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Book reviews

Genomes. T. A. Brown. BIOS Scientific Publishers, Oxford. 1999. Pp. 504. Price £29.95, paperback. ISBN 1 85996 201 7.

This is a superb textbook for modern molecular biology. The approach to the subject is significantly new and improved over Watson *et al*.'s *Molecular Biology of the Gene* and the material is categorically up-to-date. There are good and substantial textbooks for the study of cell biology such as Alberts *et al*.'s *Molecular Biology of the Cell* and Lodish *et al*.'s *Molecular Cell Biology*; this does not pretend to be such a book. Rather, the focus is solely on the genome.

The new approach Brown takes to introduce molecular biology is unmistakably modern. Only six pages into the first chapter and the Human Genome Project is in your face. It's a great point of entry — why sequence the entire human genome or any genome for that matter? There is good discussion of why genome projects are important and what can be learned from them. From there it's how to do it, which includes sections on genetic and physical mapping, and DNA sequencing techniques. Next it's how to make sense of all the data; this addresses first how to locate genes within the genome and then how to work out the function of a gene once you've found it. Included in these discussions are clear presentations of techniques using ESTs, DNA chips, the yeast-two-hybrid system, RT-PCR, DASH, FISH, etc.; basically, if you've seen a cool new molecular technique in *Science* or *Nature* or *TIGs* over the last few years, it's presented in this book.

The middle section is the hardcore workings of genes. This includes the structure of prokaryotic and eukaryotic genomes, chromatin, transcription factors and the regulation of transcription, RNA processing, translation and protein modification. The ability to regulate genome function at many levels is emphasized and current work on subjects such as signal transduction mediated gene regulation is presented in good detail. The last section addresses how genomes evolve, which starts, very logically, with a full chapter on DNA replication. After that you're into mutations and recombination and the final chapter is on molecular phylogenetics.

The set-up of the book is very reader-friendly. Everything is cross-referenced, which is enormously helpful. This way, when you run into DNA chips in Chapter 5, you can refer back to where they were first discussed in Chapter 2. Another nice aspect of the book is the small, digestible sections separate from the main body of text called 'Technical Notes' and 'Research Briefings'. The 'Technical Notes' describe in detail a technique used in studying genomes, such as cloning in bacteriophage lambda. 'Research Briefings' present the reader with new findings in current research such as *C. elegans* mutants with extended lifespans. Also included in these sections are historical anecdotes on important breakthroughs in biology, such as the experiments that led scientists to believe that genes are made of nucleic acid. There is a glossary, an index, a list of abbreviations, and an appendix that lists web sites and journals for keeping up-to-date with the current research.

The only fault I find with the book is the figures. Although they do serve their purpose and essentially all of them illustrate a point in a simple and clear way, the colour scheme is weedy and often faded looking. And as a developmental biologist, I need to take issue with the pale pink *Drosophila* embryos that look like little pork sausages (or something worse). Overall Brown's *Genomes* is an excellent textbook that provides a thorough account of what is known about genomes today and the material that it presents includes work at the cutting edge of molecular biology.

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Inducible Gene Expression in Plants. P. H. S. Reynolds (ed.). CAB International, Wallingford. 1999. Pp. 247. Price £45.00, hardback. ISBN 0 85199 259 5.

This multi-author volume provides a concise and timely summary of current understanding of transcriptional regulation of gene expression in plants. Following an introductory chapter by the editor, the first four chapters concentrate on the use of promoter/*trans*-acting factor systems derived from bacteria, insects, mammals and yeast to regulate gene expression in plants. The principles underlying these systems are explained with text-book clarity and some elegant work on their use to investigate fundamental questions in plant biology is described. A repeating motif from these chapters is that, although these systems are powerful tools in the box of technologies now available to the research biologist, their applications in the field are limited.

