

Although it might be considered a relatively new subject, one of the most entertaining chapters of this book traces the history of applied biotechnology to show that man has been using the products of microbial fermentation, in a more or less systematic way, for several thousand years. It is however, only in the last 50 years that applied microbiology (which I suspect is a more accurate description of most of the subject), has become big business.

The book begins with a resume of industrial microbiology—the bacteria, yeasts and fungi which are the basic production units of biotechnologists—and a short section on the classic methods used for strain improvement. Strain improvement in this case means persuading the strain to produce large quantities of the desired products. This is followed by an extensive chapter on the primary and secondary metabolism of these microbial strains. Primary metabolism will be more familiar to most people as the normal intermediary metabolism of the microbial cell, and many useful products arise as products of this type of metabolism in different species of bacteria. In addition, secondary metabolism, which takes over when the microbe begins to run out of nutrients, is responsible for the production of many antibiotics and other metabolites.

There is a chapter on plant biotechnology, which concentrates largely on the methods of plant tissue culture for hybridisation of plant species and generation of new variants. This was one chapter which I felt showed the age of the book, because it contained little of the recent advances in plant genetic engineering. Although this is still an embryo field, there is no doubt that it is a subject which will become of increasing importance in time.

A major part of the book is concerned with downstream processing, that is the design of the plant required for the bulk fermentation, and the methods used to purify the required products away from the medium and microbial debris. There are large sections on the design of reactors and fermentation vessels, and the methods used to optimising the operating parameters (flow rates, pH control etc.) which are critical to the cost effectiveness of the process.

Another major concern of the biotechnology industry is the purification of the product into a form which can be sold commercially, the product recovery process, and this rates a separate chapter in the book. This end of the biotechnology industry contains more of chemistry and engineering than biology.

The book is aimed at students with some background in biology, and is a condensed form of a much larger multi-volume text. In some places the compression shows, for instance the treatment of the techniques of genetic engineering is extremely brief. The book also suffers from the fact that it was first published in German in 1982, and even although some of the sections were revised up to 1987 when it was translated into English, other sections are substantially out of date in this rapidly moving field. I felt that this was particularly so in respect of recent advances in knowledge about the control of transcription and translation of the genetic material. I

would also have liked to see perhaps a bit more recognition of the problems encountered in introducing cloned genes into a non-homologous cell type, and the problems in achieving proper expression of these genes in the new host.

How useful is this book to the students at which it is aimed? In general it appears to be a good introductory level text. I must confess that I found the subject less than wildly gripping, and this is perhaps a reflection on the book, which is competent and thorough rather than exciting. The translation from the German has been competently done, and only in a few places is it obvious that the book was not originally written in English. The text is attractively laid out with line diagrams as illustration. The book does not pretend to be a comprehensive treatise on biotechnology, and there are some obvious omissions, but overall it appears to be a reasonable introduction to the subject and as such a worthwhile student text.

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Transposition. SGM Symposium 43 A. J. Kingsman, K. F. Chater and S. M. Kingsman (eds). Cambridge University Press, Cambridge. 1988. Pp. 375. Price £37.50. ISBN 0 521 35464 1.

Transposition has been found in all organisms in which it has been searched for. It is the movement of discrete segments of DNA between different (often random) sites in the genome. The process is probably a manifestation of evolution at the level of DNA: a segment of DNA that can transpose is at an advantage compared with other DNA sequences. Thus, any method that enables transposition will be favoured; this is reflected in the quite different ways in which transposition can be effected. The advantage of transposition for the host organisms is the genetic rearrangements that are entailed and mediated: transposition is certainly one of the major forces in evolution. It is also of immediate social importance: for instance, antibiotic-resistance in bacteria is very frequently mediated by transposable elements; and the AIDS virus is, of course, a retrovirus, which can be considered as a transposable element. So, an immediately-accessible and up-to-date review of the whole field is most apposite; the last such volume was in 1983, *Mobile Genetic Elements*, edited by Shapiro.

