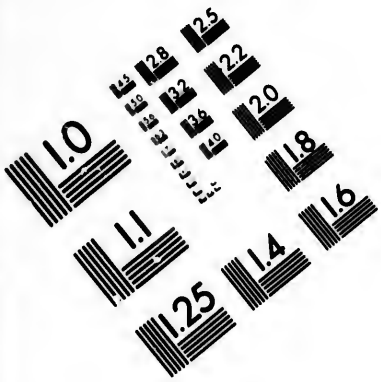

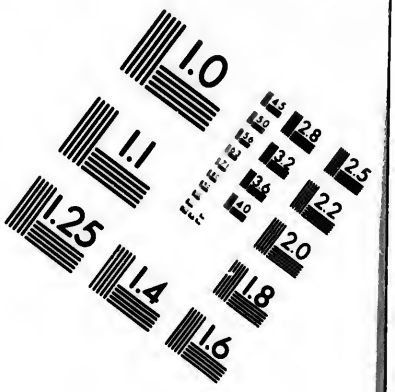

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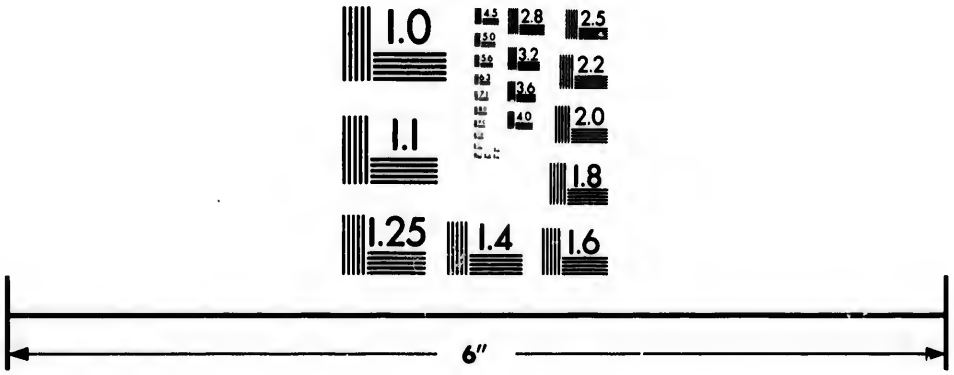

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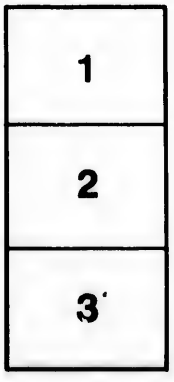

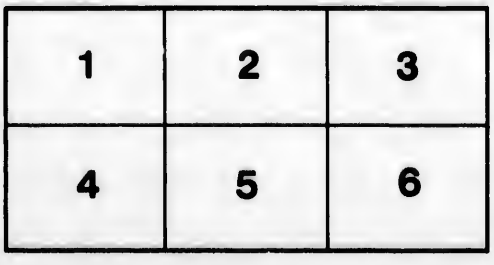

CHAPTER XXXIV.

THE GROWTH OF TORONTO CHILDREN.

By FRANZ BOAS.

INTRODUCTION.

In 1891, when active preparations for the World's Columbian Exposition were being made, Prof. F. W. Putnam, curator of the Peabody Museum of American Archæology and Ethnography, and chief of the Department of Anthropology of the Exposition, placed me in charge of the section of Physical Anthropology. At an early time during the preparation of the exhibits we agreed upon a plan to represent as fully as possible the growth and the development of American children. Valuable material was available, but it seemed desirable to extend the investigations over regions in which heretofore no observations had been collected. I submitted our plans to Mr. James Hughes, superintendent of public schools in Toronto, Ontario, and to Prof. Earl Barnes, of Leland Stanford Junior University. Through the interest taken by these gentlemen I have been enabled to obtain series of measurements of the school children of Toronto and of Oakland, Cal. The former series was taken under the supervision of Dr. Alexander F. Chamberlain, the latter under the direction of Prof. Earl Barnes. In both of these series the same plan, excepting details, was followed.

In the following pages I intend to present some of the results of our investigations upon the children of Toronto, together with a few general statements which the treatment of the material and a study of the questions involved suggest.

Since in previous investigations the influence of sex, of occupation of parents, and of descent had been studied, it seemed desirable to investigate the influence of other causes. I selected for this purpose the influence of the order of birth, i. e., the question whether first-born children have a development different from that of later-born children.

The blank on which the observations were recorded was drawn up so as to cover not only this point, but also the influence of nationality and occupation of the parents—facts which it was necessary to note in order to determine their influence on the questions to be investigated. Blue blanks were used for females, white blanks for males. Here is a copy of both sides of the blank:

[Front.]

FEMALE.

Record all linear measurements at nearest centimeter; all weights at nearest pound.

No. (name in full).
Observer (name in full).
Place of observation.
School.
Date of observation.
Age: years, months.
Place of birth.
Nationality of father's father.
Nationality of father's mother.
Nationality of mother's father.
Nationality of mother's mother.
Place of birth of father.
(City and State or country.)
Place of birth of mother.
(City and State or country.)
Occupation of father:
At time of child's birth;
At time of observation.
Residence.
Number and ages of living brothers.
Number and ages of living sisters.
Number of deceased brothers.
Number of deceased sisters.
Born child of mother.
(State whether first, second, third child, etc.)

Stature without shoes.
Finger-reach.
Height, sitting.
Weight: pounds.
Hair: Black, brown, red, golden, fair, gray.
(If gray, record also the original color, if possible.)
Eyes: Black, brown.
Hazel, gray, blue.
Ability:

The following measurements to be taken by special observers only.
Length of head.
Breadth of head.
Breadth of face.
Height of face A.
Height of face B.
Breadth of hand.

[Back.]

EXPLANATION OF MEASUREMENTS.

1. *Height standing.*—Let the person stand close to the wall in front of the measuring rod. His heels must be close together, touching the wall, and he must stand perfectly straight, looking straight ahead without raising or dropping the chin, the head touching the wall. Read off the height of the crown of the head by means of the triangle, pressing one side against the rod, the other against the crown of the head.
2. *Height sitting.*—Put a low, level seat (for instance, a small wooden box) in front of the measuring rod. Let the person sit on it so that his knees are about 5 inches higher than the seat, which is accomplished by making the seat sufficiently low, or by using a footstool. Let the person sit far back, close to the wall, keeping his back erect against the wall. He must look straight ahead without raising or dropping the chin, the head touching the wall. Give the heights of the seat and of the crown of the head.
3. *Finger-reach.*—Let the person touch a vertical post or wall with the second finger of one hand, and stretch along the measuring rod as far as he can reach. The rod must be held horizontally at right angles to the wall, in front of the body, along the median line of the arms. Let the person make the greatest possible efforts in stretching out his arms before you read off the figures.
4. The weight is to be taken in ordinary indoor costume.

The instrument used was a rod divided into 210 centimeters.[1] The index arm was a separate piece, consisting of a wooden angle, the sides of which were long enough to insure perfect contact with the measuring rod and with the crown of the head of the person being measured. The head measurements were taken by carefully trained observers; the others by the teachers. The personal data were given by the parents of the children. Owing to the peculiar social conditions prevailing in Toronto, certain groups of the population are represented by very few individuals. This is true particularly in regard to the French population, the greater part of whose children seem to attend the parochial schools. There are also very few children of the professional classes included in our material.

The success of the collection of measurements is largely due to the assistance extended by Mr. James Hughes, and to the lively interest on the part of the teachers who undertook the arduous task of obtaining the necessary information from the parents, and who took many of the measurements. To all of them my thanks are due. I have also to thank Dr. Alexander F. Chamberlain for the efficient management of the whole undertaking.

THE METHODS OF TREATING STATISTICS OF GROWTH.

The treatment of anthropometrical observations, particularly of growing children, offers peculiar difficulties. During the past years a vast number of observations referring to the growth of children have been accumulated. The method of treating the results of such observations has largely been a comparison of averages and of the frequency of occurrence of measurements between certain limits; for instance, frequency of occurrence of statures from inch to inch or of weights from pound to pound. It is generally assumed that these figures express immediately the physiological facts relating to growth.

In almost all cases the observations have been taken only once, and on a great number of individuals, not repeatedly through a long number of years on the same individuals. For this reason the series, when arranged according to years, will not be homogeneous. The younger groups contain many individuals who will not reach the adult stage, while the older classes contain only few individuals who will die before becoming adults. When we assume the whole series to be homogeneous, we imply that the value of the measurement under consideration has no relation to the liability to die at a certain age, which assumption seems to be very doubtful. Without considering details, it would seem very likely that individuals far remote from the average, who show either too small or too large measurements, approach the limits between pathological and physiological variation, and are therefore more likely to die. This would imply a greater variability of the measurements of deceased individuals of a certain age than of living individuals of the same age. The series of living individuals of all ages can be equally constituted only when the measurements of the living and of the deceased show the same values. This fact has already been pointed out by H. Westergaard.[2]

There are a few series of observations which seem to make the identity of the series of measurements of the living and of the deceased individuals of the same age very improbable. The most important among these is the peculiar decrease in the brain weight in males after the twentieth year. This can hardly be explained in any other way than by assuming an increased death-rate among men with very large brains at an age of about 20 years.

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[1] A centimeter is nearly 0.4 inch.
[2] Grundzüge der Theorie der Statistik, p. 188.

Bowditch and Roberts have shown that, on the average, children of well-to-do parents are taller and heavier than those of poorer parents. Carlier has shown the same phenomenon by proving that a number of children of a certain class, when brought under more favorable conditions—in his case into a military training school—grow more rapidly than the rest, who were left in their former conditions. The mortality of children is greater among the poorer classes than among the well-to-do classes. Therefore among the young children a greater percentage of the individuals measured belongs to the poorer classes, whose children are at the same time shorter of stature than among the older children. This fact affects undoubtedly the averages of measurements collected in our public schools.

It does not seem unlikely that the correlation between measurements and mortality is more strongly emphasized at certain periods than at others. If, for instance, many individuals of retarded growth should die during the period of adolescence, this might give the real explanation of the curious overlapping of the curves of growth of boys and girls, the girls between about the twelfth and fourteenth years being heavier and taller than boys of the same age. I am strengthened in this opinion by the observation, made by Dr. G. M. West, that the extent of this period and the amount of overlapping are the smaller the more favorable the conditions under which the individuals live. It would be interesting in this connection to study the curves of growth of a people which has a very high death-rate among young children.[1]

Social causes are apt to introduce other complications which restrict the comparability of the results. The poorer classes do not send their children to school as long and as regularly as the well-to-do; consequently their proportionate number among the school children decreases steadily, and this changing composition of the series must affect the results of the measurements.

The state of health of the children also affects the series, particularly during the first and last years. Weak children will be sent to school later than strong children, and the teachers will be inclined not to promote them as rapidly as strong children, so that the oldest school children will include an undue proportion, not only of those who are dull, but also of those who have been of weak health during a portion of their life.

For all these reasons, investigations based on single observations of children of various ages do not give us results which can be considered to indicate with the highest accuracy attainable the processes of human growth. The series for the various years differ in composition, and the physiological constants are therefore modified to a greater or less extent by a variety of disturbing factors. In order to obtain the physiological results with the greatest accuracy, the material upon which we base our studies must be made homogeneous. This can be accomplished in two ways. A very large number of children may be measured once; and year after year those who die and those who on account of social reasons are removed from the field of observation must be eliminated from the list. When all have become adults, the remaining individuals and those who dropped out for various reasons must be treated separately. But the best way would be to take measurements of a large series of children at stated intervals, as in this manner the fullest information on the manner of growth will be given, and as these repeated measurements furnish all the necessary material for subdividing the series so that each division will be homogeneous.

These limitations must be borne in mind in interpreting results of a single set of observations on children of various ages, or, to use Hertel's term, in interpreting results obtained by the generalizing method.

Besides this, certain corrections must be made which heretofore have not received sufficient attention. The number of children of various ages who have been measured is not equal. All the series begin with comparatively few children. The number increases from year to year until, beginning with the tenth or eleventh year, it decreases again. The change of numbers is not equal in the two sexes. It follows, from this fact, that among 6-year-old children, for instance, there are in the measured series more of the age of 6 years and 11 months than of 6 years exactly; and that, on the other hand, among the 15-year-old children there are more of the age of 15 years exactly than of 15 years and 11 months. In treating the various series of observations, all children between 6 and 7 years, 7 and 8 years, etc., or all the children between 6½ and 7½ years, etc., have been grouped together and the series is assumed to represent the sizes for the average ages, i. e., 6.5 years, 7.5 years, etc., or, in the other case, 6, 7, 8 years. On account of the varying frequency of the several months this is not quite correct. Among the young children the average will be

[1] I expressed these views first in Science, Vol. XX., p. 351, December 23, 1892.

a little more than 6.5, 7.5 years, etc., while among those near the upper limit of age it will be a little less than 14.5, 15.5 years, etc. I have tabulated the frequencies of various months for the children of Toronto and obtain the following results:

BOYS.

[Average age expressed in years and months.]

Months.	Age in years.										
	5	6	7	8	9	10	11	12	13	14	15
0	9	22	45	42	36	21	33	39	22	28	7
1	20	36	74	72	83	70	77	55	55	42	19
2	13	45	72	84	75	76	78	72	47	35	26
3	13	37	68	89	65	81	73	56	53	37	19
4	36	57	87	93	93	88	73	53	62	35	19
5	33	61	70	69	83	59	69	58	61	31	13
6	43	67	87	84	78	85	82	64	41	39	15
7	26	54	74	91	84	67	80	53	51	33	13
8	33	52	81	85	80	70	77	72	57	36	10
9	35	45	64	88	85	71	58	76	48	22	7
10	30	71	51	65	56	68	46	69	52	26	7
11	47	66	73	76	87	83	71	60	47	23	15
Average age	5 6.7	6 6.2	7 5.6	8 5.7	9 5.7	10 5.8	11 5.5	12 5.8	13 5.7	14 5.1	15 4.9

GIRLS.

Months.	Age in years.											
	5	6	7	8	9	10	11	12	13	14	15	16
0	.....	24	25	30	37	37	38	43	33	20	15	13
1	.....	42	57	79	79	65	88	75	44	47	26	18
2	.....	44	52	77	76	78	69	75	74	47	14	11
3	.....	28	65	74	65	64	80	72	63	38	19	11
4	.....	51	67	81	79	64	89	79	66	52	31	15
5	.....	49	54	52	86	71	63	79	52	40	22	7
6	45	81	72	80	90	76	78	73	59	38	31	7
7	30	52	73	76	72	71	60	61	63	28	26	9
8	40	55	81	82	69	82	83	77	59	40	22	11
9	33	62	77	70	72	63	78	60	41	34	18	2
10	35	51	59	62	73	73	65	55	48	34	15	3
11	49	58	77	71	77	76	85	75	53	25	8	8
Average age	.....	6 6.1	7 6.1	8 5.7	9 5.7	10 5.8	11 5.7	12 5.5	13 5.5	14 5.3	15 5.2	16 4.3

Similar deviations from the assumed average of period would be found in all the existing series if the material were arranged according to months instead of being grouped for the whole year. The error resulting from this source may be very easily corrected by adding to the average a correction proportional to the deviation of period. The following consideration will show this method to be correct. The material may be divided into periods so short that we may assume no growth worth considering to take place from beginning to end of each period, say, for instance, according to weeks. Then we may obtain the correct average for the whole year by taking the average of each period and adding to it a correction corresponding to the time that has to elapse or has elapsed between the middle of the year and the period. Let these averages for the periods 1, 2, 3 . . . . be $a_1, a_2, a_3 \ldots$, the annual growth be d, the distance in time from the periods 1, 2, 3, ... to the middle of the year be $t_1, t_2, t_3, \ldots$, then the averages corrected for time will be

$$a_1 + dt_1$$
$$a_2 + dt_2$$
etc.

In combining these, we must give each the weight corresponding to the number of cases, n_1, n_2, n_3 . . . . , from which it is derived. Let n be the total number of cases. Then we have the average for the whole year.

$$a = \frac{n_1 (a_1 + dt_1) + n_2 (a_2 + dt_2) + \ldots .}{n}$$
$$= \frac{(n_1 a_1 + n_2 a_2 + \ldots .) + d (n_1 t_1 + n_2 t_2 + \ldots .)}{n}.$$

As a_1 is the average of all the values of the period 1, we have $a_1 = \frac{s_1}{n_1}$, where s_1 is the sum of all the values of the period 1. Therefore

$$a = \frac{(s_1 + s_2 + s_3 + \ldots .) + d (n_1 t_1 + n_2 t_2 + \ldots .)}{n}.$$

The sum of all the s is evidently equal to the sum total of all the observations during the year, which we will call S.

$$a = \frac{S}{n} + d \frac{n_1 t_1 + n_2 t_2 + \ldots .}{n}.$$

The last quotient in the equation is the average of all the periods, which is multiplied by the annual increment d. We have therefore the average value for the year equal to the average of all the observations, plus a correction which is equal to the annual increment multiplied by the difference between the average period for all the observations and the full or half year, as the case may be.

While the average may be corrected in this manner without much difficulty, the variability of the series for the whole year is affected in a much more complex manner. We will suppose that the variability did not change much in the course of one year, which at certain periods of life is, however, not the case. Since the values of the average increase from month to month, it is clear that the range of variation for the early periods must begin at a lower point than for the later periods, so that the variation for the total year covers a wider range than the variations at a given moment do.

As an example I will give here the distribution of observations of 8-year-old girls, first in periods of three months, then for the whole year, with their averages and the means of the squares of deviations.

Distribution of observations of the height of 8-year-old girls.

Height in centimeters.	Number of girls measured, age 8 years and—				
	0 to 2 months.	3 to 5 months.	6 to 8 months.	9 to 11 months.	0 to 11 months.
105	1	1	.....	(a)	a 2
106	1	.....	.....	.....	1
107	.....	1	.....	.....	1
108	1	2	.....	1	4
109	3	4	2	.....	9
110	4	2	1	3	10
111	4	4	4	.....	12
112	6	7	8	.....	21
113	9	7	1	2	19
114	9	9	3	6	27
115	11	13	10	5	39
116	13	15	15	8	51
117	10	12	10	4	36
118	14	9	15	16	54
119	15	9	10	13	47
120	17	24	22	15	78
121	11	33	22	14	60
122	12	10	21	18	61
123	6	10	15	17	48
124	11	13	18	12	54
125	8	7	16	16	47
126	6	11	9	12	38
127	4	5	12	14	35
128	5	5	8	3	21
129	1	6	2	3	12

a One of 102 centimers.

