

nelles, membranes, cell walls); bioenergetics and transport ("Life's dance to the music of time"), with particular emphasis on the patterns of respiratory activity during the CDC—an area of expertise of the authors; the genetics of the CDC and the important tool that temperature-sensitive CDC mutants have afforded for the dissection of cell-cycle pathways; and, finally, the control (both deterministic and probabilistic) of cellular growth and division. The last short chapter considers the CDC-dependence of radiation sensitivity, chemical mutagenesis and carcinogenesis, and differentiation and development and its application to cancer chemotherapy. An extensive (63-page) reference list is appended; the literature search was completed on New Year's Eve of 1980.

This book will be an invaluable reference source for all workers in the field of cell cycles and the many related areas. It also could serve as an appropriate textbook for upper-level undergraduate and graduate courses on the physiology and biochemistry of the cell cycle. Unfortunately, however, its price clearly indicates that the publisher is marketing it as a trade book, thereby insuring that is far beyond the financial reach of all but the most wealthy students. C'est dommage.

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BIOMATHEMATICS AND CELL KINETICS. *Proceedings of a workshop held at Asilomar, California, 4-6 March, 1981. Developments in Cell Biology, Volume 8.*

Edited by Manuel Rotenberg. Elsevier/North-Holland Biomedical Press, Amsterdam and New York. \$65.00. xiv + 423 p.; ill.; author index. 1981.

This book is organized under four section headings: Pharmacokinetics (2 articles), Hematopoiesis (4), Cell Cycle Analysis (10), and Models of the Cell Cycle (12). In analyzing a work in biomathematics, two criteria can be applied: does it make a good contribution to biology and medicine?; does it make a good contribution to mathematics? On the basis of these criteria, the book is of uneven quality. Noteworthy in the positive sense is the section on hematopoiesis, where modeling comes face to face with the reality of the experimental situation. Other sections of the book also contain excellent and useful work. Several papers, however, especially some in the last two sections (making up 75% of the book) stand up against neither criterion. Modeling is done for a purpose, either to explain, to predict, or to control a process. Whenever the *raison d'être* for a modeling exercise is unclear and unsubstantiated, the work must be questioned. Several authors (especially some writing the review ar-

ticles) should have been more aware of newer developments in the study of normal and abnormal cell cycle progression, work that makes their articles somewhat out of date.

Quantitative modeling from first physical principles is definitely called for in cell biology, to provide a coherent framework to the jungle of empirical observations and to guide future experimentation; this book, however, despite its bright spots, contains little that is new, even for the small group of specialists to whom it is apparently addressed.

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CELL DEATH IN BIOLOGY AND PATHOLOGY. 

Edited by I. D. Bowen and R. A. Lockshin. Published in association with Methuen, New York, by Chapman and Hall, London and New York. \$65.00. xviii + 493 p.; ill.; author and subject indexes. 1981.

To most investigators the significance of cell death might seem obvious, but the contributors to this volume draw together diverse forms, functions and mechanisms of cell death that clearly define its importance as a biological phenomenon. Cell death is more than a component of dying. It is involved in the early shaping of embryos and fetuses, in metamorphosis, in neural development and in selective processes associated with the development of the immune system. Cell death is defined morphologically, biochemically, and by evidence of altered physiology. The lysosomal effects of cell death are believed to be only initiated by earlier, still mysterious, processes. This mystery surrounding accidental and programmed cell death is the precise objective that led the editors to compile this collection of reviews, authored by an international panel of experts whose interests in cell death bridge many disciplines. The editors hope that their contribution represents a beginning rather than an end to a field dealing with endings. There is much yet to do in advancing knowledge of the unique mechanisms of cell death and this volume should constitute a good resource for scientists interested in joining the field.

A major strength of this book is the evidence of strong editorial control over the content of each chapter: there does not seem to be much overlap. Each author, however, goes through the same argument when introducing his subject, as if trying to overcome the stigma of death. The book is heavily referenced, with some authors referring to over 300 papers. The publisher's use of author's name vs numbered reference is detrimental to the ease of reading, since some sentences include more citations than words.

These technical criticisms aside, this volume should be a useful reference source for biologists, medical scientists and practicing pathologists, all of whom deal with cell death in its myriad forms.

