

Book Reviews

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Gene Cloning and DNA Analysis, 5th Edition. T. A. Brown. Blackwell Publishing, 2006. 408 pages. ISBN 1405111216. Price £29.95. (paperback)

This is an excellent book for undergraduate students and also for teachers and postgraduates who need to freshen their memories on the basic principles of DNA cloning and analysis while at the same time being accessible to anyone outside this area of science who would like to gain some understanding of this important subject. It is well written and readable, and is illustrated with good, simple diagrams throughout.

The book provides a valuable introduction to the basics of cloning, beginning with ligation of DNA into various vectors, to the analysis and manipulation of the final cloned DNA fragment. It begins with a chapter describing the major scientific developments which underpin our current knowledge in this field and the author brings us right up to date with chapters on genomics, human gene therapy and, towards the end, the production of genetically modified plants. The application of DNA cloning is also discussed in relation to the biotechnological and pharmaceutical industries.

It is not intended to be a comprehensive methods manual for the molecular biologist. However, it does cover important techniques in enough detail to enable the reader to grasp the basics of many techniques such as Southern blotting, DNA sequencing and PCR. Although the basic principles of gene cloning and analysis are familiar to students from molecular biology textbooks, these often provide little detail and leave many questions unanswered. This is why this book is so valuable; it provides the extra information in a clear and concise manner.

The book is divided into three parts:

Part 1 comprises the major section of the book. Here the author provides a thorough explanation of the enzymatic manipulations of DNA and how ligated molecules are inserted into cells by transformation and transfection. Examples of various types of cloning vectors and their uses are included, as

are clear examples of screening methods to identify desired clones from genomic and cDNA libraries. This is likely to be the most useful part of the book, at least for the undergraduate student, and the technology is clearly explained.

Part 2 presents a basic introduction to many of the techniques used to study gene structure and expression. These methods include the analysis of individual clones and whole genomes by DNA sequencing, RNA analysis by northern blotting and RT-PCR, analysis of gene regulatory sequences using reporter constructs and *in vitro* mutagenesis. I liked the straightforward manner in which the author describes these, and other complex procedures, with good figures and clear explanations.

Part 3 describes some of the applications of gene cloning and is the least successful part of the book. In Chapter 15 the author describes genetic engineering in plants in some detail. However, I am surprised that gene targeting in mice is not covered in the same depth within this part of the book, given that transgenic mice have provided models for human genetic disease and have made a valuable contribution to the understanding of gene function in biological systems. I think an additional chapter describing this technology would be useful. Although there is some discussion on the use of antisense RNA to regulate gene expression in plants, the development of RNAi technology could have been included here as it is such an important established technique in the study of gene function and regulation in both plants and animals.

Although this book is perhaps less comprehensive than other text books dealing with cloning techniques such as Richard Reece's 'Analysis of Genes and Genomes' (Wiley) and 'Principles of Gene Manipulation and Genomics' by Primrose and Twyman (Blackwell), it is more accessible and enjoyable to read and is likely to be most suitable for undergraduate students.

DONALD MACLEOD
*Institute of Cell Biology
The University of Edinburgh*

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The Strongest Boy in the World. P. R. Reilly. Cold Spring Harbor Laboratory Press. 2006. 257 pages. ISBN 087969801 2. Price \$29.99. (hardback)

To those who are familiar with the author's previous books, the latest writing from Philip Reilly will come as no surprise. It has a similar structure to the previous works and maintains the high standard of readability and excellence of its predecessors. When I reviewed "Abraham Lincoln's DNA and other adventures in Genetics" I commented that both students and lecturers would derive a great deal of benefit from reading it. The same is undoubtedly true of this latest book.

The book is subdivided into four parts: Humanity, Diseases, Animals and Plants and Society, each part consisting of five separate chapters. Each chapter raises a contentious issue and discusses outcomes or consequences in thought-provoking and stimulating way. Some of these, such as the inheritance of intelligence, are very familiar but others much less so. The book title is based on a boy who has a mutation of a myostatin gene leading to "double muscling" a condition that is known from some animal breeds. This leads to a consideration of screening for athletic potential and a general discussion of performance enhancing drugs in athletics. Another chapter in the humanity section considers human ancestry and the coexistence of several human species within the comparatively recent past. Consideration of the use of the Y chromosome and mitochondria, as paternally and maternally inherited haplotypes respectively, leads to an analysis of recent human migrations. The discovery that one particular Y chromosome haplotype is found in 16×10^6 men and the deduction that this haplotype originated in Mongolia about 900 years ago leads to speculation that this one man might have been Genghis Khan.

A feature of the book is the wide range of issues that are raised and discussed. For example in the section on diseases, the chapter on Huntington's disease is used to discuss the difficulties of drug development for rare genetic diseases, and the decision of Congress to approve an orphan drug law to provide financial incentive for the development of new drugs. The chapter on the genetic causes of deafness, its treatment and the results of a survey which revealed that several deaf parents would wish to use prenatal diagnosis and selective abortion to select for a deaf child, leads to a discussion on normalcy and cultural genocide in which able, but different, individuals feel threatened by technological advances.

