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VARIATIONS OF GROWTH IN WEIGHT OF ELEMENTARY SCHOOL CHILDREN, 1921-28¹

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It is a fact of broad general experience, now supplemented by the analysis of extensive quantitative data, that the growth of plant and animal organisms varies within wide limits in different calendar years. It will be conceded, however, that organisms which develop under the influence of direct cultivation or domestication, where at least part of the deficiencies of particularly unfavorable growing years are artificially supplied, show less variation than similar organisms which depend entirely on a natural environment. Thus, human children, in populations of civilized and prosperous nations, develop in environments which remain fairly uniform from year to year. Recent work (Schlesinger (1), Wolff (2), Martin (3), and others), however, on the growth of children whose infancy and early childhood coincided with the unfavorable conditions of the recent war and post-war period, has shown the marked extent to which growth may vary in different years. In the United States at the present time, economic conditions have developed which make the determination of their effects upon the health of children an urgent public-health problem. Questions concerning the effect of the economic depression on the growth of children can be answered definitely only when adequate control standards are available. As far as is known, standards are not available which will furnish a quantitative measure of the "normal" variation that is associated with the growth of children living under fairly uniform conditions of nutrition and environment. It is with this point in view, therefore, that records in the archives of the Office of Field Investigations in Child Hygiene of the United States Public Health Service are being analyzed to provide the necessary control series. This paper, although based upon too few cases and too short

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² The investigation, during which the data used in this paper were collected, was begun under the direction of Assistant Surgeon General Taliaferro Clark, formerly officer in charge of field investigations in child hygiene. The field observations were made under the immediate supervision of Past Assistant Surgeon R. B. Norment, jr. The writer is indebted to these officers of the United States Public Health Service and to Acting Assistant Surgeon E. Blanche Sterling, Senior Statistician S. D. Collins, and Miss Katherine Schindel, field worker, for assistance in the interpretation of the data.

a period to give completely conclusive results, purposes to give a tentative answer to the specific question, What is the variation in successive calendar years of growth in body weight of children between 6 and 15 years of age, living under fairly constant and reasonably satisfactory environmental conditions?

The investigation of the problem is of importance from several other points of view. First, in connection with more general and less urgent public-health programs, it is necessary to determine the range of normal variation of growth in successive years in order to evaluate quantitatively the effect and effectiveness of various public-health proceedings and activities. Second, it is important, in connection with the anthropological studies of Jackson (4), Hansen (5), Hultkrantz (6), and others, on the variations and evolutionary changes in the average values of certain body measurements, to determine the cumulative effect upon the growth and final size of the human body of a succession of particularly favorable or particularly unfavorable "growing" years. And, third, it is becoming increasingly clear to those interested in the analysis of anthropometric measurements that, despite standardization of nomenclature and methods, and extreme care and accuracy in the taking of measurements, there are still many unconsidered sources of variation which require study.

MATERIAL AND METHODS

The material for the inquiry is derived from the records of an investigation of the growth of elementary school children made during the years 1921 to 1928 by the United States Public Health Service at Hagerstown, Md. Some of these records were used in a previous paper (7), to which the reader is referred for information concerning the methods and other details of the investigation.

The data consist of measurements of body weight, recorded in October and May of each year, of the children attending the elementary grade schools in Hagerstown. All of the weighings made during the period from October 1923 through May 1928 were made by Miss Katherine Schindel, a thoroughly competent field worker in the employ of the Public Health Service. Weighings in May and October 1922 and in May 1923 were made by the various grade-school teachers, each of whom weighed the children in her own class. During the first year of the study, all of the children in all of the elementary schools of the city were weighed. In the second year, the weights of only the children in the first four grades of the school were recorded. In the third year, children in the second through the fifth grades, inclusive, were weighed, and thereafter in each succeeding year one lower grade was eliminated from, and one higher grade was added to, the group being measured. From the records obtained, those belonging to white native-born children having complete weight protocols for 4 years or

more were chosen for tabulation and study. The data thus made available consist of serial measurements for periods varying from 4 to 7 years of approximately 2,500 different children whose ages range from 6 to 15 years.

It must be noted that the children who make up successive age groups are not identically the same children in successive years of the study. However, a fairly large proportion of the children first observed at 6 years of age were followed individually through the ages of 10, 11, and 12 years, and many of the children first observed at 10 years of age were followed through the ages of 14 or 15 years. Thus, although there is considerable change in the actual constituents of the different age groups in consecutive years, all individuals who are included in a specified age group in a specified year were born during the same calendar year and possess, therefore, nearly identical past histories with regard to the calendar years during which growth occurred.

Attention must be called, also, to the fact that relatively more young children were measured in the early years of the study, and relatively more older children were measured in the later years of the study. It is impossible, now, to evaluate explicitly the effect of this selective factor. It seems reasonable to believe, however, that the major conclusions of the investigation are not vitiated by such selection.

Measurements of weight were recorded to the nearest quarter pound, and include regular indoor clothing with the exception of shoes, coats, sweaters, and vests. Each of the eight elementary schools of the city was provided with a separate scale which was calibrated at the beginning of each school year. Thus, the chance for serious systematic errors, arising from inaccuracies of the weighing machines, is probably not large.

The day of the month on which weight was measured varied slightly from year to year. The average intervals between weighing days in May were calculated (except for 1922-23 and 1923-24, for which data were unavailable) as follows:

1924-25.....	372 days
1925-26.....	357 days
1926-27.....	359 days
1927-28.....	364 days

It has been shown (7) that average growth in weight during the month of May is approximately 0.1 pound per child per 30-day period. Thus, differences in annual growth (May to May), which may be effected by variation in number of days in the different years, would not average more than 0.05 pound and are considered negligible. Variations of the date of weighing in October averaged about 10 days; but, because weights recorded at that time will be used here only for the study of actual weights (not increments), corrections for this variation were not considered necessary.

TABLE 1.—Constants of frequency distributions of annual (May to May) gains in weight in successive years, elementary school children, Hagerstown, Md., 1922-23 to 1927-28

	Boys							Girls						
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	All years	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	All years
7-YEAR AGE CLASS														
Number of cases.....	45	63	83	61	7	-----	259	44	65	80	71	6	-----	266
Mean.....pounds..	4.75	5.18	4.54	4.54	5.09	-----	4.75	5.03	5.30	4.25	4.61	5.38	-----	4.76
Median.....pounds..	4.53	4.84	4.43	4.41	4.71	-----	4.53	4.61	4.76	3.96	4.47	5.55	-----	4.60
σpounds..	1.96	2.02	1.44	1.47	1.28	-----	1.70	3.07	2.60	1.73	1.91	1.00	-----	2.26
8-YEAR AGE CLASS														
Number of cases.....	113	116	188	169	74	7	667	114	109	173	149	87	7	639
Mean.....pounds..	5.85	5.66	5.25	5.39	6.20	6.23	5.57	5.37	5.50	4.78	5.01	5.28	3.95	5.12
Median.....pounds..	5.70	5.38	5.18	5.16	6.01	6.63	5.40	4.96	5.13	4.51	4.74	5.18	3.71	4.81
σpounds..	1.99	2.02	2.10	1.93	1.86	2.36	1.99	2.74	3.53	1.93	2.00	1.70	1.05	2.18
9-YEAR AGE CLASS														
Number of cases.....	95	122	195	209	170	76	867	80	122	165	196	156	86	805
Mean.....pounds..	6.51	5.76	5.30	5.81	6.02	5.82	5.81	5.79	5.48	5.62	5.45	6.36	6.22	5.78
Median.....pounds..	5.86	5.38	5.00	5.53	5.96	5.59	5.53	5.53	4.88	4.60	5.12	5.79	5.69	5.26
σpounds..	2.48	3.20	1.96	2.25	2.08	2.07	2.33	2.45	2.92	2.96	2.65	3.21	2.67	2.85
10-YEAR AGE CLASS														
Number of cases.....	35	97	165	218	214	162	891	31	86	166	186	196	155	819
Mean.....pounds..	5.98	5.84	5.76	6.04	6.59	6.21	6.13	6.83	6.60	5.79	6.96	7.20	7.18	6.78
Median.....pounds..	5.71	5.45	5.42	5.83	6.19	6.01	5.81	5.67	6.35	5.30	6.21	6.27	6.38	6.07
σpounds..	2.48	3.19	2.72	2.53	2.59	2.60	2.67	3.13	2.87	2.93	3.69	3.74	3.42	3.41
11-YEAR AGE CLASS														
Number of cases.....	18	37	136	186	214	204	795	8	37	129	173	199	189	735
Mean.....pounds..	6.99	5.73	6.32	6.56	6.91	7.38	6.80	9.63	7.59	7.68	7.76	9.46	8.96	8.52
Median.....pounds..	6.88	5.52	5.88	6.04	6.50	6.64	6.30	10.38	6.63	7.04	6.98	8.65	7.82	7.54
σpounds..	3.00	2.27	3.12	3.14	2.75	3.96	3.24	2.73	3.93	4.21	3.71	4.81	4.76	4.39
12-YEAR AGE CLASS														
Number of cases.....	3	22	53	157	189	197	621	-----	9	55	143	177	188	573
Mean.....pounds..	5.04	6.28	6.45	7.92	8.40	7.92	7.87	-----	9.15	9.90	10.24	10.74	11.61	10.79
Median.....pounds..	5.13	5.13	5.69	6.74	6.78	7.16	6.70	-----	10.05	8.38	9.93	10.33	11.45	10.35
σpounds..	0.47	3.13	3.26	4.30	4.77	4.63	4.24	-----	4.54	5.59	4.47	4.81	5.39	5.00
13-YEAR AGE CLASS														
Number of cases.....	-----	3	29	64	149	175	420	-----	4	15	61	138	170	368
Mean.....pounds..	-----	10.38	7.82	8.84	11.09	10.22	10.15	-----	11.63	10.58	11.92	12.45	11.90	12.05
Median.....pounds..	-----	6.38	7.38	6.59	9.53	9.15	8.76	-----	10.88	11.01	11.18	12.51	11.45	11.45
σpounds..	-----	6.38	4.02	5.91	5.90	5.58	5.66	-----	6.42	3.41	6.03	5.17	4.69	5.08
14-YEAR AGE CLASS														
Number of cases.....	-----	-----	5	39	60	127	232	-----	-----	6	22	55	119	202
Mean.....pounds..	-----	-----	6.58	10.73	12.84	13.82	12.88	-----	-----	9.54	9.38	12.16	10.48	10.79
Median.....pounds..	-----	-----	6.38	10.76	12.38	13.80	12.59	-----	-----	9.88	8.38	12.13	10.63	11.09
σpounds..	-----	-----	4.53	5.12	5.93	6.12	5.86	-----	-----	3.62	4.34	5.45	5.18	5.14
15-YEAR AGE CLASS														
Number of cases.....	-----	-----	-----	4	37	41	83	-----	-----	-----	6	22	37	65
Mean.....pounds..	-----	-----	-----	6.63	13.92	13.01	13.16	-----	-----	-----	7.21	8.01	9.02	8.51
Median.....pounds..	-----	-----	-----	4.88	12.63	13.63	12.76	-----	-----	-----	3.88	8.88	10.13	9.24
σpounds..	-----	-----	-----	2.49	6.24	6.42	6.20	-----	-----	-----	4.60	3.90	7.60	6.32

TABLE 2.—Constants of frequency distributions of weight in October in successive years, elementary school children, Hagerstown, Md., 1921-27

