from the observed "free" surface area of the cerebral hemispheres, and the third (right) column (c) represents spheres calculated from observed "total" cerebral surface.

This pictorial representation brings out the main points indicated by geometric and analytic methods. The "total" cerebral surface departs from the simple course of geometric increase approximated by the other 2 measures some time before birth, and this divergence is even more marked by the end of the developmental period; a divergence that seems obviously associated with the formation of the cerebral fissures.

8587 P

Glucose Absorption and Glycogen Formation in the Hypophysectomized Rat.*

LESLIE L. BENNETT. (Introduced by Herbert M. Evans.)

From the Institute of Experimental Biology, University of California.

The following studies of glycogen formation and glucose absorption have been carried out in the hope of partially elucidating the phenomena of abnormally low glycogen levels in the fasting hypophysectomized rat.

In these experiments the control rats were between 45 and 54 days of age at the time of sacrifice. The hypophysectomized† rats were of a similar age group at operation and were sacrificed 25 to 30 days after operation; those upon which glycogen determinations were done were sacrificed 21 to 23 days after operation. Glucose absorption was determined by the method of Cori[1] after feeding approximately 2½ cc. of a 35% solution of glucose. Previous to the experiment all rats were fasted for 24 hours in cages provided with wire screen bottoms. Tissues for glycogen determination were removed under amytal anaesthesia and glycogen determined by the cold KOH method of Cori.[2] Liver glycogen figures are for fermentable reducing substances; muscle glycogen figures

* Aided by the Presnell Fund for the study of the metabolic relations of the anterior hypophysis contributed by Robert R. Presnell, Frank Tuttle, Arthur Stebbins and Mrs. Gordon Kahn, of Los Angeles.

† Hypophysectomies were done by the parapharyngeal route and completeness of the operation was checked at autopsy in each case.

1 Cori, C. F., *J. Biol. Chem.*, 1925, **66**, 691.

2 Cori, G. T., *J. Biol. Chem.*, 1932, **96**, 259.

are the average of duplicate determinations of both gastrocnemius muscles and represent total reducing substances. All glucose determinations were done by the Shaffer-Somogyi[3] method.

In confirmation of the observations of Phillips and Robb[4] glucose absorption rates in the hypophysectomized rats were found to be about 35% below normal (Table I). These animals absorbed

TABLE I.
Mg. of Glucose Absorbed per 100 gm. Body Weight per Hour.

	1 hr. absorption	2 hr. absorption
Controls	223 mg. ± 7.7 (13)*	211 mg. ± 6.4 (14)
Hypophysectomized	141 mg. ± 4.1 (15)	135 mg. ± 4.4 (14)

*No. of animals in the group.

141 and 135 mg. per hour per 100 gm. body weight as compared with 223 and 211 mg. absorbed by the controls. There was no overlapping of the 2 groups and probable error values show this difference to be statistically significant.

TABLE II.
Glycogen Levels in Fasted and Glucose-Fed Normal and Hypophysectomized Rats.*

	Glucose absorbed in 2 hr. per 100 gm. body weight	Blood sugar	Liver glycogen	Muscle glycogen
Normal Controls (11)†	Unfed	80 mg. % ± 1.5	23 mg. % ± .12	502 mg. % ± 4.5
Hypophysectomized Controls (10)	"	51 " " ± 1.3	15 " " ± .69	322 " " ± 7.8
Normal Glucose-Fed (6)	412 mg.	140 mg. %	1348 mg. %	673 " "
Hypophysectomized Glucose-Fed (6)	247 "	111 " "	194 " "	378 " "

*All figures in this table are mean for group with probable errors indicated where the group is sufficiently large.
†No. of animals in group.

Table II shows the glycogen and blood sugar levels in 24 hours fasted normal and hypophysectomized rats as well as in a second series of fed rats. These data show not only that the glycogen levels of fasting hypophysectomized rats are abnormally low (this is especially true of the muscle glycogen) but that there is a smaller than normal increase following glucose feeding. The hypophysectomized rats deposited 5.9 mg. of new liver glycogen per 100 gm. of body weight (2.4% of the absorbed glucose) as compared with 60 mg. of new liver glycogen per 100 gm. of body weight (14.5% of the absorbed glucose) deposited by the controls. If it be as-

[3] Shaffer, P. A., and Somogyi, M., *J. Biol. Chem.*, 1933, **100**, 695.
[4] Phillips, R. A., and Robb, P., *Am. J. Physiol.*, 1934, **109**, 82.

sumed that muscular tissue represents 50% of the live weight of the rat and that glycogen is uniformly distributed, it can be calculated from the above data that the normal rats deposited as muscle glycogen 20.8% of the absorbed glucose while the hypophysectomized rats deposited as muscle glycogen only 11.3% of the absorbed glucose. While the assumptions involved in this method of calculation of muscle glycogen increases may be open to question in the hypophysectomized rat, it appears probable that hypophysectomized rats form proportionately less glycogen from the absorbed glucose than do normal animals.

8588 P

Carbohydrate Levels in Fasted and Fed Hypophysectomized Rats.*

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In an inquiry as to the nature of the hypoglycemia and low glycogen stores found in completely hypophysectomized rats, the following experiments have been undertaken: (1) the comparison under standard conditions of the carbohydrate levels of normal, hypophysectomized† and partially hypophysectomized rats when fully fed and when fasted 8 and 18 hours; and (2) the preparation of curves showing the changes in carbohydrate levels in these animals following the feeding of uniform carbohydrate meals.

All rats used were young males 50-70 days of age, the experimental animals 20-30 days post operative. Sodium amytal was used as anesthetic for obtaining samples. Muscle glycogen figures for each animal were the averages of 2 separate determinations, and the liver glycogen values included only fermentable reducing substances. The carbohydrate meals were given in the form of cornstarch, in 50% suspension in water, fed by stomach tube without anesthesia.

It was found that when the hypophysectomized animals were

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† The parapharyngeal approach was used and the completeness of the operation was checked at autopsy in all cases.