TABLE I. Comparison in Animals of Cryptenamine Alkaloids with Protoveratrine and Veriloid[R].

Preparation	Effective dose mg/kg*	Stand. error	Emetic dose mg/kg*	Stand. error	Emetic ratio†	I.V. toxicity mice (mg/kg) LD_{50}‡	LD_{100}
Secondary fraction—cryptenamine	.0081 (50)	.00014	.034 (25)	.0014	4.2:1	.64	1.06
Tertiary fraction—cryptenamine	.0052 (30)	.00019	.018 (15)	.00082	3.5:1	.6	1.0
Protoveratrine	.005 (5)	.00022	.0052(5)	.00033	1 :1	.047	.052
Veriloid[R]	.015 (10)	.0014	.018 (5)	.0023	1.2:1	.43	.6

* Figure in parentheses indicates No. of animals used.

† Ratio $= \frac{\text{Emetic dose}}{\text{Effective dose}}$.

‡ Calculated using method of Behrens(4).

these new alkaloids with protoveratrine and Veriloid[R] as regards emetic ratio and intravenous toxicity in mice are shown in Table I.

Discussion and conclusions. It has been a generally held opinion that the hypotensive and emetic properties of *Veratrum* alkaloids were inseparable properties dosewise. For the first time there has been demonstrated an appreciable difference between the emetic and effective hypotensive doses of *Veratrum* species alkaloid preparations. The existence of this emetic/effective dose ratio is not only of interest therapeutically, but suggests that the mechanisms of emetic and hypotensive actions of *Veratrum* alkaloids are not necessarily interrelated.

This difference between the emetic and effective dose also has been demonstrated in humans. Finnerty(5) recently reported that a difference does exist, and is more apparent after intravenous administration of cryptenamine.

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Effect of Choline Deficiency and Hepatic Cirrhosis on Absorption of Fat in the Rat. (20895)

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The following experiment was undertaken to determine whether alimentary absorption of fat is decreased in rats having prolonged and severe choline deficiency and marked fatty vacuolization of the liver, or in rats having associated severe cirrhosis of the liver. Tidwell(1) found decreased fat absorption in rats which were mildly choline deficient, and increased absorption of fat in similar rats after they received choline supplements. Shoshkes, *et. al.*(2), did not demonstrate any difference in the absorption of corn oil by choline deficient rats, as compared with normal animals.

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TABLE I. Lack of Effect of Severe Choline Deficiency with Fatty Vacuolization of Liver on Intestinal Absorption of Cottonseed Oil. (6 rats in each group—mean values and SE of mean given.)

Condition	Hr after feeding	Body wt (g)	Rate of absorption of oil (mg/cm²/hr)	Hydrolysis (%)	Serum lipid (mg/100 cc)	Liver fat (g/100 g)
Choline deficient with fatty liver	6	140 ± 4	.34 ± .02	6.7 ± .9	573 ± 15	27.2 ± 2.9
Control	6	139 ± 4	.31 ± .02	6.8 ± 1.3	557 ± 39	7.8 ± 1.3

Neither of these reports included rats which had developed cirrhosis on the choline deficient diet.

