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Book reviews

Narang, Saran A. (ed.): Synthesis and Applications of DNA and RNA. Florida: Academic Press 1987. 237 pp. Hard bound U.S. $ 45.00.

The book *Synthesis and Applications of DNA and RNA,* edited by Saran Narang, should be on the bookshelf of all molecular biologists, geneticists and biochemists, since it presents the chemistry of oligonucleotide synthesis and its applications in a very readable and down-to-earth manner.

The editor has organised the nine chapters to cover a rapidly-expanding research area with so many applications to molecular biology, genetics and biochemistry, and should be applauded for the manner in which it has been done. The preface, introduction and first chapter of the recent history of chemical synthesis of polynucleotides shows the depth of knowledge and organisational skills of Saran Narang, the editor, and sets the background nicely for the remaining eight chapters. These deal with automation of DNA synthesis on solid supports (two chapters) followed by a chapter by a group of authors, including the editor, on how genes have been synthesized with a large list of examples. The list and explanation is in order of increasing gene size, so as to emphasize the different construction features used in synthesis of, say, the bradykinin gene of 41 base pairs up to a gene specifying a human growth hormone of 584 base pairs.

Chemical synthesis of RNA is not neglected and is covered by a further chapter, followed by a chapter each on rapid RNA and DNA sequence analysis. The book is rounded off nicely with chapters on oligonucleotide-directed site-specific mutagenesis using double-stranded plasmids, and on synthetic oligonucleotides for identification and isolation. The latter deals essentially with the use of synthetic oligonucleotides as hybridization probes and summarizes the great potential this has for specific problems in molecular biology, including clinical applications for the diagnosis of human genetic diseases. The book has an extensive index and is recommended for all those with an interest in molecular genetics. J. F. Jackson, Glen Osmond

Plomin, R.; DeFries, J. C.; McClearn, G. E.: Behavioral Genetics. A Primer. 2nd edn. New York: W. H. Freeman and Co. 1990. 126 figs., 65 tabs. Hard bound $ 32.95.

This is the second edition of Plomin et al.'s highly successful introductory textbook, the first edition of which has been reviewed in this journal earlier (J. H. F. van Abeelen, TAG 58:48, 1980). Several of the book's chapters have been updated or even completely re-written, some parts have been deleted, and a completely new chapter on "The New Genetics" (meaning molecular genetic methods) has been added. In all, I can still agree with the conclusion of the previous review that "this well-written and well-illustrated book can be recommended as a nice appetizer to those who wish to become acquainted with the field."

Some additional comments are applicable, however. For one, it is my opinion that this book does not present a perfectly balanced view of the field, which, considering the scope of the field, would admittedly be a dire task. Rather, the book presents behavior genetics as seen through a psychologist's eyes. The main focus of the book, and its greatest strength, lies with human behavior-genetic analysis. Animal behavior is not neglected, but decidedly underrepresented. Of the total of 14 chapters, 7 are of a general nature, 5 deal with human behavior genetics, 1 with both human and animal studies, and only 1 exclusively with animal behavior genetics. Furthermore, although the chapters dealing with human studies have been extensively revised and updated, those dealing with animal behavior have remained essentially unchanged. As a result, most of the animal studies presented, although generally still classics in the field, are rather old, and only one study published after the early seventies is discussed in greater detail.

Another point is the book's preoccupation with what I would like to call descriptive genetics: despite the inclusion of a chapter on molecular-genetic techniques, and although explicitly stated otherwise, it sometimes seems as if the only goal of behavior-genetic analysis recognized by the authors is the partitioning of variance culminating in an estimate of heritability. Important quantitative genetic concepts like genetic architecture and (ambi)directional dominance are not treated, so that students may remain unaware of the information genetic analysis can provide about selection pressures that have worked on the phenotype studied in the evolutionary past.