	Boys								Girls							
	1921	1922	1923	1924	1925	1926	1927	All years	1921	1922	1923	1924	1925	1926	1927	All years
6-YEAR AGE CLASS																
Number of cases	42	34	93	62	7	-----	-----	238	28	47	87	68	7	-----	-----	237
Mean . . . pounds	44.40	43.38	44.26	44.42	45.07	-----	-----	44.23	44.71	43.88	42.75	43.01	42.50	-----	-----	43.28
σ pounds	5.34	4.65	4.49	4.66	4.62	-----	-----	4.72	6.51	5.20	4.45	4.97	4.14	-----	-----	5.02
7-YEAR AGE CLASS																
Number of cases	70	89	178	177	75	7	-----	596	68	75	180	157	85	8	-----	573
Mean . . . pounds	48.53	47.95	47.43	47.64	48.29	49.36	-----	47.83	46.41	47.90	45.99	46.24	46.85	45.25	-----	46.48
σ pounds	7.25	5.44	5.30	5.70	4.75	4.09	-----	5.63	6.49	7.01	5.59	4.36	5.03	3.60	-----	5.51
8-YEAR AGE CLASS																
Number of cases	60	106	186	214	191	74	8	839	56	113	173	209	166	86	8	811
Mean . . . pounds	53.00	53.19	52.36	52.43	52.85	53.43	53.88	52.75	51.93	51.22	51.74	50.88	50.99	51.62	50.00	51.28
σ pounds	7.85	7.81	6.92	6.42	6.76	6.02	4.12	6.86	5.86	7.58	7.52	6.58	5.25	6.55	4.00	6.63
9-YEAR AGE CLASS																
Number of cases	21	79	176	221	222	183	76	978	23	80	175	188	211	156	88	921
Mean . . . pounds	56.26	58.41	57.58	57.58	58.32	57.89	59.18	57.97	54.15	54.36	54.95	58.05	56.58	56.09	56.66	56.24
σ pounds	6.36	7.78	7.99	7.69	7.66	7.64	7.01	7.66	6.50	6.44	7.83	9.75	8.14	6.51	7.40	7.96
10-YEAR AGE CLASS																
Number of cases	4	30	141	196	223	219	179	992	4	32	137	188	203	203	158	925
Mean . . . pounds	53.25	60.10	63.65	63.34	63.49	63.87	63.95	63.51	60.50	59.91	60.93	61.11	64.41	61.94	62.54	62.20
σ pounds	6.83	10.46	9.36	9.80	9.27	9.03	8.67	9.26	7.58	9.53	9.28	9.82	11.52	10.04	8.07	9.91
11-YEAR AGE CLASS																
Number of cases	-----	13	60	160	212	213	210	868	-----	6	53	151	188	199	201	798
Mean . . . pounds	-----	70.42	66.05	69.90	69.97	69.73	71.03	69.89	-----	61.50	65.84	67.63	67.67	71.76	69.87	69.09
σ pounds	-----	11.18	9.75	11.42	11.83	10.82	11.12	11.19	-----	5.42	10.06	11.15	10.55	14.47	13.03	12.32
12-YEAR AGE CLASS																
Number of cases	-----	2	31	70	167	198	213	681	-----	3	19	66	150	187	189	614
Mean . . . pounds	-----	58.50	69.60	72.00	77.29	76.74	76.84	76.04	-----	62.50	71.66	75.20	76.62	76.63	82.15	77.95
σ pounds	-----	5.00	10.70	10.67	12.83	14.34	12.78	12.97	-----	11.31	10.57	14.88	13.80	14.53	17.59	15.30
13-YEAR AGE YEAR																
Number of cases	-----	-----	6	42	73	150	195	466	-----	5	25	69	140	176	415	
Mean . . . pounds	-----	-----	68.83	77.38	80.53	85.97	85.88	84.09	-----	76.30	84.22	85.75	87.64	88.10	87.13	
σ pounds	-----	-----	8.50	12.51	13.27	16.21	17.60	16.03	-----	12.67	14.59	18.20	16.92	16.25	16.69	
14-YEAR AGE CLASS																
Number of cases	-----	-----	-----	5	43	63	144	255	-----	-----	-----	6	26	61	127	220
Mean . . . pounds	-----	-----	-----	72.30	86.97	90.83	97.90	93.79	-----	-----	-----	84.17	92.77	96.61	99.04	97.22
σ pounds	-----	-----	-----	10.11	14.14	17.19	20.21	18.39	-----	-----	-----	12.62	15.91	21.30	16.35	17.73
15-YEAR AGE CLASS																
Number of cases	-----	-----	-----	2	36	46	91	-----	-----	-----	-----	6	22	39	67	
Mean . . . pounds	-----	-----	-----	90.50	89.79	99.17	101.48	92.03	-----	-----	-----	93.67	100.41	111.65	106.35	
σ pounds	-----	-----	-----	16.00	19.06	17.54	17.40	17.56	-----	-----	-----	13.06	16.48	20.38	18.61	

The reduction of the data consists of the analysis of frequency distributions, specific for age, sex, and year of measurement of (a) annual gains in weight and (b) actual weights. The age classification was for single years of life, age being taken as of the birthday nearest January 1. Gains in weight were calculated as the difference between the weights on the May preceding and the May following the January date of age classification. Distributions of actual weight were formed for measurements taken in October (the October preceding the January date of age classification).

Results of the analysis of the frequency distributions are given in tables 1 and 2. Table 1 shows the mean, median, and standard deviation (σ) of annual gains in weight in the different years for children in the specified age classes. Under the captions "All years" are given means and medians of the distributions specific for age and sex, but unspecified with regard to the year of measurement. The standard deviations entered in these columns are weighted averages of the standard deviations of distributions for the different years of measurement. This method for calculating the variability of gains for separate age groups would appear to give a more precise measure of dispersion than standard deviations calculated in the usual manner from distributions formed by combining the data without regard for the year of measurement. Table 2 shows the mean and standard deviation (σ) of distributions of actual weights in October for children of different ages weighed in different years. As in table 1, the columns marked "All years" give the means for the October weights unspecified for year of measurement and the standard deviations calculated as the average weighted standard deviations of the distributions for the different years of measurement.

RESULTS

Mean yearly gains.—Study of table 1 shows the usual variations with age and sex of the average annual weight increments, and the presence, during the 7-year interval, of a *systematic variation of annual gains for children in the same age and sex classes*. The primary interest in this investigation concerns the latter variation; and in order to facilitate comparisons between the different age groups, mean gains for the different years of measurement were expressed as percentages³ of the means for "all years." These percentages are represented⁴ graphically in figure 1. Here it is shown that mean gains, for each sex and for each age observed, tend to be higher in 1922-23 than the

³ For example, the mean annual gain of 6-year-old boys during 1924-25 equalled 4.54 pounds; the mean annual gain of 6-year-old boys for the entire period (all years) equalled 4.75 pounds; the percentage value for the year 1924-25 equals, therefore,

$$\frac{4.54}{4.75} \text{ times } 100, \text{ or } 95.6 \text{ percent.}$$

⁴ Printing limitations do not allow the tabulation of these values, but the basic data are given completely in table 1.

averages based upon a total of 7 years' observation. Gains in 1923-24 show an irregular fluctuation about the "all years" averages, but in 1924-25 mean annual increments are markedly reduced, both sexes and all age groups showing a marked decrease in growth. Gains in 1925-26 are generally greater than those of the previous year, and in 1926-27 growth increments are uniformly higher than at any time during the period of observation. In the last year, 1927-28, the mean gains are still above the averages, but show a slight reduction from those of the previous year. There are, of course, irregular random fluctuations of the individual groups, particularly evident for the averages based upon small numbers of cases; but it is possible, generally, to show statistically significant differences of the more divergent years. The most convincing evidence of a distinct fluctuation of growth in different years is to be found, however, in the consistency with which variations occur in the two sexes and in children of different ages. In order to bring out this consistency, the graph shown in the top section of figure 1 is presented. The data for the graph consist of weighted averages, specific for the calendar years of measurement, of percentage gains for all age groups combined. This procedure furnishes a quantitative summary of differences between the different years. Thus, in 1922-23, the growth in weight of boys, all ages taken together, exceeded by 5 percent the "all years" averages of the boys. At the same time, girls of all ages gained 3 percent more than their 7-year averages. The records of the most divergent years, 1924-25, with gains of less than 92 percent of the averages for boys and 91 percent of the averages for girls; and 1926-27, with gains of 105 percent of the averages for boys and 106 percent of the averages for girls, show that, in as short an interval as 3 successive calendar years, annual growth in weight may vary as much as 15 percent (the difference between 91 and 106 percent).

Median yearly gains.—Although it is generally known that frequency distributions of annual weight increments form only slightly skewed curves, it seemed advisable to determine the medians of the distributions and to consider whether or not the observed variation of the means is due essentially to a few aberrant measurements. Accordingly, table 1 furnishes medians of the distribution, and figure 2 shows the trends of the medians for each age group, together with a summary trend for children of all age groups combined. As in figure 1, the medians for the different years of measurement are expressed as percentages of the medians of distributions unspecified with regard to the year of measurement.

The results of the analysis confirm in every essential detail the conclusions drawn from the study of the means. The changes of the medians for the different years follow the same general trends as the changes of the means; the two most divergent years, 1924-25 and

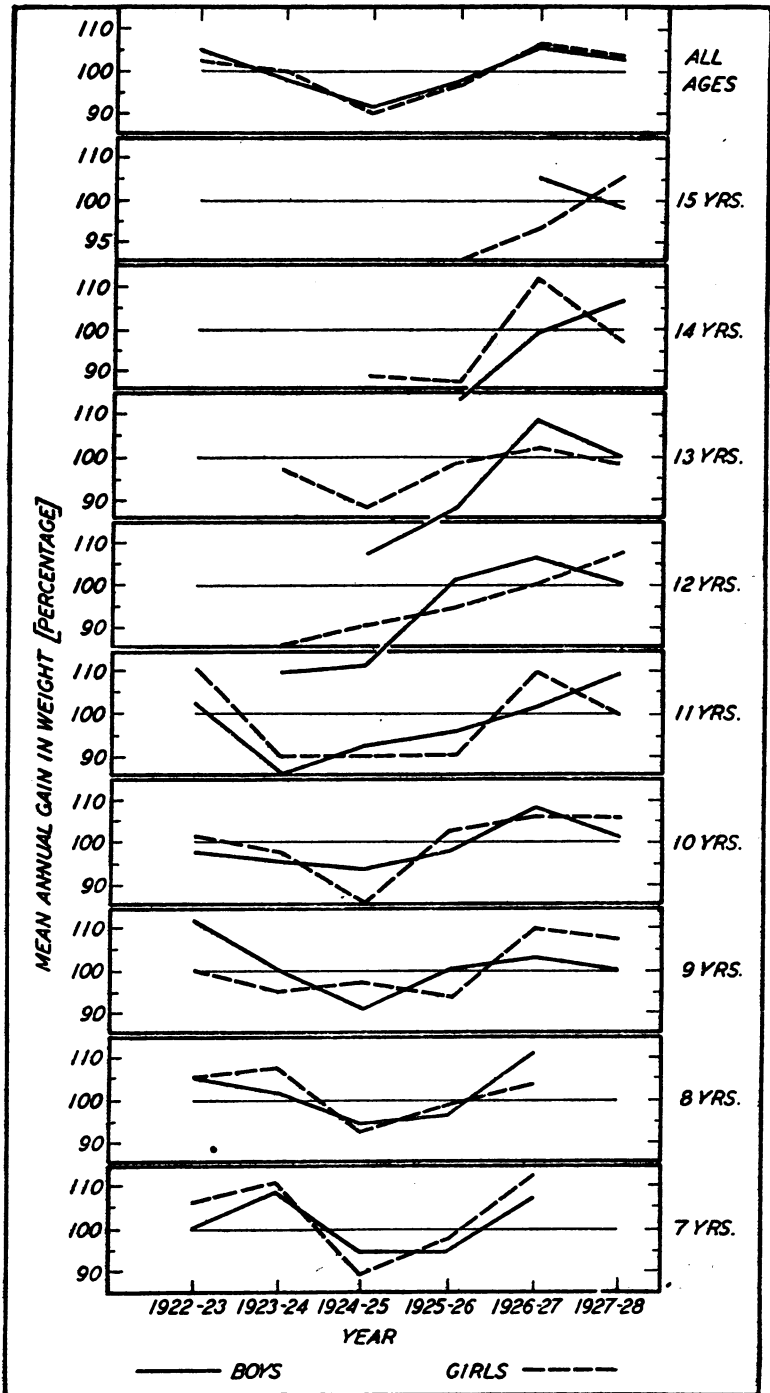


FIGURE 1.—Percentages: Mean annual gains in weight in specific years of mean annual gains all years combined. (White, native-born, elementary school children, Hagerstown, Md.)

