 Special Report Series, No. 167

Privy Council

MEDICAL RESEARCH COUNCIL

VITAMINS: A SURVEY OF PRESENT KNOWLEDGE

Compiled by a Committee appointed jointly by the Lister Institute and Medical Research Council

LONDON
PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE
1932

H.M. Stationery Office Code Number
45-5-67

Universal Decimal Classification
612.392.01 (02)

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PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE.

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PREFACE

In 1919 there was published in this series a 'Report on the Present State of Knowledge Concerning Accessory Food Factors (Vitamines)', prepared by a Committee which the Council had appointed jointly with the Lister Institute. The rapid growth of knowledge in this new field of work soon made that monograph obsolete at many points, and a completely new edition, nearly doubled in content, was prepared by the same Committee and issued in 1924. That this summary of methods and results was found useful by workers in this and other countries has been well indicated by the numbers sold—10,000 copies of successive impressions have been distributed already. Fresh advances of knowledge soon made complete revision necessary again, and this was undertaken by the Committee in 1930. On this occasion, however, much more complete revision was seen to be required, and the report now presented is an entirely fresh resumption of current knowledge and of technical methods in this subject.

The Committee in preparing this report had the great advantage of Dr. Arthur Harden's services as general editor. They were assisted in the preparation of material for particular sections by Dr. W. R. Aykroyd, Dr. C. W. Carter, Professor S. J. Cowell, Mrs. M. A. Boas Fixsen, Miss E. M. Hume, Dr. G. F. Marrian, Dr. R. A. Morton, and Miss M. H. Roscoe. All the members of the Committee named on the preceding page are responsible jointly for the final shaping of every chapter and for the whole work as now produced. To all these the Council are greatly indebted, and they believe that their feelings of gratitude will be shared by the innumerable workers now interested in this field of study.

It can hardly be contemplated that the rapid and accelerating growth of the subject can be conveniently followed further by fresh revisions of such a monograph as this. The labour entailed and the sacrifices of time made by research workers in successive revisions of such a monograph are not likely to be justifiable again. The Council have joined with the Reid Library of the Rowett Institute, Aberdeen, and the Imperial Agricultural Bureaux Council, in giving financial support to a new periodical journal, 'Nutrition Abstracts and Reviews', of which the first number appeared in October last. The Council hope that this will provide for the future a regular means of bringing together and making more readily available the results of research work as they accumulate in the now widely distributed and often disconnected fields of work, medical, agricultural, dietetic, and commercial, in which the subject of nutrition is being so rapidly developed.

In an Appendix is given the report of the International Conference on Vitamin Standards, held under the auspices of the Permanent Standards Commission of the League of Nations in London during June, 1931. The recommendations given here for adoption of

international standards for those vitamins of which present knowledge makes this practicable, together with definitions of units of activity in terms of the standards for use in each case in quantitative estimation of the vitamin, have now been adopted by the League of Nations. In their first report of 1919, mentioned already, the Committee referred to the scepticism, then shown in some quarters, even of the real existence of the subject of their monograph. They admitted that there was then no knowledge of the actual chemical nature of the vitamins, but they said that 'the study of their functions is progressing on real and objective lines, and has become in certain cases even quantitative'. It is gratifying to notice that within only a dozen years research work has advanced so far as to allow not only quantitative study but a formal international agreement upon precise quantitative standards in the case of no less than four, the so-called A, B_1, C and D, of the vitamins.

MEDICAL RESEARCH COUNCIL,
38, Old Queen Street,
Westminster, S.W. 1.

10th May, 1932.

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CHAPTER I

HISTORICAL INTRODUCTION.

As food constituents vitamins are characterized by the disproportion between the great importance of their nutritional functions and the very small amounts necessary for the adequate fulfilment of those functions. In a normal dietary they are present in quantities far too small to yield any appreciable contributions to the energy supply of the body, or to bulk appreciably as structural elements for the tissues. They are, nevertheless, definite chemical entities, and in the last eight years much light has been thrown upon the actual chemical nature of some among them. It would seem, indeed, that at least one has now been artificially prepared. During the same period, extended researches have shown that they are more numerous than was earlier suspected. Eight years ago only three were clearly recognized; now we must believe in the existence of at least eight. Each one upon good evidence has been shown to exert its own individual functions in nutrition.

Since a supply of them is essential for the animal body, the vitamins are, of course, generally present in the natural foods which are instinctively consumed by men and animals. They are primarily formed during the synthetic activities of the green plant on the land, or those of algae and other smaller organisms in the sea. From these they are transferred to the tissues of animals, terrestrial or marine. There is some evidence, however, to show that one vitamin at least, and perhaps others, may be synthesized in the organs of certain animal species. Such animals can dispense with, or are less dependent upon, an external supply of the vitamin which their own tissues produce. Such cases are rare, however, and we have no knowledge of such synthetic powers in the human body.

It is not surprising that popular experience should have wholly failed in the past to reveal the existence of nutritional agencies which function in such small amounts, and are unconsciously consumed in every adequate dietary. The distribution of vitamins in vegetable and animal foods alike may be partial and irregular, but broadly speaking it is safe to say that the adult individual finds a good supply of vitamins in his food so long as that food is reasonably varied, has received no artificial or accidental separation into parts, and has had no destructive influence applied to it. This generalization does not, however, cover the nutritional demands of infants and children.

In the observation of phenomena the importance of contributory factors is often overlooked until the effects of their removal come to light. In the case of vitamins and their functions, demonstration, so far as it depended upon observation, first came when commercial adventure or other human enterprise had led to the preparation and consumption of foods in which the natural materials had been fractionated for the sake of taste, appearance, or convenience; treated by destructive methods; or, in other cases, only preserved