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THEORETICAL AND APPLIED GENETICS

Book reviews

Darbre, P. D.: Introduction to Practical Molecular Biology. Chichester: Wiley 1988. I-VIII, 177 pp., 19 figs. Hard bound£ 9.95.

This book is for beginners in the field of molecular biology. It was developed from a collection of laboratory protocols in use in the author's laboratory for at least five years. It is not intended that this book be a major laboratory manual for established and experienced molecular biologists, and therefore it is confined to providing simple, step-by-step protocols, and giving advice on the problems that may be encountered on their use. It assumes that the genes to be used have already been cloned, and instead deals more with amplification of cloned DNA and the preparation of probes required. No attempt is made to discuss at a higher level the various strategies involved in gene cloning or genetic engineering.

By way of introduction, a very brief explanation of nucleic acid structure, restriction enzymes, other enzymes, DNA denaturation and hybridization and DNA cloning is deal with first. Then follows a chapter on the preparation of DNA from tissue or cells. The way in which DNA preparation is described is typical of the other sections in the book as well, and is the reason why this book should find itself on the beginner's laboratory bench because it is so easy to follow. I will therefore dwell on this presentation.

Following a simple discussion of the principles involved, DNA preparation is split up into five stages and a daily schedule outlined for each stage, the total time taken being 3 or 4 days, depending on the source of the DNA. All reagents and equipment needed for each day is listed, and a short segment deals with methods to check the condition of isolated DNA. The same treatment is given for the other chapters, making each very easy to follow. They deal with DNA analysis by restriction-enzyme digestion and Southern blotting, RNA preparation, RNA analysis by Northern blotting and, finally, preparation of DNA for probes. A few key references are given at the end of each chapter, while an appendix lists abbreviations, source of reagents and equipment (addresses supplied) and recipes for routine solutions. The book is rounded off by a comprehensive index. The strength of this book is its simple presentation: beginners can work through the experiments without having to wade through lots of jargon and simultaneously draw on a wealth of experience.

J. F. Jackson, Glen Osmond

Roberts, D. F.; De Stefano, G. F. (eds.): Genetic Variation and its Maintenance – With Particular Reference to Tropical Populations. Cambridge: Cambridge University Press 1986. 286 pp. Hard bound $ 39.50.

This book is based on a symposium held in Rome in April 1985. It was organised by the International Union of Biological Sciences and published by the Society for the study of Human Biology.

A number of interesting features of human populations emerge from the articles selected for this book. I think it has been fortunate to delimit the studies reported to the tropical environment with its strong natural selection pressures due to disease and pest and in some cases high population density.

The book is structured into three sections. The first section deals with the dimension of genetic variation. Here the new RFLP-technique to map molecular polymorphisms in nuclear and mitochondrial DNA seems to reveal polymorphic variation of a magnitude drastically larger than what was formerly suggested on the basis of blood groups, enzymes and other proteins. The second section comprises a number of studies that describe the importance of natural selection (malaria, etc.), inbreeding in populations and migration on the structure of small human populations. Also, the effects of mating patterns on population structure is well presented. In the third section attention is focussed on human quantitative traits or otherwise complex characters and their genetic diversity. It is a rather short section in comparison to the two others, but its message is the more important, namely that quantitative or complex traits may be under very strong selection pressures due to differences in the environment. It points at the importance of studying multigenic complexes in population genetics rather than single genes because selection may very well operate on gene clusters.

My take-home lesson from this book is how drastically the RFLP-analysis of nuclear and mitochondrial DNA had already by 1985 changed our knowledge of the amounts of genetic variation present in human populations. Since then, the method has undergone considerable refinement, and a lot of new information is thus available. As is said in the book, these studies render previous population studies almost obsolete, particularly concerning genetic distance and generally concerning the evolutionary biology of man. Recent developments to use the RFLP-method for marking chromosome sections and thus to study quantitative variation should be applied to enrich information now given in the third section of the book. Reading a book of this kind is interesting, not only due to its genetic message, but also due to the fact that it sheds new light on the history of mankind.