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THE APPLICATION OF ION-SELECTIVE MICROELECTRODES. *Research Monographs in Cell and Tissue Physiology, Volume 4.*

Edited by Thomas Zeuthen; Series Editors: J. T. Dingle and J. L. Gordon. Elsevier/North-Holland Biomedical Press, Amsterdam and New York. \$99.50. xiii + 284 p.; ill.; subject index. 1981.

Ion transport across cell membranes and the subsequent changes in intracellular and extracellular ion pools has been generally recognized as significantly contributing to the regulation and physiology of the cells and tissues comprising many different organs. During the past decade, ion-selective microelectrodes (ISM) small enough to allow intracellular and interstitial measurements of ionic activities in a wide range of cells and tissues have been developed for most of the physiologically active ions. The use of ISMs to directly measure changes in specific ion pools is now beginning to provide some illumination to what was previously a "black box" process.

In this volume, Zeuthen has compiled a series of 15 monographs examining the problems and advances associated with the application of this new technology to a wide range of tissues and organ systems. The papers are grouped into five parts: Epithelial Systems (tight, leaky, renal, & secretory); Vascular Tissue (endothelial & cerebral); Organs (retina, inner ear, liver, & skeletal muscle); Central Nervous System; and Tissue Culture. In contrast to other recent reviews of ISM research, which concentrated on the technological aspects of the electrodes, this series concentrates on the application of ISMs to investigating a range of physiological questions. The ISMs currently available for measuring the activities of the major physiological ions are all adequately discussed here, although many of the reports are limited to studies of specific ions. While individual papers may be restricted to specific ions, the organization of these monographs and the discussions they present readily allow the applications to be extended to ISMs for other ions. Because of the wide range of potential applications of ISMs this volume will be a very valuable reference for anyone interested in ionic regulation of cell, tissue, and organ function, as well as for those interested in the systems examined in the individual monographs.

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NUCLEAR PARTICLES, PART A and PART B. *The Cell Nucleus, Volume 8 and Volume 9.*

Edited by Harris Busch. Academic Press, New York. (A) \$47.50. xxi + 401 p.; ill.; index. 1981. (B) \$49.50. xxi + 372 p.; ill.; index. 1981.

In the study of nuclear particles, a lot of questions remain to be resolved. Thus, in the majority of the papers here, exciting hypotheses are proposed, but the possibility of testing them does not yet exist in many cases. These two volumes are the logical continuation of the preceding ones dealing with chromatin and are an important contribution to the literature on the structure and biochemistry of the nucleus. Most of the papers are review articles and are related to various aspects of RNA transcription, processing, and transport, analyzed by means of biochemical and ultrastructural methods.

Part A begins with well-written and well-illustrated papers devoted to some nuclear particles studied *in situ*, after isolation or by examination of spread material. The next three chapters deal with low-molecular-weight nuclear RNP and the two later concern on the one hand the relations between nRNP complexes and matrix component and on the other hand the antibodies to RNA-containing structures (ribosomes, nucleoli, nRNP complexes).

Part B deals with the structural organization and function of nuclear RNP particles containing pre-mRNA. The variations obtained in the data and models of the topological arrangement of RNA and proteins in hnRNP particles are presented and discussed. Data obtained by gel electrophoresis analyses of nuclear matrix, hnRNP particles, nuclear membrane, nucleolar matrix and chromatin are also presented. The application of antibodies to hnRNP in studies of nuclear structure and function is also the subject of one chapter. Enzyme activities expected in hnRNP and involved at post-transcriptional and post-translational levels are also exhaustively reviewed and one chapter is devoted to studies that have utilized endogenous and exogenous nucleases as probes of hnRNP structures. After analyzing post-transcriptional events involved in mRNA formation, attention is focused on transport of RNP from nucleus to cytoplasm and on the interplay with the nuclear envelope. Nuclear bodies that have already been reviewed in Volume I of this treatise are also the subject of one chapter here; those of the target cells of sex steroid hormones are given special consideration and their possible structural relationships with the nuclear matrix are suggested. Nuclear glycoproteins and glycosaminoglycans and their biological implications are discussed in the last chapter.

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