

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 Wymann & 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

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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