

## BOOK REVIEWS

**The Flavonoids—Advances in Research:** edited by J. B. HARBORNE and T. J. MABRY. Chapman & Hall, London and New York, 1982. x + 744 pp. £49.50.

This is an updating of the handbook *The Flavonoids* [for review see *Phytochemistry* **15**, 357 (1976)] covering the period 1975–1980. The present 'advances' has 12 chapters written by 20 authors. Besides contributions treating individual flavonoid groups, the book contains chapters devoted to recent advances in isolation techniques, <sup>13</sup>C NMR spectroscopy, biosynthesis and mammalian metabolism of flavonoids. The flavonoid groups treated are: anthocyanins, flavones and flavonols, flavone and flavonol glycosides, minor flavonoids (including chalcones, aurones, dihydrochalcones, flavanones and dihydroflavonols), proanthocyanidins, C-glycosylflavonoids, biflavonoids, isoflavonoids [including isoflavones, isoflavanones, rotenoids, pterocarpans, isoflavans, quinone derivatives like the abruquinones, 3-aryl-4-hydroxycoumarins, 3-arylcoumarins, isoflav-3-enes, coumestans, α-methyldeoxybenzoins, 2-arylbenzofurans, isoflavan-4-ols and coumaranochromones (= benzofuranochromones)]. The book is well indexed; it has a plant species index and a subject index. Highly valuable novel-

ties are the checklists to individual flavonoids which are included in each chapter on flavonoid types. These comprehensive checklists not only include new compounds, but also those treated in the 1975 standard work. The biflavonoid checklist on pp. 505–516 well illustrates how a wealth of information can be offered in condensed form: the 12 presently known types of interflavonoid-linkages are indicated by the numerals 1–12 (e.g. 6 means an 8,8"-linkage) and the types of flavonoids linked together are indicated by the letters A (flavone–flavone), B (flavanone–flavone), C (flavanone–flavanone) and D (others). The formula of 2B on p. 506 should have a flavanone unit on the left side instead of a flavone unit, of course.

All that was said for the 1975 handbook [*Phytochemistry* **15**, 357 (1977)] is fully valid for this first supplement. It is an extremely valuable and well produced book which cannot be missed in departments of organic chemistry, biochemistry, botany and nutritional chemistry.

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**Secondary Plant Products:** edited by E. E. CONN. Vol. 7 in the series 'The Biochemistry of Plants—A Comprehensive Treatise', Academic Press, New York, 1981. pp. 798. £56.20 (\$85.00).

"What, yet another book on secondary metabolites?" the weary phytochemist might complain. Yet an eight volume text which sets out to cover the whole of plant biochemistry can hardly fail to devote at least one volume to this subject. With so many competing texts now available in this area, the problem for the contributors is to find something novel to say which has not been said before or to find new ways of presenting their topics. I believe that the editor, Professor Conn, has successfully elicited from his staunch band of authors a variety of new viewpoints which more than justify the publication of the present text.

Inevitably, there are a number of chapters written by well-known specialists, covering once again the biochemistry of lignins, quinones, tannins, betalains and so on. Nevertheless, to balance these basic treatments, there are a variety of more general chapters which consider the biochemistry of secondary metabolism overall. Thus, their physiological role is briefly outlined by E. A. Bell in the opening chapter, while their production in tissue culture and their turnover are described by D. K. Dougall and W. Barz, respectively. Excellent chapters follow on cellular

compartmentation (H. A. Stafford) and synthesis in relation to plant differentiation (R. Wiermann). Another important general chapter is that of H. G. Floss on stereochemical aspects of biosynthesis. This is a topic which has been rarely covered in such depth before and, hence, it is particularly valuable to have it included here.