Distribution of observations of the height of 8-year-old girls—Continued.

Height in centimeters.	Number of girls measured, age 8 years and—				
	0 to 2 months.	3 to 5 months.	6 to 8 months.	9 to 11 months.	0 to 11 months.
130	2	3	5	8	18
131		2	1	1	4
132	1	2	3	5	11
133			2		2
134	1	1	2	1	5
135				1	1
136			1	1	2
137				1	1
138				1	1
139					
140				1	1
Whole number of cases	186	207	238	203	834
Average height	118.9	119.7	121.3	122.4	120.63
Variability	±5.23	±5.60	±5.08	±5.46	±5.50

The average of the variability of the four quarters is ±5.34, while that for the total year is ±5.50, a very considerable difference, which will be the greater, the more rapid the growth or the more rapid the change of variability during the year.

Previous investigations have shown that variability decreases very rapidly in the period of adolescence. During this time it is imperative to divide the series according to intervals shorter than years in order to obtain results that bring out the physiological relations clearly.

We will call the variability at any given period t of a certain year μ_t; the average value of the measurement for the same period, A_t. The sum of the squares of all the deviations for this period, divided by the number of observations n_t for this period, will then be

$$\frac{\Sigma(A_t-x)^2}{n_t}=\mu_t^2.$$

The variability for the whole year is computed according to the formula

$$\frac{\Sigma(A-x)^2}{n}=\mu^2,$$

where A is the general average, and n the total number of cases. For this we can substitute

$$\mu^2=\frac{1}{n}\Sigma n_t\frac{(A-x)^2}{n_t}=\frac{1}{n}\Sigma n_t\frac{(A-A_t+A_t-x)^2}{n_t}$$

$$=\frac{1}{n}\Sigma n_t\frac{(A-A_t)^2}{n_t}+\frac{1}{n}\Sigma n_t\frac{(A_t-x)^2}{n_t}+\frac{2}{n}\Sigma n_t(A-A_t)\frac{A_t-x}{n_t}.$$

A_t being the average of all the values of the measurement at the period t, then

$$\Sigma(A_t-x)=0.$$

and the last member of the sum disappears.

We will call $$A-A_t=d_t.$$

As stated above $$\Sigma\frac{(A_t-x)^2}{n_t}=\mu_t^2.$$

Therefore $$\mu^2=\frac{1}{n}\Sigma n_t(d_t^2+\mu_t^2).$$

We will assume that n_t can be represented by the formula

$$n_t=n_0(C+at+bt^2),$$

also $$\mu_t^2=\mu_0^2(1+a_1t+b_1t^2),$$

and $$d_t^2=a_2t+b_2t^2.$$

If we assume t as continuous, and carry out the addition between the limits,

$$+0.5 > t > -0.5,$$

thus covering the whole year, we find

$$\mu^2 = \int_{-0.5}^{+0.5} \frac{(C + at + bt^2)\,[\,\mu_0^2(1 + a_1 t + b_1 t^2) + a_2 t + b_2 t^2\,]}{n} dt.$$

$$\mu^2 = \mu_0^2\,[C + \tfrac{1}{12}(b + b_1 C + a a_1) + \tfrac{1}{80} b b_1] + \tfrac{1}{12}(C b_2 + a a_2) + \tfrac{1}{80} b b_2.$$

When a, b; a_1, b_1; a_2, b_2; are computed from the values of the year under consideration, and the preceding and following years, which may be designated by the marks —1, 0, +1, we find

$$C = 1 - \tfrac{1}{12} b,$$

$$a = \frac{n_{+1} - n_{-1}}{2},$$

$$b = \frac{n_{+1} + n_{-1} - 2\,n_0}{2},$$

$$a_1 = \frac{\mu^2 - \mu_{-1}^2}{2\,\mu_0^2},$$

$$b_1 = \frac{\mu_{+1}^2 + \mu_{-1}^2 - 2\mu_0^2}{2\mu_0^2},$$

$$a_2 = \frac{d_{+1}^2 - d_{-1}^2}{2},$$

$$b_2 = \frac{d_{+1}^2 + d_{-1}^2}{2}.$$

From these data the final corrected values of average statures and of their variabilities have been computed (see also pp. 1555, 1556.)

Average statures and variabilities.[1]

	Age.													
	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5
Boys:														
Average stature..	105.90	111.58	116.87	122.04	126.91	131.78	136.20	140.74	146.00	152.39	159.72	164.90	168.91	171.07
Variability	(4.40)	4.62	4.93	5.34	5.49	5.75	6.19	6.66	7.54	8.49	8.78	7.73	7.22	(6.74)
Girls:														
Average stature..	104.88	110.08	116.08	121.21	126.14	131.27	136.62	142.52	148.69	153.50	156.50	158.03	159.14	.....
Variability	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

It might seem that this correction could be better made by adding the proportionate amount of growth to the measurement of each individual, i. e., for those of 6 years 0 months, for instance, the amount of 6 months' growth if the measurements are to be reduced to the period of 6 years 6 months. This, however, must not be done, as small children grow differently from tall children, and therefore the amount of growth to be added differs for the various values of the measurement. That this is the case has been proved by Dr. Henry G. Beyer.[2] I collected some statistics on this subject in Worcester, Mass., the results of which are briefly given here. I am indebted to Dr. G. M. West for many of the measurements, while others were taken by myself. The first series was taken in May, 1891. The second series was repeated in May, 1892. I give first the series of annual increases which were obtained in Worcester.

[1] Figures in parentheses denote approximate values.

[2] "The Growth of United States Naval Cadets" (Proc. U. S. Naval Institute, Vol. XXI, No. 2, whole No. 74).

Increase in stature of boys.

Increase in centimeters.	Number of boys whose increase in stature was observed between the ages of—										
	5 and 6.	6 and 7.	7 and 8.	8 and 9.	9 and 10.	10 and 11.	11 and 12.	12 and 13.	13 and 14.	14 and 15.	15 and 16.
0.0- 0.4											
0.5- 0.9											1
1.0- 1.4				1							
1.5- 1.9										2	
2.0- 2.4				1			1	1		1	1
2.5- 2.9				2	2		3	1		2	3
3.0- 3.4			2		2	2	2	3	1	1	1
3.5- 3.9	1		1	2	6	6	7	2	2	2	2
4.0- 4.4		4	5	12	11	14	14	8	1	1	
4.5- 4.9		1	13	15	14	15	13	14	4	4	
5.0- 5.4		7	11	11	17	12	13	9	6	1	3
5.5- 5.9	2	11	15	14	9	11	4	10		1	
6.0- 6.4	2	15	11	5	11	12	7	3	2	1	1
6.5- 6.9	1	3	3	2	6		4	6	3	3	
7.0- 7.4	1			1	1			4	6	2	2
7.5- 7.9			2				1	2	5	1	
8.0- 8.4							1	4	4	2	
8.5- 8.9						1		4	8	2	2
9.0- 9.4							1	3	5	1	
9.5- 9.9							1	1	1		1
10.0-10.4								1	4	3	
10.5-10.9	1								2	1	
11.0-11.4									3		
11.5-11.9									1	1	
12.0-12.4								1	1		
12.5-12.9											
13.0-13.4											
13.5-13.9											
14.0-14.4											
14.5-14.9											
15.0-15.4											
15.5-15.9											
16.0-16.4									1		1
Average increase	6.55	5.70	5.37	4.89	5.10	5.02	4.99	5.91	7.88	6.23	5.64
Variability	(±1.57)	±0.68	±0.86	±0.96	±1.03	±0.88	±1.26	±1.86	±2.39	±2.91	±3.46
Cases	8	41	63	66	79	73	72	77	60	32	18

Increase in stature of girls.

Increase in centimeters.	Number of girls whose increase in stature was observed between the ages of—										
	5 and 6.	6 and 7.	7 and 8.	8 and 9.	9 and 10.	10 and 11.	11 and 12.	12 and 13.	13 and 14.	14 and 15.	15 and 16.
—0.5– —0.9										1	
—0.0– —0.4										1	
0.0– 0.4								1	1	1	
0.5– 0.9									1	4	7
1.0– 1.4						1		2	1	4	1
1.5– 1.9									1	1	1
2.0– 2.4						2	1	1	1	2	2
2.5– 2.9					1			1	6	6	1
3.0– 3.4						1	1		3	1	2
3.5– 3.9			5	2	2	2	3	2	2	1	1
4.0– 4.4	2	2	4	3	2	6	4	4		2	
4.5– 4.9	2	4	5	14	7	5	3	1	5	1	
5.0– 5.4		7	3	8	9	12	6	3	4	2	
5.5– 5.9	5	5	10	12	6	8	5	7	2	1	
6.0– 6.4	5	7	12	8	11	6	10	8	2	1	
6.5– 6.9	2	10	8	4	8	10	7	8	4	2	
7.0– 7.4	1		4	3	2	6	11	8	2	3	
7.5– 7.9		2	2	2	3	2	14	7	2	2	
8.0– 8.4		1			1	4	5	7	3		
8.5– 8.9				2	2	2	3	4	1		
9.0– 9.4						4	6	4	3		
9.5– 9.9						1	3				
10.0– 10.4					1	1		2			
10.5– 10.9						1	1				
11.0– 11.4						1					
11.5– 11.9											
12.0– 12.4							20.7–1	18.1–1	19.6–1		
Average increase	5.75	5.90	5.70	5.50	5.97	6.17	6.98	6.71	5.44	3.34	
Variability	±0.88	+0.98	±1.10	±0.97	±1.23	±1.85	±1.89	±2.06	±2.89	±2.71	
Cases	17	38	53	56	55	75	84	71	47	36	15

I next divided the series into two equal parts, the first embracing the short, the second the tall, individuals. The following amounts of growth were found for these two groups:

Average annual increase ($d+\Delta$) in stature of short and tall children between the following years:

BOYS.

Class of children and differences.	Years.									
	6 and 7.	7 and 8.	8 and 9.	9 and 10.	10 and 11.	11 and 12.	12 and 13.	13 and 14.	14 and 15.	15 and 16.
Short	5.51	5.18	4.81	4.77	4.77	4.79	5.25	7.28	7.47	6.83
Tall	5.88	5.55	4.98	5.39	5.28	5.20	6.56	8.47	4.99	4.44
Difference (2Δ)	+0.37	+0.37	+0.17	+0.62	+0.51	+0.41	+1.31	+1.19	—2.48	—2.39

GIRLS.

Short	5.75	5.49	5.34	5.52	5.81	7.01	7.38	6.55	4.45	
Tall	6.06	5.90	5.67	6.41	6.52	6.95	6.03	4.38	2.23	
Difference (2Δ)	+0.31	+0.41	+0.33	+0.89	+0.71	—0.06	—1.35	—2.17	—2.22	

the ages of—

14 and 15.	15 and 16.
	1
2	
1	1
2	3
1	1
2	2
1	
4	
1	3
1	
1	1
3	
2	2
1	
2	
2	2
1	
	1
3	
1	
1	
	1
6.23	5.64
±2.91	±3.46
32	18

That there must be an interdependence between the rate of growth and the actual size attained at a certain period can be shown to be a theoretical necessity. If the variability of a series at the age t is μ, and if the variability of the annual increment d is m, then, according to the theory of probabilities, the variability at the age $t+1$ must be $\sqrt{\mu^2+m^2}$ if the amount of annual growth does not depend upon the size attained at the period t. Observations show that m is small as compared to μ. Observations also show that μ first increases quite rapidly from year to year, and that at the period of adolescence it suddenly decreases very rapidly. It is clear that these phenomena do not agree with the assumption made. We must conclude, therefore, that the amount of annual growth depends upon the size attained at a certain period.

It is possible to give an approximate value of this relation. If the average of all measurements for the period t is A, that for the period t_1 is $A+d$, where d is the average amount of growth for the period t_1-t. We will consider in what manner a value $A+d+v$ in the series of the period t_1 develops from the series of the period t.

We will suppose that the relation between the actual size of an individual and the average amount of his annual growth is expressed by the simple relation

$$d_x = d + ax, \text{ where } a \text{ is a constant.}$$

Furthermore, we will assume that the variability of d_x is the same for all values of x. The annual growth of a single individual of the size $A+x$ will be, according to these assumptions, $d+ax+y$, where y expresses the accidental variation of the annual increment. The size of the individual at the period t_1 will therefore be

$$A+x+d+ax+y = A+d+v.$$
$$y = v-x(1+a).$$

The probability of finding the variation x is

$$P_x = \frac{1}{\mu\sqrt{2\pi}} e^{-\frac{x^2}{2\mu^2}} dx.$$

The probability of finding y is

$$P_y = \frac{1}{m\sqrt{2\pi}} e^{-\frac{y^2}{2m^2}} dy = \frac{1}{m\sqrt{2\pi}} e^{-\frac{[v-x(1+a)]^2}{2m^2}} dv = \frac{1}{m\sqrt{2\pi}} e^{\frac{-\left(\frac{v}{1+a}-x\right)^2}{2\left(\frac{m}{1+a}\right)^2}} dv.$$

The probability of finding v and y combined is

$$P_x P_y = \frac{1}{\mu m 2\pi} e^{-\frac{x^2}{2\mu^2} - \frac{\left(\frac{v}{1+a}-x\right)^2}{2\left(\frac{m}{1+a}\right)^2}} dx.\, dv.$$

v will be obtained for all the values of x. Therefore

$$P_v = dv \int_{-\infty}^{+\infty} \frac{1}{\mu m 2\pi} e^{-\frac{x^2}{2\mu^2} - \frac{\left(\frac{v}{1+a}-x\right)^2}{2\left(\frac{m}{1+a}\right)^2}} dx.$$

This value of this integral is

$$P_v = \frac{1}{\sqrt{\mu^2(1+a)^2 m^2}\sqrt{2\pi}} e^{-\frac{v^2}{2[m^2(1+a)^2+m^2]}} dv.$$

By observation we find the variability at the period t_1—that is, that of v—equals μ_1. Therefore

$$\mu_1^2=\mu^2\ (1+a)^2+m^2;$$
$$a=\pm\sqrt{\frac{\mu_1^2-m^2}{\mu^2}}-1.$$

As a must be a small value, the positive root only is available, and we have

$$a=\sqrt{\frac{\mu_1^2-m^2}{\mu^2}}-1.$$

It follows from this equation that as long as μ_1 is considerably larger than μ, a is positive; when μ_1 is smaller than μ, it is always negative. As during the early years μ increases with age, among young children the small ones are in a period of retarded growth, while the tall ones are in a period of accelerated growth, while among older children when μ begins to decrease again the tall ones cease growing, while the smaller ones grow rapidly.

The values given on page 1549 for the amount of growth of short and tall children may be considered as equaling

$$\Delta=2\int_{-\infty}^{o}(d+ax)\frac{1}{\mu\sqrt{2\pi}}e^{-\frac{x^2}{2\mu^2}}dx=d-a\mu\sqrt{\frac{2}{\pi}}$$

It is therefore possible to calculate a from the data contained in the table on page 1549. The two series of values show a fairly close agreement, considering the small number of repeated measurements.

Values of a.

Ages.	For boys by the formula—		For girls by the formula—	
	$a=\sqrt{\frac{\mu_1^2-m^2}{\mu^2}}-1$	$a=\frac{\Delta}{\mu}\sqrt{\frac{\pi}{2}}$	$a=\sqrt{\frac{\mu_1^2-m^2}{\mu^2}}-1$	$a=\frac{\Delta}{\mu}\sqrt{\frac{\pi}{2}}$
6	0.05	0.05	0.02	0.04
7	0.05	0.05	0.05	0.05
8	0.01	0.00	0.01	0.04
9	0.03	0.07	0.03	0.09
10	0.06	0.06	0.06	0.07
11	0.06	0.04	0.07	—0.01
12	0.10	0.12	—0.11	—0.11
13	0.08	0.09	—0.17	—0.18
14	—0.03	—0.18	—0.17	—0.20
15	—0.22	—0.17	.....	.....

It must also be borne in mind that the formula

$$\text{Annual amount of growth}=d+ax$$

is a very rough approximation to actual conditions, and that, particularly during the period preceding puberty, the distribution of annual increase will differ considerably from this law.

Dr. H. P. Bowditch, in a paper published in the Twenty-second Annual Report of the State Board of Health of Massachusetts, assumes that the growth of children is such that they always remain in the same percentile grade—that is to say, if the variability at the period t is μ, and at the period t_1 is μ_1, then the average child which has at the period t the measurement $A+x=A+\frac{x}{\mu}\mu$ will have at the period t_1 the measurement $A_1+\frac{x}{\mu}\mu_1$. Its growth during the intervening period will therefore be

$$A_1+\frac{x}{\mu}\mu_1-A-\frac{x}{\mu}\mu=A_1-A+\frac{\mu_1-\mu}{\mu}x.$$

The assumption is therefore narrower than the one made above, as a, which we tried to determine by means of the various data, is here given the arbitrary value $\frac{\mu_1 - \mu}{\mu}$. It will be noticed that for

$$m = o$$

a will assume the value $\frac{\mu_1 - \mu}{\mu}$. The data given on pages 1546 and 1547 show that m is so large that it can not be neglected. Therefore the assumption $a = \frac{\mu_1 - \mu}{\mu}$ can not be true, and we conclude that the average percentile grade of growing individuals is constantly changing.

