

### Thyroid Treatment and the Cyclostome Endostyle.

MIRIAM STOKES. (Introduced by J. Frank Daniel.)

*From the Department of Zoology, University of California, Berkeley.*

A relationship between the thyroid gland and metamorphosis has been fully established in amphibians,<sup>1</sup> and has been suggested for at least one species of fish.<sup>2</sup> Two factors appear to be necessary for that relationship, an actively secreting gland, and sensitivity of the body cells to its hormone.

The adult cyclostome possesses a single thyroid gland which develops at metamorphosis from the endostyle, a mucus-secreting structure ventral to the pharynx. According to Horton,<sup>3</sup> the thyroid of the adult lamprey will induce metamorphosis in tadpoles. Subjection of larval lampreys to thyroid treatment has produced no effect on external metamorphosis;<sup>4</sup> and potassium iodide solutions, effective when administered to amphibian larvae, do not alter the histology of the endostyle.<sup>5</sup>

The present study was undertaken to test the results of earlier investigators with a larger number of animals. A careful histological study of the endostyle was also made, on the possibility that slight metamorphic changes not reflected in external appearance might have been produced by thyroid treatment.

Ammocoetes larvae 50-80 mm in length, of the genus *Entosphenus*, were collected in midsummer and divided into lots of 20. Larger animals were discarded to eliminate the complication of normal metamorphosis, and the larvae were placed in finger bowls in groups of 5. The solutions used were as follows:

1. Control—pond water.
2. Crystalline thyroxin\* in pond water, 1:500,000.
3. Desiccated thyroid (crushed tablets), 1:120,000.
4. Desiccated thyroid (powder), 1:500,000.

(A similar concentration of this preparation produced dis-

<sup>1</sup> Gudernatsch, J. F., *Arch. f. Entw.-mech.*, 1912, **35**, 457, and others.

<sup>2</sup> Murr, E., and Sklower, A., *Z. f. vergl. Physiol.*, 1928, **7**, 279.

<sup>3</sup> Horton, F. M., *J. Exp. Biol.*, 1934, **11**, 257.

<sup>4</sup> Jensen, C. O., *Oversigt. over det kgl. danske Videnskabernes selskabs Forhandlinger*, 1916, **30**, 251; Remy, P., *Compt. rend. Soc. biol.*, 1922, **86**, 129.

<sup>5</sup> Marine, D., *J. Exp. Med.*, 1913, **17**, 379.

\* The thyroxin used was furnished through the courtesy of E. R. Squibb and Sons.

tinct metamorphic changes in *Hyla* tadpoles in 7 days. Stronger doses were fatal.)

In contrast to most of the earlier work, where animals were exposed only at intervals, the *Ammocoetes* were kept in the solutions, which were renewed every 3 days.

In all groups the results were consistently negative. No external evidence of metamorphosis was present, and no effect on size was noted. Histological examination of structures most influenced by metamorphosis, the eyes, the oesophagus, and particularly the endostyle, showed no changes. Experimental animals were indistinguishable from controls in section. Thus, although the metamorphosis of the lamprey endostyle is normally completed in a month, thyroid substance produced no effect on its cellular structure during a 6-week exposure.

From the data collected it may be postulated that although the adult lamprey possesses an active thyroid, the body cells of *Ammocoetes*, including the cells of the endostyle, are not sensitive to thyroid treatment. Metamorphosis in cyclostomes, therefore, is related to influences other than that of the developing thyroid.

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### Action of Mammalian Sex Hormones in the Lizard, *Sceloporus occidentalis*.

AUBREY GORBMAN. (Introduced by J. Frank Daniel.)

*From the Department of Zoology, University of California, Berkeley.*

With the discovery of an increasing number of estrogens and androgens in mammals, and an increasingly diverse series of physiological activities in which they are involved, it has become of great interest to examine the action of such substances in lower vertebrates. In adult frogs, injection of estrogens prevents atrophy of the oviduct after ovariectomy,<sup>1</sup> and high doses (1,000 rat units) stimulate growth of the oviduct in normal animals.<sup>2</sup> In normal toads, however, dosages of estrone as high as 10,000 international units have little or no demonstrable action.<sup>3, 4</sup> A surprising result is ovulation in

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<sup>1</sup> Wolf, O. M., *Anat. Rec.*, 1928, **29**, 41.

<sup>2</sup> Wolf, O. M., *Biol. Bull.*, 1939, **77**, 338.

<sup>3</sup> Valenzuela, J. R., *Rév. Méd. Cordoba*, 1937, **25**, 179.

<sup>4</sup> de Allende, I. C., *Rev. Soc. Arg. Biol.*, 1939, **15**, 185.