

Vitamin B in the Diet of Man

The Vitamin B Requirement of Man

By Prof. George R. Cowgill. (Published for the Institute of Human Relations.) Pp. xix + 261 + 4 plates. (New Haven, Conn.: Yale University Press; London: Oxford University Press, 1934.) 18s. net.

THE title of this book is so intriguing that all who are interested in nutrition will wish to know how the author has arrived at such a definite assertion, especially in view of the fact that man's requirement for vitamin B cannot be studied by direct experimentation.

Dr. Cowgill has attempted the problem indirectly. He has ascertained the minimum vitamin B requirement of different species of animals (rat, mouse, pigeon, dog) in terms of a special yeast preparation, using animals of widely different weights. His data pointed to the minimum vitamin B requirement being related to some power of the body weight. By trying various values for this power, he found that the figures agreed with the expression $\text{vit. B} = K \times Wt.^{5/3}$, and that there was a factor common to all the species. Bringing into account the maximum normal size of the different animals, the expression became

$\text{vit. B} = 4.9 \times W^{0.66} \times \frac{W}{W_{\text{max}}}$ and it agreed remarkably with the experimental figures. As $W^{0.66}$ may be taken to indicate metabolism, since basal metabolic rate and body surface are functions of the $2/3$ power of the body weight, and as from food intake figures $\text{Calories} = 1.5 \times W^{0.66}$, the expression becomes $\text{vit. B} = 4.9 \times \frac{\text{Cal.}}{1.5} \times \frac{W}{W_{\text{max}}}$.

Since W_{max} is a constant, the formula reduces to $\text{vit./Cal.} = K \times W$. For man, taking 115 kgm. as the maximum weight, the formula is $\text{vit./Cal.} = \frac{3.27}{115,000} \times W$, or 0.000284 W . The vitamin is taken in milligrams of the special preparation and the weight in grams. It should be noted, though not mentioned by Cowgill, that a vitamin/carbohydrate ratio was suggested by Randoin and Simonnet and a vitamin/Calorie ratio by Plimmer, Rosedale and Raymond, who considered that it should have a constant minimal numerical value.

By plotting vit./Cal. ratios as ordinate against weight as abscissa and using the line given by the maximum weight of 115 kgm., a series of ratios are given for different body weights. Reference to the chart shows the vit./Cal. ratios of 1.25, 1.50, 1.75, 2.00 corresponding to weights

40, 50, 60, 70 kgm. respectively. The minimum ratio for a man of 70 kgm. is thus 2.00. Figures near the line are border-line, figures above show sufficiency and below too little vitamin B.

To check the accuracy of the vit./Cal. ratio, Prof. Cowgill has collected together the diets of peoples in various parts of the world which did and did not give rise to beriberi. Beriberi is due to a deficiency of vitamin B in the diet. These diets have been evaluated for their vitamin B content in terms of the special yeast preparation. Foodstuffs had been tested by other workers, some of which had been tried by all the workers and also by Cowgill. It was thus possible to calculate all the figures on the same unit. A useful table of these values is given, and it is possible to recalculate the figures in terms of other units, or the international unit, as a table is shown giving the approximate equivalents of the various units. The vit./Cal. ratio of any diet could thus be determined.

The diets of the sufferers from beriberi had vit./Cal. ratios of 1.74, 1.96 to 2.18, 1.35 and lower values. Diets on which beriberi did not appear had the corresponding ratios of 2.18, 2.26 to 2.46, 1.97, 2.96. These figures agree closely with those shown on the chart. Occasionally there were discrepancies, but on referring to the weight it was found that the weights of the individuals were either above or below the chart line. An examination of a series of diets consumed in the United States showed the vit./Cal. ratios of 2.01-3.39. The value of 2.05 is regarded as borderline for a man of 60-70 kgm.

Though many workers will not agree with Cowgill's method of trying to fix a vitamin B-Calorie ratio as a means of determining the vitamin B requirement of man, yet it must be granted that an analysis of the diets leading to, or preventing, beriberi for their vitamin B content is an essential step. The book gives further details of the occurrence of beriberi since the date of Vedder's book, the diets of the peoples in the beriberi districts and other useful information. A chapter is devoted to other clinical conditions associated with lack of vitamin B. It is hoped that the attention of physicians be directed to the importance of vitamin B to health. It is not correct to believe that there is plenty of vitamin B in the ordinary diet and dismiss it from consideration. The vitamin/Calorie ratio should be checked in cases of enlarged heart, bradycardia and disorders of the digestive tract.