

known function of these enzymes in the detoxification processes. Despite the multiplicity of the conjugation–deconjugation enzymes, the interdisciplinarity of the subject, and the fast evolution of concepts in recent years, mainly from the molecular biology approaches, the Editor managed to provide a wholesome review and to avoid overlappings. The chapters, in a total of 17, are contributed by a remarkable board of selected authors who have themselves made important contributions in each specific area.

The Volume is organised in 3 Sections, respectively on the Genetic Polymorphism and Regulation of Expression of Phase II Enzymes, on the Conjugation–Deconjugation Reactions Regulation in Intact Cells and Tissues and on the Pharmacology and Toxicology of Drug Conjugates.

Section I concerns the molecular biology of different phase II enzymes. Chapters on transferases include UDPG-T multigene family by D.J. Clarke and B. Burch, who demonstrate the importance of the major detoxification pathway catalysed by these enzymes by presenting a condensed review on their genetic identity and physiological role versus tissue-distribution. Ontogenic dependent expression and xenobiotic induction of this enzyme multigene family as well as the known genetic deficiencies and related pathologies are shortly and concisely reviewed. Most recent data on the diversity, properties and regulation of Sulfotransferase Enzymes are reviewed by R. Weinshilboum and D. Otterness. The importance of sulfotransferases for the determination of xenobiotics, hormones and neurotransmitters net concentrations in the cells is discussed from convergent perspectives based on recent research in pharmacology, endocrinology and molecular biology. The regulation of Expression of Rat Liver Glutathione S-transferase is presented in a chapter by T.H. Rushmore, C.B. Pickett and A.Y.H. Lu, as an exhaustive and elegant review on the elucidation of the structure including very recent data on the crystal structure of the GST, and on the regulation of this gene family, namely on the transcription regulation of Pi and alpha subunit genes in responses to planar aromatic compounds and phenolic antioxidants. Human N-Acetyltransferases constitute the next chapter by K.P. Vatsis and W.W. Weber, who discuss the role of NAT1 and NAT2 genotypes in acetylation polymorphism and individual susceptibility to chemically induced disorders, a subject of utmost actuality interesting oncologists, neurologists and molecular biologists.

Deconjugation enzymes and catalysed reactions are reviewed in the following chapters which start with an interesting work on the genetic regulation and subcellular localisation of Glucuronidases by R.T. Swank, E.K. Novak and L. Zhen. This review is focused on recent work on the topogenesis mechanisms determining the native interactions of these enzymes with the endoplasmic reticulum membranes, as well as on the glucuronidase gene expression and hormone regulation. Deacylation is an important biological reaction affecting carcinogenicity and chemotherapeutic toxicity by amides. Microsomal Amidases and Carboxylesterases are reviewed by C.Y. Wang in a condensed chapter describing the recent advances in this complex area. A critical review on methyl transfer, one of the most common phase II conjugation reactions, is presented in a chapter on O-, N- and S-Methyltransferases by C.R. Creveling and D.R. Thakken, who demonstrate the pivotal role played by these enzymes in numerous physiological and metabolic functions in man.

Section II deals with factors that determine the metabolic efficiency of conjugation–deconjugation reactions in the intact cells and tissues, which therefore are essential for the physiological and pharmacological actions of drugs and endobiotic substrates. A chapter on Cofactor Supply as a Rate-Limiting Determinant of Hepatic Conjugation Reactions is written by L.A. Reinke, F.C. Kauffman and R.G.

Thurman. This is a particularly well referenced work which includes a critical description of the models used to study regulation of conjugation together with brief monographs on Glucuronidation, Sulphate and Glutathione conjugation.

The following chapters concern metabolic and pharmacokinetic factors in the regulation of the steady-state levels of conjugate metabolites in the living cell. The chapter on futile cycling of conjugates written by the editor is a review of the recent studies that illustrate the involvement of specific transferases and hydrolases, localised in the same or adjacent sub cellular compartment, in the modulation of net drug metabolite concentration in the hepatic cell. The last chapter in this Section by K.S. Pang and M. Chiba deals with the mathematical description of pharmacokinetics of drug conjugates. It presents mathematical models and a quantitative treatment of steady state conjugation and deconjugation. The aspects considered are not only the membrane barriers, zonation of enzymatic activities, and protein binding but also the futile cycling, flow and cosubstrate availability, treated in previous chapters.

