

### Book Reviews

**Binding and Linkage: Functional Chemistry of Biological Macromolecules;** By J. Wyman and S.J. Gill; University Science Books; Mill Valley, CA 94941, 1990; xiii + 330 pages; £34.95

The volume under review is the product of discussions and writing over a period of 17 years. It describes the senior author's interests and enormous contributions throughout his long and distinguished career and was published the year before his 90th birthday. The other author's interests in calorimetric and related methods also make a valuable contribution to the contents.

Jeffries Wyman has developed his treatments of linked reactions and cooperative interactions from a background of his own work on haemoglobin, which has extended over the last 60 years. Interactions of this protein with its range of ligands are used as the principal example for the subject of the book. However, there is a mine of interesting information about a great variety of other protein systems. A feature of this volume, which distinguishes it from several other books on cooperativity, is the presentation of many figures illustrating the results of experiments with a wide range of techniques. With the frequent chauvinistic attitude of practitioners of different methods it is nice to see, side by side, the balanced description of conclusions from X-ray crystallography and solution thermodynamics.

No doubt many readers will turn to Wyman & Gill for the intellectual feast presented in their elegant mathematical treatment of linked functions. They have made a very distinct mark on the application of this important thermodynamic principle to reactions of proteins. However, the majority of biochemists, who would benefit from a proper understanding of the very basic

aspects of the problem, will, alas, find it difficult to get the essential physical principles from this sophisticated treatment. This is not an elementary introduction to the subject!

I have been lecturing on thermodynamic linkage, cooperativity, allosteric effectors and ligand induced conformation changes for 25 years. I have always tried to impress on students the distinct and clear physical meaning of these terms. This was not an easy task, especially with respect to allostery. This term is used for any and all of the others by different leading figures in the field. The volume under review does, unfortunately, add to the confusion. The historical presentation and definitions of allostery are not up to the standard of rigour of the strictly scientific contents of the book. I can't help feeling like Alice when Humpty Dumpty says 'you see it is like a portmanteau, there are two meanings packed up into one word'; only there are more than two meanings involved in the case of allostery. The original definition of allostery by Monod, Changeaux & Jacob (1963) should never have been enlarged upon, then the other terms would have maintained their clear physical meaning (see Cornish-Bowden: Principles of Enzyme Kinetics).

I hope that the last few remarks will not be regarded as churlish comments on a scholarly work, which is recommended reading for those with a taste for algebra as well as an interest in physical biochemistry.

H. Gutfreund

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**Advances in Enzymology, Volume 63;** Edited by A. Meister; Wiley; New York, 1990; viii + 551 pages; £47.00, \$64.50

This series has, over the years, provided enzymologists with reviews of progress on enzymes in which they may not be specialists which can frequently stimulate thought about problems in their own areas. The latest addition to the series contains seven reviews which cover the literature in their areas up until early 1989 of which five are in the mainstream of enzymology.

The longest review in the book provides a timely warning to those enzymologists who have fallen into the trap of believing that the properties shown by a purified enzyme match those within the cell. It is an exhaustive discussion by H.F. Gilbert of third-disulphide exchange. Spontaneous exchange between thiol groups on an enzyme and disulphides, in particular oxidised glutathione, may lead to extensive modification within the cell and so to different properties from those measured *in vitro*. The mechanism of such exchanges and the likely position of equilibrium in

different compartments of the cell is considered in detail. The theme of thiol reactivity is continued by E. Shaw in a review of selective inactivation of cysteinyl proteinases which describes a wide range of active-site directed inhibitors for these enzymes. Much of the general methodology is applicable to the modification of thiol groups in other proteins.

Three articles review specific enzymes. Recent work on alanine tRNA synthetase is reviewed by P. Schimmel in an excellent description of the use of both protein and tRNA engineering techniques to investigate the binding of tRNA to the enzyme. Work on *E. coli* ribonucleotide reductase, the mechanism of which involves an iron centre and a tyrosyl free radical, is described by J. Stubbe. Other ribonucleotide reductases, including those involving adenosylcobalamin, are also discussed. A review by J. Larner on glycogen synthesis describes the control of glycogen

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synthetase by phosphorylation at several sites, the operation of insulin in controlling the activity of the phosphatases and kinases involved is elaborated.

