

Signal Transduction Protocols. Methods in Molecular Biology, vol. 41; Edited by D.A. Kendall and S.J. Hill, The Humana Press; Totowa, 1995. xi+305 pp. \$64.50 (pb). ISBN 0-89603-298-1

This book represents the latest addition in the 'Methods in Molecular Biology' series from Humana Press. Currently, receptor mediated cell signaling process belong to the most highly studied phenomena in the biological sciences. During the last years the complexity of signaling pathways has become obvious. The number of receptors, protein kinases/phosphatases and transcription factors that have already identified is staggering. Various methods and assays have been developed in this field and it is quite impossible to cover all techniques used in signal transduction research in a single handbook. David Kendall and Stephen Hill focused their attention to receptors of the G-protein-linked superfamily. The 24 short chapters are self-contained units and fall into major topics, techniques associated with cAMP/cGMP and phosphoinositide/Ca²⁺ signaling pathways. Several chapters are presented covering the mass measurements of key molecules like cAMP, cGMP, phosphoinositide intermediates, diacylglycerol and the important biological mediator nitric oxide. Two chapters describe current methods for the measurement of Ca²⁺ fluxes in permeabilized cells and the quantification of intercellular free calcium ion concentrations. The separation of inositol phosphate isomers by HPLC and single cell calcium imaging techniques are also addressed.

Another group of chapters deals with the analysis, purification and assay of enzymes involved in the formation and regulation of second messengers. This group includes chapters on phospholipases A₂, C and D, adenylyl cyclase and cyclic nucleotide phosphodiesterase isoenzymes. Moreover, a few chapters on the cAMP and cGMP-dependent protein kinases, Ca²⁺-calmodulin-dependent protein kinase and

protein kinase C, enzymes that are activated by second messengers, are included.

The editors decided to add a few supplementary topics that are quite different from the majority of techniques described in this book. Nevertheless, the chapters on radioligand binding, autoradiography and in situ hybridization may be very useful for laboratories dealing with these aspects.

The chapters are in general composed of a brief introduction followed by a survey of all materials required for the experiments and very detailed experimental protocols outlined in a 'Methods' section. Most chapters also contain a 'Notes' section and comprehensive references for further information. However, it should be noted that the latest reference given in most chapters is from 1993. The 'Notes' section seems to be very important and essential for the quality and usefulness of a laboratory handbook. It should contain hints on troubleshooting and reflections on the problems associated with the techniques and the interpretation of results. In general all chapters are of equal very good quality in this respect and fulfill the aims of a truly laboratory handbook. The editors and authors have succeeded in giving very useful descriptions of laboratory protocols for the study of G-protein linked receptors. In summary, this well-organized volume is clearly among the most viable protocol books published in this field and will turn out to be a helpful tool for many laboratories.

Thomas Bittorf

Methods in Molecular Biology, vol. 52, Capillary Electrophoresis Guidebook, Principles, Operation and Applications; Edited by K.D. Altria. The Humana Press; Totowa, 1995. xi+349 pp. \$74.50 (hc). ISBN 0-89603-315-5.

Volume 52 of the series 'Methods in Molecular Biology' is indeed a guidebook for capillary electrophoresis containing 20 chapters organized in two parts. Part I is a 'General Guidelines to the Operations of Capillary Electrophoresis Methods and Applications' covering 11 chapters, while Part II, which assembles the remaining 9 chapters, is entitled 'Applications of Capillary Electrophoresis and Specific Technologies.' The first part, which consists of 11 short chapters totaling 122 pages, is written exclusively by the editor K.D. Altria. The other nine chapters making up the second part are written by different experts in the field including the editor.

Chapter 1 entitled 'Fundamentals of Capillary Electrophoresis Theory' is rather an introductory description of CE and has a very limited amount of the theory. In major part, this chapter emphasizes sample introduction rather than the fundamentals of EC. This chapter lists only 13 references. Chapter 2, which is about 'Standard Commercial Instrument Description,' gives no specific examples of commercial instruments, and could have been easily deleted from the book. Chapter 3 is on 'Typical Operating Parameters' describing the various instrument settings (e.g. capillary temperature, capillary rinsing, detector setting, time and mode of injection, etc.). Under capillary rinsing, the author advocates the general use of NaOH without pointing out the fact that not all capillaries can be rinsed with NaOH. Chapters 2 and 3 each contain only 2 references. 'Method Development/Optimization' is the topic of Chapter 4. This chapter gives general guidelines that can be followed in the various modes of CE, and lists 30 recent references. Chapter 5 is on 'Quantitation Procedures' providing a nice overview of the use of internal standards. It is a much more detailed chapter than the preceding chapters in the text. The introduction gives good correlation between HPLC and CE. The use of mathematical equations was a very helpful tool for understanding. This chapter is based on 15 recent references. To further provide the reader with guidelines about quantitation, chapter 6 (21 references) is devoted to 'Optimization of Precision in Quantitative Analysis.' However, this chapter failed to give methods for instruments that are not automated (e.g. home-built instruments). Along the same lines, chapter 7 (22 references) is on 'Optimization of Sensitivity.' In general, this chapter provides an informative and easy to follow discussion on sensitivity. But, the chapter does not (i) discuss sample stacking which would be a vital part of this section and (ii) give specific examples. A well shaped chapter in this book is chapter 8, and it is on 'Method