Methods. General. Fifty-two healthy, young male albino rats of the Wistar strain, averaging 132 g in weight, were kept in individual metal cages equipped with wire screen bottoms. Weighed amounts of diet were provided daily. Twenty-five rats were given a diet deficient in choline and its precursors. This diet, previously published by Hartroft(3), consisted of ethanol-extracted peanut meal 6%, Alpha Soya 6%, Cystine 0.15%, Cellu Flour 2%, Sucrose 61.85%, Primex 20%, Alpha Tocopherol Acetate 0.035%, Cod Liver Oil Concentrate 0.015%, Salt Mixture 3%, and Vitamin Mixture 1%. The salt and vitamin mixtures are those previously described by Best, *et al.*(4). Thirteen rats received this diet for an average of 72 days until sacrificed, and 12 rats received it for an average of 225 days. The remaining 27 rats were pair-fed control animals on the same diet plus a supplement of 15 mg of choline/rat/day. *Administration of Oil.* After receiving the special diet as outlined above, each rat was weighed and then fasted 72 hours with water available. Each rat lost at least 10% of body weight during this time. Under light diethyl-ether anesthesia which seldom lasted more than a minute, each rat was given a measured amount of cottonseed oil from a calibrated syringe through a stomach tube. The amount of oil delivered from this apparatus varied by only ± 7 mg. The selected dose was usually close to 1.3 g, and was intended to exceed the greatest amount of absorption expected in 6 hours. *Collection and Analysis of Intestinal Contents.* At the end of the period of absorption, the animal was lightly anesthetized with diethyl-ether and killed by a blow on the head. The entire gastrointestinal tract was flushed with water and then ether by a method previously described by Irwin *et al.*(5). The collected washings were then acidified with hydrochloric acid, and extracted four times with petroleum ether. The ether extract was washed three times with water, treated with anhydrous sodium sulfate, and filtered. The solvent was evaporated off, and total fat extracted from the intestinal contents was determined after it had reached constant weight in a desiccator. This fat was then dissolved in warm absolute alcohol and the fatty acid was titrated with N/10 alcoholic NaOH. *Accuracy of Method for Recovery of Fat Fed.* Nine normal and seven choline deficient rats were tube-fed the same dose of oil (1.380 g) and killed immediately. The average amount of oil recovered from the intestinal contents of the normal rats was equal to 94% of the administered dose as compared with 92% in the choline-deficient animals. With the methods used, there was thus no measurable difference in the amount of fat in the intestinal contents of fasting choline deficient rats as compared to normal rats. Therefore, no correction was used in comparing the amounts of fat recovered from the intestinal contents of the two groups after feeding. *Collection and Analysis of Serum Lipids.* At the time of sacrifice, 3 ml of blood were taken from the heart of each rat. The serum lipid was estimated by the method of Kunkel (6). *Fat Content, and Extent of Cirrhosis of Liver.* A small piece of each liver was fixed in a solution of 10% neutral formalin which contained 2% calcium acetate. A hematoxylin-eosin stained section was made from each liver, and if vacuolization was demonstrated, frozen sections stained with Oil-Red-O and

TABLE II. Lack of Effect of Severe and Prolonged Choline Deficiency with Severe Fatty Vacuolization and Cirrhosis of Liver on Intestinal Absorption of Cottonseed Oil. (6 rats in each group—mean values and SE of mean given.)

Condition	Hr after feeding	Body wt (g)	Rate of absorption of oil (mg/cm²/hr)	Hydrolysis (%)	Serum lipid (mg/100 cc)	Liver fat (g/100 g)
Choline deficient with cirrhosis	3	188 ± 14	.20 ± .02	7.4 ± 1.7	537 ± 32	28.4 ± 1.1
Control	3	232 ± 21	.20 ± .02	4.8 ± 1.9	539 ± 41	12.0 ± 2.5
Choline deficient with cirrhosis	6	186 ± 14	.28 ± .02	8.0 ± 1.4	469 ± 22	38.7 ± 1.0
Control	6	224 ± 18	.25 ± .02	8.8 ± 2.2	484 ± 19	10.1 ± 2.1

hematoxylin were examined. The rest of the liver was weighed and the fat content determined by the method of Best, *et al.*(7). *Calculation of Body Surface.* Body surfaces were calculated using the Meeh formula ($S = K \text{ weight}^{2/3}$) and Carman's constant ($K = 11.36$).

Results. Alimentary Absorption of Fat in Rats with Severe Choline Deficiency and Marked Fatty Vacuolization of Liver. Table I contains the mean values and standard error of each mean for data obtained from rats fed the choline deficient diet for 72 days. Each of these rats developed severe fatty vacuolization of the liver, as evidenced by chemical analysis and microscopic examination. Comparison of the mean values obtained from these rats with those obtained from normal pair-fed controls which had received supplemental choline, using Fisher's "t" test, reveals no significant difference in the rate of absorption of cottonseed oil, expressed as mg oil absorbed per cm^2 per hour. Neither was there any significant difference between the experimental and control group in the percent of hydrolysis of unabsorbed fat, nor in serum lipid levels 6 hours after tube feeding. These findings confirm Shoshkes' report that choline deficiency is not associated with any change in the rate of absorption of fat in the rat.

