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THE ETIOLOGY OF THE DEFICIENCY DISEASES.

BERI-BERI, POLYNEURITIS IN BIRDS, EPIDEMIC DROPSY, SCURVY,
EXPERIMENTAL SCURVY IN ANIMALS, INFANTILE SCURVY,
SHIP BERI-BERI, PELLAGRA.

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THE diseases mentioned above present certain general characters which justify their inclusion in one group, called deficiency diseases. They were considered for years either as intoxications by food or as infectious diseases, and twenty years of experimental work were necessary to show that diseases occur which are caused by a deficiency of some essential substances in the food. Although this view is not yet generally accepted, there is now sufficient evidence to convince everybody of its truth, if the trouble be taken to follow step by step the development of our knowledge on this subject. This article is written with the intention of giving a summary of the modern investigations, and by means of a careful selection of references to facilitate the research for anybody who wishes to read the original literature. This careful selection was absolutely necessary, for there is perhaps no other subject in medicine where so many contradictory and inexact statements were made, which instead of advancing the research retarded it by leading investigators in a wrong direction.

All these diseases present some general characters, which may be sketched here. The most prominent symptoms are a general cachexia with an enormous loss of weight ; marked nervous symptoms are often present, which are due probably to the degeneration of the peripheral nervous system. It is now known that all these diseases, with the exception of pellagra, can be prevented and cured by the addition of certain preventive substances; the deficient substances, which are of the nature of organic bases, we will call " vitamines "; and we will speak of a beri-beri or scurvy vitamine, which means a substance preventing the special disease. As regards the classification two different groups present themselves : the beri-beri group and the scurvy group. The investigations made on pellagra, however, have not yet resulted in a sufficient elucidation of its etiology to establish it as a deficiency disease and it is included here provisionally owing to its similarity in some respects to the other diseases mentioned.

THE RESULTS OF OUR KNOWLEDGE OF DEFICIENCY DISEASES APPLIED TO ANIMAL METABOLISM AND NUTRITION.

The results of modern investigation of deficiency diseases seem to be unknown to most physiologists. I noticed only *one résumé* which draws attention to the deficiency diseases with regard to general metabolism; this is the *résumé* of Mandel on protein metabolism [88]. The food was up to now valued only by its content in proteins, fats and carbohydrates, and calories value.

From the present *résumé* we can conclude that all the deficiency diseases can be prevented by a complete diet. A monotonous diet ought to be avoided, because in this case a deficient food is made use of for long periods and prepares the ground for the outbreak of the deficiency diseases. There is no doubt that as our knowledge of the relative value of different foodstuffs increases we will be able to prevent completely the outbreak of the latter.

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