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**The Estrous Cycle and the Adrenal Glands.\***

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About 2 years ago experiments were reported from this laboratory showing important interrelationships between the adrenal cortex and the gonads. It was definitely shown that very early maturation of the sex glands could be induced by treatment of animals with cortico-adrenal extract.<sup>1</sup> The present brief report mainly indicates the effects of cortico-adrenal extract on the estrous cycle in normal and adrenalectomized rats. The influence of other sex hormones is also touched upon.

We have carried out observations on about 50 animals under various experimental conditions. Vaginal smears have been made daily over periods of several weeks according to the method of Long and Evans.<sup>2</sup> The extract of the adrenal cortex employed was similar to that previously described.<sup>3,4</sup> The potency of the preparations was proved by its restorative effect when injected into adrenalectomized cats showing insufficiency symptoms. A modified Swingle-Pfiffner method of extraction was used.<sup>5</sup> The chief results may be summarized as follows: Cortico-adrenal extract when injected into normal rats produced a modification of the estrous cycle in the direction of increased activity, the estrous type of smear being often observed for several days continuously. Later, in many cases, an apparent inhibition of estrus was noted.

Removal of the adrenal glands resulted in complete suppression of the estrous cycle in about 90% of cases (in agreement with the observations of Martin<sup>6</sup>).

In adrenalectomized animals in which estrus had been inhibited for various long periods, cortico-adrenal extract restored the cycle to normal, and maintained their lives indefinitely. When extract administration was stopped, in such cases, the estrous cycle was

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<sup>1</sup> Corey, E. L., and Britton, S. W., *Am. J. Physiol.*, 1931, **99**, 33.

<sup>2</sup> Long, J. A., and Evans, H. M., *Univ. of Cal. Memoirs*, 1922.

<sup>3</sup> Britton, S. W., and Silvette, H., *Am. J. Physiol.*, 1931, **99**, 15.

<sup>4</sup> Britton, S. W., and Silvette, H., *Am. J. Physiol.*, 1932, **100**, 701.

<sup>5</sup> Swingle, W. W., and Pfiffner, J. J., *Am. J. Physiol.*, 1931, **96**, 164.

<sup>6</sup> Martin, S. J., *Am. J. Physiol.*, 1932, **100**, 180.

again completely inhibited, and the animals succumbed with characteristic symptoms.

In several cases in which theelin or antuitrin "S"† was administered following adrenalectomy and inhibition of estrus, the restoration of estrus was brought about by such treatment.

Repeated administration of cortico-adrenal extract to young, immature female rats brought about a slightly earlier opening of the vagina than in litter controls.

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### Effects of Alternate Suction and Pressure on Circulation in the Lower Extremities.

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According to Poiseuille's law the volume of fluid flowing through a rigid tube is proportional to the fall in pressure along the tube. It seems possible, therefore, that if the peripheral fall in blood pressure could be increased the total amount of blood flowing past an arterial obstruction in unit time would be greater. The fall in pressure through the arterial tree may be increased physically in two ways, (a) by elevating aortic blood pressure or (b) by reducing peripheral blood pressure to a negative value. The first method is impracticable for numerous reasons but it is possible temporarily to reduce capillary and venous pressure by applying suction to the extremities.

An aluminium box was built large enough to accommodate the lower extremity to a point about 6 inches above the knee and strong enough to withstand pressures of  $-120$  to  $+120$  mm. Hg. A mercury manometer, communicating with the interior of the box, was equipped with electrodes so arranged that the one-half horse power motor operating an air pump was stopped through an electrical relay, whenever the pressure in the box exceeded or fell below atmospheric pressure by 120 mm. Hg. A valve was inserted between the pump and the box so that for 25 seconds the pump evacuated air from the box while for 5 seconds the pump expelled cooled air into the box.

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† The theelin and antuitrin "S" used in these experiments was generously supplied to us by Parke, Davis and Co., through the kindness of Dr. Oliver Kamm.