PMA Tigerstedt, Helsinki

Abramoff, P.; Thomson, R. G. (eds.): Laboratory Outlines in Biology-IV, 4th Edn. New York: W. H. Freeman and Co 1986.

The 4th edition this well-known laboratory manual in biology is planned for beginners and has been extended from 30 to 38 exercises and from 6 to 11 appendices. With this expansion the most important topics in biology are considered: the essentials of cytology (4 exercises), anatomy (4), taxonomy (14), ge-

netics (2) and physiology, including biochemistry (14) are presented in didactically skilful manner. Thirteen exercises are preponderantly on plants, 17 on animals, and the rest on both. Useful to beginners are the appendices, which contain a lot of practical information about spectrophotometry, chromatography, the use of live animals in the laboratory, radioisotopes, aseptic techniques, mathematical methods, etc.

G. Günther, Potsdam

Sengbusch, P. (ed.): Einführung in die Allgemeine Biologie, *3. überarbeitete Auflage*. Berlin Heidelberg New York: Springer 1985. XII, 527 pp. Soft bound DM 74,–.

The 3rd edition of this well-known textbook conforms extensively the 2nd edition, showing only 66 insignificant changes in 8 chapters. In these cases any new titles were taken up in the respective catalogue of literature. I can therefore revert to my review of the 2nd edition (TAG), which is more than adequate for this 3rd edition also. That my references, which are given in the first review, were not cited, is certainly no reason why this 3rd edition will find a large distribution.

G. Günther, Potsdam

Cytoskeletal Proteins in Tumor Diagnosis. *Current Communications in Molecular Biology*. Cold Spring Harbor Laboratory: Cold Spring Harbor, NY 1989.

This book is a collection of short papers presented by invited speakers at an international symposium that was held with the intention to summarize the state of the research on the findings and applications of cytoskeletal proteins in tumor diagnosis. The book includes interesting papers on cytoskeletal polypeptides: investigations on their subcellular localization and molecular structure are continously providing useful results for the investigation and diagnoses tumors. As such, actin, intermediate filaments, keratin 19, tropomyosin, villin and spectrin are shown to be biological indicators of the malignant cell state.

As the contributions are written by experts and the results are well summarized and enclose a wide number of recent references, I believe this book is of obvious interest for scientists directly involved in this field of research, as it really establishes the state of the research. Further, the presence of both general and specialized articles would nevertheless help and stimulate biologists interested into what is new and important on cytoskeletal proteins in tumor diagnosis. A. Tiezzi, Siena

Berger, S. L.; Kimmel, A. R. (eds.): Guide to Molecular Cloning Techniques. *In: Methods in Enzymology, Vol. 152*. San Diego: Academic Press 1987. I-XL, 812 pp., 56 figs., 27 tabs. Hard bound $ 89.00.

The enormous success of the series "Methods in Enzymology" is reflected in the frontispiece of this latest volume where the reader will find a list of all 155 volumes published so far. The series was begun in 1955 as a four-volume work, "the first in English to provide a comprehensive compilation of the methods used in the study of enzymes". The popularity and usefulness of the series grew from there, averaging at least five volumes a year since then. This formidable reputation is easily upheld in volume 152, "Guide to Molecular Cloning Techniques". The editors of this volume, Berger and Kimmel, have put together the most useful guide to recombinant DNA technology I have seen.

This volume is designed to meet the needs of scientists entering molecular biology for the first time and for students taking up this discipline. And yet it has also turned out to be a useful handbook for those already in the field. How has this been achieved? The secret of success has been the organization of this volume and the quality of the 87 authors who have written the 74 chapters.

