

nificant change in respirations while corresponding doses of epinephrine hydrochloride depressed respirations in 95% of experiments and the average depression of the depth was 54%. Under corresponding conditions, therefore, benzedrine does not depress respirations of rabbits as does epinephrine.

*Conclusion.* Benzedrine sulphate was found to depress spinal reflexes in brain-pithed frogs and to depress skeletal muscle *in vitro*. In doses at which epinephrine depresses respiration, benzedrine had no depressant effect.

### 9479 P

#### Nutritive Value of Lactalbumin versus Casein.\*

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In this report a summary is given of the results of studies on growth, nitrogen storage, metabolism and composition of gains of rats on diets containing 8% and 12% lactalbumin and casein.

*Growth Experiments.* A total of 2 series of animals was used consisting of 3 groups. The rats of the same group were litter mates and of the same sex and weight, and all rats were confined in individual cages. One series of 9 animals was fed a diet containing 8% protein and another series was fed 12% protein. The animals were weighed every other day and accurate food consumption records were kept. The experimental period lasted 70 days. The average results of these growth experiments showed that the gain in body weight per gram of protein intake was 1.65 gm. for 3 animals fed a diet containing 8% casein, and 2.14 gm. for 6 animals on an 8% lactalbumin diet.

On a 12% level of protein these figures were 1.60 and 1.86 for casein and lactalbumin, respectively. Nitrogen storage was determined in the rats of the growth experiments described above. In each group a fourth rat, litter mate of the same sex and weight, was sacrificed at the beginning of the experiment and the carcass was analyzed for nitrogen. These rats served as controls. After the feeding period of 70 days all animals were sacrificed. The percentage of total food nitrogen stored on each ration was computed by sub-

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tracting the amount of nitrogen found in the controls killed at the beginning of the experiment from the amount of nitrogen found in the animals that had been on the ration for 70 days. The biological value of the protein was defined as the ratio (expressed in percentage) between the nitrogen stored in the body to the nitrogen intake during the feeding period.

The biological value (according to this method) for casein was 26.3% (the average of the 3 casein-fed rats) and for lactalbumin was 37.5% (the average of 6 lactalbumin-fed rats) on the 8% level.

These figures were 29.2% for the casein rats and 36.1% for the lactalbumin rats on the 12% protein level.

*Metabolism Experiments.* Mitchell's<sup>1</sup> method was used for the determination of the biological value and a total of 28 rats was employed for these nitrogen balance experiments. Eight percent casein showed an average biological value of 69 for 12 rats; these figures were 84 for 8% lactalbumin (15 rats), 83 for casein and cystin (16 rats); 85 for lactalbumin and cystin (13 rats), 61 for 12% casein (6 rats), and 80 for 12% lactalbumin (6 rats).

The average true digestibility was 99 for 8% casein and 98 for 8% lactalbumin.

Another growth comparison of the values of both proteins at the 8% protein level was made by the modified paired feeding technique of Mitchell.<sup>2</sup> Nine pairs of rats were used. Litter mates and animals of the same weight and sex were employed in these pairs and the initial weight was about 52 gm. The food intakes of paired mates were equalized, but the lactalbumin protein ration was fed with varying amounts of a nitrogen-free ration. In this way equal gains were made and equal amounts of food were fed, but unequal amounts of nitrogen were taken in.

The 9 pairs of rats were killed at the end of about 60 days and the carcasses were analyzed for moisture, nitrogen, ash and fat in order to determine possible differences in the composition of the gain of the animals.

The results of the paired feeding experiments indicated that one gram of nitrogen from the lactalbumin ration was as effective in promoting the functions of maintenance and growth as an average of 1.33 gm. of nitrogen from the casein ration.

In similar experiments—employing 5 pairs of rats—it was found

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<sup>1</sup> Mitchell, H. H., *Biol. Chem.*, 1924, **58**, 873.

<sup>2</sup> Mitchell, H. H., Burroughs, E. W., and Beadles, J. R., *J. Nutrition*, 1936, **11**, 257.

that one gram of nitrogen from the lactalbumin ration had the same nutritive effect as 1.08 gm. of nitrogen from the casein and cystin ration.

The carcasses of the lactalbumin-fed animals showed higher percentage of nitrogen storage than those of the casein-fed animals and it was calculated that one gram of food nitrogen from the lactalbumin ration promoted the same storage of nitrogen as 1.39 gm. of food nitrogen from the casein ration.

It was concluded that lactalbumin at an 8% and a 12% level of protein intake showed better growth and better nitrogen retention in rats than did casein at those levels, and it had the same or slightly better nutritive value as casein supplemented with cystin, and it was thus found to be a superior protein of high nutritive value for maintenance and growth.

#### 9480

### Effect of Various Salts on Hemolysis and Skin Necrosis Produced by Staphylococcus Toxin.

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Volk and Lipschutz<sup>1</sup> apparently were the first to study the action of hypertonic salt solutions on staphylococcus hemotoxin. The salts used were NaCl, Na<sub>2</sub>SO<sub>4</sub>, MgSO<sub>4</sub>(NH<sub>4</sub>)<sub>2</sub>, SO<sub>4</sub> and BaCl<sub>2</sub>. It was their opinion that staphylococcus toxin was not destroyed but that the hemolytic action was inhibited in the presence of hypertonic concentrations of the neutral salts with one exception and that was with BaCl<sub>2</sub>.

Recently one of us has studied the effect of NaCl on the hemolytic and skin necrotizing factors in staphylococcus toxin.<sup>2, 3</sup> It was found that a hypertonic solution of NaCl inhibited the degree and rate of lysis of rabbits' red blood cells. When a 5% concentration of NaCl was injected intradermally in rabbits prior to the intradermal injection of staphylococcus toxin skin necrosis was inhibited at the site of toxin injection.

The above observations suggested a further study of the effect of

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<sup>1</sup> Volk, R., and Lipschutz, B., *Wien. klin. Wchnschr.*, 1903, **16**, 1394.

<sup>2</sup> Rigdon, R. R., *J. Infect. Dis.*, 1937, **60**, 25.

<sup>3</sup> Rigdon, R. H., *Arch. Path.*, 1936, **22**, 763.