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Book reviews

Ilan, J. (ed.): Translational Regulation of Gene Expression. 1st edn. New York London: Plenum Press 1987. 487 pp., 109 figs., 34 tabs. Hard bound $ 75.00.

It is the complexity of the subject matter that makes it so difficult to get an insight into the various regulatory systems involved in the translation of mRNA in prokaryotic and eukaryotic organisms. The aim of the book under review was to present both current developments in the field and to provide a comprehensive survey of associated research. The 21 chapters, each written by experts, describe the various factors and interactions which have been found to be involved in translational regulation: protein-DNA-, protein-RNA-, and protein-protein-binding; mRNA structure; nucleotide sequences; membrane association; polyadenylation; heat-shock response; nucleoside requirements; anti-sense RNA, etc. Data are reviewed from studies on *E. coli*, bacteriophages, *Drosophila, Xenopus, Echinus, Bombyx, Volvox*, yeast or the adenovirus.

The book stresses the fact that translational regulation is the most direct way of tuning protein synthesis: extremely short feedback loops enable the regulation of abundant proteins (often critical in the cells physiology) within a narrow range. Each chapter contains a short review, original data and valuable references for additional readings. J. Hofemeister, Gatersleben

Riordan, J. R.; Buchwald, M.: Genetics and Epithelial Cell Dysfunction in Cystic Fibrosis. Proceedings of a Symposium held in Kimberly, Ontario, Canada, November 12–15, 1986. New York: Alan R. Liss 1987. 223 pp., 60 figs., 24 tabs. Hard bound $ 46.00.

These proceedings summarize new results of research in pathophysiology, cell biology and molecular genetics of cystic fibrosis (CF) up to the end of 1986. Epithelium ion transport and chloride channel regulation have been studied in both intact tissues and cultured cells of the respiratory tract and sweat glands. New approaches are presented for the isolation of sweat glands and nasal epithelial tissues, and for the improved culturing of epithelial cells from these tissues. Epithelial tissues from CF patients have been found to have a profound impermeability to Cl^- ions, which is a property of the tissues themselves and not due to circulating factors.

The use of molecular genetic techniques in combination with linkage analysis has led to the identification of the CF locus on chromosome 7q31. Activities are now being directed towards isolating the defective gene. Newly discovered DNA markers that are very closely linked to CF can be used for carrier detection and prenatal diagnosis in families already having a CF child. According to the current status of genetics, there is no evidence for heterogeneity of the CF locus.

The results and effects of screening for CF in 400,000 infants in Australia by estimation of the elevated immunoreactive trypsin in blood are discussed. Different aspects of the pathologic manifestations of CF during fetal development are explained by means of the investigation of microvillar enzyme activities in amniotic fluid, which is the basis of the prenatal diagnosis in pregnant women with a 1-in-4 risk for CF.

The monograph is recommended to scientists and clinicians working in CF. G. Machill, Greifswald

Sorsa, V.: Polytene Chromosomes in Genetic Research. Ellis Horwood Books in the Biological Sciences. Horwood. 289 pp., 66 figs., 2 tabs. Hard bound $ 39.95.

Polytene chromosomes, especially those found in insects, represent an extraordinary suitable material for cytogenetic and molecular studies. Since their rediscovery by Heiz, Bauer and Painter, an enormous amount of data concerning their occurrence, structure and function has been collected. Studies on polytene chromosomes enabling the high resolution mapping of genes and genetic activities, homologization of cloned DNA sequences as well as studies on chromosome structure and evolution have contributed much to our understanding of heredity.

The present book by Sorsa is a valuable review on recent research and applications of polytene chromosomes in genetics. It is based on his own outstanding contributions to the field. The first three chapters summarize our knowledge on the occurrence of polytene chromosomes, review the main historical facts and discuss the relationships between polytene, mitotic and meiotic chromosomes. The next two chapters describe light and electron microscopic as well as molecular findings concerning the structure, replication and transcriptional activities of polytene chromosomes. A thorough description of the various experimental methods applied in structural studies (electron microscopy), functional analyses (autoradiography and analysis of puffing), molecular research (in situ hybridization, cloning and immunological methods) as well as for cytogenetic mapping is given in the following five chapters of the book. The final chapter deals with phylogenetic studies on polytene chromosomes. The book is profusely illustrated and successfully aims to collate the massive amount of literature in the field. It will prove an invaluable reference book for all those interested in chromosome research and genetics. G. Reuter, Halle (Saale)

Tuite, F. M.; Picard, M.; Bolotin-Fukuhara, M. (eds.): Genetics of Translation – New Approaches. *NATO ASI Series, Vol. H14.* Berlin Heidelberg New York: Springer 1988. 524 pp., 147 figs.; 40 tabs. Hard bound DM 248,–.

The book is a survey of a NATO workshop on the "Genetics of Translation: New Approaches" held at Aussois, France from May 21 to 26, 1987. Classical genetic approaches, detailed biochemical data, and new developments in recombinant DNA-based studies on this field are described.

The 40 chapters reflect recent discoveries concerning ribosomal RNA, ribosomal proteins, transfer RNA, translation factors, the mechanism and accuracy of translation, as well as translational control in procaryotic (especially *E. coli*) and eucaryotic (especially the yeast *Saccharomyces cerevisiae*) organisms. Each chapter comprises an introduction and detailed information, mostly concerned with the work of that laboratory. Good illustrations and an up-to-date survey of essential literature makes it rather easy for the reader to become familiar with additional references. Thus, the book can be recommended to specialists and to students interested in this promising field.

