crease in the activity of macrophages. For CFW mice (CFN and CFR) the absorption was evidently balanced by diffusion during the first 24 hours. Between 24 and 48 hours the decreased supply of RCG from the blood and the increased activity of macrophages in the peritoneal fluid raised P/S for all groups of mice to higher level (Table I).

Table I and Fig. 1 and 2 indicate clearly that higher levels of P/S were induced consistently in mice by the following factors: (1) high dose of injected RCG; (2) strain characteristics of dba mice and (3) preparation by NCG. It is easier to explain the effect of these factors by stimulation of macrophages or increase in their number than by increased diffusion of RCG into the blood. Moreover, microscopic examination showed higher percentage of macrophages in dba mice than in CFW and in mice prepared with NCG than in unprepared. Whatever may be the interpretation of effect of these factors, their role indicates the importance of various biological conditions rather than purely physical conditions in distribution of RCG in the peritoneal fluid. This interpretation is in agreement with the data of H. P. Smith(7) on the distribution of colloidal dyes between blood and tissues.

*Summary and conclusions.* (1) CFW and dba mice were inoculated intraperitoneally with Sarcoma 37 cells from serial intraperitoneal transfers. After formation of copious peritoneal exudate containing tumor cells and macrophages, these mice received intraperitoneally or intravenously 0.1 mc (in 2 series 0.3 mc) of radioactive colloidal gold. At various intervals (½ hour to 48 hours) after injection, specimens of peritoneal fluid were withdrawn from these mice and centrifuged. Radioactivity of precipitate (P) and of supernatant (S) in each specimen was determined by Geiger counter. (2) Ratio P/S was accepted as index of radioactivity distribution between macrophages and serous exudate of the peritoneal fluid. Data illustrating trends in changes of P/S in various groups of mice were plotted in graphs and discussed. These data were interpreted as the combined effect of two parallel phenomena responsible for disappearance of radioactive colloid from the peritoneal serous exudate; (a) absorption and storage of colloid particles into macrophages; (b) their diffusion into circulating blood; (3) The ratio P/S in various specimens of peritoneal fluid from the same mouse remained consistently on higher levels after (a) the use of higher doses of radioactive colloidal gold; (b) the use of dba mice and (c) the preparation with inactive (decayed) colloidal gold before treatment with radioactive gold. The effect of these factors is attributed to the increase in the number and in the activity of macrophages.

7. Smith, H. P., *J. Exp. Med.*, 1930, v51, 309, 395.

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## Pneumoperitoneum in Preoperative Preparation for Total Gastrectomy. (18531)

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Inasmuch as pneumoperitoneum, employed in the therapy of human tuberculosis, produces a rise of the diaphragm and a visceroptosis, it seemed logical that pneumoperitoneum might be of value in making the stomach and the lower segment of the esophagus more accessible for the procedure of total gastrectomy, if it were employed prior to the exploratory laparotomy. However, it was not certain that this alteration of organ position would persist after the peritoneum had been entered. Experimental studies were thus undertaken.

Eight adult mongrel dogs were employed in this study. Four dogs were employed as

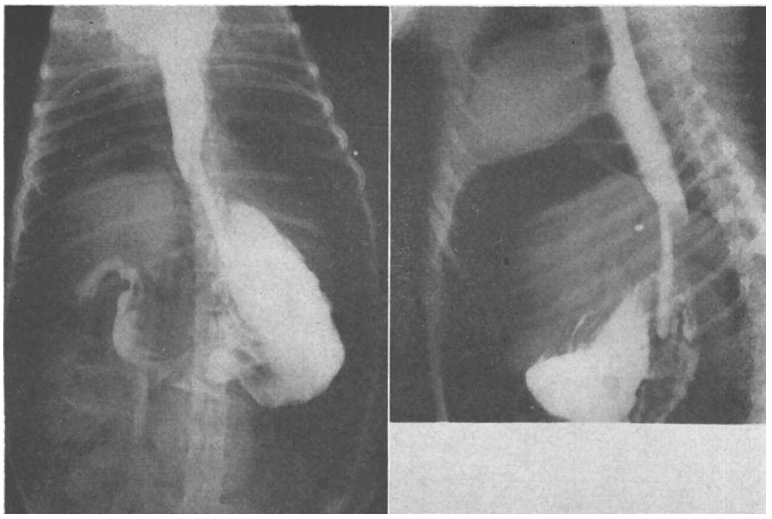

FIG. 1(A.B.).
A.P. and lateral roentgenograms of the upper abdomen and lower chest of a dog subjected to pneumoperitoneum. Barium was introduced through a catheter. The long segment of intra-abdominal esophagus is quite apparent. The stomach is well below the costal margin. (The right costal margin is easily seen). The spleen and superior surface of the liver are at the costal margin.

controls. A pneumoperitoneum was established in an experimental group of 4 dogs. A No. 18 gauge needle was passed through the abdominal wall of the left hyperchrondrium into the peritoneal cavity employing 10 cc of 1% procaine local anesthesia. 1500 cc of air were introduced with a 50 cc syringe and a 3-way stopcock. A week later 1000 cc of air were similarly introduced into the peritoneal cavity. A week later the dogs were anesthetized with intravenous injections of nembutal. AP and left lateral chest x-rays were taken of the experimental group to include in the plate the upper half of the abdomen. Fig. 1. Eight dogs were subjected to exploratory laparotomy.

