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BOOK REVIEWS

Metabolites and Metabolism: by EDWIN HASLAM. The International Series of Monographs on Chemistry, No. 12. Clarendon Press, Oxford, 1985. 161 pp. £15.00.

Whilst the natural products chemist has been well served with 'state of the art' reviews on progress in biosynthetic studies, notably through Chemical Society Periodical Reports and now Natural Product Reports, there has been a shortage of more general literature suitable for introducing the subject to undergraduate and postgraduate students. As an undergraduate I was fortunate in having available J. D. Bu'Lock's then recently published *Biosynthesis of Natural Products*. This was followed in 1969 by T. A. Geissman and D. H. G. Crout's most excellent *Organic Chemistry of Secondary Metabolism*. Today these two volumes are still arguably the best for introducing and stimulating an interest in biosynthetic processes, the latter for the range and clarity of its explanation of the mechanisms of secondary metabolism and the former for the insight it gives into the methodology and practical problems of biosynthetic studies.

In this context Haslam's book is a most welcome addition to the literature, providing a concise, easily readable and up-to-date replacement for Bu'Lock. It is divided into seven chapters, of which the first is a general introduction dealing with definitions and the methodology of biosynthetic studies. This is followed by four chapters discussing specific aspects of the biosynthesis of polyketides, alkaloids and other nitrogen-containing amino acid metabolites, plant phenols and terpenes and steroids. Any system that tries to condense a survey of biogenetic pathways under four major headings is bound to produce anomalies in the placement of groups of compounds which involve precursors of more than one type, and although that is certainly the case here the progression works well and does not cause the reader confusion. Chapter 6 deals with the general characteristics of secondary metabolic pathways, addressing important areas such as enzymology, regulation, autotoxicity and storage of metabolites as well as touching on the thorny problem of just why plants go to the effort of producing them anyway. Their *raison d'etre* is also the subject of the final chapter, in which the author explores the hypothesis that they are formed as an overflow mechanism through which the plant taps off superfluous primary metabolites. This hypothesis has many attractions and does not necessarily run counter to the numerous observations made in recent years regarding possible defense roles for secondary metabolites. However, it remains difficult to see how or why such a safety valve would have led *per se* to the enormous diversity of metabolites we are faced with today, even given that the appearance of these compounds is often consolidated through a positive selective pressure due to their beneficial effects against predation or competing plants.

There are always minor points to quibble about in a book of this type. For example, it is difficult to understand why neither erythrose-4-phosphate nor shikimic acid can find a place in Scheme 1.1 which is entitled 'Major intermediates in secondary metabolism', the aromatic amino acids all appearing to derive from phosphoenolpyruvic acid alone. More importantly the numbering of structures in Schemes and Figures seems to have gone rather sadly awry in some places, with numbers difficult to find, out of sequence and, on a few occasions missing or assigned to the wrong structure. This problem could be partially overcome by setting the structure numbers in bold-type to make them more visible. As it is the thread of an argument was often lost in the hunt for structures, a most annoying feature in an otherwise well put together book. Despite these drawbacks, this is certainly a book to be recommended. It should definitely be on the library shelf and probably in the personal bookcase of anyone with a particular interest in secondary metabolites and their biosynthesis.

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Allelopathy: by ELROY L. RICE, second edn. Academic Press, Orlando, 1984. 422 pp. £48.

The view that secondary constituents protect higher plants from herbivory or microbial invasion is now fairly widely accepted, although there are still some dissenters. However, the idea that the same substances may be loosed into the environment from one plant and then be responsible for stimulating or inhibiting a second plant growing in close proximity is still controversial. Some ecologists, such as J. L. Harper in this country, claim that the experimental evidence so far available is insufficient to prove that these chemicals have a significant role in natural communities. They believe that competition is sufficient to explain the negative or positive effect of one plant on another. Other ecologists, such as the author of

this monograph, have no such doubts and acknowledge that an understanding of allelopathy is important not only for interpreting patterning in natural ecosystems but also for maximizing plant yields in agriculture, horticulture and forestry. The first book devoted to allelopathy was published in 1972 and it stimulated research in this area, so much so that an increasing number of papers appear each month in the primary literature. It is only right and proper that the author of that first edition should provide us with a revision, which incorporates the findings of the last decade.