The Shapiro book would be hard to improve on as a general text on transposition (except in terms of modernity, of course), and has to be the yardstick for any other text at this level. How closely does this SGM volume approach it? As is generally the case with these SGM Symposia, the individual articles are good, often very good. And in many of the cases they deal with fields that Shapiro does not cover (could not, generally, because the data were not available), such as transposition in *Streptomyces* (Chater *et al.*), mechanism of phage

mu transposition (Craigie *et al.*), conjugative transposons (Clewell *et al.*). In terms of the individual contributions, this volume is the equal of the Shapiro book. But where the SGM book shows up relatively badly is in the overall choice of subject matter: there are some odd additions, and some surprising omissions. In the former category, I should place, for instance, two separate chapters on site-specific recombination (which, except that the systems discussed are carried on transposable elements, have little immediate relevance to transposition). And in the latter category, there is no chapter on Class II bacterial transposable elements, which are of great importance in the problem of antibiotic resistance and which, in the words of one of the editors (K. Chater in the chapter on *Streptomyces*), "may well be . . . a major agency by which genetic information has been disseminated horizontally between groups".

So, I have some reservations about the book as a general text on transposition. But, what it does do it does very well and, for anyone interested in transposition, it is necessary reading.

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18th Stadler Genetics Symposium. Chromosome Structure and Function. Impact of New Concepts. J. Perry Gustafson and R. Appels (eds). Plenum, New York, 1988. Pp xvi + 326. Price £39.70. ISBN 0 306 42933 0.

This optimistically titled volume reports the proceedings of the 18th Stadler Genetics Symposium, which by careful detective work can be deduced to have been held at the University of Missouri, Columbia in 1987. Compounding this air of mystery, there is virtually no information given on the origin, history, scope or purpose of the Stadler Symposium series. This omission is unfortunate since it cannot be assumed that younger workers in this area are aware of Stadler's legacy to Genetics.

In a very brief foreword, we are informed that the symposium covers "a broad spectrum of studies on chromosome structure and function". This is an understatement! With such a large canvas to cover, it is inevitable that the coverage is patchy. The result is a collection of papers which lack a distinct coherent theme. Having said that, many of the individual contributions present valuable reviews, and in some cases original material on important topics relating to chromosome organization and function.

Although they are not grouped together, four papers are primarily concerned with aspects of the linear differentiation of eukaryotic chromosomes, including both major heterochromatic blocks and the finer euchromatic bands of *Drosophila* polytene chromosomes.

These papers cover general aspects of chromosome organization and banding (Burkholder), non-histone proteins in polytene chromosomes (Elgin *et al.*), the genetics of constitutive heterochromatin (Hilliker and Sharp) and chromosome analysis in wheat (Gill and Sears). To these can be added a further paper on cladistic analysis applied to chromosome banding data which may be of interest to taxonomists but is uninformative on chromosome structure and function.

A further sub-set of three papers present detailed molecular analyses of particular genetic loci, including the rDNA of maize (Phillips *et al.*), chorion gene amplification in *Drosophila* (Orr-Weaver and Spradling), and the R-nj allele in maize (Dellaporta *et al.*). Other aspects of chromosome organization and function are covered by useful surveys of replicons in higher plants (Van't Hof), meiotic chromosome pairing and recombination (Maguire) and a particularly fascinating and inspiring survey of recent work on kinetochore organization and function (Nicklas).

This leaves a residue of three papers covering topics as diverse as molecular mapping of plant chromosomes (Tanksley), transgenic *Arabidopsis* (Redei *et al.*) and genetic engineering of crop plants (Fraley *et al.*). Although these papers are interesting and informative in their own right they are at best of only marginal relevance to the declared theme of this symposium.

Ultimately one must ask whether this volume gives a reasonably balanced coverage of the admittedly broad title of "Chromosome structure and function" since prospective purchasers may assume that this is the case. Regrettably the answer must be no, since several possible topics of relevance and interest are excluded to accommodate contributions of little or no relevance to the theme suggested by the volume's title. Nevertheless there is much of interest here. While a broad balanced coverage is not achieved, several of the individual contributions deserve to be widely read by teachers and researchers in this rapidly advancing field.

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Eukaryotic Chromosome Replication. Proceedings of Royal Society Discussion Meeting. R. A. Laskey, G. R. Banks and P. M. Nurse (eds). Royal Society, London. 1988. Pp 175. Price £36.00. ISBN 0 854 03339 4.

The papers given at this meeting were first published in the *Philosophical Transactions of the Royal Society*, ser B, 317, 393-574, and later as a separate volume of 180 pages. The title is something of a misnomer, for nearly half of the pages in the Symposium Volume are devoted to prokaryotes, and the photograph on the glossy cover