BOOK REVIEWS

membrane Na\(^+\), K\(^+\) pump and the sarcoplasmic-reticulum Ca\(^{2+}\) pump), and secondly ATP-generating systems (of a mixture of bacterial, photosynthetic and mitochondrial types; most articles are infected with chemiosmotic jargon). Even for researchers in these fields the book must be limited in value, since some of the most interesting results come in contributions which are hardly more than extended abstracts. The meeting from which the papers came was in Japan in September 1978; despite the use of 'rapid' printing from typescripts, most of the information here should already have found its way into the journals.

JONATHAN BENNETT

Structure and Function of Biomembranes

K. YAGI (Editor)
Japan Scientific Societies Press, Tokyo, 1979, pp. 244, $46.00

This book contains the proceedings of a symposium on the Structure and Function of Biomembranes held during October 1977 in Japan as part of the First Congress of the Federation of Asian and Oceanian Biochemists. The 20 papers are fairly international in origin and presented by authors who have made important contributions in this area. Unlike many of the conference proceedings which are published as books, this is not a collection of specialized research papers but a series of brief mini-reviews, written in a fairly broad perspective, of the authors' own work in a particular field.

The book is divided into four sections: Membrane Structure, Cell Surface and Biological Function, Assembly and Biogenesis, and Energy Transduction, but these are not equally represented. The largest and strongest sections are those on the Cell Surface and Biological Function and on Energy Transduction. These include useful articles on cell-surface sugars (N. Sharon), hepatic lectins (G. Ashwell and A. Morell), HLA antigen structure (J. L. Strominger and co-workers), and the chromaffin-granule membrane (G. K. Radda). A. W. Linnane and co-workers discuss the use of yeast mitochondrial mutants in studying the biogenesis of mitochondrial membranes. The book also contains papers on the proton-translocating ATPase by F. Gibson, Y. Hatafi and co-workers, E. C. Slater and Y. Kagawa, as well as mitochondrial hydrogen–electron transfer (T. E. King) and proton transport in mitochondria (P. C. Hinkle) and chloroplasts (M. Avron). Most of these articles are clearly written and contain an adequate introductory background.

The book is rather patchy in its coverage of the overall subject of Biomembranes, which is not surprising in view of the huge subject area which this title covers. As a result, I do not think it will suit the general reader looking for a broad perspective of the progress in this field. The reader looking for specialist reviews may not find it entirely satisfactory, since the articles are rather brief and by no means comprehensive. Nevertheless, the book contains several useful summaries of progress in some areas of the subject.

M. J. A. TANNER

The Biochemical Functions of Terpenoid in Plants

T. W. GOODWIN (Organizer)

In his Preface to this bound volume of the collected papers from a Royal Society Discussion meeting held in January 1978 [Philos. Trans. R. Soc. London, Ser. B (1978) 284, 439–599], Professor Goodwin remarks: 'The expert exposition of the biochemical function of terpenoids which follows ... will remove once and for all the lingering view that they are useless secondary metabolic products'. A bold claim; a class of molecules in search of a biochemical role may be generative of fruitless discussion and unproductive research. How far does this handsome volume with its authoritative imprimatur convince us that the terpenoids are now to be considered amongst the molecular matadors of dynamic plant biochemistry?

The compounds discussed comprise a minute fraction of the terpenoid armoury of the plant kingdom, but the biological phenomena considered range from hormonal to photosynthetic, and include a lucid account of the role of the polyisoprenoid alcohols, dolichols as carriers of mannose, glucose and N-acetylglucosamine in the formation of glycoprotein constituents of the membranes of yeast and higher plants (Hemming).

It is perhaps the discussion of the hormonal role of some terpenoids which is the most interesting presented. Waring has surveyed the whole gamut of functions attributed to abscisic acid, from abscission to dormancy and geotropism, and Mansfield and others have presented a seminal account of the role of abscisic acid in the closure of stomata and the synergistic effect of farnesol on this mechanism in Sorghum.

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Antagonism to the geotropic effect of abscisic acid by Xanthoxin is discussed by Dörrfling. It is perhaps not surprising, considering the vast literature pertaining to the action of gibberellins, to find no account of the action of this group of compounds. It is, however, strange that the only paper presented on these substances is concerned with their biosynthesis in the plant vacuole, significant, but scarcely encompassed by the title of the Discussion. The other group of plant hormones discussed, the cytokinins, barely justify inclusion amongst terpenoids; zeatin and its dihydro derivative can muster one isoprenoid unit side-chain, the remainder of the group cannot be called isoprenoids at all. In general the clear impression is that it makes little sense to discuss the role of one plant hormone in the absence of the others and that such discussion omitting indolyl acetic acid robs any potential Hamlet of a prince.

Two fascinating papers describe the effect of isoprenoid hormones on the formation of fungal reproductive bodies, trisporic acid inducing zygospores in the mycelium of 

Mucor mucoid and antheridiol and oogoniol in forming the sex organs of 

Achlya.