The book is organized so that it progresses from the basic techniques which are used in recombinant DNA technology to several sections which are designed to answer commonly met problems. These sections deal with genomic cloning, preparation and characterization of RNA, preparation of cDNA and the generation of cDNA libraries, selection of clones and, finally, identification of specific clones and their characterization. A particularly useful part of the book is the so-called "Process Guide" – a listing in the front of the various processes (methods) and showing the location of each by chapter in the book (e.g. nick translation etc.). This is to be used in conjunction with the subject index, which is to be found as expected at the end of the volume. In addition, the editors have carefully added cross-referencing and editor's notes where they have thought it useful. Additionally, on overview has been added to introduce five of the major sections, providing even more solid information to the subject. *The Guide to Molecular Cloning Techniques* is primarily intended as an efficient way to obtaining and characterizing a clone, and I am sure that most will find this volume particularly useful and informative. J. F. Jackson, Glen Osmond

Kingsman, S. M.; Kingsman, A. J.: Genetic Engineering: An Introduction to Gene Analysis and Exploitation in Eukaryotes. 1st edn. Oxford: Blackwell 1988. XIV, 522 pp.; several figs. and tabs. Soft bound£ 19.50; hard bound£ 39.50.

Genetic engineering in eukaryotic systems can be considered to be a revolutionary development having important practical applications that will benefit mankind. It also involves the use of techniques which require a fundamental knowledge of (1) the organization of the eukaryotic genome, (2) the localization and isolation of genes, (3) gene modification and gene transfer systems, and (4) the relationship between (genetically engineered) genotype and (desired) phenotype. This knowledge can be acquired from the book under review. It is a clear, concise, and informative introductory text and reference book on the many fundamental aspects of genetic engineering.

The contents of the book are well-organized. The text has been divided into three easy-to-distinguish parts: (1) basic concepts of the eukaryotic genome and gene transfer; (2) gene transfer systems in microbial eukaryotes, animal cells, whole animals, and plants; (3) the use and exploitation of gene transfer technology. The last two chapters of part three focus attention on the application of genetic engineering in the control of human diseases, and in the pharmaceutical, agricultural, and food industries, respectively. Each chapter is subdivided into several subsections, the first being an introduction to the chapter's subject, and the last being the summary. The easy-to-read text and accurate figures and tables fit together very well. The book contains a list of abbreviations of restriction enzyme cleaving sites, nucleosides, amino acids, and others, a useful subject index, and an extended (about 1,500 titles) and up-to-date reference list.

Some summaries, mainly those of the first chapters, are either rather superficial or just anticipate forthcoming chapters. This, together with some printing errors (e.g. "cellulose" instead of "cellulase" on p. 202, "Hookyas and Schilperoot" instead of "Hooykaas and Schilperoort" on p. 203, and "glyphosphate" instead of "glyphosate" on p. 448 and in the relevant references) and the omission of page numbers indicating chapter subsections in the table of contents, are some minor points of criticism.

This extremely presentable book is recommended to graduate students and scientific researchers interested in or already working in the field of genetic engineering, and it can be purchased at a reasonable price. L. J. W. Gilissen, Wageningen

Eckstein, F.; Lilley, D. M. J. (eds.): Nucleic Acids and Molecular Biology, vol. 2. Berlin Heidelberg New York: Springer 1988. 223 pp + XI, 70 figs., 13 tabs. Hard bound DM 148.–.

While it might be thought that there is a proliferation of books on nucleic acids and molecular biology, the editors of this annual series, F. Eckstein and D. M. J. Lilley, have chosen their authors well and produced a second volume to the series Nucleic Acids and Molecular Biology that is both interesting and topical. They have chosen structural aspects as a general theme for this second volume, which includes the structure of DNA and of DNA-protein interaction.

