

*MTP International Review of Science. Biochemistry Series One. Vol. 1.**Chemistry of Macromolecules*

Edited by H. Gutfreund

Butterworths; London: University Park Press; Baltimore, 1974

ii + 411 pages. £10.45

In spite of the general title, this volume is concerned almost exclusively with proteins. Coverage of other types of macromolecules is planned for future volumes. The book contains several excellent chapters which will prove interesting and informative reading at both undergraduate and research levels. However, if judged as an attempt to present an integrated view of proteins the book is not wholly successful. There is a general lack of coordination between the various chapters and a considerable element of repetition of material. For example, the basis of X-ray crystallography is discussed independently in chapters 2, 3 and 8 as is the structure of the non-haem iron proteins in chapters 2 and 6. In the latter case the overlap goes so far as to include the repetition of diagrams, figs 2.2 and 6.10 being identical. Some of the diagrams, especially those in the first part of the book depicting protein structure are of poor quality and difficult to interpret.

Chapter 1 on "Proteins and Evolution" certainly merits inclusion in the volume and contains some useful information and ideas, but is longer than is

necessary to develop this theme. Chapters 2 and 3 on "Three Dimensional Structure" and "Sub-unit Symmetry" are well written, but would have had more impact had they been combined into one chapter. Chapters 4, 5 and 6 on "Protein Conformation in Solution", "Chemical Modification" and "Metallo-proteins" are well balanced, useful articles. Chapter 7 is a good, concise account of the equilibria and kinetics of ligand binding to proteins. Chapter 8 on "Regulatory Phenomena" is a well written self contained article but the first two-thirds of the text is largely repetition of material in other parts of the book. Chapter 9 is an excellent review in a short space of the role of physical methods in determining protein structure. The final chapter "Proteins as Devices" represents an attempt to draw the rest of the book together but might have been more successful in this role, had it appeared at the beginning.

S. B. Brown

*MTP International Reviews of Science. Biochemistry Series One. Vol. 2.**Biochemistry of Cell Walls and Membranes*

Edited by C. F. Fox

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ii + 316 pages. £10.45

It is symptomatic of the recent progress in membrane related research that a subject which a

decade ago would have occupied little more than one or two chapters in a review on lipids, now commands

a volume of its own. Indeed, some might argue that one volume is not enough to adequately fulfill the hopes of C. F. Fox, the editor, "that the contents would be comprehensive and give a picture of the membrane field as a whole".

The broad scope of the topics included in this volume certainly illustrate the point that our understanding of membrane phenomena is being expanded in directions other than the traditional one of lipid biochemistry. That is not to say that the lipid field has been neglected, for, as is reported here, major advances have been made, particularly in their behavioural properties. But the new areas of discovery seem to be those dealing more with the characteristics of membrane proteins and the part played by the membrane in the biology of the cell as a whole. It is satisfying, therefore, that these particular areas are well represented in the review.

Considering this spread of subject matter, it is surprising that more thought was not given to the order in which the various contributions were placed in the book. Non-specialists should certainly pay attention to the attempt by the editor in his preface to correct the situation.

Adopting these suggestions, the reader will begin by obtaining a fairly clear — if somewhat simplistic — view of the revised general structure of the membrane from Marchesi's chapter on the orientation of proteins in the lipid bilayer. Although interesting — and indeed necessary — for the non-specialist, this account offers little for the knowledgeable membranologist in that it defies the stated intention of the editor by presenting a 'rehash' of an area which has received much mileage in the literature. The lipid fraction of the membrane is dealt with by Fox from the viewpoint of their phase transition properties. This chapter should provide those who still consider lipids in terms principally of an inert barrier, with much to ponder, particularly in the light of recent research on protein-lipid interaction. The more dynamic aspects of membrane structure, surely one of the major launching pads of the new approach to membranes, are tackled from a more biophysical angle in Podo and Blasie's article on the mobility of membrane components. Although this is a welcome approach, it must be admitted that the chapter is not a success. The authors have fallen into an agonising compromise in their attempt to be concise. To comprehend many of

their comments on techniques and results the reader will probably need more than a background knowledge of the theory. On the other hand experts in the field will find little new. This contribution is also not helped by the complete lack of illustrations and by the unwillingness of the writers to discuss the biological implications of mobility. Another version of this chapter would, I am sure, be welcome in future volumes of this series rather than in the first. This section on the more general properties of membranes is completed by a short contribution by Schimke on the turnover of membrane proteins. The author deals principally with the experimental results obtained in the study of protein degradation, but does not unfortunately go into its converse, protein synthesis, to the same extent. However he more than compensates for this omission by a well-written and thought-provoking section on the possible mechanisms of membrane turnover.

