Carbohydrate Research, 123 (1983) c31–c33
Elsevier Science Publishers B.V., Amsterdam – Printed in The Netherlands

Book review

Encyclopaedia of Plant Physiology, New Series: edited by A. PIRSON AND M. H. ZIMMERMANN, Volume 13A, *Plant Carbohydrates I, Intracellular Carbohydrates,* edited by F. A. LOEWUS AND W. TANNER, 1982, xxii + 793 pages + Author and Subject Indices, 124 pages, $132.40; and Volume 13B, *Plant Carbohydrates II, Extracellular Carbohydrates,* edited by W. TANNER AND F. A. LOEWUS, Springer-Verlag, Berlin-Heidelberg-New York, 1981, xxii + 677 pages + Author, Species, and Subject Indices, 91 pages, $114.10.

A quarter of a century ago, a massive, single volume* was published on "The Formation, Storage, Mobilization and Transformation of the Carbohydrates", as part of the bilingual "Encyclopaedia of Plant Physiology". Now, a new series of volumes of the Encyclopaedia is being published in English. Two of the recent ones are on "Plant Carbohydrates", separated, inevitably somewhat arbitrarily but effectively, into one on "Intracellular Carbohydrates" and the other on "Extracellular Carbohydrates". The editors rightly stress that this is not a revision of the earlier work, but a completely new enterprise. The older work will still serve to present much of value and to provide a perspective of earlier current-awareness. One minor and amusing oddity is the Editors' remark that the comparative sizes of the new and old works manifest the explosion of knowledge in the field covered. The earlier work, at over 2.5 kg and 1444 pages, was certainly no pocket book, and so one must be very thankful that the genuine explosion now so accurately and skilfully recorded has been successfully confined within a work only modestly increased in size. It is a tribute to all concerned that the dynamics and present results of the explosion are so graphically depicted, both by describing the many fragments of knowledge which are now more easily discerned and explained, and by giving a valuable impression of fragments whose natures and roles await clarification. There is much stimulating and sensible speculation in realms where the facts cannot yet support secure hypotheses, but where the speculation provokes thought which will, in turn, promote research.

The first volume, on intracellular carbohydrates, is divided into three main sections, the first two being on "The Occurrence, Metabolism and Function" of "Monomeric and Oligomeric Sugars and Sugar Derivatives" and on "Macromolecular Carbohydrates", and the final one on "Physiological Processes". The chapters in the first section deal with hexoses and uronic acids (D. S. Feingold), polyhydroxy acids in relation to hexose phosphate metabolism (J. E. M. Gander), amino

*W. Ruhland (Ed.), *Encyclopaedia of Plant Physiology*, Vol VI, Springer-Verlag, Berlin, 1958.

acids of plants and fungi (L. Beevers), branched-chain sugars (E. Beck), sugar alcohols (R. L. Bieleski), cyclitols (F. A. Loewus and D. B. Dickinson), sucrose and other disaccharides (G. Avigad), sucrosyl oligosaccharides (O. Kandler and H. Hopf), and glycosylation of glycosides and C-glycosyl compounds (G. Franz). The second section deals firstly with reserve polysaccharides in chapters on biosynthesis of starch and its regulation (J. Preiss), other reserve polysaccharides in higher plants (H. Meier and J. S. G. Reid), and those in algae, fungi, and lichens (D. J. Manners and R. J. Sturgeon). The section continues with chapters on plant glycoproteins (R. R. Selvendran and M. A. O'Neill), membrane glycoproteins (D. J. Bowles), glycolipids and other glycosides (A. D. Elbein), and steryl glycosides (M. Axelos and C. Péaud-Lenoël). The volume ends with chapters on transport of sugars (E. Komor), secretion of nectar (N. Findlay), storage of sugars in higher plants (J. Willenbrink), storage of starch (C. F. Jenner), and the control and mobilization of reserve polysaccharides in higher plants (P. Halmer and J. D. Bewley).