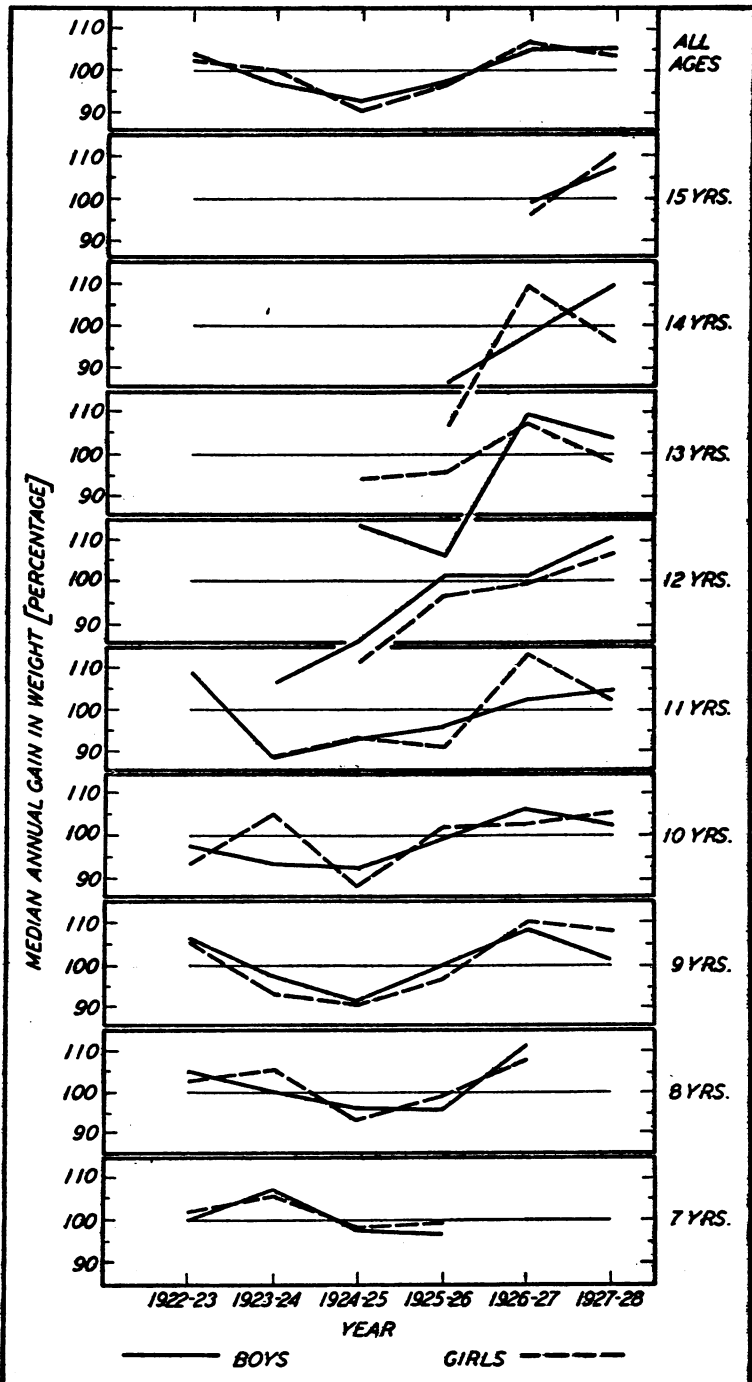


FIGURE 2.—Percentages: Median annual gains in weight in specific years of median annual gains all years combined. (White, native-born, elementary school children, Hagerstown, Md.)

1926-27, show an average difference of approximately 17 percent in median annual increments; and it is clear that the variations of gain in the several successive years must be representative of general factors which influence the growth of all of the children.

Correlation of means and standard deviations of annual gains.—Study of table 1 indicates, and a quantitative test shows, that there is a direct association between the means and standard deviations of the distributions of gains in the different years. The Pearsonian correlation coefficient ⁵ is for boys $+ .59 \pm .13$; for girls, $+ .61 \pm .15$, and for both sexes combined, $+ .60 \pm .09$. These are clearly significant correlations, and show that increased growth increments are associated with increased variability of growth increments. The meaning of this correlation is not altogether clear. It is, of course, well known that both means and standard deviations of weight increments increase with age, and the statement is made frequently that increased variability is inherently associated with increased rapidity of growth. However, Nylin (8), and Palmer (7) have shown that in children of the same sex and age very great differences in mean *monthly* gains in weight are not directly associated with the variability of the gains. Acceptance of all of these findings necessarily leads to no logical contradiction, but explanations of them are at this time almost entirely conjectural.

Actual weights in successive years.—Means of the October weights for the different years, expressed as percentages of the means of distributions of "all years", are shown graphically in figure 3. With the exception of the means based on few cases, the fluctuations are small, and it is generally impossible, on the basis of samples of the sizes dealt with here, to show statistically significant differences in the average weight of children born in successive calendar years. A further analysis of these data was made by averaging the percentage deviations of groups of the same children ⁶ as they were followed during the 7 years of measurement. The result of the analysis gave no indication of a systematic trend, either for boys or girls, or for the two sexes together. The only suggestive finding is that girls, born within 6 months of January 1, 1915 (entering these data in the group of 6-year-old girls measured in 1921, and continuing as the group of 7-year-old girls measured in 1922, 8-year-old girls in 1923, etc.), are slightly heavier, on the average, than is usual for girls of their age. Inspection of the frequency distributions showed that the average is

⁵ The variables, standard deviations, and means were expressed as percentages of the values, standard deviations and means, respectively, under the headings "All years." This method of analysis was adopted as a practical expedient for eliminating the effect of age changes on the correlation. The correlation coefficient was calculated after omitting pairs of values based upon distribution of less than 25 cases and without weighting for the number of cases upon which each pair was based.

⁶ These are, of course, not exactly the same children, but they are children *born in the same year*, and those who have lived, therefore, through, identical "growing" years.

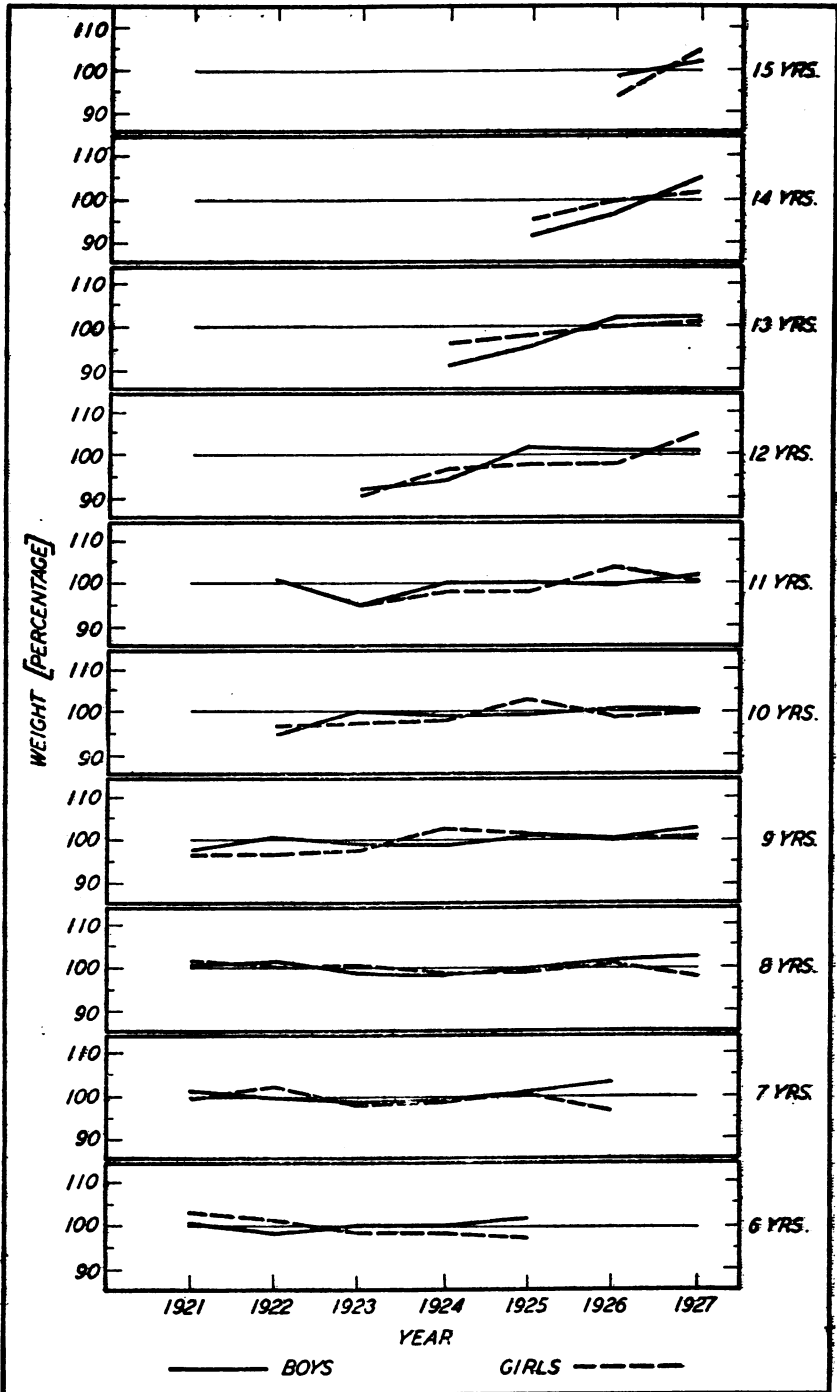


FIGURE 3.—Percentages: Mean weights in specific years of mean weights all years combined. (White, native-born, elementary school children, Hagerstown, Md.)

influenced by a small group of rather heavy individuals, and that there is no evidence of a really significant character in the finding.

The results of this part of the investigation show that when groups of children born in successive calendar years reach school age, the effects of differences of growth in different years are largely eliminated. Such a finding is, *a priori*, to be expected, if, as is shown above, there is considerable variation in the *succession* of good and poor "growing" years. Exceptions to this generalization may be expected and are clearly shown⁷ in recent work on the growth of children living for a succession of years under the very unfavorable conditions which existed in central Europe during and immediately following the war.