Validation' listing 30 recent references. As a part of sample handling in CE, chapter 9 is a short discussion of fraction collection after CE separation for further studies covering 8 references. Chapter 10 covers 'Troubleshooting,' and attempts to provide the CE users with solutions to common problems using flow charts for quick problem solving tactics. Part I concludes with a 3 page chapter on 'Quick Guide to Running a Successful Separation.' This quick chapter may be useful for a new CE practitioner.

The first chapter in Part II (chapter 12) is on 'Micellar Electrokinetic Chromatography' (MEKC) by K. Otsuka and S. Terabe. Written by the inventor of MEKC, this chapter is a comprehensive (71 references) and easy to follow discussion of the MEKC technique. This was enhanced by the use of meaningful figures and graphs. Chapter 13, which lists 23 references, is a description of 'Capillary Gel Electrophoresis' by A. Guttman. Although it is concisely written, the chapter does not go over the principles of size-based separation. Chapter 14 is devoted to 'Chiral Separation by Capillary Electrophoresis' by M.M. Rogan and K.D. Altria. This chapter discusses the various approaches for enantiomeric separations by CE, covers 80 references and provides guidelines for methods development. However, the four charts illustrating ways for methods development are copies of the same charts used in chapter 4. This repetition could have been avoided by simply referring to the charts in chapter 4. Chapter 15 on 'Electrochromatography' is written by I.H. Grant. This chapter provides some theoretical considerations as well as the practical aspects of the technique. Since capillary electrochromatography is still in its infancy, there are only limited applications for the technique. Chapter 16 (31 references) is on 'Application and Limits of Sample Stacking in Capillary Electrophoresis,' and is written by D.S. Burgi and R.-L. Chien. This chapter discusses two main approaches to perform on-column concentration to enhance CE detectability, namely transient isotachopheresis and field-amplified sample stacking. The illustrations provided in the chapter are very useful in helping the reader understand the basic principles of both approaches. The 'Analysis of Bases, Nucleosides and Oligonucleotides by Capillary Electrophoresis' is the topic of Chapter 17 by H.E. Schwartz and K.J. Ulfelder. This chapter listing 83 references covers a little bit of everything concerning the application of CE to nucleic acids including the various modes of separation and detection approaches as well as the purity control of synthetic oligonucleotides and DNA sequencing.

The 'Application of Capillary Electrophoresis to Pharmaceutical Analysis,' is reviewed in chapter 18 by K.D. Altria. This is a well written chapter listing 60 references, and describing systems for the separation of a variety of pharmaceutical compounds. In addition, chapter 18 shows how impurities in drugs can be determined readily by CE at the 0.05 to 0.1% levels, and emphasizes chiral separation of enantiomeric drugs. Chapter 19 (38 references) by Herold et al. reviews the 'Separation of Peptides and Protein Digests by Capillary Electrophoresis.' This chapter covers in detail the effects of buffer and sample handling on peptide mapping by CE, and describes the use of photodiode array detector in peak identification. In addition, chapter 19 reviews approaches for micropreparative peptide separation and identification by MALDI-TOF-MS (matrix assisted laser desorption

ionization-time of flight-mass spectrometry), and discusses important applications including purity confirmation and characterization of recombinant proteins. Finally, and for completeness, K.D. Altria reviews in chapter 20 'Additional Application Areas of Capillary Electrophoresis' including the analysis of small ions, agrochemicals, carbohydrates, vitamins, biomedical applications, amino acids, particulates, bacteria and dyes. This chapter review 139 recent references.

In summary, the book is a very useful guidebook for CE practitioners as well as a reference book for researchers and graduate students. I highly recommend this book for libraries and individuals active in the field of CE.

