Animal Cell Electroporation and Electrofusion Protocols. Methods in Molecular Biology, Vol. 48; Edited by Jac A. Nickoloff, Humana Press, Totowa, NJ, 1995; xx + 369 pp. $ 64.50 (pb). ISBN 0-896-03304-X.

Efficient delivery of molecules into living cells has become an indispensable tool in modern biology allowing the researchers to approach most fundamental questions about the nature of complex biochemical and biophysical processes. Among number of different approaches, based mostly on chemical treatment, electroporation has increasingly evolved in a tecnique of choice with unusually broad applicability: a large spectrum of macromolecules including DNA, RNA and proteins, and many small molecules such as oligonucleotides, peptides, analytic dyes and drugs have been successfully transported into such diverse targets as animal cells, plant protoplasts, yeast, *Dictyostelium* and bacteria. The physical nature of electroporation, utilizing the formation of small, self-healing pores in cell membranes exposed to defined electric field, enabled efficient permeabilization and transport of exogenous molecules even in those systems that had been resistant to all kinds of available chemical-mediated transfer. Many other advantages such as lower mutation rate of electrotransfected DNA, more natural number of gene copies stably integrated into host genome after electroporation, elimination of some drawbacks of utilizing retroviruses in gene therapy, possibility to treat and subsequently analyze large numbers (millions) of cells under identical conditions, and no adverse effect of potentialy toxic chemicals, favorize electrotransfer in many experimental settings over chemical methods or even microinjection, another precise physical method which can, however, deal only with limited number of cells in a reasonable time. Therefore, technical manual summarizing most advanced electrotransfer or electrofusion protocols is urgently needed and awaited by researchers from different fields in biology, biotechnology and medicine.

Animal Cell Electroporation and Electrofusion Protocols aims to meet all these requirements, and fill the apparent gap in many scientific libraries. The book, containing almost 400 pages, is well and logically structured, starting with the description of the essential theory outlining some elementary concepts and mechanisms of electroporation in Part I. This introductory section closes up with the comprehensive review of the commercially available instrumentation. The following 26 chapters are subdivided into two topically distinct blocks: *Electroporation protocols* (Part II) and *Electrofusion protocols* (Part III).

Electroporation protocols presents detailed descriptions of electroporation of plasmid and sperm DNA and various proteins such as restriction nucleases, antibodies or antigenic peptides into a variety of commonly used as well as more specialized cell types (e.g. fibroblasts, blood cells, hepatocytes, pituitary cells, oocytes and embryonic stem cells) of mammalian, insect and fish origin. In addition to detailed, well-tested and optimized electroporation protocols, the authors also present useful discussions highlighting the advantages and limitations concerning the efficiency and reliability of different methods of macromolecule transfer in every described experimental system. One example could be the comparison of antibody delivery by electroporation into cells treated in suspension versus those growing adhered on electrically conductive surface. Practically useful are sections describing the methods of quantitation of electroporation efficiency and the influence of buffer composition and specific DNA sequences on gene transfer. The two final chapters are more clinically oriented, describing conditions for electroporation of cardiac cells and summarizing the potential use of electroporation in gene therapy.

The *Electrofusion protocols* section describes in five chapters the current experience in cell fusion technologies, comparing the efficiency of electrofusion in various experimental systems with those of fusogenic chemicals or viruses. The applications focus mainly on immunology and developmental biology, describing the use of electrofusion in generating hybridoma lines producing monoclonal antibodies, electrofusion of oocytes and embryonic cells or nuclear transfer in mammalian embryos. Also, this section gives the fundamental background of the basic physics underlying the effect of electrofusion and well-documented methods how to monitor the efficiency of cell fusion by spectrofluorimetric assays and flow cytometry.

The protocols are generally well instructive, straightforward to follow and, importantly, supplied with useful troubleshooting remarks. The manual is easy to use and further information, e.g. electroporation settings for very specialised cell types, not mentioned in this issue, could be potentially traced up using the references attached topically to each chapter.

Overall, the editor managed to select distinguished scientists, apparently very experienced in using the physical transfer of macromolecules in a variety of biological models and assemble their contributions in an instructive and long sought manual for everybody who aims to apply electrotransfer or electrofusion techniques in studying various aspects of cell biology. The book presents insights into the substantial progress made in our possibilities to deliver biologically active molecules into living animal cells and points out the limitations and opened questions that might challenge the readers to find even more effective approaches.

