

mate controls. At the time of autopsy these glands appeared swollen and highly vascular. Upon microscopic examination the acinar epithelium, which in the normal animal is cuboidal, was invariably found to be of a very tall columnar type. The follicles were irregular in outline and the follicular epithelium was thrown into numerous folds. The lumina of the acini, which in untreated animals are typically filled with solid colloid, were found to be empty. In some follicles the lumina had become obliterated by enormously elongated epithelial cells. The cytoplasm of these enlarged cells was filled with granular material and the nuclei were quite vesicular. On the whole, the thyroid picture was one of excessive secretory activity.

The follicular stimulating fraction produced no significant change in the weight of the thyroid. Histologically these glands were quite normal in every respect with the exception of 2 animals. In each of these the thyroid was somewhat atrophic. The acinar epithelium was flattened and the nuclei of the epithelial cells were likewise flattened and pycnotic.

It was found that neither castration nor sex altered the response of the thyroid to either of the gonadotropic substances. Also, similar experiments, in which young female rats were used, gave essentially the same results as those for guinea pigs.

Other preparations such as placental extracts, prolactin from pregnancy urine, and corporin, produced no significant changes either in the weight or the histological appearance of the guinea pig thyroid.

The data presented here indicate that thyroid hyperplasia was produced either by the luteinizing principle or by another substance associated with it in the preparation.

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Hypophysectomy and Thyroidectomy of Snakes.*

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The effects of hypophysectomy on mammals and amphibians have been extensively investigated, but apparently no work of this

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nature has been done on reptiles. The present study on garter snakes (*Thamnophis sirtalis* and *T. radix*) was made to determine whether or not hypophysectomy of reptiles produces the same results known for other vertebrates. Several male snakes were hypophysectomized to determine the histological changes of the endocrine organs, while others were given homeoplastic hypophyseal implants.

The testes of hypophysectomized animals became small and flaccid with degenerating spermatocytes in the atretic seminiferous tubules, while the size of the interstitial cells was less than normal. Subcutaneous implantation of a single hypophysis every other day for a period of 30 days, elicited germ cell production, enlarged the tubules, and increased the size of the interstitial cells. The adrenal glands after hypophysectomy were reduced to about two-thirds normal size. The cortical cells were atretic, and most of the nuclei had migrated to the periphery of the cell cluster. No retrogressive changes were noticed, however, in the cells of the medullary tissue. Hypophyseal implants, as given, did not restore the normal size of the gland, but the cells regained approximately their normal appearance and nuclear distribution.

The acinar epithelium of the thyroid gland, which is normally cuboidal, was, after hypophysectomy, reduced to a squamous type and these modifications were definitely although not entirely corrected by hypophyseal implants. Removal of the hypophysis also invariably caused shedding[†] of the skin which appeared to be due to thyroid disturbance. The first shedding occurred between 13 and 30 days after which the animals continued to shed at irregular intervals ranging from 22 to 70 days. One animal of this group shed 5 successive times, while normal animals kept under the same dietary and environmental conditions shed only once. Benedict,¹ in his studies on the basal metabolism of reptiles, found considerable deviation during the shedding period, and inferred that the shedding is not without influence upon metabolism. The present study suggests that the thyroid gland in some manner controls the shedding process. Two snakes which were thyroidectomized shed 15 days later, and entered shedding cycles similar to those of hypophysectomized snakes; one sloughing 5 and the other 6 times. That

[†] The word "shedding" as used in this report refers not only to the actual sloughing of the skin, but also to the first appearance of milky eyes which initiates the shedding process.

¹ Benedict, F. G., Carnegie Institution of Washington, Pub. No. 425, 1932, 163.

such shedding is due to the absence of thyroid activity is demonstrated by the fact that the feeding of 0.5 mg. of desiccated thyroid tissue for each gram of body weight to both hypophysectomized and thyroidectomized snakes prevented shedding. About 30 snakes were put under hibernating conditions for several months, and none of them shed its skin during that time. This indicates that the shedding is not induced by lowered metabolism alone, but probably is due to the absence of thyroid activity.

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Purification of Phage by Adsorption and Elution.

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A precise study of the nature of viruses is rendered difficult by various extraneous substances. Although these substances do not appear to affect the action of the virus on its specific host, they modify the behavior of the virus in tests designed to ascertain its nature. Recently two methods have been reported for purifying viruses. One is based on ultrafiltration,¹ the other on adsorption and elution.²

The latter procedure is more easily carried out in the laboratory. However, it is difficult to standardize the technique and hence some authors have reported positive, others negative results. This paper deals with the standardization of the technique and the further purification of *B. coli* bacteriophage.

Media and Reaction: The character of the medium influences the adsorption, elution and amount of phage produced. In a synthetic medium the concentration of phage at the outset is low and elution is unsatisfactory. Adsorption is best in an acid and elution in an alkaline medium. The following protocol is typical:

Parallel tubes of broth and synthetic media were seeded at the same time with the same amounts of phage and culture, incubated 24 hours at 37°C., and filtered through a Seitz filter.

The phage titre in the broth was 10⁹, in the synthetic media 10⁵.

Method of Eluting. Adsorption is more complete at pH 5.5 than

¹ Elfold, W. J., *J. Path. and Bact.*, 1931, **34**, 505.

² Kligler, I. J., and Olitzki, L., *Brit. J. Exp. Path.*, 1931, **12**, 172.