

INTRACELLULAR 'FREE' AMINO-ACIDS

Amino Acid Pools

Distribution, Formation and Function of Free Amino Acids: Proceedings of a Symposium on Free Amino Acids held at the City of Hope Medical Center, Duarte, California, May 1961. Pp. xi+815. Edited by Joseph T. Holden. (Amsterdam, London, New York: Elsevier Publishing Company, 1962.) 120s.

IT is now a commonplace of biochemistry that treatment of living cells with boiling water, detergent solutions, alcohols or mild acids in the cold, etc., releases mixtures of free amino-acids from within the cells. Therefore the cells contain amino-acids either in the free state or in some form from which they are readily released in the free state. Such intracellular amino-acids constitute the 'amino-acid pool' of the cell, and pools have now been described in cells ranging from micro-organisms to mammalian, plant and insect tissues. This volume is the first comprehensive collection of data and theories about the nature, distribution, function and variation of amino-acid pools, and presents an expanded account of the proceedings of a symposium held at the City of Hope Medical Center, Duarte, California, in 1961. The volume is edited by J. T. Holden, who was chairman of the Organizing Committee and contributes two major articles on amino-acid pools in micro-organisms. The contributions are set out in detail with many illustrations and accompanied by edited accounts of discussions which followed presentation of the papers at the meeting. Originally the title of the symposium included the term 'free amino-acids', but, since some of the participants doubted whether intracellular amino-acids are truly free, the title of the book has been restricted to the non-committal *Amino Acid Pools*. More than seventy authors contribute to the book, and it would be invidious to single out individuals for specific mention.

Amino-acid pools are relatively easy to study (perhaps deceptively so) and, when quantitative data can be obtained, provide an indication of changes in the metabolic state of the cells. It is essential to establish accurate analytical methods for the extraction, identification and estimation of the amino-acids and to relate the results to the pools in the cells before extraction. When extracts are subjected to examination by paper chromatography, questions arise concerning the nature of unknowns as well as the proper identification of probably knowns. Appropriately, therefore, the volume begins with discussion of analytical techniques, accuracy of identification, production of artefacts and recognition of errors. The first part of the book then contains some thirty papers describing the amino-acids found in pools extracted from plants, micro-organisms, insects and vertebrates and includes six papers on amino-acids of the blood of man and animals in various normal and pathological states and after treatment with drugs. Participants were "encouraged to submit as much chromatographic evidence as they felt was required to document their conclusions". The result is that there are many pages of photographs of chromatograms (a rough count gives 900) which add more to the weight (nearly 4 lb.) of the book than to its scientific value. There is a mass of factual material in these 500 pages which provides a fund of information for anyone contemplating this type of investigation. The particular problems arising from extraction of specific tissues provide many valuable contributions to the methodology of pool investigations.

The second part of the volume contains nineteen contributions on dynamic aspects of amino-acid pools and sets out more fundamental attempts to elucidate the properties and functions of internal free amino-acids. Amino-acid pools can accumulate as a result of endo-synthesis or transport of preformed amino-acids from the

external medium, and both phenomena raise problems of membrane permeability and transport processes. Various theories of membrane passage are discussed by a number of speakers and the nature, localization and metabolic character of the pool debated. The relationship of free amino-acids to protein metabolism is clearly of importance, and the last group of papers in the symposium deals with protein turnover and its control, the role of free amino-acids as obligatory intermediates in protein synthesis, and the metabolic significance of lipo-amino-acid complexes. The book is completed by a report of a round-table discussion on the state of the intracellular amino-acids.

Protein synthesis occurs much more efficiently in cells than in test-tubes because the cell interior is a highly controlled and integrated metabolic system. The free amino-acid pool provides a delicate measure of the balance of the metabolic processes forming this system and its study should throw much light on cell physiology. This symposium is invaluable for anyone entering the field of amino-acid metabolism in any living tissue and provides, within the compass of one volume, an assembly of information nowhere else available.

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CARBOHYDRATE CHEMISTRY AND BIOCHEMISTRY

Advances in Carbohydrate Chemistry

Vol. 17. Edited by Melville L. Wolfrom. Pp. xi+503. (New York and London: Academic Press, 1962.) 114s. 6d.

VOLUME 17 of this now venerable series contains rather fewer, but on average longer, articles than its predecessors. There are reviews of higher carbon sugars (J. M. Webber), sugars of the cardiac glycosides (T. Reichstein and E. Weiss), oligosaccharides (R. W. Bailey and J. B. Pridham), platinum-catalysed oxidations (K. Heyns and H. Paulsen), dicarbonyl carbohydrates (O. Theander), purine nucleosides (J. A. Montgomery and H. J. Thomas), and enzymatic synthesis and degradation of starch and glycogen (D. J. Manners). Most of the articles bring earlier reviews up to date, as well as covering new ground; the chapter on oligosaccharides provides the first comprehensive compilation of these sugars in this series. About 200 are listed, and a measure of the rapidity of development in this field is that an unpublished list prepared by one of the authors now totals about 350. The volume also contains a review of the late H. O. L. Fischer's life and work, by J. C. Sowden.

Publications of this type do not warrant the usual type of review. Each article is a survey by an expert in the particular field, and as such is warmly welcomed by carbohydrate chemists in general. The articles are of a style that dates very little and because, when it is possible, they contain compilations of compounds with their properties, they have come to be the major source of reference in the field. Anyone with serious pretensions to be a carbohydrate chemist would do well sooner or later to spend the £70 required to purchase the complete series. The editors, M. L. Wolfrom, now editing his fifteenth volume, and R. S. Tipson, his ninth, deserve the largest share of the credit, for their zeal in enlisting contributors, in ensuring that all aspects of the subject are eventually covered, and in imposing their own high standards to ensure clarity and attractiveness of presentation. This laudable drive for high standards of presentation has, however, led them in the preface to describe as "deplorable" the "babel of initials employed for the designation of many of the starch hydrolases, in contrast to the more-meaningful names utilized for the glycogen hydrolases". In truth, only two starch hydrolases, *R*-enzyme and *Z*-enzyme, have been so designated. Others, which are not hydrolases, also carry this type of name, namely, *D*-, *P*-,