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Suitability of the Common Goldfish for Assay of Thyrotropic Hormone.

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

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The unusual responsiveness of the thyroid tissue of goldfish to small amounts of hypophyseal thyrotropin has provided in these experiments the basis for a sensitive, inexpensive assay procedure. In a series of tests in which 115 two-inch-long fish were used, marked growth of the epithelium of the thyroid follicles was produced by crude and relatively purified preparations from the pituitaries of mammals, birds, amphibia, and fishes. One Parkes-Rowlands guinea pig unit, 0.25 mg of a purified, standardized mammalian pituitary thyrotropic powder was much larger than the minimum dose producing thyroid stimulation in the goldfish.

Groups of 5 fish receiving the same treatment were kept in one-gallon jars. The hormone was administered intraperitoneally in 5 successive daily injections of 0.2 cc each day, dissolved or suspended in the desired dilution of Ringer's solution. At autopsy, performed on the sixth day, the lower jaw was removed and trimmed. This piece of tissue, about 2 mm by 3 mm in size, was fixed in Bouin's fluid which contains enough acid to eliminate the need of special decalcifying agents. The jaw was cut sagittally in 10μ sections. Only about 100 serial-sections, estimated to be approximately median sagittal and parasagittal were saved. The height of the epithelium was measured with a calibrated ocular micrometer and an average of 10 measurements from different follicles was taken.

TABLE I.
Dose of Thyrotropic Preparation Required for Specified Response, Expressed as Milligrams of Desiccated Tissue.*

Reaction height epithelium, μ	Pituitary preparations					
	Fish (sole)	Leopard frog	Bull- frog	Chicken	Sheep	Parkes Th 9
2.0 μ -3.5 μ	10.0	5.0	†	5.0	†	†
3.5 μ -5.0 μ	†	10.0	5.0	10.0	†	†
5.0 μ -9.0 μ	†	†		10-20	150	0.25—
9.0 μ +	†	†	20.0	†	†	5.0

*Excepting the Parkes thyrotropic extract for which the dose is expressed as milligrams of purified powder.

†Lowest dosage was too high to produce this response.

‡Highest dosage was too low to produce this response.

The thyroid epithelial response in this cold-blooded animal was very uniform to any given dosage level. The average control epithelial cell measured 1μ in height, with extreme variations of 0.5μ from this dimension. In strongly stimulated thyroid tissue, epithelia as high as 12μ were seen. It was found convenient to recognize different grades of stimulation. A 50% increase in average follicle cell height (cells 2μ high) was considered the minimal reaction. Increases of 175% (3.5μ), 300% (5μ), and 500% (9 to 10μ), respectively, were adjudged the arbitrary limits for delineation of the reactions referred to as mild, strong, and very strong.

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Further Experiments on Nutritional Achromotrichia in Rats and Mice.

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From the results of previous experiments it has been concluded that "concentrates of pantothenic acid, with a purification up to 40 to 50%, appear to contain one factor but not the only factor concerned in the cure of nutritional achromotrichia in rats."¹

Later, it became evident that this factor, which proved to be heat labile in alkaline solution, is identical with pantothenic acid.² In a group of rats kept on a diet free from pantothenic acid, administration of daily doses of from 75 to 100 μ g of synthetic pantothenic acid[†] brought about cure of the nutritional achromotrichia in from 5 to 7 weeks.² In some rats the cure was slower and in a few it was never quite complete.

These experiments were repeated with black mice[‡] kept under

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¹ György, P., Poling, C. E., and Subbarow, Y., *J. Biol. Chem.*, 1940, **132**, 789.

² György, P., and Poling, C. E., *Science*, 1940, **92**, 202.

[†] Synthetic pantothenic acid was generously put at our disposal by Merck & Co. Inc., Rahway, N.J.

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