

Book reviews

Sobti, R.C.; Obe, G. (eds.): Eukaryotic Chromosomes: Structural and Functional Aspects. Berlin Heidelberg New York Tokyo: Springer 1991. 295 pp. Hard bound DM 178.00.

Eukaryotic chromosomes are the most widely studied, yet the least understood, organelles of the cell. Progress in any facet of cytogenetics depends on a thorough understanding of these organelles. Therefore, a book giving an integrated account of the information available on chromosomes would be welcomed by all biologists, particularly by cytogeneticists and geneticists. However, the book *Eukaryotic Chromosomes: Structural and Functional Aspects* contributes very little to our understanding or misunderstanding of chromosomes.

This book contains 23 articles on various topics, some totally unrelated to the main theme of the book. The first article contributed by Brown introduces the subject reasonably well. It makes the readers aware of how little we know about the general structure and molecular organization of eukaryotic chromosomes. In article 2, Dutta and Verma discuss DNA systematics in evolutionary studies, a topic entirely different from the first one. This discussion is perhaps better suited for a book on molecular systematics. Even then the sentence structure in this article is rather convoluted and difficult to understand. For example, the very first paragraph ends with the following sentence: "The G+C more per cent of DNA has been used to identify the affinities between a wide range of bacteria, lower eukaryotes, higher plants, and animals (2, 3)." Do the authors mean G+C rich DNA? Also, article 6 on in situ absorbance and chromosome characteristics belongs to a book of taxonomy, although the taxonomic significance of DNA absorbance remains to be established. Article 3 by Vig on centromere separation describes that all eukaryotes exhibit a non-random, sequential separation of centromeres and highlights the role of constitutive pericentric heterochromatin in bringing about this phenomenon, the significance of which remains controversial at best.

Articles 7 and 8 deal with the cytogenetics of the mosquito. The latter one by Narang and Seawright deals with genetic and evolutionary divergence, and reproductive isolation and speciation in anopheline mosquitoes. Although well written, this essay is misplaced in this book. In fact, most articles in the book deal with mammalian cytogenetics, and some relate to cancer cytogenetics and cytogenetic characterization of human disorders. One article deals with the influence of osmotic stress on mammalian cells in culture. These articles would perhaps be better received in a book on cytogenetics.

Five of the articles deal with chromosomal aberrations and chromosomal assays for testing various clastogenic, genotoxic, and carcinogenic agents. Article 19 by Sobti et al., for example, deals with sister chromatid exchanges (SCEs) and the sensitivity of this assay for detecting the level of genotoxicity or carcinogenicity of different agents to which humans are exposed. The article tends to be descriptive. SCEs were discovered by Taylor et al. as early as 1957 and form the subject matter of a number of volumes. The in vivo genotoxic potency of chemical compounds has been evaluated frequently by direct examination of chromosomal material to determine the rates of induction of SCEs. Sobti et al.'s article on this topic adds little to our understanding of this phenomenon. Only old literature has been reviewed, and the article has some errors, including typographical mistakes. The first sentence under History (page 229), for example, states that SCEs were first demonstrated "about two

decades ago by Taylor et al. (1) . . ." but this paper by Taylor et al. was published in 1957, i.e. about 34 years before the publication of this book. Just to give one example of spelling mistakes, in reference 58, "Shelly" should be "Shelby".

On the whole this book is poorly organized and poorly edited. The book contains grammatical and spelling mistakes. It appears as if the articles were published in no particular order or perhaps they were published in the order in which they were received. It would make more sense if the articles were organized in a logical sequence according to the broad subject matter they deal with. If all the articles currently included in the book had to be included, it should have been given a different title and should have been subdivided into different parts or sections, each section containing articles of a similar nature dealing with one important topic. In my opinion this book has limited usefulness and at 178 DM it is poor value for the money.

P. P. Jauhar, Fargo

Harris, C. C.; Lechner, J. F.; Brinkley, B. R. (eds.): Current Communications in Cell and Molecular Biology. Cellular and Molecular Aspects of Fiber Carcinogenesis. First edition. Cold Spring Harbor: Cold Spring Harbor Laboratory Press 1991. 221 pp., 42 figs., 9 tabs. Soft bound.

The adverse health effects of airborne fibers are a major environmental concern. Both naturally occurring mineral fibers and man-made substances present uncertain risks. A major theme of the volume under review is the pathological comparison of asbestosis with other types of fibers, including its proposed substitutes. To answer specific questions, including those related to risk assessment, 13 multidisciplinary contributions prepared by a Cold Spring Harbor Laboratory Meeting on the theme deal with the understanding of the molecular mechanisms of fiber-induced aberrations in cell division, transduction of growth factor signals, and genomic stability. The status of these fundamental studies is analysed in this book. The book is recommended to cell biologists, tumor biologists, cancer cytogenetics and advanced students in these fields.

