the average of 5 or more readings, the absorption coefficient is not known so accurately. It is difficult to reach an absolute equilibrium with a separatory funnel. The method of repeated extractions in a separatory funnel may be used, each extraction estimated separately and the total added together. If it is desired to titrate the iodine rather than to use the colorimetric method, run 10 cc. of distilled water into a separatory funnel, add one drop of 0.1 normal sulfurous acid and the carbon tetrachloride containing the iodine, and shake 200 times or until all of the iodine is reduced to iodide and passes into the water, run off the carbon tetrachloride and transfer the water to a beaker, make volume 100 cc., acidify with 1 cc. of 50 per cent phosphoric acid, oxidize with chlorine or bromine water. Boil off the bromine or chlorine, transferring to a dry beaker to prevent bumping, and reducing the volume to 50 cc., add 2 cc. of KI and some starch solution and titrate with 0.001 N thiosulphate with a micro biuret, and divide the result by 6. This is a complete report.

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## The Prenatal Growth of the Human Pancreas.

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The ponderal growth of the pancreas, with respect to body-weight, has been studied from 319 observations on human fetuses, varying from 26 to 4380 gm. in total body-weight. When the weight of the fetal pancreas is plotted against the weight of the body as a whole, it follows the course of a straight line which may be approximated by the expression:

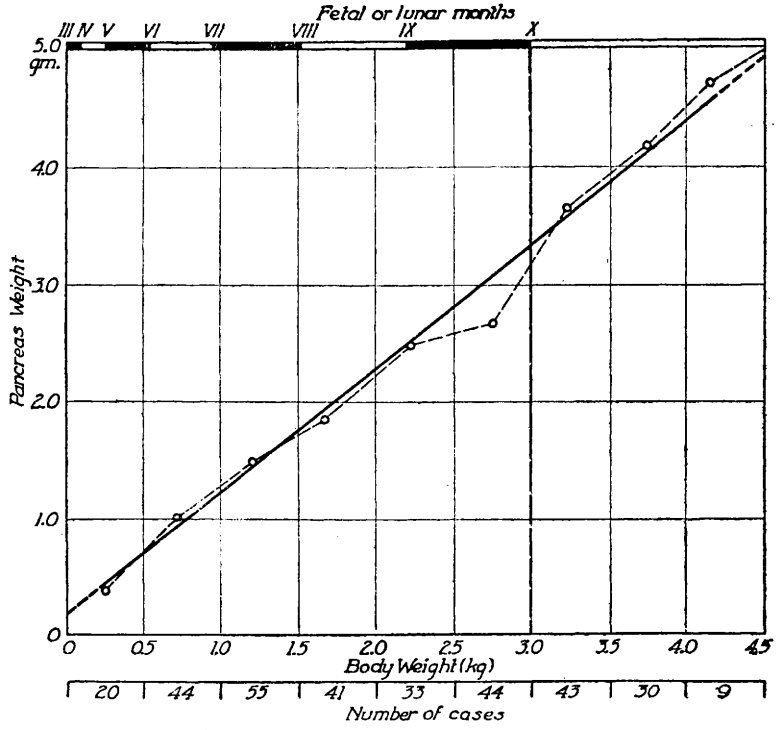
$$PW = 0.0010335\ BW + 0.19 \quad (1)$$

where "PW" is the pancreas weight in grams and "BW" is the total weight of the body in grams. This formula was computed from the means of 500 gm. ranges of body-weight, from 0 to 4500 gm. inclusive, by the method of means (weighting by the square root of the number of cases in each interval). The calculated values thus obtained show a mean, weighted, absolute, deviation of 0.123 gm. and a mean, weighted, relative deviation of 6.07 per cent from the observed averages. A similar relationship to total body-weight is characteristic of the weights of many of the other organs and parts of the body.

The relation of pancreas-weight to body-length, as determined from 325 observations, is shown in Figure 2. As in the case of the weight of the body as a whole and many of its parts, the weight of the pancreas may be approximated by a small fraction of the body-length raised to a power approaching a cube. The empirical formula, determined from the averages of pancreas-weight for 5 cm. intervals of body-length from 15 to 55 cm. inclusive (weighting by the square root of the number of cases in each interval) is:

$$PW\ (gm.) = 0.00001150\ BL\ (cm.)^{3.2035} \quad (2)$$

FIG. 1.

