tion of the strandin concentration. 3. Strandin exerts a marked effect upon the UV spectrum of stilbamidine, optical density rising above the theoretical below 280 mμ, and falling well below the theoretical curve above 280 mμ. 4. Compound 48/80 causes a reduction in turbidity of the strandin-lysozyme and the strandin-protamine systems. In the case of the lysozyme system the reaction was markedly reversed by readdition of strandin. This was not the case with the protamine system. With stilbamidine similar results were obtained with both lysozyme-strandin and poly-l-lysine-strandin. In the case of protamine-strandin, stilbamidine caused an increase in turbidity of the system. 5. Both compound 48/80 and stilbamidine suppress the metachromasy of the toluidine blue O-strandin system. 6. Strandin was found effectively to suppress the interaction between chondroitin sulfate and stilbamidine, and the interaction between Germanin and stilbamidine. 7. A mechanism involving a reversible equilibrium between these compounds and strandin has been proposed to explain the results obtained.

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Fat Excretion in Dogs Lacking Both Bile and Pancreatic Juice.* (26526)

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When dogs are deprived of bile or pancreatic juice they excrete 40 to 60% of ordinary dietary triglycerides over a wide range of intakes(1). However, degree of steatorrhea has not been measured in dogs when both bile and pancreatic deficiency occur simultaneously. This investigation was undertaken to make this determination.

Methods. Experiments were performed on normal dogs and on dogs lacking pancreatic juice, bile or both. Surgical procedures were performed aseptically on mongrel females weighing 9 to 18 kg with due regard for the requirements of proper animal care. Pancreatic deficiency was produced by removing all of the pancreas except the uncinate process(2). Subsequent necropsy and histological study showed no connection between duodenum and pancreatic remnant. None of the dogs became diabetic. External bile fistulas were prepared by a modified Rous-McMaster technic(3). The combined deficiency was produced by simultaneous pancreatectomy and preparation of the bile fistula. A return

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TABLE I. Fecal Fat Excretion in 4 Normal Dogs.

Food intake/day	Fecal fat, g
Control diet*	.7 ± .2‡
plus 25 g oleic acid	1.0 ± .2
" 50 g " "	4.1 ± 1.1
" 75 g " "	10.1 ± 2.9
" 50 g olive oil	1.9 ± .7
" 75 g " " †	2.0 ± .1

* 10 g fat.
† 2 dogs only on this test.
‡ Mean ± S.D.

cannula of Tygon tubing was implanted in the duodenum in all groups for administration of saline(3). A many-tailed binder covered the cannulas.

Test meals, fed once daily starting approximately one week after operation, were completely consumed. They consisted of a control meal of 300 g of canned dog food ("Friskies", Carnation Co.) supplemented with sucrose (50 g), casein hydrolysate (25 g) and brewers yeast (2 g); or the control meal to which were added varying amounts of olive oil or oleic acid. The order of feeding was randomized to control the possible effects that time after operation and diet schedule might have on fat excretion. Feces were collected and refrigerated for the last 5 days of 7 day test periods. Fecal fat excretion was then estimated on duplicate aliquots of the total blended fecal sample as the petroleum ether soluble material extracted in 7 hours(4).

Results. Normal dogs (Table I). Fecal fat excretion did not increase significantly when 25 g of oleic acid or olive oil were added to the control meal, indicating that complete absorption occurred. In confirmation of an earlier study(5) 50 g and 75 g of oleic acid were incompletely absorbed since fecal fat excretion was 6.8% and 12.5% of the intakes respectively

$$\left[\% \text{ fat excretion} = \frac{\text{Total fecal fat} - \text{control diet fecal fat}}{\text{Total dietary fat}} \times 100\right].$$

Accordingly, to minimize a possible laxative effect of these larger doses, operated animals were fed only 10 g and 20 g of oleic acid.