M. Wehnert, Greifswald

Cook, L. M.: Genetic and Ecological Diversity. The Sport of Nature. First edition. London New York Tokyo: Chapman + Hall 1991. 192 pp. Soft bound £ 13.95.

Population genetics may still seem a little odd to many ecologists as is ecology to many geneticists. There is no doubt that it is necessary to study ecological adaptations, food webs and energy fluxes in order to understand ecosystems. However, the analysis of an ecosystem may not be successful at all without considering the principles of population genetics. It is, therefore, necessary for ecologists to be familiar with population genetics. The attempt to bring together ecology, and population genetics in a small book is meritorious, and it was successful!

The book is divided into three parts. The first part deals with species abundance and species diversity. The reader is first given some basic information about ecology and evolution and then introduced to problems that may be analysed with the help of population genetics. The second part with 10 chapters presents the features of population genetics. In the third part the author comes back to evolution reflecting upon the chances and limitations of population genetics.

I enjoyed the book, which should stimulate the reader. It is well edited. Explanations of mathematical terms and equations are clear; mathematics has been confined to the minimum necessary. The price is reasonable. I recommend the book to students and teachers of biology, especially general ecology and evolution. Moreover, the book is an excellent introduction into population genetics.

H.-D. Görtz, Münster

McCarthy, John E. G.; Tuite, Mick F. (eds.): Post-Transcriptional Control of Gene Expression. NATO ASI Series, Series H: Cell Biology Vol. 49. First edition. Berlin Heidelberg New York: Springer 1990. 652 pp., 205 figs., 46 tabs. Hard bound DM 298,00.

This book contains the Proceedings of the NATO/CEC Advanced Research Workshop on Post-Transcriptional Control of Gene Expression, which was held in Goslar (FRG) in April 1990.

During the last two decades many pioneering results have been obtained regarding the events following transcriptional initiation. These reactions have a remarkable influence on the regulation and control of gene expression. A diversity of post-transcriptional mechanisms in both prokaryotes and eucaryotes have been detected. It was the intention of the organizers of this meeting to bring together leading authorities in different areas of this important field of molecular biology.

The present volume contains 59 chapters and is divided into eight sections: mRNA stability, Antisense regulation, Transcriptional (anti-)termination, Translational control, Translational regulatory circuits, Biochemistry and genetics translation, Translational accuracy/frameshifting and Post-translational events. Most papers are devoted to problems of regulation, biochemistry and genetics of translation. Many of the contributions are concise, representative and up-to-date reviews of a given topic, e.g. "Regulation of mRNA stability in yeast", "Yeast mRNA structure and translational efficiency", "Mechanism of ribosomal protein translational autoregulation", "Structure and function of mammalian initiation factors", and "Ribosomal frameshift and frame-jump sites as control points during elongation". At the end of each paper recent references are given, including the full titles.

The reader will find much valuable information concerning the control of gene expression in viruses, bacteria and yeast, but only one paper that treats the post-transcriptional control of gene expression in chloroplasts. Obviously much work has to be done to clarify post-transcriptional mechanisms of gene expression in plant cells.

In summary the book gives an excellent state of the art of the "control of gene expression" field as it has developed during recent years. This highly stimulating volume is recommended for all those with an interest in molecular genetics.

D. Gröger, Halle (Saale)

IAEA/FAO Joint Division, Vienna, Austria (Plant Breeding and Genetics Sections): Plant Mutation Breeding for Crop Improvement (Proc. Int. Symp. Vienna, 18–22 June 1990). Vienna: IAEA 1991. 552 + 498 pp. (in two volumes), various tables and plates).

Since the establishment of the Plant Breeding and Genetics Section of the joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture in Vienna in 1964, an impressive range of publications, covering all aspects of mutation breeding, has been issued. *Plant Mutation Breeding for Crop Improvement* is the most recent contribution to the proceedings series.

