The Chemistry and Biochemistry of the Amino Acids

Edited by G.C. Barrett

Chapman and Hall; London, 1985

x + 684 pages. £49.50 (hardback)

A challenging title indeed! We find 22 chapters which are in effect reviews of selected topics, with the publisher's intention being to provide "an authoritative source of information to support chemical and biochemical studies involving amino acids". Inevitably the book falls into unequal sections. There is a coherent group of chapters on the analytical methods including chromatography (ion-exchange, liquid and gas-liquid), NMR and crystallography. They offer both exposition of principles and tabulated reference data. These topics link successfully with chapters on amino acid chemistry which cover peptide synthesis, resolution of stereoisomers, reactions in general and the long-standing but always topical issue of the degradation of amino acids accompanying protein hydrolysis. In the context of a research handbook the above chapters are of obvious value.

My fear is that this integrated section is diluted by the inclusion in the book of other topics which though worthy in themselves do not link together. Such topics include a scholarly exposition of non-protein amino acids and an exhaustive account of the chemical syntheses of a wide variety of amino acids, both chapters being supported by extensive tabulated data. The section dealing with metabolism of amino acids was disappointing, represented only by two chapters 'Metabolic and Pharmacological Studies' and 'Biosynthesis of Amino Acids in Plants'. Their coverage went little beyond standard textbooks and would not in themselves seem to compel the acquisition of the book by a research group. Each of these topics could however have supported a volume in its own right, which would have allowed the inclusion of subjects of current interest such as intracellular compartmentation and the overall control of amino acid metabolism, particularly in the comparison of different tissues.

One must conclude that the title was too ambitious, the attempt to achieve a broad coverage increasing the cost but not necessarily the value to any particular research group. Perhaps this is a common pitfall for multi-author volumes?

K.V. Rowsell

Molybdenum Enzymes

Volume 7 in the 'Series Metal Ions in Biology'

Edited by T.G. Spiro

Wiley; New York, 1985

x + 611 pages. £127.90

The biochemistry of molybdenum has come a long way from the early observations that it was required as a trace element for nitrogen fixation, nitrate reduction and other metabolic processes.

Research is now at the level of determining its incorporation and function in specific enzymes. It is about five years since two books appeared on the molybdenum enzymes, and meanwhile there have been several conference proceedings on nitrogenase. This book provides an updated and generally well-balanced review of developments on the role of molybdenum in enzymes.

Nitrogenase, the enzyme which reduces atmospheric dinitrogen to ammonia, has been the subject of intensive research, and occupies the first six chapters of the book. In nitrogenase the molybdenum exists as the iron-molybdenum cofactor. The second part of the book deals with other enzymes which have a pterin-containing molybdenum cofactor. These unstable cofactors can be extracted from the enzymes, and re-inserted into enzymes from mutants which lack them. There has been intensive study of their properties and composition, which is described in two lively and critical reviews by Steifel and Cramer. So far, however, the long-awaited determination of the chemical structures of the cofactors has proved elusive. In the absence of this information, the book gives the impression of a mystery novel from which the last chapter is missing.

The relevant chemistry of molybdenum complexes, and the substantial efforts that have been made to synthesise the cofactors or chemical analogues of them, are described in chapters by Holm and Simhon, and Garner and Bristow. Many molybdenum- and molybdenum-iron-sulphur complexes have been synthesised but none of them will replace the natural cofactors. Meanwhile there has been more progress, described by Hidai, on chemical models which can reduce dinitrogen, which promise to imitate the form of the reaction if not the biological structure.

There has also been progress in the enzymology of the molybdenum enzymes. Most of these contain other groups such as flavin or haem. Because of their suitability for a range of spectroscopic techniques, these are among the best-studied electron-transfer systems. For nitrogenase these methods are summarised by Stephens. Thorneley and Lowe describe their elegant kinetic model for the mechanism of nitrogenase, based on stopped-flow studies. The mechanism of xanthine oxidase is also understood in considerable detail, as reviewed by Hille and Massey, together with the related enzymes aldehyde oxidase and sulphite oxidase (incidentally, it is not mentioned that xanthine oxidase is probably a degraded form of xanthine dehydrogenase, the promised article on which does not appear. Finally, Adams and Mortenson review the structure and function of nitrate reductase and formate reductase.

For the biochemist, what is missing from this book is an overview of molybdenum enzymes in metabolism. Other molybdenum enzymes are known, and continue to be discovered but these are omitted in favour of the best-studied enzymes.

R. Cammack

Practical Protein Chemistry – a Handbook

Edited by A. Darbre

John Wiley and Sons; Chichester, 1986

620 pages. £52.00

This work brings together 21 contributions from authors whose brief was to produce concise and up-to-date information on methods including practical details. The selection of what to include within the target of a single-volume equivalent of the Methods in Enzymology series is inevitably constrained; hence chemical modification of proteins and peptide synthesis are specifically excluded as topics.

Practical protein chemistry could start at the availability of a pure protein as is assumed in the first chapter on the characterisation of protein