Creatinine picrate is more soluble in water and 50 per cent alcohol than is guanidine picrate, and therefore cannot be removed quantitatively from a mixture of the two salts by extraction with either of these solvents.

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The growth in mass of the various regions of the body in the fetal period.

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It has been pointed out by Calkins,[1] Calkins and Scammon[2] and others[3] that the growth of a large number of the external dimensions of the human body in the fetal period is directly proportional to the growth in total body-length, and that the probable values of these dimensions in this period may be expressed by the general formula:

$$D = aL \pm b \quad (1)$$

where "D" is the dimension in question, "L" is the total body-length, "a" is a constant in the form of a decimal fraction, and "b" is a second constant in the form of an absolute number. In accord with the law of developmental direction the "b" constant is positive for dimensions of the head and neck, negative for dimensions of the extremities and positive, negative or zero for measurements of the trunk, depending on their position.

If this law holds true for all external bodily dimensions the volumes of the major body-parts should bear a similar relation to the volume of the body as a whole, or:

$$P_v = aB_v \pm b \quad (2)$$

where "P_v" is the volume of any major body-part, "B_v" is the

[1] Calkins, L. A., *Anat. Rec.*, 1921, xxi, 47, and *Am. J. Obstet. and Gyn.*, 1922, iv, 109.

[2] Calkins, L. A., and Scammon, R. E., PROC. SOC. EXP. BIOL. AND MED., 1925, xxii, 353.

[3] Akiba, T., *Fol. Anat. Japon.*, 1924, ii, 189.

total volume of the body, and "a" and "b" are constants as in (1). In spite of the small differences in the specific gravity of the various parts of the body in prenatal life, the same relation should be approximated by the weights of the body and its various parts.

It is possible to test these relations with a series of observations by Corrado[4] which has not been analyzed hitherto. These data include 137 observations on the weight of the head (and neck), and total body-weight for specimens ranging from 400 to 4000 gm. in body-weight. When these are averaged for 400 gm. intervals of body-weight the relation between head and body-weight (as determined by the method of averages, which means weighted for the number of cases in each interval) is:

$$HW = 0.23600\ BW + 79.4\ gm. \quad (3)$$

where HW is the weight of the head in grams, and BW is the weight of the total body in grams. The sum (without regard to sign) of the deviations of the observed 400 gm. range averages from the corresponding computed values is 118.0 gm., the unweighted mean deviation is 13.1 gm., and the mean deviation, weighted for the number of observations in each interval, is 11.1 gm.

The relation similarly determined for 137 observations on the weight of the trunk is:

$$TW = 0.48596\ BW - 29.8\ gm. \quad (4)$$

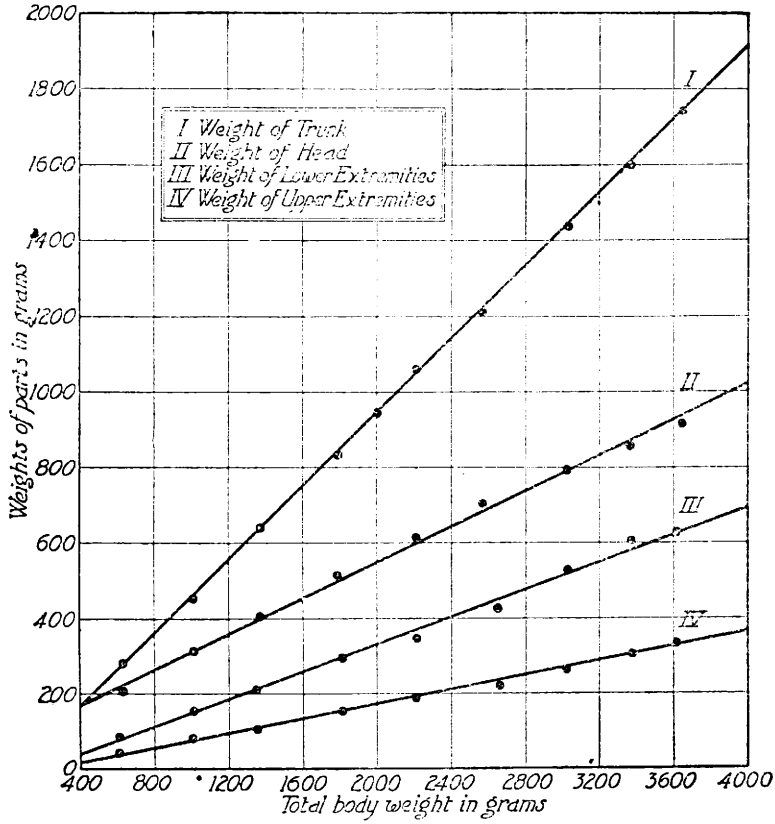
The sum (without regard to sign) of the deviations of the observed 400 gm. range averages from the corresponding computed values is 75.9 gm., the unweighted mean deviation is 8.4 gm., and the mean deviation, weighted for the number of observations in each interval, is 8.5 gm. These relationships are shown by curves I and II in the following figure.

A second set of data collected by Corrado is available for the study of ponderal growth of the extremities. There are 161 observations on the weight of the upper extremities of specimens having body-weights between 400 and 4000 gm. and the relation therefor, determined by the method noted above, is:

$$UEW = 0.09647\ BW - 22.7\ gm. \quad (5)$$

The sum (without regard to sign) of the deviations of the observed 400 gm. range averages from the corresponding computed values is 39.9 gm., the unweighted mean deviation is 4.3

[4] Corrado, G., *Gior. d. Ass. Napol. Med. et Natural.*, 1899, ix, 405.



A graph illustrating the relations of the weights of various major parts of the body to the weight of the body as a whole in the fetal period. The dots represent the observed averages for 400 gm. intervals of body-weight. The curves are drawn to the empirical formulæ given in the body of this article.

gm., and the mean deviation, weighted for the number of observations in each interval, is 4.3 gm.

The expression (based on the same number of cases) for the relation between the weights of the lower extremities and of the body is:

$$\text{LEW} = 0.18042\ \text{BW} - 31.1\ \text{gm.} \quad (6)$$

The sum (without regard to sign) of the deviations of the observed 400 gm. range averages from the corresponding computed values is 128.2 gm., the unweighted mean deviation is 14.24 gm., and the mean deviation, weighted for the number of observations in each interval, is 13.8 gm.

Curves III and IV of the accompanying figure show the relation of these computations.

These findings support those quoted above for the inter-relationships of the external bodily dimensions and indicate that the growths of the various major parts of the body in the fetal period are directly proportional to the ponderal growth of the body as a whole. The presence of a positive "b" constant in formula (3) for head weight and of negative "b" constants in formulæ (5) and (6) for the weights of the extremities offers further evidence of the action of the law of developmental direction in the fetal period.