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Book reviews

Suzuki, D.T.; Griffiths, A.J.F.; Miller, J.H.; Lewontin, R.C.: An Introduction to Genetic Analysis (3rd edn.). New York: W.H. Freeman 1985. X + 612 pp., several figs. and tabs.

This greatly revised third edition is an excellent continuation of the very informative second edition. The rapid progress made in important areas of genetics has been comprehensively considered. More attention is paid to the increasing value and importance of molecular biology in the theoretical and practical applications of life sciences than in the second edition. By explaining the structure of DNA in chapter 10 (starting on page 185 in contrast to the second edition starting only at page 425) it was possible to integrate molecular genetics into classical genetics at an earlier stage. Obviously the increased emphasis of molecular genetic considerations is due to the input of J. Miller, the new coauthor of this edition. The precise and instructive figures of the 2nd edition were further enhanced by the introduction of a second colour as well as of new schemes, some of them originally published in Scientific American.

It seems presumptive to give any critical comment on such an admirable textbook. However, in Fig. 10.29 the primer should also be shown. Chapter 13 gives the impression that the transfer of the bacterial chromosome is the preferred process in bacterial conjugation, whereas the importance of plasmid transfer is not sufficiently considered.

To my opinion this 3rd edition is the best or at least one of the best textbooks in genetics today. It is a very interesting source of genetic knowledge, valuable for scientists as well as for students. Admirable is the manner in which not only facts are presented but even the experiments to find these important data.

E. Günther, Greifswald

Hopwood, D.A.; Bibb, M.J.; Chater, K.F.; Bruton, G.J.; Kiesser, H.M.; Lydiate, D.J.; Smith, C.P.; Ward, J.M.; Schrempf, H. (eds.): Genetic Manipulation of *Streptomyces*. A Laboratory Manual. Norwich: The John Innes Foundation 1985. 356 pp., several figs. and tabs. Soft bound £ 25.–.

Streptomyces is a genus of Gram-positive procaryotes with a complex morphological differentiation and the capacity to synthesize antibiotics. In the mid-1950's genetic recombination in *Streptomyces* was discovered, and from this time on, interest of geneticists and molecular biologists in these organisms has been gradually increasing. Modern tools for their research are the in vitro techniques known as genetic manipulation, successfully tested in *Escherichia coli*. The new laboratory manual is intended to help two groups of scientists: those who know a lot of *Streptomyces* biology but nothing about genetic manipulation, and those who are experienced *E. coli* manipulators but are not acquainted with the special tricks required for *Streptomyces*. Anticipating his final judgement, the referee believes that the authors succeeded in this aim.

Most of the manual consists of protocols and descriptions of specific procedures which are in routine use at the John Innes Institute, Norwich. It is divided into 8 sections (Preparation of organisms and phages; In vivo *Streptomyces* genetics; Preparation of chromosomal, plasmid and phage DNA; Transformation and transfection; In vitro manipulation of DNA; Cloning of DNA: choice of vectors and strategies; Techniques using radiolabelled DNA; Techniques for handling RNA), each consisting of about 10 protocols. The protocols contain a short introduction, followed by a list of materials, a step-by-step description of the procedure, and notes concerning special peculiarities. A few sketches clarify complicated situations. Though there are ten different authors, the text of the contributions is consistently clear. The short, numbered steps of the procedures are easy to survey; the reader feels that the book is written by research experts with a profound experience in course leading. An appendix (Media and maps), references (up to 1985), and an index terminate the manual. It can be recommended to every worker in the *Streptomyces* field.

G. D. Vogels, Nijmegen

Brown, T.A.: Gene Cloning an Introduction. Wokingham: Van Nostrand Reinhold Co. Ltd. 1986. v + 234 pp., several figs. and tabs. Soft bound £ 8.50.

This book is aimed at first and second year biochemistry undergraduates, but would also suit biologists and others with research interests outside recombinant DNA areas who have reason to believe that gene cloning may have a role to play in their own research projects. The author suggests that this book may serve as a "painless introduction to the complexities of recombinant DNA technology" for those of his colleagues wishing to branch out into this new discipline.

Dr. Brown, a lecturer at the University of Manchester Institute of Science and Technology, has first hand experience with all the techniques described. The book assumes very little background knowledge on the part of the reader, the author explains that an understanding of the details of DNA and genes expected at Matriculation or University entrance levels is enough for readers of his book. The book itself is divided into three parts – the first on basic principles of gene cloning, the second on applications of gene cloning in biological research, and the third on gene cloning in biotechnology. The latter section is rather small, but important never-the-less in showing the industrial potential of gene cloning techniques.

