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.

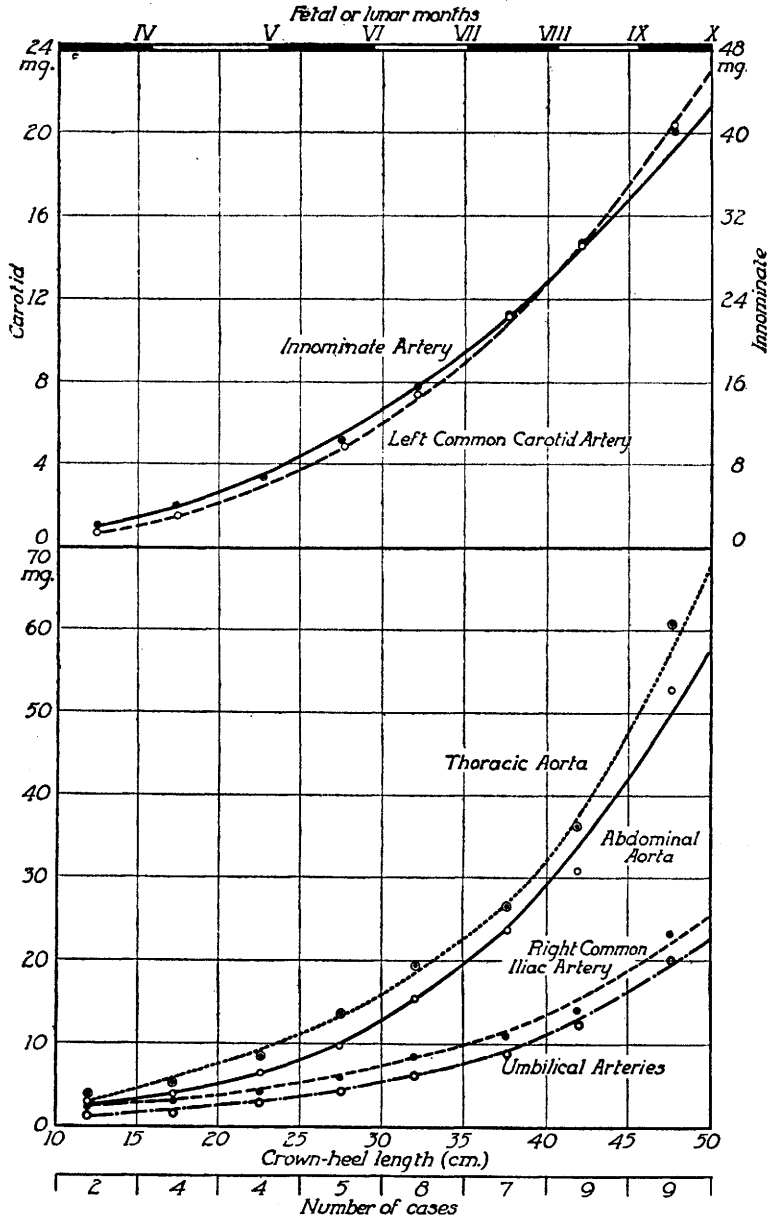
CHARLES H. WATKINS. (Introduced by R. E. Scammon.)
From the Department of Anatomy, University of Minnesota.

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,

FIG. 1.



A graph illustrating the growth in weight of rings of various arteries in prenatal life. The ring weights (in mg.) are plotted against the total body-length (in cm.). The observed means for the 5 cm. intervals of body-length are represented by dots or circles, and the lines drawn through them represent the calculated expressions given in this paper. The total body-length is given on the

base line of the graph. The panels along the lower margin represent the number of cases in each 5 cm. interval of body-length. The panels along the upper margin represent the age in fetal or lunar months. The latter are calculated by the empirical formula of Scammon and Calkins[1] for the relation of fetal age to body-length.

the innominate, left common carotid and left subclavian arteries, fall in the first class, in which the relation to body-length may be expressed by the general formula:

$$Y = aX^b$$

where "Y" = the weight of the segment in question, "X" = the total body-length and "a" and "b" are empirically determined constants, the first in the form of a decimal fraction and the second a power between a square and a cube. The graphs of these relationships are shown in the following figure. The empirical formulae for these weights, as determined from the 5 cm. interval averages of crown-heel length by the method of means, weighting by the square root of the number of cases, are as follows:

TABLE I.