Inevitably the role of carotenoids is discussed (or should it be debated?), and their function both in facilitating energy transfer to chlorophyll and the protection of that molecule from bleaching is described. An account of the function of plastoquinone in the coupling of photosystems I and II is included, but here it must surely be conceded that the operational part of the molecule is the quinone and the role of the isoprenoid moiety must be relegated to that of an anchor within the thylakoid.

It is too naive to expect a Discussion meeting to discuss? Your reviewer was not present at the meeting, but such
fragments of the exchange that took place as have been preserved for posterity are seen in the cold light of print to be for the most part trivial and at times banal. It is likely that the range of biological topics covered resulted in a lack of focus and that a post hoc justification of a group of molecules is not evocative of stimulating discussion. Professor Goodwin cast his net widely and more interesting biochemical fish may well remain as yet undiscovered but the papers, although individually worthy of the canon of the Philosophical Transactions, lack the cohesion which justifies publication as a separate volume.

R. G. O. KEKWICK

Photosynthesis in Relation to Model Systems

J. BARBER (Editor)
Elsevier, Amsterdam, 1979, pp. 434, $80

This book is the third in a series on photosynthesis edited by J. Barber. It is the least satisfactory of the three books; the first two had clearly defined objectives and the authors on the whole stuck to the concept of an up-to-date review of their field for the non-specialist or student. The present volume attempts to cover the amorphous field of the relevance of photosynthesis to the 'energy crisis'. This has produced a rather mixed bag of papers, ranging from broad-based reviews to reports of work from a single laboratory and ranging in length from 15 to 60 pages. The subject matter also shows a wide range, from the theoretical physical chemistry of Blankenship and Parson's review of electron transfer in bacterial reaction centres, to proposals for construction of algal cultural systems on factory roofs in the paper by Hallenbeck and Benemann. Indeed some of the articles, such as those of Thornber and Barber, and Blankenship and Parson, might have been more appropriately placed in the second volume of the series. Despite these criticisms the book is in many ways excellent. The majority of the individual chapters are well written and authoritative. All the major proposals for the utilization of photosynthetic mechanisms in solar-energy utilization are discussed in chapters on hydrogen production by algal cultures or isolated chloroplast/hydrogenase systems, electrical potential generation by photosynthetic pigment and bacteriorhodopsin incorporated in artificial lipid membranes, and ammonia production by nitrate reduction. There is also a chapter devoted to the problems of stabilizing the catalytic systems once they are isolated from the plant.

Considered as a companion to the other two books in the series, this is a satisfactory third volume describing the first steps towards the technological utilization of the discoveries described in these books. Taken alone it is too uneven and in many of the papers too detailed to be recommended as an introduction to biological solar energy or for teaching.

The specialist will find that much of the information is readily available elsewhere, but that the excellence of some chapters will make it a worthwhile addition to their library.

M. C. W. EVANS

Immunology of Proteins, Volume 3

M. Z. ATASSI (Editor)

Those familiar with the first two volumes of 'Immunology of Proteins', edited by M. Z. Atassi, will certainly welcome this third volume, devoted primarily to the antigenic features of the antibody molecules, their biological and physicochemical characteristics and the properties of their effector sites. These three chapters are followed by a comprehensive review on the immunochemistry and biology of the components of complement and by an interesting chapter on the immunochemistry of albumin. It is perhaps a measure of the success of this volume that, soon after its arrival on my bench, I and a colleague of mine made large use of its numerous and accurate information in a series of lectures to postgraduate students.

The five chapters, written with great competence and clarity by leading active workers in the field, provide a major reference treatise for all engaged in research in protein immunology. It is very hard to find faults in this volume and I highly recommend the book as a valuable guide to present and future studies in immunochemistry.

M. ADINOLFI

Immobilized Enzymes

I. CHIBATA (Editor)

The author of this book has been much involved in the technological application of immobilized enzymes and microbial cells to real industrial problems, which lends authority to his presentation of this area. The range of applications is surprisingly large, many being used for the large-scale production of biochemicals in the tonne range. The book covers a wide range, including the synthesis of these materials, some of their 'academic' properties and wide-ranging but necessarily cursory coverage of applications. The large range of subject matter covered in a book of this size results in little space being available for discussion of chemical mechanisms, theoretical models or development of the academic aspects of the subject. The development of the mathematical models of charge interaction and diffusion are rudimentary or absent. The organization of the book is excellent for reference purposes and the bibliography is very complete.

That the book has relatively little pure academic appeal does not obviate the desirability of its presence on the library shelf or preferably in the lab, since as a ready source of references it is superb.

Many would query the general statement at the start of Chapter 3 to the effect that immobilization of enzymes is useful in the elucidation of enzymic structure–function relationships. It can be argued that, in general, immobilization complicates the elucidation of structure–function relationships by introducing new, frequently unwanted, variables. The exception to the above may be represented by the attempted modelling of membrane-