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.

By **J. R. MURLIN.**

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

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

mother dog in both cases. The reduction of the nitrogen elimination on the second sugar day as compared with the fasting day just preceding, was 20 per cent. in the non-pregnant condition instead of 50 per cent. in the pregnant condition.

TABLE I.

DOG PREGNANT 9TH WEEK.

Date, Dec., 1907.	Weight, Kgm.	Carbohydrate.	Nitrogen in the Urine.													
			Total.	Urea.		NH_3		Urea+NH_3		Creatinin.		Creatin.		Undetermined.	
				Gms.	Per Cent.	Gms.	Per Cent.	Gms.	Per Cent.	Gms.	Per Cent.	Gms.	Per Cent.	Gms.	Per Cent.
7	12.46	3d day fasting.	5.036	4.383	87	0.190	3.7	4.573	90.7	0.078	1.5	0.084	1.6	0.301	6.2
8	12.24	42 gm. cane sugar.	3.401	2.614	76.9	0.120	3.5	2.834	80.4	0.082	2.4	0.141	4.1	0.344	13.1
9	12.10	42 gm. cane sugar.	2.495 (50% red.)	1.874	75.1	0.058	2.3	1.932	77.4	0.085	3.4	0.164	6.5	0.314	12.7
10	12.00	fasting.	3.240	2.627	81.0	0.137	4.2	2.764	85.2	0.050	1.5	0.157	5.4	0.269	7.9

TABLE II.

SAME DOG, FOUR WEEKS AFTER WEANING PUPPIES.

Date, Feb., 1908.	Weight, Kgm.	Carbohydrate.	Nitrogen in the Urine.													
			Total.	Urea.		NH_3		Urea+NH_3		Creatinin		Creatin.		Undetermined.	
				Gms.	Per Cent.	Gms.	Per Cent.	Gms.	Per Cent.	Gms.	Per Cent.	Gms.	Per Cent.	Gms.	Per Cent.
15	10.42	3d day fasting.	2.856	2.420	84.7	0.133	4.6	2.553	89.3	0.089	3.1	0.045	1.6	0.169	6.0
16	10.20	42 gm. cane sugar.	2.520	2.150	85.3	0.168	6.6	2.318	91.9	0.078	3.1	0.055	2.2	0.069	2.8
17	10.16	42 gm. cane sugar.	2.284 (20% red.)	1.942	85.0	0.074	3.2	2.016	88.2	0.080	3.4	0.059	2.5	0.129	5.9
18	10.04	fasting.	2.352	1.999	85.1	0.084	3.5	2.083	88.6	0.081	3.4	0.040	1.7	0.148	6.3
19	9.82	fasting.	2.587	2.127	82.2	0.124	4.8	2.251	87.0	0.081	3.1	0.056	2.2	0.199	7.7

The greater effect of the sugar in the former experiment is due to a large relative, as well as an absolute, reduction in the urea plus ammonia nitrogen. The explanation might be either that the sugar interfered with the production of urea and ammonia, that is, with deamidization and dehydration of the proteins placed in circulation when fasting is superimposed on the pregnancy, or that

the sugar has helped in the utilization of such proteins for the maintenance of the fœtal growth. The latter is, I think, the better interpretation. It would seem that the sugar has diverted substances which would otherwise have been eliminated as urea or ammonia, and it seems probable that this has been accomplished by synthesis in the embryonic tissues. The very high creatin nitrogen eliminated in the pregnant condition may be taken as an indication that the muscles are the chief source of these proteins but that the creatin itself is not (all) available for the embryonic growth. The fact that the dog was apparently weakened much more by this fasting period than by the period of similar duration when not pregnant would lend support to this view. The conditions would be entirely analogous, therefore, to Miescher's classical case of the fasting Rhine salmon where it has been shown that the muscular tissues are levied upon for the growth of the germ cells just previous to the spawning season. At all events it is clear from the above experiment that the carbohydrate has caused a much greater retention of the proteins in the pregnant condition.

Perfectly concordant results were obtained on a second dog in the sixth week of pregnancy where the reduction in the nitrogen output by a proportional amount of carbohydrate was 38 per cent.

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The transplantation of parathyroid glands in dogs.

By **W. S. HALSTED.**

[*From the Hunterian Laboratory, Johns Hopkins University.*]

Our experiments, begun in the winter of 1906–7, have with interruptions been continued to date. In the course of the work many questions have arisen which still require solution and we find ourselves on the threshold of the investigation.

The first attempt of which I know to transplant these organs was made by us in December, 1906. Two parathyroid glands, one from the right and one from the left side of the dog's neck, were successfully implanted into the thyroid lobes from which they were removed.[1]

[1] Halsted: *American Journal of the Medical Sciences*, 1907, cxxxiv, No. 1 (July).