The above-described stock solution of the active fraction gave a negative biuret test and a strongly positive Molisch test. It is interesting to note that the partially purified Shwartzman-active substances obtained by Apitz[1] also gave a negative biuret and a positive Molisch test.

The absorption spectrum of the active fraction was examined by Dr. E. Lorenz; no selective absorption was noted.

Since the most striking immediate effect of this agent on tumors is the production of severe hemorrhage, the reaction of the vascular system to this agent is of interest. Dr. V. Menkin[2] of the Pathology Department of the Harvard Medical School tested its effect on the permeability of capillaries of normal tissue; no increase in permeability was detected.

The purified fraction, in both concentrated and dilute solution, retained its activity after storage for 8 weeks in the cold room.

8607 P

Differential Bile Acid Analysis in Various Pathological Conditions.

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By means of a method previously described,[1] bile from normal and diseased gall bladders and from biliary tract fistulae was analyzed for bile acids conjugated with taurine and with glycine, cholic acid, deoxycholic acid, total bile acids, and free bile acids. Duodenal drainage material was analyzed for cholic acid, deoxycholic acid and total bile acids. Some of the results are summarized in Table I.

A perusal of Table I shows that in a series of 24 cases of chronic cholecystitis (No. 2, Table), the average figure for the percentage of cholic acid in relation to the total bile acids was 28% as compared to the normal of about 50%. The average figure for the ratio of free bile acids rose from a normal of about 10% to 25%. This deviation in the ratio of the different bile acids is more marked in the gall bladder bile in acute cholecystitis. In 14 of

[1] Apitz, K., *J. Immunology*, 1935, **29**, 343.

[2] Personal communication.

[1] Doubilet, H., PROC. SOC. EXP. BIOL. AND MED., 1936, **34**, 86.

these cases (No. 3, Table) the cholic acid averaged only 13% of the total bile acids. It was found difficult to estimate the free bile acids in a number of cases, since gall bladder bile from acute cholecystitis cases often contained an alcohol soluble material which yielded amino nitrogen on hydrolysis. This not only gave a false result, but also masked the presence of free bile acids. Two typical cases are presented in the table. In the first, (No. 3A) 75% of the total was found to be free bile acids; in the second case, (No. 3B) estimation of bile acids by the Schmidt-Dart method (nitrogen hydrolysis) yielded a figure much greater than the total bile acids. At the same time no trace of cholic acid was found.

These figures show that in chronic cholecystitis the average reduction of the total bile acids is approximately 50% while in acute cholecystitis, the total bile acids are reduced on the average by 90%.

From these figures it appears that the absorption of bile acids by an inflamed gall bladder wall[2, 3] proceeds in a differential manner. The cholic acid disappears more rapidly than the deoxycholic acid, while the conjugated bile acids tend to be absorbed at a faster rate than the free bile acids.

In early biliary obstruction due to carcinoma of the pancreas, the bile salts tend to accumulate and reach very high figures, (No. 4, Table). In these cases, the ratio of cholic acid and of free bile acids to the total tend to be normal, although at times the percentage of free acids is quite high (No. 4A). When the obstruction is of long duration (No. 4B) and absorption obviously has taken place, the total percentage of bile acids tends to be very low. Here again the ratio of cholic acid to the total is low, while there is a high percentage of free bile acids.

In cases of cholangitis, analysis of the fistula bile tends to yield figures which are analogous to those obtained from the gall bladder bile in cases of acute cholecystitis. The percentages of cholic acid and of free bile acids as compared to the total bile acids are similar to those in acute cholecystitis. A typical example is found in the Table (No. 5). In the absence of cholangitis, after recovery from the operative procedure, analysis of fistula bile reveals normal proportions in the different bile acids present.

When tubes drain both the gall bladder and the common bile duct at the same time, analysis of the bile collected simultaneously shows clearly the remarkable ability of the inflamed gall bladder to absorb bile salts (No. 6, Table). The total amount of bile acids

[2] Rosenthal, F., and Licht, H., *Klin. Wchnschr.*, 1928, **7**, 1952.

[3] Andrews, E., Schoenheimer, R., and Hrdina, L., *Arch. Surg.*, 1932, **25**, 796.

