effect within the mucosa, produced by the toxic products of the infection upon the vaso-motor endings in the mucosa. (b) Hyperesthetic Rhinitis. The hyperesthetic cases, using the same method as in normals, produced erratic vaso-motor changes. Frequently in such cases a cold stimulus on the cutaneous surface produced a reflex rise in the mucosa temperature instead of a drop; a hot stimulus produced a lowering of the mucosa temperature instead of a rise.

6679

Thyroid Hypertrophy as a Response to the Gonad-stimulating Hormone of the Pituitary.

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Following our[1] isolation of a third anterior pituitary hormone (prolactin) in fairly pure form, together with the purification of the growth and gonad-stimulating hormones facilitated by this accomplishment and notably by the very recent purification of the growth hormone,[2] it is perhaps admissible to attempt the association of certain hitherto observed structural and functional responses with each of the (3) now known hormones of the anterior pituitary. If still other now unrecognized hormones exist in the pituitary this attempt may be premature. In our opinion, only accelerated body growth was hitherto a proved specific response to the growth hormone; only accelerated gonad growth a proved specific response to the gonad-stimulating hormone; and only activation of crop-glands and lactation proved specific responses to prolactin. Many other responses are known but remain unassigned to a specific pituitary hormone. On the basis of scant evidence a few previous workers have variously suggested that thyroid hypertrophy is a response to the growth, the gonad-stimulating and to a specific thyreotropic hormone.

The data tabulated here are taken from several hundreds of as-

* Deceased.

[1] Riddle, O., Bates, R. W., and Dykshorn, S. W., PROC. SOC. EXP. BIOL. AND MED., 1932, **29**, 1216. (Also, *Am. J. Physiol.*, 1933, in press.)

[2] Collip, J. B., Selye, H., and Thomson, D. L., PROC. SOC. EXP. BIOL. AND MED., 1933, **30**, 544.

says of pituitary extracts or fractions (in very various stages of hormone isolation and purification) injected into doves and pigeons. These animals afford an exceptionally quick and easy test for prolactin, probably a fair test for the growth hormone, and the immature males are probably the most sensitive known test for the gonad-stimulating hormone. The thyroid response can be studied to some advantage in our colony of animals, since various races have here

TABLE I.

Thyroid hypertrophy in ring doves is obtained from preparations which contain the gonad-stimulating hormone. Growth hormone and prolactin, when free of the gonad-stimulating principle, do not stimulate the thyroid.

Ant. pituitary; known contamination	No.	Daily dosage		Body wt. change	Age	Thyroid Test	Thyroid Control (an av.)	Crop gland active (+) or not (—)
		mg.	days	gm.	mo.	mg.	mg.	
Growth (no maturity,	Q16	1.5	6	147— 3	2.3	13.2	13.8	—
trace prolactin)		1.5	8	139+12	3.0	17.0	15.6	+
(Collip, Selye,	Q21	1.5	7	141— 1	2.9	20.1	15.1	+
and Thomson)		1.5	7	147+11	2.3	9.6	13.8	+
		1.5*	5	139+ 5	3.1	21.9	14.8	—
Growth (+ maturity)	36	1.5	5	110+ 3	3.0	42.0	20.0	+
(Lee and Schaffer)		2.2	9	137+ 9	3.2	65.9	20.0	—
		2.2	10	142+28	3.3	36.5	14.8	—
Growth (+ maturity)		4	6	172+10	14.0	41.5	15.3	+
(traces prolactin)		4	7	160+14	14.0	41.7	15.3	+
Phyone (Van Dyke)		8	5	137+ 1	2.8	29.3	13.9	+
		4	8	150+23	2.8	44.3	15.3	+
	36a	?	5	134— 7	2.8	26.4	20.3	—
		?	5	144— 8	2.8	28.4	20.3	—
Gonad-stimulating	43	3.5	5	143— 4	2.9	43.9	20.0	—
(+ traces pituitrin)		3.5	5	143—13	2.9	72.9	20.0	—
(own preparations)		3.5	5	160—12	2.7	24.7	15.3	—
		3.5	7	172— 6	13.7	60.8	13.9	—
	56	2.2	6	157—16	2.9	29.2	20.1	—
		2.2	6	160—16	3.3	52.0	(23.0)	?
	71[1]	3.0	5	160—20	2.2	15.7	16.4	—
		3.0	5	158—24	2.3	12.1	16.9	—
	34	2.5	6	161+ 0	12.2	15.8	17.9	+++
		10.0	5	154— 3	12.1	14.2	17.9	+++
Prolactin	69	10	7	137— 3	3.1	10.7	20.0	++++
(no maturity)		10	7	152—15	2.9	13.5	(11.9)	++++
	93	20	8	159— 2	2.5	18.6	18.1	++++
		20	8	137— 6	3.1	12.4	14.5	++++

* These values (protein) calculated from the nitrogen content, except values for prolactin.

