Current topics in biochemistry

Annual Review of Biochemistry 1989. Vol. 58. C. C. Richardson, J. B. Abelson, P. D. Boyer and A. Meister eds. Annual Reviews Inc., Palo Altfo, USA. 1167 pp.

This volume of *Annual Review of Biochemistry* includes 34 chapters in its traditional format and style. The autobiographical first article 'Never a dull enzyme' by Arthur Kornberg is an account of four decades of research, inspirational to all biologists. It gives a vivid picture of a great scientist's evolution and the enthusiasm for research even in his 70th year ('... for me it was the research that mattered most, because all my attitudes and activities were shaped by it'). The rest of the review articles deal with a variety of topics of current interest.

The article by V. Kikkawa *et al.* discusses heterogeneity in the protein kinase C (PKC) family and its implications in cellular regulation. The next article by N. A. Nicola describes the biological action of hemopoietic cell growth factors, control of their production, structures of the gene and the receptor. The oncogenic potential of these factors is discussed at the end of the chapter. The interaction of reactive O_2 intermediates with intracellular environment is the basis for the pathophysiological state. This aspect is covered in the article 'Biochemistry of oxygen toxicity' authored by E. Cadenas. The article by Futai *et al.* reviews in detail, gene and enzyme structure, synthesis, function and assembly of ATP synthese. Interesting aspects of P-glycoprotein mediated multidrug resistance are presented by J. A. Endicott and V. Ling. This chapter deals with characterization of P-glycoprotein multigene family and its role in multidrug resistance. The very next chapter by J. Lechner and F. Wieland is on structure and biosynthesis of prokaryotic glycoproteins. J. R. Knowles has written an excellent article on the mechanism of biotin-dependent enzymes. A. Bax has contributed a detailed account of 2-D NMR and its applications in determining the protein structure. After reading this article one gets the feeling that soon the structure of larger proteins will be determined using this technique. In the next article J. A. Stubbe illuminates on protein radical involvement in biological catalysis. The chapter entitled 'Molecular biology of Alzheimers disease' (B. Muller-Hill and K. Beyreuther) is a timely one. K. Karlsson has contributed a detailed review on animal glycosphingolipids as membrane attachment sites for bacteria.

Topoisomerases are an interesting class of enzymes solving the conformational and topological problems of DNA. Research in this field has progressed from enzymology into new antitumour drugs. This timely review will be very useful to the investigators working in this area. Next, M. H. O'Leary narrates the multiple isotope effects on enzymatic reactions. Quinoproteins are the enzymes having pyrralo-quinoline quinone as cofactors. They are the subject of the article by J. A. Duine and J. A. Jongejan. A. A. Travers gives an excellent overview on the role of DNA structure and conformation in DNA-protein interactions. Phosphorylation-dephosphorylation is an important mechanism in regulating various major intracellular events. The structure, substrate specificity and the regulation of protein phosphatases are adequately covered by P. Cohen. Although a wealth of information has been accumulated on immunoglobulin gene rearrangements over the years, the story is far from complete. The role of gene conversion event in generating antibody diversity is discussed by C. J. Wysocki and M. L. Gefter. M. G. Rossmann and J. E. Johnson have presented a detailed account on Icosahedral RNA virus structure. An extensive review on the heparin binding growth factor family of proteins is contributed by W. H. Burgess and T. Maciag. The article by Rees *et al.* gives a detailed account of the bacterial photosynthetic reaction centre's structure. The reaction centre is an integral membrane protein-pigment complex and its structure is taken as a model for folding of membrane proteins. Phospholipid biosynthesis pathways in yeast, the enzymes involved, their regulation, genetics and molecular biology of the process are reviewed by G. M. Carman and S. A. Henry. This is an excellent overview giving a complete picture. Exhaustive, as well as authentic coverage of animal virus DNA replication is given by M. D. Challberg and T. J. Kelly. Molecular events during the fertilization process are aptly narrated by D. L. Garbers. Glutathione S-transferases are an important class of enzymes catalysing the conjugation of glutathione to electrophiles and a variety of hydrophobic compounds. These proteins are coded by the multigene family. The gene structure, regulation and biological function of these enzymes are presented by C. B. Pickett and A. Y. H. Lu. An article by Tom Alber summarises the effects of mutations on protein stability. P. F. Johnson and S. L. Mcknight present the most recent developments and discoveries in the evergrowing field of eukaryotic transcriptional regulatory proteins. It is clear that this review will become obsolete soon considering the speed with which new transcriptional factors are isolated. The review 'Glycosylation in the nucleus and cytoplasm' (G. W. Hart *et al.*) highlights the recent developments in this field. T. A. Waldmann provides an overall picture of interleukin-2 receptor's structure and function. One of the most important topics in molecular biology is genetic recombination. A. Landy's article gives a lucid presentation of the most recent developments in dynamic, structural and regulatory aspects of the site specific recombination. The helix-loop-helix Ca^{++} binding proteins are a family of highly homologous proteins whose activities are regulated by the Ca^{++} binding event. A detailed overview on the structure and function of this class of proteins is presented by N. C. J. Strynadka and M. N. G. James. In an article entitled 'Topography of membrane proteins,' M. L. Jennings summarises computational and experimental methods used to study topographical arrangement of integral membrane polypeptides in the lipid bilayer. J. Normanly and J. Abelson discuss the problem of tRNA identity. The last review in the volume is written by K. Struhl. The relative simplicity, fast growth rate, availability of powerful genetic approaches to characterize important genes, gene products and mutant strains, etc. makes yeast one of the best studied eukaryotic model systems. Thus a wealth of information on transcription factors and regulation