The chemosystematics of secondary metabolites rates a separate chapter by D. S. Seigler, who provides a useful, if brief, outline of the different chemical patterns encountered among the some quarter of a million known plant species. This same subject creeps into several other chapters, notably that by L. Fowden on non-protein amino acids. Although these unusual amino acids have been much reviewed before, this author still finds fresh things to say about them and this contribution is a real pleasure to read. There has been much recent interest in the polyamines, such as spermine and spermidine, in relation to plant growth processes and in a companion chapter, T. A. Smith elegantly summarizes our present knowledge about plant amines.

The enzymology of biosynthesis is another general theme which is taken-up in many chapters. It is salutary to compare the considerable successes that have been achieved with the flavonoid-synthesizing enzymes (reviewed here by K. Hahlbrock) with the general lack of success in isolating the enzymes for alkaloid biosynthesis. It is clear from an extensive account of alkaloid metabolism by

G. R. Waller and O. C. Dermer that our information on alkaloid-synthesizing enzymes is, apart from one or two exceptions, very fragmentary. Other enzymic chapters deal with oxygenases (V. S. Butt), methyltransferases (J. E. Poulton) and glycosyltransferases (W. Hosel). There is also a definitive account of phenylalanine ammonia lyase, the key enzyme of phenolic biosynthesis, by K. R. Hanson and E. A. Havir.

An apparent bias in this work towards phenolics and nitrogen-containing metabolites is immediately explained by the fact that terpenoids were dealt with in Volume 4 under lipids. One might argue that, considering the vast

number of known plant alkaloids, they should rate as many chapters as there are on phenylpropanoids. However, as mentioned already, the biochemistry of plant alkaloids is still at an early stage of development. Indeed, it may be hoped that the publication of this volume, if it does nothing else, will encourage plant scientists to turn their attention to a sadly neglected but highly important area of plant enzymology: the catalysis of alkaloid biosynthesis in plants.

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**Recent Advances in the Biochemistry of Fruit and Vegetables**, edited by J. FRIEND and M. J. C. RHODES. Phytochemical Society of Europe Symposia Series No. 19. Academic Press, 1981. 275 pp. £24.00.

This book contains invited papers presented at a symposium of the Phytochemical Society of Europe held in Norwich in April 1980. Thirteen papers appear in the book, written by researchers from the U.S.A., Australia and Europe whose work relates to the post harvest biochemistry of fruit and vegetables. A range of relevant papers is included which are grouped to form a number of themes, two or three papers being related to each theme. The opening chapter reviews work on respiration and fruit ripening and is followed by chapters on low temperature sweetening, and cyanide-insensitive respiration. The importance of the volatile plant growth regulator ethylene, both in the ripening process and the response to stress, has been recognized by the inclusion of two papers. One reviews the elucidation of the pathway of ethylene biosynthesis and investigations into the mechanism of its control whilst the other deals with the metabolism of ethylene. The subject of softening and fruit texture is covered in three chapters which, by their choice of content, give a comprehensive treatment of this topic. These chapters include: changes in cell wall composition; the enzymology of fruit softening; and the control of the alterations in synthesis of cell wall degrading enzymes at the molecular level. The final group of papers is devoted to

phenolics and pigments which, as components of fruit and vegetables, are significant factors in quality. Topics included in this section are: changes in polyphenol oxidases during the ripening of fruit; the molecular properties of plant tyrosinases; stress-induced changes in phenolic metabolism; and anthocyanins in fruit and vegetables.

The style and content of the book have been influenced by asking contributors to survey the progress made in their respective fields during the previous 10 years. The result is a series of review chapters which have avoided the problems of appealing only to the specialist researcher. Instead there is sufficient background information in each chapter for readers not expert in the field to familiarize themselves with the subject and bring themselves up to date. This has not precluded the inclusion of advanced data though it is now 2-years-old. Inevitably there is a degree of overlap with some of the papers but this has been kept to a minimum and serves to underline the theme of related papers as in the case, for example, of the contributions on cell walls. The authors have made the book interesting, especially for the non-specialist, by avoiding the inclusion of a mass of technical detail. This, combined with the range of topics covered means that the book will be a useful addition to the library in departments where biochemists, plant physiologists and food scientists work.

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