The greater part of the book is taken up with the basic principles of gene cloning, the author taking great pains to explain the jargon used, to explain important concepts from first principles, and the whole text is provided with lots of illustrations to make an understanding of the principles easier. The importance of gene cloning is first outlined, and then the reader is taken through consideration of the vehicles of cloning – the plasmids and bacteriaphages, then DNA purification, DNA manipulation, transformation by DNA, and finally cloning vectors for E. coli, yeasts, higher plants and animal cells all find a place in this first and main section of the book.

The book is provided with a further reading list, a comprehensive glossary where the jargon is further explained and defined, and an index. An excellent book for "budding" biochemists, and for those biologists who feel that gene cloning can be of assistance in their own research work and who are in need of first principles in the subject.

J. F. Jackson, Glen Osmond

Klingmüller, W. (ed.): *Azospirillum* III. Genetics, Physiology, Ecology. Proc. 3rd Bayreuth *Azospirillum* Workshop. Berlin, Heidelberg, New York, Tokyo: Springer 1985. xiv+263 pp., 102 figs. Hard bound DM 78,–.

Azospirillum is a genus of soil bacteria which live in close vicinity to the roots of grain plants and forage grasses; furthermore they have the capacity for binding molecular nitrogen from the air. It is especially this latter trait which makes them interesting research subjects for geneticists, agronomists and microbial physiologists. A reflection of this fact are the 23 contributions of the Proceedings from an international workshop held in 1985. By means of genetic manipulation (e.g. cloning, complementation, site-directed transposon mutagenesis, cartridge mutagenesis etc.), a better understanding of relevant *Azospirillum* gene structures is presented. Several reports concern auxin production and nitrogenase regulation in *Azospirillum*, as well as growth responses of plants after inoculation with the bacteria. However, concerning the latter topic, it is not yet clear if the positive results obtained from field trials in Saudi Arabia can be extrapolated to regions with different climatic and soil conditions.

A report on electron microscopy of the attachment of *Azospirillum* to young wheat roots reveals that the majority of the bacteria were not tightly attached to the root surface but were lying at some distance from it. New results on the well-known pleomorphism in *Azospirillum* conclude the interesting book.

C. Stumm, Nijmegen

Olby, R.: Origins of Mendelism, 2nd edn. Chicago, London: University of Chicago Press. xv+310 pp., several figs. and tabs. Soft bound $ 17.25.

In the winter of 1904–1905, the geneticist William Bateson visited Brno in Czechoslovakia to find answers to questions such as why Gregor Mendel made his discoveries and how it came they remained unnoticed between the time of publication in 1866 and their rediscovery in 1900. Because Mendel's private notes had been destroyed he found nothing. Bateson's questions are one of the recurrent themes in the history of biology. The stock answer of historians of science and geneticists alike is that Mendel was far ahead of his time. As Mendel's first biographer Hugo Iltis put it: Mendel "disclosed an unknown land before the time was ripe". However, hardly any research has been carried out in support of this view.

In the book under review, the stock answer is strongly challenged by Robert Olby. The author argues that like in any other scientific discovery, many mythical elements have been introduced in the reconstruction of the origin of Mendelian genetics. First, Mendel did not work in a novel, hitherto unknown area, but responded to the research in plant hybridisation of Koelreuter and Gärtner. According to Olby, Mendel should, therefore, not be studied from the point of view of Mendelian genetics of this century, but as part of the tradition of the studies on plant hybridisation in the 18th and 19th century. Second, Olby maintains that Mendel is not a Mendelian like the geneticists in the first half of the 20th century. As the late J. Heimans has shown, Mendel actually dealt with characters and not with factors (i.e. genes), even when he used the notation Aa. This is, among others, demonstrated by the fact that for homozygotes, Mendel did not use the notations AA or aa, but A and a respectively.

In all, Olby's analysis is convincing and sheds new light on Mendel. Furthermore, it clearly demonstrates the need for critical examination of traditional views instead of blind acceptance. The first edition of this book was published in 1966, but, according to Olby, failed to make much change in the general view on Mendel. The main text of the present edition is largely the same as the first. Only some paragraphs and one chapter have been rewritten. The author has considerably enlarged the Appendix. Most notably he has included his excellent essay "Was Mendel an Mendelian?", originally published in 1979.

Since the heyday of intellectual history in the fifties and sixties, the study of the history of science has gone through major changes. In particular, philosophical and sociological aspects have attracted more attention. This becomes, for example, clear from the shifts in emphasis in the study of the history of evolutionary theory. Olby avoids such issues almost completely. In spite of this, his book is undoubtedly a classic on the history of genetics.

G. J. de Klerk, Canberra

Zoller, M.; Fletterick, R. (eds.): Current Communications in Molecular Biology. Computer Graphics and Molecular Modeling. Cold Spring Harbor: Cold Spring Harbor Laboratory 1986. 150 pp., several figs., colorplates, appendix. Soft bound $ 29.–.