GENERAL DISCUSSION

Analysis of the various factors which may be related to the differences of growth in the different years, although of great importance in the final interpretation of the results of the study, will not, and at the present time cannot, be made. It is reasonable to believe that a great number of intercorrelated variables are associated with the observed variation. On the side of the physical or climatological characteristics of the different years, it is conceivable that the amount of solar energy, in terms of total hours of sunshine, hours of cloudiness, amount of rainfall, average humidity, and so on, is related to the growth differences. In connection with the study of such variables it would be of interest to determine whether or not the growth of trees and plants, yields of grain and vegetable products, milk yields, egg production, and so on, show a similar fluctuation. On the side of the socio-economic characteristics of the years of observation, it is reasonable to suppose that the amount of unemployment, per capita wages of the employed, etc., might be associated with the growth trends. From the point of view of hygiene and public health, it is of importance to consider mortality rates, the incidence of epidemic diseases, fluctuations of endemic diseases, the efficiency and effectiveness of school hygiene, and similar variables. Consideration of the possible factors involved and a study of some of them have convinced the writer that the variables concerned are probably closely correlated, and that it is quite impossible on the basis of only 7 years of observation to find significant associations. In this paper it must be sufficient, therefore, to point out that statistically significant differences in annual weight increments *are* observed in children living under what may be considered normal conditions in normal years.

⁷ See, for example, Wolff, G., *Loc. cit.*

SUMMARY

Records, collected by members of the Office of Field Investigations in Child Hygiene of the United States Public Health Service, furnish the basis for a study of the fluctuations of annual growth in weight of elementary school children during the years between 1921 and 1928. The purpose of the paper is to analyze these fluctuations and to present standard measurements with which growth in other calendar years, particularly the recent years of the economic depression, may be compared.

Analysis of the records leads to the following general conclusions:

1. With the exception of a few groups, the average weights of children of given age did not vary significantly from year to year during the 7-year period.

2. Average annual weight *increments* showed a systematic and statistically significant fluctuation during the 7-year interval. The most divergent year, May 1924 to May 1925, was found to be an inferior "growing" year, weight increments averaging approximately 92 percent of the standards based on 7 consecutive annual measurements. The best "growing" year, 1926-27, showed an average increment of over 105 percent of the 7-year standards.

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ADDITIONAL STUDIES ON THE RELATIONSHIP OF THE VIRUSES OF ROCKY MOUNTAIN SPOTTED FEVER AND SAO PAULO EXANTHEMATIC TYPHUS¹

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In two recent reports the writers have presented experimental evidence which indicates a close relationship between the viruses of Rocky Mountain spotted fever and exanthematic typhus of Sao Paulo: (1) Sera from guinea pigs and rabbits recovered from exanthematic typhus of Sao Paulo exhibit marked protective value against the virus of Rocky Mountain spotted fever; (2) sera from guinea pigs recovered from Rocky Mountain spotted fever exhibit similar protective value against the virus of exanthematic typhus of Sao Paulo; (3) guinea pigs recovered from Rocky Mountain spotted fever are completely resistant to the Sao Paulo virus.

Additional studies are presented as follows:

(1) The protective value of Rocky Mountain spotted fever vaccine against the virus of exanthematic fever of Sao Paulo, (2) cross-immunity tests by injecting guinea pigs recovered from exanthematic typhus of Sao Paulo with the virus of Rocky Mountain spotted fever, and (3) cross-immunity tests by injecting monkeys recovered from Rocky Mountain spotted fever with Sao Paulo virus.

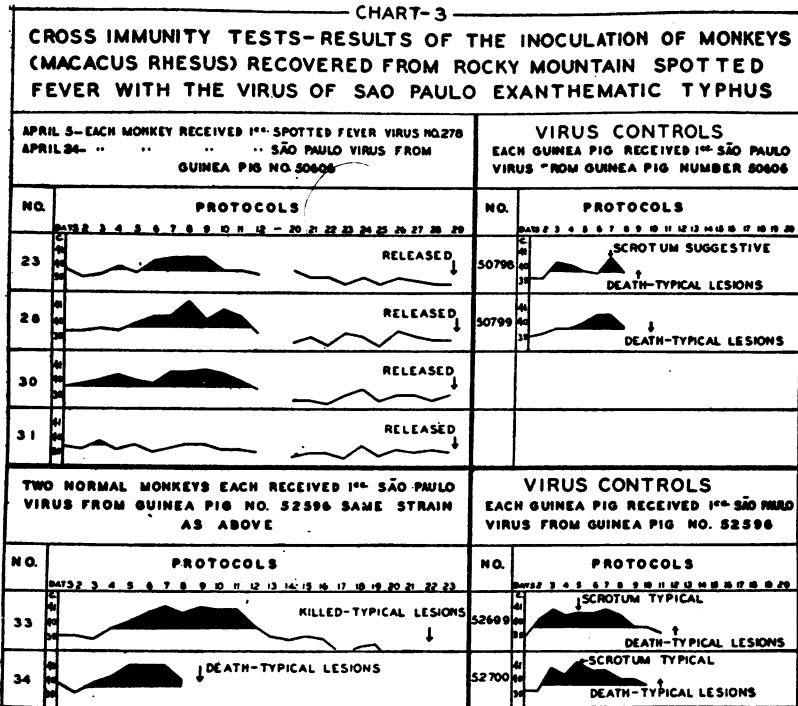
THE PROTECTIVE VALUE OF ROCKY MOUNTAIN SPOTTED FEVER VACCINE

The method followed in testing the protective value of Rocky Mountain spotted fever vaccine against the virus of exanthematic typhus of Sao Paulo was the same as is used in the routine testing of vaccine for protective properties against spotted fever. On May 9th, 30 guinea pigs each received a subcutaneous injection of 1 cc of spotted fever vaccine no. 1599. Ten days later 20 guinea pigs of this group each received an intraperitoneal injection of 1 cc of Sao Paulo virus. Five of these received virus no. 302, five virus no. 303, five virus no. 304, and five no. 305. Each lot of virus was shown to be bacteriologically sterile. The remaining 10 guinea pigs each received 1 cc of spotted fever virus no. 296. Two normal guinea pigs were used as controls on each virus.

Results (chart 1).—The five guinea pigs receiving Sao Paulo virus no. 302 remained afebrile throughout the 12 days of observation. One of the five receiving virus no. 303 and one of the five receiving virus no. 304 showed temperatures of 40° C. and 39.8° C., respectively, on the eighth day. Two of the five guinea pigs receiving virus no. 305 each showed 1 day of temperature, viz, 39.8° C. on the third day and

¹ Contribution from the Rocky Mountain Spotted Fever Laboratory of the U.S. Public Health Service at Hamilton, Mont.

fever at any time during the 13 days of observation nor was there scrotal reddening or swelling. All were released on the thirteenth day. The two spotted fever virus control guinea pigs were typical clinically; both died on the tenth day, and typical lesions of the spleen, testes and adnexa were found at necropsy. The spotted fever virus was also titrated in guinea pigs as follows: Two received 0.01 cc of virus each; two 0.004 cc each; and two 0.002 cc each. Five of these died of spotted fever. One of those which received 0.004 cc was released on the twenty-first day. It had shown irregular fever over a period of 6 days but no scrotal swelling. Such reactions are of frequent occurrence in the titration of spotted fever virus.



Monkeys (chart 3).—Four survivors of a series of monkeys (*Macacus rhesus*) which had been injected on April 5 with spotted fever virus, each received on April 24, 1 cc of Sao Paulo passage virus from guinea pig no. 50606. Following the injection of the spotted fever virus, 3 showed definite febrile periods, while in 1 the highest temperature recorded was 39.8° C. Following the injection of Sao Paulo virus none showed temperature above 39.6° C. during the observation period.

Unfortunately, normal monkeys were not available for virus controls. However, two guinea pigs which received 1 cc of this virus showed definite febrile reactions, and suspicious scrota. Both died on

the ninth day and showed typical lesions at necropsy. On June 15 two normal *rhesus* monkeys and two normal guinea pigs received an intraperitoneal injection of 1 cc each of the same strain of Sao Paulo virus as that used in the monkeys as above described. One monkey died on the ninth day following a pyrexial period. There was a macular purpuric rash on the face, on the arms at the elbows, on the legs and perineum. The spleen was congested. The other monkey was sacrificed when *in extremis* on the twenty-second day. Epistaxis had been present for several days. A petechial rash, which appeared first on the face and legs had become confluent. There was extensive necrosis of the fingers and toes, perineum, and alae nasi. The liver extended 5.5 cm below the costal margin. There was a marked myocardial hypertrophy and excess fluid in the pericardial cavity. The two guinea pigs used as virus controls died on the tenth and twelfth days, respectively, showing typical lesions of the Sao Paulo disease.

DISCUSSION

Our results as regards cross-immunity tests have been paralleled by Dr. J. L. Monteiro of the Instituto Butantan (personal communication) and by Dyer (1933). Our data indicative of the close relationship of the two diseases concerned furnish the added evidence of cross protection by convalescent sera and the equal degree of protection which Rocky Mountain spotted fever vaccine affords against both infections. In the latter connection Doctor Monteiro has advised that a vaccine prepared from *Amblyomma cajennense* also protects against both viruses. The essential identity of these typhus-like diseases appears to be well established.

SUMMARY

Guinea pigs which have received Rocky Mountain spotted fever vaccine are protected in equal degree against both spotted fever virus and the Sao Paulo virus.

Guinea pigs which have recovered from the Sao Paulo disease are completely resistant to spotted fever virus.

Monkeys which have recovered from spotted fever are completely resistant to Sao Paulo virus.

These results are additional evidence of the essential identity of the two viruses.

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ESTIMATION OF BASOPHILIC CELLS (RETICULOCYTES) IN BLOOD BY EXAMINATION OF ORDINARY BLOOD FILM

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BRIEF REVIEW OF LITERATURE

Cunningham (1920) described a method for permanently staining reticulocytes. Key (1921) published a very interesting paper dealing with the various forms of basophilia and their relation to the normal red blood corpuscle. Seyfarth (1927) furnished an excellent bibliography, reviewed in detail much of the late work done on reticulocytes, and discussed the relationship of basophilia to other blood findings.

Brilliant cresyl blue is the stain most commonly used for supravital staining of blood preparations; but it has long been known that the basic staining substance present in young erythrocytes can be stained by any basic dye which may enter the corpuscle. As stated by Key, this substance is demonstrated either in the form of polychromatophilia, punctate basophilia, or reticular designs, depending upon the staining method used. Any stain containing a basic dye, applied after chemical fixation and before destruction of the basic staining substance, furnishes the polychromatic picture or that of punctate basophilia, or both. Vital staining applied without fixation furnishes the familiar reticulations, sometimes with more or less fragmentation of the reticulum.

If it were possible in routine practice to stain a blood film uniformly and regularly so as to show every polychromatic cell clearly differentiated from mature red blood cells, that procedure would naturally be the most convenient method of estimating the percentage of juvenile erythrocytes. While this has not, to date, proved feasible by the use of the chemically fixed film, nevertheless, films air dried and stained according to Ehrlich's proposal in 1881 do provide a picture from which it is possible to make as accurate an estimation of the percentage of young cells as by any known procedure, and with relatively less training as well as less laboratory equipment. This offers a distinct advantage, not only in research and industrial medicine, but in the field of general practice as well. The physician may, from a single blood smear made at the bedside and without special prepara-

tion, later secure an estimation of reticulocytes from the same slide which is taken for ordinary purposes (such as differential white cell counts).