The remaining two articles, by E. Breslow and S. Burman on neurophysin receptors and by E.C. Theil on ferritins are studies of binding by proteins.

All the authors are experts in their fields and much of their articles follows from their own work. The volume indexing is excellent. Every enzymologist should read this volume; if they work in or near any of the areas described it should be on their bookshelves.

A. Thomson

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**Hormones: From Molecules to Disease;** Edited by E.-E. Baulieu and P.A. Kelly; Chapman and Hall; London, 1990; viii + 697 pages; £47.50.

This book comprises a series of 14 chapters which combine to form a comprehensive review of our current understanding of the endocrine system. It opens with a very long account of the basic principles of endocrinology in a chapter which could almost stand alone as a textbook on the subject. This is followed by rather shorter contributions from a variety of authors who write in detail on the synthesis, secretion and action of hormones. The coverage is wide and the book achieves its objective of taking the reader from basic science to clinical medicine in each chapter. As such it will be a valuable resource to students (and teachers) of endocrinology in a range of disciplines. One of the most innovative features of the book is the inclusion of subsections which provide detailed accounts, at the molecular level, of recent important developments in defined areas of the subject. These sections allow coverage of material (e.g. receptor-mediated endocytosis, control of transcription) at a level of detail which would not be appropriate in the main body of the text. As such, they provide valuable information that would normally be available only in more specialised works. Apart from this aspect, the book contains much of the standard material that would be expected in a modern endocrinology textbook.

Each chapter deals with a different hormone or group of hormones and the chapters are all subdivided extensively, which

makes it relatively easy to locate topics of interest. All sections are also well illustrated and referenced, with the references appearing as footnotes on, or near to, the appropriate pages. The references are supplied with titles, which aids in the selection of further reading when attempting to follow up a particular topic. In this context, I suspect that most readers will find this book more useful as a source of reference, than as an introductory text to be read from cover to cover. Indeed, extended reading is made difficult by the decision of the editors to highlight 'significant' concepts by placing certain words in italics. This serves to emphasise the words on the printed page, but has been employed so frequently that, in my view, it represents a distraction from the flow of the text. Moreover, on a number of occasions, the choice of italicised words seems arbitrary and leaves the reader wondering as to the precise implication.

Overall, I believe that this book should be welcomed as comprehensive and up to date textbook of endocrinology. Its price dictates that it will not be found on every student's bookshelf, but it will be a valuable source of reference to all scientists and clinicians with an interest in endocrine physiology and pathophysiology.

N.G. Morgan

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**Peptide Hormone Action: A Practical Approach;** Edited by K. Siddle and J.C. Hutton; IRL Press; Oxford, 1991; xix + 256 pages; £22.95

The Practical Approach series occupy a valuable niche in Biochemistry and Cell/Molecular Biology. Although full of detailed protocols, they are not just recipe books, because the authors are encouraged to discuss the advantages and disadvantages of different methods, and place them in the context of their field. They are also marketed at a price at which individuals and laboratories can buy specific volumes, rather than waiting for the library to buy the whole series. The present volume, which maintains the generally high standard of the series, is a companion to 'Peptide Hormone Secretion', and covers the action of peptide hormones at the target cell, i.e. receptors, second messengers, and other signal transduction systems. It would be surprising if there were not some overlap with two previous volumes in the series, i.e. 'Receptor Biochemistry' and 'Receptor-

Effector Coupling', but I did not have those volumes available for comparison.

This book is in fact relevant to a wider field of research than the title indicates, because 4 out of the 7 chapters discuss second messenger systems that are utilized by many non-peptide hormones and mediators. The first two chapters cover receptor binding studies and receptor characterization and, as in the last chapter, insulin and its receptor are widely used as a model. There follow the four chapters on second messengers, i.e. cyclic nucleotides, calcium, inositol phosphates and lipid mediators (e.g. diacylglycerol). The chapter on calcium by Campbell's group is notable for spending as much time on the use of photoproteins as on the more popular synthetic intracellular indicators such as fura-2. While this information is hard to obtain elsewhere, a minor