Artery	Empirical Formula	Mean weighted absolute deviation	Mean weighted relative deviation
		(mg.)	(per cent)
Innominate	$W(0.1\text{ mg.}) = 0.74121L(\text{cm.})^{2.21327}$	0.72	2.11
Left Common Carotid	$W(0.1\text{ mg.}) = 0.091892L(\text{cm.})^{2.59054}$	0.13	1.37
Left Subclavian	$W(0.1\text{ mg.}) = 0.050606L(\text{cm.})^{2.74465}$	0.23	1.47

The curve of the left subclavian artery is not included in the figure for its values are so similar to those of the left common carotid artery that they could not be clearly represented upon the combined graph.

The weights of the rings of the vessels which supply both the body and placenta, the thoracic and abdominal aortae, the right and left umbilical, and the right and left common iliac arteries, form a second type in which the relation to body-length may be expressed by the general formula:

$$Y = a + bX + cX^2 + dX^3$$

where "Y" = the weight of the segment in question, "X" = the total body-length and "a", "b", "c" and "d" are empirically determined constants. The graph of these relationships are shown in the lower section of the following figure. The empirical formulae for

these values, as determined from the 5 cm. interval averages of crown-heel length by the method of means, weighting by the square root of the number of cases are:

TABLE II.

Artery	Empirical Formulae	Mean weighted absolute deviation	Mean weighted relative deviation
		(mg.)	(per cent)
Thoracic Aorta	$W(0.1\ mg.) = -148.2659 + 22.28314L(cm.) - 0.83921L^2 + 0.01456L^3$	1.40	4.32
Abdominal Aorta	$W(0.1\ mg.) = 5.19394 + 2.53099L(cm.) - 0.14442L^2 + 0.00648L^3$	1.09	5.93
Mean of the Right and Left Umbilical	$W(0.1\ mg.) = -0.84473 + 2.69173L(cm.) - 0.10109L^2 + 0.00299L^3$	0.46	2.43
Right Common Iliac	$W(0.1\ mg.) = -31.08656 + 5.08158L(cm.) - 0.19437L^2 + 0.00392L^3$	0.42	1.97
Left Common Iliac	$W(0.1\ mg.) = 9.62014 + 2.53324L(cm.) - 0.09946L^2 + 0.00275L^3$	0.67	4.79

The curve of the left common iliac artery is not included in the figure for its values are so similar to those of the right common iliac artery that they could not be clearly represented upon the combined graph.

The growth curves of the vessels which supply the body only show the same type of increment which is characteristic of the growth of most of the organs and parts of the body. These vessels have the short period of slow growth in early fetal life, followed by a more rapid increase during the rest of the fetal period.

The curves of the vessels which supply *both* the body and placenta are characterized by a relatively long period of slow growth followed by a short period of more rapid growth during the latter part of prenatal life. This is a preliminary report.

[1] Scammon, R. E., and Calkins, L. A., PROC. SOC. EXP. BIOL. AND MED., 1924, xx, 353.

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Observations on the Mechanism of Circulatory Failure in Diphtheria.

M. H. NATHANSON. (Introduced by George Fahr.)

From the Department of Medicine, University of Minnesota.

This report consists of study by means of the string galvanometer of the effects of diphtheria toxin upon the heart. It has long been known that a circulatory collapse may occur in diphtheria, which frequently results in death. There is still considerable uncertainty, however, as to whether it is the heart or the vasomotor apparatus which is primarily effected.

In the present study electrocardiographic observations were carried out (1) on a series of diphtheria patients (2) on animals injected with diphtheria toxin.

Previous observers[1, 2, 3, 4] have noted electrocardiographic changes indicating myocardial injury during the acute stage of diphtheria. The present investigation was made during the convalescent or late stage of the disease, since circulatory failure may occur during this period also.

Readings were taken of 15 diphtheria patients during the period of convalescence, beginning usually in the 3rd or 4th week of their illness. In all cases, the local throat condition had entirely cleared