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Book reviews

Chromosomes: a synthesis. R. P. Wagner, M. P. Maguire and R. L. Stallings. Wiley-Liss, New York. 1993. Pp. 523. Price £60.00, hardback. ISBN 0 471 56124 X.

This volume aims to give a broad integrated treatment of the structure, organization, activity and evolution of eukaryotic chromosomes and is directed at advanced undergraduate and postgraduate students and their teachers. This is far more than a cytogenetical treatise, since it sets out to synthesize the findings of cytologists, geneticists, cell and molecular biologists, biochemists and biophysicists towards "a better understanding of what chromosomes are structurally and functionally". This is an ambitious task and one which has rarely been undertaken in recent years, perhaps not surprisingly considering the sheer quantity and diversity of new information to be synthesized. Inevitably a compromise has had to be struck between breadth of coverage and the amount of detail on specific topics. Although one can easily find specific points of omission or light treatment to quibble about, by and large the point of compromise is about right. Where, for reasons of economy, a subject is introduced but not pursued in detail, relevant review articles are cited as a source for further information.

The book is arranged in ten chapters which cover, among other things, basic chromosome structure, chromosome organization (higher order), the cell cycle and chromosome replication, meiosis and recombination, gene and chromosome action and activity, gene linkage and chromosome maps and genome/chromosome evolution. Most of these chapters are sensibly organized, but one massive chapter of more than a hundred pages, under the pantechnicon title "Variation in chromatin organization and amount" covers chromosome rearrangements, transposable elements, somatic DNA rearrangements (for example, immunoglobulins), genome size variation, gene amplification, chromatin diminution/elimination, euploidy, aneuploidy and gene dosage/dosage compensation! This range of topics within a single chapter is daunting to the seasoned campaigner but must surely be a big turn-off for the average student. As expected, the balance of coverage reflects the expertise and special interests of the authors and it is therefore not surprising to find that classical aspects of cytogenetics, meiosis and recombination, and genome organization and physical mapping are well treated. There are, however, some surprising lapses. For instance, although most topics are well treated, the section on genetic mapping contains some terrible howlers such as the suggestion that map distance reaches a limit of 50 cM, and that "map units actually equal half the percentage crossover frequency between two genes". Evidently a student reading this book is unlikely to be enlightened on the relationship between genetic recombination frequency and map distance.

Leaving aside the specific content, this book is notable in general for its enthusiasm for chromosomes. The authors evidently have 'the chromosome bug' and their enthusiasm for these aesthetic bodies infects every page and cannot fail to inspire the reader. Chromosome enthusiasts are prone to speculate on whether chromosomes are mere passive carriers of genes, or whether they have an existence and rules of their own, transcending those governing the cells, individuals and species they inhabit. The authors revive this metaphysical question in their preface but they do not promise answers and indeed the reader is largely spared any further consideration of this hoary old chestnut. Surprisingly, the one area in which this theme could have been profitably developed, namely B chromosomes, is barely mentioned.

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An Introduction to Genetic Analysis (Fifth Edition). A. J. Griffiths, J. H. Miller, D. T. Suzuki, R. C. Lewontin and W. M. Gelbart. W. H. Freeman, London. 1993. Pp. 840. Price £25.95, hardback. ISBN 0 7167 2285 2.

Knowledge of genetics has come a long way since the 1860s when Gregor Mendel formulated the concept of the gene from studies on the garden pea. Today genes can be detected, isolated, cloned, mutated and even transferred between phylogenetic groups due to our increased level of understanding. Genetic text books have also come a long way in the last decade, since I was an undergraduate struggling to grasp the fundamental principles of genetics. I would have welcomed this book with open arms.

The book appealed instantly due to its beautiful and meticulous layout containing many attractive coloured illustrations and photographs. The colour photographs at the beginning of each chapter are particularly inspiring and bring a real-life significance to genetics that pen drawings couldn't hope to achieve. True to its title, the book doesn't simply state the facts for students to learn by rote. Instead, it attempts to provide the reader with an understanding of the way in which important principles have been obtained. The book also considers the significance of these principles to the general understanding and elucidation of genetics. The landmark experiments in genetics are frequently recreated so that the reader can be led through the analysis of the data. This approach allows readers to draw conclusions as if they had conducted the research themselves.