The second volume, primarily on extracellular carbohydrates, has five sections. The first, on "Cell Walls of Higher Plants" has chapters on wall polysaccharides (G. O. Aspinall), biophysical and biochemical views of the ultrastructure of the wall (J. R. Colvin and K. Katō, respectively), the assembly of polysaccharide fibrils (D. G. Robinson), biosynthesis and metabolism of cellulose, and noncellulosic, wall glucans (G. Franz and U. Heiniger), metabolism of noncellulosic polysaccharides (G. B. Fincher and B. A. Stone), glycoproteins and enzymes of the wall (D. T. A. Lamport and J. W. Catt), lipid-linked saccharides in the biosynthesis of complex carbohydrates (A. D. Elbein), biosynthesis of lignin (T. Higuchi), cutin, suberin and associated waxes (P. E. Kolattukudy, K. E. Espelie and C. L. Soliday), and on wall extensibility and hormones (R. E. Cleland). The next section, on "Cell Walls of Algae and Fungi" has chapters on algal walls and their composition and biosynthesis (E. Percival and R. H. McDowell), their cytology of formation (D. G. Robinson), and autolysines (U. G. Schlösser). After a survey of cell walls by J. G. H. Wessels and J. H. Sietsma, there are chapters on chitin (E. Cabib), glucans (G. H. Fleet and H. J. Phaff), and mannoproteins (R. E. Cohen and C. E. Ballou), and on the biosynthesis of the last (L. Lehle). The third section, on "Export of Carbohydrate Material", has three chapters, namely, those on the secretion and secretory activity of fungi (R. Sentandreu, G. Larriba, and M. V. Elorza), of cell walls of higher plants (J. H. M. Willison), and of the root cap (M. Rougier). The penultimate section, on "Cell Surface Phenomena", is on components involved in pollination (A. E. Clarke), and on plant–pathogen interactions (T. Kosuge), and the final section, on "Lectin–Carbohydrate Interactions", has two chapters, one on lectins and their physiological role in slime moulds in higher plants (H. Kauss), and the other on the role of lectins in plant–microbe interactions (E. L. Schmidt and B. B. Bohool).

There are *comparative* newcomers and older hands in the foregoing band of authors. The former present fresh views that are well considered, and the latter,

well considered views that are fresh; it is a successful blend. The authors, with very few exceptions, have in common the uncommon ability to communicate clearly and to create and sustain interest. Only rarely does one wish that the Editors had intervened a little, to modify style rather than content. It would be churlish and petty to dwell on such rare defects, as it could unfairly distort the overwhelming impression of excellence and the value of the complete work.

The Editors have succeeded in briefing, or in some way guiding, the various authors to provide self-contained chapters on subjects that are related, or indeed overlapping, while contriving to avoid repetition. The chapters are both independent entities easily read on their own, and parts of a satisfying, interdependent whole. Except where suggested by the authors, there is little need to refer elsewhere in either volume in order to understand the chapter currently being read. For most, it is probable that any extensive reading will be on a permute-your-chapters-as-you-need basis. The reviewer found that, whether read in this way, or in the order of presentation, the volumes are splendid guides and clear informants. The books can also, but less usefully, be dipped into for specific points with the aid of the Subject and Species Indices, totalling 50 pages (for no clear reason, these indices are separate in Volume 13A, and combined in Volume 13B). The author indices totalling 157 triple-column pages will prove particularly valuable to those well acquainted with a particular field. The alphabetically ordered references are appended to each chapter, and are fully titled; over half of them are to material published within the past ten years.

All of the chapters are, in essence, reviews. They vary markedly in style; emphasis and selection of materials are clearly matters involving well informed and intelligent judgments made by the respective authors. Although very fully documented, the reviews are in no danger of sinking beneath masses of facts and supposed facts. The authors succeed in presenting the abundant evidence selectively, in order to convey a sense of the current awareness in their various fields. The writing is kept lively and individualistic, due to the authors' personalities and controlled views being allowed to shine through the texts. A pleasant mixture of humour and wry comment contributes to this attractive feature. The guidance offered by the various authors ensures that uncertainty is revealed, rather than concealed. This is very important, as it ensures that the reader is given a sense of reality, akin to that experienced at his own bench. This is so, even when one is reading about a less well known, or largely unknown, field. Clarity is attained, but not by tidying disquieting or intriguing uncertainties out of sight in order to present apparently definitive versions

The books are attractively and substantially bound, crisply printed, and provided with excellent Figures and high-quality plates. They will serve a very long time as the major, compact source of current awareness, and be indispensable in libraries and, it is to be hoped, on private shelves.

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