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Influence of cold and exercise in phlorhizin glycosuria.

By **GRAHAM LUSK.**

[*From the Physiological Laboratory of the University and Bellevue Hospital Medical College.*]

When phlorhizinized fasting dogs with a urinary D : N ratio of 3.65 : 1 are exposed to cold they at first lose extra sugar which is derived from body glycogen. But if the exposure to cold be repeated the D : N = 3.65 : 1 may remain unaltered.[1] The lowering in environmental temperature was such as would increase fat combustion in the animal by 50 per cent. and yet the sugar output remained unchanged.

Mechanical work at first brings about an increased sugar excretion. If, however, a dog be freed from glycogen mechanical work has no influence on the sugar excretion. In the following experiment a fasting dog was made use of on the third day of total phlorhizin glycosuria. He was prepared by administering cold baths on the first and second days of the glycosuria, and then exposing him to a temperature of 10° C.; shivering removed his surplus glycogen. The mechanical work was done in a wheel during five-minute intervals of alternate work and rest throughout a first hour of a two-hour period. The results were as follows:

Period in Hours.	Distance Travelled in Meters	D	N	D : N
2		4.20	1.19	3.53
2	1,500	5.32	1.36	3.90
2		4.57	1.26	3.63
2	1,500	4.62	1.26	3.67

[1] Confirms Brasch, Minkowski, Allard; opposes Lüthje.

The fat metabolism during the hour of work must have been double that of an hour of rest, and yet in the last experiment there is absolutely no change whatever in the sugar excretion as a result of travelling 1,500 meters. The D : N ratio is therefore absolutely independent of fat metabolism, but is dependent upon protein metabolism.

To illustrate the manner of sugar production from protein, glutamic acid with its five C atoms was administered subcutaneously and *per os* to a phlorhizinized dog. The resulting increase in the output of urinary sugar was such as would indicate certainly a conversion of three and possibly a conversion of four of the carbon atoms of glutamic acid into dextrose. One can explain the former case as a result of the cleavage of glutamic acid into an alanin radicle which is convertible into lactic acid in metabolism and this again into dextrose.

The writer was assisted in this work by Mr. H. P. Mencken.

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The influence of carbohydrate on the protein metabolism of a fasting pregnant dog.

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A dog in the ninth week of pregnancy and weighing 12.46 kgm., on the third fasting day of a three-day period was fed 42 gm. of cane sugar for two days. The reduction in the nitrogen elimination on the second sugar day as compared with the last fasting day was over 50 per cent. The same experiment was repeated on the same dog more than two months later, *i. e.*, four weeks after the puppies were weaned. The dog weighed on the third fasting day 10.42 kgm. Since the puppies when they were born (four days after the conclusion of the former experiment) weighed 1.5 kgm., this probably represents, as nearly as one can estimate, the weight of the mother alone at the time of the former experiment. The cane sugar fed, therefore, would represent about the same percentage of the actual requirement on the part of the