Furthermore, any discussion of neural mechanisms is omitted, as exemplified by the fact that, in the otherwise very detailed subject index, only a single reference is made to a neuronal variable (nerve conduction velocity), and even that topic is just merely cited in the text. The authors come some way to meeting the objection of their focussing on description rather than on mechanism where they introduce bi- and multivariate analysis. By using these kinds of methods, valuable insights into the mechanisms regulating behavior may be gained. Although I recognize that an introductory text cannot possibly cover the complete field, I do think that a more balanced presentation would have been possible and desirable.

A book of this size always has, of course, its share of minor errors and glitches. Some references, for example, are listed but not referred to or the other way round. The chapter on Quantitative Genetic Theory contains a subchapter about What Heritability is Not (p. 232). Here, six lines below the statement that the concept of heritability does not refer to one individual, an example is given in which heritability is in fact applied to one individual (also on p. 5). The book still contains the erroneous statement (p. 74) that "... homogentisic acid is normally converted into urea." (noted in the previous review and already present in the precursor to this book: McClearn and De Fries, Introduction to Behavioral Genetics; Freeman, San Francisco, 1973).

However, the foregoing is not intended to detract from this book's obvious qualities. Indeed, to me, the introduction given to the present status of human behavior-genetic research is unsurpassed as yet, and the book is therefore excellently suited to be an introductory text for psychology students. The Cinderella-like treatment of animal behavior and neurobehavioral genetics is unfortunate, however, and makes the book only suitable for students in biology if additional information is provided.

W. E. Crusio, Paris

Zander, W.; Boetcher, F.K.: Haltung und Zucht der Biene. 12th revised and extended edn. Stuttgart: Ulmer 1989. 352 pp., 220 figs.

This monograph is remarkable in that most of it is devoted to bee breeding. It is completely up-to-date and reviews not only the present state of knowledge on the different races of *Apis mellifica* (in the Anglo-Saxon countries the older, but incorrect terminology that was corrected by Linnaeus himself is still in use – *Apis mellifera*), but also the basic principles of drone and queen breeding and the technique of natural copulation. Artificial insemination is described in detail. Phenotypic marks such as wing index and proboscis length as well as other selection criteria like honey production, life-time, aggressiveness, brood production, resistance and adaptation to specific nectar-delivering flowers are mentioned. The principles and practices of bee breeding, inbreeding, inbreed depression, sister × brother and aunt × nephew pairing, repeated backcrossing and heterosis effects are explained.

This excellent book has two disadvantages. Firstly, it is written in German, and this automatically restricts distribution of its expertise to the German-speeking countries. Secondly, the list of references is exclusively limited to German publications and contains only those papers published after 1980, thereby forcing the interested reader to ask assistance of the authors' library or to do some troublesome work of retrival on his own.

H. F. Linskens, Nijmegen

Boehme, H.; Mettin, D.; Müller-Stoll, W.R.; Muentz, K.; Rieger, R.; Rieth, A.; Scholz, F.; Stubbe, H. (eds.): Die Kulturpflanze. Mitteilungen aus dem Zentralinstitut für Genetik und Kulturpflanzenforschung Gatersleben der Akademie der Wissenschaften der DDR. Band 37. Berlin: Akademie-Verlag 1989. 511 pp., 164 figs., 15 tabs. Soft bound.

The most recent proceedings of the central institute of genetics and crop research of the former East Germany Academy of Sciences still contains Russian summaries of all articles. However, nine of the articles are written in English. Four reviews on gene transfer in sugar beet, on dwarfism in wheat, on gene technological manipulation of plant virus resistance and on the use of local insects as pollinators demonstrate the shift to modern methods of breeding research. The usual progress report of the institute, with its sections on molecular cell genetics, molecular biological fundamentals of productivity, and on applied genetics, taxonomy, and gene bank of cultivated plants, is accompanied by 15 technical papers. Most of these are on collection activities of the institute's staff in Kachetia, (North) Korea, Cuba (of course), Columbia, and southern Italy. Most interesting are the literature reviews on the taxonomy and evolution of crop plants for 1987/88 and on the archeological remains of cultivated plants (with 150 references briefly discussed).