G. Kunze, Gatersleben

Knolle, H.: Cell Kinetic Modelling and the Chemotherapy of Cancer. Lecture Notes in Biomathematics, vol. 75. Berlin Heidelberg New York: Springer 1988. 157 pp., 36 figs., 7 tabs. Soft bound DM 33.00.

The main objective of this book has been outlined in the author's preface: "The number of papers dealing with mathematical modelling of chemotherapy is surprising, but the application of mathematical methods to the design of treatment protocols is still hampered by severe problems, one of which is the lack of data describing the action of the drugs used in cancer therapy. The thesis of this monograph is that the next step towards 'mathematical chemotherapy' should be the design of methods suited to determining the action parameters of cytotoxic drugs".

The author opens with a discussion of the growth kinetics of unperturbed cell populations (basic facts of cell proliferation, mathematical models of population growth). He proceeds to the mathematical evaluation of some cell kinetic experiments without drug effects. A mathematical description of various effects of cytotoxic agents and a discussion of experiments for the measurement of action parameters follows. Computer simulations of the action of cytotoxic drugs on cell populations are included. Substantial simplifications are, of course, accepted by the application of models which are represented by linear equations (with exponential solutions). They neglect the spatial structure of tissues and solid tumors.

The author uses the linear model of Takahashi.

The book has been divided into three chapters (Mathematical models of cell populations; Determination of cell kinetic parameters; Cell kinetics and cancer therapy) and an Appendix, which includes some mathematical topics (Limit theorems for matrix models; A model with periodic parameters; Pharmacokinetics and the dose-effect relation).

The author succeeds in keeping the mathematics and statistics involved to a moderate level. Nevertheless, the presumed knowledge of such basic facts from mathematical topics as calculus, statistics and probability theory, differential equations, recursive equations, series, Laplace transformation, integral equations, Fourier series, complex numbers, etc. will probably cause some difficulties in reading this book for a nonmathematician.

This comment, however, should in no way narrow the value of this recommendable book. It can be profitably used by both (1) the experimental research worker, for example the clinical oncologist who needs a mathematical guide in the design and evaluation of his experiments and (2) the mathematician who is interested theoretically in cell kinetic modelling with regard to applications in the chemotherapy of cancer.

M. Huehn, Kiel

Vig, B. K.; Sandberg, A. A. (eds.): Aneuploidy, part B: Induction and Test Systems. New York: Alan R. Liss 1988. VIII, 342 pp., many figs. and tabs. Hard cover.

Together with its companion volume *Aneuploidy, Part A: Incidence and Etiology* (1987) by the same editors, this is an excellent review of the field with understandable emphasis on human aneuploidy. They nicely complement the 1985 conference report by Dellarco et al.: *Aneuploidy, Etiology and Mechanisms* (Plenum Press, New York). The follow-up to these volumes was a meeting organized by a committee headed by B. Vig at Reno (USA) in January 1989, the proceedings of which will be published by the same publisher. Although, understandably, many of the authors feature in more than one of these books and reports, their contributions and consequently the four volumes complement each other rather than duplicate or overlap.

The present book contains 21 chapters written by a total of 31 contributors sub-divided into an introduction and two main sections: I. Induction and II. Test Systems. An editor's introduction and a very useful index complete the book. In part I a variety of environmental mutagens, such as radiation, ethanol, antibiotics, and plant growth regulators, are considered in a systematic arrangement. In the section on test systems, whole organisms, tissues, and tissue and cell cultures are discussed, including new technical approaches. There is no consistent difference between the two sections. As expected, considerable information on induction and the mechanisms involved is included with the test systems. The format of the two sections themselves is also heterogenous, inevitable for a book with such a diversity of contributors, so many different potential inducing agents, and so many targets. Also, both generative (including meiotic) and somatic systems are considered, regrettably with the first by far in the minority. Because of this heterogeneity, there is also no clear differentiation with the subjects of Part A. This does not really reduce their excellent quality.

In the chapter on EPA guidelines in the introductory section, Dellarco and Jacobson-Kram point at the difference between induced DNA errors and induced aneuploidy. Agencies (and individuals) interested in environmental mutagens are often insufficiently aware of this difference, both for induction of cancer and of germ-line damage. In addition, due to the very effective mechanisms of elimination of gross chromosomal damage by the human reproductive system, the actual incidence of aneuploidy at birth is incomparably lower than at conception. Therefore, induced or spontaneous aneuploidy in the germ line is usually expressed as reduced fertility rather than as genetic defects in the progeny. This difference with other effects of environmental mutagens makes it all the more important that these books and reports are read by those who advise on this subject both at the political and personal level.

The many chapters are almost without exception of a good to excellent quality and make interesting reading, even for cytogeneticists not primarily involved in the medical implications of aneuploidy. Because of the limited experimental accessability of human in-vivo material, much of the information presented has been derived from non-human experimental material, including mice, insects, and even plants and lower eukaryotes. Although the relevance for human aneuploidy is not always quite clear, it adds to the general interest of the book.

The role of induced aneuploidy in the origin of cancer is still insufficiently understood. Nor does all the accumulated knowledge on the origin of aneuploidy offer favourable prospects for reducing the frequency of by far the most important aneuploidies (trisomy 21, especially in ageing mothers; sex chromosome aneuploidy). Yet the information collected in this book, together with that in the other three volumes mentioned, is of great significance – at least for our understanding and hopefully also for the possibilities of ultimately reducing the incidence of aneuploidy in somatic and germ-line tissues, and the accompanying reduced fertility.

J. Sybenga, Wageningen