

operatively and also 7 weeks after operation. At autopsy the control animals showed evidence of extensive adhesion formation, whereas those treated with the ferment showed either no evidence of adhesion or the adhesions which were formed were fine and veil-like. Control experiments were also carried out using the ferment alone; varying strengths from 1-1000 to 1-400,000 were used, and in none were there any evidences of irritation when papain solution or any of its associated substances were employed. This was studied both macroscopically and microscopically.

Series 2. 16 dogs. The effect of the vegetable digestion on the re-formation of adhesions. In this series a peritonitis was produced as in series 1. Nothing was added to the peritoneal cavity. The animals were allowed to live. Forty-three days later the animals were re-laparotomized and definite peritoneal adhesions found. These were divided. In half of the animals vegetable digestants were added to the peritoneal cavity. This was used in varying strengths. The other half of the animals were used as controls. The animals were sacrificed on the 4th, 7th, 10th, 13th days and 7 weeks after the second laparotomy. Invariably in control animals evidence of numerous adhesions, matting together the loops of the bowels and also extending between the bowel and the parietal peritoneum was found. One animal died of intestinal obstruction due to adhesions. Those animals treated with vegetable digestants in 3 instances showed very fine adhesions, between the operative wound and several loops of intestine, which could easily be broken with the finger. In the remaining dogs no evidence of adhesions was found.

3934

The Treppe in Excitability in the Turtle Ventricle.

RICHARD ASHMAN AND ROBERTA HAFKESBRING.

From the Department of Physiology, Medical School, Tulane University.

In earlier reports, we have demonstrated a treppe in conduction through compressed cardiac muscle, *i. e.*, after a period of quiescence, the conduction times for a series of impulses, more or less rapidly elicited, may show a progressive decrease. In attempting further to elucidate this phenomenon, it became necessary to determine whether, with repeated stimulation, the excitability would

show a similar stepping up. Adrian,¹ in studying the supernormal recovery curve of the frog ventricle, determined the excitability at various intervals following a single response. There is nothing in his paper to show whether, as seemed highly probable, the excitability would have still further increased had there been 2 or more antecedent responses, *i. e.*, whether a *treppe* of more than 1 step would have appeared.

We placed a freshly excised turtle ventricle in a moist chamber, and recorded the mechanical response while varying the strength of the break induction shock by changing a resistance in the primary. Six turtles were used in these experiments. Using the quiescent ventricle and starting with the least effective stimulus, we found that the effective strength could be progressively diminished when we stimulated repeatedly at intervals varying from 2 to 30 or more seconds. In 1 typical case, when the decrements were small and the interval 2 seconds, the resistance was changed from 25 to 46 ohms before failure of response ensued. On the other hand, with intervals of 30 seconds, the muscle responded only up to 31 ohms. If the decrements were great, *e. g.*, over 0.2 ohm, failure of response appeared sooner because the *treppe* in excitability did not keep pace with the decrement in strength of stimulus. After a 3 minute rest, the least effective stimulus corresponded to 25 ohms. More prolonged rests, up to 15 minutes, did not result in increased excitability. So far as determined, the changes in mechanical response were closely parallel with those in excitability.

Other findings, as well as evidence that sympathetic stimulation did not cause the results, will be given in a later communication.

3935

Treatment of Ileus by Splanchnic Anesthesia. An Experimental Study.

ALTON OCHSNER, I. M. GAGE AND R. A. CUTTING.

(Introduced by Henry Laurens.)

From the Department of Surgery, Tulane University Medical School.

Markowitz and Campbell¹ have shown that spinal anesthesia will relieve paralytic ileus produced in experimental animals. Believing that in these cases inhibitory impulses were transmitted to the in-

¹ Adrian, E. B., *J. Physiol.*, 1920, liv, 1.

¹ Markowitz, J., and Campbell, Walter R., *Am. J. Physiol.*, 1927, lxxxi, 101.