Thirty second meeting.

New York University and Bellevue Hospital Medical College. February 17, 1909. President Lee in the chair.

28 (366)

A method for the direct observation of normal peristalsis in the stomach and intestines.

By **YANDELL HENDERSON.**

[*From the Physiological Laboratory of the Yale Medical School.*]

When the abdomen is opened peristalsis ceases. Because of this fact all previous investigators have found difficulty in making observations directly upon the motility of the stomach and intestines. The peristalsis which has been seen differs considerably from that which the radiographs of Cannon have shown to be the normal movements.

Failure of peristalsis, as Meltzer especially has pointed out, is one of the characteristic and important phenomena of surgical shock. I have advanced the hypothesis[1] that the cause of shock is acapnia. By applying this theory to the problem of maintaining normal peristalsis after laparotomy, the following simple and effective method was devised. After the administration of a moderate dose of morphin, the animals (dogs of about 10 kilos) were anæsthetized with chloroform. So far as possible the hyperpnœa of the initial stage of anæsthesia was avoided. The abdomen was laid open the entire length of the mid line. The omentum was cut out, and the viscera moved sufficiently to bring into view the upper colon, lower ileum, and the greater curvature of the stomach from the pre-antral groove to the pylorus. A sheet of transparent celluloid was inserted under the body wall and over the viscera; and the air in the space back of this window was washed out with a stream of carbon dioxide gas. To the trachea was attached a tube 15 mm. in diameter and 2 meters in length. Blood gas analyses showed that the blood-gases were thus main-

[1] Y. Henderson: *American Journal of Physiology*, 1908, xxi, 126.

tained normal, — not asphyxial in respect either to the oxygen or carbon dioxide contents. When the stomach was distended with air, and the large intestine and lower ileum with bread mush, movements in these three parts of the alimentary canal were seen identical with those shown by the radiographs of Cannon. In the stomach a deep constriction developed at the pre-antral groove every 15 seconds and moved toward the pylorus where it disappeared as its successor was developing. In the colon there was active anti-peristalsis. In the ileum vigorous rhythmic segmentation was seen.

In other experiments I have found that animals under ordinary operative conditions develop, and remain in, a state of acapnia. This lowered carbon dioxide content of the blood and tissues, by inducing loss of tonus, is the cause of the failure of peristalsis after laparotomy. The essential point in the above described method is the prevention of acapnia.

29 (367)

Studies on the effects of carbon mon-oxide poisoning.

By **A. I. RINGER.** (By invitation.)

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

If an animal be allowed to breathe an atmosphere containing carbon mon-oxide, it will soon present a series of circulatory, respiratory, cerebral and metabolic disturbances, which, if carried too far, will result in death. These disturbances are believed to be brought about by the reduction of the oxygen-carrying capacity of the blood, due to the formation of the relatively stable carbon mon-oxide-hemoglobin, thus producing a state of progressive asphyxiation of the tissues. The severity of these disturbances depends entirely upon the degree of asphyxiation; and, with the exception of some individual peculiarities in a few of the twenty-one dogs that I have experimented upon under anæsthesia, all presented the same symptoms at the same stage of asphyxiation.

In nine experiments the following subjects were studied in their relationship to the degree of saturation of the hemoglobin with carbon mon-oxide: (1) the pulse, (2) the blood pressure,