made at the same time. In agar cultures inoculated from a 12-hour agar culture (which has nearly reached the maximum of growth but has not yet formed spores) it was found that the cells began to increase in size during the lag phase and reached a maximum length, about six times that of the inoculated cells, shortly after the beginning of the maximum growth phase, then rapidly becoming shorter. During the period of increase in length, frequency curves showed a tendency towards bimodality, indicating that possibly a process of selection of rapidly growing cells may occur during the lag phase, as has been suggested by some investigators.

Two series of broth cultures inoculated from a 7-hour agar culture (during the period of maximum growth) showed no lag phase; nevertheless an increase in the size of the cells was observed beginning two hours after inoculation. The cells did not become so large as did those on agar, and the variation was not so great, bimodality being present in but one of the frequency curves. One series was inoculated with 10 times as many bacteria as the other, and the series receiving the lesser amount of inoculum showed a slightly greater increase in the size of the cells over a slightly longer period of time.

67 (1814)

On the weight increments of premature infants as compared with those of fetuses of the same gestation age and those of full-term children.

By RICHARD E. SCAMMON.

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One method of approaching the problem of the effect of birth and the postnatal environment on the course of human growth is by the comparison of the rates of growth of premature infants with the growth rates of fetuses of the same gestation age and with those of full-term children. If the environmental factors are the all-important ones it might be expected a priori that the rate of growth of prematures would agree, in the main, with that

of full-term children. If, on the other hand, the effects of the extrauterine environment do not seriously modify the course of growth established in prenatal life, it is to be expected that the curve of rate of growth in prematures will follow in general that of the fetus of the same gestation age.

The following study was based upon the weight records of 78 premature infants. In collecting the histories all cases were included which made any gain in weight in the first month after birth. These cases were divided in four groups according to their birth weight, and the rate of growth in the form of the monthly percentage increment in weight was determined separately for each case. The mean monthly increment of each groud for each month was then determined by averaging these individual percentages. The results obtained are shown in the table below. It will be noted: first, that the percentage increment in weight of prematures in the first postnatal month is lower than in the second month, and that following the second month the rate of increment gradually decreases; and, second, the percentage increments are in a general way inversely proportional to the birth weight.

AVERAGE MONTHLY PERCENTAGE INCREMENTS IN BODY-WEIGHT OF PREMATURE AND FULL-TERM CHILDREN IN INFANCY.

	Group.			
	A	B	C	D
Range in birth-weight (grams)	1,000 to 1,500	1,500 to 2,000	2,000 to 2,500	ca. 2,750 to ca. 4,200
Approximate average birth weight (grams)	*1,300*	*1,720*	*2,300*	*3,380*
Total number of cases	17	35	26	*
Average percentage increment in:				
First month	22.8	16.8	13.8	21.2
Second month	45.1	31.6	26.7	19.4
Third month	24.5	20.4	15.5	14.6
Fourth month	21.1	17.2	13.5	11.4
Fifth month	16.2	13.6	—	8.9
Sixth month	14.4	—	—	5.8
Seventh month	11.6	—	—	5.9
Eighth month	7.4	—	—	3.9
Ninth month	5.1	—	—	4.0

* Average of ten large published series of observations.

The increments thus determined were next compared with those of fetuses of the same gestation age and with those of full-term newborn children.

The norm for fetal growth in weight was estimated from the following empirical formulæ: (1) $Y = 0.24\ X^{3.2} + 400$, where Y is the body-weight in grams and X is the body length in cm., and (2) $Y = 8.9\ (X - 1) - 0.27\ (X - 1)^2 - 6.5$, where Y is the body length in cm. and X is the age in fetal or lunar months. The norm for weight increment in the first nine postnatal months was determined by calculation from 10 large series of published averages on the increase in body weight in the first year. When the monthly weight increment rates of the premature infants are compared with these norms it is found that they fall much closer to the calculated rates of growth of fetuses of the same size and age than to those of newborn children. This is shown particularly well by group A of the smallest prematures which were approximately 7 fetal months old when born. The comparison is shown graphically in the chart below.