The average individual of the measurement $A + x$ at the period t will be at the period t_1

$$\begin{aligned} A + x + d + ax &= A + d + x\,(1 + a) \\ &= A + d + \frac{x}{\mu}\sqrt{\mu_1^2 - m^2} \\ &= A + d + x\frac{\sqrt{1 - \frac{m^2}{\mu_1^2}}}{\mu}\mu_1. \end{aligned} \qquad (1)$$

If the individual remained on the same percentile grade, his measurement would be

$$A + d + \frac{x}{\mu}\mu_1. \qquad (2)$$

It will be seen that the deviation (1) is smaller than (2). It follows, therefore, that the average of all growing individuals who in one year have a certain percentile grade will be nearer the general average the following year. This agrees with the results found by Dr. Henry G. Beyer.[1]

These facts and considerations have an important bearing upon the theory of the statistics of growth.[2] When we consider children of a certain age, we find that they are not all in the same stage of development. Some have reached a point just corresponding to their age, while others are a little behind, and still others a little in advance, of their age. Consequently the values of their measurements will not exactly correspond to those of their age. We may assume that the difference between their stage of development and that belonging to their exact age is due to accidental causes, so that the number less developed than the average of a particular age will be the same as the number of those more developed; or there will be as many children in a stage of development corresponding to that of their age plus a certain length of time as in a stage corresponding to that of their age minus a certain length of time.

The number of children who have a certain amount of deviation may be assumed to be arranged according to the laws of probability, so that the average of all the children will be exactly in the stage of development belonging to their age.

Observations have shown that growth during childhood is quite regular, and that it decreases rapidly during the period of adolescence. At this period, when the rate of growth is decreasing, those children whose growth is retarded will be more remote from the value belonging to their age than those whose growth is accelerated. As the numbers above and below the average are equal, those with retarded growth will have a greater influence upon the average than those whose growth is accelerated; therefore the average of all values of the measurement of all the children of a certain age will be too low when the rate of growth is decreasing and too high when it is increasing.

These considerations may be expressed in mathematical form as follows:

In the adult the relative frequency of the variation x from the average value of the measurement s will generally be expressed by the formula

$$P_{s+x} = \frac{1}{\mu_1\sqrt{2\pi}}\, e^{-\frac{x^2}{2\mu_1^2}}\, dx, \qquad (1)$$

where μ_1 is the measure of the variability of the series.

[1] "The Growth of United States Naval Cadets" (Proc. U. S. Naval Institute, Vol. XXI, No. 2, whole No. 74).

[2] The following theory was first published in "Science," Vol. XIX, 1892, May 6, p. 250; May 20, p. 281.

The value of the measurement belonging to the average of all those individuals who will finally reach the value s is, at any given period, a function of that period, and may be called s_t. The value of the measurement at the period t of all those individuals who will finally reach the stature $s+x$ is a function of s_t and x, and may be expressed by $f(s_t; x)$.

The individuals constituting the adult series will not develop quite regularly, but some will be in advance of others. We assume that at any given time these variations in period will be distributed according to the law of probabilities. The relative frequency of the variation y from the period under consideration, t, will be

$$P_{t+y} = \frac{1}{\mu_2\sqrt{2\pi}} e^{-\frac{y^2}{2\mu_2^2}} dy. \tag{2}$$

The probability, therefore, of finding an individual who will finally have the stature $s+x$, standing at the period of development $t+y$, and whose measurement is therefore $f(s_{t+y}; x)$ is equal to $P_{s+x} \cdot P_{t+y}$; or,

$$P_{f(s_{t+y};\, x)} = \frac{1}{\mu_1\mu_2 2\pi} e^{-\frac{x^2}{2\mu_1^2}-\frac{y^2}{2\mu_2^2}} dx \cdot dy. \tag{3}$$

The individuals who will finally have the measurement $s+x_1$ will have at a period $t+y_1$ the same measurement that other individuals who will finally be $s+x_2$ have at the period $t+y_2$. Consequently there will be an infinitely large number of combinations of x and y, which will result in the same value $s+v$. This will be the case whenever

$$f(s_{t+y};\, x) = s_t + v$$
$$y = \varphi(s_t + v;\, x).$$

By substituting this value of y in (3), and taking the integral for all values of x,

$$P_v = \int_{-\infty}^{+\infty} \frac{dv}{\mu_1\mu_2} e^{-\frac{x_1^2}{2\mu_1^2}-\frac{\phi(s_t+v,\, x)^2}{2\mu_2^2}} dx.$$

As an approximation, we may assume

$$\varphi(s_t + v;\, x) = s_t + v + ax + bx^2.$$

The distribution of probabilities about the type will then be asymmetrical. It is possible to compute from these data the typical values for each year, and at the place quoted above I have given a method of approximation. The latter is, however, not sufficient. I have disregarded values of the order ab and b^2 in arriving at the results given. This is, however, not sufficient. By including terms of higher order it is possible to compute the series more accurately, but the calculation is so exceedingly long and entails so much labor that I have given it up, particularly as it must be verified by actual observation. It seems more economical to wait until a satisfactory series of measurements, taken at annual intervals, is available.

Dr. H. P. Bowditch[1] has called attention to the asymmetry of the curves, which he expressed by the difference between the probable and average values. His observations were corroborated by the study of material collected in St. Louis, Mo., by Dr. W. T. Porter,[2] who followed the method laid down by Dr. Bowditch.

In order to gain a better insight into the character of the annual curves I have combined all the available American material. This computation was carried out for me by Dr. G. M. West, according to my instructions. The computations were made under his immediate supervision, and he is responsible for the preliminary interpolation, while I made the final combination myself.

[1] Twenty-second Annual Report of the State Board of Health of Massachusetts, pp. 479 ff.
[2] Transactions of the Academy of Science of St. Louis, Vol. VI, No. 12, 1894, pp. 350 ff.

The method of procedure was the following. Observations are available from the following six cities: Boston, Milwaukee, St. Louis, Worcester, Toronto, Oakland. These represent a variety of conditions. We may assume that the variations represented by various cities are due to accidental causes, that is to say, that when the children in all the towns and cities of the country are measured we expect to find the results to vary around a certain average, according to the laws of probability. The type of the total population would embrace statistics of all the individuals of various ages. These are not available, and we must consider the cities in which the measurements were taken as representatives of the total population. In order to unite the material properly we ought to know how large a portion of the population is represented by each city. We can not obtain any satisfactory information on this point, and the only practicable way of uniting the material seems to be to add all the measured individuals, without regard to the varying numbers that were measured in each city. This has been done. It was necessary to reduce the observations that were recorded in inches to centimeters. Similar reductions were necessary in the tables of weights. This required a lengthy interpolation. The St. Louis measurements required an additional interpolation, as the age of the measured children was recorded at the nearest birthday, while all the other observers counted age from the last birthday. The results of this calculation are given on pages 1555 and 1556.

It will be noticed that the distribution is rather unexpectedly irregular. I presume this is due to the fact that observers developed a tendency to round their observations, so that full inches and the centimeters ending with 0 or 5 (110, 115, 120, etc.) were given undue preference. It is likely that if this fact had been considered, the resulting curves would have been smoother.

Frequencies of statures of American boys, in percentages.

Height in centimeters.	Ages, in years.													
	5.589	6.536	7.511	8.504	9.496	10.494	11.492	12.489	13.481	14.467	15.454	16.445	17.453	18.424
91- 92.99...	0.4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
93- 94.99...	0.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
95- 96.99...	1.7	0.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
97- 98.99...	3.5	0.4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
99-100.99...	6.7	0.7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
101-102.99...	10.7	2.2	0.2	0.1	0.1	.....	.....	.....	.....	.....	.....	.....	.....	.....
103-104.99...	15.3	4.9	0.8	0.1	0.1	.....	.....	.....	.....	.....	.....	.....	.....	.....
105-106.99...	16.9	9.0	2.0	0.4	0.1	.....	.....	.....	.....	.....	.....	.....	.....	.....
107-108.99...	13.7	12.2	3.3	0.5	0.1	.....	.....	.....	.....	.....	.....	.....	.....	.....
109-110.99...	13.3	15.5	6.2	1.3	0.1	0.1	0.1	.....	.....	.....	.....	.....	.....	.....
111-112.99...	9.1	15.8	11.1	2.5	0.3	0.1	0.1	.....	.....	.....	.....	.....	.....	.....
113-114.99...	4.3	13.5	13.0	4.6	0.8	0.1	0.1	.....	.....	.....	.....	.....	.....	.....
115-116.99...	2.3	10.9	14.8	7.7	1.6	0.4	0.1	.....	.....	.....	.....	.....	.....	.....
117-118.99...	0.9	6.9	14.7	11.3	4.1	0.7	0.2	.....	.....	.....	.....	.....	.....	.....
119-120.99...	0.5	4.1	12.5	14.3	6.9	1.8	0.2	0.1	0.1	.....	.....	.....	.....	.....
121-122.99...	0.2	2.2	9.1	15.0	10.3	3.7	0.7	0.2	0.1	0.1	.....	.....	.....	.....
123-124.99...	.....	0.9	5.9	13.5	12.9	6.0	1.8	0.5	0.2	0.1	0.1	.....	.....	.....
125-126.99...	.....	0.3	3.4	10.5	13.8	8.8	3.1	0.8	0.2	0.1	.....	.....	.....	.....
127-128.99...	.....	0.3	1.8	7.9	13.9	11.1	6.0	1.9	0.7	0.2	.....	.....	.....	.....
129-130.99...	.....	0.1	0.7	4.8	12.0	12.8	8.5	3.5	1.0	0.2	.....	.....	.....	.....
131-132.99...	.....	.....	0.3	2.7	9.2	12.7	9.6	5.3	1.6	0.4	.....	.....	.....	.....
133-134.99...	.....	.....	0.2	1.5	6.3	12.3	12.0	7.7	2.8	0.8	0.1	.....	.....	.....
135-136.99...	.....	.....	.....	0.7	3.5	10.5	13.5	10.5	4.8	1.2	0.3	.....	.....	.....
137-138.99...	.....	.....	.....	0.4	2.0	7.6	11.9	10.8	6.1	2.5	0.6	0.1	0.2	.....
139-140.99...	.....	.....	.....	0.1	1.0	5.0	10.4	12.5	8.8	3.6	1.5	0.4	.....	.....
141-142.99...	.....	.....	.....	0.1	0.4	3.1	8.6	11.3	10.1	5.2	2.2	0.4	.....	.....
143-144.99...	.....	.....	.....	.....	0.3	1.8	5.3	9.9	10.8	5.6	2.2	0.7	.....	.....
145-146.99...	.....	.....	.....	.....	0.1	0.7	3.2	7.7	10.5	8.0	3.2	0.7	0.3	.....
147-148.99...	.....	.....	.....	.....	0.1	0.4	2.1	5.9	9.3	9.1	4.2	0.8	0.3	.....
149-150.99...	.....	.....	.....	.....	.....	0.3	1.2	4.3	8.6	10.0	6.1	2.3	0.3	0.4
151-152.99...	.....	.....	.....	.....	.....	0.1	0.7	2.7	6.3	8.2	7.3	2.8	0.7	0.4
153-154.99...	.....	.....	.....	.....	.....	.....	0.3	1.8	5.3	8.8	7.6	2.7	1.4	0.9
155-156.99...	.....	.....	.....	.....	.....	.....	0.1	1.2	4.9	8.3	7.8	4.9	1.6	2.2
157-158.99...	.....	.....	.....	.....	.....	.....	0.1	0.6	3.1	6.2	8.2	5.8	2.9	1.8
159-160.99...	.....	.....	.....	.....	.....	.....	0.1	0.5	1.7	5.7	8.6	8.0	5.4	2.6
161-162.99...	.....	.....	.....	.....	.....	.....	.....	0.2	1.1	4.7	8.1	8.4	5.8	3.9
163-164.99...	.....	.....	.....	.....	.....	.....	.....	0.1	0.7	3.7	6.6	10.5	8.9	9.2
165-166.99...	.....	.....	.....	.....	.....	.....	.....	.....	0.4	2.4	6.9	10.1	11.4	9.2
167-168.99...	.....	.....	.....	.....	.....	.....	.....	.....	0.2	1.5	6.0	10.2	10.3	10.5
169-170.99...	.....	.....	.....	.....	.....	.....	.....	.....	0.3	1.4	4.7	10.5	10.5	10.9
171-172.99...	.....	.....	.....	.....	.....	.....	.....	.....	0.1	0.9	3.3	8.6	9.6	13.5
173-174.99...	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.5	2.0	4.5	9.3	9.6
175-176.99...	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.2	1.1	3.0	7.2	8.3
177-178.99...	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.2	0.6	2.7	5.1	5.2
179-180.99...	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.1	0.4	1.2	4.2	4.8
181-182.99...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.1	0.5	2.3	0.1
183-184.99...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.1	0.5	.....
185-186.99...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.1	0.5	.....
187-188.99...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.1	.....	.....	0.4
189-190.99...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.1	.....	0.3	.....
Cases	1,535	3,075	5,379	5,633	5,531	5,151	4,759	4,205	3,573	2,518	1,481	753	429	229
Average height...	100.41	111.78	116.89	122.00	126.89	131.75	136.17	140.08	145.88	152.14	159.48	164.68	168.81	170.91
Average variation	±3.83	±3.98	±4.17	±4.35	±4.50	±4.78	±4.97	±5.35	±6.04	±6.88	±7.31	±6.15	±5.78	±5.45
Mean variation.....	±4.81	±4.92	±5.22	±5.53	±5.66	±5.90	±6.32	±6.79	±7.69	±8.65	±8.92	±7.77	±7.25	±6.76
Corrected average for half year	105.90	111.58	116.83	122.01	126.91	131.78	136.20	140.74	146.09	152.39	159.72	164.90	168.91	171.07
Mean variation corrected ...	±4.80	±4.92	±5.22	±5.53	±5.66	±5.90	±6.32	±6.80	±7.71	±8.66	±8.87	±7.75	±7.23	±6.74
Mean variation at half year	±(4.40)	±4.66	±5.09	±5.34	±5.48	±5.74	±6.20	±6.62	±7.54	±8.40	±8.61	±7.63	±7.15	.....

Frequencies of statures of American girls, in percentages.

Height in centimeters.	Ages, in years.												
	5.611	6.545	7.513	8.501	9.497	10.495	11.494	12.490	13.479	14.471	15.466	16.473	17.466
87- 88.99	0.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
89- 90.99	.....	0.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
91- 92.99	0.1	0.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
93- 94.99	0.9	0.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
95- 96.99	2.2	0.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
97- 98.99	4.6	0.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
99-100.99	9.4	1.5	.....	0.1	.....	.....	.....	.....	.....	.....	.....	.....	.....
101-102.99	12.3	3.5	0.3	0.1	0.1	.....	.....	.....	.....	.....	.....	.....	.....
103-104.99	17.1	6.7	1.3	0.1	0.1	.....	.....	.....	.....	.....	.....	.....	.....
105-106.99	16.8	10.2	2.5	0.3	0.1	.....	.....	.....	.....	.....	.....	.....	.....
107-108.99	13.9	13.9	4.3	0.6	0.3	0.1	.....	.....	.....	.....	.....	.....	.....
109-110.99	11.1	17.1	8.3	2.0	0.1	0.1	.....	.....	.....	.....	.....	.....	.....
111-112.99	6.0	14.8	11.4	3.8	0.4	0.1	.....	.....	.....	.....	.....	.....	.....
113-114.99	2.9	11.3	13.0	6.0	1.2	0.2	0.1	0.1	.....	.....	.....	.....	.....
115-116.99	1.9	6.1	15.4	9.3	2.8	0.5	0.2	0.1	.....	.....	.....	.....	.....
117-118.99	0.4	6.0	13.3	11.8	4.7	1.1	0.2	0.1	0.1	.....	.....	.....	.....
119-120.99	0.1	2.7	12.0	14.4	7.9	2.4	0.4	0.1	0.1	.....	.....	.....	.....
121-122.99	0.2	1.3	9.0	14.2	11.0	4.3	1.2	0.3	0.1	.....	.....	.....	.....
123-124.99	.....	0.5	4.5	12.5	13.2	6.3	1.9	0.4	0.1	.....	.....	.....	.....
125-126.99	.....	0.2	2.8	9.9	14.2	9.5	3.2	0.7	0.1	0.1	.....	.....	.....
127-128.99	.....	0.1	1.1	6.9	14.0	11.2	5.4	1.4	0.2	0.1	.....	.....	.....
129-130.99	.....	0.1	0.5	4.2	11.1	13.2	7.9	2.6	0.4	0.1	.....	.....	.....
131-132.99	.....	.....	0.2	2.1	7.9	13.0	10.1	3.9	0.8	0.2	.....	.....	.....
133-134.99	.....	.....	0.1	0.9	4.7	11.7	11.7	5.6	1.3	0.4	.....	.....	.....
135-136.99	.....	.....	.....	0.4	3.0	9.2	11.7	7.5	2.6	0.6	.....	.....	.....
137-138.99	.....	.....	.....	0.3	1.7	6.7	10.4	9.1	4.4	0.9	0.2	.....	.....
139-140.99	.....	.....	.....	0.1	1.0	4.4	10.4	10.4	5.6	1.7	0.7	0.2	.....
141-142.99	.....	.....	.....	.....	0.3	2.8	8.3	11.4	6.5	2.6	0.7	0.2	0.1
143-144.99	.....	.....	.....	.....	0.1	1.7	6.0	10.3	7.8	3.5	1.5	0.8	0.3
145-146.99	.....	.....	.....	.....	0.1	0.7	4.2	9.0	10.8	5.6	2.6	2.0	1.0
147-148.99	.....	.....	.....	.....	.....	0.4	2.6	7.2	9.3	7.0	3.8	2.6	2.4
149-150.99	.....	.....	.....	.....	.....	0.2	2.1	6.2	11.2	10.2	7.8	5.4	4.4
151-152.99	.....	.....	.....	.....	.....	0.1	1.0	4.8	10.5	12.4	10.2	8.2	6.7
153-154.99	.....	.....	.....	.....	.....	.....	0.4	3.4	8.4	12.8	12.1	11.0	8.4
155-156.99	.....	.....	.....	.....	.....	.....	0.3	2.4	7.6	13.4	15.3	12.9	10.8
157-158.99	.....	.....	.....	.....	.....	0.1	0.2	1.6	4.9	9.3	11.8	12.7	10.1
159-160.99	.....	.....	.....	.....	.....	.....	0.1	0.8	3.4	7.4	11.2	13.8	13.5
161-162.99	.....	.....	.....	.....	.....	.....	.....	0.3	2.0	5.1	8.9	11.3	13.8
163-164.99	.....	.....	.....	.....	.....	.....	.....	0.1	1.0	3.0	5.9	7.3	7.1
165-166.99	.....	.....	.....	.....	.....	.....	.....	0.1	0.4	1.9	3.5	5.8	7.1
167-168.99	.....	.....	.....	.....	.....	.....	.....	0.1	0.2	0.8	2.2	2.9	3.5
169-170.99	.....	.....	.....	.....	.....	.....	.....	.....	0.1	0.5	0.7	1.4	2.4
171-172.99	.....	.....	.....	.....	.....	.....	.....	.....	0.1	0.2	0.5	1.2	1.1
173-174.99	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.2	0.2	0.2	0.5
175-176.99	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.2	.....	0.8
177-178.99	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.1	.....
179-180.99	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cases	1,260	3,618	4,013	5,289	5,132	4,827	4,507	4,187	3,411	2,537	1,656	1,171	790
Average height	105.45	110.32	116.10	121.21	123.13	131.24	136.58	142.46	148.58	153.41	156.45	158.00	159.11
Average variation	±3.74	±3.98	±4.23	±4.45	±4.51	±4.91	±5.45	±5.98	±5.89	±5.18	±4.68	±4.64	±4.43
Mean variation	±4.69	±5.09	±5.25	±5.58	±5.73	±6.18	±6.83	±7.57	±7.38	±6.71	±5.96	±5.79	±5.75
Corrected average	104.88	110.08	116.08	121.21	126.14	131.27	136.62	142.52	148.09	153.50	156.50	158.03	159.14
Mean variation corrected	±4.64	±5.07	±5.25	±5.58	±5.73	±6.18	±6.83	±7.57	±7.37	±6.69	±5.96	±5.79	±5.75
Mean variation at half year	.....	±4.78	±5.01	±5.46	±5.54	±6.00	±6.63	±7.41	±7.20	±6.57	±5.88	±5.65	.....

