This patient had received a large salt infusion during the convulsive period. In two other fatal cases hemolysis was found only in emulsions made from the spleen, but not in the hepatic, portal, or uterine veins, or in the placenta. In a fourth fatal case with bloody urine and extensive hemorrhages in the brain, liver, and peritoneal cavity, 300 c.c. of blood were drawn from the arm during life. The serum was entirely unstained by hemoglobin.

The blood of the placenta mixed with fetal blood, or with extracts in salt solution of liver and kidney, failed to hemolyze.

The observations indicate that the eclamptic toxin is not a hemolytic agent derived from the placenta, and that hemolysis is not necessarily associated with the lesions of the viscera. Semb's observations in which he demonstrates visceral lesions strongly resembling those of a hemolytic serum, cannot be accepted as evidence of a specific eclamptic toxin. Histological study of the liver of eclampsia indicates that the characteristic lesions consist in fibrin thrombi and not in agglutination and hemolysis of red cells, and that when hemolysis occurs it results from the products of degeneration and necrosis of endothelial and hepatic cells. It is therefore probably an entirely secondary factor in the disease.

81 (224)

Glycocoll nitrogen in the metabolism of the dog.

By **J. R. MURLIN.**

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

While attempting to explain the behavior of gelatin in metabolism it occurred to the writer that much significance might be attributed to its high content of glycocoll. It is well known that the nitrogen of gelatin is not ordinarily retained in the body but appears quantitatively in the urine, chiefly as urea. But when fed with meat and abundance of carbohydrate it is possible to establish nitrogen equilibrium near the fasting level, if two-thirds of the total quantity of nitrogen fed is present in proteid-free gelatin and only one-third present in the meat.[1] Would glycocoll, if fed in the same way, behave as does gelatin?

[1] Murlin: This journal, 1905, ii, p. 38.

v. Brügsch and Hirsch fed 20 gm. of glycocoll[1] to a fasting woman on the twelfth day of her fast and observed that all of its nitrogen appeared in the urine as urea. Samuely[2] had likewise observed this fate (chiefly) of glycocoll nitrogen when glycocoll was added to meat and other foodstuffs in the diet of dogs suffering from artificial anemia. But Lüthje[3] reports a nitrogen retention, with asparagin and glycocoll as the only sources of nitrogen, provided carbohydrates are fed freely at the same time. He thinks there may be a synthesis of the amino acids with carbohydrate and the formation of an "amino sugar," which escapes the destructive processes of the body.

It has appeared in my experiments with gelatin that the power of the body to conserve its nitrogen supply is stronger the lower the proteid condition of the animal at the time of feeding. For the purpose of testing the power of retaining glycocoll nitrogen therefore, I prepared the dogs by subjecting them to long periods of fasting or under-nutrition. For example, a dog weighing in good condition 6.5 kg. fasted for 13 days, during which the weight fell to 4.8 kg. Then for two weeks more he was kept in under-nutrition as regards proteid, for the purpose of a gelatin experiment. At the end of the month the weight had been reduced to 4.2 kg. The total output of nitrogen on the last day of a fasting period at this time was 1.247 gm. By feeding for a period of 5 days, 6.4 gm. of proteid-free gelatin and supplying over 100 cal. per kg. of energy (chiefly in the form of carbohydrates), the output of nitrogen was reduced to 0.406 gm. Ten days later on a diet containing 0.491 gm. of nitrogen in the form of beef heart and 150 cal. per kg. (weight still 4.2 kg.), the dog was almost in nitrogen equilibrium (— 0.02). To this diet were then added 5 gm. of glycocoll containing 0.951 gm. nitrogen, bringing the total nitrogen ingested up to 1.442 gm. The diet was continued for five days, on four of which there was nitrogen retention — a total for the period of 0.257 gm. But on the day following when the glycocoll was dropped and when there should have been nitrogen equilibrium, as there was previ-

[1] v. Brügsch and Hirsch: Zeitschr. f. ex. Path. u. Ther., 1906, p. 638.

[2] Samuely: *Deutsch. Arch. f. klin. Med.*, 1906, p. 220.

