

Dietary Depigmentation of Young Rats

WHEN black (or hooded) young rats are given a ration containing much carbohydrate and also the vitamins B₁ (acid clay standard), B₂ (egg-white or horse-flesh), A and D (standardised cod liver oil), McCollum's salt mixture and the necessary amino acids (casein, egg-white or horse-flesh), they are liable to show symptoms of yellowish depigmentation of the fur after about two months. Symptoms are less pronounced if the carbohydrate contains much cellulose (wheaten bread, rye bread). If such diets

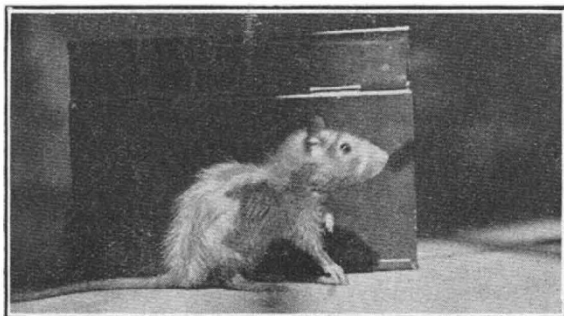


FIG. 1. Experimental rat, yellowish white with black sides.

contain much fat or sugar (cake), the symptoms develop more readily.

Rapid cure was not possible with any of the food-stuffs hitherto tried; only one rat was partly cured within a few weeks by the administration of lemon juice; two other rats exhibited a small improvement during the same period. Addition of whole, dried yeast, on the other hand, resulted at best in a very slow cure; the sides of the body improved first (Fig. 1), finally after two months the fur got back its original black colour. When the yeast was omitted afterwards, the rat showed symptoms of depig-

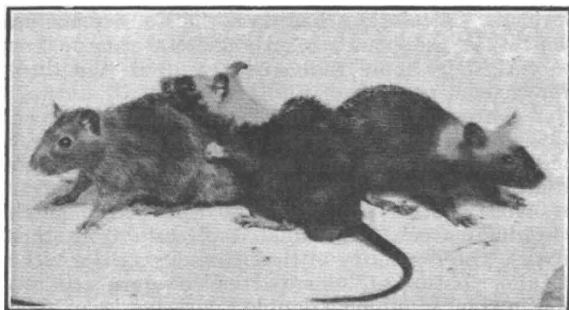


FIG. 2. Animal on left, yellowish grey; those on right black with bald head and neck.

mentation again simultaneously all over the body (Fig. 2, left animal). Sometimes there was loss of fur on the head, neck and back during this period of depigmentation (Fig. 2, two animals on right); the new hairs which appeared on neck and trunk before the cure started were more obviously yellow-tipped than the remaining old hairs which began slightly to turn pale by that time.

The symmetrical distribution of the returning pigment reminds one of the hyperpigmentation in pellagra of man (Lavinder¹); the diet which causes

depigmentation is probably deficient in the pellagra-preventive factor B₆ (György²) or the growth-promoting factor Y (Chick and Copping³); on the other hand, the alleged relation between pellagra and diets rich in sugar (Leader⁴) is in some measure corroborated by the above mentioned results. After all, the fact that lemon juice was active too suggests that vitamin C or some other active principle in lemon juice may play some part, although vitamin C itself is generally assumed to have no effect on the rat. One should take into account here the beneficial results obtained by Morawitz⁵ with lemon juice as regards hyperpigmentation and scurvy of a human patient.

F. J. GORTER.

Delft,
Aug. 13.

¹ Lavinder, "Avitaminosen und verwandte Krankheitszustände", p. 684, Springer, Berlin, 1927.

² György, NATURE, 133, 498, March 31, 1934.

³ Chick and Copping, Biochem J., 24, 1764; 1930.

⁴ Leader, Biochem. J., 24, 1172; 1930.

⁵ Morawitz, Klin. Wochenschr., 13, No. 9; 1934.

Acceleration of Respiration of Normal and Tumour Tissue by Thionine (Lauth's Violet)

THE defective oxidation of carbohydrate by tumour tissue (Dickens and Šimer)¹ causes experiments directed towards its restoration to be of interest. It is now known that at least two types of reagent are able to function as catalysts in increasing directly the oxygen consumption of body-cells: (a) certain reversibly oxidisable systems, particularly methylene blue^{2,3} and pyocyanine⁴; (b) the dinitrophenols, particularly dinitro-*o*-cresol, found by Dodds and Greville^{5,6} to increase the respiration of surviving kidney and tumour tissue.

In the course of investigations of the action of reversibly oxidisable systems on the metabolism of normal and tumour tissue, I have found that this action of dinitro-*o*-cresol on the respiration of kidney tissue is apparently not a special property of the nitrophenols, but is shown also by the dyestuff thionine (Lauth's violet). Measurements were made in the Haldane-Barcroft-Warburg apparatus, and those of respiratory quotient in bicarbonate media by the method of Dickens and Šimer⁷. Thionine added to a lactate-containing medium in 5×10^{-5} M. concentration was found to cause an increase of respiration of surviving kidney of the rat amounting up to 90 per cent in phosphate- and up to 59 per cent in bicarbonate-Ringer solution; an example follows:

	R.Q.	QO ₂	Q _{CO₂}	Extra oxygen	Extra carbon dioxide
Control	0.83	-27.5	-6.05	15.2	16.0
With thionine 5×10^{-5} M.	0.92	-42.8	-10.6		

Comparison of these figures with those given by Dodds and Greville⁶ for dinitro-*o*-cresol shows an almost perfect analogy in the effect of the two substances. In both cases, the extra oxygen is used for the combustion of metabolite at or near R.Q. unity, and the increase itself is of the same order of magnitude. Thus a link is provided between the hitherto obscure action of the nitrophenols (or perhaps of products formed from these in the tissues) and that of the reversibly oxidisable dyestuffs. The respiration of kidney in presence of glucose is also increased by thionine.