Professor J. W. Ellis, for research in infra-red spectroscopy.

Professor V. O. Knudsen, for studies in physiological and architectural acoustics.

Professor C. G. Haines, for a comparative study of review of legislative acts by courts.

Professor Ellen B. Sullivan, for research in delinquency and home rehabilitation.

Dr. Gordon H. Ball, for an investigation of the life histories of various intestinal Protozoa.

Professor Bennett M. Allen, for research on the influence of the endocrine glands of amphibian larvae upon growth and development.

Professor John C. Parish, for historical research in connection with a monograph on John Stuart and the Indian boundary line.

Professor Henry R. Brush, for photostat copies of manuscripts necessary in a study of French historical poetry.

SPECIAL ARTICLES

LONG-BONE LENGTH AND BODY SIZES

IN going over some bone-length, body-length relations observed in a series of albino rats used as controls for another study, it was noted that a singular consistency in ratios existed, regardless of age or body size, once the animals had passed the pre-pubertal stage of development. On remarking this to Dr. H. H. Donaldson, of this institute, he reminded me of the idea attributed to Cuvier that it should be possible to reconstruct an animal from a single bone. While I have been unable to track down this statement in the literature, the figures in the accompanying table show that the principle is not at all preposterous, providing certain obvious limitations are recognized.

The ratios given in the table were derived from length measurements of the humerus, femur and body of ten or more rats of each sex of each age series from 50 days onward. The 20- and 30-day-old groups were composed of 20 animals of each sex.

The data show definitely that once puberty is established, which occurs in the albino rat at about 65 days of age, the ratios between humerus length and body length, and femur length and body length are practically constant, notwithstanding the actual increases which take place in bone and body size. Thus given a humerus or a femur of a male or female albino rat of 65 days of age or over, it is possible to compute from its length the body length of the animal from which the bone was taken, and from this the approximate body weight as well as that of the several organs, more particularly the brain and spinal cord, by the use of the "standard" values established by Donaldson.

BONE LENGTH-BODY LENGTH RATIOS OF ALBINO RATS

Age in days	Male				Female			
	Body weight gm.	Hum. L. Body L.	Fem. L. Body L.	Hum. L. Fem. L.	Body weight gm.	Hum. L. Body L.	Fem. L. Body L.	Hum. L. Fem. L.
23	27	.141	.155	.905	29	.142	.157	.903
30	41	.135	.158	.853	39	.138	.162	.855
50	75	.128	.159	.806	74	.128	.159	.805
65	121	.125	.159	.785	105	.127	.161	.785
75	133	.125	.160	.785	116	.127	.162	.785
100	162	.125	.163	.771	138	.127	.164	.776
150	263	.126	.164	.765	183	.127	.165	.773

It will be noted that, of the two bones, the humerus length bears the more constant ratio to the body length, that of the femur tending to increase slightly with age. While this increase is numerically small, its occurrence in both sexes, combined with the fact that the humerus length-femur length ratio consistently decreases with age marks the distinction as valid, and indicates that of the two the humerus is the better bone for reconstruction purposes.

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DIETARY REQUIREMENTS FOR REPRODUCTION[1]

XII. THE INEFFICIENCY OF THE LACTATING MOTHER (MUS NORVEGICUS ALBINUS) TO SECRETE VITAMIN B IN THE MILK AND THE RELATION OF SUCH PHENOMENON TO INFANT MORTALITY

FOR the past eight years I have been attempting to induce lactating albino rats to rear and wean their

[1] Aided by grants from Eli Lilly and Co., Indianapolis, and the Committee on Scientific Research of the American Medical Association. Research paper No. 49, Journal Series, University of Arkansas.

young at a normal rate on synthetic diets composed of purified food substances. After seven years of continuous failure I have finally succeeded during the course of the last year in these efforts, but only by increasing the Vitamin B content of the diet, in the form of alcoholic extracts of the wheat embryo, to unusually high proportions.[2]

