

### Hormone Production in the Undescended Testis.

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The level of production of the "male hormone" in cryptorchid as compared with scrotal testes is of interest on two counts. Failure of the testis to descend is a fairly common defect in development, and an altered hormone-producing capacity of the retained testis may have a bearing on the origin and perhaps even on means of correcting the defect. Moreover, the inhibited differentiation of the seminiferous tubules in the cryptorchid testis, accompanied by evident increase of the interstitial elements, renders it interesting in relation to the question of the site of production of the testis hormone.

Apparently there have been few studies concerned with hormone production in the undescended testis. Early workers merely noted that the secondary sex characters are essentially normal in cryptorchid animals (Bouin and Ancel<sup>1</sup>). The first quantitative study seems to be that of Moore and Gallagher<sup>2</sup> who found, in testing the cryptorchidized guinea pig by the electric ejaculation method, that hormone production was as great as normal. Jeffries,<sup>3</sup> utilizing the cytological signs in seminal vesicle and prostate, observed no castration changes in rats 60 days after cryptorchidizing, from which it was thought that there was no diminution in hormone production. Nelson,<sup>4</sup> using the same tests, found in rats 240 days or longer after being cryptorchidized normal prostates, but seminal vesicles showing castration changes, an observation indicating reduced hormone production in the operated animals. It is to be noted that these authors used as criteria of hormone production not quantity of hormone itself but hormonally regulated characters in their cryptorchid animals.

The present report is based on a study of 2 lots of mixed cryptorchid and normal testes of swine obtained in New York City through the assistance of Dr. C. A. Slanetz. The testes were placed on CO<sub>2</sub>-ice upon being taken from the animals and were packed in CO<sub>2</sub>-ice for shipping. When received at the laboratory the tissue

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<sup>1</sup> Bouin, P., and Ancel, P., *Arch. de Zool. Exp. et Gen.*, 4th ser., 1903, **1**, 437.

<sup>2</sup> Moore, C. R., and Gallagher, T. F., *Am. J. Anat.*, 1930, **45**, 39.

<sup>3</sup> Jeffries, M. E., *Anat. Rec.*, 1931, **48**, 131.

<sup>4</sup> Nelson, W. O., *Anat. Rec.*, 1934, **58**, 30 (suppl.).

was still frozen solid. A fragment of each testis was submitted to frozen section and stained with polychrome methylene blue in order to differentiate the normal from the cryptorchid gonads. The tissue was extracted by the method of Gallagher and Koch<sup>5</sup> as far as the cold acetone stage. The cold acetone-soluble material was dissolved in olive oil and assayed upon White Leghorn capons by the method of the same authors.<sup>6</sup>

The first lot of testes yielded 232.5 gm. of normal testis and 694.5 gm. cryptorchid. The normal tissue was found to contain 1 bird unit in each 38.7 gm., while the cryptorchid tissue contained 1 bird unit in 86.7 gm. of tissue. The second group contained 134 gm. normal testis and 964 gm. cryptorchid testis. Here the scrotal testes contained 1 bird unit in 27.0 gm. and the cryptorchid tissue 1 bird unit in 53.5 gm. of tissue. These weights are based on testis tissue stripped of all its coverings.

The values found indicate that in the pig the cryptorchid testis contains approximately one-half as much hormone per unit weight as does the scrotal testis. And it may be emphasized that here we have determined the quantity of hormone itself and not the relative masculinity of the animals, in which the hormone may be only one regulating factor. The explanation of the difference in potencies of the 2 lots of testes, especially marked in the cryptorchids, has not been explained; but it will be noted that the values obtained by us for the normal tissue agree quite closely with the potency of bull testis tissue as reported by Womack and Koch.<sup>7</sup>

The bearing of the present findings on the question of the site of production of the testis hormone is somewhat uncertain. It is clear that hormone production is continuing notwithstanding the state of the tubular tissue as described by Hanes<sup>8</sup>; however, despite probable hypertrophy of the interstitial cells, the rate of production is distinctly less than normal. In this connection the finding of Moore and Samuels<sup>9</sup> that the testis may present an essentially normal structure and yet secrete no hormone is of interest.

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<sup>5</sup> Gallagher, T. F., and Koch, F. C., *J. Biol. Chem.*, 1929, **84**, 495.

<sup>6</sup> Gallagher, T. F., and Koch, F. C., *J. Pharm. Exp. Therap.*, 1930, **40**, 327.

<sup>7</sup> Womack, E. B., and Koch, F. C., *Endocrinology*, 1932, **16**, 267.

<sup>8</sup> Hanes, F. M., *J. Exp. Med.*, 1911, **13**, 338.

<sup>9</sup> Moore, C. R., and Samuels, L. T., *Am. J. Physiol.*, 1931, **96**, 278.