Askanazy (1893) noted in preparations of blood from persons suffering from anemia the presence of certain cells showing reticulations, but failed to consider what relationship might exist between the presence of such cells and the degree of anemia. In 1895 the same author published a paper in which he discussed the significance of megaloblasts found in blood films made upon patients suffering from secondary anemia, and again noted the presence of cells showing reticulations.

Biondi (1908) is credited with publishing the first statement that cells showing polychromatophilia and those showing reticulations were the same, depending upon the method of staining. Pepper and Peet (1913) went on record as agreeing with him. The preceding year Cesaris-Demel advanced the theory that cells showing punctate basophilia and those showing reticulations were the same, but erred by further stating that polychromatophilia was of nuclear origin.

Hawes (1909), using blood from sick and well individuals, old and young, showed that the three forms of basophilia must be considered different forms of the same process. He secured a somewhat higher count of reticulocytes by the vital staining technique than polychromatic cells in the fixed preparations, but decided that the difference was due to the increased efficiency of the vital stain (cresyl blue) over that used in staining fixed preparations.

Robertson (1917) proved by a series of experiments that basophilic cells were indeed young cells, and that their incidence expressed the degree of blood regeneration going on at the time. During 1929 examinations were made by research workers of the United States Public Health Service of over 1,500 ordinary blood films taken from employees of a storage battery establishment, who were either ill with plumbism or showed evidence of lead absorption. The most constant finding upon examination of the fixed films was an increase in the percentage of polychromatic cells (both diffuse and punctate). Examination of the nonfixed films taken at the same time showed a corresponding increase in basophilic cells (classed as reticulocytes). There was also a definite correlation between the estimations of punctate polychromatic cells and of basophilic cells (reticulocytes); but the latter appeared in much greater numbers per million red blood cells.

The work of Swartz (1921), in developing the thick drop method of testing for lead absorption, was basically an application of the staining principles advocated by Ehrlich. McCord (1924), in this country, recognized the value of the test and offered a "standard" for reporting the density of the "aggregations". Seiffert (1922)

recommended staining the usual thin blood film without fixation by the same technique as staining the thick drop, but he erred in considering all basophilic cells so demonstrated as punctate basophilia ("stippled") and also in staining the whole film so that no accurate check could be made as to total number of erythrocytes furnishing a given number of basophilic cells.

Fleckel and Tschernow (1930) reported a method of classifying degree of lead absorption in individuals by expressing the ratio of the number of reticulocytes shown by vital staining to that of erythrocytes. (They considered the presence of from 0.7 to 1.0 percent of erythrocytes showing reticulations as normal.) Our experience agrees with them in most cases; however, we cannot accept in all cases the ratio of reticulocytes to total erythrocytes as a true criterion of the degree of lead absorption any more than that punctate basophilia may be so considered. Severe cases of plumbism of long duration with a marked secondary anemia may show very few basophilic cells until they are taken away from exposure, effective treatment is begun, and a start toward recovery is made. In fact, the percentage of erythrocytes staining as basophilic cells may be below normal. Böttrich (February 1932) makes this same statement regarding punctate basophilia in cases of plumbism of long standing.

Most methods devised for counting the young erythrocytes present some difficulty; and with all methods a certain amount of training and experience is required on the part of the technician to insure trustworthy results. In the hands of careful workers these methods have generally proved quite satisfactory for clinical purposes. Because of certain physical properties of these juvenile red blood cells, especially their tendency to stick to foreign substances, and their difference in weight per cell volume, the necessity for carrying out the preparation in the simplest manner is obvious. The transfer of blood from pipettes to slides may be accompanied by the loss of a significant amount of new cells.

The technique here described calls for no transfer of blood by means of pipettes, no centrifuging and separating of cells from the staining solution, no attempt to make an even film over a slide covered by dried stain—simply the spreading of an even blood film over a clean slide as for making the ordinary blood smear. This method is particularly adapted for research study because more cells are examined, assuring a greater degree of accuracy; and, also, no cells are lost through transfer of specimens or centrifuging process. Furthermore, the same slides furnish fields from which stippled cell estimations may be made. No special preparation other than the providing of proper staining fluid is necessary. The permanency of the preparation is also of distinct value, affording an opportunity for continued study or rechecking of results obtained.

BLOOD FILM TECHNIQUE

The purpose of this article is to describe a technique for the estimation of basophilic cells (reticulocytes) using the ordinary blood film instead of vitally stained preparations.

Although, in the study made by the Public Health Service workers referred to above a slightly different basic stain was used than that used by either Swartz, Seiffert, or McCord, the principle was that proposed by Ehrlich. Staining without fixation results in partial destruction of adult erythrocytes, only the immature or basophilic cells remaining. This fact made it impossible for previous workers to estimate the number of erythrocytes examined. The present technique obviates this difficulty in that fixation of one half of the film through its long dimension makes it possible to estimate the number of erythrocytes in any nonfixed portion of the film from the number found in a corresponding area of the fixed portion, as shown by the accompanying diagram (fig. 1). It is necessary to use corresponding



FIGURE 1.—Diagram of slide showing one half of the film area fixed.

portions of the film, because, for instance, there may be considerable difference in the distribution of cells at A² and A¹; but in a well made film the number of cells per unit of area at A¹ is practically the same as at B¹, and at A² the same as at B².

Before beginning the investigation of the incidence of plumbism among the group of battery workers, several of the stains commonly used to demonstrate punctate basophilia were tried out to determine which, in the hands of those doing the work, would prove the most efficient. All factors considered, the Sussmann-Weindel solution of toluidine blue, methylene blue, and borax furnished the most uniform results in examination of both fixed and nonfixed films. The formula is as follows:

Toluidine blue.....	0.5 gm
Borax.....	.05 gm
Methylene blue solution (Loeffler's).....	5 cc
Distilled water.....	100 cc

The borax is added to the water, which is heated to dissolve if necessary. The toluidine blue is added and allowed to stand for a few minutes; occasional stirring may hasten solution. Next is added the

methylene blue. The solution is then filtered through a single no. 30 filter paper.

Films are made as for ordinary blood smears. (If care is taken to have clean slides, a little practice will insure relatively thin, even films.) The films are allowed to dry for from 5 minutes to several hours, but best results are obtained when stained not more than 3 hours after smearing. One half of the smear (as shown in fig. 1) is fixed with 95 percent methyl alcohol by placing a strip of filter paper about 1 centimeter wide over this half and saturating it with alcohol, care being taken not to drop the alcohol on too rapidly or in such amount that it will run past the paper over the other half of the slide. The paper will fall off when dry. The slide is then immersed in the staining solution (using an ordinary staining jar) and allowed to remain for from 20 to 30 minutes. After being rinsed under a cold water tap by passing through a slow stream of water three to six times, it is placed on edge and allowed to dry.

When examined under oil immersion, those cells on the half of the slide fixed with methyl alcohol have the appearance of regularly stained blood films (fig. 2); and differential leucocyte and stippled counts may be obtained and any other change in the morphology of the red blood cell noted. On the portion of the slide which received no fixation other than drying in the air, only the white cells and erythrocytes containing basic staining substance (reticulocytes) remain, the aqueous dye solution having destroyed adult erythrocytes by laking (as shown in fig 2).

As the same stain is used over and over again, its density is increased through loss of water, and the adult cells may not be completely laked. However, they show up only as outlines or what might be termed "cell shadows."

The same procedure as the above, with a solution of Manson's blue as advocated by McCord, will give quite similar results and give them more quickly (in 2 to 5 minutes). However, although the cells in the nonfixed portion may show up as well as when using toluidine blue, the fixed portion is not nearly so satisfactory for routine examinations. One must be more particular about the duration of staining, and results with this solution are likely to be less uniform. Much the same criticism may be offered concerning the use of various concentrations of methylene blue and toluidine blue. Sussmann-Weindel solution holds up very well and may be used for 3 to 6 weeks after being prepared.

No special equipment is required for estimating the number of reticulocytes per 1,000 red blood cells, but the procedure is much simplified by using the counting ocular designed by Ehrlich for determining the ratio between red and white corpuscles in stained dry mounted preparations. The ocular may be adjusted to furnish one

to four visual fields of known ratios, the ratio of the fields being 1 : 4 : 9 : 16. A no. 3 field with this ocular, which has nine times the area of a no. 1 field, was found most convenient. Metal or cardboard disks, inserted in the ordinary eyepiece, may be used in lieu of the ocular, one disk with an aperture 1 millimeter square, and one with an aperture 3 millimeters square. Since the fields covered are measured by use of a mechanical stage, it is necessary to know how many fields are viewed in moving the stage 1 millimeter. This is found by focusing on a blood smear, setting the stage at a given point, then counting 100 fields in succession while the stage is moved laterally and noting the distance the mechanical stage has moved. Several trials gave an average of 11.1 no. 3 fields per millimeter.¹

It is not difficult to get the average cell count of cells found or viewed by the use of one no. 3 field. For example, say the smear is of such thickness that the average number of cells per field found in 20 no. 1 fields is 10; then one no. 3 field would contain 9 times 10, or 90 cells; and going 1 millimeter on the mechanical stage would bring into view 11.1 times 90, or 999 cells.

To estimate reticulocytes, focus on the fixed half of the smear and move to the nonfixed area, note the reading on the mechanical stage, then count all the basophilic cells seen as the stage is moved laterally, and note final reading. The next step is to count the number of erythrocytes viewed in examining a corresponding area on the fixed half of the film; this count may be taken as the number of erythrocytes that are present in the portion of the nonfixed half examined for reticulocytes.²

COMPARATIVE RESULTS WITH ORDINARY BLOOD FILM AND VITAL STAINING TECHNIQUE

Through the cooperation afforded by the superintendent and staff of a local hospital, it was found possible to make blood examinations for the purpose of comparing the results obtained by vital staining techniques and the staining of air-dried blood film with Sussmann-Weindel staining solution. In all about 46 specimens of blood from persons suffering from some form of anemia were examined by both methods. When possible, without inconvenience to the patient, four vital stain preparations and a like number of ordinary blood films

¹ This (constant) number of fields per millimeter move of the mechanical stage needs to be determined but once for any given set-up of microscope, eyepiece, and lens.

² For example, suppose we count 180 reticulocytes and find the stage has been moved 12.2 millimeters. Then we take the average number of cells found in a no. 1 field by counting 10 to 20 no. 1 fields in the fixed portion of the slide corresponding to the area in which the 180 reticulocytes were found. This multiplied by 9 gives the average number viewed in one no. 3 field; and with 11.1 such fields to the millimeter we estimate that we have examined 12.2 times 11.1 times 9 times average no. 1 field (say 10)=12187 cells, in which 180 reticulocytes were found. Thus the specimen shows $\frac{180}{12187}=1.47$ percent of erythrocytes showing reticulations.

