After the string leaves it the top is no longer subject to any appreciable torque, and so falls without further precession but maintaining the direction it had when the string left it. In spite of this last fact being so well known, it may possibly be worth mentioning that I have been able to spin a top on a table only a few centimeters below my hand, and have also thrown a top a number of times from a window more than ten meters above the ground. Every time that the top was thrown from the window spinning it fell without turning over and landed on its toe, whereas when it was dropped from the window without spin it usually turned over on the way down.

ARTHUR TABER JONES

SMITH COLLEGE

A VITAMIN B DEFICIENCY MANIFESTING ITSELF FOR THE FIRST TIME IN THE SECOND GENERATION

Two years ago the author was engaged in a series of feeding experiments in which it was desired to determine as far as possible the results upon reproduction of feeding a diet which was considered adequate in all respects except a possible deficiency or excess of the vitamins contained in cod liver oil and butter fat.

The diet used was uniform throughout, except for variations in the content of cod liver oil or other fat soluble vitamin containing foodstuffs. It was composed as follows:

Casein (purified)	18 per cent
Steenbock's No. 40 Salt	4 " "
Agar agar	8 " "
Dextrine	65 " "
Crisco	5 " "

Whatever of vitamin-containing fat was added was done by replacing an equivalent amount of Crisco. The drinking fluid was made up to contain:

Water	86.4 per cent
Lemon juice	12.0 " "
Fleischman's yeast (dry)	1.6 " "

The lemon juice was added as a carrier of Vitamin C. This was done because, in my experience, better results were obtained when the anti-scorbutic was used than when it was not. It has been maintained in this laboratory that as long as the anti-scorbutic vitamin is so plentifully supplied in practical dietaries it is necessary to include it also in synthetic diets in order that experimental conditions may compare as closely as possible to natural ones. Yeast was added at a level of 1.6 per cent. because it was noted that at this level a rat ingested the equivalent of 200 mgs per day, the amount which Osborne and Mendel[1] found sufficient to carry a rat through life at a normal rate in all respects.

Although the bulk of the data from these experiments is being reserved for a more complete report, it is desired at this time to state that the reproductive ability of the animals on these diets varied greatly. Cod liver oil was fed at levels varying from 0.25 per cent. to 5.0 per cent. On the diets containing enough cod liver oil to insure reproduction, the death-rate was very high. The clinical and pathological findings seemed to group the deaths in more than one class according to the most outstanding features. It is the purpose of this communication to submit evidence concerning one of these groups and the dietary changes that were necessary to obviate this difficulty in raising young on synthetic diets.

In experiment 60 four females and one male were receiving the above basal ration containing 2.0 per cent. cod liver oil. In order to conserve space, the history of only one female will be given. When female No. 279 was 168 days old (on the diet 140 days) she delivered six young, one of which died within a few hours. The young averaged 5.6 grams in weight, which is within normal limits. The young were adequately nursed, for they grew normally for fifteen days, at which time four suddenly showed paralysis of the hind limbs, shivering and an extreme diarrhea. Past experiences indicated that this was polyneuritis, and the diagnosis was so made in face of the fact that the mother showed no symptoms of polyneuritis and that her diet contained 1.6 per cent. yeast. As soon as one of the young died its sciatic nerve was carefully removed, stained in osmic acid and examined. Extensive myelin degeneration was found. Thus the diagnosis was confirmed. The yeast was immediately increased to 8.0 per cent. One of the young remained in good condition throughout the period of nursing and was successfully weaned. Of the remaining three animals suffering from polyneuritis, one died within a few days after the yeast addition; one recovered completely and was weaned and the remaining one improved sufficiently to have its life prolonged for several days.

The mammary glands of the mother showed histological evidence of active secretion. The stomachs of the young that died were filled with milk. Because of these facts and since the animals gained steadily in weight except at the very last (the diarrhea was very severe) it was concluded that starvation could not be a contributing factor. It was also considered that this was good evidence in favor of separating Vitamine B into two factors, one growth promoting and one preventative of polyneuritis.

