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Relation of Cystine to Achromotrichia.

P. L. PAVCEK† AND H. M. BAUM. (Introduced by W. H. Griffith.)
From the Biological Laboratories, Anheuser-Busch, Inc., St. Louis, Mo.

It has been shown by Mulford and Griffith[1] that the cystine furnished by 18% casein as the sole source of dietary protein may be a limiting factor in the growth of the rat. Since cystine has been investigated[2, 3, 4] in relation to hair growth in the rat and found to influence the amount of hair produced, the study of the relation of this amino acid to nutritional achromotrichia was undertaken.

Weanling black male rats of the Wisconsin strain between the ages of 18 and 23 days and weighing 40-45 g were placed on a diet consisting of starch (Anheuser-Busch) 62%, Labco casein 18%, Crisco 14%, salt mixture (Merck No. 1) 4%, and cod liver oil (Mead Johnson) 2%. Supplements of 25 γ thiamine, 20 γ riboflavin, 20 γ pyridoxine, 300 γ nicotinic acid and 5 mg choline* were fed daily to each animal.

On the basal diet the rats became grey in 4-5 weeks and plateaued in weight by the 6th week. Administration of 200 γ pantothenic acid (as calcium salt) daily to a group of 10 animals resulted in marked diminution in greying. The blackening of the fur began in 4-5 weeks after the beginning of pantothenic acid administration and reached a maximum intensity only after 12-14 weeks. It should be pointed out that the regeneration of black fur was incomplete—the coat being interspersed with grey resulting in a stippled effect much like that described by Dimick,[5] Williams,[6] and Unna.[7] A group of 7 animals receiving daily 75 mg cystine in addition to the pantothenic acid supplement reached the same final stage of the regeneration in but 5-7 weeks. In this instance the first darkening of the fur appeared in 3-4 weeks. It was interesting that during these first few weeks the rats receiving only pantothenic acid exhibited

† Present address: St. Louis University School of Medicine, St. Louis, Missouri.

1 Mulford, D. J., and Griffith, W. H., Abstracts 101st Meeting of A.C.S., St. Louis, Mo., April 7-11, 1941.

2 Lightbody, H. D., and Lewis, H. B., *J. Biol. Chem.*, 1929, **82**, 485.

3 Beadles, J. R., Braman, W. W., and Mitchell, H. H., *Ibid.*, 1930, **88**, 623.

4 Smuts, D. B., Mitchell, H. H., and Hamilton, T. S., *Ibid.*, 1932, **95**, 283.

* Increased to 20 mg in the added cystine groups.

5 Dimick, M. K., and Lepp, A., *J. Nutrition*, 1940, **20**, 413.

6 Williams, R. R., *Science*, 1940, **92**, 561.

7 Unna, K., and Sampson, W. L., PROC. SOC. EXP. BIOL. AND MED., 1940, **45**, 309.

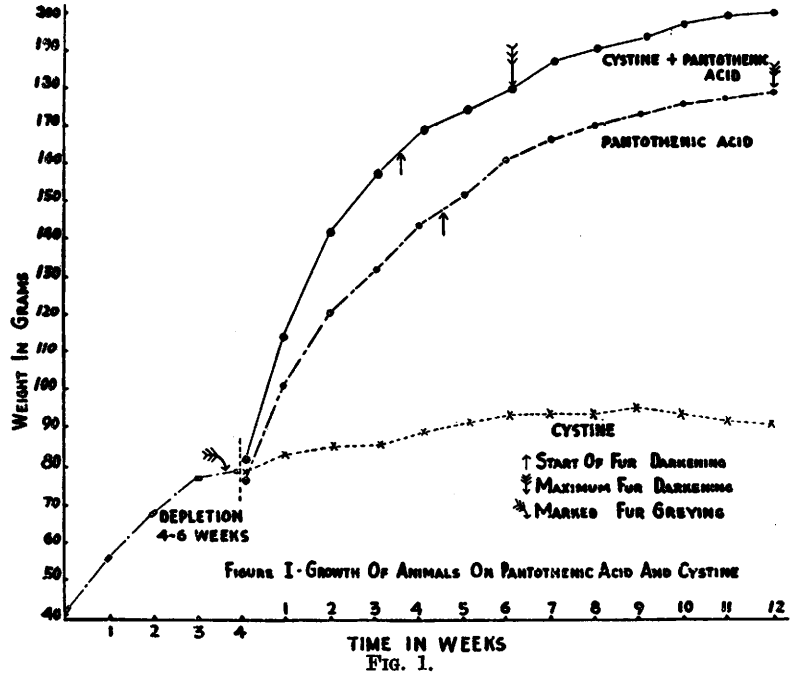

FIG. 1.

intensification of the greying, whereas the group receiving cystine in addition did not show this phenomenon. The third group of 4 animals on cystine alone became increasingly grey.

The responses in growth on the various supplements is illustrated graphically in Fig. 1. It is evident that the rats receiving both pantothenic acid and cystine grew faster than those on pantothenic acid alone. During the first 5 weeks the former group averaged almost 4 g per week more than the latter. Even after the animals had been on the supplements for 14 weeks, the cystine-pantothenic acid animals were over 20 g heavier than those receiving only pantothenic acid.

Summary. From the above data it appears that on an 18% casein diet, the supplementation of 75 mg of cystine in addition to 200 γ of pantothenic acid per rat per day markedly decreases the time required for the replacement of the grey hair of nutritional achromotrichia. Since better growth results when this amount of cystine is administered, the findings of Mulford and Griffith[1] that 18% casein diets do not furnish enough cystine for maximum growth of the rat, are substantiated.

The authors wish to acknowledge the technical assistance of Mr. Alois E. Rempe in this work.