Ziad El Rassi

Basic DNA and RNA Protocols. Methods in Molecular Biology, vol. 58; Edited by A.J. Harwood. The Humana Press; Totowa, 1996. xiii+514 pp. \$ 99.50 (pb). ISBN 0-896-03331-X

The profound expansion in the sequence information of genes and their function in, e.g. human, makes detailed DNA and RNA analysis very important for many scientific and routine investigations. The context of this book (514 pages) includes protocols that cover some frequently used techniques for DNA, RNA analysis, gene cloning and subcloning, PCR techniques, DNA sequencing, site-directed mutagenesis and protein synthesis. Each of the 58 chapters/protocols begins with a brief introduction followed by materials, methods and notes sections. As a technical laboratory manual this handbook serves its purpose well by being easily readable and in contrast to most other handbooks, manuals and methodological manuscripts this handbook includes note sections for each chapter. These sections give the reader a series of valuable hints for establishing successful experiments or even pinpointing handling errors. However, since no discussion section is present, it would have been of convenience for at least some readers, if a few of the introductions were extended beyond their few lines to include a description of the potentials of the described method. In other words, although it is a technical handbook, brief orientations of questions/problems that have been solved using the particular technique may improve the practical applications of the book.

While the PCR technique in particular has revolutionized the possibility for gene specific mutation analysis, a broad set of RNA and DNA analyses are used whenever new mutations are described as plausible disease causing determinants. However, it seems that the book suffers from a lack of powerful techniques, e.g. single strand conformation polymorphism analysis and denaturing gel analysis, for finding and analysis of DNA for sequence variations. Furthermore, since PCR-based assays for detection of known point mutations are becoming central for many scientific and clinical projects many readers might have benefitted from a chapter describing the principles for establishing such assays.

In conclusion, this handbook adds to the number of comprehensive books dealing with methods used in molecular biology. However, since some central methods for RNA and DNA analysis have been left out of the book, it probably will not be selected as *the* laboratory handbook.

Niels Rüdiger

The Natural Selection of the Chemical Elements; Edited by R.J.P. Williams and J.J.R. Frausto da Silva. Oxford University Press; Oxford, 1996 xxvi+646 pp. £75.00 (hc). ISBN 0-19 855843-0

Chapter 1. The development of man's ideas concerning nature – gives an impression of the classical western (i.e. Greek) attempt to understand the environment by relating all natural manifestations to a few (i.e. four) basic elements: earth, water, and fire. The authors try to explore the possibilities of this four-element universe by substituting with: solid, liquid, gas, and energy; and they use this idea as an organizing principle for the following treatment. This is a brilliant idea that gives the reader an opportunity to rethink the path from our senses to our statements.

Less interesting is an account of ideas developed in China that contribute little if anything to the understanding of modern chemistry. It would have been more interesting to learn about the theoretical problems for the Greek philosophers induced by a scientifically inadequate language, or to learn about experiences from the applied chemistry harvested in the rich Arab culture.

The rest of the chapter deals with the development of modern views, including hard facts such as atomic structure in relation to the periodical system and an introduction to kinetic gas theory and different forms of energy. This account posed no problems for this reviewer (with a background in chemistry), but he reached his limits to understanding when he was confronted with the following sentence: "It is generally accepted that gravitational and electrical fields have been generated in the universe by the big bang expansion of rest mass into simultaneously created space, and their distribution has been affected by its subsequent non-homogeneous development."

Chapter 2. Order in chemical systems: elements and their combinations – contains a general description of intramolecular binding of atoms to molecules and intermolecular binding of the latter to condensed phases. The authors have chosen a non-mathematical ap-

proach, and for this reason (?) they have ignored molecular orbital theory, which even in its simplest version (LCAO) could have given a more clear background of molecular morphology. The present account based on valence shell electron pair repulsion theory gives rise to several blunders such as a dioxygen molecule with a double bond instead of being a biradical (of extreme importance for survival of life), and a lack of clear distinction between the little molecule CO₂ and the infinite molecule SiO₂ – and why it has to be so (also of some importance to the development of life!). There are other peculiarities such as two tables with data about the size of cations, but none for anions, and a sizeable gap between the level of information in the main text and in a figure such as Fig. 2.26. But, given the space, the description is from workable to useful – the latter applied for the condensed phases, and the chapter concludes with an excellent summary.

Chapter 3. The balance between order and disorder – re-introduces the idea of balanced systems between order and disorder, that is between solids, liquids, and gases and connects this with energy. This particular view on order and disorder is followed consistently, but readers, tending to think in structural terms, should remember that order in this book means chemical bonds. Thermodynamic criteria for equilibria and non-equilibria are well treated, but the topic remains difficult. It adds to the difficulties that the conventions used differ slightly from what is common for this reviewer and for authors of newer textbooks for undergraduates.

Chapter 4. Phase equilibria – illustrates such balances for bulk phases for people, highly experienced in analyzing multi-component phase diagrams for rocks and alloys. Maybe they will benefit from the fact that the authors have given up the non-mathematical approach