The third and last Section of this volume integrates five chapters on the Pharmacology and Toxicology of Drug Conjugates. It starts with a chapter on Biologically Active Conjugates of Drug and Toxic Chemicals by F.C. Kauffman, J. Zaleski, R.G. Thurman and G.Y. Kwei describing a number of illustrative examples of phase II conjugation reactions known to play relevant roles in both the inactivation and the activation of many xenobiotics. This critical review further discusses the questions of drug interactions and potentiation of pharmacological activity of drug conjugates. The following two chapters on the Acyl Glucuronides as Chemically Reactive Intermediates by C. Fenselau, and on the role of UDG transferases in Chemical Carcinogenesis, by K.W. Bock and W. Lilienblum, are excellent complements to the previous chapter on the molecular biology of UDPG super family. They constitute exhaustive reviews on acyl glucuronides cytotoxicity and carcinogenicity, which stress the role of individual UGT isoenzymes in the transport and targeting of carcinogens. The next chapter by J.A. Miller and Y.J. Surth, on the Sulfonations in Chemical Carcinogenesis gives an extensive description of the metabolic activation of aromatic amines and several other classes of carcinogens by sulphuric acid ester metabolite generation. A chapter on Glutathione Conjugate-mediated toxicities by T.J. Monks and S.S. Lau describes the most recent advances on the mechanisms through which xenobiotic GSH conjugation can result in toxicity, rather than detoxification. Paradigmatic examples of GSH conjugation generating biologically reactive intermediates illustrate this interesting review.

This book ends with a final chapter on the Challenges and Directions for a future research by F.C. Kauffman who further contextualizes the different topics, and provides suggestions for future developments in this important area.

In conclusion this book constitutes an excellent compendium integrating the enormous progress made over the last few years in the understanding of conjugation–deconjugation enzymes and reactions, and the most recent concepts on the fundamental importance of these systems in pharmacology, toxicology, and control of homeostasis. It will provide a fundamental work of reference, which was missing so far, for all those who wish to get a complete view on the specialised yet interdisciplinary field of conjugation–deconjugation and a good perspective on related upcoming new areas of drug discovery and development. The clarity of topics presentation makes this volume accessible to researchers in neighbouring areas as well as to students, though it should become a classical fundamental handbook.

Maria Celeste Lechner

The Beginnings of Cancer in the Cell. An Interdisciplinary Approach; Edited by J. Ladik and W. Förner, Springer-Verlag; Berlin, Heidelberg, New York, 1994; vii + 194 pages. DM 78.00. ISBN 3-540-57962-1.

The Beginnings of Cancer in the Cell, by Janos Ladik and Wolfgang Förner, is labelled an interdisciplinary approach to the problem, and the advertisement on the back of the book promises application of theoretical models using approved methods from quantum theory and solid state physics in conjunction with information on the disturbance of the cell's self-regulation through oncogene acti-

vation and antioncogenes. Quite a mouthful, but potentially very interesting.

However, already after the first two chapters it is clear that this book cannot help anyone in need of information on the mechanics of the creation of a cancer cell. Why is it that 'interdisciplinary approaches' so often end up being hopelessly amateurish, naive and outdated? These

two chapters deal with the questions of whether we carry the cause of cancer in our cells and with activation of cancer causing genes. However, several biological explanations are mystifying rather than illuminating, leaving the reader confused and bewildered, and the factual content is faulty: here, it is stated that regulatory sequences are also carried inside a gene and called introns, that the product of *v-src* is a phosphorylase, that growth factors are bound to the cell membrane and that oncogene activation by LTR's is an 'only artificial possibility'. The normal function of anti-oncogenes is described as inhibiting the overproduction of oncogene products, the viral version of the *v-H-ras* as having a single point mutation (it has two of importance, in addition to amino acid 12, also 59 is mutated), and how it is possible, in 1994, to write: 'Although the structure of the cellular proto-oncogene of *v-Ki-ras* is yet unknown, it is highly probable that also in *c-Ki-ras* the amino acid glycine should be encoded in this position' (referring to

position 12), is beyond me. The references to these first two chapters, in total 82 and 67, respectively, includes 4 and 1 from 1990 and later, and on page 33, the sentence: 'We only want to note here that, up to 1984, ...', reveals that indeed, this part of the manuscript was completed a decade ago.

Perhaps 'application of theoretical models using approved methods from quantum theory and solid state physics' does not need the same up-to-date information as does knowledge from the oncogene field, but linking it 'with information on the disturbance of the cell's self-regulation' most certainly does. I doubt that this book supplies the reader with useful ideas, based as they are on outdated information. Those with a genuine interest in understanding the beginnings of cancer in the cells will have to go elsewhere for information.

B. Willumsen

Lectin–Microorganism Interactions; Edited by R.J. Doyle and M. Slifkin, Marcel Dekker Inc.; New York, 1994; viii + 401 pages. \$ 165.00. ISBN 0-8247-9112-4.

In 1936, Sumner and Howell reported that concanavalin A, then the only well characterized lectin, agglutinates certain bacteria. This observation remained almost unnoticed until the early 1970's, when a steady flow of publications started to appear on the interaction of lectins, mostly from plants, with a variety of microorganisms, on their application to the study of microbial carbohydrate-containing polymers, and on their potential use as typing reagents for bacteria and viruses. At the same time, the important discovery was made that bacteria by themselves produce lectins, mostly in the form of surface appendages known as fimbriae or pili. These lectins and the key role they play in infectious disease, are discussed in great detail in another recently published book 'Bacterial Adhesion to Cells and Tissues' written by I. Ofek and Doyle (Chapman and Hall, London, 1994).

