

PROCEEDINGS OF THE NUTRITION SOCIETY

ONE HUNDRED AND SIXTY-THIRD SCIENTIFIC MEETING
GUY'S HOSPITAL MEDICAL SCHOOL, ST THOMAS'S STREET,
LONDON, SE 1

14 MARCH 1964

CARBOHYDRATES AND NUTRITION

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Carbohydrates and nutrition: Chairman's opening remarks

By R. J. L. ALLEN, *Beecham Food and Drink Division Limited, Brentford, Middlesex*

If I may be excused a personal reference, let me say that I was especially glad to be invited to preside over this Symposium. My first contact with research, and indeed with biochemistry, was in W. J. Young's department at Melbourne and it was Young, of course, who in 1909 isolated and characterized the 'hexosediphosphate', or D-fructofuranose 1,6-diphosphate, that is formed when hexose is fermented by yeast juice (Young, 1909). Young's work in collaboration with Arthur Harden at the Lister Institute, which is commemorated in the name 'Harden-Young ester' for that compound, can be regarded as opening the way for much of our modern understanding of the intricate processes concerned in the utilization of carbohydrate by the living organism. Later, I myself studied the aldolase-catalysed transformation of hexosediphosphate into two molecules of triosephosphate in higher plants.

However, one has to recognize that the study of carbohydrates for their own sake is out of fashion with nutritionists. It has needed the passage of over 22 years, and the holding of 162 meetings, before this Society felt the need to devote a symposium to them. We get the same general impression, in a somewhat wider context, if we examine the latest (1962) subject index to *Chemical Abstracts*. The columns headed 'Proteins' occupy nearly 10 m of print, those under 'Fats' and 'Fatty Acids' 6 m, and those under 'Carbohydrates' a mere 2 m.

The reasons for such comparative neglect of a group of nutrients that provide half the calories in our own diet, and a much higher proportion in many tropical countries, merit examination. First, perhaps there is the fact that carbohydrate is, dietetically speaking, not an essential nutrient. The Eskimo and the Australian aborigine, in their natural conditions, provide contrasting examples of existence on a diet containing little or no carbohydrate. Then, the various carbohydrates that form part of man's diet are commonly thought of as nutritionally equivalent in the sense that they are soon converted into α -D-glucopyranose on ingestion. Thus the field for investigation is, on this view, narrowed unattractively. Lastly, is it too fanciful to speak of an attitude of almost moral disapproval on the part of some nutritionists towards carbohydrates as a class? They seem to approach the subject of carbohydrate in a frame of mind not unlike that of a theologian discussing sin—they are against it. For some,

indeed, carbohydrate has come close to displacing ethanol from the position that that nutrient occupied in past years as the prime enemy of public well-being. Certainly that appreciable fraction of the population who look to women's magazines and other organs of the popular press for dietetic instruction might be excused for concluding that nutritional salvation was to be attained by the total extirpation of carbohydrate foods from their diets. The undesirable consequences, especially for the growing child, that may ensue if excessive carbohydrate in the diet crowds out, for example, protein are well recognized even if not fully understood. Nevertheless, it is perhaps permissible to question whether it can be taken for certain that wholesale reduction of carbohydrate intake by the average adult in this country would be physiologically advantageous. Certainly any such shift in the general pattern of consumption would have a catastrophic effect on our economy and even more on that of the primary producing areas overseas that live by selling us sugars and starches in various forms. Graham Lusk (1928) quotes Rubner as declaring that 'a large protein allowance is the right of civilized man' but world population pressures may before long make Chittenden's (1904) concept of protein economy more relevant.

The topics that our distinguished contributors are to discuss all touch in some degree on the problems that I have ventured to mention. If this Symposium serves to stimulate the interest of nutritionists in carbohydrate and to point the way for further investigation it will have served its purpose.

REFERENCES

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Carbohydrates and protein

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Introduction

The invitation to contribute to this Symposium suggested that the title of my paper should be 'Carbohydrates and protein metabolism'. This, however, would have restricted discussion to a field which has already been reviewed by specialists, both in its biochemical (Munro, 1964) and nutritional (Miller & Payne, 1964) aspects. Conversely a paper on 'Carbohydrate metabolism and protein' might have borne too close a resemblance to another paper (Blaxter, 1964) given at last year's Symposium on the 'Interrelationships of Nutrients' ((The) Nutrition Society, 1964). The whole point of that Symposium, in the present context, is that the utilization of dietary carbohydrate or protein is in every instance dependent on the other.

It would be impossible, and undesirable, in a review of this nature to cover the literature of such an enormous field. Instead an attempt will be made to underline