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BOOK REVIEWS

Biochemistry of Storage Carbohydrates in Green Plants: edited by P. M. DEY and R. A. DIXON. Academic Press, Orlando, 1985. 378 pp. £65.

After a long period when few comprehensive reviews were available we are now regaled by a feast of modern texts on the biochemistry of plant carbohydrates. First in the field was volume 3, edited by J. Preiss, in Conn and Stumpf's 'Biochemistry of Plants' published in 1980. Even more comprehensive accounts appeared in 1982 in volumes 13A and 13B of the Springer 'Encyclopedia of Plant Physiology' New Series. More recently, we have had a general introduction from C. M. Duffus and J. H. Duffus and a volume on storage carbohydrates under the imprint of the S.E.B. and the editorship of D. H. Lewis. This book, also on storage aspects, thus arrives to face considerable competition. Whether you decide to buy it will depend on which of the above books you already have on your shelves.

The four basic chapters of the book are those on sucrose (J. S. Hawker), galactose-containing oligosaccharides (P. M. Dey), starch (D. J. Manners) and fructans (H. G. Pontis and E. Del Campillo) and these are all excellent in their various ways. To this main core are added an all-too-brief chapter on plant glycosides and four chapters on other polysaccharides (e.g. mannans, $\beta 1 \rightarrow 3$ glucans), where the extent of the storage function is still uncertain. Finally, there is a single chapter by E. Percival and R. H. McDowell on algal polysaccharides, where lower plants appear for the first time. The book is generally up-to-date, although few references after 1982 appear, and provides a broad survey of the subject within a reasonable compass. It is glossily produced to high standard; the illustrations in particular deserve a special mention. Overall, then this is a useful addition to the plant biochemistry literature.

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The Chemistry and Biology of Isoquinoline Alkaloids: edited by J. D. PHILLIPSON, M. F. ROBERTS and M. H. ZENK. Springer, Berlin, 1985. 304 pp. DM 108.

If one had to choose one group of alkaloids to illustrate modern plant alkaloid research, those of the opium poppy would be high on most people's list. Morphine remains one of the most widely used painkillers, while its diacetate, heroin, continues to give pleasure to many thousands, in spite of its addictive properties. It is a classic example of a plant drug which is both a blessing and a curse; correctly used, it relieves untold suffering but, misused, it leads inexorably to ill-health and even death. A new book on these and related alkaloids is bound to attract a wide audience.

As indicated in the opening scholarly chapter by N. G. Bisset, the use of opium by Mediterranean man for religious, and probably also medicinal, purposes can be traced back with some certainty to 1600 B.C. Although morphine itself is unique to *Papaver somniferum* and the closely related *P. setigerum*, isoquinoline alkaloids as a class are widespread not only in *Papaver* but also throughout Papaveraceae. A significant chemotaxonomy has emerged from the study of the natural distribution of poppy alkaloids and this is discussed by N. G. Bisset and also in a separate chapter by V. Preininger.

The painkilling properties of morphine have inspired organic chemists to provide a total synthesis and also the synthesis of many analogues in a search for a similar painkiller, which is non-addictive. More recently, discoveries of opiate receptors in the human brain have given rise to the synthesis of many further structures, which may be classified as opioids with either agonist or antagonist activity. These chemical studies are reviewed here by both A. Brossi and J. L. Neumeyer.

The elucidation of the biosynthetic pathway to the complex pentacyclic morphine molecule has presented a considerable challenge to plant scientists and we are still far from a complete picture. However, the broad outline has been indicated by tracer feeding experiments, as reviewed here by R. T. Brown, R. B. Herbert and E. Brockmann-Hanssen. The final stages in the pathway have been more clearly defined than some of the earlier steps. The enzymology of the pathway has remained relatively elusive, as is clear from the chapter of M. H. Zenk, but the successful combination of plant cell culture techniques with radioisotope and immunological methods has at least provided the means of characterizing some of the enzymes along the pathway.

Tissue culture techniques have so far failed to produce morphine in quantity, although thebaine, codeine and morphine all have been detected in cultured cells. The production of these alkaloids in cell cultures is currently being developed in many laboratories, because of the possible biotechnological application and recent progress is fully described in contributions by F. Constabel and by M. Rueffer. In the opium poppy, morphine is laid down in the latex and recent experiments reviewed here by T. M. Kutchan *et al.* give details of the subcellular localization of poppy alkaloid accumulation.