The publication of the first book devoted solely to lectin–microbial interactions, is most welcome. It has been edited by two veteran researchers in the area, each of whom also contributed one of the ten chapters of the book, a lengthy introduction (by Doyle) and a survey of the applications of lectins in clinical microbiology (by Slifkin). Seven of the other chapters deal with more specialized topics, such as the use of lectins in virology, and the interaction of lectins with medically important yeasts, with *Leishmania* and with trypanosomes. The last chapter is devoted to blood group-specific lectins and their applications. Although not directly related to the main subject of the book, it has been included because of the traditional association between blood bank laboratories and microbial diagnostic laboratories. Between them, the chapters contain a wealth of information documented from a total of over 1,600 references, many unavoidably repetitious. They provide access to techniques the principles of which are often well described in the text. However, very few of the references are to articles published after 1990.

The introductory chapter is particularly interesting, because of the brief survey it gives of lectins (although recent exciting developments on the role of lectins in the migration of leukocytes to sites of inflammation are not mentioned) and of their applications in microbiology. Another helpful feature of this chapter is the appendix, which lists some 350 lectins from diverse sources and their specificities, and provides an update of the list published earlier by Wu et al. (Adv. Exp. Med. Biol. 288, 819–847, 1988).

As made clear throughout the book, lectins are useful tools in microbiology because of their stability and ability to probe subtle

differences between carbohydrates in solution and as well as on cell surfaces, often by simple procedures (precipitation, agglutination or light microscopy). Many of them are commercially available, both in their native form and as different derivatives, e.g. for light and electron microscopy and in immobilized form for affinity chromatography. Indeed, lectins have been widely employed in the isolation and characterization of microbial glycoconjugates, and for detection and identification of microbial surface polymers. They can also serve as an aid for discriminating between closely related organisms and thus for diagnostic purposes.

The book might have benefited from more careful editing. This would have weeded out lapses of style, for example, 'lectins capable of agglutinating agglutinated erythrocytes' (p. 143), 'The use of HPA was used' (p. 149), and 'because of the ... lectin definition that limits their specificities to carbohydrates, lectins can now be used only for the detection and study of glycosylated blood group antigens'. (p. 327). Attention should have been paid to incorrect terminology, for instance, neuraminidase (p. 97) for sialidase, 'N-acetylglucose' (p. 113) for N-acetylglucosamine, 'mannosialogangliosides' (p. 310) for monosialogangliosides, 'tagerin' for 'taglin', the trypsin-activated lectin of *Giardia lamblia* (p. 310) and the inconsistent use of the configurational designation of the monosaccharides (D- and L-) as well as their abbreviated names (NeuAc, NeuNAc and Neu-5-Ac for N-acetylneuraminic acid). There are also errors of fact, e.g. *Erythrina corallodendron* lectin is not specific for N-acetylglucosamine (Table 1, p. 47) but for N-acetylgalactosamine, nor are the lectins of *Datura stramonium* (thorn apple or jimson weed) and of *Solanum tuberosum* (potato) specific for β -(1-4) oligomers of N-acetylgalactosamine (p. 147), but of N-acetylglucosamine.

Like in many books published these days, the index lacks important entries. Thus, there is no mention of organisms such as *Bacillus anthracis* or *Bordetella pertussis* discussed frequently in text, of bacterial fimbriae, and of peanut agglutinin or soybean agglutinin that appear often in the book.

This book will be of interest to lectinologists and microbiologists alike and is especially recommended to laboratories of clinical microbiology that wish to explore the possibilities of introducing lectins as diagnostic tools. Unfortunately, it is rather expensive.

Nathan Sharon

Modern Analytical Ultracentrifugation. Acquisition and Interpretation of Data for Biological and Synthetic Polymer Systems; Edited by T.D. Schuster and T.M. Laue, Birkhauser; Basel, Boston, Berlin, 1994. xii + 360 pages. \$ 94.50. ISBN 0-8176-3674-9.

Analytical ultracentrifugation is apparently undergoing a revival due to new equipment, computerisation and sophisticated software. In this book, no less than 42 authors have contributed to 16 chapters. The book is divided in 4 parts covering sedimentation equilibrium, sedimentation velocity, acquisition and data reduction and finally some specific examples.

Part I opens appropriately with a chapter by Hiroshi Fujita, modestly entitled: Notes on the derivation of sedimentation equilibrium equations. The intention is clearly to help understanding the difficult parts of sedimentation equilibrium theory, however the treatment very soon becomes rather sophisticated and sets the style for many of the following chapters. Another chapter gives detailed hints on the analysis