

a similar procedure. We have recently obtained from this horse an immune serum which has been tested by Dr. Francis G. Blake for its capacity to neutralize the rash locally in the skin in human cases of scarlet fever. In all the cases tested so far a positive neutralization has occurred which is somewhat more conspicuous than that obtained under similar circumstances from the use of convalescent scarlatinal serum. We propose in the near future to test the serum therapeutically. Such a sequence of observations undoubtedly again throws the balance of evidence in favor of *S. hemolyticus* as the causative agent of scarlet fever. It would seem that the disease may not be unlike diphtheria in that the principal localization of the infection is in the throat where the organism produces a toxin which gives rise to the general symptoms and the rash. The immunity produced is in all likelihood antitoxic in character and the blanching reaction represents the neutralization of the toxin *in situ*.

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On the pharmacological action of the anti-rachitic active principle of cod liver oil.

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We pointed out some time ago that the diets used to produce rickets in animals have an appreciable excess of base over acid and that rickets is not produced if such diets are made more acid. We also noted that the hydrogen ion concentration of infants' stomach contents is lower than that of adults, and that a further depression may appreciably decrease the amount of soluble calcium and phosphoric acid available for absorption. In looking for a possibility of explaining the action of cod liver oil in rickets, we studied its effect on the reaction of the intestinal contents. The feces of rats on the rickets producing diet No. 84, used in this laboratory, when made into a suspension with water, give a pH of 7.4 to 8.0 with an average of about 7.6. When such rats are

given the active principle of cod liver oil which we have described or cod liver oil itself, the reaction of the feces changes in a few days to the acid side, usually to about pH 6.2 or even as far as pH 5.7. Controls with cotton seed oil give an unchanged alkaline reaction of the feces.

When a solution of the active principle in olive oil or in glycerol is injected into rachitic rats subcutaneously, it does not produce healing or change the pH value of the feces, provided measures are taken to prevent the licking of the site of injection. (We apply a drop of collodion with a little picric acid dissolved in it.) We thus have additional evidence that the action of the active principle is in the gastro-intestinal tract. Orr et al.¹ on the basis of metabolism experiments on infants have also taken the viewpoint that the primary disturbance in rickets is in the gastro-intestinal tract.

Now it remained to see whether the rickets curing effect of light may be reduced to the same basis. Rats on diet 84 exposed to a moderate amount of sunlight showing by x-ray an incomplete prevention of rickets give a feces reaction of about pH 6.7, while another group liberally treated with the mercury-vapor lamp showed complete prevention of rickets and a feces reaction of about pH 6.4. Babbot and others² have shown that in infantile tetany the pH of the stomach contents is high and that treatment, for instance with the mercury-vapor lamp, tends to restore it to the more acid normal value.

¹ Orr, Holt, Wilkins, and Boone, *Am. J. Dis. Child.*, 1923, xxvi, 302.

² Babbott, Johnston, and Haskins, *Am. J. Dis. Child.*, 1923, xxvi, 486.