

the duodenal end of the common bile duct. This was shown by us several years ago in a drawing of the biliary apparatus of the guinea pig. The structure is formed by a definite dilatation and partial sacculcation of the common bile duct and contains a thick layer of smooth muscle almost as great as the muscularis of the duodenum. This organ pulsates during the emptying of the gall bladder. However, the emptying of the gall bladder is not necessarily dependent on this peculiar structure because, when a cannula is inserted in the common bile duct on the hepatic side of this structure, and the gall bladder stimulated, it will still contract and produce considerable pressure (80 mm. water) in a straight glass manometer. No similar structure has been found in any of the many other species of animals examined. A complete report on the mechanism of the biliary tract of the guinea pig will be made later.

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<sup>1</sup> Boyden, E. A., *Anat. Rec.*, 1926, xxxiii, 201-255.

<sup>2</sup> Whitaker, L. R., *Am. J. Physiol.*, 1926, lxxviii, 411-435.

<sup>3</sup> Higgins, G. M., and Mann, F. C., *Am. J. Physiol.*, 1926, lxxviii 339-354.

<sup>4</sup> Hamrick, R. A., *J. Am. Med. Soc.*, in press

<sup>5</sup> Kodama, S., *Am. J. Anat.*, 1926, lxxvii, 385-388.

<sup>6</sup> Graham, E. A., *J. Am. Med. Soc.*, 1926, clxxii, 625-643.

<sup>7</sup> Burget, G. E., *Am. J. Physiol.*, 1925, lxxiv, 583-589.

<sup>8</sup> Mann, F. C., Brimhall, S. D., and Foster, J. P., *Anat. Rec.*, 1920, xviii, 47-66.

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#### Blood Sugar Level and Activity in Rats.

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The primary problem in the study of activity is to discover those internal factors and conditions which stimulate an animal to become active. Since the energy for muscular contraction comes from the oxidation of glucose it is conceivable that a relation exists between blood sugar and activity.

In studying this relationship 45 male albino rats, 5 months old, were used; these were divided into 2 groups of 19 and 26 animals respectively. Their activity was recorded in revolving drums of the type used by Slonaker, Hoskins, and others who have worked on activity. The animals lived in these cages for six weeks; they were fed 30 cc. of bread and milk at a regular hour each day, and daily turns of each cage recorded. Temperature and light conditions

were constant. The animals received no food during the 24 hours just preceding blood sugar but they remained in the activity cages until about 2 hours before their death. The activity measure which was chosen as best representing the level of an animal's activity at the time blood sugars were done, was the median of his last five days runs.

The animal was sacrificed for making the blood sugar analysis. The sugar determinations were made according to Folin's copper reduction method as revised in his 1926 articles. Sugars varied within a range 66 to 125 mg. per 100 cc. The average for all animals was 95 mg.

Correlations between blood sugar and activity ran thus:

Group I	19 cases	Blood sugar and activity	$-.21 \pm .155$
Group II	26 cases	Blood sugar and activity	$-.05 \pm .139$
All animals	45 cases	Blood sugar and activity	$-.21 \pm .10$

These correlations, although so near zero as to indicate little more than a chance relationship, still are consistent as to sign and two are of the same magnitude. They seem to indicate that high activity is accompanied by low blood sugar, and low activity by high blood sugar.

To test this point further the average activity for animals having blood sugars of 100 mg. and above was compared with that for animals having sugars below 90 mg. The results are:

	No. of cases	Av. sugar	Av. activity in rev. per day	P. E. Av.
Blood sugar 100 and above	19	112	3468	$\pm 263$
Blood sugar below 90	16	82	5749	$\pm 773$

On the average those having low sugars are more active than those having high sugars. The two most active rats had sugars of .92 and .91. The difference in activity between the low and high sugar groups is such that one can predict, by the ordinary statistical methods, that the difference in activity will lie in favor of those animals having lower sugars in 97 per cent of the future repetitions of this experiment.

The evidence, therefore, seems to point toward an inverse relationship between activity and blood sugar. Physiologically this probably means that the more active rat uses up his available sugar at a more rapid rate than his less active brother. Whether or not by inducing a high level of sugar in all animals, one would reduce activity is a problem to be attacked soon.

This is a preliminary report.