Pancreatic deficiency (Fig. 1). As in an earlier investigation(5). the dietary triglyceride was poorly assimilated. The calculated regression line on 4 dogs indicates an assimilative deficiency of nearly 50%. Fecal fat

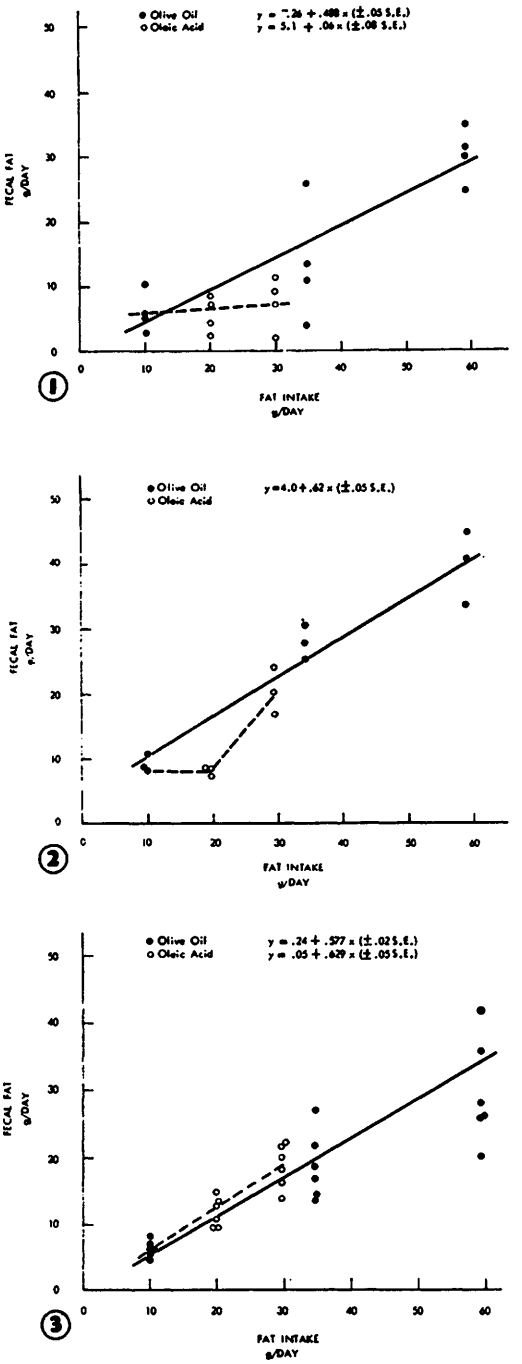

FIG. 1. Absence of pancreatic juice.
FIG. 2. Absence of bile.
FIG. 3. Absence of bile and pancreatic juice.

did not increase significantly when 10 g and 20 g of oleic acid were added to the control meal, comparable to the finding when 25 g were fed to normal dogs.

Bile deficiency (Fig. 2). In 3 dogs fecal fat excretion was 62% of the intake of olive oil, comparable to the defect for triglyceride observed by others in bile deficiency(1). Fat excretion was unchanged when 10 g of oleic acid were added to the control meal. However, when 20 g were fed, the deficiency in absorption was comparable to that for olive oil.

Combined pancreatic-bile deficiency (Fig. 3). Assimilative deficiencies for olive oil and oleic acid were nearly 58% and 63% respectively when 6 dogs were deprived of both bile and pancreatic juice.

Discussion. Approximately 40% of the dietary triglyceride and fatty acid were assimilated even when neither bile nor pancreatic juice was present. This finding fails to support an implication from a study in rats (6) that triglyceride and fatty acid assimilation are virtually absent in combined pancreatic-bile deficiency. When corn oil, corn oil fatty acids or oleic acid were placed in the duodenum of rats from which both pancreatic juice and bile were excluded, no corn oil and only 4.6% and 6.7% respectively of the corn oil fatty acids and oleic acid were recovered in the intestinal lymph(6). In rats, long chain lipids are transported from the intestine largely if not exclusively *via* lymphatic channels, since as much as 90% of the dietary lipid has been recovered in the intestinal lymph(7-9). Apparently in the dog, however, mechanisms other than the actions of pancreatic juice and bile can account for a substantial degree of fat assimilation. Investigations are planned to elucidate these mechanisms *in vivo*.

Summary. In 6 dogs deprived of both pancreatic juice and bile and fed varying amounts of olive oil or oleic acid added to a control meal, the fat assimilative deficiency was approximately 60%. It was comparable in 3 dogs with bile deficiency. In 4 dogs lacking pancreatic juice, oleic acid was absorbed as well as in normal dogs. However, the assimilative deficiency for olive oil was nearly 50%. Apparently in the dog, mechanisms other than the actions of bile and pancreatic juice can account for the assimilation of approximately 40% of the dietary fat.

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