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Synergistic Effect of Anterior Pituitary and Male Hormone.

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(Introduced by John F. Norton.)

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The sex hormones of the anterior pituitary are not sex specific, but stimulate the secretion of the male as well as the female sex glands. However, for the same dose of hormone the effect on the female is far more striking than the effect on the male. In connection with other work in this laboratory, and prompted by the recent work of Funk and Harrow,[1] we carried out experiments to increase the stimulating effect of the anterior pituitary hormone on the male sex glands by simultaneous injections of male hormone.

These experiments were done on our laboratory albino rats. Eight rats of approximately equal age and weight were divided into 4 groups of 2 each: (1) control; (2) injected with anterior pituitary hormone; (3) injected with male hormone; (4) injected with both anterior pituitary and male hormone. All injections were made intramuscularly and twice daily. At autopsy the whole genital tract was exposed and the seminal vesicles and testes inspected macroscopically, and weighed.

The solution of the anterior pituitary was prepared from fresh glands and standardized by the Zondek-Aschheim technic to contain 100 mouse units in each cc. This solution was a mixture of the maturing and the luteinizing fractions as determined by previous assay on female rats.

The solution of the male hormone was prepared from fresh testes and tested on the castrated rooster for its ability to restore secondary sex characteristics. Each cc. contained approximately ½ cock unit. A cock unit is the amount of hormone necessary to cause an increase of 20% in the size of the comb and wattles in the course of 10 days. The solution of male hormone was purposely made quite dilute to preclude the possibility of any great amount of activity originating from this solution. In every case, the male hormone was itself inactive in the doses employed. In the following experiments mature and immature rats were injected twice daily over varying periods of time, and the seminal vesicles and testes examined for a degree of hypertrophy, content of secretion, ramifica-

[1] Funk, C., and Harrow, B., *Am. J. Physiol.*, 1932, **101**, 218.

tions of the glandular structure, and general appearance. All injections were run in duplicate.

In Table I, we show representative tests. The figures given represent the weights in milligrams of the seminal vesicles and testes.

TABLE I.
11 Injections in 6 Days. Autopsied on 7th Day.

Body Wt.	Immature rats, 6-7 wk. old	S.V.	Testes
65	Control	25	767
65	Control	21	737
61	.50 cc. Anterior Pituitary	38	830
66	.50 cc. Anterior Pituitary	44	1182
65	1.00 cc. Male Hormone	24	684
65	1.00 cc. Male Hormone	52	742
66	.50 cc. Ant. Pit. + 1.00 cc. Male Hormone	81	1244
58	.50 cc. Ant. Pit. + 1.00 cc. Male Hormone	64	1247
	Mature rats, 4 mo. old.		
250	Control	1078	3443
190	Control	839	2983
210	1 cc. Anterior Pituitary	1757	3064
218	1 cc. Anterior Pituitary	1575	3212
195	1 cc. Male Hormone	652	2280
225	1 cc. Male Hormone	1038	3141
210	1 cc. Ant. Pit. + 1 cc. Male Hormone	1918	3041
215	1 cc. Ant. Pit. + 1 cc. Male Hormone	1673	3228

In these experiments the weights of the seminal vesicles of the controls and the rats receiving the male hormone were practically the same. The anterior pituitary hormone alone stimulated the glands to a considerable extent, but under the influence of the combination of anterior pituitary and male hormones, the seminal vesicles were activated to a higher degree, producing greater thickness and increased secretion of the glands. In physical appearance the glands were opaque and yellowish in color, with many convolutions. Contrary to our expectations, the mature animals appeared very reactive. These results seem to indicate a sensitizing or synergistic effect between the male hormone and the anterior pituitary hormone. This effect is evident in both mature and immature rats and cannot be ascribed to purely an additive effect, since in these experiments the male hormone itself is practically inactive in the dilutions employed. This synergistic physiological effect is evident in the seminal vesicles, while in the case of the testes the results, as expected, were irregular. However, a definite hypertrophy was shown in some cases in the testes of immature rats. No attempt has been made as yet to either explain this phenomenon physiologically or to study the quantitative relationships.