Of especial interest was the influence of temperature on egg respiration. The temperature coefficient for fertilized eggs was slightly under 2, between 11° and 30°C., essentially as reported by Loeb and Wasteneys.[4] The unfertilized eggs, however, show a high coefficient, over 4; so that a 5-fold increase in respiratory rate is true only for intermediate temperatures. At 10° the increase is 10 times and at 31-32°, by slight extrapolation (it is not practical to use these temperatures because of injury), there is no change at all on fertilization. These striking differences in resting and fertilized respiration indicate some fundamental change in the chemistry of the egg. The general reaction: substrate is oxidized, still goes on. Whether the change indicates a shift of master reaction from one member of the concatenated reactions of oxidation to another, or whether it indicates that fertilization introduces an excess of catalyst so that some physical process now becomes the limiting factor in determining oxidation rate, cannot be decided from these experiments.

We wish to acknowledge the kindness of Dr. A. J. Goldforb in permitting us to compare our results with his unpublished ones, which agree on a number of the above points.

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Ovarian Response of Hypophysectomized Rats to Urinary Follicle-Stimulating Principle.*

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Zondek[1] and Kurzrok,[2] by injections in normal immature female rodents, have demonstrated that certain urines (after ovariectomy and the menopause) may induce predominantly a follicular growth. Leonard[3] has shown that the principle in this urine can be differentiated from that in P.U. by the rabbit ovulation test. The dif-

[4] Loeb, J., and Wasteneys, H., *Biochem. Z.*, 1911, **36**, 345.

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[1] Zondek, B., *Klin. Wochenschr.*, 1930, **9**, 393.

[2] Kurzrok, R., 1933, in press.

[3] Leonard, S. L., *Am. J. Physiol.*, 1931, **98**, 406.

ference in the ovarian response elicited by the F.-S.U.‡ extract and the principle in P.U. is a quantitative one in normal animals for P.U. injections also give follicular growth in them. We have found a definite qualitative difference in the effect given by these 2 types of urine in hypophysectomized rats.

We have secured pronounced follicular growth in each of the 12 hypophysectomized rats injected with F.-S.U. extract, treatment having been begun 5-15 days after pituitary ablation.§ This follicular growth takes place within a 5-day period. Even when treatment was continued for 10 days, luteinization occurred only in a small part of the wall of an occasional follicle. The ovaries are very similar to those of normal immature rats whose gonads have been precociously matured by A.P. implants. The effect of the injections is thus opposite to treatments with P.U. extract which does not induce follicular growth after hypophysectomy but causes interstitial hypertrophy and luteinization.

The ovarian weights after treatment with F.-S.U. extract are in the normal range. Structure rather than weight is the better index of a successful replacement therapy.

The injection of F.-S.U. extract has not induced ovulation after hypophysectomy. It brings the follicles to a condition similar to that obtaining in rabbits in heat. Ovulation was secured in 2 pituitaryless rats, however. Each was unilaterally ovariectomized after a 5-day period of F.-S.U. injections and then 100 R.U. of Antuitrin S was given intraperitoneally. The remaining tube of one animal contained 21 ova, that of the other animal 6 ova. All showed polar spindles. In 4 hypophysectomized rats given the same treatment, but after a shorter post-operative period, ovulation did not occur. The ova lay free, however, in the follicular cavity and had spindles.

Concurrent injections of F.-S.U. and P.U. extracts give "augmentation" in normal and hypophysectomized rats. The ovarian weights are greatly in excess of those which would be predicted from adding the increases produced by each of the extracts injected individually. The principle in the F.-S.U. extract appears to be of pituitary origin. It almost completely fulfills the requirements postulated for a follicle-stimulating hormone of the anterior hypophysis.

‡ Since pregnancy urine is commonly designated as P.U., we have abbreviated the follicle-stimulating urine as F.-S.U., thus avoiding the use of the term "Prolan", which designates a patented product.

§ The urine used in these experiments was from a woman who had passed the menopause and who suffered from migrane. It was secured through the courtesy of Dr. Kurzrok. A urine equivalent of 10 cc. or 20 cc. was injected subcutaneously, each day.