Contributions of induced mutations to practical breeding of new crop varieties often have been considered with some suspi-

cion, despite the fact that many excellent examples can be given of successful and economically important varieties obtained in this way. One correct criticism sometimes made is that in the past too many scientists, interested in mutations but without an adequate knowledge of plant breeding, have presented their mainly fundamental research work as being of direct practical importance for the breeding of new varieties and, thus, raised unjustified expectations. This approach still can be observed in some countries and, in addition, routine experiments like seed irradiation and checking M_2 and M_3 generations for various types of mutations are still presented sometimes as 'highly valuable' contributions to plant breeding. Even relative outsiders may easily appreciate that the induction of genetic variation is nothing but a first and relatively easy step in a breeding programme. The subsequent steps of selection and testing of potentially useful genotypes requires much more time, energy and skill.

The above-mentioned Plant Breeding and Genetics Section, in particular in recent years under the now-retired, active head, Dr. A. Mücke, has contributed significantly to the collection and distribution of relevant information about mutation breeding. As we are now at the stage that several of the pioneers are no longer active in this field, the 1990 symposium, 25 years after the start by IAEA, offered an excellent opportunity to make an inventory once again on what has been achieved so far and what problems still have to be solved.

About 120 participants from 46 countries attended the congress. Lectures were concentrated into four sessions: country contributions, specific crops, particular objectives and methodology of mutation breeding. Achievements of past and present research were adequately covered, but this reviewer has the impression that no more fundamentally new concepts or approaches are to be expected in this field.

Mutation breeding has become well established by now and, in a number of cases, can be considered a suitable practical breeding method, provided that expectations are realistic. Whether to apply mutation breeding or another technique should be based on economic considerations: which method is the quickest, easiest, cheapest, most promising, etc. in a specific case.

Mutation breeding as a field of study may lose its integrity in the near future and become incorporated into plant biotechnology. This would be a pity unless the knowledge and practical experience collected so far would be conserved and used. In particular relative newcomers in the field of plant breeding such as molecular and cell biologists without specific knowledge of crop science and crop breeding still could learn a lot from the experience of mutation breeding specialists when trying to bridge the gap between the practical approaches by crop breeders and, theoretically, very 'promising' schemes from fundamental scientists. The above-described proceedings provide a wealth of information and could act as an easy starting point on such efforts.

A. M. van Harten, Wageningen

Bogorad, L.; Vasil, I. (eds): Cell Culture and Somatic Cell Genetics of Plants. Vol. 7A The Molecular Biology of Plastids; Vol. 7B The Photosynthetic Apparatus Molecular Biology and Operation. San Diego London: Academic Press 1991. xxvi + 340 pp., xvi + 482 figs., many tabs. Hard bound \$ 109; \$ 139.

The comprehensive title *Cell Culture and Somatic Cell Genetics of Plants* covers a series of quite encyclopedic volumes for use by scientists in academia and industry who are engaged in studies of advanced biotechnology and agriculture. Since most regular papers and congress contributions tend to be rather short in describing the techniques used and the underlying biological principles, this series tries to fill up a gap in information. Editor-

in-chief, Indra Vasil, chose plant cell culture as the central theme since it constitutes a logical point of integration of modern genetics and molecular biology and a very promising starting point for the development and application of biotechnology in plant culture. Hence, some of the volumes give mainly information on technology (e.g. vols. 1, 2, 4, 8). The volumes reviewed here present biological principles and discuss recent observations. Whereas the molecular biology of plant nuclear genes could still be surveyed in one volume (nr. 6), editor Bogorad needed two volumes (7A and 7B) for the molecular biology of plastids. This reflects the spectacular progress that this field has experienced during the last 10 years: gene maps are now available for over 1000 species, complete DNA maps for the plastids of 3 species. This has been possible because plastids and photosynthetic bacteria have been very thoroughly studied by classical biochemistry and biophysics, which has resulted in the consensus of plastids as endosymbionts. It thus turns out that the plastid genome is relatively simpler than that of free-living bacteria, comprising only a few clusters of genes. Even so, an enormous amount of ingenuity and tenacity were necessary in order to achieve these results, which are here condensed in well-ordered, minimally overlapping reviews by very competent authors. Referencing up to 1990 is very extensive: 22% of the text pages present papers referred to. (This does not include tables, like chapter 15B, or indices). Volume 7A is a survey: structure and evolution of plastid chromosomes, including the problems of genetic flux between the endosymbiont and the nucleus; replication and transcription; transcript processing. Next come 3 chapters on the genes for rRNAs, tRNAs and ribosomal proteins. A chapter on the structure and properties of the plastid envelope provides a thorough background for the discussion of chloroplast protein transport. The final chapter on the origin and evolution of plastid genomes reviews the insights gained and remaining problems: even the question of the mono- or polyphyletic origin of plastids cannot be solved before complete DNA sequences are available for many more species.