Jiri Lukas

Comparative Animal Biochemistry; K. Urich (with illustrations by C. Urich), translated from the German by P.J. King, Springer-Verlag, Berlin, 1994; IX + 782 pp. DM 178.00 (hc). ISBN 3-540-57420-4.

This book, as the title suggests, covers comparative data from protozoans to higher animals but excludes consideration of bacteria, algae, lower fungi and higher plants and is aimed at zoologists as well as biochemists. The stated objective of the author is to provide the first textbook to draw together the results of countless reviews and other articles on comparative biochemistry. His thesis is that since the comparative approach has been so productive at higher levels of complexity in the fields of morphology and physiology, it can also be applied with great effect at the molecular level.

It is the English translation of the German edition which appeared in 1990 and surveyed the literature to the middle of 1988: the English version (which is fluent and a credit to the translator) includes a substantial update encompassing the literature to the end of 1991; of the 4607 references given, 45% were published later than July 1988 and replace some 2100 references contained in the earlier edition.

Each chapter is divided and sub-divided into clear sections with a hierarchical numbering system reminiscent of an academic thesis; in addition, key words in the text are picked out in bold (except in chapter 2 for some reason) so that one can rapidly appreciate the scope of the material presented. Devoid of colour, the 87 tables, 248 figures and extensive literature citation are more characteristic of a reference work than of a modern textbook.

The subject matter can be considered to be arranged into two parts. The first 11 chapters cover the structure and function of macromolecules. The first two chapters on nucleic acids and proteins are brought together in a discussion of molecular evolution in chapter 3. There follow chapters on the comparative properties of extracellular proteins (including yolk, anti-freeze and metal-binding proteins); immunoproteins; respiratory pigments; regulatory messenger proteins; toxic (anti-regulatory) proteins; contractile proteins; and structural proteins.

The second half of the work follows the pattern of classical chemically-based biochemical texts albeit ranged more widely over the animal kingdom than is usual. There are chapters on nitrogen metabolism and elimination; carbohydrate structure and metabolism; glycolysis; lipid metabolism; sterols and steroids; esterases, ATPases and ion channels; biological oxidation; and secondary metabolites.

This is an admirable effort to redress the balance from the usual way of presenting biochemistry; that is, as a general scheme of reactions really only valid for mammals but assumed to apply universally throughout the biosphere. One cannot but be impressed by the breadth of knowledge and understanding which the author has brought to bear on his subject, to say nothing of the work required to cover the literature over such a diversity of fields. Inevitably there has to be some re-presentation of basic biochemistry to provide a framework within

which to examine diversity and adaptation. However in many cases the treatment is more extensive than appears necessary and, while this may be aimed at the zoologist reader, it is presented much less clearly and pictorially than one can find in many excellent modern texts. Moreover, while the author goes on to present up-to-date views on biochemical mechanisms in a balanced way (at least in those cases where this reviewer is competent to judge), space limitations dictate that the treatment is mostly somewhat terse and the reader would need more than a basic knowledge of biochemistry to appreciate it fully.

While, at first, molecular diversity was seen as a methodological impediment to biochemical studies, the increasing appreciation of the existence of homologous domains and of proteins belonging to superfamilies makes it easier to comprehend variations on a theme. The author's belief is that the comparative approach at the molecular level will increasingly provide a valuable tool for examining both biological adaptation to environmental conditions as well as the basis of phylogenic diversification. In this book he has provided a valuable reference text to the basic literature across the spectrum of research on the comparative biochemistry of animals. While it may not provide the complete answer to anyone searching to apply the principle promulgated by the great Danish physiologist August Krogh that for solving every biological problem there exists an ideal animal model, there is much fascinating information packed into the pages of this book to inform and stimulate the biochemical browser.

J. Mowbray

Cell Biology: A Laboratory Handbook, Volumes 1, 2, 3; Edited by Julio E. Celis, Academic Press; San Diego, New York, Boston, London, Sydney, Tokyo, Toronto, 1994; 1714 pp. $ 120.00 (pb). ISBN 0-12-164714-5 (set).