The present volume is derived from a symposium held by the Phytochemical Society of Europe in London in April 1984. There are details of other alkaloids besides those of poppies—indeed isoquinoline alkaloids occur in the Annonaceae, Cactaceae and Leguminosae (*Erythrina*) and the alkaloids of these plant groups receive up-to-date reviews. In summary, this is an attractive, well-illustrated and reasonably priced review volume and I am sure it will interest many other phytochemists besides those working immediately in this field.

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Biosynthesis and Biodegradation of Wood Components: edited by TAKAYOSHI HIGUCHI. Academic Press, London, 1985. 679 + xvi pp. £99.00.

Like 'All Gaul' this substantive and comprehensive book, the first on wood biochemistry, is divided into three parts: (i) the structure and chemistry of the major components of wood cell walls; (ii) the metabolism and synthetic function of cambial tissue, the function of organelles involved in biosynthesis, and the biosynthesis both of the major cell wall components of wood and wood extractives; and (iii) the microbial degradation of cellulose, hemicelluloses and lignins and of wood extractives.

This is a useful book. Granted there is occasional repetition but it is no more than is to be expected in a compilation of this kind. The whole book to which the editor, Takayoshi Higuchi himself has made elegant and knowledgeable contributions in his chapters on 'The Biosynthesis of Lignin' (Chapter 7) and on 'Degradation Pathways of Lignin' (Chapter 20) is well annotated and indexed.

The section on structure of wood cell walls (Chapters 1–3) is well documented pictorially with good quality photographs of scanning and transmission electron micrographs and ultraviolet photomicrographs, techniques available for investigating lignin distribution. The second section (Chapters 4–15) is, not surprisingly with such a wide range of topics and with a corresponding number of authors, a little uneven in depth. However, several chapters are timely reviews of recent developments in their respective fields; those particularly relevant and up-to-date are written by the reigning masters in the respective subjects, for example 'Biosynthesis of Flavonoids' (Hans Grisebach), 'Biosynthesis and Metabolism of Phenolic acids and Monolignols' (G. G. Gross), Biosynthesis of Stilbenes' (H. Kindl). An excellent, readable and well referenced chapter on the 'Biosynthesis of Terpenoid Wood Extractives' (Chapter 15) concludes this section.

In many ways, the third section (Chapters 16–22) is from a biotechnological point of view the most exciting. These chapters, on biodegradation of cellulose (Chapter 17), of hemicellulose (Chapter 18) and the degradation of wood by microorganism (Chapter 16), contain full references to 1984. Contributions and complementary approaches to the chemistry of lignin biodegradation demonstrate clearly the rapid progress in this field. It is evident that some discrepancies exist between the results from studies on the fungal degradation of lignin model components (Chapter 20) and from studies on the fungal degradation of lignins in wood (Chapter 19).

This book is well produced, but even by present day standards the unit cost of the book is high; nonetheless, the information content more than compensates for the price. In my view the authors have achieved their objective of writing a useful up-to-day reference book for professional chemists, biochemists and wood technologists and conceivably some final year undergraduates.

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Advances in Botanical Research Vol. 11: edited by J. A. CALLOW and H. W. WOOLHOUSE. Academic Press, Orlando, 1985. 205 pp. £42.

The latest volume in this now well established review series has four diverse topics: Laser light scattering in biological research, the transport and fixation of inorganic carbon by marine algae, the biochemistry of seed gums and hemicelluloses and *Welwitschia mirabilis*. There is thus something here for most plant scientists. Laser light scattering is a new technique which permits the study of dynamic events within the plant without destruction and with regular samplings at very short time intervals. The basic principles are explained and some biological applications, e.g. to the observation of cytoplasmic streaming in plant cells, are discussed. The second chapter deals with the experimentally difficult photosynthetic system of marine algae. Recent work on the properties of algal RUBISCOs and on variations in carbon assimilation among the different algal groups is reviewed in some detail.

The third chapter considers that problematical group of