results obtained are recorded in Table I. The values given represent averages.

Conclusions. The growth-promoting effect of lactoflavin or of lactoflavin-5-phosphoric acid is independent of the way in which it is administered, that is, whether orally or parenterally. There are no biological differences, as shown by growth tests, between lactoflavin and lactoflavin-5-phosphoric acid, the rat-day dose for both being about 7 to 10 γ. It can therefore safely be assumed that the phosphorylation of lactoflavin is not only an intestinal but also a general cellular reaction.

8911 C

Vitamin D Deficiency on Concentration of Blood and Tissue Enzymes of the Albino Rat.* V.

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Experimental rickets was produced according to the technique of Steenbock and Black,[1] with the modification of our paired feeding technique, so as to eliminate the influence of the plane of nutrition.[2] The animals were 29 to 55 days of age, and weighed 50 to 58 gm. at the beginning of the experiments. Since the ricketic type of diet employed allows only very small increases of weight, the size of the animals at the time of sacrificing yielded insufficient amount of blood for all the blood serum enzyme determinations; hence, some groups were taken for blood serum amylase and esterase, and others for blood serum phosphatase. Of the total numbers of groups studied, 24 showed by the line tests severe experimental rickets; 4, advanced; 8, moderate; and 2, mild.

There was a total of 658 titrations carried out in this investigation in duplicate, the results of which are summarized in Table I.

It will be noted that no noteworthy changes are apparent in concentration of blood and tissue enzymes in rickets developed in the albino rat compared with enzyme concentrations on the same diet supplemented with vitamin D supplied by irradiation of the ricketic ration.

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1 Steenbock, H., and Black, A., *J. Biol. Chem.*, 1924, **61**, 405.

2 Sure, B., Kik, M. C., and Buchanan, K. S., *J. Biol. Chem.*, 1935, **108**, 27.

TABLE I.
Influence of Vitamin D Deficiency on Concentration of Blood and Tissue Enzymes.
P = Pathological; C = Control.

Enzyme	No. of Groups Studied	Aver. for all groups	
		P	C
Blood Serum Amylase*	17	31.9	32.9
" " Esterase†	18	17.2	18.4
" " Phosphatase*	27	62.0	58.2
Trypsin*	38	50.1	49.0
Erepsin*	38	24.3	24.2
Pancreatic Amylase*	38	280.0	265.0
" Lipase‡	38	158.0	160.0
Hepatic "	38	26.9	27.9
Pancreatic Esterase†	38	13.1	13.6
Hepatic "	38	43.0	44.0

*expressed in units.
†expressed as mg. butyric acid.
‡expressed as mg. oleic acid.

The significant point in this study is the failure to obtain in experimental rickets large increases in concentration of blood serum phosphatase observed in human rickets.[3, 4] As a matter of fact, Bodansky and Jaffe[4] claim that the concentration of this blood enzyme is of even greater diagnostic value than blood phosphorus and calcium. It would appear then that experimental rickets is not the analogue of human rickets as it is generally assumed.

Our results on blood serum phosphatase in experimental rickets are in accordance with the recent findings of Scoz,[5] the report of which appeared during the progress of our own investigations.

8912 C

Deficiency of Vitamins A and B Complex in Concentration of Blood and Tissue Enzymes of Albino Rat.* VI.

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We have reported[1] that in vitamin A deficiency there is a marked decrease in the concentration of blood serum esterase, an appreciable

[3] Kay, H. D., *J. Biol. Chem.*, 1930, **89**, 249.

[4] Bodansky, A., and Jaffe, H. L., *Am. J. Dis. Child.*, 1934, **48**, 1268.

[5] Scoz, G., *Boll. Soc. Ital. Sper.*, 1935, **10**, 823.

* Research paper No. 429, Journal series, University of Arkansas.

[1] Sure, B., Kik, M. C., and Buchanan, K. S., *Am. J. Dig. Dis. and Nutr.*, 1936, **3**, 493.