Volume 7B starts with an excellent introduction by Bogorad to photosynthesis and the photosynthetic apparatus, followed by specialized chapters on PS II, the *cyt b₆/f* complex, PS I and a review of the genetics of the PS apparatus of bacteria. Part II of this volume deals with: cyanobacterial phycobilisomes, the syntheses of chlorophylls, carotenoids and Rubisco, respectively; photoregulation of chloroplast development; differentiation of amylo- and chloroplasts; chromatic adaptation of cyanobacteria; the intergenomic integration and regulation of gene expression in plastids and nucleus/cytoplasm. The final chapter summarizes in 12 pages of tables the available data on nucleotide sequences of protein-coding chloroplast DNA, with estimations of the relative rates of evolution. This reviewer regrets that the gene nomenclature is only referred to, but is duly impressed by the enormous progress made in a few years.

Since the prospective readers of this series, and of these volumes, are those interested in both theoretical and applied aspects of plant genetics, TAG readers should pay attention to these authoritative books, which are of a very high informative value. The price/value ratio therefore seems quite favorable, also considering the good quality of the paper, printing and binding.

J. F. G. M. Wintermans, Nijmegen

Sass, H.-M. (Hrsg.) unter Mitarbeit von Anderson, W. E.; Bayerts, K.; Brandts, H.; Bülow, E.; Cook-Deegan, R.M.; Eberbach, W. H.; Fletcher, S. C.; Fuchs, S. C.; Gabriel, H. W.; Kimu-

ra, R. et al.: **Genomanalyse und Genterapie**. Ethische Herausforderungen in der Humanmedizin. Berlin Heidelberg New York: Springer 1991. 347 pp., 4 figs. Soft bound DM 98,50.

Modern molecular genetics irresistibly gives rise to new biological facts and social implications. Pragmatic medical progress is in hard competition with the fears buried deep in many people, because up-to-date molecular genetics does not only place *Homo sapiens* as a result of several evolutionary steps, but also presents a prospect of permanent alterations in the human genome. The project "human genome analysis", stimulated by some pressure groups, does not only accelerate medical progress, and thereby running a risk of misguided gene therapy, but opens the doors to unwelcome and intolerable insights into the human personality. Now, anyone has the chance of being totally genetically analysed and recorded! This book is the first one of its kind to relate to the international level of projects analysing the human genome and to give strategies of gene therapy. Contributions from a large number of experts in the fields of human genetics, molecular genetics, industrial medicine, justice and philosophy, as well as representatives of ministries and journalism guarantee a complete and discriminating representation of the large diversity of ethical, medical and political views of these not only promising but also most questionable developments of modern biomedical research work. Meanwhile, Germany has passed the Genetic Engineering Law in 1990, and its five regulations which complement and give concrete form to the law. Particular emphasis is given to two regulations, the Genetic Engineering Safety Regulation (Gentechnik-Sicherheitsverordnung) and the Genetic Engineering Recordkeeping Regulation (Gentechnik-Aufzeichnungsverordnung). Especially for researchers in gene diagnosis, general duties of care, record-keeping and operating instructions are presented in detail. In spite of this legislation the above book should be paid attention too; may it have success!

P. Eberle, Braunschweig

Finch, C. E.: **Longevity, Senescence, and the Genome**. First edition. Chicago and London: The University of Chicago Press 1990. 922 pp., 214 figs., 34 pp. Hard bound \$ 57.50.

C. E. Finch, an outstanding specialist in the biology of aging, lifespan and senescence, provides a comprehensive review of the role of environmental and genetic factors in the process of senescence and longevity in eukaryotes. The book is divided into two major sections, each with six chapters. In section I the comparative biology of senescence, the diversity of species' differences in the patterns of senescence and lifespan of plants, animals, and humans are analysed. Many examples of species' differences in senescence and lifespan as well as genotypic variations in organ-specific degenerative conditions within species have demonstrated that the genome has major influences on the characteristics of senescence. Section II, genomic functions during senescence, describes various genomic influences at the molecular, cell, and physiological levels. Alternative patterns of gene expression or changes in gene activity cause differences in lifespans between related organisms. On the basis of our present knowledge, genomic mechanisms in senescence appear to be much more complex and phylogenetically diverse than the genetic mechanisms involved in development.

The book will attract the attention of researchers interested in behavioral, developmental, evolutionary, and molecular biology as well as in the biomedicine of aging. They will find a lot of data and theories that try to explain mechanisms in senescence and lifespan.

G. Machill, Greifswald