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Nutritional Achromotrichia.*

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Several reports have appeared in the literature to indicate that there is a factor in the vitamin B complex which is concerned with the maintenance of normal hair pigmentation in piebald or black rats. Its identity or non-identity with the known members of the vitamin B complex has not been definitely established.[1-4] Morgan *et al.*[1] and Lunde and Kringstad[2] have classified it as one of the "filtrate factors." Nicotinic acid and vitamin B_6 have been eliminated by Lunde and Kringstad. These workers also concluded from the lack of correlation between growth and achromotrichia that the chick antidermatitis factor was not concerned.[3] Morgan and Simms[4] found adrenal atrophy to occur simultaneously with the achromotrichia.

We became interested in this factor because of its possible relation to several rat factors being studied in this laboratory, namely, factor W,[5] pantothenic acid,[6] and the spectacled eye factor.[7] Thus far we have studied various concentrates of known potency in the above mentioned factors, using both the cure and prevention of achromotrichia as a test of their activity.

Piebald rats from our colony were used. The basal ration has the following composition: sucrose 67%, purified casein 18%, salts III[8] 4%, butter fat 9%, and cod liver oil† 2%. In addition each rat received 10 gamma thiamin, 20 gamma riboflavin, and 10 gamma vita-

* Published with the approval of the Director of the Wisconsin Agricultural Experiment Station. Supported in part by a grant from the Research Funds of the University. We are indebted to the W.P.A. project No. 8649 for assistance in care of animals.

1 Morgan, A. F., Cook, B. C., and Davidson, H. G., *J. Nutrition*, 1938, **15**, 27.

2 Lunde, G., and Kringstad, H., *Avh. Norske Vid.-Akad. Oslo*, 1 Mat. Nat. Kl., 1938, Nr. 1.

3 Lunde, G., and Kringstad, H., *Z. Physiol. Chem.*, 1939, **257**, 201.

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6 Oleson, J. J., Woolley, D. W., Elvehjem, C. A., and Hart, E. B., in press.

7 Oleson, J. J., Bird, H. R., Elvehjem, C. A., and Hart, E. B., *J. Biol. Chem.*, 1939, **127**, 23.

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† The cod liver oil was provided by Dr. C. Nielsen, Abbott Laboratories, North Chicago, Illinois.

min B_6‡ per day. The achromotrichia usually developed within 6-10 weeks in the rats receiving the basal ration alone or with an inactive supplement. Some of our results are given in Table I.

TABLE I.
Effect of Various Liver Fractions on Nutritional Achromotrichia.

Liver fraction	Factor present in the concentrate	Activity
Liver extract	All factors	+
Fuller's earth filtrate	"Filtrate factors"	+
" " "	"Eluate factors"	—
Corn oil		—
Nicotinic acid		—
Adenylic acid		—
Vitamin B_6		—
Acid-ether extract	Pantothenic acid	—
$CHCl_3$ residue	" "	—
Barium salt	" "	—
Hexane butanol extract	Factor W	—
Acetone eluate	" "	—

Liver extract§ was very effective at a level of 250 mg/day. The fuller's earth filtrate was active when fed equivalent to the same level. The fuller's earth eluate, which we found would prevent paralysis and the hemorrhagic disease in rats,[7] was inactive when fed equivalent to 1 g of liver extract per day. Synthetic nicotinic acid, adenylic acid, and vitamin B_6 were completely without effect.

We have found that corn oil, which is known to prevent the symptoms of acrodynia in rats, will also prevent or cure the spectacled eye condition, which can be cured with the fuller's earth filtrate.[9] However 3-4 drops of corn oil per day had no effect on achromotrichia. This indicates that these two factors are unrelated.

Three different pantothenic acid concentrates were tested. The acid-ether extract and the chloroform residue fractions of Woolley *et al.*[10] and the barium salts preparation described in brief by Oleson *et al.*[6] were fed at levels equivalent to 1 g of liver extract per day for the first two named and 100 gamma pantothenic acid for the latter preparation. These preparations were not active in preventing the appearance of achromotrichia though the time of onset of the symptoms was delayed somewhat in most cases. This effect was not observed when the concentrate was treated with alkali to destroy the

‡ We are indebted to Dr. Robertson, Merck and Company, Rahway, New Jersey, for the thiamin and vitamin B_6 used.

§ The liver extract was kindly supplied by Dr. David Klein, Wilson and Company, Chicago, Illinois.

9 Oleson, J. J., Elvehjem, C. A., and Hart, E. B., unpublished data.

10 Woolley, D. W., Waisman, H. A., Mickelsen, O., and Elvehjem, C. A., *J. Biol. Chem.*, 1938, **125**, 715.

pantothenic acid. This indicates that the slight activity was destroyed along with the pantothenic acid by the alkali treatment.

Two preparations of factor W were tested at levels equivalent to 250 mg of liver extract per day. The first preparation was made by extracting liver extract thoroughly with dry butanol and then precipitating out considerable material by adding an equal volume of hexane.[11] The second, a much more purified preparation, was an "acetone eluate" preparation, kindly prepared for us by Mr. Simon Black.[11] Both of these preparations were inactive. The factor which prevents achromotrichia was undoubtedly lost in the early stages of the above preparations.

In confirmation of the results of Lunde and Kringstad[2] we have observed the "rusting" of the fur of albino rats fed the above and other purified diets and also have not been able to correlate the appearance of achromotrichia with the growth of the animals.

Thus it appears that the dietary factor which prevents nutritional achromotrichia is distinct from all factors of the vitamin B complex which have thus far been identified and associated with specific function in the nutrition of the rat. Further the factor does not seem to be involved in the growth of the rat.

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Hypersecretion of Gonadotropic Hormone of Pituitary Gland of Rats Resulting from Treatment with Antigonadotropic Serum.*

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Thompson and Cushing[1] have reported that the anterior pituitary gland of a dog chronically injected over a period of months with pituitary extract had an increase in the number of basophiles associated with an atrophy of the gonads. Collip, Selye and Williamson[2] also found similar changes in rats injected with pituitary gonadotropic extracts, and Severinghaus and Thompson[3] noted a correspond-

[11] Black, S., and Elvehjem, C. A., unpublished data.

* Supported in part by a grant-in-aid from the Wisconsin Alumni Research Foundation.

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2 Collip, J. B., Selye, H., and Williamson, J. E., *Endocrinology*, 1938, **23**, 279.

3 Severinghaus, A. E., and Thompson, K. W., PROC. SOC. EXP. BIOL. AND MED., 1939, **40**, 627.