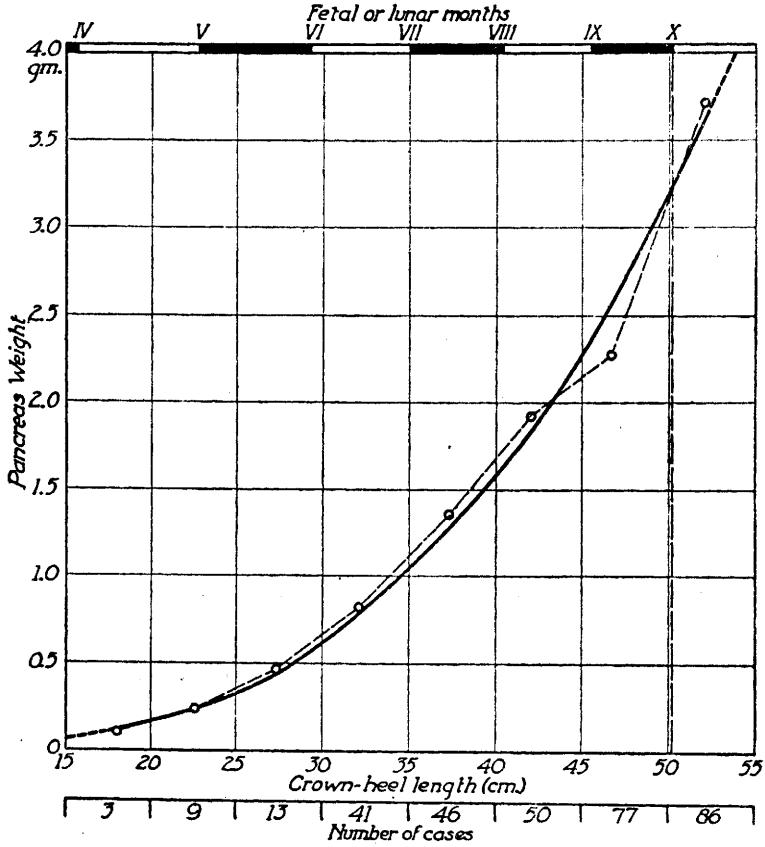



A graph illustrating the ponderal growth of the pancreas with respect to total body-weight in the fetal period. The body-weight (in kg.) is indicated on the base line of the graph. The estimated age (as computed from the "exact" formula of Scammon and Calkins) is represented by the panels along the upper margin of the figure. The observed, mean pancreas-weights for 500 gm. intervals of total body-weight are indicated by circles connected by light broken lines. The graphical expression of the empirical formula for the relation of pancreas-weight to body-weight is represented by the heavy solid line. The number of observations in each 500 gm. interval of body-weight is indicated in the lower panel of the graph. The vertical broken line in the field represents the computed birth value of body-weight.

where "PW" is the pancreas weight and "BL" is the total or crown-heel body-length. The mean, weighted, absolute deviation of the observed from the corresponding calculated means as determined by this formula is 0.121 gm., and the corresponding relative deviation is 6.710 per cent.

Applying the formula of Scammon and Calkins[1] for the relation of age to body-weight, the computed natal weight of the pancreas

FIG. 2.




A graph illustrating the ponderal growth of the pancreas with respect to crown-heel body-length. The body length (in cm.) is indicated on the base line of the graph. The estimated (as computed from the empirical formula of Scammon and Calkins) is represented by the panels along the upper margin of the figure. The observed mean pancreas weights for 5 cm. intervals of total body-length are indicated by circles connected by light broken lines. The graphical expression of the empirical formula for the relation of pancreas-weight to body-length is represented in heavy solid line. The number of observations in each 5 cm. interval of body-length is indicated in the lower panel of the graph. The vertical line in the field indicates the computed birth value of body-length.

is 3.29 gm. Applying the age-length formula of the same authors[2] the natal weight of the pancreas is 3.23 gm. A collation of natal pancreas weights from various sources (465 cases) gives a mean value of 3.54 gm., which is distinctly higher than the computed ones. As a rule the observed, average, natal weights of organs, as usually recorded, are lower than the calculated ones since the former often contain a number of premature cases. The reverse condition in this instance may be due to the exclusion of all known cases of congenital lues (which often increases the pancreas weight) from the present series of observations.

These figures indicate; (a) that the ponderal growth of the pancreas in the fetal period is quite comparable to that of the body as a whole, and that of most of its major parts and organs; and (b), that although the growth in absolute weight of the pancreas is proportional to the growth in body-weight in the fetal period, the *relative* weight of the organ, with respect to body-weight, undergoes a reduction during this period from 0.3 per cent at four fetal months to 0.1 per cent at birth. This is a complete report.

[1] Scammon, R. E., and Calkins, L. A., PROC. SOC. EXP. BIOL. AND MED., 1923, xx, 355, (formula 1).

[2] Scammon, R. E., and Calkins, L. A., PROC. SOC. EXP. BIOL. AND MED., 1924, xxii, 157, (formula 5).

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## The Growth of the Arterial System in the Human Fetus.

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A quantitative study has been made of the growth of a portion of the arterial system in 48 human fetuses ranging from 10.7 to 49.8 cm. in total or crown-heel length.

A segment of standard length was cut from each vessel with an apparatus consisting of two steel blades firmly fastened in parallel to a machined brass block exactly 5 millimeters apart. Rings were cut from each of the following arteries: thoracic aorta, abdominal aorta, innominate, left common carotid, left subclavian, right and left umbilical and the right and left common iliac.

When the weights of the rings are plotted against crown-heel length in centimeters, the resulting curves are of two general classes. The values of the rings of the vessels which supply the body only,