

Some of the difficulty in grasping the details of this system come from the terminology, which evolved not with the organism but with its students. This terminology is even more firmly built into the subject than QUERTYUIOP... is built into the English typewriter and computer keyboard. The latter was, I believe, designed to make it impossible for early typists to type fast and so snarl up the crude mechanism, but attempts to replace it by an easier symbol order have never got anywhere. Likewise, we shall just have to get used to lambda terminology, as have those who use it: it is needlessly confusing, but not impenetrable.

In conclusion, I should like to suggest that lambda may not need such a complex system to maintain its place in *E. coli.* So I challenge Mark Ptashne – or others in the field – to design a better/simpler switch mechanism and associated circuitry for lambda, on the assumption that evolution does not always produce the best solution. Addressing this question might help in understanding lambda.

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*Molecular Biology and Crop Improvement. A case study of wheat, oilseed rape and faba beans.* R. B. AUSTIN, R. B. FLAVELL, I. E. HENSON AND H. J. B. LOWE. Cambridge University Press for the Commission of the European Communities. 1986. 114 pages. £17.50. ISBN 0521 32725 3.

This book deals with the ways in which the techniques of molecular biology could be applied to crop improvement, especially of wheat, oilseed rape and faba beans. It comprises a report to the Commission of the European Communities by the Cambridge Plant Breeding Institute. While the attention to wheat requires no comment, oilseed rape and faba beans are of increasing economic significance as substitutes for imported vegetable oils and meals for animal feed.