[1] Method of Fevold, Hisaw and Leonard.

been established on the basis of thyroid size[3]; in the present study, however, much of this advantage has been lost because we have been forced to use numerous hybrids of these races, and such hybrids often show a wide variability of thyroid size. Thyroid hypertrophy is measured here solely in terms of increased weight.

The data of Table I, like practically all of the assays made by us, clearly indicate that neither the growth hormone nor prolactin—when these are freed of the gonad-stimulating or sex maturity principle—has any special capacity to cause enlargement of the thyroid. Growth preparations Q16 and Q21, kindly supplied us by Dr. Collip, like our own prolactin preparations, have shown no gonadotropic response whatever when used in the quantities indicated here. The growth preparations of Lee and Schaffer and of Van Dyke and Wallen-Lawrence do contain the sex maturity hormone in addition and these preparations regularly produce thyroid hypertrophy. Our own preparations of the gonad-stimulating hormone, made with somewhat variable procedures, have been found to be free of prolactin when tested in the quantities used here; they probably contain but little growth hormone; they regularly induce rapid growth in the immature male testis and in most cases produce thyroid hypertrophy. Several tests made with excellent gonad-stimulating fractions, prepared from whole sheep pituitary according to the method of Fevold, Hisaw and Leonard,[4] completely failed to increase the weights of thyroids.

The last column of the table provides the test for the presence or absence of prolactin in the various preparations; the maximum prolactin effect is observed only after 7 or 8 days of dosage. The thyroid response, or lack of response, clearly does not depend upon the quantity (apart from quality) of protein injected. Equivalent results, though less satisfactory because of greater thyroid variability, have been obtained on a wholly different species—common pigeons.

Summary. For the first time it is shown that 2 anterior pituitary hormones—prolactin and the growth principle—do not cause the thyroid hypertrophy which characteristically follows the injection of various pituitary extracts. Hyperplasia of the normally developed thyroid following pituitary administration is a specific response to the gonad-stimulating hormone, or to another pituitary derivative having very similar solubilities. Good gonad-stimu-

[3] Riddle, O., *Am. Nat.*, 1929, **63**, 385.

[4] Fevold, Hisaw and Leonard, *Am. J. Physiol.*, 1931, **97**, 291.

lating preparations do not invariably induce an increase in thyroid weight in doves and pigeons.

6680

Monophasic Electrical Response Produced by the Contraction of Injured Heart Muscle.

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The electrical responses produced by injured heart muscle are of great interest not only because of their important bearing upon the interpretation of the electrical phenomena exhibited by excitable tissues generally, but because of their relation to the electrocardiographic changes that follow coronary thrombosis in man. We here report briefly experiments relating to the electrical responses produced by the injured heart beating *in situ*.

When one of 2 non-polarizable electrodes connected to the terminals of the string galvanometer is placed in contact with a burned region on the epicardial surface of the exposed turtle's heart and the other in contact with the subcutaneous tissues at a point distant from the heart, the ventricular complex of the curve recorded is essentially monophasic in outline. The monophasic character of the response is due to the disappearance during systole of the injury current flowing during diastole. The direction of the deflection indicates that during ventricular systole the cardiac or exploring electrode is relatively positive with respect to the distant or indifferent electrode. Curves of the same type are obtained by leading from the exposed and freshly injured surface of the mammalian auricle or mammalian ventricle to a distant point. In all such experiments we have connected the electrodes to the galvanometer in such a way that relative negativity of the exploring electrode yields an upward deflection in the completed record. In the curves obtained by leading from an injured to a distant region, ventricular systole is, therefore, represented by a monophasic deflection directed downward.

If a monophasic response is obtained, in the manner described, from the ventral surface of the turtle's heart by means of an elec-