Alterations in the blood electrolytes at the height of the jaundice were marked. All animals developed acidosis, reduction in the CO_2 content of the blood varying from 22 to 50%. The acidosis was due essentially to a considerable increase in lactic acid in the blood. This increase varied from twice to 7 times the control values. The increase in lactic acid was roughly proportional to the extent of liver damage. All the dogs showed a considerable drop in serum chlorides. This drop varied from 7.2 to 20.2 milli-equivalents per liter. No change occurred in the serum sodium values. The inorganic phosphorus of the serum increased from 1½ to almost 4 times the original control values, while the calcium remained remarkably constant. In 2 animals there occurred an increase in serum potassium values, and in the 3 animals in which magnesium studies were made the original control figures were doubled or trebled. An elevation of non-protein nitrogen and urea occurred in all cases. Four of the animals developed a definite hypoglycemia, the blood sugars being 16, 20, 32, and 50 mg. %. The development of hypoglycemia may be explained by the fact that following extensive injury to the liver this organ is incapable of converting lactic acid into glycogen. As a result of this incapacity there occurs an accumulation of lactic acid in the blood, and eventually a depletion of liver glycogen which is the major available source for blood sugar.

8894 C

Effect of Certain Drugs on After-Contraction.

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When voluntary muscles are put under tension against resistance through conscious effort, and then allowed to relax with the resistance removed, there follows an involuntary contraction in the original direction. Thus, as has long been known, if one stands against a wall, pushing the hand strongly against it, with the arm held stiff, on stepping away from the wall, the arm slowly rises toward a horizontal position. This phenomenon, which may be called after-contraction, has been studied by Kohnstamm, Csiky and others, who have given various explanations of its mechanism, none of which, however, seems adequate. In view of the more recent advances in the physiology of the nervous system, it seemed to us that further

study of the after-contraction would be of value. The present report deals with some aspects of the reaction.

The after-contraction may be obtained from any voluntary muscle group, and in these experiments the movement studied was flexion at the hip joint, the leg being extended. The subject stood on a platform, supporting his weight on one foot. To the other foot, hanging free, was attached a cord, passing over a pulley and carrying a fixed weight. Also attached to this foot was a string connected with a system of levers arranged to record the leg movement on a kymograph. At a given signal, the subject lifted the weight off its support by raising the extremity, and held it in a fixed position for a definite period. Then, at a second signal, the leg was relaxed and the weight disconnected. After a variable latent period the leg slowly rises, without conscious effort on the part of the subject and, indeed, somewhat to his astonishment.

Sixty or more subjects have been studied. In the great majority of instances the reaction occurred as expected. In a few, however, it was obtained only after some practice. Six kilos was the weight usually employed, and 15 seconds the time of supporting it. Variations in either factor altered the character of the after-contraction.

Using the method described, changes in the response of normal individuals under varying conditions, and in patients with neurological disorders have been studied, and will be described at a future time. In this communication the effects of some of the drugs studied will be reported. These are bromides, chloral, barbital, commonly used depressants, and caffein and strychnine, stimulants.

Of 10 subjects given bromides (2 G) all showed a marked reduction of the after-contraction, and in 7 it was absent. The effect came on in 30 minutes or more and persisted for several hours. In spite of this marked effect, subjective symptoms were absent or mild. No change in the knee jerk was observed.

Eight subjects were given caffein in dosage from 0.15 to 0.5 G. In 5 of these there was no appreciable change in the after-contraction. In 2 there was a moderate increase and in one a marked increase (500%). In contrast to this lack of uniformity of caffein action on normal subjects, caffein in small doses, corresponding to that in a cup of coffee, completely offset the depression caused by bromides. The antagonism was only temporary, the bromide effects returning in an hour or more.

Barbital was given to 6 subjects in relatively large doses, 0.3-0.6 G. In 3 instances there was no effect, in 2 a slight decrease, and in one no after-contraction. Two of these subjects were given bromide at one time and barbital at another. In these, the bromides abolished the after-contraction with no subjective symptoms, the

barbital was without effect on the after-contraction although marked mental depression was experienced.

Seven subjects were given chloral hydrate (0.6 G). In 3 there was no effect on the after-contraction, in 2 some lessening and in 2 an appreciable increase. Most of these experienced mental depression.

Strychnine was given to 9 subjects in dosage of 3 mg. Only 2 showed an increase in after-contraction. Unlike caffein, in every case where depression had been induced, strychnine failed to offset it.

In this report it is shown that of the three depressants studied, the bromide in all instances abolished or markedly reduced the after-contraction, whereas chloral and barbital, as a rule were ineffective. Of the 2 stimulants neither in the majority of instances produced any significant increase in the after-contraction. After it had been abolished by a depressant, caffein brought the after-contraction back to its original state, strychnine was ineffective. These experiments throw additional light on the selective action of drugs on the central nervous system, and with others in progress should aid in the study of some of the specialized functions of the cerebrum.

8895 P

Effect of Liquid Air Temperature on Bacteria.

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1. Twenty-four-hour cultures of *B. typhi, B. coli, Staph. albus, B. subtilis* on agar slants and in beef tea were immersed in liquid air. In addition, strips of sterile filter paper that had been impregnated with the above cultures were also placed in liquid air. At the end of one week, the cultures and the filter paper were removed from the liquid air. They were then transferred to new media. After incubation all tubes showed growth.

2. A suspension of a 24-hour culture of *B. typhi* was made in physiologic saline solution and standardized to one million bacteria per cc. by cytometric count. Five cc. of the suspension were placed in sterile test tubes 150x13 mm. The tubes were sealed in a blast-lamp and then placed in liquid air. Daily, for a period of 10 days, a tube was removed and melted and the number of survivors de-