

basic aspects of organic chemistry including reaction mechanisms, principles of stereochemistry, non-classical carbocations, and isotopic effects. These purely chemical sections are probably unnecessary for English or American students, but may be part of the lecture course from which Professor Manitto has prepared the book. In addition, there is a short but useful section on research methods and techniques; but it is in this section that a glaring omission becomes apparent: there is no coverage of  $^{13}\text{C}$ -methods. Anyone who follows the literature of polyketide biosynthesis can hardly be unaware of the impact of  $^{13}\text{C}$  NMR, yet the subsequent chapter on polyketides contains no mention of the technique. So, for example, in the section on aflatoxin biosynthesis Buchi's work (*ca* 1970) using  $^{14}\text{C}$  acetates is cited, but no mention is made of the more recent (1976–1980) work of Steyn and others using  $[1,2-^{13}\text{C}_2]$ acetate in conjunction with  $^{13}\text{C}$  NMR analysis. This kind of omission is evident throughout the chapter, and gives the

reader a rather distorted view of our current understanding of polyketide biosynthesis.

The chapters on isoprenoids are comprehensive, and the choice of material is good, though once again certain key results of the past few years are not mentioned, e.g. the biological significance of the hydroxy metabolites of the vitamins D, and the new mechanism for the prenyl transferase reaction. Similarly the chapters on shikimate metabolism are good, with the same reservations, and there is a particularly comprehensive section on the flavonoids. Finally, there is a further omission: the alkaloids receive no mention at all. There is a reasonable index, and there are lists of books and reviews at the end of each chapter. In addition, there are innumerable excellent structures throughout the book, and these are largely devoid of errors.

The overall impression of the book is thus one of comprehensiveness in certain areas, with serious omissions in others, and in consequence, at £35, it is perhaps overpriced for the information it provides.\*

\*Since this was prepared, the publishers have announced a paperback edition at £12.50.

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**Sulfur in Proteins:** by YU. M. TORCHINSKY. Pergamon Press, Oxford, 1981. 290 pp., 40 figs. £40.00.

Though the amount of sulphur in proteins is relatively small the sulphur-containing amino acids make important contributions to reactivity and stabilization of structure and hence biological function. It is these considerations which fully justify a text devoted to 'Sulfur in Proteins'. This book is essentially an update of the author's earlier (1974) *Sulphydryl and Disulfide Groups of Proteins*; both have been based on Russian texts of a few years earlier. Whilst the coverage in *Sulfur in Proteins* is much the same as that in the earlier book the change of emphasis has necessitated additional sections on areas such as the chemical properties and role in proteins of the thioether group of methionine, thiol cofactors, and acid-labile sulphur. Though directly reproduced from a typescript the book is acceptably presented and I found few errors, none serious. As might be expected in a book devoted to this specific topic there is much chemical detail, based on extensive coverage (over 1800 references) from the earliest literature to a few from early 1980. The index needs, and appears to be, comprehensive.

Part 1 deals with the chemistry of sulphur-containing groups in proteins and with methods for their determination. Some of the chapters are virtually catalogues of reactions and at the outset it is evident that this book is aimed at researchers in enzymology and protein chemistry and not at the general reader. The mainstay of this part of the book is a large

section which summarises the ease with which sulphydryl groups enter into a wide range (over 50) of chemical reactions, the reacting species often being a thiolate ion. There are then comparable, but smaller, sections on the properties of S–S groups and methods for their cleavage, and on the thioether group of methionine, before concluding chapters on the quantitative determination of sulphydryl and S–S groups, and the differential reactivity of the former in native proteins. The depth of coverage is impressive and it is hard to imagine that much of importance can have been omitted.

