the streptococcus which causes the majority of cases of scarlet fever by its lack of sensitivity to phage C. *S. epidemicus* rarely causes scarlet fever.

8246 P

Cytological Changes in Frog Pituitary Considered in Reference to Sexual Periodicity.

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Recent experiments with Amphibia indicate that the anterior lobe of the pituitary exerts a controlling influence not only on the development of the primary sex organs, but also on the release and discharge of the sex products. Wolf[1] and Rugh,[2] working with various Anura, have demonstrated that amplexus and shedding of the sex products can be induced in mid-winter by simple hetero- or homoplastic implantation of anterior lobe tissue. Houssay and Lascano-Gonzales[3] observed a degeneration of the testes following hypophysectomy in the toad. The writer wishes to present briefly the results of a cytological study of the frog anterior lobe, and on the basis of cytological evidence to postulate the rôle played by the pituitary in the mechanism of sexual periodicity.

Several species of the genus *Rana* were used in this study. At regular intervals throughout this annual cycle specimens were killed and the cytological condition of the anterior lobe pituitary was noted. Various sublimate and osmic acid fixatives were used in preparing the tissue for microscopic examination. Staining procedure most consistently used was a modification of the acid fuchsin-methyl green technique.

The general pattern of the winter frog anterior lobe is similar to that found in the other vertebrates. The numerical proportion, the inclusions and the structure of the cell types, however, do not conform entirely to those of the higher vertebrates, particularly mammals. The basophiles are small cells, few in number, and their general appearance does not suggest high secretory activity. True acidophiles, on the other hand, are larger and are filled with densely

1 Wolf, O. M., PROC. SOC. EXP. BIOL. AND MED., 1929, **26**, 692.

2 Rugh, Roberts, *Biol. Bull.*, 1934, **66**, 22; *Biol. Bull.*, 1935, **68**, 74.

3 Houssay, B. A., and Lascano-Gonzales, J. M., *Compt. rend. Soc. Biol.*, 1929, **101**, 938.

packed acidophilic granules. True chromophobes are as large as the acidophiles, but are more or less free of specific granulation. Grading between the true acidophilic type and the true chromophobic type are found cells exhibiting intermediate stages of acidophilic granulation, some containing comparatively few acidophilic granules, while others approach the true acidophiles in amount of granulation present. The size of the acidophilic particles varies from exceedingly fine granules to large coarse droplets of globules which have a distinct affinity for fuchsin and iron-haematoxylin. This size gradient suggests the origin of the latter from the former. The large fuchsinophilic droplets may occur in acidophiles as well as in the otherwise chromophobic cells.

A preliminary study of the seasonal and local distribution of the acidophilic inclusions reveals the following information. During the late summer and autumn months the anterior lobe exhibits a relatively low number of acid cells and a paucity of fuchsinophilic droplets. Throughout the winter months, while the frog is in a low metabolic condition, there is a numerical increase of true acidophiles, apparently at the expense of the chromophobes. The fuchsinophilic droplets in both cell types also increase in size and number. A quantitative maximum in this direction is attained in early spring. At this time the cytological appearance of the anterior lobe is predominantly acidophilic, and the fuchsinophilic droplets are large and present in almost all but the inconspicuous basophilic cells. The larger droplets are frequently found in the otherwise chromophobic cells. In the spring and summer immediately following discharge of the gametes there is a paucity of the large fuchsinophilic droplets, and the number of acidophilic cells is reduced.

These observations lend themselves to but one interpretation. The frog anterior lobe is active continuously throughout the year. During the summer months the secretion probably stimulates the development of the sex glands. By the end of summer, when the sex elements are completely developed, either the secretion can no longer be utilized or the sex glands inhibit the release of the hormone, and a storage occurs. This storage continues throughout the winter, and is evidenced by a progressive increase in acidophilic granules and fuchsinophilic droplets. During the breeding season the stored material is discharged from the pituitary. Its immediate effect on the organism is to induce amplexus and to cause a discharge of the mature sex products.

The Amphibia exhibit a great variety of breeding habits. A physiological mechanism, therefore, which is found to operate in

one genus cannot be applied broadly to the entire group or even to other genera.

This cytological study of the pituitary in relation to sex activity is being extended into other groups of Amphibia. A more quantitative analysis of the work together with the results of castration and injection experiments will be published *in extenso* at a later date.

8247 C

Effect of Iron on Hemoglobin Regeneration in Gastrectomized Dogs.

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We have previously shown[1] that the gastrectomized dog has a markedly reduced capacity to regenerate hemoglobin when maintained at anemic levels on various diets. The average production capacity is approximately 10% of that of normal dogs and is around 0.2 gm. of hemoglobin per day on a meat diet. It was also noted that liver feeding or the administration of liver extract 343 (Lilly) is comparatively ineffectual in increasing the level of hemoglobin production. Liver extract 55 (Lilly), however, caused a definite increase in hemoglobin production. As this preparation contains added iron, the present studies were directed to determining the effect of the oral administration of iron. Incidentally, the character of the blood findings during the period of anemia and of iron therapy were followed.

The same 4 dogs used in the previous study were used, the gastrectomy operation thus preceding the present experiments by from 2 to 3 years. The technique of study was similar to that used previously. The dogs were maintained at an anemic level (*e. g.*, hemoglobin levels of 6 to 9 gm. per 100 cc.) by intermittent bleeding, the hemoglobin production for a given period being determined as the total hemoglobin removed by the bleedings plus or minus the gain or deficit in total circulating hemoglobin during the same time. This is the method developed by Whipple and his coworkers. The hemoglobin determinations were made with a Sahli-Hellige Haemometer

[1] Mullenix, R. B., Dragstedt, C. A., and Bradley, J. D., *Am. J. Physiol.*, 1933, **105**, 443.