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Hydrogen-ion Concentration of the Bile of the Guinea Pig.*

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Nichols[1] was the first to observe the comparatively greater degree of alkalinity of the bile of the guinea pig in his studies on the antiseptic action of the biles from various species. Using colorimetric methods Neilson and Meyer[2] corroborated the alkalinity of the gall bladder bile of the guinea pig. These workers observed the bile to be alkaline to litmus and phenolphthalein, but gave values of pH 7.7 and 7.8 to unexposed hepatic bile of the guinea pig, which they contend is slightly more alkaline than the bile from the gall bladder. During the course of experiments on the dissolution of gall stones, the authors have had occasion to determine the hydrogen-ion concentration of fresh bile from a large number of guinea pigs. The excessive alkalinity and uniformity in pH was deemed worthy of recording.

The bile was taken from the gall bladder with a syringe while the animal was under light ether anesthesia. The hydrogen-ion concentration was determined immediately without exposure using the Wilson[3] type hydrogen electrode at 25° ± 0.5°C. Using the more acidic bile of the dog, experiments showed reasonably satisfactory agreement between the hydrogen electrode and the quinhydrone electrode, *i. e.*, ± 0.2 pH.

Determinations were made on 26 animals. The mean of the series is pH 8.89, the minimum value 8.66, the maximum value 9.14. In the series, the mean and the median are identical, the modal series is pH 8.85 to 8.95, $\sigma = 0.13$ pH and C.V. = 1.45.

Three composite samples of bile were analyzed by Douglas-Sauermann[4] method. The average results showed: total solids 2.16%, ash 0.10%, mucin 0.51%, total lipid fraction 0.14%, bile acids determined as cholic and desoxycholic acids 0.78%. The analysis shows that the gall bladder bile of the guinea pig corresponds

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1 Nichols, H. J., *J. Exp. Med.*, 1916, **24**, 497.

2 Neilson, N. M., and Meyer, K. F., *J. Infect. Dis.*, 1921, **28**, 510.

3 Wilson, J., *Ind. Eng. Chem.*, 1925, **17**, 74.

4 Douglas-Sauermann, A. G., *Z. Physiol. Chem.*, 1935, **231**, 92.

generally to human bile in concentration of major constituents. Its hydroxyl-ion concentration, however, is much greater.

Summary. The pH of guinea pig's bile has been determined and an analysis of the principal constituents has been made.

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Inhibition of Oestrus and of the Vaginal Response to Oestrone by Testosterone.

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Mature mice showing regular oestrous cycles were injected with 0.1 mg. of testosterone in 0.1 cc. oil twice daily. (I am indebted to Messrs. Ciba, Limited, for the supply of testosterone.) During the period of injections extending over 2 weeks or more oestrus was abolished. Following cessation of injections oestrous cycles were reestablished. Injected mice were placed with males for a week; no mating was observed and no vaginal plugs were found. Normal cycles were continued in control mice injected with oil alone.

Mature ovariectomized mice were injected with oestrone in doses sufficient to produce cornification, together with testosterone. The simultaneous administration of testosterone inhibited the oestrous reaction of the vagina. The oestrogenic effect of 0.0001 mg. of oestrone (a dose which produces cornification in 50% of our mice) was inhibited by 0.4 mg. of testosterone.

These findings show that there may be a direct antagonism between the female and the male hormones in their actions on the vagina of the female mouse, and are the more remarkable in that testosterone in large doses has been shown to produce oestrogenic effects in the infantile rat (Butenandt and Kudzus[1]).

Further experiments are now in progress to investigate quantitatively the relation between the actions of oestrone and testosterone on the vagina, and to determine whether other compounds with male hormone properties have effects similar to testosterone.

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1 Butenandt, A., and Kudzus, H., *Hoppe-Seyler's Zeit.*, 1935, **237**, 75.