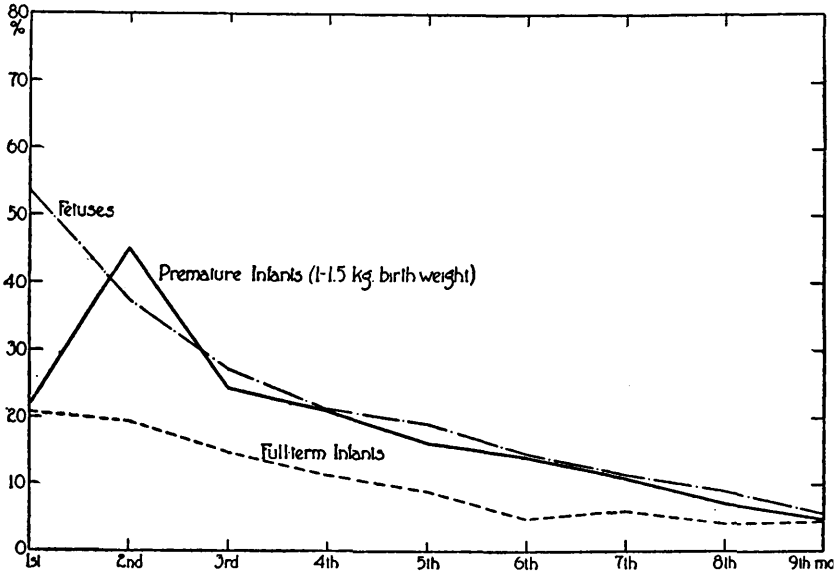

FIG. 1. A graph showing monthly percentage increment in weight of a group of premature infants ranging from 1.0 to 1.5 kg. in birth weight. The solid line represents the rate of increment of the premature children in the first 9 months after birth. The upper broken line represents the calculated rate of increment of the fetuses of the same size and age as the prematures. The lower broken line represents the rate of increment of full-term children.

These results indicate that premature children, after a short period of retarded growth incident to the adjustment to the extrauterine environment, tend to regain the fetal rate of growth and to follow this course of growth until some time in the latter part of the first year when the rates of fetal and postnatal growth approximate one another. In other words the growth tendency of prematures is in general that of fetuses of the same size and age rather than that of full-term children. These results are in agreement with those of Hammett[1] on growth capacity and body weight in the first two weeks of postnatal life, and with certain findings of Cammerer,[2] but seem to be in opposition to some of the conclusions of Schwarz and Kohn[3] and of Ylppö.[4] That this opposition is apparent rather than real will be shown in a later communication.

68 (1815)

An undetermined principle obtained from poison ivy.

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An undetermined principle has been obtained from poison ivy which so far as I have been able to find differs in its behavior from that of any substance previously described.

It came down as a precipitate after long standing of a filtrate after precipitating with lead acetate.

No work has as yet been done with the substance except to determine a few of its properties.

It is non-irritant when applied to the skin, neutral to litmus and is bitter to the taste. It has a melting point of 190° when heated slowly, insoluble in cold water and fairly soluble on boiling, imparting a lemon yellow color to the solution. It is soluble in ammonia water, acetic acid and hot alcohol. Insoluble in alcohol in the cold, ether, chloroform, petroleum ether and acetone. It

[1] Hammett, F. S., *Amer. Jour. Physiol.*, 1919, xlv, 396.

[2] Cammerer, W., *Jahrb. f. Kinderheilk.*, 1900, liii, 381.

[3] Schwarz and Kohn, J. L., *Amer. Jour. Dis. Children*, 1921, 296.

[4] Ylppö, *Zeitschr. f. Kinderheilk.*, 1919, xxiv, 179.