more pancreatic juice when no bile was present in the intestine than when it was returned by mouth.

It seems quite definite, therefore, that, in the dog at least, bile salts cannot be considered essential either for the activation of pancreatic secretin or for its passage into the blood in effective form.

7048 C

Removal of Bromsulphalein from the Blood Stream by the Reticulo-Endothelial System.

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The early work of Aschoff, Ribbert, Goldmann and Kiyono showed that colloidal dyes are removed from the blood stream by the reticulo-endothelial system. Phenoltetrachlorphthalein, a colloidal dye, was shown by Schellong and Eisler[1] to remain longer than normally in the blood stream of rabbits following India ink injection or splenectomy and Saxl and Donath[2] obtained similar results after electrocollargol injections in humans. Merklen, Wolf and Arnovljevitch[3] and Fiessinger and Longchampt[4] believed this dye to be a test of the reticulo-endothelial system rather than of the liver.

Bromsulphalein, introduced by Rosenthal and White,[5] to estimate liver function is supposed to circulate as a soluble dye and to be more specifically excreted by the liver than phenoltetrachlorphthalein. Herlitz,[6] however, on the basis of clinical investigations, called attention to the possibility that bromsulphalein might be excreted through the reticulo-endothelial system in general and Kupffer cells in particular rather than through the hepatic parenchyma. To investigate this we performed bromsulphalein tests on dogs which had been splenectomized or had received India ink injections.

Control dye tests were done on 11 apparently normal animals.

[1] Schellong and Eisler, *Z. f. d. ges. exp. Med.*, 1928, **58**, 738.

[2] Saxl and Donath, *Wien. Arch. f. i. Med.*, 1927, **13**, 7.

[3] Merklen, Wolf and Arnovljevitch, *Bull. et Mem. de la Soc. Med. des Hop.*, 1925, **49**, 1180.

[4] Fiessinger and Longchampt, *Presse Med.*, 1925, **33**, 1873.

[5] Rosenthal and White, *J. Pharm. Exp. Therap.*, 1924, **24**, 265.

[6] Herlitz, *Acta. Paediat.*, 1931, **12**, 1 (Supp. 5).

Two milligrams of bromsulphalein per kilo body weight was injected intravenously and blood samples taken 5 and 30 minutes later. The percentage of dye in the serum was estimated as outlined by Rosenthal and White.[7] Six of the animals were splenectomized under nembutal anesthesia and one was laparotomized as a control. Bromsulphalein tests were then done on the second or third postoperative day and repeated at various intervals thereafter. The control dog showed no change in the percentage of bromsulphalein in the blood, while the splenectomized animals showed slight increases at the end of 5 minutes. This effect lasted for 3 to 4 weeks, at the end of which time the results were normal. Table I summarizes the results obtained.

TABLE I.
Effect of Splenectomy on Dye Test.

	% 5 min.	% 30 min.
Control (6 dogs)	0-35	0
2-3 days after splenectomy	20-70	0-5
10 " " "	25-60	0
20 " " "	10-25	0
30 " " "	5-20	0

Splenectomy, therefore, causes a slight but nevertheless definite slowing of the removal of bromsulphalein from the blood.

Each of the other 4 animals received an intravenous injection of 50 cc. of an 8% India ink suspension in normal saline. One-half hour later a bromsulphalein test was performed. Two of the dogs were then sacrificed and histological examination made of the liver and spleen. The Kupffer cells were found to be well filled with ink, while the splenic endothelial cells were not so well blocked. The hepatic parenchyma appeared normal in both animals. On the other 2 dogs bromsulphalein tests were done on successive days. Table II summarizes the results.

There was a considerable retention of the dye following reticulo-endothelial blockade with India ink, lasting 48 hours, gradually diminishing so that at the end of 3 to 4 days the elimination becomes normal. The question arises whether this dye retention is due to the actual mechanical stuffing of the reticulo-endothelial cells with ink or to some other factor. Victor, Van Buren and Smith[8] presented evidence to show that the retention of brilliant vital red in the blood stream after ink injections was not due to the carbon particles in the ink but to some other ingredient. The injection of

[7] Rosenthal and White, *J. Am. Med. Assn.*, 1925, **84**, 1112.

[8] Victor, Van Buren and Smith, *J. Exp. Med.*, 1930, **51**, 531.

TABLE II.
Effect of Reticulo-Endothelial Blockade on Dye Test.

	% 5 min.	% 30 min.
Control (4 dogs)	5-10	0
30 min. after ink injection	70-100	25-50
24 hrs. " " " (2 dogs)	65-100	35-50
48 " " " " (1 ")	90	45
68 " " " "	35	10
92 " " " "	15	0
120 " " " "	20	0

ground graphite suspended in acacia did not impair the ability of the liver to excrete the dye. They thought that the effect of the ink injection was produced through a hindrance in the excretion of the dye into the bile. If this is correct, splenectomy then should have no effect on the dye excretion since the spleen does not have any known rôle in bile formation. Shellong and Eisler,[1] however, obtained almost as much retention of phenoltetrachlorphthalein after splenectomy as after ink injection. We also note a slight effect of splenectomy on bromsulphalein excretion.

Our results do not agree with Rosenthal and Lillie,[9] who found no effect on the bromsulphalein excretion after splenectomy or colloidal quartz injection in rabbits. Our findings support the opinion of Herlitz that bromsulphalein is excreted through the reticulo-endothelial system, the Kupffer cell component of which plays a very important rôle.

7049 C

Specificity of Toxin of a Non-Hemolytic Variant of a Scarlet Fever Streptococcus.

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A strain of hemolytic streptococcus, No. 1452, isolated by Jones and Little[1] from the infected udder of a cow the milk of which had caused an epidemic of scarlet fever was sent to us about 3 years ago. On receipt, this streptococcus formed large mucoid colonies resembling *Str. epidemicus* on ascites blood agar and capsules were demonstrable in India ink preparations. The toxin of this strain

[9] Rosenthal and Lillie, *Am. J. Physiol.*, 1931, **97**, 131.