From the preceding facts and considerations we conclude that the averages and variabilities of growing children must not be considered more than indices of the typical conditions characteristic of a certain age. In order to determine these accurately, the asymmetry of the distributions must be taken into account. This, however, can not be done, except by the expenditure of a vast amount of labor, until a sufficient series of observations, taken according to the individualizing method, is available.

GROWTH AS DETERMINED BY THE TOTAL SERIES OF TORONTO CHILDREN.

I give first of all a table of statures grouped in periods of quarter years. In this tabulation all those individuals who did not expressly state that their age was so

and so many years and no months were omitted, because there is a considerable probability that in many cases of this sort the number of months was not recorded. For this reason the number of children corresponding to the full years and no months is too small. It might have been better to group the material as follows: 11, 0, 1 months; 2, 3, 4 months; 5, 6, 7 months; 8, 9, 10 months: but I did not do so, in order to preserve the comparability with other series which extend over the whole year. The records of ages show that in order to obtain accurate results the question ought not to be simply for years and months, but we should ask for the age at the last birthday, age at the coming birthday, and the date of the birthday. When we simply ask for years and months, the person answering the question will often first give the age at the nearest birthday, particularly when the approaching birthday is not far distant, and then add the number of months passed since the last birthday, thus introducing an error of a whole year. This was noticed to occur in the Worcester measurements that were repeated after the lapse of a year, Accuracy can be attained only by the three questions given before.

The following are the tables of statures:

Statures of Toronto boys, grouped in quarter-year periods.

Height in centimeters.	Number of boys of the following ages.											
	5 years and—				6 years and—				7 years and—			
	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.
91	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
92	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
93	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
94	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
95	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
96	2	4	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
97	.....	1	1	.....	1	.....	.....	1	.....	.....	.....	.....
98	2	2	2	2	.....	1	.....	.....	.....	.....	.....	.....
99	2	2	3	2	1	2	.....	.....	.....	.....	.....	.....
100	4	3	4	4	.....	.....	.....	1	.....	.....	.....	.....
101	1	6	3	2	1	1	2	.....	.....	.....	.....	.....
102	2	6	6	5	1	3	2	.....	.....	.....	.....	.....
103	5	6	5	5	5	5	4	2	1	.....	.....	1
104	3	8	9	7	3	6	2	6	1	.....	.....	.....
105	5	6	7	8	4	8	9	5	.....	3	1	.....
106	4	8	4	12	3	6	9	4	1	3	2	1
107	3	5	5	6	7	5	9	5	6	3	4	.....
108	1	3	11	11	13	9	11	6	3	4	2	2
109	2	11	5	10	11	13	12	8	4	7	5	1
110	.....	4	6	14	9	17	17	19	9	9	7	5
111	4	1	9	8	9	19	14	9	16	12	8	8
112	.....	1	12	6	8	14	15	12	17	23	12	5
113	1	2	4	3	6	11	9	10	15	12	7	11
114	.....	.....	1	3	5	8	19	15	16	18	17	17
115	.....	1	.....	4	3	12	16	17	12	25	13	10
116	.....	.....	3	4	4	5	8	14	26	20	14	11
117	.....	.....	.....	1	5	3	4	11	14	14	20	15
118	.....	.....	1	2	1	2	5	10	14	16	21	15
119	.....	.....	.....	.....	1	3	1	9	10	12	21	13
120	.....	.....	.....	1	1	.....	2	5	10	9	25	13
121	.....	.....	.....	.....	.....	.....	2	6	5	9	12	7
122	.....	.....	.....	.....	.....	1	1	1	2	10	12	16
123	.....	.....	.....	.....	.....	1	.....	1	3	5	7	7
124	.....	.....	.....	.....	.....	.....	.....	.....	5	3	11	7
125	.....	.....	.....	1	.....	.....	.....	2	1	3	6	5
126	.....	.....	.....	.....	.....	.....	.....	1	.....	2	4	1
127	.....	.....	.....	.....	.....	.....	.....	1	.....	1	2	4
128	.....	.....	1	.....	.....	.....	.....	.....	.....	1	4	7
129	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2
130	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	2
131	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
132	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
133	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	1
134	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
135	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
136	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
137	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Cases	42	82	102	121	103	155	173	182	191	225	242	188
Average height	103.0	104.5	107.3	108.1	109.7	110.3	111.1	115.1	114.0	115.5	117.7	118.3
Mean variation	±4.44	±4.70	±5.07	±4.60	±4.59	±4.48	±4.29	±5.25	±4.17	±4.67	±4.81	±5.40

Statures of Toronto boys, grouped in quarter-year periods—Continued.

Height in centimeters.	Number of boys of the following ages.											
	8 years and—				9 years and—				10 years and—			
	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.
105	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
106	1	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
107	.....	2	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
108	2	1	.....	.....	.....	1	1	.....	.....	.....	.....	.....
109	.....	3	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
110	2	3	2	.....	.....	1	.....	.....	.....	.....	.....	.....
111	3	.....	1	1	.....	1	.....	1	.....	.....	.....	.....
112	4	3	4	1	.....	1	1	1	1	.....	.....	.....
113	8	4	3	3	1	1	1	.....	.....	.....	.....	.....
114	5	8	5	2	.....	2	1	.....	.....	1	.....	.....
115	16	8	10	4	1	.....	1	.....	1	2	1	1
116	15	17	4	6	3	.....	6	.....	.....	.....	.....	.....
117	8	14	13	11	4	6	2	5	1	1	1	1
118	17	21	14	11	11	8	5	3	1	1	1	.....
119	16	13	12	14	5	9	4	3	3	4	.....	1
120	19	25	30	16	7	7	9	8	4	3	2	3
121	18	10	20	16	19	11	9	13	.....	1	5	2
122	13	17	22	20	8	17	9	9	6	8	3	1
123	9	13	15	19	12	15	8	15	7	3	7	3
124	12	14	23	14	19	18	14	13	5	11	6	7
125	6	13	24	16	18	18	22	9	9	11	3	9
126	8	8	12	12	16	16	11	20	11	7	8	6
127	4	11	11	11	11	21	20	11	8	17	8	6
128	3	11	9	18	11	19	20	12	10	14	9	11
129	2	4	5	10	7	8	15	13	14	14	13	10
130	3	8	4	2	12	16	21	16	9	21	16	18
131	1	5	2	5	10	5	13	13	13	17	12	11
132	1	3	3	7	6	12	14	16	10	11	18	16
133	.....	2	2	6	2	9	11	13	9	13	20	16
134	1	3	3	1	5	7	9	6	7	11	9	14
135	.....	2	1	1	2	4	3	10	10	13	20	14
136	.....	1	2	1	3	5	4	4	9	8	12	13
137	.....	1	.....	.....	.....	.....	4	1	4	11	7	9
138	.....	1	.....	.....	1	2	2	4	3	5	7	7
139	.....	.....	1	.....	.....	.....	1	1	2	4	10	8
140	.....	.....	.....	.....	.....	.....	.....	2	1	6	7	9
141	.....	.....	.....	.....	.....	.....	.....	2	5	4	4	13
142	1	.....	.....	.....	.....	.....	.....	1	1	4	4	2
143	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	2	3
144	.....	.....	1	.....	.....	.....	.....	.....	1	.....	2	3
145	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
146	.....	.....	.....	.....	.....	.....	1	.....	1	1	2	1
147	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....
148	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	1
149	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2
150	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Cases	198	251	260	220	194	241	242	228	167	228	222	222
Average height	119.7	121.3	122.2	123.5	125.1	125.6	127.0	127.9	129.9	130.2	132.2	132.9
Mean variation	±5.08	±6.01	±5.31	±5.13	±4.47	±5.43	±5.51	±5.99	±6.00	±5.97	±6.01	±6.09

Statures of Toronto boys, grouped in quarter-year periods—Continued.

Height in centimetors.	Number of boys of the following ages.											
	11 years and—				12 years and—				13 years and—			
	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.
117	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
118	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
119	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
120	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
121	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
122	.....	1	1	1	.....	1	.....	.....	.....	.....	.....	.....
123	.....	2	2	2	1	.....	1	.....	1	.....	.....	.....
124	1	2	4	.....	2	.....	.....	1	.....	.....	.....	.....
125	3	8	5	1	2	.....	.....	2	.....	.....	.....	.....
126	4	3	4	2	2	3	.....	.....	.....	1	.....	.....
127	5	4	3	4	2	3	1	1	.....	.....	1	.....
128	9	5	6	7	2	2	5	1	2	1	.....	.....
129	6	11	9	5	3	2	1	5	.....	.....	.....	.....
130	12	14	10	8	6	3	4	5	1	1	3	.....
131	10	10	12	3	3	4	7	2	3	1	3	.....
132	7	10	12	7	7	5	4	7	2	2	1	.....
133	8	17	7	6	5	7	3	6	1	3	2	3
134	15	14	24	11	8	9	6	4	2	3	2	2
135	10	11	9	13	9	7	8	6	4	2	5	3
136	16	13	15	13	13	7	18	5	8	6	6	4
137	13	12	11	5	11	8	8	11	7	3	6	5
138	15	13	11	14	16	15	14	9	10	4	2	3
139	10	14	15	6	12	9	12	9	4	8	3	4
140	9	12	18	10	9	7	13	19	4	14	3	7
141	7	4	12	16	10	6	8	14	2	7	12	4
142	11	10	7	7	7	12	12	14	10	8	10	4
143	4	5	10	8	6	10	8	10	7	8	5	9
144	2	2	4	5	8	10	7	18	8	7	3	5
145	3	7	3	4	3	6	8	11	9	14	10	13
146	2	3	2	3	3	6	5	8	3	10	4	8
147	1	2	5	2	8	5	10	7	2	9	11	5
148	1	1	2	5	8	5	8	6	5	5	6	15
149	.....	.....	1	2	3	2	3	4	3	13	5	1
150	.....	1	2	1	1	4	7	9	3	11	5	9
151	1	.....	1	.....	2	1	2	3	3	4	9	2
152	1	.....	.....	1	1	1	2	2	6	6	3	5
153	.....	1	1	1	.....	1	1	1	4	6	5	3
154	.....	.....	.....	1	.....	1	1	1	1	.....	2	6
155	.....	.....	.....	.....	1	2	1	3	5	4	3	7
156	.....	.....	1	.....	.....	1	.....	1	.....	2	2	5
157	.....	.....	.....	.....	.....	.....	.....	2	.....	1	3	3
158	.....	.....	.....	.....	1	.....	.....	.....	2	3	5	2
159	.....	.....	.....	.....	.....	.....	1	1	.....	4	1	1
160	.....	.....	.....	.....	1	1	.....	.....	1	1	2	2
161	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2	1
162	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....
163	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2
164	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	2
165	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
166	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
167	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....
168	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
169	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
170	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Cases	188	215	230	175	176	167	189	214	124	176	149	147
Average height	135.3	134.9	136.5	137.1	138.6	139.4	140.1	141.6	142.8	145.3	145.5	147.1
Mean variation	±5.60	±6.06	±6.28	±6.39	±6.63	±6.53	±6.33	±6.97	±7.38	±7.31	±8.30	±7.54

Statures of Toronto boys, grouped in quarter-year periods—Concluded.

Height in centimeters.	Number of boys of the following ages.					
	14 years and—				15 years and—	
	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.	0 to 5 mos.	6 to 11 mos.
122		1				
123						
124		1			1	
125	1		1			
126						
127						
128		1				
129						
130		1				
131						
132	1					
133	2					
134						
135	1		2			
136		3		1		
137	3	1		1	1	
138	1	3	1	1		
139	1		1	1	1	
140	1	1	1	3	3	1
141	4	4	2	3	2	1
142	3	1	1	1	1	
143	6		4			1
144	5	1	2	1	1	1
145	6	8	4	2		2
146	7	2	3	3	4	3
147	1	8	6	1	1	1
148	5	9	11	2	3	2
149	2	2	2	7	4	
150	6	9	6	5	2	3
151	5		5	2	3	
152	8	6	4	4	3	
153	3	6	5	2	6	4
154	9	7	6	3	6	2
155	2	3	5	6	5	4
156	3	4	2	2	3	2
157			7	5	2	3
158	2	3	2	1	9	6
159	3	2	2	5	6	2
160	3	1	5	1	7	4
161	3	4	3		5	2
162	3		4	2	4	2
163	1	2	1	1	2	1
164	2		1	2	2	2
165	1	1	2	1	1	3
166	1	1	2		4	2
167		1	1		2	2
168		2			2	3
169		2	1	1	3	1
170			2			2
171						
172					2	3
173		1	1			
174				1		1
175						
176		1			1	
177						
178						
179						
180						1
181						
182						
183						
184						
185						
186						
187					1	
Cases	105	103	108	71	103	67
Average height	149.4	150.5	157.4	156.9	156.1	158.2
Average variation	±7.94	±9.20	±8.21	±7.55	±9.07	±8.75

Statures of Toronto girls, grouped in quarter-year periods.

Height in centimeters.	Number of girls of the following ages.											
	5 years and—				6 years and—				7 years and—			
	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.
85												
86												
87				1								
88												
89												
90												
91												
92												
93	1											
94		1										
95	1	1				1						
96		1	5	1								
97	1	1				1		1				
98	6	1	3	1		3						
99	2	3	3	2	1	1						
100	3	7	10	4			2					
101	3	4	9	5	4	2	2					
102	3	10	7	8	4	2	5	4			2	
103	3	9	8	10	5	3	1	4		1		2
104	5	12	12	8	2	5	8	9	1	1	3	2
105	2	5	12	6	5	6	9	5	2	3	4	3
106	5	6	8	13	9	8	9	5	2	1	2	5
107	2	7	6	9	13	11	12	6	4		4	1
108	2	2	5	6	10	14	12	8	2	4	9	1
109	1	5	8	7	7	10	13	10	3	6	4	5
110	2	3	7	9	7	11	21	17	14	13	9	4
111	2	3	4	5	9	7	13	14	9	13	5	12
112	1	1	2	4	10	12	16	13	12	8	10	10
113	2	1	1	9	9	7	15	11	9	10	16	11
114		1	1	2	6	4	13	11	8	13	13	12
115			1	3	7	7	7	16	9	17	16	15
116			2	2		3	8	9	8	19	20	16
117						3	9	12	6	17	22	13
118				2		1	6	6	10	12	17	14
119					2	1	2	2	8	8	16	10
120						1	3	2	7	9	16	16
121			1					2	5	11	8	19
122						2	1		7	6	9	9
123								2	3	1	8	6
124						1	1	2	2	4	4	7
125						1				1	3	6
126									1	4	3	5
127									1	3	2	1
128											1	2
129									1			1
130												3
131										1		1
132												
133												1
134												
Cases	47	84	115	117	110	128	188	171	134	186	226	213
Average height	103.6	104.2	104.9	106.8	108.9	109.4	110.6	111.6	114.9	115.7	115.9	117.1
Mean variation	±4.82	±4.01	±4.69	±4.97	±4.13	±5.25	±4.61	±4.93	±5.00	±4.94	±5.16	±5.74

Statures of Toronto girls, grouped in quarter-year periods—Continued.

Height in centimeters.	Number of girls of the following ages.											
	8 years and—				9 years and—				10 years and—			
	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.
100												
101												
102				1								
103												
104												
105	1	1					1					
106	1											
107		1										
108	1	2		1				1				
109	3	4	2		1						1	
110	4	2	1	3			1			1		
111	4	4	4		1							
112	6	7	8		1		1					
113	9	7	1	2	1	2	1	1				
114	9	9	3	6	1	1	2			1		
115	11	13	10	5	4	3	3	3	1			
116	13	15	15	8	3	8	1	3		1	1	1
117	10	12	10	4	12	2	4		4		1	
118	14	9	15	16	3	5	5	7	3	3		
119	15	9	10	13	12	15	6	7		3		
120	17	24	22	15	16	10	9	8	3	3	1	3
121	11	13	22	14	14	9	14	6	5	4	3	2
122	12	10	21	18	12	19	7	16	9	6	6	4
123	6	10	15	17	17	11	17	13	4	7	6	3
124	11	13	18	12	13	20	16	17	6	5	8	7
125	8	7	16	16	15	17	23	15	15	18	17	10
126	6	11	9	12	12	18	16	14	8	11	5	8
127	4	5	12	14	13	18	20	21	7	13	8	9
128	5	5	8	3	6	25	11	18	16	8	9	9
129	1	6	2	3	7	8	16	8	8	11	13	11
130	2	3	5	8	10	10	13	19	13	19	16	14
131		2	1	1	7	8	18	8	15	8	14	20
132	1	2	3	5	8	6	7	6	18	8	11	17
133			2			3	6	3	8	15	14	18
134	1	1	3	1	1	3	3	6	9	6	15	12
135				1	1	1	4	7	9	14	15	11
136			1	1	1	4	3	4	4	5	11	7
137				1		2	1	7	4	9	16	9
138				1			1	3	2	6	12	8
139						2			3	3	5	5
140				1			1		2	4	8	6
141									2	3	1	
142								1			3	4
143									1	1	2	4
144										1	2	1
145										1	2	2
146									1			2
147										1	2	1
148												2
149												
150											1	1
151												
152												1
Cases	186	207	238	203	192	230	231	222	180	199	229	212
Average height	118.9	119.7	121.3	122.4	123.55	124.98	125.72	126.47	129.11	129.75	131.81	132.17
Mean variation	±5.23	±5.60	±5.08	±5.46	±4.95	±4.97	±5.23	±5.50	±5.59	±5.70	±6.15	±6.13

Statures of Toronto girls, gronped in quarter-year periods—Continued.

