obstruction is not inconsistent with the "phosphatase retention" theory. As to whether the increased serum phosphatase is of hepatic or osseous origin, our results do not exclude the one or the other possibility since occlusion of the excretory biliary channels would tend to cause retention of bile constituents of both hepatic and extra-hepatic origin.

Summary. Ligation of hepatic ducts in 4 dogs resulted in increased phosphatase but not bilirubin in the serum, increased bilirubin but not phosphatase in the urine. The dissociation in the blood is thought to be due largely to differential renal excretion and to be consistent with the "phosphatase retention" theory.

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Breast Cancer Produced in Male Mice of the C57 (Black) Strain of Little.

GRAY H. TWOMBLY. (Introduced by C. P. Rhoads.)

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Bittner[1] has shown that hybrids from a cross between a mouse from a strain having a high incidence of mammary cancer and one from a low tumor strain have a high or low incidence of breast cancer depending on what type of mother they nurse. If the nursing mother comes from the strain having the high incidence of spontaneous tumors, a large percentage of the female hybrids will develop mammary cancer. If they are nursed, on the other hand, by a female from the low tumor strain very few will develop breast cancer. Female mice from a high cancer strain nursed by their own mothers have a high incidence of mammary cancer while if they are foster-nursed by a mouse from a low tumor strain the chance that they will develop breast cancer will be materially reduced.

An attempt was made to confirm this observation on a different strain of animals. Mice of the RIII (Paris) strain of Dobrovolskaia Zavadskaia were given to a female of the C57 (black) strain of Little to nurse while the young of the latter were given to the RIII mother. The RIII females have an incidence of spontaneous mammary cancer of 70% in virgin females. The incidence in C57 black females is less than 1%. The incidence of breast

[1] Bittner, J. J., *Am. J. Ca.*, 1939, **35**, 90.

cancer occurring in these 2 groups of animals appears to confirm Bittner's observations but the number of animals is as yet not very statistically significant and consequently will be reported later in another place.

Since litters were shifted within less than 12 hours of birth when the sex was often hard to determine, many males which had been foster-nursed by mothers of the other strain became available. It has been proved[2] that male mice of a strain showing a high incidence of spontaneous breast cancer in the females will develop cancer more quickly than their littermate sisters if a crystal of oestrone weighing 0.1 mg is implanted in them subcutaneously on the tenth day after birth. Because this procedure was easy and the mice were available the C57 males nursed by RIII females were so treated.

Many animals have been used, a fair proportion of which have died of hyperestrinism before they were old enough to show tumors. Some are still too young for tumors to have developed. Nine males so treated have had spontaneous mammary cancer, 8 of which have been proved histologically. The ninth died in the night and was eaten by his cage-mates before morning. The earliest tumor appeared at 7½ months after birth in a mouse implanted with 0.18 mg of crystalline oestrone. The oldest mouse to develop a tumor did so 11 months after birth after a dose of 0.09 mg of oestrone. The average age at which tumors appeared was 9 months. So far 27 animals have lived 9 months or longer or have developed tumors before the ninth month. Fourteen of these animals are still alive. In this small series then we may say that by foster nursing C57 black male mice with RIII (Paris) mothers and implanting them at 10 days of age with a crystal of oestrone weighing 0.07 to 0.18 mg, 9 out of 27, or 33%, have developed breast cancer.

This observation assumes greater importance when one considers that mammary cancer has not been observed previously in C57 black male mice. Haagensen in a personal communication reports the treatment of 107 males with maximal doses of oestrone benzoate in oil twice a week from 10 days of age to death without producing a single tumor. Gardner has had 3 tumors in 250 mice treated. It would seem that breast cancer in the animals reported in the present communication is due not only to hormonal stimulation of the male breast tissue but to some agent or influence transmitted in the mother's milk other than oestrogenic substances.

2 Twombly, G. H., PROC. SOC. EXP. BIOL. AND MED., 1939, **40**, 430.