H. F. Linskens, Nijmegen

Capecchi, Mario R. (ed.): Molecular Genetics of Early Drosophila and Mouse Development. Current Communications in Molecular Biology. Cold Spring Harbor: Cold Spring Harbor Laboratory Press 1989. 141 + XIII pp., illustrated Paperback.

This book provides a one-evening lecture on the present state-of-art in molecular studies on the early development of *Drosophila* and mouse. It summarizes contributions given at the Banbury Meeting: 20 articles, which are in fact extended abstracts, give an impression on recent achievements in developmental studies of early embryogenesis. Most contributions succeed in presenting the essential points clearly and in a generally informative way that allows also readers without much background to extract the essential messages. Such readers, in fact, will be the addresses of this book, since it provides only rather general information that is common knowledge to the expert. My feeling is that the general reader is well served and will retain an overview on what is presently known.

The book begins with a number of contributions on *Drosophila,* followed by a larger number of summaries dealing with mouse embryogenesis. Although not unexpected, the extent of our knowledge on these two organisms is startling, but it also becomes clear to what degree the work on *Drosophila* has influenced research on the mouse. Basic techniques are still under discussion with respect to mouse research, while research on *Drosophila* deals with advanced questions on gene regulation. The references to the individual contributions will enable readers to extend their reading to more extensive reviews and to primary publications.

The book can be recommended as a basic introduction to actual questions in molecular research on embryogenesis.

Wolfgang Hennig, Nijmegen

Edlin, Gordon: Human Genetics – A Modern Synthesis. Boston: Jones and Bartlett Publ. 1990. 425 pp. Hard bound £ 17.50.

The purpose of Edling's book is to inform readers with little or no scientific background about the principles of genetics, especially human genetics. Indeed, it is in the area of human genetics that the most dramatic and startling genetic advances have been made in the past decade. Hundreds of hereditary human diseases can now be detected in utero, giving prospective parents childbearing options that were not available to earlier generations. And progress in molecular, medical and evolutionary genetics continues to give not only new insights into controlling biological processes, but also the fear of possible genetic abuses and the infringment of basic human rights. Thus, information needs not only to be exact and representative, but also requires full scientific backing. Consequently, Edling's book not only deals with human genetics, but also with plant and animal genetics, and with the social problems and those of human dignity arising from knowledge learned in both the past and present. The book is arranged in 20 chapters, beginning with Mendel's laws and ending with "Hereditary and Environment", and includes sections on sociobiology and eugenics. Each chapter in this book includes a list of additional readings, study questions, and essay topics. Definitions of key words are given at the end of each chapter as well as in a glossary at the end of the book. To engage the readers interest, controversial or thought-provoking material is presented in boxes. Congratulations on this book!

P. Eberle, Braunschweig

Boyd, G.W.: On Stress Disease and Evolution. A Unifying Theory. University of Tasmania: Holbart 1989. 246 pp. Soft bound Aust $ 29.95.

In contrast to the recent advances that have been made in the technological aspects of medical science, our understanding of disease mechanisms has been a relatively slow process. According to Grahm Boyd, professor of medicine at the Australian University of Tasmania since 1977, this situation is related to two problems, which he discusses in this monograph: (1) a philosophy that is dominated by the views of Popper, which emphasize testing hypotheses much more than formulation, and (2) the increasing specialization of medicine, so that only parts of the general problem are examined. Consequently, in his book Boyd takes a broad look at the whole range of disease, in particular vascular aspects of disease pathology in various organs, and evolutionary mechanisms. The fundamental theme of the book is that stress-induced arterial vasospasm is a fundamental initiating factor underlying many disease processes, which has an importnat bearing on cancer and evolutionary mechanisms through ischaemic destabilization of a genome composed essentially of viral genetic modules.

