

## 10153

### Capacity of Skeletal Muscle of Castrated Male Rats to Sustain Work Output.

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A comparison has been made of normal and castrated male rats in respect to the capacity of the gastrocnemius muscle to perform work when made to contract by faradic stimulation.

Albino male rats were closely matched into 12 pairs on a basis of body weight and one animal of each pair was castrated on the twenty-first day following birth. The castrated and control animals were maintained under uniform conditions. Each rat was prepared for the work test on the first day that its body weight reached 180 g. The animal was anesthetized with phenobarbital sodium; its gastrocnemius muscle was weighted with 100 g and was stimulated directly to contract 3 times per second until the "fatigue" of the muscle or for a maximum of 120 hours. The amount of work performed was recorded automatically. Each rat received 5 cc of physiologic saline solution by subcutaneous injection every 12 hours. A detailed description of the apparatus and procedures used has been presented.

TABLE I.  
Work Records\* for 12 Pairs of Normal and Castrated Rats.

Group	Hours work					Total
	0-24	24-48	48-72	72-96	96-120	
Normals						
Avg	72.0	49.2	48.0	40.9	32.1	242.2
Range	52.0-98.0	26.1-80.6	25.9-93.0	7.0-84.1	0.0-65.6	139.7-420.2
Castrates						
Avg	76.1	50.0	51.2	48.0	31.1	256.5
Range	61.6-104.1	30.7-83.8	26.1-88.2	11.4-97.0	0.0-64.8	136.6-420.6

\* Expressed as kilogram-meters of work. The actual error in recording is unknown. The error for relative values does not exceed 10%.

The data on averages and range for 12 pairs of rats are summarized in Table I. No inferiority of the castrated male rats to sustain work was observed in this experiment. This finding does not agree with the experimental results of Gans and Hoskins,<sup>1</sup> who used a somewhat similar method for the study of work performance

<sup>1</sup> Gans, Marvin, and Hoskins, R. G., *Endocrinology*, 1926, **10**, 56.

in castrated rats. The times for continuation of muscular contractions and the values for total work for both normal and castrated rats were much smaller in their experiment than in the present one. Heron, Hales, and Ingle<sup>2</sup> have discussed some of the important differences between the methods used by Gans and Hoskins and the method described by themselves, which I have used in this experiment.

## 10154

**Blood Sugar Changes in Hypophysectomized Rats During Adaptation to Various Stimuli.**

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Recent experiments have shown that the blood sugar of fasting adrenalectomized animals decreases rapidly under the influence of exposure to any damaging agent capable of producing an "alarm reaction". Such a decrease, however, is not seen in animals which have been pretreated for a few days with the same dose of the same damaging agent and are consequently in the "resistant phase" of the general adaptation syndrome. It seems, therefore, that the hypoglycemia is simply part of the alarm reaction, and consequently cannot be elicited at a time when the noxious agent has lost its "alarming" effect. After further continued treatment, however, during the "stage of exhaustion", these animals again responded with hypoglycemia which in this latter case proved to be fatal.<sup>1</sup>

Since hypophysectomy elicits disturbances in carbohydrate metabolism which in certain respects are very similar to those caused by adrenalectomy, it seemed of interest to perform similar experiments in the hypophysectomized animal. Female hooded rats weighing between 95-130 g were used for all experiments reported in this communication. In every case, a rest of 8 days was allowed following hypophysectomy as it was found that the blood sugar reaches a constant level at this time and stays fairly constant for as long as the animals are in good condition. In order to avoid complicating our experiments with repeated fasting and bleeding, each rat was

<sup>2</sup> Heron, W. T., Hales, W. M., and Ingle, D. J., *Am. J. Physiol.*, 1934, **110**, 357.

<sup>1</sup> Selye, Hans, *Proc. Soc. Exp. Biol. and Med.*, 1938, **38**, 728.