To try or not to try? This must have been a haunting question for the editor before committing himself to work on a 'recipe-book' of modern biology. Cell biology is no doubt one of the most dynamic areas of contemporary biomedical sciences. The recent stunning discoveries made by the quickly expanding crowd of cell biologists have been made possible, at least to some extent, by a plethora of newly modified or entirely novel techniques and approaches. Unlike their luckier colleagues working in molecular biology, whose methods 'bible' by Maniatis and Sambrook was first published more than a decade ago and later updated, the cell biologists have been waiting for their laboratory manual until now. The *Cell Biology: A Laboratory Handbook* represents a highly desirable, brave attempt to fill this major gap in the scientific literature. The enormous diversity of the biological methods covered by this comprehensive manual made its preparation an extremely demanding task. Fortunately for the reader, the book was edited by a highly respected cell biologist and at the same time a very experienced organizer of numerous international laboratory courses, who was supported by a team of dedicated coworkers.

The three volumes of the manual are organised in 15 parts subdivided into sections, which together contain almost 200 chapters contributed by leading experts in their fields, covering a broad range of model organisms and cell types, and including protocols for techniques from diverse branches of cell biology.

Volume 1 begins with tissue culture and associated techniques, starting with general procedures related to tissue culture media, testing cell cultures for various contaminants, and detailed practical advice on cultures of specific cell types derived from various tissues. The first volume then continues with timely descriptions on cell separation techniques, model systems applicable in analysis of cell differentiation, cellular immortalization, progression through the cell cycle, cellular senescence and cell death. While the book primarily focuses on animal cells, it also contains useful chapters devoted to cultures of cells from organisms as diverse as Drosophila, nematodes, protozoa, fungi, plants, and viruses, i.e. a selection of organisms which are proving extremely useful in contemporary research and/or biotechnology industry. The last part of Volume one describes biochemical methods of isolation and purification of cellular organelles, nuclear structures, and contains optimized protocols for isolation of DNA and total RNA.

Volume 2 provides solid, informative descriptions of presently used microscopy techniques, including light microscopy, fluorescence, video-enhanced and confocal microscopy, and a number of electron microscopy procedures. This book also deals with several micro-dissection methods, and basic techniques of histochemical staining, followed by several chapters describing production, purification, labeling, characterization, and application of antibodies. The second Volume ends by a series of protocols used in cytogenetics and topological analysis of gene expression by various modifications of in situ hybridization.

The third and last volume integrates modern methods of gene and protein transfer into living cells, covering approaches such as microinjection, electroporation, lipofection, etc. A separate section is devoted to genetic manipulation at the level of the whole organisms, including production of transgenic animals, embryo cloning, and gene targeting. The widely used Baculovirus and Vaccinia virus expression systems are also included, followed by detailed presentation of a wide range of protein analysis techniques. The latter include protocols on protein determination, preparation of tagged proteins, gel electrophoresis and staining, various overlay techniques, protein microsequencing, and amino acid analysis.

A large number of illustrative diagrams, photographs, colour plates, and an index with surprisingly few omissions (considering the vast range of topics covered by the manual) contribute to the overall impressive design and general usefulness of this book. Another helpful feature of the manual are the three appendices, devoted to tissue culture media, most frequently used cell lines, and safety recommendations for working with radioactivity, respectively. Perhaps inevitably, due to time required to put together a book covering such enormous area of biology, and due to fast progress in the field, some of the chapters would benefit from updating or extending to the most recent modifications of several techniques, a task for the future edition already under consideration by both the editor and the publisher. The spectrum of methods, their clear and uniform style, sense for important practical detail, and thoughtful editing make this manual a unique laboratory handbook which should be of great help for the large and still rapidly growing flock of scientists using techniques of cell and molecular biology.

In summary, *'Cell Biology: A Laboratory Handbook'* is the type of essential manual that is easily accessible to potential users among students, as well as scientists from both research laboratories and biotechnology companies. This book, if updated and expanded in the future to reflect the trends in the field, may well become the practical 'bible' of modern cell biology.

Jiri Bartek

Biochemistry of Cell Membranes; Edited by S. Papa and J.M. Tager, Birkhäuser Verlag, Basel, Boston, Berlin, 1995; x + 365 pp. $ 149.00 (hb). ISBN 3-7643-5056-3.

This collection of 24 short reviews does not, as its rather heterogeneous content might suggest, derive from a symposium, but is part of a series entitled 'Molecular and Cell Biology Updates', and contains invited contributions on selected topics, deemed by the editors and their advisory panel to represent areas in which recent progress has been particularly rapid. The coverage indicates a fairly relaxed interpretation of the title, as some of the topics have only a tenuous connection with membranes – in the last resort, any and every biochemical topic is membrane-related in some way – but this imparts a welcome breadth to the book. The collection is definitely aimed at a post-doctoral