TABLE I.
Differential Quantitative Bile Acid Analysis in Various Conditions.

Group	No. of Cases	Conjug. with Taurine %	Conjug. with Glycine %	Cholic Acid %	Deoxy-cholic Acid %	Cholic Acid %	Free Bile Acid %
1.							
Normal	3	3.05	4.06	3.74	4.12	48	10
2.							
Cholecystitis (C)	26	1.53	1.74	1.19	3.15	28	25
3.							
Cholecystitis (A)	14	—	—	0.10	0.64	13	—
*A		0.38	0	0.23	1.34	14	75
*B		0.32	0.11	0	0.32	0	—
4.							
Ca. Pancreas							
A	3	2.83	4.18	4.67	4.97	50	29
B	2	0.10	0.02	0.03	0.10	23	8
5.							
*Cholangitis		0.11	0	0.03	0.21	12	54
6.							
*Simultaneous							
A		0.15	0.15	0.16	0.14	53	0
B		0.36	0.01	0.01	0.01	50	—
7.							
*Simultaneous							
A		0.59	0.77	0.32	0.52	37	—
B		—	—	0.24	0.48	34	—
8.							
*Simultaneous							
A		—	—	0.83	1.87	31	—
B		—	—	0.10	0.09	52	—
C		—	—	1.37	2.84	33	—
D		—	—	0.10	0.19	35	—
E		—	—	0.02	0.29	6	—
F		—	—	0.13	0.22	37	—

*Typical case.

is reduced 10 times in passing through the gall bladder (No. 6A) as compared to the bile acids collected from the common bile duct (No. 6B). Simultaneous collection of bile from a common duct fistula (No. 7A) and by means of a duodenal drainage (No. 7B) shows the dilution produced by pancreatic juice and succus entericus. Other analyses have shown 2 or 3 fold dilution of the hepatic bile.

In a number of cases duodenal drainage was performed immediately before operation for gall bladder disease, and the gall bladder bile analysis compared with the duodenal bile. As a rule the duodenal "A" bile showed a normal proportion of cholic acid (No. 8B) while the gall bladder bile, in chronic cholecystitis, had a ratio of cholic acid to total bile acids of about 30% (No. 8A). Occasionally analysis of duodenal "A" bile showed an abnormally low ratio of cholic acid (No. 8D) while the bile removed from the gall

bladder immediately afterwards showed the typical low cholic acid ratio (No. 8C). In acute cholecystitis the percentage of cholic acid was always much lower in the gall bladder bile (No. 8E) than in the duodenal drainage "A" bile (No. 8F, Table).

8608 P

Effect of Light on Reproductive Cycle of *Peromyscus leucopus noveboracensis.*

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Bissonnette[1] apparently eliminated exercise as a causative factor in advancing the breeding season of his starlings, showing that such an advance was due to the effect of the added light acting on the birds more directly. The same investigator[2, 3] has reported that artificial light added to normal light has a similar effect on the ferret. These mammals showed gametogenesis, active development of reproductive organs, libido, and oestrus several weeks in advance of the controls.

A similar study is under way on the white-footed mouse, *Peromyscus leucopus noveboracensis* (Fischer). Credit is due Dr. Alvalyn E. Woodward for her advice on the conduct of this study.

Animals, trapped locally during the winter of 1934-35, were used, along with their mature offspring. Two groups were kept in a large basement room. Room conditions of natural light, heat, humidity, and ventilation were the same for both groups. The mice were kept in wire cages, usually in pairs. The diet was that of Dice.[4]

Group A, consisting of 35 animals, was given about 13 hours daily illumination from a General Electric Sunlamp Type S-1, 6 feet from nearest cages, starting September 23, 1935. The light was gradually increased up to 18 hours daily by December 26. Group B, the control group, consisting of 28 animals, was treated with an electric radiant heater to compensate for the heating effect of the lamp on Group A.

1 Bissonnette, T. H., *J. Exp. Zool.*, 1931, **58**, 281.
2 Bissonnette, T. H., *Proc. Roy. Soc., B.*, 1932, **110**, 322.
3 Bissonnette, T. H. *Biol. Bull.*, 1935, **68**, 300.
4 Dice, L. R., *J. Mammal.*, 1934, **15**, 160.