The phenomenon of transport appears in a variety of guises. A general survey of substrate translocation across the membrane is presented in a clear, concise and thoroughly enjoyable chapter by Epstein. This subject matter is introduced well and developed logically. Moreover the discussion of controversial evidence is both lucid and critically constructive. The same high standard of presentation is also to be found in Cotman and Levy's contribution on the difficult topic of nerve impulse conduction. In the interests of clarity, these authors have wisely introduced the more physical concepts only where absolutely necessary. The main criticism of this account is its limited scope. It would have been so much more complete and rewarding had the authors also tackled (or been allowed to tackle) intercellular transmission of the nerve impulse with all its ramifications. The fundamental property of specificity which underlies the biological processes mentioned above is defined in a scholarly chapter by Eisenman and Krasne on the ion selectivity of carrier molecules, membranes and enzymes. Although difficult to read and digest thoroughly on account of the lack of adequate definition, this chapter does contain basic principles which will ultimately be crucial to our understanding of more general biochemical phenomena. Finally on the transport theme, although of a quite different form, there is the discussion of endocytosis. This is a topic not often reviewed but, as shown by Korn,

nevertheless encompasses elements fundamental to our understanding of membrane function. What is the cellular role of microtubules and microfilaments, for example, or again, what do we know of the mechanism of membrane fusion? Perhaps the use of illustrations and a less fragmentary treatment might have added even more to the narrative.

Two chapters deal with the provocative question of cell growth and transformation. The first by Pardee and Rozengurt attempts, fairly successfully, to present an overall statement of the process of cell division without getting too 'bogged down' in the confusing minutiae which fill the literature. The second from Brady and Fishman is a more detailed analysis of the biochemical changes in membrane components which often accompany transformation. Perhaps due to the conflicting nature of current evidence the narrative at times appears a little confusing.

Finally, Strominger gives a compact description of

the structure and biosynthesis of the bacterial cell wall as seen through the effect of various antibiotics on the process. This refreshing approach allows for a very tidy and readable account.

Two comments arise forcefully on reading this volume. The first, voiced by most authors, emphasises how little concrete information we actually possess despite the encouraging start to research in these various areas. Secondly, it is apparent that the pace of discovery is very rapid, for many of the questions raised in the text have now been, at least partially, answered — only to raise new ones! It is with great anticipation, therefore, that one awaits the second edition of the promised series. It is to be hoped, however, that the long time-lag between the preparation of the various chapters and their eventual publication can be significantly shortened.

J. B. C. Findlay

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Energy Transducing Mechanisms

Edited by E. Racker

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This volume contains five chapters, written by different authors. A high standard of presentation is maintained throughout, and it is to the credit of the editor, E. Racker, that the various contributions complement one another and gel together to form a useful overview of the subject.

"Electron Transport and Energy-dependent Responses of Deep and Shallow Probes of Biological Membranes" by B. Chance deals particularly with non-toxic extrinsic probes, such as 1-anilinonaphthalene-8-sulphonate, 12-(9-anthroyl)stearate and 2-(*N*-methylaniline)naphthalene-6-sulphonate and others, and the use of fluorescence, e.s.r., n.m.r. and X-ray diffraction to follow the changes in these probes caused by alterations in the membrane during

energy transduction. This chapter starts with a useful account of the practical limitations and a comparison of the diagnostic value of each method. In a final section, the theoretical basis of these methods is discussed, with particular reference to the cyanine dyes, such as the carbocyanins and merocyanins, which report changes in membrane change by changes in their own fluorescence and absorption. Thus the chapter comprises a useful review of the rationale and methodology behind the recent investigations on membrane function in the squid axon by Cohen et al., and in chromatophores and submitochondrial particles by B. Chance et al.

The second chapter, "Energy Coupling in Biological Membranes: Current State and Perspectives", by