

Summary. Evidence is offered that the essential factor for the production of pregnancy cells in the anterior pituitary of the rat is contained in the luteinized ovary and, further, that this factor is not sex specific.

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Effects of Thyreotropic and Adrenotropic Hormones on Hypophysectomized Frog Tadpoles.

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Twenty-four specimens of *Rana sylvatica* and *Rana pipiens* hypophysectomized at the tail-bud stage, and kept in the laboratory for 525 days, whose normal mates had metamorphosed at 65-70 days, were divided into 3 groups. Seven animals were kept as controls, 7 were treated with Collip's adrenotropic¹ hormone, batch AI, and the remaining 10 with his thyreotropic² hormone, batch TG. As a result of his own bio-assays (on rats) Collip stated that the thyreotropic hormone was not free from adrenotropic material but that the adrenotropic hormone was 'fairly pure'. The hormones were administered by intraperitoneal injection, using special fine needles, in 0.05 cc. doses, given once daily, 6 days a week. For the injection an animal was removed from its aquarium and placed on a pad of absorbent cotton wet with ice water. It was then immobilized, ventral side uppermost, by a smaller sheet of wet cotton having a slit cut in it through which the injection could be made. Following the injection the animal was quickly returned to its aquarium.

In 4 days both of the treated groups were dark in color. The adrenotropic group was decidedly darker than the thyreotropic. The only other change noted in the first 5 days was a slight reduction of the tail fin in a few cases.

On the 6th day the hind legs of one animal in the thyreotropic group appeared to be lengthening and by the 10th day all but 2 of this group showed definite growth of the hind legs. From then on the changes normally seen at metamorphosis appeared rapidly. Fore-legs emerged from the 11th day on, the tail shortened, the mouth became a transverse slit, characteristic frog spots (*R. pipiens*) ap-

¹ Collip, Anderson and Thompson, *Lancet*, 1933, **2**, 347.

² Anderson and Collip, *Proc. Soc. Exp. Biol. and Med.*, 1933, **30**, 680.

peared and from the 14th day animals were living out of the water. Most of the adrenotropic-treated animals showed little leg development or reduction of body or tail-length, although 2 grew hind legs of considerable size.

The animals were autopsied under the binocular microscope. The thyroid and the hypophysis region were preserved in Bouin's fluid, the gonads, kidneys and adrenals in chromic-osmic. The epithelial hypophysis was invariably entirely absent. The thyroids of the untreated group were very small and the individual vesicles distinctly seen. In the thyreotropic group the thyroids were greatly enlarged, rounded and opaque; no vesicles could be observed. The adrenotropic group showed slight enlargement of the thyroids. A determination of the relative volume of the thyroid for 7 individuals of each group gave the following averages: Untreated silvery, 1; thyreotropic, 6; adrenotropic, 2.

Histologically the thyroids of the thyreotropic group show marked stimulation. There is little colloid present; the epithelium is very tall and mitotic figures are numerous. The vesicles apparently have increased in number by branching and division.

After fixation in chromic-osmic and clearing in chloroform the adrenal glands were visualized due to the blackened lipoids contained in the cells of the cortex. In the untreated group the gland is seen as a faintly darkened irregular cord on the ventromesial surface of the kidney. In the adrenotropic animals it is much larger and very heavily stained. The thyreotropic group also shows decided increase in the lipoids of the adrenal. These observations are confirmed by histological study. Grossly the gonads show no apparent modification.

Thus it is seen that the hypophysectomized frog tadpole is a striking test object for the action of pituitary hormones. This is especially true for the thyreotropic, since the objective signs of metamorphosis are more readily observed than are changes in the basal metabolic rate.