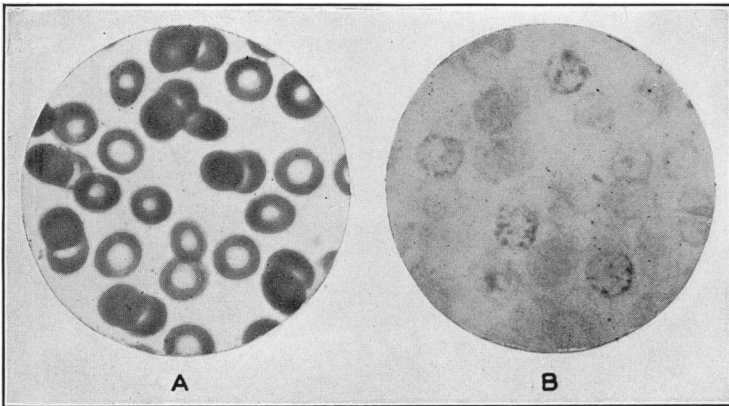


FIGURE 2.—A, Photomicrograph of fixed portion of the film; B, photomicrograph of nonfixed portion of the field (demonstrating basophilic cells).

were made from the same blood samples (34 such samples were obtained).

Like duplicate samples were obtained from 22 apparently well individuals.

The average percentage of erythrocytes showing reticulations was found to be 3.73 for all examinations by the vital staining technique and 3.78 for corresponding examinations using the air-dried blood film. For apparently normal individuals, these averages were 0.49 and 0.62, respectively. For persons showing some degree of anemia, these averages were 5.13 and 5.48, respectively. Thus it is seen that

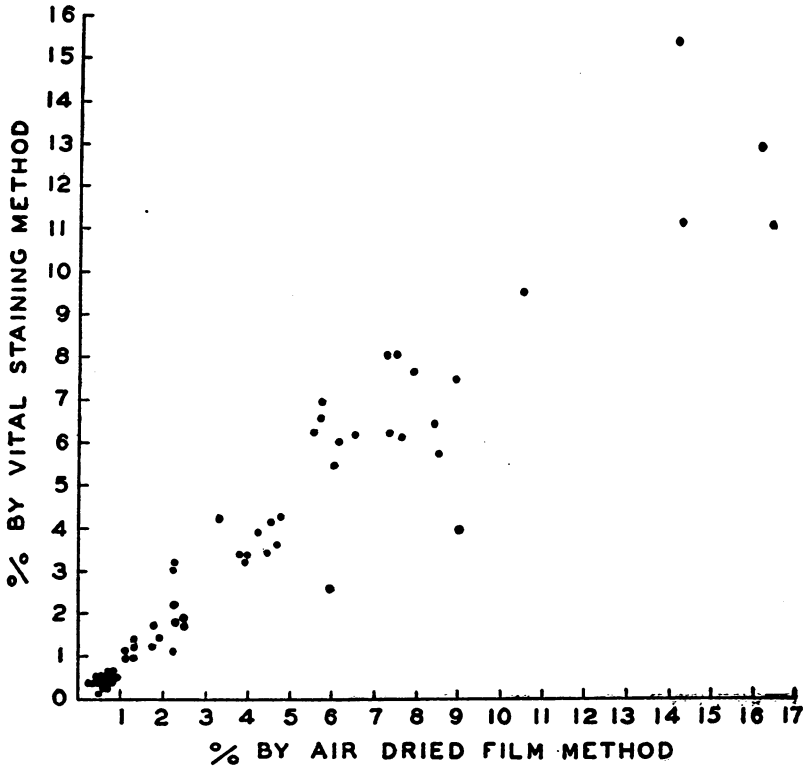


FIGURE 3.—Correlation between the results obtained in estimation of percentage of reticulocytes from vital stained preparations and air-dried films.

the ordinary blood film technique and the vital staining technique yield about the same average results.

In individuals showing high reticulocyte percentages by the vital staining method, equally high values were found with the ordinary blood film method. This fact is shown in figure 3, which indicates the correlation between the results obtained by both methods on different individuals.

This close correlation is evidence that the ordinary film method will give results equally as reliable as those obtained by the vital staining method.

With regard to the question of reliability, additional evidence is given by a comparison of the respective variabilities in successive readings made from the same specimen. Such variability may be measured approximately, for each method, by taking the deviations of individual counts from the mean for all readings made from the same specimen, averaging these deviations, and dividing the average by this mean (giving what may be termed a coefficient of variability). In table 1 is illustrated the method by which the calculation is made, for both vital staining and ordinary blood film techniques.

TABLE 1.—*Calculation of coefficient of variability¹ in different estimations made from the same specimen*

[Case 24. Pernicious anemia]

Estimation	Vital staining technique (cresyl blue)			Dried films (toluidine blue)		
	Percent- age of red cells showing reticula- tions	Devia- tion from average	Coeffi- cient of varia- bility	Percent- age of red cells showing reticula- tions	Devia- tion from average	Coeffi- cient of varia- bility
First.....	8.3	1.2	-----	9.4	1.0	-----
Second.....	10.4	.9	-----	11.1	.7	-----
Third.....	10.7	1.2	-----	10.4	.0	-----
Fourth.....	8.7	.8	-----	11.0	.6	-----
Average.....	9.5	1.02	10.7	10.4	.57	5.4

¹ This is not the customary coefficient, but is obtained as explained in the text.

When this procedure is applied to the whole group of persons (34) for whom four estimations by each method were made on a single specimen of blood, it was found that the average of the coefficients of variability for the vital staining technique was 24.39, while for the ordinary blood film technique it was only 8.89, indicating a greater stability in the latter case. This difference is statistically significant as indicated by table 2.

TABLE 2.—*Distribution of coefficients (average deviation from the mean divided by the mean)*

	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+
Vital staining.....	0	2	7	9	4	3	3	4	2
Ordinary blood film.....	5	15	9	5	0	0	0	0	0

All factors considered, it would seem that the greater stability of results obtained by the ordinary film method is accounted for by the fact that the vital staining technique ordinarily calls for the actual examination of from 500 to 1,000 erythrocytes, while by ordinary blood film method from 7,000 to 12,000 cells are usually viewed.

No effort should be made to distinguish between stippled and reticulated cells in the nonfixed portion of the slide (both being young erythrocytes). If it is desired to secure the stippled cell count, the same should be made upon the fixed portion of the film. If convenient, several blood films should be prepared at the same time, especially until one's technique is so developed that thin, evenly spread films are regularly prepared.

By exercising care and attention upon the task of determining the proper "constant" for the microscopic set-up being used, the calculations are simplified and more uniform. At first glance the technique may seem rather complex; but once the "constant" is determined, the calculations are easily completed.

SUMMARY

1. A simple method of estimating juvenile red blood cells (basophilic cells or reticulocytes) from ordinary blood films is described.

2. The preparation may be made and examined at the convenience of the technician, and is relatively permanent, so that re-checks may be made by the same technician or by others interested.

3. It is possible to use the same slide for estimation of reticulocytes; differential white blood count; platelet estimation; and study of red blood cells for polychromatophilia, achromasia, anisocytosis, poikilocytosis, and punctate basophilia.

4. A report is made to the effect that this technique was used in examining blood films taken from persons exposed to lead and that most of such examinations showed an increase in the total number of reticulocytes.

5. Comparison of the vital staining and ordinary blood film techniques shows—

- (a) The average percentage of erythrocytes with reticulations was about the same by both methods.
- (b) There was a high degree of correlation in the results taken individually.
- (c) There was less variability in the results obtained by the ordinary blood film technique than by vital staining.

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COURT DECISION RELATING TO PUBLIC HEALTH

Abatement of public nuisance by local board of health.—(California Supreme Court; *Eaton et al. v. Klimm et al.*, 18 P. (2d) 678; decided Jan. 31, 1933.) The plaintiffs were partners in a general contracting business for street improvement work and sought to enjoin the board of health of the city and county of San Francisco from carrying into effect a resolution of the said board declaring the structures occupied by the plaintiffs to be a nuisance and ordering that the said structures be vacated and demolished, and also to enjoin the chief of police from taking summary action based on failure to comply with the order. The plaintiffs' premises comprised, among other things, a two-story frame structure used as an asphalt mixing plant and a series of non-descript one-story woodsheds used as places of storage. The trial court denied an injunction and the plaintiffs appealed to the supreme court.

The appellate court held that the operation of the asphalt mixing plant constituted a public nuisance and that a right to maintain such a nuisance could not be gained by prescription. Relative to the fact that, by the zoning ordinance which zoned the district as a light

industrial district, the plaintiffs were permitted to continue the operation of their plant, the court said that this was not an absolute defense to nuisance proceedings, and quoted from a district court of appeal decision that "It has been held a number of times in this court that a license, permit, or franchise does not authorize the creation or maintenance of a nuisance."

The court took the view that the nuisance was caused by the operation of the asphalt mixing plant and was not even remotely connected with the sanitary condition of the buildings upon the premises. It also reached the conclusion that the ordinance under which the board acted covered only those situations in which the buildings themselves, or any part thereof, were insanitary. This being so, it was held that the remedy provided and penalty prescribed by the ordinance were inapplicable to the instant situation.

The court said, however, that it did not follow that the plaintiffs were entitled to the injunction which they sought restraining the board from "taking possession of or removing or, in any manner, whatever, interfering with any of the property hereinabove described or with the business of plaintiffs conducted thereon, or with plaintiffs' operation of said business upon said property." The case of *McQueen v. Phelan*, 4 Cal. App. 695, 88 P. 1099, 1100, was cited, wherein it was held that, inasmuch as under section 3494 of the civil code "a public nuisance may be abated by any public body or officer authorized thereto by law", public officials could not be restrained by injunction from proceeding, according to law, to abate what is found to be a public nuisance, whether the ordinance under which they purported to act was valid or void. "In the instant case", said the court, "the issue of whether or not the operation of appellants' business constituted a nuisance was presented by the pleadings, and the court expressly found that the conditions complained of were true and that the operation of the plant constituted a nuisance. It follows that the board of health, under section 3494 of the civil code, is entitled to abate the operation of said asphalt mixing plant, and the trial court properly refused to grant an injunction restraining the board of health from interfering *in any manner, whatever*, with the appellants' business."

The court held, however, that the plaintiffs—

were entitled to an injunction restraining the carrying into effect of the drastic order issued by the board of health under the purported authority of ordinance no. 501 (new series); that is to say, the demolishing of the buildings and the removal of appellants' equipment. Appellants are also entitled to an injunction against the attempted enforcement of said order by the infliction of the penalty specified in ordinance no. 816 (new series) for a failure to comply with said orders.

The judgment was reversed and the cause remanded to the trial court with directions to issue an injunction in accordance with the conclusions expressed in the opinion.

