

BOOK REVIEWS

Plant Nonprotein Amino and Imino Acids: by GERALD A. ROSENTHAL. Academic Press, New York, 1982. x + 273 pp. \$37.50 (£24.80).

The non-protein amino acids (to add imino only brings in a wide number of alkaloids which are not covered here) are an ecologically important group of compounds which in spite of excellent work by, *inter alia*, Arthur Bell, Leslie Fowden and the present author are still regarded by many as phytochemical freaks. Well, this book should put them more on the map. It is not addressed to phytochemists, however, but more to toxicologists, and animal and plant physiologists and biochemists.

The book contains four chapters and an extensive table which lists almost all the known non-protein amino acids (NPA's) up to the end of 1980. This table is extremely useful although it is a pity that there was not room for the plant families for the 241 compounds whose structures are given. Thus *Acacia* is familiar but *Quisqualis* is not! This would also perhaps have allowed the taxonomic significance of these compounds to be seen.

Of the four chapters, the last two which deal with 'Toxic Constituents and Their Related Metabolites' and the 'Components of Intermediary Metabolism' are well

done. The first of these contains most of the available data on the compounds. Lucid accounts of the activity of each NPA against a variety of organisms, mainly mammals, insects and plants, are given. It would have been useful to have had summary tables of these activities like that given for just canavanine. Perhaps a general introduction to the chapter could have outlined the meaning of toxicity and possible cures. The last chapter deals with the biosynthesis and inter-relationships of several amino acids, both protein and non-protein. It might have been better to have put this before, or alongside the relevant sections in Chapter 3.

The reason for the first two chapters is not at all clear. They will be of little interest to most people since they consist of elementary accounts of molecular structure, pH and so on and demonstrations of how to separate *mainly* protein amino acids in a variety of ways. Here a few tables of R_f , R_i and spectral parameters of the more common nonprotein amino acids would have been valuable. Nevertheless this book is a welcome addition to the library of any department interested in phytochemistry.

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The Natural Coumarins: by R. D. H. MURRAY, J. MENDEZ and S. A. BROWN. John Wiley, Chichester, 1982. 702 pp. £70.

Waste no time reading this review if you have any direct interest in natural coumarins—whether chemical, phytochemical, biological, or pharmacological—this book is for you. It is comprehensive, well written, accurate, balanced and practical. It is the result of painstaking effort over many years by the authors and will undoubtedly become a standard work.

This review continues only because there will be many whose commitment to coumarins is less but who will find the volume valuable and will want some detail about the contents before making up their minds about purchase for themselves or for a library. The book is *ca* 700 pages long and falls near enough into two equal parts, the first being mainly discussion, the second consisting entirely of tabulated material. There are 800 or so coumarins presented, and over 4000 occurrences are listed for *ca* 690 genera. I may have missed a few dozen; I doubt the authors have missed any. The main list of coumarins is an updated and expanded version of that already published by one of the authors [Murray, R. D. H. (1978) *Fortschr. Chem. Org. Naturst.* 35, 199]. The number and importance of plant coumarins entirely justifies so detailed and extensive a treatment.

The discussions begin with an introduction and a short chapter on isolation procedures. A major chapter follows, concerned with methods of identification and structure determination; it includes a section on paper chromato-

graphy (which is still an excellent tool for plant analysis though it has lost the eminence it once had in the general chemical laboratory) and reviews with many references the full range of UV, MS, IR, NMR and fluorescence spectroscopic methods of tested value (though the reviewer rather churlishly thought some more examples of actual UV spectra would have been an advantage). Definitive X-ray diffraction studies are also commented on.

Spectroscopic techniques are now so powerful and pervasive that an actual chemical reaction has rather a quaint look about it; the authors sensibly treat only reactions that are still significant; mainly the effects of acid and alkali, reduction, and oxidation. Chemical synthesis is dealt with separately, of course, and includes discussions of nuclear hydroxylation and selective etherification, as well as numerous modifications of side chains such as cyclization giving new ring systems. Coumarins are not rich in stereochemical problems but the configurational relations and determinations of compounds like columbianatin and the khellactones are fully explored. The sugar parts of glycosides are not mentioned, however, except very briefly.

The biosynthesis of coumarins is discussed at length; not surprisingly, the carcinogenic aflatoxins receive considerable emphasis. There is also a small section devoted to biosynthesis in diseased plants since attack by pathogens can augment or even induce coumarin production. Conversely, there is a chapter on the degradative metabolism and detoxification of coumarins by animals, microbes and plants, special emphasis being given to the

physiologically important members of the series, especially the anticoagulant dicoumarol and the carcinogen aflatoxin. Compounds related to these also form the subjects of separate chapters on their biological modes of action; a third, similar chapter does the same for the furanocoumarins, some of which sensitize the skin to injury by light and some of which interfere with the replication of DNA and have other important biological effects. Many coumarins inhibit growth in seeds and micro-organisms and alter respiration rates. Some of these sections are not as easy to read as the others because by their nature they often have to accommodate a large number of disparate and even conflicting reports but all the material is presented with clarity and sensitivity.

The index is perhaps less extensive than it might have been, but it is adequate and the immense tables are themselves a form of indexing. A table of melting points in order is something of a novelty and is an eminently practical notion. Perhaps more attention should have been given to the desperate problem of nomenclature; as

the authors remark, there is no agreement even on numbering furanocoumarins, modern chemical and biochemical practice being substantially different. Indeed, the more chemical parts of the book use one system, the more biochemical parts another. Some notes on how to recognize coumarins in *Chemical Abstracts* would have been useful now that that invaluable publication has adopted a system that mixes coumarins with all other kinds of pyrones, including the even more numerous flavones. There is a very helpful index of trivial names.

The casual browser should perhaps be warned that there are two methods used side-by-side for designating structures. The natural coumarins themselves are given heavy-type numbers as assigned in the appropriate index, while other structures are given lighter type numbers increasing through each chapter in the usual way.

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