The destabilized genome causes, according to this theory, uncontrolled cell growth and proliferation, partly through derepression of the virus-like genes within the body's DNA. This discussion of (retro-)viruses within all but primitive life forms gives rise to the view than much of the non-random DNA mutational change required to explain the paradox of the speed of evolution has come about by viruses interchanging gene fragments within and between host species. If this hypothesis is true, it suggests that it is not man who is the master genetic engineer, but nature itself. Or, in other words: viruses are of prime importance in evolution in that they provide the essential non-random drive through the promotion of gene exchange across species' border. This diagonal evolution theory is supported directly and indirectly from population genetics' studies and new insights in molecular evolution, and from evidence of the viral contribution to the prokaryotic genome. There is no doubt that the viral interchange mechanism has an obvious potential importance in evolutionary terms. Arguments from recent information on eucaryotic DNA from the literature are also included.

This is a highly stimulating book that is based soundly on a knowledge of the microbiological and molecular biological literature. If viruses are really a part of our being, for the sake of our evolution we should not prevent all viral infections and viral-related diseases.

H. F. Linskens, Nijmegen

Rees, A. R.; Sternberg, M. J.: From Cells to Atoms. An Illustrated Introduction to Molecular Biology. Oxford, London, Edinburgh, Boston, Palo Alto, Melbourne: Blackwell Scientific Publ. 1984. viii + 94 pp., several figs. and tabs. Soft bound U.K. £ 6.80.

As an illustrated introduction to molecular biology, From *Cells to Atoms* provides undergraduates in biology and medicine with the essentials of molecular and cellular biology. The authors have produced a book which is so well illustrated that the illustrations take up at least half of the space available. The illustrations are so good that the facts the authors are trying to put forward to the undergraduate are readily perceived and to the busy undergraduate this must mean a great saving in time and more efficiency in the learning process.

The latest research results are incorporated, so that the shapes and properties of DNA, RNA and proteins are taken into account, for example, when an account of the role of the nucleus in storage, replication and expression of the genetic material is given. And all of this is of course put forward in an illustrated format, so that the beginner in the field is able to assimilate and inter-relate cell biology and molecular biology quite readily. The selection of topics covered is quite wide and ranges from the description of whole cells and their organelles to the shapes of biological macromolecules. The primary structure of proteins is particularly well covered, starting with the chemical properties of amino acids and how this basic property determines shape and other properties of the various proteins. Similarly, nucleic acids and genes and carbohydrates and lipids are covered very well in a similar and well-illustrated fashion.

A final section covers the molecular biology of nerves, muscle, transport, antibodies, vertebrate hormones and antibiotics. The book is finished off with useful definitions and physical principles, while an extensive index is provided. An account of genetic engineering principles and antibody structure gives the undergraduate a feeling of familiarity with these new and important techniques and topics. The book will fascinate the beginner and encourage him or her to pursue the subject further. The book is therefore recommended to the undergraduate embarking on a career in biology or medicine.

J. F. Jackson, Glen Osmond

Edwards, J. H.; Lyon, Mary F.; Southern, E. M.: The Prevention and Avoidance of Genetic Disease. Proceedings of a Royal Society Discussion Meeting held on 29 and 30 April 1987. London: The Royal Society 1988. 157 pp. Hard bound £ 32.50.

Advances in genetics are now making it possible to diagnose some diseases prenatally or to detect whether potential parents are carriers of genetic disease before conception takes place. This book, which consists of the proceedings of a symposium of specialists held in high repute, conveys the picture that while considerable progress has been made in the prevention of suffering that results from genetic disease, many problems remain to be solved. Developments in genetics, biochemistry, and classic and molecular cytogenetics provide up-to-date approaches to the prevention and avoidance of congenital malformation. The approaches available include the avoidance of harmful environmental factors, screening of the newborn and early treatment, genetic counselling and antenatal monitoring with selective termination. This book reflects our very high level of knowledge on human disease caused by genetic disorders and the now reachable possibilities of preventing and avoiding them.

P. Eberle, Braunschweig