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The occurrence of multilocular fat cells in the perirenal fat of man.

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While a number of writers[1] have called attention to the presence in man of a multilocular adipose tissue similar to the so-called hibernating gland of animals, convincing evidence of the structural similarity between these tissues does not seem to have been brought forth.

Gross and microscopic preparations of multilocular adipose tissue in the perirenal fat of a new born and of a child 1½ years old are demonstrated with similar specimens from both the white rat and the American marmot, showing great similarity between this type of adipose tissue from all three sources. Its glandular appearance is striking until examined microscopically. The evidence indicates that these multilocular fat cells are not developmental stages of ordinary fat.

The history, distribution and functional significance of this brown gland-like fatty tissue leads to the conclusion that there are not sufficient data to warrant taking seriously the suggestion that it may be an endocrine organ of importance in deficiency diseases.

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Empirical formulæ for the postnatal growth of the human brain and its major divisions.

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Although several graphs have been published illustrating the post-natal growth of the human brain, as well as a few of the

[1] For review of the literature see article "The so-called hibernating gland" by the writer in a forthcoming number of the *Journal of Morphology.*

growth of the major divisions of the structure, apparently no attempt has been made to analyze these curves and to develop formulæ for the expression of the relation between brain weight and age between birth and maturity. We have made a series of calculations of this type and have computed empirical formulæ for the growth of the encephalon as a whole, the cerebrum, the cerebellum, and the pons, medulla and mid brain, from birth to 20 years. These formulæ have been determined from the weighted average of male and female brain weights. While it will no doubt be possible to develop slight varients of these formulæ for the weight of the entire brain and of the cerebrum for males and females separately, our data indicate that it is hardly practicable to establish separate curves for the sexes, on the basis of the material now available, for the weight of the cerebellum and the brain stem. Likewise no attempt has been made to correct graphically or mathematically for the effect of disease on the weight of the brain although all records of cases involving any brain pathology were rigidly excluded. The curves and formulæ, therefore, represent the growth of the organ in a hospital rather than in the general population.

When plotted against age and tested graphically all the curves of the postnatal growth of the brain approach hyperbolæ and may be expressed approximately by the general formulæ:

$$Y = \frac{x + c}{a + bx} \text{ or } Y = \frac{x}{a + bx} + c.$$

In these formulæ, Y is the weight of the brain or brain-part, X is the age in years and a, b and c are empirically determined constants.

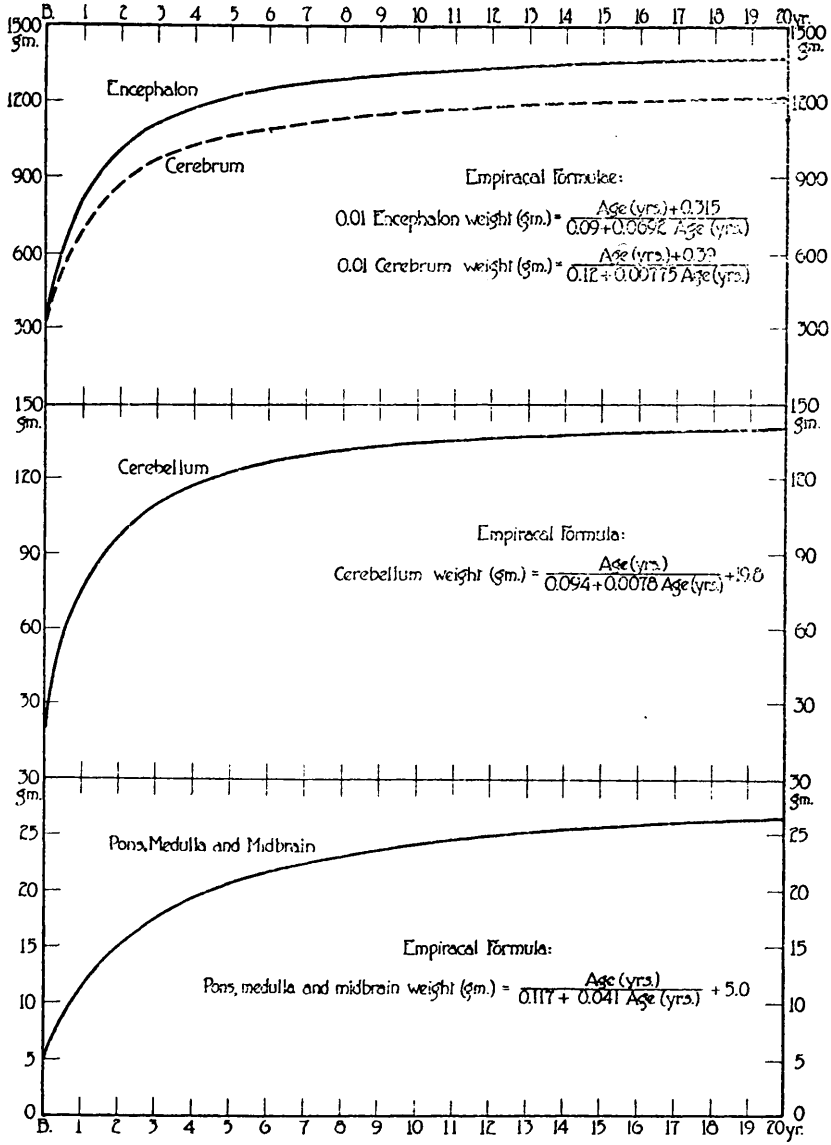
A total of 2956 observations on the weight of the brain as a whole in the postnatal developmental period were available for study. Of these 317 were of newborn infants and 2639 were of individuals between birth and 20 years. The empirical formula of the curve for these data as drawn by inspection is:

$$0.01 \text{ Encephalon weight (gm.)} = \frac{\text{Age (yrs.)} + 0.315}{0.09 + 0.0692 \text{ age (yrs.)}}$$

The average deviation of the calculated values as determined by this formula from the observed trimester averages for the first year and the observed yearly averages thereafter to 20 years is 18.0 grams, and the average percentage deviation for the same values is 1.75 per cent.

The inspected curve of the postnatal growth in weight of the cerebrum, (1032 cases—108 newborn and 924 from birth to 20 years) is expressed by the formula:

$$0.01 \text{ Cerebrum weight (gm.)} = \frac{\text{Age (yrs.)} + 0.39}{0.12 + 0.00775 \text{ age (yrs.)}}$$



The mean deviation of the calculated from the observed averages for the time intervals as given above is 28.4 grams, and the mean percentage deviation is 2.68 per cent.

The weight of the cerebellum from birth to 20 years (890 cases—99 newborn and 791 between birth and 20 years) may be represented by the formula:

$$\text{Cerebellum weight (gm.)} = \frac{\text{Age (yrs.)}}{0.094 + 0.0078 \text{ age (yrs.)}} + 19.8$$

The mean deviation of the calculated from the observed averages is 3.82 grams and the percentage deviation is 3.72.

The empirical formula for the inspected weight of the pons, medulla and midbrain (857 cases—100 newborn and 757 between birth and 20 years) is:

$$\text{Pons, medulla and midbrain weight (gm.)} = \frac{\text{Age (yrs.)}}{0.117 + 0.041 \text{ age (yrs.)}} + 5.0$$

The mean deviation of the calculated values from the observed averages in 0.25 gm. and the mean percentage deviation is 2.2 per cent.

The accompanying graph illustrates the curves of postnatal growth of the brain and its parts as drawn to the formulæ given above.