During the last few months I have perfected a quantitative biological method for the study of Vitamin B requirements for lactation. Details of the method, as well as detailed accompanying data, will soon be published elsewhere, but essentially the technique is as follows: Mothers with their litters, reduced to 6 in number, are transferred from our Stock Diet No. 1[3] to the following Vitamin B-deficient ration: Casein (purified), 20.0; agar-agar, 2.0; butter fat, 5.0; McCollum's salt mixture No. 185, 4.0; and dextrin, 69.0. Daily records are kept of food consumption and the mothers and young are weighed daily. Each mother and litter is placed in an individual compartment containing false screen bottom so there is no access to feces, and a liberal supply of distilled water is allowed daily. On such a dietary régime nursing rats will rear their litters for 10 to 12 days, during which period the mothers lose 20 to 30 per cent. of their body weights. The young then reach a maintenance curve, at which point we employ the curative method by administering brewer's yeast, or concentrated preparations therefrom, to the mothers quantitatively in petri dishes separately from the ration. By such technique it was discovered that it is necessary to supply at least 1,500 milligrams of dehydrated brewer's yeast (the same amount of Harris yeast is required) to successfully wean our litters, and in most cases, that was accomplished only by a prolongation of the nursing period.

It was found, however, that rearing of the young could be considerably expedited if, at a certain stage in lactation when the young are able to partake of the mother's diet, the greater portion of the vitamin allowance is administered to the young instead of to the mother. Fortunately, I now have access to a much more concentrated Vitamin B product from yeast than I have ever encountered before in my laboratory.[4] When it became apparent that several litters were failing on 200 to 500 milligrams of the concentrated vitamin apportioned to the mother daily at an early stage of lactation when the nursing young are entirely dependent on the mother's milk, the nursing babies having developed screaming running fits and spasms, and when the paralysis beginning at the posterior quarters extended to the jaws, so that they could swallow only with great difficulty, the greater portion of the vitamin dosage allowed the mother was then administered to the young in aqueous solution with a medicine dropper. The first response was almost immediate. The convulsive young overcame their spasms in less than two minutes, and could swallow readily in five minutes. It was then an easy matter to give the young the rest of the vitamin dosage. In a few hours the young were observed nursing and on the next morning playing cheerfully in the cage. The young were successfully weaned in 7 to 10 days.

We find there is an optimum requirement of Vitamin B for mother and young during different stages of lactation, the amounts depending on the condition of the mother and the age of the young.

At this writing we are having unusual success with a Vitamin B concentrate with a daily dosage of only 50 to 65 milligrams by distributing the vitamin between mother and young according to needs.

We have now perfected our technique so we can save baby rats just a little over one third of an ounce in weight, still blind, lying flat on their backs or sides constantly nursing, and this procedure we adopt only when it is determined that the mother is dissipating considerable of the vitamin dosage apportioned to her in the metabolism of transfer to the milk. The results are remarkably successful.

It is quite possible that a large proportion of the infant mortality associated with gastro-intestinal disturbances during the first year of life may be due to Vitamin B deficiencies. Such vitamin deficiencies may be brought about by the character of the present American diet, which is composed largely of degerminated cereals, sugar, and meat, and in addition by the physiological inability of the nursing mother to secrete her daily Vitamin B intake quantitatively and rapidly into the milk indispensable for infant nutrition and welfare. Pediatricians already recognize the needs of cod liver oil, and orange or tomato juice for infants to furnish Vitamins A, D, and C. No provision is as yet, however, being made for Vitamin B therapy.

This communication is essentially preliminary in character and the detailed data will appear in scientific journals.

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[2] Sure, B., J. Biol. Chem., 1927, lxxiv, 55–69.

[3] *Ibid.*, lxxiv, 49.

[4] This concentrate was prepared for me by Mr. E. H. Stuart, chemist of the Eli Lilly Research Laboratories, Indianapolis, Ind.