There is thus demonstrated a dietary deficiency which is not manifested until the appearance of the second generation. As far as the writer knows, this

[1] Osborne and Mendel, *Jour. Biol. Chem.*, 54: 739, 1922.

is the first evidence offered, indicating that the maternal organism will not always deplete its own stores in favor of its young. It also makes apparent the necessity of increasing the Vitamin B intake in the diet of an expectant mother and maintaining this increase at least through the lactation period. This will have to be regarded as prophylactic treatment because of the inability to diagnose a condition of Vitamin B shortage until after the onset of the symptoms when the institution of curative measures is of little or no avail.

The curative effect of increasing the yeast intake after evidences of polyneuritis were seen was almost nil. Therefore it is concluded that by the time clinical evidence of polyneuritis has become manifest the progress of the disease has so far advanced that recovery is extremely doubtful. This conclusion naturally infers the fact that there are changes occurring in an animal due to a deficiency of Vitamin B that give no visible evidence of their existence. These changes can affect the organism before birth as well as after. It is undoubtedly due to this fact that there is a prenatal limitation of litters in mothers who are receiving a minimum of the anti-neuritic vitamin. The experience of others in bettering the reproductive ability of their animals by increasing the yeast content of their diets can easily be explained on this basis.

The clinical application of the above findings will be of the greatest value in such countries as Japan, where, according to Takano,[2] infant mortality from beri-beri is so high. According to this author the mortality from beri-beri is the greatest among breast-fed infants to the extent that one half of all the deaths from this disease during 1923 were from this class. It is also significant to note from this author that while nine thousand infants died from beri-beri only five hundred mothers did so. He says: "There are instances in which sucklings suffer from beri-beri while the mothers show no sign of the disease. . . . One of the reasons for the high death-rate among infants is the fact that infantile beri-beri cases are, as a rule, apparently nourished and have no apparent complaints, so that when it is diagnosed as beriberi, it is already in the advanced stage of the disease and accordingly its prognosis is unfavorable." These remarks bear out some of the conclusions mentioned above.

IRA A. MANVILLE
UNIVERSITY OF OREGON MEDICAL SCHOOL

RATE OF GROWTH OF YOUNG LOBSTERS

DURING the summer of 1920 I undertook the problem of estimating the rate of growth of young lobsters. Having learned during the previous summer where to look for very young lobsters and how to capture them, I succeeded in capturing 262 lobsters under six inches in length. Of these 176 were under five inches, eighty-six were under four inches, and twenty-four were under three inches.

The contents of the stomachs of a number were examined, in order to learn something about the natural food of these animals, but that work has not been completed. The rest of the five-inch lobsters were liberated and the others retained for one year.

The 143 lobsters which were kept for further study were put into a large latticed box, divided by partitions into three compartments of different sizes. The latticed work was close, leaving only one quarter inch spaces between the pieces. The bottom of the box was covered with stones and sods of eel grass to make conditions as nearly natural as possible. For convenience the compartments were labelled I, II, III. In compartment I seventeen lobsters, having an average length of 2.86 inches, were placed. In compartment II we put sixty lobsters, having an average length of 3.60 inches. In compartment III we put sixty-six lobsters having an average length of 4.53 inches.

A suitable place was then selected, some distance from shore. The box was properly weighted, and so situated that there were several feet of water above the box at low tide. In this way all danger from ice was avoided. By means of a method which we devised, the lobsters were provided regularly with food and they were free to live practically in the same way as if they were free. They could burrow and hide among stones.

One year later the three compartments were again examined and the following results obtained. In compartment I fourteen out of seventeen were found alive. The average length was 3.97 inches. In compartment II thirty-two were found, having an average length of 4.75 inches. In compartment III thirty-six were obtained, with an average length of 5.79 inches.

Hence a lobster measuring 2.86 inches was found one year later to measure 3.97 inches, thus showing a yearly growth in length of 1.11 inches. In the same way a lobster measuring 3.60 inches grew to 4.75 inches, thus gaining 1.15 inches. Also a lobster measuring 4.53 inches grew in one year to measure 5.70 inches, thus showing an increase of 1.17 inches.

The expense of this investigation was borne by the Biological Board of Canada and the work was done under the supervision of the chairman, Dr. A. P. Knight.

D. A. MACKAY
COLLEGIATE INSTITUTE, OTTAWA

[2] Takano. *The Jap. Med. World*, 6:8, 1926.