Throughout the book, care has been taken with the presentation of information. This provides optimum benefit to the reader, both for initial study and for revision. Each chapter opens with a list of key concepts and an overview of

the main principles to be covered. This is followed by attempts to relate each new subject to those already covered. Boxed messages are used frequently to highlight important concepts and each chapter ends with a concise summary which reinforces those concepts. Every chapter was followed by a large number of problems (some with, and some without, answers) to test comprehension of the material covered. In addition, a comprehensive list of references for each chapter was supplied at the end of the book, adjacent to the glossary.

Throughout the book, there was good use of straightforward examples to explain complex issues. I particularly liked the explanation of the Poisson distribution, using an example close to the heart of student readers — the free distribution of dollar bills in a class. I appreciated the greater emphasis placed on human genetics although the much simpler prokaryotic and eukaryotic systems studied by students were still described in great depth. Also most welcome, and appropriate, were the sections on the role and importance of genetics in society. These included discussions of its significance at individual and at population levels. Attention was given to topical concerns such as biodiversity, increased exposure to radiation and chemicals, recombinant DNA and social responsibility. These are important issues that are frequently overlooked.

The book gives equal priority to classical and molecular genetics with the first half covering mainly classical eukaryotic genetics. This provides a sound basis for the more complex issues and molecular genetics detailed in the second half of the book. On the whole, I felt the first half of the book was better designed for students than the second half. When reading the later chapters, I sometimes wondered whether the level of detail given and complexity of issues covered were a little too daunting for anyone other than a "serious fully fledged geneticist". Basic information was frequently neglected of trivialized while more complex issues were discussed at length. This could easily confuse and confound a student. In addition, the simple practical aspects of genetic analysis were rarely explained. Whilst not wishing for a book describing the methods of molecular genetics (there are many good examples of those already) I felt that simple explanations of the more practical aspects would have been of great benefit to the reader.

It is four years since the fourth edition of this book was published. Although the fifth edition follows the same format as its predecessor, it benefits from the reorganization and expansion of several chapters. The most extensive alterations are seen in the chapters on developmental genetics, due to the introduction of an additional author, William Gelbart. The addition of colour illustrations and photographs greatly increases the allure of this book to a potential buyer and, at £25.95, it is a worthwhile investment for anyone wishing to advance their knowledge of genetics.

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The Human Genome (Bios Medical Perspectives Series). T. Strachan. Bios Scientific Publishers, Oxford (1992). Pp. 160. Price £13.95, paperback. ISBN 1 872748 80 5.

In the preface, Strachan states that the book was written to provide a concise description of current knowledge of the human genome, and for the most part this has certainly been achieved. The book is organized into six short chapters and each chapter is clearly written and therefore easy to read and understand.

The first chapter gives a good overview of the sequence organization in the human genome. It includes useful tables and figures comparing the nuclear and mitochondrial genomes and outlining the highly repetitive nature of the human genome. It also includes essential information about the structure of human genes and the regulation of gene expression, using specific genes or gene clusters to illustrate the points. This forms the basis from which the non-specialist reader can understand the remaining five chapters. The second chapter, which describes the many mechanisms which generate polymorphisms and also contribute to the evolution of genes and gene families, is equally good and full of useful illustrations. However, the interchangeable use of *VNTR* with either *microsatellite, minisatellite* or even *satellite* is confusing and it would have been better to have limited the use of the term *VNTR* to an alternative description of a minisatellite. This confusion continues into the third chapter on the analysis of the human genome where the section on *VNTR-based RFLPs and DNA fingerprinting* is very misleading. The reader is lead to believe that Southern blot analysis of minisatellites or VNTRs requires the use of a unique flanking probe. This is completely unnecessary, as minor alterations in the hybridization conditions remove or significantly reduce any signal from cross-hybridizing loci with related but different repeat units. In addition, the section on the analysis of microsatellites does not include the use of end labelled primers, multiplex analysis of multiple loci, or resolution on automated sequencing apparatus. Some of these adaptations are new and this may explain why they have been omitted from the book. A number of sections in this chapter have been written in such a generalized way that they are of limited use to any reader.

The methods of mapping the human genome are again explained clearly although this chapter also needs updating to include recently developed (and useful) techniques, such as exon trapping, for identifying genes. The last two chapters outline the types of mutations which cause disease, their relative frequency at different loci, and their effect on protein production and clinical phenotype. The final chapter also covers genes which contribute to susceptibility to common diseases, such as diabetes and coronary heart disease. All of these topics are described very clearly and with plenty of references to particular genes and diseases.

Since the book was published in 1992 some significant advances have been made in our understanding of the human genome and how it might be studied. Therefore (as indicated above) some sections of the book already need updating to include, for example, a more extensive section on triplet repeats in genes, expansion of repeat arrays between genera-