BOOK REVIEW

In celebration of chromosomes

Chromosomes: Organisation and Function

AT Sumner

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Reviewed by W Bickmore

In 2003, we may be celebrating 50 years since the elucidation of the double helix structure of DNA, but chromosome structure and function has been a source of fascination and investigation for more than a century. Even with many whole-genome sequences completed, it is clear that DNA sequence alone cannot explain genetic inheritance nor the control of gene expression. No genome can be understood without putting it in its biological context – the chromosome.

Using a clear and easy writing style, the author takes us through the various aspects of chromosome biology, covering both the structure and function of chromosomes. The structure of chromosomes in interphase, mitosis and meiosis is discussed, as are more specialised but intriguing forms such as lampbrush and polytene chromosomes. The role that chromosomes play in the cell cycle, in maintaining genome integrity and in epigenetic mechanisms of gene regulation are all covered. The author has been careful to embrace a wide phylogenetic spectrum (from yeasts to man) to draw on for examples, especially where chromosomes in less well-studied organisms have unusual properties. There is always excellent historical perspective moving through to more recent molecular details and mechanisms, although in a fast-moving field it is impossible in a book to include the absolutely current state of knowledge. I especially enjoyed the final chapters on chromosomes in disease

and chromosome engineering/artificial chromosomes. This looks into the areas where chromosome biology promises to make a large impact on medicine and biotechnology. There are always going to be omissions and I was disappointed not to see chromosome translocations making an appearance in Chapter 3 (Chromosome structural rearrangements), or more prominently in the chapter on disease.

This book is aimed at advanced undergraduates and postgraduates and it would certainly provide biology, molecular biology and genetic students with a broad grounding in all aspects of chromosome biology. Some of the arguments and controversies in chromosome biology, such as the nature and existence of the nuclear matrix, are rather glossed over, which is appropriate for an undergraduate text, but perhaps less so for a postgraduate one. What is not covered very well are some of the more recent techniques of chromosome biology. Inset boxes are used to explain some methodologies, for example, FISH, banding, immunofluorescence (there are errors in this one). However, there is no coverage of the use of GFP, or FRAP, for example. I think that some of the tables, many of which are little more than extensive lists of proteins, would have been more useful in the form of diagrams. Also the reader will not find molecular mechanisms dissected down to the level of protein domains or biochemical interactions in this book, but there are plenty of other places to look for this information.

As would be expected from this author, the book is well illustrated with micrographs. Some of these suffer slightly from the lack of colour in the illustrations, but the compensation for this is the competitive price of what is a really useful information resource. This is going to be a well-thumbed book on my shelf.

W Bickmore

MRC Human Genetics Unit Crewe Road Edinburgh EH4 2XU,
UK