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Book Reviews

Prokaryotic Structure and Function: A New Perspective. S. MOHAN, C. DOW and J. A. COLE. Pp. 440. Cambridge University Press, 1992. £60.00 (US$120.00). ISBN 0 521 41570 5.

This is a most enjoyable book, which all cell biologists could read with profit. It contains the proceedings of an SGM Symposium held in April, 1991 and already, in the faster growing areas with which it deals, one could add further interesting data. However, the emphasis of the book is on 'new perspectives' – it is the ideas that count, and this is a field where new hypotheses have been particularly successful in driving experimental work in the last few years. The authors and editors have done a good job in meeting the aspirations of the title of the symposium.

Like bacterial cell walls, the book develops by 'inside-to-outside' growth. The first chapter, by Ford Doolittle and colleagues, considers the evolution of the genomic structure of prokaryotes. The authors take advantage of the concensus now emerging on the divergence between 'bacteria' and 'archaea' to assess the importance and conservation of particular genomic features in a most entertaining and enlightening way. Rouvière-Yaniv and colleagues continue the theme with an examination of the physical structure of chromosomal DNA and the role protein HU plays in the supercoiling process. Though this is a somewhat more specialised experimental approach than most of the other topics in the book, it has important things to say about the role of supercoiling and about DNA-binding proteins generally. The final approach to the genetic basis of prokaryotes is Thomas and Jagura-Burdzy's chapter on chromosomal replication and segregation. Jacob's replicon hypothesis has, as the authors point out, dominated thinking about bacterial replication since it was first propounded in 1963. The enormous progress that has been made in understanding DNA replication, and the properties and dynamics of cell membranes and walls, since then has shown that Jacob's model of replication was greatly oversimplified and has radically altered views of how surface attachment could be responsible for chromosome segregation following replication. Nevertheless, the chapter shows how fruitful Jacob's ideas continue to be, and presents a most useful overview of current knowledge of chromosome replication.

The giant step from chromosome replication to cell growth and division is accomplished in the book by a chapter by Wheal. This is an invaluable comparison of prokaryotic and eukaryotic cell cycles that asks fundamental questions about the significance of differences between the two groups and suggests answers that would enlighten any consideration of the regulation of microbial growth. Bi and Luktenhaus present an enjoyable chapter on the genetics of cell division, dealing mainly with *Escherichia coli* but with some useful comparative material on *Bacillus subtilis* providing a Gram-positive element. They are concerned particularly with the coordination of DNA replication and cell division. Nanninga, Wientjes, Mulder and Woldringh deal with the other aspect of the cell cycle, the growth and division of the cell envelope. This is a thorough experimental and theoretical review of knowledge of wall growth in *Escherichia coli*. However, the reader will find nothing about the walls of Gram-positive bacteria and the information they provide about differences between rods and cocci and about potential modes of insertion of peptidoglycan into the wall, here or elsewhere in the book. Despite its title, this chapter says little about the cytoplasmic membrane and there is no compensation for this elsewhere in the book, despite a most thorough survey of intracytoplasmic membranes by Drews, in another chapter. A similar imbalance is introduced by the interesting chapter of Pugsley on transport systems with nucleotide binding sites, involved in traffic of macomolecules. This is certainly a new perspective, but the reader will also need a review of the equally rapid developments in studies of protein export by signal sequence-dependent processes in order to see the subject 'in the round'.

Two welcome chapters by Dawes and Ferguson respectively, deal with less fashionable but undeniably vital components of two cellular compartments, the cytoplasm and the periplasm. Dawes thoroughly reviews the fascinating recent developments in understanding intracellular storage materials glycogen, polyhydroxyalkanoates, polyphosphates, sulphur and cyanophycin

and their biochemistry. Some of these are now receiving the attention they deserve as a result of our perception of them as '*biotechnologically*' interesting. Ferguson's chapter on the periplasm is a useful, if rather short one. The periplasm is very poorly treated in textbooks, and there are few adequate up-to-date reviews, so this is a most valuable contribution. It was good to find discussion of the periplasm's physical properties and of how Gram-positive bacteria do without it.

The volume is completed by five chapters on bacterial differentiation. These seem to be becoming obligatory in books on cell biology. The problem for organisers of symposia is selecting the topics. Bacillus sporulation and germination chooses itself as a topic, and there are two excellent short chapters, by Moir and Stragier, on different aspects of compartmentalization of gene expression during sporulation. This particular process is the nearest we can come at the moment to explaining morphogenetic events in bacteria. So little is known of the genetics and molecular biology of most of the other candidates for Differentiation chapters, compared with the *E. coli* and *B. subtilis* material that fills the rest of the book, that the choice has to be a subjective one. The present volume avoids contributors whose reviews can be found everywhere, and as a result there is a welcome freshness to Adams' article on multicellular development in cyanobacteria, Shimkets' on myxococcus and Hodgson's on 'actinomycetes' (actually streptomyces after the second page), though in this last case some of the illustrations are old friends!

The book has no index, but the chapters are mainly short and well-focused and probably do not need one. Moreover a bad index, which is the norm, is seldom better than none. Altogether, this book is a valuable addition to the literature and, though expensive, I think good value for money. It is very well produced, with good illustrations, good bibliographies and a good binding. It is a good buy.

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Colour Guide – Infectious Diseases. A. P. Ball and J. A. Gray. Pp. 120. 152 figs. Churchill Livingstone, 1992. £7.95.

I feel a little bit sorry for modern students as the medical curriculum continues to expand. You can see their brains overheating as they stand at the bedside, trying to reconcile the logic of basic sciences with the bewildering array of rashes, lumps and bumps that they encounter during their clinical attachments. This book will definitely help them to learn about clinical infectious diseases. It is part of the genre of clinical atlases that can slip into the pocket. This book is different in that it appears to attempt to fuse the clinical atlas with the depth of information that you would expect to see in a 'lecture notes' book. Photographs of clinical cases are accompanied by notes on the opposite page. These are really quite detailed and contain paragraphs broken down into aetiology, incidence, pathogenesis, clinical features, complications, treatment and prevention. The book attempts to provide an acceptably large amount of information in a logical format and therefore rises above the average atlas. With the exception of the chest X-rays, all of the photographs are of the highest quality and I do not believe I have seen any of them published before. they were sufficiently clear to allow me to attempt a diagnosis without referring to the text (I was not 100% correct, I am afraid). One problem with the photographs is that there is inconsistency in the use of bars to exclude the patient's eyes. Some photographs have them, others do not; when they are used they are so ineffective that you can easily see the features of the patient's face.

I have few arguments with the text. It is divided into 43 infectious diseases, to each of which are devoted 1–2 pages accompanying 1–6 photographs. It has a commendably large paragraph on pathogenesis with each of the sections, which helps the student understand the subsequent details of the clinical features. Sometimes the paragraphs on treatment and prevention are a little too brief. I only found one typographical error in the book.

My main quibble is that no place is found for malaria, schistosomiasis and other common imported infections such as amoebic disease. In common with other Infectious Diseases Units we are seeing an increasing number of patients with these infections, and I think that a book