

Southern Section.

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Observation on the Motility of the Gastro-Intestinal Tract of Starving Rats.

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(Introduced by W. H. Harris.)

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Many reports have been made on the contraction of the stomach due to hunger, in man and animals. In certain instances the x-ray was used¹ and in others, mechanical contrivances were utilized to record the results. The radiological studies have included the emptying time of the stomach due to hunger. Ivy and Fauley² state that hunger or fasting causes the stomach to empty faster in both dog and man.

The experiments herein reported were made on normal, healthy rats that were gradually deprived of food over a period of 3 weeks, with no restriction as to the intake of water. This series consisted of 5 rats, averaging 342 gm. in weight. They were at first made to fast for a period of 24 hours and subsequently each rat was fed 2 gm. of normal food a day for a period of 21 days. Two of these rats died, one on the tenth and the other on the fifteenth day of the experiment. All of the rats lost weight, the average weekly loss in weight per rat was 54 gm.

The remaining rats of this series on the twenty-first day of starvation were fasted and made to abstain from water for 24 hours and then fed a 10 gm. mixture of 3 parts of buttermilk and one part of barium sulphate and permitted to eat for 20 minutes and then immediately fluoroscoped to ascertain if the stomach was filled. The fluoroscopic observations were continued every 15 minutes until the

¹ Rogers, F. T., and Martin, C. L., *Am. J. Phys.*, 1926, **76**, 349.

² Ivy, A. C., and Fauley, G. B., *Am. J. Phys.*, 1929-30, **91**, 206.

stomach and small intestines were found empty. The examination of the colon was made at greater intervals of time.

Three normal rats were fed the same food over the same time, but the quantity of food per day was 14 gm. per rat which is considered an average normal amount.³ On the twenty-first day they also were made to fast and abstain from water for 24 hours, when they were given the same mixture as the other rats and examined in a similar manner by means of the x-rays.

In every one of the 3 starving rats a marked hypermotility was observed of the entire gastro-intestinal tract.

TABLE I. *Averages.*

Food	No. Rats	Wt. gm. 9/9/30	Wt. gm. 10/1	Wt. gm. Lost	Ate gm.	Cecum Ap. time	Stom. Emp. Time	Sm. I. Emp. Time	Col. Emp. Time	Rations per day per rat. 9/9 to 10/1
Starving	3	327	243	84	9.6	1:27	3:29	4:32	45 h.	2 gm.
Normal	3	240	249.2	0	8.2	3:10	7:24	9:49	70 h.	14 gm.

Table I represents the results obtained in these experiments. It will be noted that the rats of both series ate nearly the same amount of buttermilk and barium sulphate and that the passage of this substance through the entire gastro-intestinal tract in the starving rats was very much faster than in the control rats.

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Potassium Content of Human Cardiac Muscle.

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The investigations of Ringer,¹ Howell,² and Zwaardemaker³ and their coworkers offer the strongest evidence that the element potassium is an indispensable factor in cardiac activity. This conclusion is derived from experimental work on hearts of the lower animals, as a rule amphibians. Zwaardemaker alone has endeavored to adapt his findings to human heart function, in that he has

³ Donaldson, "The Rat".

¹ Ringer, S., *Am. J. Physiol.*, 1884, **5**, 247.

² Howell and Duke, W. W., *Am. J. Physiol.*, 1928, **21**, 51.

³ Zwaardemaker, H., *Arch. f. d. ges. Physiol.*, 1924, **205**, 20.