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BOOK REVIEWS

Phytochemistry and Angiosperm Phylogeny: edited by D. A. YOUNG and D. S. SEIGLER. Praeger, New York, 1981. 295 pp. $21.95.

This volume contains the eight review lectures that were presented at a Symposium held in Stillwater, Oklahoma in August 1979 under the aegis of the Botanical Society of America and opens with an introduction by Dale M. Smith. As the title indicates, the book is concerned mainly with the application of phytochemical data at the familial and ordinal levels of angiosperm classification; the first paper of Belford, Thompson and Stein on DNA hybridisation techniques is exceptional in that it only covers variation within a single genus, *Atriplex*.

The last major symposium concerned with chemistry and botanical classification was that organised by the Nobel Foundation in Stockholm, Sweden, the proceedings of which appeared in 1973. It is interesting and instructive to observe that the major topic of discussion then, the distribution of betalain pigments in the Centrospermae, is not included here in any detail and indeed, surprisingly little new has emerged on this theme since 1973. While the systems of phylogeny mainly in evidence at the Nobel meeting were those of Cronquist and Takhtajan, in the present volume we have those of Dahlgren and Thorne, both of whom are much more sympathetic towards phytochemical data than the former systematists. Here, in separate chapters, these two authors discuss at length revisions of their angiosperm systems in the light of the continually improving phytochemical data that amasses year by year. It is particularly valuable to have two different viewpoints and two distinctive systems, since it helps to emphasise once again that no single phylogenetic tree can yet adequately express all the available information on family relationships within the flowering plants. Much still depends on personal interpretation; for example, while Dahlgren's system includes the idea that the iridoids are of monophyletic origin, that of Thorne rejects such a view. Another contrast between the two systems is that Dahlgren has many more families than the conservative Thorne; for example, Dahlgren names 98 monocot families, while Thorne only accepts 49 distinct families.

The remaining five chapters of the book are by phytochemists, who discuss the phylogenetic significance of amino acid sequence studies (R. Scogin), glucosinolates (J. E. Redman), cyanogenic glycosides (S. G. Saupe), terpenoids (D. S. Seigler) and flavonoids (D. A. Young). These chapters all include useful up-to-date summaries of presently known distribution patterns of many secondary substances. It is clear that many, perhaps most, classes of chemical appear as yet to be randomly distributed, in several or more unrelated family groups. Such a random picture may be illusory and only reflect the fact that our knowledge for many classes of compound is extremely sketchy. The chapter by Young on flavonoids, for example, is particularly helpful in indicating which particular parts of the angiosperm system require attention from flavonoid phytochemists in order to fill in the gaps.

In summary, while this book does not pretend to provide a comprehensive coverage of the phytochemistry of angiosperms, it does provide a valuable working account of present trends in plant chemosystematic research. It should be of interest to a wide audience. In general, the editors have done an excellent job but the absence of any index is especially unfortunate since it makes cross reference between chapters difficult. On the bonus side, however, there is the inclusion of two alternative synopses of angiosperm families, laid out according to the latest views of Dahlgren and Thorne. These alone should ensure that this book becomes available in all phytochemical and botanical libraries.

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Biosynthesis of Natural Products: by P. MANITTO. Ellis Horwood, Chichester, 1981. 548 pp. £35

Until recently there were three main textbooks on biosynthesis: *The Biosynthesis of Natural Products* by J. D. Bu'Lock (1965), *Organic Chemistry of Secondary Plant Metabolism*, by T. A. Geissman and D. H. G. Crout (1969), and *Secondary Metabolism in Plants and Animals* by M. Luckner (1972). The first is lightweight but very readable, while the other two are comprehensive with good indexes and research references. All are now rather out-of-date, at least in some respects. In 1978 *Secondary Metabolism* by J. Mann appeared (with a second, revised edition in 1980), to be followed in 1981 by the book under review. The former text, like others in the 'Oxford Chemistry Series', is meant to provide a readable introduction to the subject, while the book by P. Manitto claims to provide a comprehensive introduction to the subject.

This claim is substantially correct, at least in some sections of the book, and it also has long sections on enzyme reactions (64 pp), primary and intermediate metabolism (41 pp), and shorter sections on several

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}C-methods. Anyone who follows the literature of polyketide biosynthesis can hardly be unaware of the impact of ^{13}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}C] acetates is cited, but no mention is made of the more recent (1976–1980) work of Steyn and others using [1,2-$^{13}C_2$]acetate in conjunction with ^{13}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) *Sulfhydryl 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 [3Fe–3S] centres and of the X-ray crystallographic structure for a [2Fe–2S] ferredoxin have been missed. Methods for, and difficulties in, determining acid-labile sulphur are