[3] Lüthje: *Pflüger's Arch.*, cxiii, summary p. 604; also Kongress f. inn. Med., 1906, p. 440.

ous to the glycocoll feeding, there was a loss of 0.435 gm. N. It is believed that this loss includes the glycocoll nitrogen retained temporarily.

A second dog weighing in good condition 5.4 kg. fasted for 10 days during which the body weight fell to 4.6 kg. The nitrogen output on the last fasting day was 1.697 gm. For five days immediately following this, 1.496 gm. of nitrogen were given, two-thirds of it (1.006 gm.) in the form of very pure gelatin and one-third (0.490 gm.) in the form of beef heart. A total energy supply of 130 cal. per kg. (chiefly carbohydrates) was maintained. On the fifth day there were 1.55 gm. N in the urine. On the next day the gelatin N was replaced by glycocoll N and, singularly enough, the nitrogen output in the urine was exactly 1.559 gm. This, however, is probably a mere coincidence and is not to be interpreted as showing that glycocoll N exerts the same sparing effect on the body proteid as gelatin, for on the second day with glycocoll, the nitrogen in the urine rose to 1.898 gm.

A fasting period of five days was next introduced, the nitrogen in the urine on the last day being 1.288 gm. For three days thereafter 7 gm. of glycocoll, containing 1.332 gm. N were given, and the total energy supply was made up with carbohydrates and a small quantity of fat (10 gm.) to 140 cal. per kg. The nitrogen loss represented by the urine alone on the three days was 0.125, 0.280 and 0.674 gm. respectively. Then the glycocoll was dropped and the carbohydrates with a small quantity of fat were continued for two days. The nitrogen in the urine for these days was 0.987 and 0.713 gm. respectively. A third day would probably have reduced it still more, since as Landergren[1] has shown, it is possible to reduce the nitrogen output of a man to about one-third of what it would be in fasting, by ingestion of carbohydrates alone. While, therefore, there is an evident benefit, as regards waste of nitrogen, conferred by the glycocoll while it is being ingested, the nitrogen which it conserves is rapidly eliminated after the feeding period. It is possible that this nitrogen is retained temporarily in the form of glycocoll itself, since as shown by Parker and Lusk,[2] the amount of glycocoll which may be removed by combination with

[1] Landergren: Review by Hammarsten, *Maly's Jahresber.*, 1902, p. 685.

[2] Parker and Lusk: *Amer. Journ. of Physiol.*, 1900, iii, p. 472.

benzoic acid given to rabbits is greater on the first day of the administration during a fasting period than on subsequent days. Whether the glycocoll is combined with carbohydrate as an amino-sugar, as Lüthje imagines, or not, it is evident from the several experiments that no permanent synthesis takes place. Glycocoll, therefore, behaves in much the same way in metabolism as does gelatin.

82 (225)

An hydrodynamic explanation of mitotic figures.

By **ARTHUR B. LAMB** (by invitation).

[*From the Havemeyer Chemical Laboratory, New York University.*]

The distinctly polar arrangement of the chromatin substance about the astral centers in dividing cells, combined with the pronounced curvature of the astral rays and of the spindle fibers, have demanded the assumption of some polar force as universally operative. On such an assumption it is of course necessary to assume further that astral centers represent either opposite or like poles. On the alternative of opposite poles, we should expect, with any force so far proposed, a configuration of astral rays simulating that of iron filings between *opposite* magnetic poles, coupled with a mutual *attraction* of the astral centers. On the other alternative, we should similarly expect a configuration of astral rays and spindle fibers simulating that of iron filings between *like* magnetic poles, coupled with a mutual *repulsion* of the astral centers. Actually, we have neither of these conditions, but instead, a configuratian like that of iron filings between *opposite* magnetic poles *and at the same time an apparent repulsion between the astral centers or the centrosomes.*

This is not the case with the forces of attraction or repulsion existing between bodies oscillating or pulsating in a fluid medium. More specifically, if two spheres are pulsating synchronously and in opposite phase, or oscillating synchronously and in the same phase, they will repel one another, *but at the same time the field between them will simulate the configuration of iron filings between opposite magnetic poles.*[1]

[1] See Bjerknes' text-book, "Hydrodynamische Fernkräfte," J. A. Barth, Leipzig, 1902.