I found the final section – Society – particularly stimulating. The chapter on preimplantation genetic diagnosis (PGD) provides a thought-provoking opinion on the future of this technology. The chapter

surveys current attitudes and possible future developments using microarray technologies and PGD in combination. The arguments for and against the use of PGD for selecting the sex of an embryo, for eliminating chromosome abnormalities and for selecting a sibling as a tissue donor are raised and debated in a way that is characteristic of this author. A balanced presentation of both sides of an argument is followed by a decisive opinion.

I am strongly recommend this book both as a source of very interesting material for lectures and also for students of genetics at all levels.

JEFF BOND

*Institute of Cell Biology
The University of Edinburgh*

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Landmark Papers in Yeast Biology. Ed. by P. Linder, D. Shore & M. N. Hall. Cold Spring Harbor Laboratory Press. 2006. 306 pages. ISBN 0-87969-643-5. Price £60.00. (hardback)

Nowadays it is taken for granted that yeast – or more precisely yeasts – form an appropriate model system for multicellular eukaryotes, with the rider that the latter possess some functions and activities that yeasts do not. However this is a fairly recent point of view with respect to the history of yeast biology, which dates back to at least the 1930s. Modern yeast biology started around 1950 with the development of classical genetical methods and their application to biological questions. During the decades that followed, many biological processes were investigated through the analysis of mutants and, through genetic analysis, examining the effects of combining mutations. While a great deal was discovered by classical (pre-cloning) genetics, the conclusions drawn could not generally be extrapolated, because there was no way of ascertaining whether a particular yeast gene had counterparts in other organisms. A common assumption was that yeast was unusual and therefore not likely to shed light on processes in other organisms. This all started to change around 1980 with the development of recombinant DNA methods for yeasts, which revolutionised research approaches: yeasts have been central to biological research ever since.

This book "Landmarks in Yeast Biology" is an excellent and readable introduction to yeast biology and especially to its history. It consists of a collection of 15 chapters covering different areas of yeast biology, written by experts in those areas. The chapters deal with topics ranging from cytoplasmic inheritance (which, surprisingly, has the oldest pedigree) through chromosomal functions, aspects of gene expression and protein modifications, cell growth and division,

morphogenesis, meiosis, and concludes with the relatively new field of genomics.

The book differs from most multi-author books based on a unifying theme in that each chapter is centred around four or five landmark papers in the field. Electronic versions of all the papers are included in a CD-ROM which comes with the book. The papers were chosen by the authors and those that I read certainly merited the “landmark” description: such papers make one think “I wish I had done that” or “that’s so elegant – why didn’t I think of it?” The scientific lifetime of most of the authors extends back to pre-cloning times, and nearly all the chapters include a “potted history” of their fields of research. The format works best when the chapters focus on the key discoveries described in the landmark papers. Most authors have taken this approach and kept their chapters concise – often a difficult task given the breadth of some of the fields. Only in one or two chapters did I get the feeling that the author had tried to take on an entire field and had written a broad, medium-length review rather than keeping the focus on the key papers. A minor gripe is that of the 71 landmark papers, only two are about the “other” yeast, *Schizosaccharomyces pombe*, despite the great advances made in some areas of cell and molecular biology using it.

For me, there were two particularly enjoyable aspects of reading the book. First, it was good, if somewhat self-indulgent, to revisit observations and ideas that I had last heard described at International Yeast Meetings in the 1970s and 1980s. Their freshness and excitement had in many cases not faded during

the intervening decades: I read some chapters as detective stories, eager to discover the next twist in the tale. Second, reading the book emphasised the point, made in the thoughtful editorial by Jasper Rine, that many current studies, and especially their conceptual basis, have their roots in the pioneering experiments of twenty or thirty years ago. It is interesting to note that the majority of landmark papers date from the 1970s and 1980s.

In summary, this book contains a history of ideas and thinking within cell and molecular biology, in addition to a wealth of biological information about yeast biology. Who might be interested in reading such a book, and at whom is it aimed? One readership will be yeast scientists like myself who like to look back. However it seems that the intended readership is advanced students – presumably graduate research students – taking advanced courses in yeast biology or aspects of molecular cell biology more generally. The presence of (quite challenging) set questions based on the landmark papers at the end of each chapter certainly suggests a teaching role for the book. I fear that in the UK this readership will be small as it is unusual for research students to take taught courses, although it is common in the US and perhaps other countries. In my view it would be valuable for PhD students entering yeast research to acquire some understanding of the roots of the field and especially of the ideas involved, and this book provides an excellent entry point.

PETER FANTES

*Institute of Cell Biology
The University of Edinburgh*