*Results.* 1. As a result of the pneumoperitoneum the diaphragms were found to have been elevated and stretched and after release of the intra-abdominal air pressure the musculature was flabby. The excursions of the stretched diaphragms were 2-3 cm greater than in the controls. In the control group the diaphragms were taut.

2. In the experimental group the liver was found suspended from the under surface of the diaphragm by a central ligament 1.5 cm in length. This contained a 1.5 cm segment of exposed inferior vena cava and a ½ cm segment of the hepatic veins as these entered the inferior vena cava. This ligament was invested by serosa and subserosa extending from the inferior surface of the diaphragm into the capsule of the liver. In the control animals the liver was found against the diaphragm suspended by the triangular and central ligaments. Only a 2-3 mm segment of the inferior vena cava could be exposed and the hepatic veins could not be visualized.

3. Caudal to the ptosed liver was the stomach. As a result of ptosis of the viscera the abdominal segment of esophagus measured 3-4 cm in length. This intra-abdominal segment of esophagus had herniated from the mediastinum into the peritoneal cavity. In the controls the abdominal segment of the esophagus was less than ½ cm in length. The 3-4 cm abdominal segment was invested by markedly thinned out diaphragmatic muscle fibers and serosa and subserosa extending in "hernia sac" fashion from the peritoneal aspect of the diaphragm. This serosal and subserosal investment of the herniated segment of the esophagus inserted into the serosa of the stomach at the cardia.

4. The cardia of the stomach was found

at the left costal margin in the experimental animals. In the controls the cardia was found 1 cm below the diaphragm; 4-5 cm cephalad to the left costal margin.

5. In the pneumoperitoneum group the spleen was found at the costal margin. As a result of the ptosis of the viscera the root of the mesentery was stretched. In the control animals the spleen was found in contact with the inferior surface of the diaphragm.

6. Since the visceroptosis had produced a long intraabdominal esophageal segment making the entire stomach readily accessible, a total gastrectomy and a conventional loop 2 layer silk esophagojejunostomy was more readily accomplished in the group of animals prepared with pneumoperitoneum. Because the intra-abdominal segment of esophagus in the pneumoperitoneum group was invested with a serosa and subserosa, the esophagojejunostomy was stronger than could be achieved in the control group since in this latter group the esophageal muscularis was not covered with serosa.

*Summary and conclusion.* 1. Pneumoperitoneum produces (a) an intra-abdominal herniation of the lower end of the eosphagus (b) a ptosis of the stomach, liver, spleen and the root of the mesentery, displacing the first 3 structures from beneath the costal margin and therefore making them more accessible for surgical procedures. 2. Pneumoperitoneum employed in the dog, prior to total gastric resection, proved valuable. As a result of the intra abdominal herniation of the lower segment of the esophagus, the displacement of the cardia of the stomach to the level of the costal margin, and the mobility of the root of the mesentery, the stomach was readily resected and an esophagojejunostomy established.

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## Cardiac Effects of a Hypotensive Veratrum Derivative in Dogs Premedicated with Digitalis or Quinidine.* (18532)

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This investigation of the effects of Veriloid† on the electrocardiogram (EKG) of dogs premedicated with toxic dosages of digitalis or quinidine was undertaken because of a clinical impression that cardiac side actions of veratrum preparations and of digitalis or quinidine may be additive(1,2).

*Method.* Four series of experiments were done on adult mongrel dogs weighing 5 to 15 kg. Series I: Veriloid,‡ 1 mcg/kg/min for 10 minutes,§ was infused by vein into unanesthetized dogs. Thirty minutes from the beginning of that infusion, atropine sulfate, 0.05 to 0.25 mg/kg, was administered intravenously.

Series II: Dogs were premedicated with toxic dosage of a digitalis preparation. Drugs used were digitoxin,‡ 0.2 or 0.3 mg/kg, and ouabain,‡ 0.05 to 0.07 mg/kg. Evidence for toxic digitalization was obtained by EKG one hour after ouabain, 24 hours after digitoxin.

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† Veriloid (registered trade mark of Riker Laboratories, Los Angeles) is a biologically standardized (dogs) extract of Veratrum viride of constant hypotensive potency.

1. Fries, E. D., personal communication.

2. Meilman, E., and Krayer, O., *Circulation,* 1950, v1, 204.

‡ Grateful acknowledgement is made to Abbott Laboratories for digitoxin, to E. Fougera and Co. for Ouabain Arnaud and to Riker Laboratories for Veriloid used.

§ This dose produces average fall of 30% ± 12 in mean arterial pressure with recovery in 30-90 min. in dogs anesthetized with pentobarbital; no tachyphylaxis to a second injection exists after recovery.