The book moves on to look at transcriptional regulation of gene expression in response to the environmental stimuli, nitrate, heat shock and wounding. The recurring theme of these chapters is the complexity of interactions between environmental stimuli and the influence of developmental status and cell specificity on gene induction. The chapter on wound-inducible genes provides a useful reference table of wound-responsive genes and summarizes current understanding of the role of signalling compounds such as methyl jasmonate and ethylene in the wound response.

The last three chapters of the volume concentrate on transcriptional regulation by plant hormones. This section

starts with a description of developmental targeting of an Agrobacterium-derived cytokinin biosynthetic gene, *IPT*, under the control of a senescence-responsive promoter, creating an auto-regulatory loop to retard senescence. This is followed by a detailed analysis of current understanding of *cis*-acting elements involved in abscisic acid- and auxin-responsive gene expression.

Overall, *Inducible Gene Expression in Plants* provides a useful reference book for the researcher wishing to exploit transcriptional mechanisms to regulate gene expression in plants and draws attention to the complexity of plant gene regulation. Throughout the book the potential applications of the fundamental studies which are described are emphasized. However it would have been useful if the introductory chapter could have placed transcriptional regulation within the context of other mechanisms such as post-transcriptional and post-translational systems that plants employ to control gene expression.

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Cladistic Biogeography — Interpreting Patterns of Plant and Animal Distributions (2nd edn). Christopher J. Humphries and Lynne R. Parenti. Oxford University Press, Oxford. 1999. Pp. 187. Price £35.00, hardback. ISBN 0 19 854818 4.

For more than two centuries, biologists have tried to understand geographical distributions of plants and animals. De Candolle (1820) was the first author to propose that the current geographical distribution of living organisms depends upon both ecological and historical parameters. The influence of historical parameters can be assessed via historical biogeographic studies. Cladistic biogeography (or phylogenetic biogeography) is a method for inferring historical biogeography that combines phylogenies with distribution patterns.

The first chapter of this book presents a review of the history of biogeography going back to the eighteenth and nineteenth centuries, and citing prestigious biologists such as Linnaeus, Buffon, De Candolle, Wallace and Darwin. The second chapter, much more technical, deals with methods. At the end of these two chapters, and with the help of the glossary, the reader not specialized in historical biogeography should be sufficiently familiar with the jargon used by biogeographers to understand the two next chapters. Using both real and hypothetical examples, chapter three surveys some practical problems one might face in carrying out a biogeographic analysis. Finally, in the last chapter, the authors have attempted to provide their own explanation for both antitropical (taxa present in boreal and austral zones, but absent from the tropics) and austral distributions.

I would recommend Humphries and Parenti's book as a key reference text for any biologist interested in biogeography. This book represents an easy way to gather together all the concepts and methods concerning historical biogeography, and to immerse oneself in a research field that is relatively isolated as a result of its peculiar vocabulary. Nonetheless, I was expecting to obtain some feeling about what will happen in the few next years in historical biogeography. This was not the case. The book gives a very precise view of the past, but does not provide any clues for imagining new directions. Furthermore, when reading the book, I had the impression that very few recent references were cited. I decided to carry out a more precise assessment of this feeling. First, it appears that almost 30% of the cited references are older than 1980, which is not surprising considering that biogeography interested scientists two hundred years ago. Secondly, 66% of the cited references are between 1980 and 1995, clearly corresponding to the golden age of historical biogeography with 14 citations per year on average. Finally, less than 4% of the references come from the last years (only 12 between 1996 and 1999!). How might one explain such a decrease in the number of papers dealing with historical biogeography? This is very surprising because new methods for inferring area cladograms (relationships among geographical regions) were developed early in the nineties, and many reliable phylogenies are now available thanks to the development of molecular phylogenetics. A possible explanation is that the authors missed many recent papers, but undoubtedly this is not the case. An alternative explanation could be that classical historical biogeography is close to extinction, and that the field is now moving towards intraspecific phylogeography (Avise *et al.*, 1987). Humphries and Parenti's book does not deal with this area.

References

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