In Table III are shown the Wassermann results obtained with 1,000 consecutive specimens, giving varying results with the Kahn test. The figures indicate the number of sera giving each combination of reaction. It will be seen that those in which a Kahn reaction of the first type (stronger in the first tube than in the last) was obtained, the average Wassermann value was 3+ to 4+; those giving the second type of Kahn test (equally strong in all three tubes) the average Wassermann value was 1.5+ to 3.5+; that in those giving the third type of Kahn test (stronger in the last tube than in the first) the mean Wassermann value was 0.3+ to 2.8+. To further study this point we titrated out the strength of the Wassermann in the number of sera giving a ++++ reaction and found that the very strong reactions were obtained only in those showing the first type of Kahn reaction.

These experiments are reported because they illustrate so well the principles laid down by Dean and because they are of some practical importance in interpreting the precipitation test. A true idea of the strength of the reaction cannot be obtained by averaging the values of the three tubes. The first type reaction described should be regarded as strongly positive, the third type as weakly positive, and the second as of intermediate strength.

## 231 (2463)

### The basal metabolism in vitamin B deficiency.

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The heat production in dogs during rest has been determined with the respiration calorimeter when these animals were fed with diets deficient in vitamin B. The purified food mixture fed to Dogs XXIV and XXV was complete in all respects with the exception of vitamins B and C. It was composed of casein, butter fat, lard, sucrose, salt mixture, and bone ash. Vitamin C

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was omitted since it has been shown that dogs, when fed with such mixtures containing vitamin B, remain in normal condition over long periods of time and show no effects from this lack.[1] Basal metabolism measurements were made by the usual technique employed in this laboratory.

On Dog XXIV the metabolism was determined at approximately weekly intervals during the course of the ingestion of the standard vitamin B-free diet. In this animal the basal heat production gradually fell, but the diminution was no greater than that which would be expected from the decreased body weight of the animal due to a decreasing food intake. On the day before the development of polyneuritic symptoms and on the four days following the removal of these symptoms by the administration of 20 gm. of yeast vitamin (Harris), the basal metabolism was remarkably constant, thus indicating that vitamin B deficiency *per se* does not influence heat production.

In the case of Dog XXV the basal metabolism was determined at the height of polyneuritis and was found to be about 25 per cent higher than the normal value to which it gradually fell after the removal of the symptoms. In this case the high heat production must have been due to the extreme muscular tonicity caused by the polyneuritic condition and only indirectly to the vitamin B deficiency.

That vitamin B does not influence the metabolism of the normal dog when it is given in an amount greater than that necessary for maintenance is shown in the case of Dog XIX.[2] This animal, which was usually given a diet containing a small but sufficient amount of vitamin B, did not show an altered basal metabolism following the augmentation of this supply by the daily addition, over a period of several months, of doses of 1 gm. of vitamin B concentrate to the same diet that this animal had previously received.

The basal nitrogen elimination—by which we mean the endogenous metabolism 16 to 18 hours or more after food—was found to be three times as high during polyneuritis as that after the recovery following the administration of vitamin B. During the height of polyneuritis in Dog XXV this value was found to

[1] Cowgill, G. R., Deuel, H. J., Jr., and Smith, A. H., *J. Biol. Chem.*, 1924, lix, 11.

[2] These data were kindly supplied us by Dr. D. Rapport.

be 0.273 gm. per hour, while 10 days later, after recovery, it had gradually fallen to 0.095 gm. hourly. After 6 days of fasting, at which time the animal had attained the same body weight as that which prevailed during polyneuritis, the basal nitrogen output amounted to 0.095 gm., thus indicating that the high nitrogen excretion during polyneuritis is not attributable to the starvation at this time. Subsequent investigations now in progress on the same animal seem to indicate a relationship between the basal nitrogen content of the urine and the extent of vitamin B starvation.

It may be concluded that vitamin B starvation *per se* does not alter the basal metabolism, although when complicated with polyneuritis an increased metabolism is evident; an increased nitrogen catabolism is also found in the latter condition, as shown by urinary nitrogen excretion.

## 232 (2464)

### Studies on the chemistry of cod liver oil. II. A cod liver oil concentrate manifesting both antirachitic and antiophthalmic properties.*

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In recent years, the demonstration of the specificity of cod liver oil for rickets has provided a stimulus for further attempts to isolate and identify the active principle of the oil. Though the goal has not been reached, nevertheless appreciable progress has been reported by various investigators.

The problem has been approached by devious routes, but the most promising finding has been the demonstration that the vita-

* This investigation was started in January, 1922, and is still being continued.