

Effect of Hypophysectomy on the Ovary of Immature Rats.

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We know that the immature gonad is largely independent of the pituitary. Malformations of the pituitary, such as those associated with anencephaly, do not influence the embryonic development of the ovary, although they inhibit the growth of the adrenal cortex very markedly.¹ It has also been shown that the anterior pituitary-like hormone is unable to produce follicle maturation and formation of corpora lutea in the ovary of the very young rat; its only effect at an age of 6-12 days is luteinization of theca cells.² It seemed of interest, therefore, to study the effect of hypophysectomy on immature rats. In previous experiments we saw that the immature

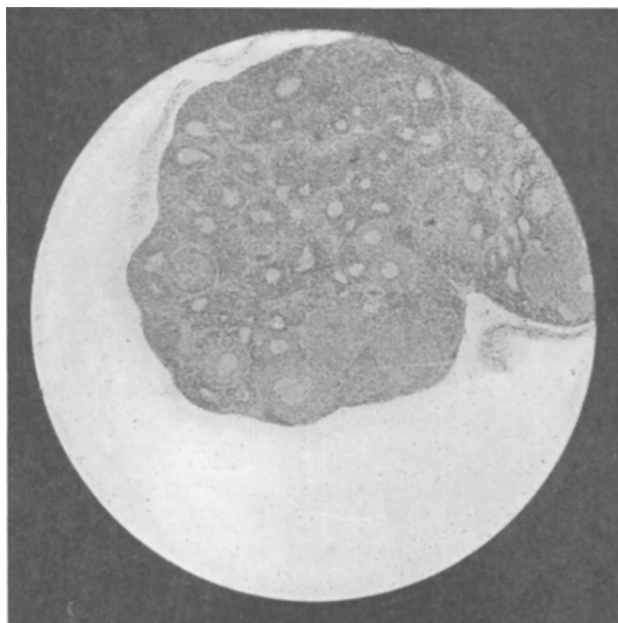


FIG. 1.

Low magnification of an ovary taken from a rat hypophysectomized at 18 days of age, and killed 25 days after operation. Picture shows that there is considerable follicular atresia, but many follicles are still normal.

¹ Jaffe, R., and Tennenberg, I., *Hirsch's Handbuch. d. Inneren Sekretion*, **1**, 520.

² Selye, Collip and Thomson, *PROC. SOC. EXP. BIOL. AND MED.*, 1933, **30**, 647.

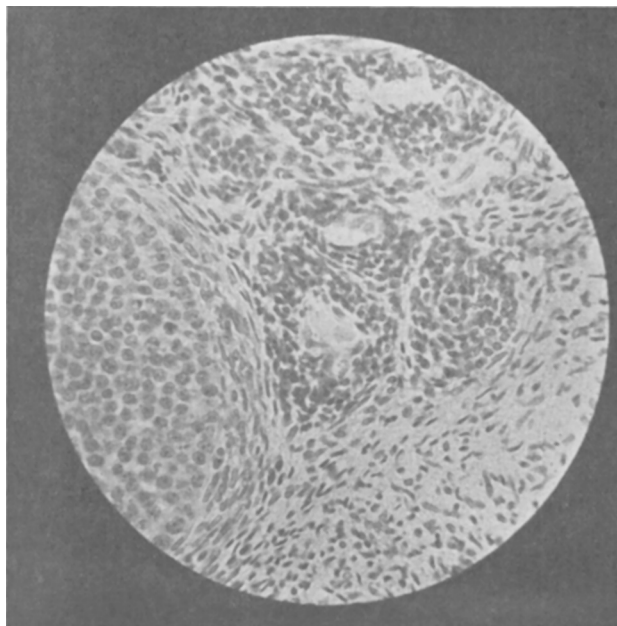


FIG. 2.

High magnification of a part of the ovary shown in Fig. 1. To the left, normal follicle surrounded by normal theca cells; in the center and to the right 2 atretic follicles the theca cells of which show definite signs of hormone deficiency (typical thecal deficiency-cells).

follicles of young rats may persist a very long time after the removal of the pituitary, and although the follicular atresia in such animals is usually considerable the results of hypophysectomy are not very clear-cut because the number of follicles undergoing atresia is also very considerable in the normal immature rat. We thought that our recent observations³ on the effect of hypophysectomy on the theca might be used to detect more obvious signs of pituitary deficiency in the immature rodent. We hypophysectomized 20 female rats 18 days of age and killed them at various intervals between the 10th and 25th days after operation. They all showed both normal and atretic follicles, and many typical thecal deficiency cells as described previously.³ The chromatin of their nuclei aggregates in large, dark granules, leaving unstained spaces in between (Figs. 1 and 2).

It is interesting to note in this connection that the transformation of thecal cells into deficiency cells occurs only around the atretic follicles, while the theca of normal follicles maintains its normal

³ Selye, Collip and Thomson, *Endocrinology*, 1933, **17**, 494.

appearance (Fig. 2). The reason for this phenomenon is not known to us, but it seems that the living granulosa and ovum protect the theca. This observation reminds one of the fact that thecal luteinization as produced by the anterior pituitary-like hormone of pregnancy urine also appears most readily in thecal cells which are not in immediate contact with living granulosa cells.

We conclude from this experiment that the hypophysis has a definite trophic influence on the ovary of the rat long before the animal reaches maturity. It is interesting to note that in these immature rats the most obvious signs of deficiency after hypophysectomy appear in the theca—that is, in those cells which are the only ones which respond to the administration of A.P.L. in the very young rodent.

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Effect of Anterior Pituitary-like Hormone on the Ovary of the Hypophysectomized Mouse.

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We have stated previously that preparations of A.P.L. (anterior-pituitary-like hormone) from pregnancy urine or placenta do not lead to maturation of follicles or formation of corpora lutea in the ovary of the hypophysectomized rat,^{1, 2} but only to luteinization of theca cells. Smith,³ however, who repeated this experiment with the commercial preparation of the anterior pituitary-like hormone prepared from pregnancy urine bearing the name Antuitrin S., found that after such treatment new corpora lutea could be seen in the ovaries of both pre- and post-pubertal hypophysectomized rats; these were of the same type as the normal corpora lutea of the postpubertal animal. Thinking that the difference in results might be due to a difference in the preparations used, we repeated our experiment on 10 pre-pubertal (22-day-old) rats, using Antuitrin S.,* but the results

¹ Collip, Selye and Thomson, *Nature*, 1933, **131**, 56.

² Selye, Collip and Thomson, *Proc. Soc. Exp. Biol. and Med.*, 1933, **30**, 780.

³ Leonard and Smith, *Proc. Soc. Exp. Biol. and Med.*, 1933, **30**, 1248.

* We used the standard commercial preparation, but Dr. Smith has informed us that the material employed in his experiments was a special sample of greater purity.