Height in centimeters.	Number of girls of the following ages.											
	11 years and—				12 years and—				13 years and—			
	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.
115	2											
116		1										
117												
118												
119		1										
120	2		1									
121	2		2	1		1						
122	1	1		1	1	1	3					
123	2		4	1								
124	4	1	2		2							
125	5	3	2	2	1	1	1					
126	8	3	4	3		2						
127	4	6	5	2		2	1	2		1		
128	9	8	6	7	4	5	1		1			
129	12	9	7	3	4	2	3		1	1		
130	9	17	11	10	2	4	4	1				1
131	8	15	7	9	2		1	4		3		
132	11	11	11	7	4	8	6	3		2		1
133	10	14	5	13	3	5	4	2	2			
134	16	11	11	13	8	9	12	3		3	4	
135	10	15	14	12	7	8	10	2	2	4	2	
136	10	15	16	10	14	5	11	3		5	3	
137	12	20	17	18	11	14	9	7	4	6	1	1
138	9	8	14	14	15	11	11	10	9	10	5	2
139	11	17	13	16	9	17	7	7	3	2	2	3
140	10	17	13	10	16	13	14	10	3	7	8	1
141	6	9	5	18	9	11	14	13	5	10	4	4
142	4	3	9	7	12	12	18	6	3	6	9	3
143	4	3	12	7	12	14	15	11	10	10	5	4
144	4	2	5	8	9	9	12	13	13	9	5	4
145		7	5	11	12	14	5	11	13	16	12	7
146	3	2	6	4	5	8	6	8	16	8	14	5
147	3	3	5	3	7	10	9	12	7	11	6	11
148		3		3	6	9	6	8	7	6	11	5
149	2	2	2	7	3	9	2	9	10	5	4	10
150	1	4	4	6	6	9	4	8	3	11	18	11
151	1		1		1	2	4	5	6	9	10	11
152			1	1		3	2	6	4	7	9	8
153		1			2	3	1	4	3	1	5	8
154			1		2	1	6	7	3	7	13	6
155						3	2	3	4	3	4	4
156					2	2	4	6	3	3	1	5
157						3			6	2	6	4
158					2			1	2	2	7	6
159				1			1		2	3	4	4
160							1	1	1	3	2	5
161							1	2	1		2	1
162								1	1	3	1	2
163										1	2	1
164								1	3	1		4
165											1	
166												
167												
168												
169												
170												
171											1	
Cases	195	232	221	228	193	230	211	190	151	181	181	142
Average height	133.98	135.56	136.49	137.76	140.2	141.2	141.0	144.6	146.7	145.6	148.5	150.4
Mean variation	±6.56	±6.02	±6.50	±6.45	±6.48	±7.02	±7.10	±7.00	±6.57	±7.38	±6.90	±6.57

Statures of Toronto girls, grouped in quarter-year periods—Concluded.

Height in centimeters.	Number of girls of the following ages.									
	14 years and—				15 years and—				16 years and—	
	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.	0 to 2 mos.	3 to 5 mos.	6 to 8 mos.	9 to 11 mos.	0 to 5 mos.	6 to 11 mos.
127		1								
128										
129										
130										
131										
132		1								
133										
134	1									
135			1							
136		1								
137	1	2								
138										
139	3	2	1	1	1					
140		2				1				1
141		1	2	1						
142	4	2	1	2			2			
143	1	3			1					1
144	4	2	5	1	2	2			1	
145	4	2	3	1	2	1	1		1	1
146	3	3	1	1	2	1		2	2	
147	4	2		1		3	1		1	
148	6	9	3	2	1	3	1	1		1
149	2	7	5			1	2	1	4	2
150	6	12	6	8	4	2	2	3	2	1
151	8	8	10	5	3	4	5		3	1
152	5	7	6	5	7	4	4	1	2	2
153	3	14	4	7	3	3	5	1	3	2
154	10	7	9	5	1	7	4	2	8	3
155	11	13	5	7	5	7	8	4	4	6
156	9	4	12	8	2	3	4	8	6	2
157	5	6	2	6	1	4	2	2	4	1
158	10	6	7	6	2	1	8	5	4	2
159	3	2	3	4	4	4	4	1	6	4
160	4	7	5	10	3	6	6	1	12	2
161	1	1	4	4	2	2	7		4	3
162	1	3	2	3	1	3	6	1	1	5
163	1		1	1	4	1	2	1	3	1
164			1	2	3	3	1	1	3	1
165			2	1	1	1	1	2	1	3
166	1		1	1		1		4		1
167	1		2			4	2			1
168	2						1			
169										
170			2							
171										
172										1
Cases	114	130	106	93	55	72	79	41	75	48
Average height	152.4	151.3	153.9	154.9	154.5	155.4	156.5	156.7	156.19	156.96
Mean variation	±6.44	±6.21	±6.44	±5.44	±6.25	±6.17	±5.11	±5.40	±4.90	±6.37

Statures of Toronto boys, grouped in one-year periods.

Height in centimeters.	Number of boys measured of the age of—											
	4 years	5 years.	6 years.	7 years.	8 years.	9 years.	10 years.	11 years	12 years.	13 years.	14 years.	15 years.
90	1											
91		1										
92		1										
93												
94	4	1										
95	5		1									
96	3	6	1									
97	3	2	2									
98	5	8	1									
99	5	9	3									
100	8	15	1									
101	12	12	4									
102	13	19	6									
103	5	21	16	2								
104	9	27	17	1								
105	6	26	26	4	2							
106	4	28	32	7	2	1						
107	7	19	26	13	2		1					
108	1	26	39	11	3	2						
109	1	28	44	17	4							
110		24	62	30	7	1						
111	4	22	51	44	5	2						
112	1	19	49	57	12	3	1					
113		10	36	45	18	3						
114	1	4	47	68	20	3	1					
115		5	48	60	38	2	5					
116		7	31	71	42	9						
117		1	23	63	46	17	4	1				
118		3	18	66	63	27	3	1				
119			14	56	55	21	8		1			
120		1	8	57	90	31	12	2				
121			8	33	64	52	8	3				
122			3	40	72	43	18	3	1		1	
123			2	22	56	50	20	6	2	1		
124				26	63	64	29	7	3		1	1
125		1	2	15	59	67	32	17	4		2	
126			1	7	40	63	32	13	5	1		
127			1	7	37	63	39	16	7	1		
128		1		12	41	62	44	27	10	3	1	
129				3	21	43	51	31	11			
130				4	17	65	64	53	18	5	1	
131				1	13	41	53	35	16	7		
132					14	48	55	36	23	5	1	
133				3	10	35	58	38	21	9	2	
134					8	27	41	64	27	9		
135					4	19	57	43	30	14	3	
136					4	16	42	57	43	24	4	
137				1	1	5	31	41	38	21	5	1
138					1	9	22	53	54	19	6	
139					1	2	24	45	42	19	3	1
140						2	23	49	48	28	6	4
141						3	26	39	38	25	13	3
142					1	1	11	35	45	32	6	1
143						1	5	27	34	29	10	1
144					1		6	13	43	33	9	2
145					1		1	17	38	46	20	2
146						1	5	10	22	25	15	7
147							2	10	30	27	16	2
148						1	2	9	27	31	27	5
149							3	3	12	22	13	4
150						1		4	21	28	26	5
151								2	8	18	12	3
152								2	6	20	22	3
153								3	3	18	10	10
154								1	3	9	25	8

Statures of Toronto boys, grouped in one-year periods—Concluded.

Height in centimeters.	Number of boys measured of the age of—											
	4 years	5 years.	6 years.	7 years.	8 years.	9 years.	10 years.	11 years.	12 years.	13 years.	14 years.	15 years.
155									7	19	16	9
156								1	8	9	11	5
157									2	7	12	5
158									1	12	8	15
159									2	6	12	8
160									2	6	10	11
161										4	10	7
162										2	9	6
163										3	5	3
164										3	5	4
165										1	5	4
166											4	6
167										2	3	4
168											3	5
169										1	4	8
170										2	2	2
171												
172												5
173											2	
174											1	1
175												
176											1	1
177												
178												
179												
180												1
181												
182												
183												
184												
185												
186												
187												1
188												
189												
Cases	90	347	613	846	934	905	839	817	749	596	387	170
Average age	4.512	5.558	6.517	7.468	8.475	9.475	10.483	11.458	12.483	13.475	14.425	15.408
Average height		106.51	111.23	116.63	121.72	126.55	131.39	135.70	140.05	145.30	151.00	157.00
Mean variation		±5.12	±4.82	±5.08	±5.58	±5.59	±6.15	±6.15	±6.80	±7.79	±8.55	±9.00
Corrected average for half year		106.2	111.1	116.8	121.8	126.7	131.5	135.9	140.1	145.4	151.5	157.6

Statures of Toronto girls, grouped in one-year periods.

Height in centimeters.	Number of girls measured of the age of—												
	4 years.	5 years.	6 years.	7 years.	8 years.	9 years.	10 years.	11 years.	12 years.	13 years.	14 years.	15 years.	16 years.
87	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
88	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
89	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
91	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
92	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
93	5	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
94	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
95	2	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
96	4	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
97	9	2	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
98	8	11	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
99	2	10	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
100	13	24	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
101	9	21	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
102	8	18	15	2	1	.....	.....	.....	.....	.....	.....	.....	.....
103	3	20	13	3	.....	.....	.....	.....	.....	.....	.....	.....	.....
104	9	37	24	7	.....	.....	.....	.....	.....	.....	.....	.....	.....
105	3	25	25	12	2	1	.....	.....	.....	.....	.....	.....	.....
106	3	22	31	10	1	.....	.....	.....	.....	.....	.....	.....	.....
107	2	24	42	9	1	.....	.....	.....	.....	.....	.....	.....	.....
108	1	15	44	16	4	1	.....	.....	.....	.....	.....	.....	.....
109	2	21	40	18	9	1	1	.....	.....	.....	.....	.....	.....
110	.....	21	56	40	10	1	1	.....	.....	.....	.....	.....	.....
111	1	14	43	39	12	1	.....	.....	.....	.....	.....	.....	.....
112	1	8	51	40	21	2	.....	.....	.....	.....	.....	.....	.....
113	.....	13	42	46	19	5	.....	.....	.....	.....	.....	.....	.....
114	.....	4	34	46	27	4	1	.....	.....	.....	.....	.....	.....
115	.....	4	37	57	39	13	1	2	.....	.....	.....	.....	.....
116	.....	4	20	63	51	15	3	1	.....	.....	.....	.....	.....
117	.....	.....	24	58	36	18	5	.....	.....	.....	.....	.....	.....
118	.....	2	13	53	54	20	6	.....	.....	.....	.....	.....	.....
119	.....	.....	7	42	47	40	3	1	.....	.....	.....	.....	.....
120	.....	.....	6	48	78	43	10	3	.....	.....	.....	.....	.....
121	.....	1	2	43	60	43	14	3	1	.....	.....	.....	.....
122	.....	.....	3	31	61	54	25	3	5	.....	.....	.....	.....
123	.....	.....	2	18	48	53	20	7	.....	.....	.....	.....	.....
124	.....	.....	4	17	54	66	23	7	2	.....	.....	.....	.....
125	.....	.....	1	10	47	70	60	12	3	.....	.....	.....	.....
126	.....	.....	.....	13	38	60	32	18	2	.....	.....	.....	.....
127	.....	.....	.....	7	35	72	37	17	5	1	1	.....	.....
128	.....	.....	.....	3	21	60	42	30	10	1	.....	.....	.....
129	.....	.....	.....	2	12	39	43	31	9	2	.....	.....	.....
130	.....	.....	.....	3	18	52	62	47	11	1	.....	.....	.....
131	.....	.....	.....	2	4	41	57	39	7	3	.....	.....	.....
132	.....	.....	.....	.....	11	27	54	40	21	3	1	.....	.....
133	.....	.....	.....	1	2	12	55	42	14	2	.....	.....	.....
134	.....	.....	.....	.....	5	13	42	51	32	7	1	.....	.....
135	.....	.....	.....	.....	1	13	49	51	27	8	1	.....	.....
136	.....	.....	.....	.....	2	12	37	51	33	8	1	.....	.....
137	.....	.....	.....	.....	1	10	38	67	41	12	3	.....	.....
138	.....	.....	.....	.....	1	4	38	45	47	20	.....	.....	.....
139	.....	.....	.....	.....	.....	2	16	57	40	10	7	1	.....
140	.....	.....	.....	.....	1	1	20	50	53	19	2	1	1
141	.....	.....	.....	.....	.....	.....	6	38	47	23	4	.....	.....
142	.....	.....	.....	.....	.....	1	7	23	48	21	9	2	.....
143	.....	.....	.....	.....	.....	.....	8	26	52	29	4	1	1
144	.....	.....	.....	.....	.....	.....	4	19	43	31	13	4	1
145	.....	.....	.....	.....	.....	.....	5	23	42	48	10	4	2
146	.....	.....	.....	.....	.....	.....	3	15	27	43	8	5	2
147	.....	.....	.....	.....	.....	.....	4	14	38	35	7	4	1
148	.....	.....	.....	.....	.....	.....	2	6	29	29	20	6	1
149	.....	.....	.....	.....	.....	.....	.....	13	23	29	14	4	6

Statures of Toronto girls, grouped in one-year periods—Concluded.

Height in centimeters.	Number of girls measured of the age of—												
	4 years.	5 years.	6 years.	7 years.	8 years.	9 years.	10 years.	11 years.	12 years.	13 years.	14 years.	15 years.	16 years.
150	.....	.....	.....	.....	.....	.....	2	15	27	43	32	11	3
151	.....	.....	.....	.....	.....	.....	.....	2	12	36	31	12	4
152	.....	.....	.....	.....	.....	.....	1	2	11	28	23	16	4
153	.....	.....	.....	.....	.....	.....	.....	1	10	17	28	12	5
154	.....	.....	.....	.....	.....	.....	.....	1	10	29	31	14	11
155	.....	.....	.....	.....	.....	.....	.....	.....	8	15	36	24	10
156	.....	.....	.....	.....	.....	.....	.....	.....	14	12	33	17	8
157	.....	.....	.....	.....	.....	.....	.....	.....	3	18	19	9	5
158	.....	.....	.....	.....	.....	.....	.....	.....	3	17	29	16	6
159	.....	.....	.....	.....	.....	.....	.....	1	1	13	12	13	10
160	.....	.....	.....	.....	.....	.....	.....	.....	2	11	26	16	14
161	.....	.....	.....	.....	.....	.....	.....	.....	3	4	10	11	7
162	.....	.....	.....	.....	.....	.....	.....	.....	1	7	9	11	6
163	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	3	8	4
164	.....	.....	.....	.....	.....	.....	.....	.....	1	8	3	8	4
165	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	3	5	4
166	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	5	1
167	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	6	1
168	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	1	.....
169	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
170	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....
171	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
172	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
173	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
174	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cases	88	303	597	759	834	875	822	876	824	665	443	247	123
Average age	.....	.....	6.508	7.508	8.475	9.475	10.483	11.475	12.458	13.458	14.442	15.433	16.358
Average height	100.4	105.2	110.4	116.0	120.6	125.2	130.8	136.0	141.7	147.7	153.0	155.8	156.5
Mean variation	±4.26	±4.80	±4.80	±5.30	±5.53	±5.32	±6.20	±6.52	±6.96	±7.17	±6.35	±5.86	±5.35
Corrected average	.....	.....	110.4	116.0	120.7	125.3	130.9	136.1	141.9	148.0	153.3	156.0	156.7

The following table exhibits the statures of Toronto children as compared with American children in general:

STATURES OF BOYS, IN CENTIMETERS.

	Age in years.											
	5.5.	6.5.	7.5.	8.5.	9.5.	10.5.	11.5.	12.5.	13.5.	14.5.	15.5.	16.5.
Toronto	106.2	111.1	116.8	121.8	126.7	131.5	135.9	140.1	145.4	151.5	157.0	.....
American	105.9	111.6	116.8	122.0	126.9	131.8	136.2	140.7	146.0	152.4	159.7	.....

STATURES OF GIRLS, IN CENTIMETERS.

Toronto	105.2	110.4	116.0	120.7	125.3	130.9	136.1	141.9	148.0	153.3	156.0	156.7
American	104.9	110.1	116.1	121 2	126.1	131.3	136.6	142.5	148.7	153.5	156.5	158.0

VARIABILITY OF BOYS' STATURES.

Toronto	±5.12	±4.82	±5.08	±5.58	±5.59	±6.15	±6.15	±6.80	±7.79	±8.55	±9.00	.....
American	±4.80	±4.92	±5.22	±5.53	±5.66	±5.90	±6.32	±6.80	±7.71	±8.66	±8.87	±7.75

VARIABILITY OF GIRLS' STATURES.

Toronto	±4.80	±4.80	±5.30	±5.53	±5.32	±6.20	±6.52	±6.96	±7.17	±6.35	±5.86	±5.35
American	±4.64	±5.07	±5.25	±5.58	±5.73	±6.18	±6.83	±7.37	±7.37	±6.69	±5.96	±5.79

It appears from these tables that on the whole the Toronto children are not as favorably developed as are American children, their statures being slightly shorter. The variability of the Toronto series does not differ so much from the general series as might be expected. The causes that modify the growth of children in a single city appear to be so great that the decrease in general variability is very slight indeed.