Alimentary Absorption of Fat in Rats with Severe and Prolonged Choline Deficiency, Marked Fatty Vacuolization of Liver, and Severe Hepatic Cirrhosis. These rats were given the choline-deficient diet for 225 days, and all of the animals in the experimental group developed severe fatty vacuolization and cirrhosis of the liver. As shown in Table II, comparison of the data obtained from these rats with that obtained from pair-fed control animals which had received supplemental choline, reveals a significant difference in the mean fat content of the liver in the experimental and control groups ($p = <.001$), but no significant difference in the rate of alimentary absorption of fat, percent of hydrolysis of cottonseed oil, or blood lipid levels, whether the comparison is done with groups of rats sacrificed at 3 or 6 hours after tube feeding. The presence of severe and prolonged choline deficiency, with associated severe fatty vacuolization and cirrhosis of the liver, did not influence the rate of absorption of fat in the rat.

Effect of Weight and Age upon the Alimentary Absorption of Fat. It was of interest that the younger rats, sacrificed at a weight of about 140 g, tended to absorb slightly more oil in 6 hours than did the heavier older rats. However, these differences were equal in normal and in choline deficient rats, and were not related to choline deficiency, fatty vacuolization of the liver, or hepatic cirrhosis.

Summary. The presence of severe and prolonged choline deficiency in rats, with associated severe fatty vacuolization and cirrhosis of the liver, does not affect the rate of absorption of cottonseed oil, the degree of hydrolysis of fat in the intestine, or the level of serum lipids.

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Comparative Study of the Penrose Drain and Drains of Teflon.* (20896)

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It has been recognized that a drain that would drain longer and more freely, and which would cause less adhesion formation due to the irritant properties of the drain itself would be desirable. In this respect it was decided to compare a commonly used rubber sheathed gauze filled drain, the Penrose drain (commonly called called cigarette drain), with drains made of a new non-reactive plastic, Teflon. Studies to determine the reactivity of Teflon in the peritoneal cavity of the rat were done and confirmed the conclusions reached by LaVeen and Barberio(1) in their work on the dog, that Teflon elicited minimal or no tissue reaction. This absence of tissue reaction seemed to warrant a trial of drains made of this substance.

Materials and methods. Four types of drains were studied: 1) a rubber Penrose drain with a gauze filler, 2) a drain of Teflon with a gauze filler, 3) a drain of Teflon with a Teflon filler, and 4) a drain of Teflon that differed in shape by being folded several times so as to present a fluted appearance, as compared to the tubular form of the other drains. Teflon tubing was not available in the form desired to make the tubular drains so Teflon sheet .003 inch in thickness was obtained and the drains made from this. The edges were sewn with a thin strip of Teflon and inverted so that the outer surface of the drain presented as uniform a surface as possible. The gauze fillers in the Penrose drain and in the Teflon drain were identical. The filler of Teflon for the one type of drain was made by fluting 2 pieces of Teflon, each 1 inch wide and then this was fitted into the drain. The fluted drain of Teflon was made by folding a one inch wide piece of the sheet four times with the folds parallel to the long axis. All of the drains were one-and-a-half inches long and the tubular drains were 5/16 inch in diameter. The drains were prepared for operation by being washed in ethyl alcohol and rinsed in distilled water. Then the appropriate fillers were inserted in those drains using them and all of the drains autoclaved. The *operative procedure* to install the drain was done under ether anesthesia. The abdomen of the rat was shaved and then prepared by swabbing with tincture of iodine and removing the excess with 95% ethyl alcohol. Sterile technic was followed with the exception that gloves were not worn. A mid-line ventral incision was made in the upper half of the abdomen and the peritoneal cavity opened. The drains were then placed through a stab-wound made on the right side of the animal. Following this the peritoneum with overlying muscle was closed with a continuous suture of black silk. The drain was secured in place with a stitch of black silk passing twice through the skin and the drain. The skin was closed with a

* The Teflon was supplied by the Polymer Corp. of Pennsylvania.