DEATHS DURING WEEK ENDED JULY 29, 1933

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended July 29, 1933	Corresponding week, 1932
Data from 85 large cities of the United States:		
Total deaths.....	7,162	6,632
Deaths per 1,000 population, annual basis.....	10.0	9.5
Deaths under 1 year of age.....	481	521
Deaths under 1 year of age per 1,000 estimated live births (81 cities).....	41	44
Deaths per 1,000 population, annual basis, first 30 weeks of year.....	11.3	11.7
Data from industrial insurance companies:		
Policies in force.....	67,700,024	71,641,157
Number of death claims.....	12,065	13,014
Death claims per 1,000 policies in force, annual rate.....	9.3	9.5
Death claims per 1,000 policies, first 30 weeks of year, annual rate.....	10.2	10.0

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended August 5, 1933, and August 6, 1932

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Aug. 5, 1933, and Aug. 6, 1932

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932
New England States:								
Maine.....	2	2			1	4	0	0
New Hampshire.....					8	2	0	0
Vermont.....					8	19	0	0
Massachusetts.....	16	37			83	88	1	0
Rhode Island.....	2	1				3	1	0
Connecticut.....	3	4	4		25	26	0	1
Middle Atlantic States:								
New York.....	31	49	1	1	186	311	3	2
New Jersey ²	7	13		3	34	94	2	2
Pennsylvania.....	42	34			195	194	4	7
East North Central States:								
Ohio.....	15	24	3	4	28	67	1	0
Indiana.....	5	23	20	7	13	12	2	5
Illinois ¹	17	31	6	4	34	24	4	2
Michigan.....	20	7			33	214	2	1
Wisconsin.....	5	38	21	8	42	45	0	3
West North Central States:								
Minnesota.....	4	2	1		9	5	1	1
Iowa ³	7	11			1	4	1	1
Missouri.....	4	4	1	1	13	6	0	1
North Dakota.....	2	4	5		27	16	1	9
South Dakota.....	3	3					0	0
Nebraska.....	2	2				4	0	3
Kansas.....	3	6			3	17	0	0
South Atlantic States:								
Delaware.....							0	1
Maryland ^{1 4}	1	6	2	4	10	7	0	1
District of Columbia.....	8	1			2		1	0
Virginia ^{2 4}	13	36			26	22	0	1
West Virginia.....	10	8	10		33	34	2	0
North Carolina ^{1 4}	18	21	1	28	43	26	0	1
South Carolina ²	4	7	62	49	32	16	0	0
Georgia ²	28	18		11	24	3	0	1
Florida ²	9	11		2	11	2	0	0
East South Central States:								
Kentucky.....	6				5		0	5
Tennessee.....	15	6	6	13	20		0	0
Alabama ²	21	14	7	6	14		0	1
Mississippi ³	17	19					0	0

See footnotes at end of table.

*Cases of certain communicable diseases reported by telegraph by State health officers
for weeks ended Aug. 5, 1933, and Aug. 6, 1932—Continued*

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932
West South Central States:								
Arkansas.....	8	2			19	1	0	0
Louisiana ²	5	15	6		6	3	1	0
Oklahoma ³	11	30	5	3	4	3	0	0
Texas ⁴	55	46	90	16	148	13	2	1
Mountain States:								
Montana ⁴	1	1			2	32	0	1
Idaho ⁴		2	4		4		0	0
Wyoming ⁴	1				5	3	0	0
Colorado.....	2	7			4	7	0	0
New Mexico.....	3	8			14	2	0	0
Arizona.....	4	2				1	1	0
Utah ³			1	1	24	2	0	0
Pacific States:								
Washington.....		3		2	19	14	1	1
Oregon.....		2	6	11	27	13	0	0
California.....	25	40	9	119	106	35	0	1
Total.....	455	600	280	295	1,355	1,304	31	44
Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932
New England States:								
Maine.....	1	1	4	3	0	0	0	2
New Hampshire.....	0	1	6	3	0	0	0	1
Vermont.....	0	0	1	4	0	0	0	0
Massachusetts.....	20	2	56	60	0	0	10	6
Rhode Island.....	1	2	12	6	0	0	0	1
Connecticut.....	0	0	13	9	0	0	3	2
Middle Atlantic States:								
New York.....	73	12	100	157	0	2	40	54
New Jersey ²	4	7	30	44	0	0	12	9
Pennsylvania.....	4	17	106	99	0	0	35	34
East North Central States:								
Ohio.....	4	2	110	64	3	4	58	44
Indiana.....	1	0	11	32	1	1	24	20
Illinois.....	7	10	74	48	2	1	28	44
Michigan.....	3	7	59	78	2	0	16	17
Wisconsin.....	0	1	17	8	2	1	3	6
West North Central States:								
Minnesota.....	4	6	10	13	0	1	2	3
Iowa ²	1	2	8	6	2	8	8	17
Missouri.....	4	1	16	28	0	1	32	28
North Dakota.....	1	2	1	1	0	4	0	3
South Dakota.....	1	0	2	4	0	0	2	0
Nebraska.....	0	0	3	9	0	0	0	2
Kansas.....	5	3	17	18	0	0	15	9
South Atlantic States:								
Delaware.....	0	0		2	0	0	3	1
Maryland^{2,4}:	3	3	14	25	0	0	34	41
District of Columbia.....	0	0	7	2	0	0	2	0
Virginia ^{2,4}	0	2	13	11	0	0	38	52
West Virginia.....	3	0	28	4	0	0	53	45
North Carolina ^{2,4}	0	0	24	15	0	0	24	45
South Carolina ²	1	5	4	4	0	0	36	50
Georgia ²	0	2	10	4	5	0	45	87
Florida ²	0	0	1	3	0	1	2	9
East South Central States:								
Kentucky.....	0	1	12	17	1	0	83	127
Tennessee.....	14	0	18	7	0	0	95	111
Alabama ²	0	3	10	8	0	0	36	33
Mississippi ²	0	0	9	7	0	0	23	31

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Aug. 5, 1933, and Aug. 6, 1932—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932	Week ended Aug. 5, 1933	Week ended Aug. 6, 1932
West South Central States:								
Arkansas.....	0	0	1	5	0	1	25	13
Louisiana ¹	2	2	7	5	0	1	53	27
Oklahoma ²	0	0	7	4	0	7	22	66
Texas ³	3	2	25	17	3	1	55	43
Mountain States:								
Montana ⁴	0	0	2	8	0	4	4	2
Idaho ⁴	0	0	4	1	1	5	2	2
Wyoming ⁴	2	0	1	1	0	0	5	0
Colorado.....	0	0	2	6	6	2	4	10
New Mexico.....	0	0	3	-----	3	0	5	6
Arizona.....	0	0	3	-----	1	0	3	0
Utah ⁵	0	0	3	2	0	0	2	0
Pacific States:								
Washington.....	1	0	7	8	5	6	4	4
Oregon.....	1	1	10	11	4	2	3	3
California.....	5	4	54	35	16	3	5	9
	169	101	937	906	57	56	954	1,119

¹ New York City only.

² Typhus fever, week ended Aug. 5, 1933, 73 cases, as follows: New Jersey, 1; Illinois, 1; Virginia, 2; North Carolina, 6; South Carolina, 1; Georgia, 18; Florida, 2; Alabama, 18; Louisiana, 1; Texas, 23.

³ Week ended earlier than Saturday.

⁴ Rocky Mountain spotted fever, week ended Aug. 5, 1933, 15 cases, as follows: Maryland, 3; Virginia, 5; North Carolina, 4; Montana, 1; Idaho, 1; Wyoming, 1.

⁵ Exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Menin- gococ- cus- menin- gitis	Diph- theria	Influ- enza	Mala- ria	Mea- sles	Pel- lagra	Polio- mye- litis	Scarlet fever	Small- pox	Ty- phoid fever
<i>May 1933</i>										
Hawaii Territory.....	1	8	8	-----	-----	-----	0	1	0	8
New Hampshire.....	-----	1	-----	-----	-----	-----	0	92	0	2
<i>June 1933</i>										
Georgia.....	1	37	114	341	679	74	0	17	0	194
<i>July 1933</i>										
Arkansas.....	1	16	7	277	198	244	-----	12	1	104
Connecticut.....	2	21	11	-----	177	-----	6	76	0	9
District of Colum- bia.....	1	10	3	-----	58	-----	2	17	0	4
Iowa.....	4	21	-----	1	29	-----	1	42	11	5
Nebraska.....	2	16	-----	-----	81	-----	0	39	8	4
New Hampshire.....	-----	2	-----	-----	-----	-----	0	41	0	2
North Dakota.....	2	9	-----	-----	15	-----	7	5	3	2
Pennsylvania.....	17	129	-----	-----	1,284	1	19	664	0	69
Wyoming.....	-----	3	-----	-----	13	-----	1	17	1	5

May 1933		July 1933—Continued		July 1933—Continued	
Hawaii Territory:	Cases	Anthrax:	Cases	Puerperal septicæmia:	Cases
Chicken pox	84	Arkansas	1	Pennsylvania	6
Conjunctivitis, acute epidemic	6	Chicken pox:	4	Rabies in animals:	18
Conjunctivitis, follicular	12	Arkansas	193	Connecticut	18
Hookworm disease	24	Connecticut	14	Rocky Mountain spotted fever:	
Impetigo contagiosa	1	Iowa	29	District of Columbia	3
Leprosy	1	Nebraska	13	Iowa	2
Mumps	43	North Dakota	23	Wyoming	20
Septic sore throat	1	Pennsylvania	615	Septic sore throat:	
Tetanus	4	Wyoming	9	Connecticut	4
Trachoma	2	Dysentery:		Tetanus:	
Whooping cough	339	Pennsylvania	2	Pennsylvania	7
<i>June 1933</i>					
Georgia:					
Chicken pox	27	German measles:		Trachoma:	
Dysentery	84	Connecticut	6	Arkansas	2
Hookworm disease	131	Pennsylvania	18	Pennsylvania	1
Mumps	51	Hookworm disease:		Trench mouth:	
Paratyphoid fever	3	Connecticut	1	Wyoming	2
Septic sore throat	30	Impetigo contagiosa:		Tularæmia:	
Tetanus	3	Iowa	1	Arkansas	1
Trachoma	4	Lethargic encephalitis:		Wyoming	12
Tularæmia	2	Pennsylvania	6	Undulant fever:	
Typhus fever	48	Mumps:		Arkansas	1
Undulant fever	7	Arkansas	5	Iowa	23
Whooping cough	350	Connecticut	78	Pennsylvania	7
<i>July 1933</i>					
Actinomycosis:		Iowa	46	Whooping cough:	
Pennsylvania	1	Nebraska	12	Arkansas	55
		North Dakota	2	Connecticut	175
		Pennsylvania	309	District of Columbia	34
		Wyoming	1	Iowa	192
		Ophthalmia neonatorum:		Nebraska	117
		Iowa	16	North Dakota	82
		Pennsylvania	1	Pennsylvania	1,323
		Paratyphoid fever:		Wyoming	14
		Connecticut	2		

WEEKLY REPORTS FROM CITIES

City reports for week ended July 29, 1933

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Small-pox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0		0	1	1	0	0	1	2	4	
New Hampshire:											
Concord	0		0	0	4	0	0	0	0	0	16
Nashua	0		0	0	0	0	0	0	0	0	
Vermont:											
Barre	0		0	3	0	0	0	1	0	0	2
Burlington	0		0	0	0	0	0	0	0	0	11
Massachusetts:											
Boston	5		0	51	0	21	0	9	0	66	167
Fall River	0		0	3	0	2	0	1	0	8	28
Springfield	0		0	0	2	1	0	0	1	4	21
Worcester	1		0	13	1	5	0	0	3	3	33
Rhode Island:											
Pawtucket	0		0	0	0	0	0	0	0	0	9
Providence	0		0	0	0	5	0	2	0	43	56
Connecticut:											
Bridgeport	0		0	3	2	1	0	5	0	2	33
Hartford											
New Haven	2		0	0	1	0	0	0	1	1	28
New York:											
Buffalo	1		0	16	13	11	0	10	0	56	123
New York	26	1	2	82	76	22	0	87	17	135	1,231
Rochester	0		0	1	11	2	0	2	1	14	70
Syracuse	0		0	0	2	0	0	0	0	8	42
New Jersey:											
Camden	0		0	0	3	0	0	1	0	0	20
Newark	0	2	0	5	5	4	0	9	0	51	93
Trenton	0		0	6	3	2	0	1	2	1	33
Pennsylvania:											
Philadelphia	4	2	0	80	5	14	0	28	6	15	397
Pittsburgh	4		1	0	9	12	0	4	0	68	120
Reading	0		0	0	1	0	0	2	0	8	21
Ohio:											
Cincinnati	0	1	0	0	7	10	0	7	0	20	131
Cleveland	3	16	0	0	4	9	0	10	5	59	174
Columbus	0		0	0	3	2	0	4	2	0	88
Toledo	2		0	6	4	18	0	4	3	28	63