The volume begins with chapters on laser Raman spectroscopy and conformation of polypurine-polypyrimidine sequences. A chapter summarizing and assessing the Raman bands, which serve as fingerprints of specific conformational structures of DNA is particularly timely. It sets out to review classical Raman spectroscopy of various DNA crystal structures to indicate which Raman bands can be used for rapid characterization, and to point out how the Raman indicators can be useful for nucleic acids not amenable to crystallographic analysis. It is pointed out that Raman spectra are most useful when applied in combination with X-ray data, and that B, A and Z conformations of DNA can be identified from Raman spectra. The study of protonated oligopyrimidine/oligopurine duplexes is a complicated one, as shown in the second chapter in this book, and has not yet advanced sufficiently to suggest an unequivocal model for transition structures. Following this is a chapter on the design of sequence-specific DNA-binding molecules, with the ultimate aim being the development of new clearing moieties for DNA so that human chromosomes could be cleaved uniquely at a single nucleotide position within a chromosome. A further chapter on metal complexes which target DNA sites develops this theme and also shows the specificity of $-Co\ (DIP)_3^{3+}$ for cleaving Z-DNA regions. A chapter on bleomycin illustrates another metal complex agent that aids in DNA cleavage. The bleomycins are a family of structurally related glycopeptide antibiotics.

The editors have chosen to deal with oligonucleotides next in this volume, given that single-stranded regions in the DNA double helix are made accessible to oligonucleotides that might interfere with the normal course of the enzymatic processes. Additionally, a chapter subsequently deals with oligonucleotide-directed mutagenesis with single-stranded vectors. It is claimed that these methods can produce mutant frequencies of greater than 50% under certain conditions. Following a chapter on protein-induced DNA bending, there follows a treatment of the so-called "Zinc-finger". This refers to a linear arrangement of repeated protein domains, each centered on a tetrahedral arrangement of Zn ligands; the whole of the approximately 30 amino acid repeat is rich in basic and polar residues, implicating the region in DNA binding. These "Zn-fingers" are found particularly in transcription factors. A treatment of NMR studies on the repressor-operator interaction (in particular the *lac* control region) and of DNA repair by the *Ada* protein of *E. coli* precedes a final chapter on steroid hormonesl (e.g. glucocorticoids and progestins) and the interaction between steroid hormone receptors and chromatin.

This book is a "must" for all students, undergraduate or post-graduate, involved in research in genetics or nucleotide biochemistry in that it deals with so many important structural aspects of the interaction of DNA with other molecules and the importance of these interactions to molecular biology. A chapter in this volume by W. Holloman demonstrates the importance of these structural considerations by linking rec 1 protein to the promotion of homologous pairing in DNA. This involves a synapsis phase with a paranemic joint, thought to contain left-handed Z-DNA. Potential Z-forming stretches have been found in the vicinity of recombinational crossover points in a number of instances, an observation we are bound to hear more about in the future. Yes, you should certainly add this one to your library.

J. F. Jackson, Glen Osmond

Erratum

Theor Appl Genet (1990) 79:417–421. A. Gallais: Theoretical determination of the optimum number of parents for synthetics. Unfortunately Table 1 which is mentioned in the legend of Fig. 1 was not printed in the article. Here is the missing table.

Table 1. Description of the situations represented Fig. 1. The genetic coefficient of variation is always of 0.10

Situation	d	h	ϱ	q^2	g^2	N
1	0.10	0.80	0.80	0.50	0.75	250
1′	0.10	0.80	0.80	0.90	0.75	250
2	0.20	0.80	0.80	0.90	0.75	250
3	0.20	0.80	0.80	0.50	0.50	250
4	0.30	0.80	0.80	0.90	0.75	250
5	0.20	0.60	0.50	0.50	0.75	250
6	0.40	0.70	0.80	0.90	0.75	250
7	0.40	0.50	0.80	0.90	0.75	250
8	0.10	0.70	0.80	0.50	0.75	100
8′	0.10	0.70	0.80	0.85	0.75	100
9	0.20	0.70	0.80	0.85	0.75	100
10	0.20	0.50	0.80	0.85	0.75	100
11	0.30	0.70	0.80	0.85	0.75	100
12	0.30	0.50	0.80	0.85	0.75	100