METABOLISM OF CYSTINE AND METHIONINE

THE fact that methionine is similar to the indispensable amino acid, cystine, in containing sulfur lends considerable interest to the fate of methionine in the animal organism as well as to any possible metabolic interrelation of these two protein units. We have investigated the effect of the administration of racemic methionine to albino rats ingesting food presumably deficient in cystine. The basal diet contained whole milk powder at a low level with a supplement of gelatin. It was found that, whereas the administration of other amino acids, serine and alanine, as well as certain derivatives closely related to cystine, produce a negligible or at most a very minor acceleration in growth, the addition of either cystine *or methionine* to the diet produces an *unmistakable* increase in body weight. The conclusion that methionine may satisfy an animal's cystine requirement might be drawn from these experiments. However, we prefer at this time to postpone final interpretation of the findings until we have carried out further experiments to throw more light upon the phenomenon in question.

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THE TRANSFORMATION OF CAROTENE TO VITAMIN A IN VITRO

MOORE[1] and Capper[2] have been able to demonstrate the transformation of carotene to vitamin A in rats. More recently, the conversion has been observed in the fowl.[3] If the reaction is enzymatic, it should be possible to transform carotene to vitamin A *in vitro*.

Preliminary experiments indicated that carotene was destroyed and that vitamin A appeared when carotene was incubated with fresh liver tissue, obtained from vitamin A-deficient rats. Ultra-violet absorption spectra of the ether extracts of such mixtures showed a band at 325 μμ, characteristic of vitamin A, while the ether extracts of the livers without carotene addition were without absorption at that wave-length.

The following experiments verified the supposition that an enzyme was responsible for the reaction. Two rats which had ceased to grow on a vitamin A-free ration were killed, their livers extirpated, and ground with sand and water. After standing for 24 hours at 37°, the extract was filtered. One portion of the liver extract was extracted with ether. An ultra-violet absorption spectra photograph of the extracted material showed no absorption at 325 μμ, indicating that the liver extract contained no vitamin A.

Another portion of the liver extract was added to a few cubic centimeters of a colloidal solution of carotene in water, the mixture was incubated for 36 hours and extracted with ether. The ether extract was colorless, there was a definite band at 325 μμ, and none at 340 μμ, at which wave-length carotene itself absorbs. A third portion of the liver extract was boiled for one minute, then treated with carotene as before. After incubation, the ether extract was yellow, the absorption spectrum showed no band at 325 μμ, while the band at 340 μμ was still present. The enzyme, which should be called "carotenase," had been destroyed by the heating.

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[1] T. Moore, *Biochem. Journ.*, 1930, 24, 692; 1931, 25, 275.
[2] N. S. Capper, *Biochem. Journ.*, 1930, 24, 980.
[3] N. S. Capper, I. M. W. McKibbin, and J. H. Prentice, *Biochem. Journ.*, 1931, 25, 265.

CONICAL SNOWFLAKES

THE account by Professor A. D. Moore, in SCIENCE for June 12, of the fall of conical snowflakes at Ann Arbor recalled similar conical flakes or stones which I observed at what was then the Great Basin Forest Experiment Station above Ephraim, Utah, in September, 1920. The station is situated on a small bench at 8,750 feet elevation in the Wasatch Mountains and during the latter part of the summer is subject to short but intense rain or hail squalls. On one occasion, however, the precipitation, instead of being in the usual form of rain or round hail, consisted of cones of hard compacted snow. The bases of the cones were hemispherical, giving the stones the general outline of an inverted parachute. In size they ranged larger than those observed by Professor Moore, all being over one quarter inch across the base and many of them reaching one half inch. The fall was accompanied by a strong wind from the northeast and lasted only a few minutes.

I took no notes on the phenomenon at the time and can no longer remember just what the weather was, preceding the fall, but I recollect that the wind which accompanied the squall was cold. The stones were so dense and landed with such force that we were compelled to take shelter, but in composition they were packed snow and not the ice of ordinary hailstones.

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