thyroid powder, in the same kind of larvae, caused metamorphosis 14 days (at the latest) after the beginning of the experiment.

Neither our own nor Armour's preparation of anterior lobe had any effect on the metamorphosis of the salamander larvae when administered by mouth, while they proved most potent when injected intraperitoneally. Armour's preparation behaved in this respect entirely as our own preparation, and both differed from Armour's thyroid powders.

4190

Anterior Lobe Substance, the Thyroid Stimulator. III. Effect of Anterior Lobe Substance on Thyroid Gland.

E. UHLENHUTH AND S. SCHWARTZBACH.
*From the University of Maryland Medical School.**

In previous work[1] we found that intraperitoneal injection of an extract made from Armour's anterior lobe powder causes the thyroid gland of the larvae of *Ambystoma tigrinum* to display its functional phase in a typical manner long before it is displayed in normal animals and linked with the progress of metamorphosis in the same way as it is in normal metamorphosis. Exactly the same result we obtained by injecting, intraperitoneally, an extract of anterior lobe powder prepared in our own laboratory by the method described in Article I of this series. Illustrations are required to demonstrate satisfactorily these results and will be published in a more complete article. The main results will be summarized here.

The animals used are the same as those discussed in Article I of this series. Larvae of the eastern as well as of the western race (Utah axolotle) of *Ambystoma tigrinum* were examined. The thyroids of 16 experimentals and 11 controls were examined. The thyroids were studied fresh, stained or unstained, by a method described fully in a previous article.[2] Three representative thyroids will be discussed here.

In one larva (CCXCIV b 2) the cells of the thyroid were found distinctly changed towards increased functional activity, although

* These experiments were made with the support of the Julius Friedenwald Fund for Research of the University of Maryland and of the Elizabeth Thompson Science Fund of Harvard University.

[1] Uhlenhuth, E., and Schwartzbach, S., *Anat. Rec.*, 1926, xxxiv, 119. *Brit. J. Exp. Biol.*, 1927, v, 1.

[2] Uhlenhuth, E., *Roux's Arch. f. Entwicklungsmech.*, 1928, in press.

the animal had received only 3 injections. The height of the cells was increased, the number and size of the neutral red granules was larger than in the controls (and in normal standard animals in general) and the intensity of the neutral red stain was distinctly greater. This animal showed only a few signs of metamorphosis.

In another animal (CCXCIV b 3) the thyroid was examined unstained, after 3 injections had been given. The cells were distinctly enlarged and showed the typical dome-like protrusion of the apices, observed in active glands of spontaneously metamorphosing larvae. In this animal no definite start towards metamorphosis had been made.

In a third animal (CCXCIV b 1) which had received 5 injections, the cells exhibited characters indicative of the highest secretory activity. Some cells were found which were twice as high as the cells of control thyroids and contained one large Andersson vacuole at the apex. Other cells were merely increased in size; of these 50% contained so many Andersson vacuoles that little of the cytoplasma remained. This animal had shed its first skin completely one day before examination.

Our conclusion is that genuine anterior lobe extract has the same action on the thyroid as Armour's commercial product, that a fully potent extract can be obtained not only from dried, but from fresh glands; that the anterior lobe contains a substance which, alone among other substances tested and quite contrary to thyroid substance and substances stimulating the autonomic nerves, forces the inactive thyroid gland into function; and that, in amphibians, metamorphosis is caused by this principle only indirectly, through the function of the thyroid gland.

4191

Anterior Lobe Substance, the Thyroid Stimulator. IV. Effect in the Absence of Thyroid Gland.

S. SCHWARTZBACH AND E. UHLENHUTH.

*From the University of Maryland Medical School.**

Spaul[1] reported that injections of anterior lobe substance induced metamorphosis in thyroidectomized axolotls. According to our

* These experiments were made possible through the generosity of Mr. Victor G. Bloede, Baltimore.

[1] Spaul, E. A., *Brit. J. Exp. Biol.*, 1925, ii, 427.