The variabilities given in the preceding tables are those for the whole year. When the variabilities for each year are calculated from the averages of the trimonthly periods given on pages 1558–1564, a considerable reduction in the values takes place.

BOYS.

Variability for—	Age in years.											
	5.5.	6.5.	7.5.	8.5.	9.5.	10.5.	11.5.	12.5.	13.5.	14.5.	15.5.	16.5.
The whole year	±5.12	±4.82	±5.08	±5.58	±5.59	±6.15	±6.15	±6.80	±7.79	±8.55	±9.00	.....
Quarterly periods	±4.70	±4.65	±4.77	±5.38	±5.35	±6.02	±6.08	±6.61	±7.63	±8.22	a±8.91	.....

GIRLS.

The whole year	±4.80	±4.80	±5.30	±5.53	±5.32	±6.20	±6.52	±6.96	±7.17	±6.35	±5.86	±5.35
Quarterly periods	±4.62	±4.73	±5.21	±5.34	±5.18	±5.89	±6.38	±6.90	±6.85	±6.13	±5.73	±5.63

a Six-monthly period.

THE GROWTH OF FIRST-BORN CHILDREN.

I have shown (Science, 1895, April 12) that the first-born children in Oakland, Cal., exceed in height later-born children. The data which were then available gave the following results. The columns headed "Differences" contain the amount to be added to the average statures and weights in order to obtain the measurements of first-born and later-born children. The figures in parentheses designate the number of individuals measured.

STATURES OF OAKLAND BOYS, IN MILLIMETERS.

Age in years.	Average stature.	Differences between average stature and stature of—				
		First-born children.	Second-born children.	Third-born children.	Fourth-born children.	Later-born children.
6.5	1137 (145)	+ 7 (30)	+ 7 (39)	−13 (25)	− 2 (16)	− 5 (33)
7.5	1180 (197)	+11 (49)	− 4 (42)	+13 (31)	± 0 (24)	−10 (46)
8.5	1249 (234)	− 3 (57)	− 7 (54)	− 1 (32)	−18 (25)	−21 (61)
9.5	1283 (220)	+ 2 (57)	− 2 (47)	+ 5 (38)	+ 5 (23)	+ 1 (46)
10.5	1334 (243)	± 0 (66)	+33 (49)	−18 (41)	−15 (35)	− 8 (47)
11.5	1379 (208)	− 1 (58)	+ 1 (39)	+16 (32)	−13 (27)	− 1 (45)
12.5	1426 (230)	+20 (66)	− 1 (47)	− 4 (38)	− 5 (36)	−19 (41)
13.5	1482 (184)	+16 (54)	+10 (43)	+16 (28)	−31 (26)	−25 (30)
14.5	1556 (163)	+11 (46)	−19 (40)	+ 4 (27)	± 0 (25)	+ 8 (24)
15.5	1632 (118)	+ 6 (35)	+ 8 (29)	−18 (22)	−14 (15)	+ 4 (17)
16.5	1668 (116)	−19 (29)	+17 (30)	+21 (18)	−20 (13)	± 0 (25)
Average differences	.....	+4.5	+4.0	+1.9	−7.9	−6.9

STATURES OF OAKLAND GIRLS, IN MILLIMETERS.

Age in years.	Average stature.	Differences between average stature and stature of—				
		First-born children.	Second-born children.	Third-born children.	Fourth-born children.	Later-born children.
6.5	1125 (113)	+11 (32)	± 0 (28)	— 9 (15)	—16 (10)	— 1 (28)
7.5	1175 (199)	+ 8 (49)	— 1 (40)	+ 3 (44)	— 4 (24)	—11 (42)
8.5	1226 (221)	+14 (52)	—11 (46)	— 9 (43)	+13 (19)	— 4 (61)
9.5	1277 (252)	— 4 (65)	— 3 (57)	+14 (47)	—17 (21)	+ 5 (50)
10.5	1335 (224)	+ 7 (59)	— 2 (46)	+15 (28)	— 6 (26)	—11 (59)
11.5	1389 (226)	+12 (52)	+10 (41)	— 3 (32)	+ 3 (34)	—14 (61)
12.5	1450 (293)	+ 3 (65)	+14 (56)	— 1 (55)	+ 7 (40)	+ 8 (67)
13.5	1516 (222)	— 3 (62)	+ 9 (48)	—19 (33)	+ 6 (29)	+ 9 (45)
14.5	1566 (241)	+ 9 (61)	± 0 (68)	— 8 (38)	—17 (23)	— 1 (49)
15.5	1577 (170)	— 2 (42)	+11 (36)	— 6 (32)	— 1 (19)	— 5 (41)
16.5	1597 (127)	+15 (30)	—38 (28)	— 3 (23)	— 1 (14)	—18 (32)
17.5	1597 (99)	+10 (30)	—21 (19)	— 8 (19)	± 0 (15)	+14 (16)
18 and older	1602 (82)	+12 (27)	— 5 (20)	—25 (10)	—10 (9)	— 1 (16)
Average differences		+7.1	—2.8	—4.5	—3.3	—2.3

WEIGHTS OF OAKLAND BOYS, IN POUNDS.

Age in years.	Average weight.	Differences between average weight and weights of—				
		First-born children.	Second-born children.	Third-born children.	Fourth-born children.	Later-born children.
6.5	47.7 (147)	—0.3 (28)	+0.7 (38)	+0.1 (26)	—0.1 (18)	—0.5 (35)
7.5	51.7 (191)	+1.1 (48)	—0.6 (42)	+0.1 (32)	—1.0 (21)	±0.0 (44)
8.5	57.3 (220)	—0.3 (58)	+0.2 (52)	+0.5 (32)	+0.7 (26)	—0.6 (57)
9.5	62.2 (212)	—0.4 (57)	+0.1 (45)	—0.2 (36)	—0.2 (22)	—0.1 (43)
10.5	69.0 (235)	—1.6 (64)	+5.4 (47)	—2.1 (39)	—1.4 (36)	—0.1 (44)
11.5	74.8 (206)	+1.0 (58)	—0.9 (38)	+1.2 (33)	—0.9 (27)	—0.3 (44)
12.5	81.6 (224)	+2.1 (64)	+1.2 (46)	—0.4 (37)	—2.6 (34)	—1.8 (41)
13.5	89.1 (185)	+2.0 (50)	+2.3 (46)	+4.1 (28)	—8.9 (32)	—2.5 (32)
14.5	105.1 (160)	+1.6 (47)	—0.7 (38)	—0.2 (26)	—1.4 (23)	+0.5 (25)
15.5	119.5 (114)	+3.0 (33)	—1.7 (27)	+0.1 (21)	+0.8 (15)	+1.8 (17)
Average differences		+0.82	+0.60	+0.32	—1.58	—0.44

WEIGHTS OF OAKLAND GIRLS, IN POUNDS.

6.5	45.7 (123)	±0.0 (31)	+0.9 (30)	—1.0 (15)	—1.2 (10)	+0.4 (32)
7.5	49.6 (186)	—0.1 (45)	+0.6 (37)	—0.1 (42)	—0.5 (23)	+0.1 (39)
8.5	55.7 (217)	+0.6 (50)	+0.3 (45)	—1.1 (42)	+0.8 (21)	±0.0 (59)
9.5	60.0 (242)	—1.5 (64)	+0.3 (57)	+2.1 (48)	—3.1 (22)	+1.0 (46)
10.5	66.8 (221)	+0.4 (57)	—0.8 (45)	—1.8 (28)	+2.5 (25)	—1.0 (60)
11.5	74.3 (232)	+2.1 (50)	—1.2 (41)	+0.4 (31)	+0.7 (32)	—1.2 (62)
12.5	84.2 (280)	+1.2 (67)	+2.6 (56)	—3.2 (54)	—0.4 (30)	—0.2 (64)
13.5	94.2 (220)	—0.9 (62)	+3.9 (47)	—2.6 (37)	+0.3 (29)	—1.2 (45)
14.5	105.8 (235)	+0.4 (60)	+1.3 (64)	—4.2 (35)	—1.4 (25)	+1.7 (49)
15.5	110.7 (165)	+2.1 (41)	+0.1 (32)	—3.5 (33)	+2.4 (19)	+1.2 (40)
16.5	116.5 (124)	+7.9 (29)	—1.5 (27)	—3.9 (22)	—7.5 (14)	—0.1 (32)
17.5	117.4 (90)	+1.9 (30)	—0.5 (18)	—3.2 (19)	+4.1 (15)	—1.2 (16)
18 and older	118.3 (82)	+2.4 (27)	+0.4 (20)	—0.1 (10)	—6.0 (9)	—1.1 (16)
Average differences		+1.12	+0.48	—1.71	—0.72	—0.12

The following tables contain the detailed results of the measurements obtained in Toronto:

Statures of Toronto boys. Age, 4 years.

Stature in centimeters.	Order of birth.									
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	14th.
88				1						
90						1				
91										
92				1						
93										
94	1	1	2							
95		1	2	1				1		
96		1	1	1			1			
97	1				1			1		
98		2	2			1	1			
99		2	3				1			
100	2	1	4	1	1		1			
101	1	2	2	2	1	3	1			
102	1	4	2	3				1	1	1
103		1	1	1						
104	3	2	3		1					
105	1	2			1	2				
106		1	2	1						
107	1	2	2	1	1					
108	1									
109	1									
110										
111	3			1	1					
112				1						
113										
114	1									
Cases	17	22	26	15	7	7	5	3	1	1
Average age (months over 4 years)	7.0	7.7	6.5	6.2						
Average stature	104.8	101.4	100.5	101.2						

Statures of Toronto boys. Age, 5 years.

Stature in centimeters.	Order of birth.													
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.
90														
91				1										
92														
93														
94	1													
95														
96			1	1	2		1			1				
97	1				1		1							
98		4	1			2	1							
99		2	2	1	2	1	1	2	1	1				
100		5	3	2	1	2	1	1	1					
101		3	3	1	1		2	1	1			1		1
102	4	5	7	1	2	1	1	1						
103	5	6	4	2	2	2		1				1		
104	6	6	4	5	2	1	3			1				
105	5	9	8	2	1	2	2	2						
106	3	6	8	7	3	2		2						
107	3	8	3	2	1	1		1			1			
108	2	5	7	5	3	2	1	1	2					
109	6	6	4	4	5		1		1				1	
110	8	4	5	1		3	2							
111	5	4	5	4	5									
112	4	3	6	5	1		1		1					
113	3	3	1	2			1							
114	2					1			1					
115		1	1		1			2						
116	1	3		1	2									
117				1										
118		2					1							
119														
120				1										
121					1									
122														
123														
124														
125			1											
126														
127														
128		1												
129														
Cases	59	86	74	49	36	20	17	14	8	3	1	2	1	1
Average age (months over 5 years)	7.2	6.7	6.9	6.8	6.7	6.4	6.0	6.5						
Average stature	107.4	106.5	106.3	107.2	106.7	104.8	104.8	105.1						
Corrected average at 5 years 6 months	106.8	106.2	105.9	106.8	106.4	104.6	104.8	104.9						

Statures of Toronto boys. Age, 6 years.

Stature in centimeters.	Order of birth.													
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.
95	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
96	.....	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
97	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
98	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
99	.....	2	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
100	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
101	.....	.....	.....	.....	1	.....	1	1	1	.....	.....	.....	.....	.....
102	.....	.....	.....	3	.....	2	.....	1	.....	.....	.....	.....	.....	.....
103	4	2	3	1	2	3	1	.....	.....	.....	.....	.....	.....	.....
104	3	8	2	1	2	.....	2	1	2	.....	.....	.....	.....	.....
105	4	9	7	3	4	.....	.....	2	.....	1	.....	.....	.....	.....
106	4	5	4	2	5	.....	.....	2	1	.....	.....	.....	.....	.....
107	4	10	7	3	3	.....	2	1	.....	2	1	.....	.....	.....
108	9	7	12	4	1	2	5	1	1	1	.....	.....	1	.....
109	14	11	7	3	5	2	3	1	2	.....	1	.....	1	.....
110	10	14	14	13	6	8	.....	1	1	1	.....	.....	.....	.....
111	12	9	11	6	5	4	2	2	.....	1	1	1	.....	.....
112	11	11	6	6	9	4	2	2	1	.....	3	.....	1	.....
113	5	6	8	9	3	5	3	.....	1	.....	.....	.....	.....	.....
114	9	12	5	6	3	1	4	3	1	.....	1	.....	.....	.....
115	12	15	5	4	7	1	.....	.....	4	1	.....	.....	.....	.....
116	6	8	6	4	3	2	1	1	1	.....	.....	.....	.....	.....
117	2	6	4	6	3	.....	.....	.....	1	1	.....	1	.....	.....
118	4	4	3	2	2	.....	1	1	1	.....	.....	.....	.....	1
119	4	4	2	2	1	1	.....	1	.....	1	.....	.....	.....	.....
120	1	1	1	1	.....	.....	2	.....	.....	.....	.....	.....	.....	.....
121	4	.....	.....	2	1	.....	.....	1	.....	.....	.....	.....	.....	.....
122	2	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....
123	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
124	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
125	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
126	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
127	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
128	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
129	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cases	128	147	108	85	67	36	31	23	18	9	7	2	3	1
Average age (months over 6 years	6.5	6.2	6.2	5.9	5.7	6.0	6.0	6.2	7.1	.....	.....	.....	.....	.....
Average stature.	112.0	110.9	110.8	111.3	111.1	110.7	109.8	109.6	111.2	.....	.....	.....	.....	.....
Corrected average at 6 years 6 months	111.8	110.8	110.7	111.3	111.2	110.7	109.8	109.5	110.7	.....	.....	.....	.....	.....

Statures of Toronto boys. Age, 7 years.

Stature in centimeters.	Order of birth.													
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.
103	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
104	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
105	.....	1	.....	1	.....	.....	.....	.....	1	.....	1	.....	.....	.....
106	2	1	1	.....	1	1	1	.....	.....	.....	.....	.....	.....	.....
107	4	1	2	1	3	.....	.....	1	.....	.....	.....	.....	1	.....
108	1	1	2	.....	1	.....	1	2	2	.....	.....	.....	.....	.....
109	4	5	4	1	1	.....	.....	.....	.....	1	.....	.....	.....	.....
110	9	3	5	4	3	.....	4	1	.....	.....	1	.....	.....	.....
111	8	11	7	4	3	3	.....	2	.....	.....	.....	1	.....	1
112	13	10	5	7	6	7	3	2	1	.....	.....	.....	.....	.....
113	5	10	12	3	4	4	2	1	1	.....	1	.....	.....	1
114	23	12	6	6	2	3	3	2	3	.....	1	.....	.....	.....
115	14	14	8	6	5	5	1	1	2	1	.....	.....	.....	.....
116	16	10	6	11	9	2	5	3	1	1	.....	.....	.....	.....
117	16	13	7	10	2	4	2	4	.....	3	.....	1	.....	.....
118	16	13	6	9	4	4	3	2	1	3	.....	.....	.....	.....
119	10	10	13	7	4	4	1	2	3	.....	.....	.....	1	.....
120	13	12	6	6	6	6	3	.....	.....	.....	.....	1	.....	.....
121	6	8	5	5	1	3	1	2	.....	.....	.....	.....	.....	.....
122	10	7	5	6	3	4	3	.....	.....	.....	.....	.....	.....	.....
123	6	7	4	1	.....	1	1	1	.....	.....	.....	.....	1	.....
124	4	4	8	2	2	3	1	1	.....	.....	.....	.....	.....	.....
125	5	2	1	1	2	1	.....	.....	2	.....	.....	.....	.....	.....
126	2	2	1	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....
127	.....	2	2	1	1	.....	1	.....	.....	.....	.....	.....	.....	.....
128	8	.....	1	1	.....	1	1	.....	.....	.....	.....	.....	.....	.....
129	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
130	2	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
131	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
132	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
133	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
134	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
135	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
136	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
137	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cases	201	163	119	94	64	58	37	28	17	9	4	3	3	3
Average age (months over 7 years)	5.9	5.6	5.8	5.4	5.1	6.0	5.1	5.3	5.4	5.6	3.5	7.3	2.3	5.7
Average stature	117.1	116.8	116.6	116.5	115.9	117.0	116.5	115.9	115.2	116.1	110.5	116.0	116.3	117.7
Corrected average at 7 years 6 months	117.1	117.0	116.8	116.8	116.3	117.0	116.9	116.2	115.5	116.3	.....	.....	.....	.....

Statures of Toronto boys. Age, 8 years.

Stature in centimeters.	Order of birth.												
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.
91				1										
94				1										
101			1											
105			1						1					
106	1						1							
107		1						1						
108					1		1	1						
109	2	1	1											
110	1	1	1	2	1	1	1	1						
111	3		1			1	1							
112	3	2	3	1		1	1		1	1				
113	1	2	6	3	3	2		1	1					
114	8	6	3	1	4	1	1					1		
115	8	7	6	5	6	1	6			2				
116	9	7	6	6	8	3	3	1	1	1				
117	10	7	8	5	3	2	4	3	3	2	1			1
118	14	11	10	11	5	9	1	2	1					
119	16	15	8	7	4	3	2	4	1	1				
120	21	18	14	6	7	4	6	4	5	2	1	1		
121	14	15	9	8	5	3	8	1	1	1	2			
122	14	11	14	5	9	5	8	2	2	1		1		
123	14	15	10	8	1	4	1	4				1		
124	8	14	11	10	5	10	3	2		1			1	
125	12	17	8	9	1	4	2	3		4				
126	8	10	7	3	4	3	4	1	1	1				
127	11	6	3	5		2	2	2	2			1		
128	9	3	9	9	5	2	3		1					
129	4	4	3	3	1	1	3	1						
130	8	1	5	1	1	2								
131	1		2		3			1						
132	4	3	3			2	1			1		1		
133	2	2	2				2	2						
134		4	2	1						1	1			
135		1	2	2										
136	1	3												
137			1											
138					1									
139		1												
140														
141														
142	1				1									
143														
144	1													
145	1													
Cases	216	188	159	111	79	64	64	35	21	19	5	6	1	1
Average age (months over 8 years)	5.8	5.6	6.0	5.7	5.8	5.4	5.9	5.9	4.7	4.9				
Average stature	121.9	122.0	121.6	121.7	120.7	121.6	121.0	121.2	119.4	121.6				
Corrected average at 8 years 6 months	122.0	122.2	121.6	121.8	120.8	121.8	121.0	121.2	119.9	122.0				

Statures of Toronto boys. Age, 9 years.

