

CCX. THE VITAMIN B₂ CONTENT OF VARIOUS MATERIALS COMPARED BY THEIR POWER TO PROMOTE GROWTH AND TO CURE DERMATITIS RESPECTIVELY.

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It has been suggested that the promotion of growth and the prevention or cure of dermatitis are due not to one but to two separate dietary factors, contained in the component of the vitamin B complex known as vitamin B₂ [Kuhn *et al.*, 1933].

Aykroyd and Roscoe [1929]; Chick and Copping [1930]; Chick, Copping and Roscoe [1930]; Roscoe [1930; 1931] showed, however, that all the natural food-stuffs tested which promoted growth when given as source of vitamin B₂ also cured dermatitis. Halliday [1932], on the other hand, in attempts to assay the curative power for dermatitis of various heated preparations of protein-free milk, in some cases obtained growth without amelioration of symptoms. This, however, was attributed to the severity of the dermatitis, and no evidence was obtained from her work or that of the other authors enumerated above that the growth-promoting and dermatitis-curing effects were due to different factors.

In the present paper results are given of experiments in which an attempt has been made to determine the minimum amounts of various materials which will respectively cure dermatitis and promote a given weight increase. It was thought that such a comparison might show a differing distribution of the two factors, if two such exist.

EXPERIMENTAL.

The rats received the diet and vitamin supplements described in the previous paper [Roscoe, 1933, 1].

For the purpose of the curative tests the severity of the dermatitis was graded into three groups as follows.

(1) *Slight inflammation* of paws or nose. Inflammation of the ears or eyelids of a not severe form occurred often and was not necessarily followed by the development of more severe symptoms; it was not therefore reckoned as dermatitis unless subsequent inflammation of other parts occurred.

(2) *Marked dermatitis* of one or more limbs, nose, ears and eyelids; the skin being red, shiny, denuded of hair and sometimes oedematous.

(3) *Severe dermatitis*, showing symptoms as in (2) only more marked, the animal in this stage being very ill.

Before testing the curative action of the materials the symptoms were allowed to proceed to the second stage of marked dermatitis. Cases of slight

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dermatitis may sometimes cure spontaneously. The following materials were tested:

- (i) Watery yeast extracts.
- (ii) Yeast extracts heated for 5 hours at acid reaction.
- (iii) Yeast extracts heated for 1 hour at alkaline reaction.

The preparation of (i), (ii) and (iii) is described in the following paper [Roscoe, 1933, 2].

(iv) Egg-white filtrate, prepared according to the method described by Chick, Copping and Roscoe [1930].

- (v) Meat, minced beef steak, dried at 37° and ground.

The results of the dermatitis-curing and growth-promoting tests are given in Table I. For the latter, the criterion was the daily dose needed to promote

Table I. *Daily doses of various materials needed by young rats when given as sole source of vitamin B₂, in order to: (1) promote 50-60 g. weight increase in 5 weeks; (2) cure the dermatitis developing in the absence of vitamin B₂.*

Material	Daily dose g.*		No. of rats			Smallest dose on which more than ½ of the rats were cured, g.	Ratio of growth-promoting to dermatitis-curing doses (a/b)
	required for 50-60 g. wt. incr. in 5 weeks (a)	given to cure dermatitis	Cured	Slight improvement	No improvement		
Yeast extract							
R. VIII	0.25	0.06 0.125	— 2	1	—	0.125	2.0
R. X	0.25	0.06 0.125	— 3	1	3	0.125	2.0
R. XII	<0.25	0.06 0.125	2 1	—	1	0.06	<4.0
Acid autoclaved yeast extract (120°, 5 hours)							
R. V	0.25	0.06 0.125 0.25	— 3 1	1 —	— 1	0.125	2.0
R. X	0.25	0.06 0.125	2 3	1 —	2 1	0.125	2.0
Alkaline autoclaved yeast extract (120°, 1 hour)							
R. VIII	1.5	0.25 0.5	1 1	—	1	0.5	3.0
R. X	0.5	0.125 0.25 0.5	— 3 1	1 1	1	0.25	2.0
R. XII	1.0	0.125 0.25	— 2	—	1	0.25	4.0
Egg-white filtrate							
R. I	10	1.25 2.5	— 2	—	1	2.5	4.0
Meat							
Steak, dry	0.7	0.1 0.2	— 2	1 —	3 1	0.2	3.5

* The doses of yeast extracts are given as the equivalents in dry yeast, those of the egg-white filtrate as equivalents of fresh egg-white.

50-60 g. weight increase in 5 weeks; for the former the smallest daily dose which resulted in cures of more than half the animals. It will be seen that the amount needed to cure dermatitis varied from one half to one quarter of that required to

support the standard rate of growth. The number of rats used for each material was admittedly small so that a variation of this magnitude was not considered significant.

The results indicated that, within the large experimental error unavoidable in this type of experiment, the dermatitis-curing and growth-promoting factors have a similar relative distribution in the materials tested, yeast extract, egg-white filtrate and meat, and that they are similarly affected by heat in acid and alkaline media, both being much more sensitive in the latter case [see also the following paper, Roscoe, 1933, 2]. It is therefore concluded that the two factors are identical.

SUMMARY.

The daily doses of yeast extract, egg-white filtrate or meat needed to cure the dermatitis associated in young rats with vitamin B₂ deficiency were shown to be proportional to the daily doses needed to promote a given weight increase. This was also true of the yeast extract after it had been heated in acid or alkaline media. Thus no support was found for the theory postulating the existence of separate dietary factors responsible respectively for preventing and curing dermatitis and for promoting growth.

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