While Part 1 thus closely follows the organisation established in the author's earlier text, the remainder of the book deals with the role of sulphur-containing groups in enzymes and other proteins and diverges rather more. Some overlap between the two parts is evident but is not unduly obtrusive. In Part 2 chapters on methods of identification of essential sulphydryl groups in enzymes and on the role of sulphydryl and S–S groups in proteins are retained, but are now joined by new chapters on the topics indicated earlier. In general I felt these latter chapters did not come up to the high standard of review in the rest of the book. In Chapter 11, for example, the impression could be given (Fig. 37) that rubredoxin contains acid-labile sulphur. Here, too, the essential completion of the literature survey of this area in 1978 means that recent reports of  $[3\text{Fe}-3\text{S}]$  centres and of the X-ray crystallographic structure for a  $[2\text{Fe}-2\text{S}]$  ferredoxin have been missed. Methods for, and difficulties in, determining acid-labile sulphur are

scarcely mentioned. Admittedly, these latter comments may reflect personal interests, and it would be difficult to fault the reviews of the reactivity and role of sulphhydryl and S-S groups in proteins, which forms the major part of the text.

My overall conclusion is that this book is an essential reference text for enzymologists and protein chemists at all interested in studying the role of sulphhydryl or S-S groups in proteins. For most other

biochemists access to a library copy will be sufficient. The considerable cost of the book, despite direct reproduction of the author's typescript, led me to believe the publishers may have anticipated this limited demand.

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**Introduction to Alkaloids, A Biogenetic Approach:** by GEOFFREY A. CORDELL. Wiley Interscience, New York, 1981. 1055 pp. £92.50.

Considering both the enormous medicinal importance and the potential toxicities of plant alkaloids, it is remarkable how few attempts there have been to provide a general introductory text that caters for a wide audience of readers. The classic text of T. A. Henry, the fourth edition of which appeared in 1949, has long been out of date and out of print. A general chemistry text, edited by S. W. Pelletier, appeared in 1970 but this suffered from uneven presentation due to the variety of contributors involved. The present book benefits from the uniform treatment a single author can provide and it goes a long way towards meeting the needs of the general scientist for a work of reference providing the basic facts about a given alkaloid or group of alkaloids.

It is true that the main theme of the book is the biosynthesis of these substances, but there is sufficient coverage of the botany, chemistry and pharmacology of the 5000 or more known alkaloids to make this an extremely useful reference work. Two introductory chapters provide the necessary background on detection, isolation, classification, nomenclature and biosynthetic techniques. The remaining ten chapters then describe in sufficient detail for easy comprehension the chemistry, biosynthesis and activity of all the major groups of alkaloid, arranged logically in sequence according to their known precursors. Each section is lavishly illustrated with formulae, spectral details and biosynthetic schemes and concludes with a key list of literature references.

The author has a natural, flowing style of writing which makes for enjoyable and easy reading. To have dealt authoritatively with the chemistry, biosynthesis and pharmacology of so many widely differing groups

of natural product is a great achievement. This accomplishment recalls to mind what the poet Goldsmith, in the *Deserted Village*, said of the village schoolmaster:

And still they gazed and still the wonder grew,  
That one small head could carry all he knew.

Clearly, alkaloid chemists specializing in one or other structural class may be disappointed with the brevity of coverage of their favourite substances, but this is inevitable in a work which describes every important known alkaloid and every known class. One might regret the limited treatment of botanical aspects (e.g. yields are not often given, plant sources are only sketched in, etc.) but again this is inevitable in an introductory work. In any case, the chemotaxonomy of alkaloids has been rather well covered elsewhere (e.g. by R. Hegnauer and others). In general, the work appears to be accurate and free from serious errors, although I did note that the polyamines spermine and spermidine which are widespread in plants are described as being also formed primarily in the prostrate (sic!) gland of man. The book concludes with useful details of how to prepare alkaloid-detecting reagents and there is an excellent index.

The tragedy about this book is that it is so highly priced that it will not only be outside the range of the individual's pocket but also outside the purchasing power of many libraries. This is an enormous pity since it is an immensely readable and well ordered reference book that should be widely available. Indeed, it is the nearest thing to a modern Henry that we can expect in this day and age.

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