City reports for week ended July 29, 1933—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Small-pox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Indiana:											
Fort Wayne	1		0	0	0	0	0	2	0	0	25
Indianapolis	0		0	3	8	1	0	5	1	8	
South Bend	0		0	1	0	0	0	0	2	0	13
Terre Haute	0		0	0	0	0	0	0	0	2	24
Illinois:											
Chicago	4	1	2	27	19	37	0	46	3	76	638
Springfield	1		0	0	0	0	0	0	0	1	
Michigan:											
Detroit	11	2	0	9	1	13	0	27	3	128	216
Flint	1		0	2	0	6	0	1	0	7	21
Grand Rapids	0		0	0	1	1	0	1	0	3	27
Wisconsin:											
Kenosha	0		0	1	0	0	0	0	0	7	6
Madison	0		0	2	0	7	0	2	0	11	
Milwaukee	0	1	1	2	0	7	0	2	0	204	81
Racine	1		0	0	1	2	0	0	0	29	16
Superior	0		0	0	0	0	0	0	0	12	6
Minnesota:											
Duluth	0		0	9	0	2	0	0	0	13	12
Minneapolis	3		0	1	0	5	0	1	0	10	91
St. Paul	0		0	1	3	1	0	2	0	53	58
Iowa:											
Des Moines	4			0		2	0		0	0	
Sioux City	0			0		0	0		0	6	1
Waterloo											
Missouri:											
Kansas City	2		0	0	10	4	0	5	2	16	89
St. Joseph	0		0		2	1	0	0	0	0	23
St. Louis	13			19	3	2	0	12	6	19	209
North Dakota:											
Fargo	0		0	0	0	0	0	0	0	0	4
Grand Forks	0		0	0	0	0	0	0	0	0	
South Dakota:											
Aberdeen	0		0	0	0	0	0	0	0	0	
Sioux Falls	0		0	0	0	0	0	0	0	0	5
Nebraska:											
Omaha											
Kansas:											
Topeka	0		0	0	0	2	0	0	0	3	18
Wichita	0		0	1	0	0	0	0	0	9	
Delaware:											
Wilmington	0		0	0	1	0	0	3	0	1	31
Maryland:											
Baltimore	1	1	0	4	7	13	0	20	1	62	190
Cumberland	0		0	2	0	1	0	0	0	0	5
Frederick	0		0	0	0	0	0	0	0	0	2
District of Columbia:											
Washington	2	1	1	4	7	3	0	18	4	8	156
Virginia:											
Lynchburg	0		0	7	0	0	0	0	0	14	12
Norfolk	1		0	0	0	0	0	2	5	0	19
Richmond	0		0	0	1	1	0	3	2	10	39
Roanoke	1		0	0	1	1	0	0	4	1	14
West Virginia:											
Charleston	0		0	0	0	1	0	0	0	2	14
Huntington	0		0	0	0	0	0	0	0	0	
Wheeling	0		0	0	0	0	0	0	0	1	15
North Carolina:											
Raleigh	0		0	0	0	0	0	1	1	0	18
Wilmington	0		0	1	0	1	0	1	0	0	10
Winston-Salem	1		0	4	2	3	0	2	0	1	18
South Carolina:											
Charleston	0	2	0	0	1	0	0	0	1	1	18
Columbia											
Greenville	0		0	0	0	0	0	0	2	0	7
Georgia:											
Atlanta	6	7	0	0	2	2	0	4	11	13	76
Brunswick	0		0	0	0	0	0	0	0	0	6
Savannah											
Florida:											
Miami	0	1	0	0	0	0	0	0	0	2	22
Tampa	1		0	0	1	0	0	2	2	1	24
Kentucky:											
Ashland	0		0	0	0	0	0	0	7	7	
Lexington	0		0	2	0	0	0	2	8	0	20
Louisville	0		0	0	5	4	0	2	3	3	69
Tennessee:											
Memphis	1		0	9	1	2	0	20	5	10	108
Nashville	0		0	0	2	0	0	0	3	9	49

City reports for week ended July 29, 1933—Continued

State and city	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Small-pox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
	Cases	Deaths								
Alabama:										
Birmingham.....	1	0	0	3	3	0	1	9	2	40
Mobile.....	1	0	0	0	0	0	1	0	0	12
Montgomery.....	2		0		0	0		0		
Arkansas:										
Fort Smith.....	0	0	0	0	0	0	0	0	0	
Little Rock.....	0	0	1	2	0	0	3	0	0	5
Louisiana:										
New Orleans.....	2	1	1	4	0	0	14	5	1	126
Shreveport.....	0	0	0	2	2	0	0	1	0	9
Oklahoma:										
Oklahoma City.....	2	0	0	4	1	0	3	0	6	45
Tulsa.....	0		2		1	2		2		
Texas:										
Dallas.....	6	0	1	0	1	0	0	4	5	44
Fort Worth.....	1	0	0	0	0	0	3	0	0	35
Galveston.....	0	0	0	1	0	0	2	0	0	13
Houston.....										
San Antonio.....	3	2	0	4	2	0	5	0	1	58
Montana:										
Billings.....	0	0	0	0	0	0	0	1	1	6
Great Falls.....	0	0	0	2	0	0	0	0	5	11
Helena.....	0	0	0	0	0	0	0	0	0	2
Missoula.....	0	0	0	0	0	0	0	0	0	7
Idaho:										
Boise.....	0	0	0	0	0	0	0	1	5	10
Colorado:										
Denver.....	1	1	4	3	2	0	4	1	11	61
Pueblo.....	0	0	0	1	0	0	1	0	2	11
New Mexico:										
Albuquerque.....	0	0	0	1	0	0	3	0	5	15
Utah:										
Salt Lake City.....	1	0	2	1	0	0	0	0	11	42
Nevada:										
Reno.....	0	0	0	0	0	0	0	0	0	4
Washington:										
Seattle.....	0		1		1	0		0	22	
Spokane.....	0		0		1	0		0	0	
Tacoma.....	0	0	0	1	1	0	2	0	7	28
Oregon:										
Portland.....	1	0	3	2	1	2	0	0	2	70
Salem.....	0		0	0	0	0	0	0	0	
California:										
Los Angeles.....	13	15	1	32	7	19	24	4	88	269
Sacramento.....	0		0	0	1	1	1	0	10	32
San Francisco.....	1		0	2	4	2	0	0	17	144

State and city	Meningococcus meningitis		Polio-myelitis cases	State and city	Meningococcus meningitis		Polio-myelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Missouri:			
Boston.....	0	0	16	Kansas City.....	0	1	0
New York:				St. Louis.....	0	0	1
New York.....	7	3	40	North Dakota:			
Pennsylvania:				Fargo.....	1	0	3
Pittsburgh.....	0	0	2	Maryland:			
Ohio:				Cumberland.....	0	0	1
Cleveland.....	0	0	1	Virginia:			
Indiana:				Richmond.....	0	0	1
Indianapolis.....	1	0	1	West Virginia:			
Illinois:				Wheeling.....	0	0	1
Chicago.....	1	0	4	Florida:			
Michigan:				Tampa.....	0	0	2
Detroit.....	1	0	2	Kentucky:			
Flint.....	0	0	1	Louisville.....	1	1	0
Minnesota:				Tennessee:			
Minneapolis.....	0	0	2	Memphis.....	0	0	1
Iowa:				Oklahoma:			
Des Moines.....	1	0	0	Tulsa.....	5	0	0
Sioux City.....	1	1	1	California:			
				Los Angeles.....	2	2	0

Lethargic encephalitis.—Cases: New York, 1; Birmingham, 1.
Pellagra.—Cases: Chicago, 2; Wilmington, N. C., 1; Atlanta, 1; Louisville, 2; Memphis, 4; Birmingham, 1; New Orleans, 1; Dallas, 1; Los Angeles, 1.
Typhus fev..—Cases: Newark, N. J., 1; Wilmington, N. C., 2; Charleston, S. C., 4; Tampa, 1; Montgomery 1; San Antonio, 1.
Rabies (17 man).—Nashville, 1 death.

FOREIGN AND INSULAR

CANADA

Quebec Province—Communicable diseases—Two weeks ended July 29, 1933.—The Bureau of Health of the Province of Quebec, Canada, reports cases of certain communicable diseases for the 2 weeks ended July 29, 1933, as follows:

Disease	Cases	Disease	Cases
Chicken pox.....	58	Poliomyelitis.....	4
Diphtheria.....	28	Puerperal septicemia.....	1
Erysipelas.....	4	Scarlet fever.....	34
German measles.....	1	Tuberculosis.....	132
Influenza.....	1	Typhoid fever.....	46
Measles.....	278	Whooping cough.....	176

CHILE

Typhus fever.—According to information dated August 8, 1933, 2,530 cases of typhus fever, with 521 deaths, had been reported in Chile from January 1 to July 29, 1933. An intensive campaign was being waged against the disease.

CZECHOSLOVAKIA

Communicable diseases—May 1933.—During the month of May 1933, certain communicable diseases were reported in Czechoslovakia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax.....	1	-----	Paratyphoid fever.....	14	-----
Cerebrospinal meningitis.....	20	8	Poliomyelitis.....	9	1
Chicken pox.....	410	-----	Puerperal fever.....	42	20
Diphtheria.....	2,163	109	Scarlet fever.....	2,153	23
Dysentery.....	3	-----	Trachoma.....	150	-----
Influenza.....	29	3	Typhoid fever.....	337	26
Lethargic encephalitis.....	1	1	Typhus fever.....	31	4

MEXICO

Vera Cruz—Vital statistics—Year 1932.—During the year 1932, births and deaths were reported in the city of Vera Cruz, Mexico, as follows:

Population, estimated.....	74,741	Death rate per 1,000 population.....	23.69
Number of live births.....	1,776	Infant mortality per 1,000 births.....	171.17
Birth rate per 1,000 population.....	23.76	Number of stillbirths.....	187
Number of deaths.....	1,995		

Deaths from certain diseases were reported in Vera Cruz during 1932 as follows:

Disease	Number of deaths	Death rate per 10,000 population	Disease	Number of deaths	Death rate per 10,000 population
Dysentery.....	27	3.61	Tuberculosis.....	229	30.63
Gastro-intestinal diseases.....	528	70.64	Typhoid and paratyphoid fever.....	24	3.21
Malaria.....	74	9.90	Uncinariasis.....	51	6.82

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for July 28, 1933, pp. 896-906. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued Aug. 25, 1933, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

India—Bombay.—During the week ended July 15, 1933, 2 cases of cholera with 1 death were reported in Bombay.

Philippine Islands.—During the week ended August 5, 1933, cholera was reported in parts of the Philippine Islands as follows: Province of Bohol, Tagbilaran, 1 case; Province of Cebu, Opon, 4 cases, 5 deaths.

Plague

Argentina—El Mollar.—During the month of July 1933, 7 cases of plague with 3 deaths were reported in El Mollar, Salta Province, Argentina.

France—Marseille.—Under date of August 8, 1933, 2 cases of plague with 2 deaths were reported in Marseille, France.

Iraq—Basra.—During the week ended July 1, 1933, 3 cases of plague were reported in Basra, Iraq.

Typhus Fever

Egypt—Damietta.—During the week ended July 15, 1933, 2 cases of typhus fever were reported in Damietta, Egypt.