has come out in recent years. The article 'Molecular mechanisms of transcriptional regulation in yeast' elegantly analyses all the data with up-to-date coverage.

It is evident that this volume like any other volume of *Annual Review of Biochemistry* covers a wide variety of topics of current interest. Almost all reviews are presented in a very lucid style ending with extensive bibliography. Again, the whole volume is a blend of various aspects of biochemistry and molecular biology.

Personally, I would urge any student/scientists of biology to read the first chapter which sets the trend for the whole book and gives hope for the scientists. This book is a must for the reference section of any library.

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Photobiology and plants

Light and Plant Growth. J. W. Hart. Unwin Hyman, London, 1988.

I read the book with great interest from cover to cover. It is rare these days to find single-authored books which have coherence and continuity in writing and expression. Although it is a little late to review this book, yet I find that it is still up-to-date with respect to the basic information on photomorphogenesis. The author has deliberately kept the photosynthesis out of context in this book. This to me seems a good decision as there are a number of books on that subject and moreover its inclusion would divert the flow of the theme in the book.

There are eight chapters in the book. The first three chapters describe the nature of light, quality and quantity, reaching the surface of the earth and how it interacts with plants and affects its development. In chapter four the pigments involved in light perception are discussed and in the following chapter mechanism of action of light is illustrated. The chapters on phototropism and photoperiodism have been well described in the title itself as the orientation of plants in space and in time respectively.

The book is excellent reading material for the graduate and post-graduate students and also for those who wish to get information on the photobiology of plants. One interesting aspect of the book is the special topic 'boxes' in each chapter which give additional information like historical perspectives or explanation of certain important points.

The glossary at the end of the book would be also very helpful to newcomers.

Overall, for the students it is worth keeping a personal copy. However, it is advised that for latest and recent information, especially those that have come in the area of light regulation of gene expression, other literature should be referred.

I recommend all the 'students' of photobiology to read this book.

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Overview of radiobiology

Recent Trends in Radiobiological Research, P. Uma Devi, ed. Scientific Publishers, Jodhpur, 1990. 254 pp. Rs. 350.

'Recent Trends in Radiobiological Research' is Proceedings of invited papers presented at a symposium organized by P. Uma Devi at the Kasturba Medical College, Manipal in November 1987. Radiobiology is a large branch of Science; so with as few as 15 papers the net cannot be cast in depth and sometimes the connection may be lost. Nevertheless, the effort appears worthwhile.

If at all there is any accent, it appears to be on the modification of radiation effects. P. N. Srivastava describes his experiences with sulfhydryl compounds in radiation protection. It is known that because of slow rates of reaction, SH compounds generally offer only anoxic protection. However, working with microsomal system, Srivastava and his coworkers were unable to pinpoint 2-Mercaptopropionylglycine (MPPG) radioprotective mechanisms.

Quintilliani *et al*, on the other hand, interpret their glutathione and oxygen effects in terms of the Biaglow model. According to this model, GSH is not only able to prevent the radiation damage fixation by oxygen but can also detoxify peroxyl radicals. They draw the conclusion that not only oxygen and glutathione can modify the same group of potentially lethal lesions but it is unnecessary to postulate an alternate target for the oxygen-dependent damage.

Maisin's paper is concerned with normal tissue response to radiation and chemical protection. He draws attention to the two great difficulties encountered in tumour therapy with radio-protecting compounds which is their toxicity and the short period during which they are active. The range between the active and the toxic dose is narrow. Protective compounds also have deleterious effects and this is the suggestion of Maisin—to combine a very active low dose radioprotector such as WR 2721 in combination with a suitable biological response modifier like glucan F.

Weiss *et al.* suggest that vitamins E&A can have protective effects post-irradiation. This effect probably arises from the stimulation of the immune system. B. B. Singh argues that phenothiazines, in particular can cause radiosensitization, chemosensitization and sensitization of hyperthermia effect on tumours. P. C. Kesavan notes modification of oxygen-dependent and -independent components of radiation mutagenesis by caffeine probably acting through inhibition of DNA repair. Viney Jain considers Hpd-PDT (Hematoporphyrin derivative-Photodynamic Therapy) an effective treatment for localized tumours.

Paper by Frankenberg-Schwager *et al* discusses the repair of double-strand breaks (DSB) in the DNA of eukaryotic cells. Working with yeast, which has several mutant strains and which are