Stature in centimeters.	Order of birth.												
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.
93								1					
95		1											
105													
106			1										
107													
108	1	1											
109	1												
110		1											
111													
112	1				1						1		
113	1		2										
114		1	1					1					
115		1			1	1							
116	2	1	1	2	2					1			
117	5	1	2		3	3	2	2					
118	4	11	3	3	2	3	2	1	1				
119	5	3	2	2	7		2	1	1				
120	6	6	4	6	4	4	1	3	2		1		1
121	17	9	9	6	5	2	2	1	3				
122	6	9	5	7	6	4	5			4			1
123	11	11	8	9	3	6	4	1		1			
124	19	12	12	7	5	7	3	1	2				
125	13	10	14	13	4	10	3	4	2	1			
126	15	15	10	5	6	6	5	2	3	1			
127	22	13	6	6	2	4	3	2	4	3	1	1	
128	19	16	6	6	6	4	2	1	2		1		
129	10	6	10	7	5	1	2			2	1	1	
130	21	11	8	4	7	3	2	6	1		1		
131	10	8	6	7	2		2	4	1				
132	13	9	4	4	6	5	4	2	2	2			
133	9	4	11	5	3	4	1	1					
134	8	8	2	3	4	2	1						
135	5	5	1	6	2	1	1						
136	5	4	3	2			1		1				
137	3		1	1	1								
138	4	1	3	1									
139	1							1					
140		1											
141	1		1										
142	1												
143			1										
144													
145													
146	1												
147													
148		1											
149													
150								1					
Cases	240	180	137	112	87	71	48	36	25	15	6	2	2
Average age (months over 9 years)	5.8	6.2	5.6	5.7	6.1	5.6	6.0	5.3	6.4	5.5			
Average stature	127.0	126.1	126.5	126.6	125.4	125.4	125.7	126.7	125.6	125.4			
Corrected average for 9 years, 6 months	127.1	126.0	126.7	126.7	125.4	125.6	125.7	127.0	125.4	125.6			

Statures of Toronto boys. Age, 10 years.

Stature in centimeters.	Order of birth.												
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	15th.
107						1								
114	1													
115	2			1	1				1					
116														
117		1	1		1		1	1						
118	1		1		1									
119	1	1	1	4		2	1							
120	2	1	2	1	2	2		1		1				
121	3		2	2	2			1						
122	7	3	7	3	3		2							
123	7	2	1	2	1	1		3	2					
124	6	6	5	3	2	6	2	3	1		1			
125	10	5	4	9	3	3	3			1				1
126	8	7	6	5	1	2	3	1		1				
127	11	11	2	5	4	2	2							
128	8	10	8	7	3	2	1	2	1	2		1		
129	13	9	12	4	4	3	3	2	1					
130	19	11	7	10	8	6	3	2	1		2	1		
131	10	9	7	4	12	7	3	3	3	1			2	
132	18	7	9	5	7	2	2	3	3					1
133	12	8	12	12	1	7	2	1	1	1				
134	7	8	14	1	4	2	3	2			1	1		
135	14	9	7	7	7	6	1	2		2	2			
136	15	3	7	4	3	5	4	2	1	1				
137	6	6	5	6	2	3	3	1	1					
138	7	3	7		2	1	3							
139	2	7	5	5	1	2			2					
140	6	5	1	5	2	1	1	1						
141	5	6	3	2	3	3	1	1			1			
142	5	1	1	3					1					
143				1	2	3								
144	4		2	1										
145	1													
146	1	3				1								
147		1				1								
148		1	1											
149	1	1				1								
Cases	213	145	140	112	82	75	44	34	19	10	7	3	2	2
Average age (months over 10 years)	5.9	5.8	5.8	5.6	6.0	5.6	5.8	5.2	5.7	6.8				
Average stature	131.2	131.9	131.3	130.8	130.7	131.8	130.7	129.5	130.9	129.7				
Corrected average for 10 years, 6 months	131.2	132.0	131.4	130.9	130.7	131.9	130.8	129.8	131.0	129.4				

Statures of Toronto boys. Age, 11 years.

Stature in centimeters.	Order of birth.														
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.	17th.
115										1					
116															
117	1														
118	1														
119															
120	1				1										
121	3			1											
122	1	1	1			1		1	1						
123	1	3	3	3		1									
124		3	3	1		1	1							1	
125	5	1	3	3	4	3			1				1		
126	3	4	3	3				2	1						
127	4	4		5	1	1									
128	4	5	6	4	5	3	1	1		1					
129	7	6	6	5	3	5	3			1					
130	15	9	8	8	7	6	2	1							
131	3	10	6	2	1	3	1	2	1	1					
132	7	6	5	3	6	6	1	1	2						1
133	8	3	7	5	6	2	4	2	1			1			
134	10	12	11	9	5	3	5	3	1	2					
135	11	10	9	7	3	3	2				1	1			
136	9	8	4	12	10	3	1	2	1		1		1		
137	13	7	4	2	3	3	3	3	1	1					
138	11	10	11	7	5	4		4	2						
139	8	5	5	4	5	7	3	2	1	1	1				
140	8	12	7	8	3	2	3	1	2				1		
141	7	9	4	6	2	5	3			1					
142	6	8	4	3	5	3	2	1	1		1				
143	7	4	3	6	5	1		1		1					
144	1	2	2	1	2	3	2			1					
145	3	5	2	3	3							1			
146	2	3	3				2					1			
147	5	2	1		1						1				
148	2	1	3		1	2					1				
149	3														
150	2	1		1											
151	1	1													
152	1	1													
153			2					1							
154						1									
155															
156		1													
157															
158		1													
164			1												
Cases	177	156	125	109	86	71	39	28	16	11	6	4	3	1	1
Average age (months over 11 years)	5.6	5.7	5.6	5.5	5.6	6.0	4.8	5.4	5.1	4.4					
Average stature	135.6	136.1	135.5	134.9	135.5	135.1	136.0	135.2	134.1	135.9					
Corrected average for 11 years, 6 months	135.8	136.2	135.7	135.1	135.7	135.1	136.5	135.4	134.4	136.5					

Statures of Toronto boys. Age, 12 years.

Stature in centimeters.	Order of birth.												
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	14th.
107		1											
119	1												
120													
121													
122	1												
123	1				1								
124	1	1		2									
125	3		1			1							
126	1	1	1		1	1							
127	2	1		1	1	1	2						
128	3		1	1	1	2		2					
129	4	1	3	2		1		1					
130	3	3	3	3		3	2	1					
131	3	1	4	1			4	2		2			
132	5	3	5	5	2		1	1	1				
133	6	4	5	2				3	1	1		1	
134	7	3	7	4	1	1	1	1	1				
135	7	5	3	4	3	2	5	1		1			
136	4	8	8	6	4	4	5	2	3				
137	4	3	4	11	3	6	2	3	2		1	1	
138	15	9	5	7	4	3	5	1	2	2			
139	12	7	6	1	1	7	4	1		3	1		
140	11	11	10	6	3	6	2	1	1	1			1
141	10	9	7	3	3	4	1	2		1	1	2	
142	9	11	5	2	5	1	5	3		3	1		
143	7	9	9		2	2	2	1	3				
144	7	13	7	3	1	3	3	3	2	2			
145	4	6	9	5	1	2	2		2				
146	7	4	6	4		2	1						
147	9	8	5	4	2	1	2						
148	3	8	3	5	2	3	1	2	1		1	1	
149	3	1	2	1		2	1			2			
150	8	1	5	3	1	3	1						
151	2	2			1	2							
152		3			1	1	1						
153	2				1								
154	1	1	2										
155	2	1	1	2	1								
156	2	1	2	1			1	1					
157	1									1			
158	1												
159	1				1								
160		1			1								
Cases	173	141	129	89	48	64	54	32	19	19	5	5	1
Average age (months over 12 years)	6.0	5.7	5.8	5.3	6.4	6.0	6.3	4.7	5.4	4.8			
Average stature	139.9	141.1	140.2	139.2	140.6	139.7	139.1	137.9	139.6	149.6			
Corrected average for 12 years, 6 months	139.9	141.2	140.3	139.5	140.4	139.7	139.0	138.5	139.9	141.1			

Statures of Toronto boys. Age, 13 years.

Stature in centimeters.	Order of birth.													
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.
78	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
125	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
126	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
127	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
128	1	.....	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
129	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
130	1	.....	1	.....	.....	1	2	.....	.....	.....	.....	.....	.....	.....
131	4	.....	.....	.....	1	2	.....	.....	.....	.....	.....	.....	.....	.....
132	.....	3	.....	1	1	.....	.....	.....	.....	1	.....	.....	.....	.....
133	1	.....	3	1	.....	1	1	.....	.....	1	.....	.....	.....	.....
134	2	3	.....	1	.....	.....	3	.....	.....	.....	.....	.....	1	.....
135	1	3	5	2	2	1	.....	.....	.....	.....	.....	.....	.....	.....
136	9	5	3	2	1	1	.....	.....	1	2	.....	.....	.....	.....
137	6	3	4	4	1	2	.....	1	.....	.....	.....	.....	.....	.....
138	5	1	1	5	2	3	2	.....	.....	1	1	.....	.....	.....
139	3	6	3	3	.....	3	1	2	.....	.....	.....	.....	.....	.....
140	1	8	7	4	4	3	1	1	1	.....	.....	.....	1	.....
141	4	3	3	8	2	2	4	1	1	.....	.....	.....	.....	.....
142	6	4	4	3	3	6	.....	1	1	1	1	1	.....	.....
143	15	5	2	1	1	1	1	3	1	1	.....	.....	.....	.....
144	5	6	2	3	2	3	2	.....	.....	.....	.....	.....	.....	.....
145	15	9	9	7	3	1	.....	3	1	.....	.....	.....	.....	.....
146	7	4	3	5	4	1	.....	1	.....	.....	1	.....	.....	.....
147	9	4	6	4	1	2	.....	.....	3	.....	1	.....	.....	.....
148	6	6	6	4	.....	2	3	1	.....	.....	.....	.....	.....	1
149	9	3	4	2	1	2	1	1	1	.....	.....	.....	.....	.....
150	10	5	3	2	1	5	.....	1	.....	.....	.....	.....	.....	.....
151	4	8	1	1	4	.....	.....	.....	1	1	.....	.....	.....	.....
152	5	6	.....	1	3	1	1	2	.....	.....	.....	1	.....	.....
153	2	5	3	2	1	1	.....	2	.....	1	.....	.....	.....	.....
154	4	1	1	2	2	1	1	.....	.....	.....	.....	.....	.....	.....
155	8	1	3	2	1	3	.....	1	.....	.....	.....	.....	.....	.....
156	2	3	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
157	.....	4	.....	1	.....	.....	2	1	.....	.....	.....	.....	.....	.....
158	2	4	1	1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
159	2	1	1	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
160	1	1	.....	.....	1	.....	.....	1	1	.....	.....	.....	.....	.....
161	.....	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
162	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
163	1	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
164	1	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
165	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
166	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
167	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
168	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
169	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
170	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cases	158	120	84	80	45	49	25	23	12	9	4	3	2	1
Average age (months over 13 years)	5.9	5.7	5.9	5.7	5.5	5.4	6.3	5.3	4.8	.....	.....	.....	.....	.....
Average stature	146.0	146.3	144.0	145.1	145.3	143.7	142.3	146.8	145.7	.....	.....	.....	.....	.....
Corrected average for 13 years 6 months	146.1	146.5	144.1	145.3	145.6	144.0	142.1	147.2	146.3	.....	.....	.....	.....	.....

Statures of Toronto boys. Age, 14 years.

Stature in centimeters.	Order of birth.										
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
120											
121											
122				1							
123											
124						1					
125				1							
126		1									
127											
128											
129											
130								1			
131				1							
132			1								
133	1	1									
134											
135	1				1						
136	2		1	1	1	1					
137		1			1		1	1			1
138	1	1		1	2	1					
139		1		1	2		1				
140	1	1		3	1	3					
141	7	3	1	1	1	1	1				
142		3	3								
143	1	2	2	2	2	1					
144	1		4	1	2	1			1		
145	5	2	4	3	2	2		2	1		
146	2	5	4		3		1			1	
147	3	4	2		5	1	1				
148	7	3	6	2	5	1	1				
149	2	2	1	3	4		1	1	1		
150	7	7	7	1	3	1	1				
151	3	4	1			1	1	1			
152	5	4	6			2	2	3			
153	3	4	3	1	3			1	1		
154	3	6	4	4	1	3	1		2		
155	5	5	2	1		1	1			1	1
156	2	2	1	4	1		2		1		
157	1	3	4		2	2					
158	2	3	1	1			1				
159	3	1	3		3			1	1		
160	4		2	1	1	1		1			
161	3		3		2			1			
162	2	2	2	2		1					
163	2	1				1	1				
164	1			2	1	1	1				
165	1	1	1		2						
166				2	1				1		
167		1		1							
168				2							
169	3	1									
170				1		1					
171											
172											
173	1	1									
174	1										
175											
176			1								
177											
178											
179											
Cases	86	76	70	44	52	28	18	13	0	2	2
Average age (months over 14 years)	5.8	4.7	4.5	4.6	5.3	6.1	7.6	3.8	.....	.....	.....
Average stature	151.9	150.8	151.1	150.8	149.4	150.4	151.0	149.7	.....	.....	.....
Corrected average for 14 years 6 months	152.0	151.6	152.0	151.7	150.1	150.3	150.0	151.0	.....	.....	.....

Statures of Toronto boys. Age, 15 years.

Stature in centimeters.	Order of birth.											
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.
124	1											
137			1									
139			1									
140	3			1								
141	1	2										
142				1								
143	1	1										
144			1	1								
145			1		1						1	
146	1		1	2	1		1		1			
147	1						1	1				
148	1		1	1					1			
149			2					1			1	
150		1	3	1	1							
151	3				1							
152	2		1					1				
153	3	2		2	2		1					
154	3	2		3			1					
155	2	1		2	1	2	1					
156	3		1					1				
157	1		1	1			2					
158	2	3	1	3	3			1	1		1	
159	2	1	2	2	1							
160	3	1	2		3	1		1				
161	3	2				1	1					
162		2	1	2	1							
163		1	2		1							
164	2				1							1
165	2		1	1								
166	3				2	1						
167	3	1										
168	1	1		1	1					1		
169	1			2			1					
170				1				1				
171												
172	3	1		1						1		
173												
174			1									
175												
176						1						
177												
178												
179												
180	1											
187		1										
Cases	52	23	24	28	20	6	9	7	3	2	3	1
Average age (months over 15 years)	5.0	4.4	5.0	5.1	5.8							
Average stature	157.1	156.8	154.0	156.4	157.7							
Corrected average for 15 years 6 months	157.5	157.5	154.4	156.8	157.8							

Statures of Toronto boys. Age, 16 years.

Stature in centimeters.	Order of birth.										
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	10th.	11th.	13th.
138							1				
139				1							
141		1									
150					1						
151											
152	1	1					1				
153											
154		1									
155	2		1								
156			2				1				
157	2					1					
158		1									
159		2				1					
160	2										
161				1							
162		1	1								
163			1								
164	1	1								1	
165								1			
166							1				
167		1						1			
168											
169		1									
170								1			1
171			1						1		
172			1		1						
173											
174											
175											
176											
177			1								
178											
179				1							
Cases	8	10	8	3	2	2	4	3	1	1	1
Average age (months over 16 years)	5.5	5.2									
Average stature	157.5	158.5									
Corrected average for 16 years 6 months	157.7	158.8									

Statures of Toronto girls. Age, 4 years.

Stature in centimeters.	Order of birth.								
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.
90									
91			1						
92									
93	1	3	1				1	1	
94		2							
95			2		3		1		
96			1	1	2				1
97	1	3	1	1	2	1	1		
98	2		3	2	3		2	1	
99							1		1
100	2	6	3					2	
101	3	2		1	1	2		1	
102	3		2	2	1				
103	1		1	1	1				
104	3	2	1		1	1	1	1	
105		2	1						
106	2		1						
107	1					1			
108			1						
109	1			1					
110									
111	1								
112	1								
113									
114									
Cases	22	10	10	9	12	5	7	6	2

Statures of Toronto girls. Age, 5 years.

Stature, in centimeters.	Order of birth.													
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	19th.
85														
86														
87				1										
88														
89														
90														
91		1												
92														
93			1											
94														
95		1					1							
96			1	1		2				1				
97			1		1									
98	1	2	2	5	3	1		2				1		
99	1	2	3	3	1	3								
100	5	3	6	3	3	2		2	1					
101	6	4	6	2	2		1	1	1					
102	2	10	3	4	2	2			2	2			1	
103	8	4	9	6			2	1						
104	4	12	9	4	2		2	1	2	2				
105	5	7	6	3	2	3			2					
106	9	6	8	1	1	3	2		1					
107	3	3	7	5	2	2	1	2			1			
108	4	5	2	4		1								
109	5	6	2	3	1	2					1			1
110	7	3	4	2	1	1								
111	2	7	4		1		1							
112	4	3	1	1	1		1	1						
113	5	3		2	1									
114	2	1			1									
115		1		1			1		1					
116		1	1	2										
117														
118		1		1										
119														
120														
121	1													
Cases	74	86	77	54	25	22	12	10	10	5	2	1	1	1
Average age (months over 5 years)	6.1	7.0	6.5	6.3	5.8	6.2	7.3	5.7	7.1					
Average stature	106.5	105.8	104.2	104.7	104.1	103.4	105.6	103.0	104.4					
Corrected average for 5 years 6 months	106.5	105.4	104.0	104.6	104.2	103.3	105.0	103.1	103.9					

Statures of Toronto girls. Age, 6 years.