The first edition seemed to me to be rather poorly organized in its subject matter and it is pleasing to report that the sequence of topics is now more logically presented. After an introductory chapter concerned with nomenclature, there follow two chapters on manipulated ecosystems, one on plant pathology (a very weak contribution) and then five on natural ecosystems, dealing in turn with the patterning of vegetation, the effects of algal growth, field succession, seed germination and the nitrogen cycle. The final five chapters then cover the chemistry of allelopathic agents, the factors affecting their production, their movement between plants, their likely mechanisms of action and their effectiveness *in vivo*. Finally, there is an extensive 48 page bibliography. This is one of the most valuable features of the book, though the references to the phytochemical literature are somewhat out-of-date.

One fault of the first edition was its anecdotal style, the author being content in many cases to report results with little critical comment but this has been partly remedied here and the whole reads very much better than before. Undoubtedly, this second edition will be valued for the completeness of coverage of the subject. In my view, the most important evidence supporting the phenomenon of allelopathy are the experiments of Cornelius Muller and his students carried out during the 1950s and 1960s and rightly Rice devotes much space in chapter 5 to these data. It is disappointing that none of the work carried out since then has really added a great deal to these pioneering experiments. However, the publication of this second edition may once again stimulate further experimentation and we may well see the critics of allelopathy having to eat their words in the years ahead.

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The Families of the Monocotyledons: Structure, Evolution and Taxonomy: by R. M. T. DAHLGREN, H. T. CLIFFORD and P. F. YEO. Springer, Berlin, 1985. 520 pp. DM 294.

For as long as I can remember, phytochemists wishing to relate their findings to systematics at the higher levels of classification among the flowering plants have been in a quandary. Thus, taxonomists such as Cronquist, Takhtajan and Thorne have each produced a different system of classification and it is never quite clear to the outsider which one he should relate to. Furthermore, the reasons why particular families are grouped together in various orders and superorders are not always made clear in the taxonomic literature. The present volume, which treats only the monocotyledons, is especially welcome since it provides an integrated system which is supported by extensive character analysis and where the evidence is discussed and the decisions taken are explained. Additionally, places in the classification where affinities are still unclear are carefully indicated. Even better, the available phytochemical evidence has also been used when appropriate.

This monograph is, in fact, the third dealing with monocot classification by the indefatigable author Rolf Dahlgren to have appeared in the same number of years. Previous accounts have assembled the relevant biological and chemical data (Dahlgren and Clifford, 1982) and provided cladistic analyses of these data (Dahlgren and Rasmussen, 1983). However, this book stands on its own and can be used without extensive reference to the two earlier works, since their findings are summarized and recapitulated here. What we have in this book is a reasoned argument for a particular classification of the 100 or so families into 21 orders and 10 superorders. The evidence for this system is then outlined, with accounts of the morphological concepts, the chemical features, the evolutionary concepts and the distributions of the character conditions. This takes up the first 100 pages. The remainder is then an outline of the classification, family by family, with line drawings illustrating the key morphological features of each family. Chromosome numbers are given, geographical distribution described and ornamental and economic uses mentioned.

There are two drawbacks, which must be mentioned. Firstly, this book has been published in advance of the monocotyledon volume in the series "The Families and Genera of Flowering Plants" which will provide a complete listing at the generic level. Without having the advantage of these lists, the book is thus not comprehensive; while in the smaller families all the genera are usually mentioned, this is not so in the larger families. This disadvantage is counterbalanced by the fact that other taxonomists have been consulted for the taxonomic treatments of the more important families (e.g. Dr. Goldblatt for the Iridaceae, etc.) so that the family treatments have considerable authority.

The second drawback is that the chemical evidence is not completely up-to-date. Unfortunately, again, the authors have not had the advantage of consulting R. Hegnauer's updating of his monocot volume in *'Chemotaxonomie der Pflanzen'* volume 7, which is actually in press at the moment. Having said that, it is pleasing to see that the recent survey by Harris and Hartley of UV fluorescence in cell walls (due to attachment of ferulic acid residues) does get a mention. There are, however, a