Carbohydrate Research
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Book review

Carbohydrate Metabolism and its Disorders: edited by F. DICKENS, P. J. RANDLE, AND W. J. WHELAN. Academic Press, London and New York, 1968. Volume 1, xvi + 576 pp., 130*s*. Volume 2, xiv+392 pp., 100*s*.

For biological macromolecules, probably the greatest body of connected chemical, physiological, pathological, and biochemical knowledge is that concerned with glycogen. This has been amassed from a multiplicity of investigations in many laboratories, notably in the last two decades. The publication of these volumes is particularly timely in bringing together much data that have not been assembled previously in an authoritative work.

The first volume, comprising sixteen chapters each contributed by one or more distinguished specialists, deals with broad aspects of carbohydrate metabolism as normally found in mammals. In the opening chapter, W. F. Widdas outlines some theories about membrane transport of sugars by erythrocytes, microorganisms, and other cells. In a rapidly moving field, it is inevitable that the principal emphasis is laid on established hypotheses rather than more-recent thought about molecular entities involved in transport processes. In a concise and well-written review, R. K. Crane systematically deals with aspects of absorption and digestion of carbohydrates in terms of cellular organisation and especially of intestinal, brush border cells. The part played by phosphorylation in glycolysis and related enzymic pathways is discussed in detail by A. Sols. Considerations are also included of essential control mechanisms at the enzymic level and of their relation to the integration of metabolic pathways. W. J. Whelan and his colleagues lead the reader through the intricacies of biosynthesis and degradation of glycogen from a strictly enzymological point of view, with the skill to which we have become accustomed. The established knowledge regarding pentose and uronate metabolism is well reviewed by B. L. Horecker in Chapter 5. The rapidity of developments in the biochemical understanding of the structure and metabolism of glycosaminoglycans (mucopolysaccharides) has been particularly dramatic in recent years. The chapter by K. S. Dodgson and A. G. Lloyd embodies much of the newer information, and considerations of metabolic turnover are particularly useful. It is much to be hoped that their suggestion to redesignate "*high-molecular weight protein–polysaccharide complexes*" as *proteoglycans* will receive wide approval. Similarly, the glycoprotein field also has been a scene of rapid biochemical progress. R. D. Marshall and A. Neuberger, who review glycoproteins in terms of the different types of carbohydrate–peptide bonds, are to be congratulated on their thorough collation of important, recent, biochemical results, and some of the physiological implications.

The chapters which follow (S. Pontremoli and E. Grazi; G. D. Greville) are

tersely factual and give a clear and concise guide to the properties of individual enzymes involved in gluconeogenesis and pyruvate and citrate metabolism. Perhaps the most impressive parts of Volume 1 are the chapters on hormonal regulation of carbohydrate metabolism; J. Ashmore and G. Weber on hormonal control in liver; H. T. Narahara and C. F. Cori on that in muscle; P. McLean, J. Brown, and A. L. Greenbaum, in adipose tissue; and the effects of hormonal release, dealt with by P. J. Randle, S. J. H. Ashcroft, and J. R. Gill. An interesting survey is contributed by G. C. Kennedy on the role of the central nervous system in relevant aspects of metabolism and integration. Together, these represent a notable achievement in an area difficult to assess and seldom treated effectively, even in specialised monographs.

The volume concludes with chapters on developmental aspects of carbohydrate metabolism (by D. G. Walker) with special emphasis on foetal carbohydrate supply, and an organ-by-organ account (by G. F. Cahill and O. E. Owen) of the human capability for carbohydrate turnover.

The thirteen chapters of Volume 2 are devoted to carbohydrate disorders. In the opening chapter, G. F. Joplin and A. D. Wright review the detection of diabetes in man, in more than generous detail, and hormonal aspects, in particular insulin, growth hormone, corticosteroids, and glucagon, receive close attention in the following chapter by C. N. Hales. A well-constructed review of hypoglycemia is contributed by M. Cornblath, and another, by G. S. Dawes and H. J. Shelly on physiological aspects of foetal metabolism. Glycogen-storage diseases discussed (in Chapter 5) by B. I. Brown and D. H. Brown and (in Chapter 6) by H. G. Hers and F. van Hoof represent not only interesting studies in enzymic defects but also underline the value of genetical contributions to an understanding of biochemical pathways.

The age-changes and pathological variations in glycosaminoglycans of connective tissue and synovial fluid are competently reviewed in considerable detail by J. C. Caygill. Other disturbances of carbohydrate metabolism, instanced by insulin antagonists, are considered by H. M. Katzen and M. S. Glitzer, while E. Samols and D. Holdsworth contribute a chapter of disturbances in liver disease, and A. Dahlqvist, B. Lindquist, and G. Meeuwisse review digestive disturbances.

Chapters on carbohydrate intake in relation to diabetes and atherosclerosis (by J. Yudkin), glucose tolerance in cardiovascular disease (by F. Wahlberg and B. Thomasson), and glycosurias (by V. Marks and E. Samols) add further weight to the volume.

As the editors state in their first preface, they are well aware of the difficulties associated with multi-author volumes and, in the main, they have been successful in avoiding the major pitfalls. There is some overlap in subject matter between the two volumes, and the choice of chapter topics has clearly been problematical, possibly the more so in the second volume. The work restricts itself severely to mammalian carbohydrate metabolism and thus, regrettably, such major areas as cellulose and chitin biochemistry fall outside its scope. It is, however, surprising that in neither volume is there more than brief mention of scurvy or of ascorbic acid, one of the best known of the vitamins and the first to be synthesized chemically.

Nevertheless, the editors have made a useful coverage which will meet the interests of a wide circle of readers. The volumes, written in a readable style, are well printed, and are commendably free from minor errors. Each volume is indexed separately, both for authors and subjects, in an ample fashion.

The editors consider it "doubtful if any author could have covered so ably and so authoritatively the many aspects of our subject in the way that our distinguished contributors have done". They are right. While the volumes, in general, are more informative than critical, fundamental areas of mammalian intermediary metabolism are integrated in an admirable way, and the work represents a signpost in the contemporary biochemical literature.

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