

as great in the unanesthetized animals as in the experiments in which the glucose injections were made under amytal anesthesia. Because of this finding we believe that animals under this anesthetic are not suitable for experimentation in problems concerning carbohydrate storage.

TABLE I.
Glycogen increase in gm. per 100 gm. of tissue.

With amytal			Without amytal		
No.	Liver	Muscle	No.	Liver	Muscle
1	1.73	.95	5	4.39	.63
2	2.63	.20	6	5.72	.59
3	1.59	.54	7	4.16	.18
4	2.23	.20	8	3.52	.52
Avg.	2.05	.47	Avg.	4.45	.48

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Effect of Pituitrin Administration on Rate of Disappearance of Injected Substances.

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In previous investigations by the authors,^{1, 2} it was found that pituitrin administration resulted in a decreased rate of removal of injected fluid and glucose by the tissues of the unanesthetized dog. This report is concerned with the effect of pituitrin on the removal from the blood stream of intravenously injected chlorides and a colloidal dye, Brilliant Vital Red. The former is of interest because the work of other investigators tended to show that the diuretic-antidiuretic action of pituitrin may be due to an effect on electrolyte distribution.

Unanesthetized dogs deprived of food and water for a period of 20 hours were injected with an isotonic or hypertonic (5 times isotonic) Ringer's solution at a rate of 15 or 25 cc. per kilo body weight per hour by the continuous intravenous method. At times commercial pituitary extracts in amounts of .05 to .08 cc. per kilo

¹ Hines, H. M., Leese, C. E., and Boyd, J. D., *Am. J. Physiol.*, 1927, lxxxi, 27.

² Hines, H. M., Leese, C. E., and Jacobs, H. R., *Am. J. Physiol.*, 1927, lxxxiii, 269.

per hour were added to this solution. Studies were made of plasma chloride changes, chloride output in urine and relative blood volume changes as calculated from hemoglobin and plasma protein changes. The amount of chlorides retained by the tissues was calculated from the difference between the amount injected and that present in urine and blood. The small amount of chlorides that the animal would have eliminated without chloride administration has been neglected in these calculations. The effect of pituitrin on rate of disappearance of Brilliant Vital Red from the blood was determined by comparing the plasma dye concentration following the injection of 15 mg. per kilo of body weight at intervals of 1/10, 1½, 3½, 6 and 9 hrs. after its administration. Controls were run on all animals and the order of the control and pituitrin experiments was alternated in the different animals.

When isotonic Ringer's solution was injected for a period of 2 hours the plasma chlorides showed an average increase of 34 mg. (NaCl) as compared to an increase of 43 mg. in the same animals with Ringer's and pituitrin. When hypertonic Ringer's was injected the increase was 89 and 144 mg. respectively. Table I summarizes the average values obtained for the distribution of the injected chlorides in experiments on 6 animals. It is to be noted the effect of pituitrin was to lessen the amount of chlorides taken up by the tissues from the blood stream. This effect is more marked in the experiments with isotonic solutions. Little effect was noted on the amount of chlorides eliminated by kidney. This suggests an extra renal action of pituitrin as being the major factor involved. In the experiments with isotonic Ringer's solution the urine chloride concentration averaged 1.96% (NaCl) as compared to 1.53% with Ringer's and pituitrin. In the experiments with hypertonic solutions the concentrations averaged 1.57% and 2.08% respectively. Pituitrin administration was found to retard the rate of removal of

TABLE I.
Distribution of Injected Chlorides (Averages).

Nature of Injection	% excreted during injection period	% found in blood stream*	% calculated to enter tissues*	% excreted in 3 hr. post injection period
Isotonic Ringer's	29.1	27.2	43.7	34.4
Isotonic Ringer's and Pituitrin	27.4	48.7	23.9	45.5
Hypertonic Ringer's	14.0	27.3	58.7	61.9
Hypertonic Ringer's and Pituitrin	23.4	33.6	43.0	57.7

* At the end of the injection period.

Brilliant Vital Red from the blood stream in experiments on 5 out of 8 animals. Experiments on 3 animals showed no appreciable effects. Blood volume as determined by hemoglobin changes was not altered in the Vital Red studies. These and previous findings lend support to the idea that many of the effects of pituitrin administration are due to a lessened exchange of material between the blood and tissues.

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**Effect of Various Ions upon the Heart Rhythm of Crayfish
(*Cambarus clarkii*).**

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Using perfusing solutions of various salts approximating in ionic concentrations those found by Griffith¹ to be present in the blood of *Astacus fluviatilis*, an attempt was made to determine the effect of the Na, K, Ca, and Mg ion upon the intact heart of the Crayfish (*Cambarus clarkii*). For comparative purposes a control perfusing solution containing 1% NaCl+0.028%—KCl+0.024% CaCl₂ was employed. Such a solution applied to the heart maintained the normal rhythm for a period of several hours when perfused at a temperature of 25±0.1 degrees centigrade. Graphic records were obtained of the heart rhythm while being perfused with the various solutions.

In determining the effect of the Na ion, 3 perfusing solutions were employed, viz.: A pure solution of 1% NaCl, one containing 2% NaCl+0.028% KCl+0.024% CaCl₂ and one containing 0.028% KCl+0.024% CaCl₂. Both solutions containing Na produced a marked increase in rate and amplitude of the beats coupled with a loss in tone. The pure 1% solution had an especially marked effect upon the tone. The solution lacking Na produced a sharp increase in the tone accompanied by a loss in amplitude and rate, the heart generally stopping in diastolic arrest in less than 20 minutes. It may be noted in this connection that Carlson,² working upon *Limulus*, found that the Na stimulates the heart and increases the amplitude of the beats. Hogben³ noted that in *Maia* and *Homarus* a pure solution of NaCl produced an almost immediate increase in

¹ Griffith, A. B., "The Physiology of the Invertebrata." New York, 1892.

² Carlson, A. J., *Ergebnisse der Physiol.*, 1909, viii, 372.

³ Hogben, L. T., *Quar. J. Ex. Physiol.*, 1925, xv, 263.