Computer graphics has become a valuable tool for the study of biological macromolecules. A meeting held at Cold Spring Harbor in December 1985 focused on the diverse applications of molecular modeling. This volume is a collection of nineteen extended abstracts from that meeting. While not always the most recent results, the approaches presented provide a good representative cross-section of modeling programs, molecular dynamics, tertiary structure prediction, interpretation of electron density maps, comparison of homologous tertiary structures of proteins and the application of all these to protein engineering.

One deficiency is the lack of experimental verification of the reliability of many approaches presented. The volume also lacks a summary describing the sense of the meeting, and what new directions were discussed. Nevertheless, this volume will provide researchers active in the field with a sufficiently detailed description of what is being most actively pursued. Each abstract includes a list of references to guide the interested reader looking for more information. One additional feature is an appendix listing some 150 installations using computer graphics and presumably molecular modeling. This number will certainly increase, no doubt, stimulated in part by the results and promise presented at meetings such as this.

R. Bott, South San Francisco

Mizrahi, A.; van Wezel, A. L. (eds): Advances in Biotechnological Processes, Vol. 5. New York: Alan R. Liss. 1985. XVI+312 pp., several figs. and tabs. Hard bound £ 60.00.

This fifth volume in the series *Advances in Biotechnological Processes* deals with commercial applications of biotechnologies relating to the production of pharmaceuticals, vaccines, foodstuffs and energy. As such it continues the stated aims of the series in presenting a comprehensive review of recent developments and applications in biotechnology, including information of the nature, scope, detailed steps, ideas and policies on reviewed product and processes.

Among important processes covered in this volume is that of biodegradation of various forms of waste. Four chapters cover this topic. One of these deals with biodegradation in effluents, including agricultural-type wastes from animals, from the use of pesticides and the cellulosic wastes from rice and sugar canes. Food, pulp and textile wastes find an im-

portant place here as well. Another chapter deals in great detail with the rotating biological contactor method for sewage and waste-water treatment, while a third contribution on biodegradation looks at breakdown of lignin, concentrating on the fungal white-rot decay of lignin. Biodegradation of wastes through cultivation of mushrooms is described in detail. As pointed out by the author, mushrooms transform waste materials into a highly flavoured, nutritious foodstuff and this means of waste disposal needs to be encouraged.

The remaining five chapters of this book cover a rather "mixed bag" of topics, and indeed it is hard to see how they could reasonably be dealt with in the same volume if there is to be some sort of cohesion between the chapters. These chapters deal with culture media for mammalian cells and viruses, with plant tissue culture, with protein modelling, with computer graphics, with production of poultry viral vaccines and finally with production of plasminogen activator by mammalian cells in culture. Perhaps cell culture techniques covers all the chapters, a fact which serves to show us how diverse the field of biotechnology really is.

An interesting and varied volume, with lots of information for those using cell culture for commercial production and for those interested in waste treatment. The volume has an index, while each chapter is adequately illustrated and provides an extensive list of references.

J. F. Jackson, Glen Osmond

Clarke, B.C., F.R.S.; Robertson, A., F.R.S.; Jeffreys, A.J. (eds): The Evolution of DNA Sequences. Proceedings of a Royal Society Discussion Meeting Held on 13 and 14 March 1985. London: The Royal Society 1986. 164 pp., several figs. and tabs. Hard bound £ 29.00.

This book represents the Proceedings of a Discussion Meeting of the Royal Society held in March, 1985. The papers presented were first published in Philosophical Transactions of the Royal Society of London, 1986, and are now gathered together in one volume for the first time. The authors were chosen for their distinction in molecular biology and/or evolutionary genetics, so the result is a series of papers which produce a real insight into the functions and evolution of DNA sequences.

The evolution of DNA sequences in *E. coli* is dealt with in the first chapter, as is fitting, and it is then proposed that certain families of transfusable elements originally evolved in plasmids and functioned in forming replica fusions to aid in horizontal transmission of non-conjugational plasmids. A second chapter focusses on transfusable elements in *Drozophila,* and yet a third deals with the population biology of transfusable elements. Repeated sequences are taken up in a further chapter, dwelling particularly on plant evolution, and followed by another on repeat DNA in animal cells. Amplification, rates of DNA evolution and molecular drive, gene conversions, gene clusters and mitochondrial DNA all find a place in this volume. Finally a chapter on the neutral theory of molecular evolution is presented by Kimura, first to put forward this theory. Recent sequence data tends to vindicate the theory, and Kimura suggests that at the molecular level, neutral evolution predominates over *Darwinian* evolution.

All interesting reading, this book brings together discussions of the widespread occurrence of polymorphisms, of "jumping genes" and the interpolation of non-coding sequences within the coding regions. Put these together with contributions by population geneticists and an interesting interplay of ideas results. This book does give an up-to-date account of a subject that is developing rapidly. Unfortunately, there is no index to this excellent collection of papers.

J. F. Jackson, Glen Osmond