

Book Review: Principles of Gene Manipulation and Genomics

R Lundblad

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Abstract

Principles of Gene Manipulation and Genomics by S.B. Primrose and R.M. Twyman Blackwell Publishing, Malden, Massachusetts (USA), 2006 ISBN 1-4051-3544-1

This book combines two previous works, *Principles of Gene Manipulation*, 6th edition, and *Principles of Genetic Analysis and Genomics*, 3rd edition into a truly exceptional single volume of approximately 700 pages. Both of these books have been extremely well received and there is every reason to presume that this current work will receive even more enthusiastic acceptance.

The Table of Contents describes the twenty six chapters in sufficient detail that much material can be located quickly without use of an index. These chapters are organized into four parts: (I) Fundamental Techniques of Gene Manipulation; (II) Manipulating DNA in Microbes, Plants, and Animals; (III) Genomic Analysis, Genomics, and Beyond; (IV) Applications of Gene Manipulation and Genomics. There is also a small appendix and an excellent collection of references.

The first part contains a useful introduction to the development of molecular biology and a combination of basic science and technical application for DNA manipulation, cloning vectors, and gene cloning strategies. There is a very good section on basic techniques such as electrophoresis, blotting, and PCR which are central to most nucleic acid studies. There is a separate chapter on cutting the joining DNA which include restriction enzymes, issues of methylation, and ligases. The section on vectors describes the evolution of technologies and includes phage, plasmids, and cosmids.

DNA sequencing techniques are described in detail The cloning chapters include the various strategies for the development of genomic libraries, techniques for library

screening, mutagenesis and protein engineering. There is brief but sufficient coverage of bioinformatics with information on the several databases such as SWISS-PROT and TrEMBL. Overall, Part I contains all of the information necessary for proceeding into the more complicated work described in the following chapters.

The second part describes the process of gene manipulation in bacteria other than *Escherichia coli* and yeasts and other fungi. There is a very nice section on yeast artificial chromosomes (YACs). This section also discusses gene transfer to animals and the genetic manipulation of animals including gene targeting. Gene transfer to plants is also discussed with a very nice discussion of *Agrobacterium tumefaciens* and crown gall tumours. RNA interference is also discussed within a section on new directions in gene manipulation.

Part III covers genomic analysis, comparative genomics, and the transcriptome. Genomic analysis includes organism and organelle DNA. Organelle DNA includes chloroplasts and mitochondria. Nuclear DNA organization is discussed in great detail and includes mapping and sequencing technologies. Comparative genomics includes consideration of orthologs and paralogs, comparative genomics of bacteria, comparative genomics of organelles, and comparative genomics of eukaryotic genomes including large scale mutagenesis and interference. The section on the transcriptome includes the rapidly developing new technologies including SAGE and microarray analysis. The discussion of microarray techniques contains an excellent comparison of oligonucleotide and cDNA probes and the issue of data comparison (MIAME). Part III also contains material on proteomics and metabolomics. The inclusion of this range of material in this section permits an understanding of the contributions of the various “omics” to

systems biology which is discussed in Part IV.

Part IV is integrative in the sense that it contains a good section on human genetics. There is also a chapter on recombinant DNA technology which includes one of the more comprehensive lists of recombinant DNA products, a section on GM crops, and the use of DNA for vaccines and gene therapy.

Overall, this is an excellent book. I do not work in this area but found the book easy to understand. The early inclusion of a comprehensive list of abbreviations made the

subsequent read comfortable. This work is not written for a “cult” following but will be of value to advanced undergraduate students, graduate students, post-doctoral fellows, and independent investigators. It should have broad appeal to both academic and non-academic audiences. Individuals involved in commercial biotechnology will find this book of value for understanding of science necessary for regulatory and marketing issues in the application of molecular biology for both therapeutic and diagnostic purposes.

References

Author Information

Roger L. Lundblad, Ph.D.

Editor in Chief, Internet Journal of Genomics and Proteomics