Stature, in centimeters.	Order of birth.											
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.
95			1									
96												
97							1		1			
98	1		1		1							
99		2										
100	1				1							
101	1		3	1			2	1				
102	1	1	5	4		1	2					
103	3	2	2		1	1			1			
104	6	6	3	5	1		1	2	1	1		1
105	2	5	4	6	1	1	1	1		1		
106	9	6	3	2	2	1	1			1	1	
107	6	8	3	6	5	5	3	1	1	2		
108	9	4	12	4	6	2	2		2			
109	12	5	4	3	3	2	2	1	1			
110	11	13	6	6	7	6	3	3				
111	8	5	8	4	6	2	4	1		1		
112	11	9	7	7	8		1	2	2		1	
113	9	15	7	2	3	1	2		1		1	
114	7	9	5	4	2	1	2	1		1		
115	8	12	2	2	2	2	2	1	1	1		
116	5	5	2	2	1	2	1			1		
117	7	3	2	3	1	3	1	1	1	1		
118	1	5	2	4				1				
119	1	2	1		1			1				
120	1	2	2									
121					1	1						
122	1		1	1								
123		1	1									
124	4											
125				1								
Cases	125	120	87	67	53	31	31	17	12	10	3	1
Average age (months over 6 years)	6.4	6.2	5.5	6.0	6.4	6.2	5.6	6.0	6.7	6.6	4.7	
Average stature	110.9	111.2	109.7	110.1	110.1	110.6	108.9	110.5	108.7	110.2	110.3	
Corrected average for 6 years 6 months	110.7	111.1	109.9	110.1	109.9	110.5	109.1	110.5	108.4	109.9	110.9	

Statures of Toronto girls. Age, 7 years.

Stature, in centimeters.	Order of birth.														
	1st.	2d.	3d.	4th	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.	16th.
100															
101															
102	1		1												
103					3										
104		3		1	1			1							
105	1	4	3	2		1	1								
106	1	1	1			4					1				
107	1	3	2	2		1									
108	3	4	4	1				1		1	1				
109	1	1	7	1	2		3			1	1				
110	8	9	2	7	4	2	1	3			2				
111	15	6	6	2	1		2	1		1	1			1	
112	7	12	7	5	5	1			2	1					
113	15	7	4	5	3	5	4	1		1					
114	9	11	5	7	2	2	4	1	1	1					
115	15	14	7	6	6	3	1	2			1				
116	13	12	14	9	10		1		1	1		1	1		
117	8	17	9	7	2	4	8	1		1	1				
118	16	9	12	4		3	3	1		1					1
119	7	10	5	10	3		1	1	1	1	1				
120	12	9	8	4	3	3	3	1	3	1					
121	14	5	5	7	4	2	1	3	1						
122	7	3	4	4	4	2	1	2							
123	5	2	1	2	3	1	3								
124	4	5	3	3	1		1								
125	1	2	1	1		1	1	1	1						
126	3	3	2	2	1	1									
127		2	2	1	1	1									
128	1	1		1											
129						1		1							
130			1	1											
131	1		1												
132															
133		1													
134															
Cases	169	156	117	95	59	38	39	21	10	11	9	2	1	1	1
Average age (months over 7 years)	6.0	6.0	5.9	6.4	6.4	6.4	7.2	5.3	4.1	5.6	6.9	8.5	6.0	4.0	6.0
Average stature	116.3	115.7	115.9	116.5	115.7	115.9	116.2	116.4	117.9	114.3	111.7	123.5	116.0	111.0	118.0
Corrected average for 7 years 6 months	116.3	115.7	115.9	116.3	115.5	115.7	115.7	116.7	118.7	114.5	111.3	122.5			

Statures of Toronto girls. Age, 8 years.

Stature in centimeters.	Order of birth.													
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.
102			1											
103														
104														
105		1					1							
106									1					
107					1									
108	2	1	1											
109	1		2	1	1	1	1			1	1			
110	1	3	2		1									
111	3		3		3	1			1	1				
112	3	5	3	2	1	2		2						
113		5	2	3	5	2	1	1						
114	8	2	3	5	3		2		1				1	
115	5	6	8	6	2	2	2	2	2		1			
116	5	13	10	6	7	1	3		1	1	2			
117	5	8	1	4	3	4	4		1					1
118	6	8	5	8	4	9	4	4	2	2				
119	10	9	9	7	5	4				1		1		
120	22	16	8	10	3	3	3		3	2	1			
121	11	9	12	9	6		3	2		4				
122	9	15	8	8	7	2	5	3	2	1				
123	13	7	4	6	5	3	1	2	4	1				
124	15	7	7	4	4	4	4	2	2					
125	10	7	6	4	5	2	7	2	1	1				
126	15	4	9	4	4		1							
127	6	7	6	6	1	2	3			1				
128	7	2	4	4	3	1								
129	2	1	4	1		2		1	1					
130	7	1	3	2	1			1						
131	2	1			1									
132	4	2	1		1		1							
133	1					1								
134	1		1	1			1			1				
135	1													
136	1	1												
137			1											
138			1											
139														
140	1													
Cases	177	141	125	101	77	46	47	22	22	17	5	1	1	1
Average age (months over 8 years)	5.9	5.9	5.7	6.0	5.2	4.8	5.2	5.8	5.2	6.2	3.6	2.0	4.0	7.0
Average stature	122.1	120.2	120.8	120.5	119.8	119.9	120.7	120.5	119.5	120.4	115.2	119.0	114.0	117.0
Corrected average for 8 years 6 months	122.1	120.2	120.9	120.5	120.1	120.4	121.0	120.6	119.8	120.3				

Statures of Toronto girls. Age, 9 years.

Stature in centimeters.	Order of birth.												
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.
95	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
105	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
106	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
107	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
108	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
109	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
110	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
111	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
112	.....	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
113	1	1	1	1	.....	.....	1	.....	.....	.....	.....	.....	.....
114	.....	.....	1	1	1	.....	.....	.....	.....	.....	1	.....	.....
115	6	2	2	.....	1	.....	1	.....	.....	.....	.....	.....	1
116	1	3	1	1	1	3	3	.....	.....	1	.....	.....	.....
117	2	3	3	4	3	1	1	1	.....	.....	.....	.....	.....
118	6	3	1	2	2	1	1	2	1	.....	.....	.....	.....
119	3	5	9	5	5	2	2	4	1	3	.....	.....	.....
120	13	3	4	7	4	5	2	2	.....	.....	1	.....	.....
121	10	8	4	4	5	4	3	.....	1	.....	1	.....	.....
122	11	7	8	9	4	5	3	1	1	.....	.....	1	1
123	13	12	11	4	5	2	4	.....	4	1	1	.....	.....
124	16	12	7	5	6	7	4	3	4	.....	.....	.....	.....
125	22	13	6	7	9	4	3	2	3	.....	.....	1	.....
126	16	15	4	10	4	4	3	2	1	.....	1	.....	.....
127	18	5	13	8	4	6	.....	4	5	1	2	2	.....
128	11	10	11	6	11	2	3	1	3	.....	.....	.....	.....
129	16	10	3	3	1	2	3	1	.....	.....	.....	.....	.....
130	16	8	8	4	5	4	4	1	.....	1	.....	.....	.....
131	10	3	10	5	2	2	4	1	1	.....	.....	.....	.....
132	9	3	4	3	2	2	.....	.....	.....	1	1	1	.....
133	4	2	.....	1	2	2	.....	.....	.....	1	.....	.....	.....
134	4	4	1	3	.....	.....	1	.....	.....	.....	.....	.....	.....
135	6	3	1	1	1	.....	.....	1	.....	.....	.....	.....	.....
136	2	4	.....	1	2	.....	.....	1	.....	.....	1	.....	.....
137	3	1	4	2	1	.....	.....	.....	.....	.....	.....	.....	.....
138	1	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
139	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
140	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
142	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cases	222	147	119	98	82	58	48	27	25	9	9	5	2
Average age (months over 9 years)	5.8	5.8	6.1	5.1	5.7	5.7	5.1	6.5	5.3	4.9	5.8	6.2	9.5
Average stature	125.9	125.6	125.6	124.9	124.7	124.5	123.2	124.5	124.8	124.2	125.3	.....	.....
Corrected average for 9 years 6 months	126.0	125.7	125.6	125.3	124.8	124.6	123.6	124.3	125.1	.....	.....	.....	.....

Statures of Toronto girls. Age, 10 years.

Stature in centimeters.	Order of birth.												
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.
109	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
110	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
114	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
115	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
116	.....	.....	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
117	.....	1	1	.....	.....	1	1	1	.....	.....	.....	.....	.....
118	2	1	1	1	.....	.....	.....	.....	.....	1	.....	.....	.....
119	1	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
120	3	1	2	.....	.....	2	1	.....	.....	1	.....	.....	.....
121	2	3	1	1	2	.....	1	1	1	.....	.....	.....	.....
122	5	3	8	6	.....	1	1	.....	.....	.....	1	.....	.....
123	6	3	1	.....	2	5	2	.....	.....	.....	1	.....	.....
124	6	7	2	2	2	1	1	.....	.....	1	.....	.....	.....
125	17	7	7	4	2	4	4	6	.....	2	1	1	1
126	5	7	5	7	2	.....	2	2	1	.....	.....	.....	.....
127	9	4	5	3	2	2	3	2	.....	2	2	1	.....
128	10	8	8	7	2	3	1	.....	1	.....	1	.....	.....
129	5	6	8	6	1	4	.....	4	.....	1	1	.....	.....
130	15	14	13	5	4	5	2	.....	1	1	.....	1	.....
131	18	11	7	8	3	2	.....	.....	2	2	.....	1	.....
132	10	8	9	8	9	1	1	2	.....	.....	1	1	.....
133	12	11	5	9	6	4	.....	.....	3	.....	1	2	.....
134	10	5	4	8	4	1	5	1	1	.....	.....	.....	.....
135	12	9	9	7	6	2	1	1	.....	.....	.....	.....	.....
136	5	4	8	1	4	.....	2	1	1	1	.....	.....	.....
137	6	10	3	5	2	7	.....	2	1	.....	.....	.....	.....
138	4	7	7	2	.....	5	1	.....	.....	2	.....	.....	.....
139	4	4	2	1	2	1	1	.....	1	.....	.....	.....	.....
140	4	3	5	2	1	2	.....	1	1	.....	1	.....	.....
141	2	1	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
142	2	.....	1	.....	1	.....	2	.....	.....	1	.....	.....	.....
143	4	1	.....	.....	.....	1	1	.....	1	.....	.....	.....	.....
144	1	.....	.....	1	.....	1	1	.....	.....	.....	.....	.....	.....
145	2	1	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....
146	1	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....
147	1	.....	.....	.....	1	1	1	.....	.....	.....	.....	.....	.....
148	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
149	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
150	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
151	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
152	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
Cases	185	141	130	97	60	58	36	25	15	15	10	7	1
Average age (months over 10 years)	6.1	6.0	5.9	5.2	5.9	6.0	5.3	5.0	7.2	7.0	5.5	5.4	2.0
Average stature	131.0	130.8	130.6	130.8	131.8	131.8	130.2	129.8	133.0	129.4	128.6	130.1	125.0
Corrected average for 10 years 6 months	131.0	130.8	130.6	131.2	131.8	131.8	130.5	130.2	132.5	128.9	.....	.....	.....

Statures of Toronto girls. Age, 11 years.

Stature in centimeters.	Order of birth.										
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
115	1	1									
116		1									
117											
118											
119						1					
120	2				1						
121	1		1		1		1				
122	1			1					1		
123	1	2	2	3			1				
124	2	1	1	3	1						
125	1	3	3	1	2		1		1		
126	3	4	4	2	5	1		1			
127	3	4	6	3	2		1		2		
128	3	3	10	7	1	3	1	1			
129	6	6	3	4	5	4	2	1		1	
130	8	9	6	8	4	4	5		1	1	1
131	7	5	8	6	5	2	2	2	1	1	1
132	15	8	4	4	4	1	1	1	2		
133	10	7	10		3	3	3	3	2	1	
134	17	6	10	7	3	5	2		2	1	
135	10	5	9	11	5	3	3	2		2	2
136	15	8	8	8	6	4	3	1	1		
137	19	14	7	8	5	4	3		1		
138	7	11	6	4	3	6	2		2	2	
139	16	13	5	8	3	4	3	3		2	1
140	15	9	6	3	6	1	3	2	1	1	
141	5	9	2	5	6	5	3	1	3	2	
142	2	4	9		3	2	1	1	1		
143	7	2	2	4	6	1	1				
144	4	4	2	3	1	3	1				
145	3	4	2	5	4	3		1			
146	4	4	3	1	1	1		1	1	1	
147	3		4	3	1		2	1			
148		4			1	1	1				
149	3	2	1	2	2		2	1			
150	5	2	2	1	1				1		
151					1		1		1		
152	1										
153	1										
154	1										
155											
156											
157											
158											
159	1										
Cases	203	158	135	114	91	62	49	23	24	15	6
Average age (months over 11 years)	5.4	5.2	5.4	5.5	5.1	5.7	5.7	6.0	4.5	6.1	
Average stature	136.4	136.0	134.8	135.3	136.1	136.2	136.2	136.9	135.9	136.6	133.0
Corrected average for 11 years 6 months	136.7	136.4	135.1	135.5	136.5	136.3	136.3	136.9	136.6	136.6	

Statures of Toronto girls. Age, 12 years.

Stature in centimeters.	Order of birth.														
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.	15th.
120															
121				1											
122		1	2		1				1						
123															
124	1	1	1												
125	2	1				1									
126	1	1													
127		3	1						1						
128	3	3	1		1	1		1	1						
129	3	2	1	2		1	1								
130	3	1	3	2		2	1	1			1	1			
131	2		2		1				1						
132	4	6	5	3	3		3	1	3						
133	3	4	3	1	3		3		3						
134	7	4	5	7	3	1	1		3		1				
135	1	4	5	3	7	1	1	5	1						
136	5	8	5	3	5	3	1	1		1	2				
137	4	9	8	7	3	5		3	1	1				1	
138	14	3	6	4	4	4	6	4	4	1					
139	4	8	3	8	9	1	3	3							
140	7	8	7	10	6	4	3	5	1						
141	7	10	11	3	3	6	1		4	1					
142	13	11	5	6	5	3	1		3	1		1			
143	12	8	4	6	3	3	3	7	3	3		1			
144	6	8	9	9	3	4	5			1	1				
145	10	11	7	7	3			3					1		
146	6	4	7	3	3	3	1	1	1						1
147	6	6	14	4	3	1	3	1		1					
148	11	8	4	1		1	1		3	1					
149	4	4	3	4	3	1	3	1	1		3				
150	5	6	5	3	1	4	1	1	1	1					
151		1	3	3	1	3	1								
152		3	3	3		1			1						
153	3	4	3	1											
154	3	3	2	1	1		3	1			1	1			
155	3	3		3			2								
156	1	3	4	3	1	3		1	1						
157	1		1		1										
158	1			1	3										
159	1														
160	1		1												
161	3	1													
162		1													
163															
164			1												
Cases	157	160	143	107	73	51	44	37	33	11	8	4	1	1	1
Average age (months over 12 years)	5.3	5.6	5.5	5.7	5.2	5.9	5.0	6.0	5.2	6.2	6.1				
Average stature	142.1	141.6	142.0	141.6	140.5	141.4	142.0	140.5	139.4	142.6	141.5				
Corrected average for 12 years 6 months	142.5	141.8	142.3	141.8	140.9	141.5	142.5	140.5	139.8	142.5					

Statures of Toronto girls. Age, 13 years.

Stature in centimeters.	Order of birth.													
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.
125														
126														
127														
128				1										
129	1		1		1									
130											1			
131					1									
132	1	1		2			1							
133		1	1											
134	1	3	3											
135	2	1	1	1	1									
136	2	2	4	1	1									
137	3	1			1	1		1		1				
138	2	6	2	2	2	2	2	1	1					1
139	3	2		2	4	1								
140	2	5	4	4	4		1	1						
141	4	6	2	2	3		1			1		1		
142	9	2	2	3	2	1	1			1				
143	5	6	4	3	4	4	1	2						
144	4	7	4	4	4	1	3			1	2			
145	8	14	7	6	1	7	1	1	3	1				
146	9	5	8	4	6	4	2	1	3					
147	3	5	4	5	6	5	2		2	2				
148	8	7	5		5	1	1	2	2	1	1	1		
149	6	8	5	7	3	1	1	3					1	
150	10	8	5	3	6	2	3	1	1					
151	9	7	6	6	3	1	2	2		1				
152	9	6	6	4	4	1		1	1		1	1		
153	4	5	3	3		3		1		1				
154	4	6	4	5	3	3	2	1	1	2				
155	5	1	5	1	1			1	2	2	1			
156	3	2	2	3	2	1		1		1		1		
157	4	2	2	3	5	1	3		1	1				
158	6	4	2	4	1									
159	4	4	2	2		1			1					
160	2		2	5	1	1		1						
161			1			1		1						
162	4				1		2							
163	1		1	1	1						1			
164		2	1	1	1	2			1					
165	1													
166														
167														
168														
169														
170														
171		1												
Cases	139	130	99	88	78	45	29	22	19	16	7	4	1	1
Average age (months over 13 years)	5.1	5.7	5.6	6.0	5.5	5.6	5.6	6.6	6.1	4.9				
Average stature	148.5	147.2	147.8	148.7	147.3	148.6	147.9	149.0	149.8	149.1				
Corrected average for 13 years 6 months	148.9	147.3	148.0	148.7	147.5	148.8	148.1	148.8	149.8	149.5				

Statures of Toronto girls. Age, 14 years.

Stature in centimeters.	Order of birth.												
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.
118			1										
127		1											
130													
131													
132					1								
133													
134	1												
135		1											
136													
137	1	1	1		1								
138	1		1										
139		1		1	1	1			2				
140		1					1						
141			1				1						
142	3	1	2	1	1	2							
143	2		2										
144	1	5	4		2		1						
145	2	2	1		2	3	1	1					
146		2	1		2	1			2				
147	2	4				1							
148	7	3	2	3	2	2	1						
149	3	4	1	2	2	2	1				1		
150	6	8	6	3	7	3	3						
151	3	6	7	4	2	2	3	2			2		
152	6	6	4	1	3	2	1		1	1			
153	5	8	6	2	4	1	1						1
154	6	5	10	3	3		3		1			1	
155	7	3	7	5	1	4	3	3	3	1			1
156	9	5	6	3	3	3	4		1		1		
157	4	5	2	2	1	1	3		2				
158	8	7	4	1	3	1	1	1	1	1			
159	4	3	2	2	2	1							
160	6	4	5	2	3	4		2	1				
161	2	1	1	2	3	1							
162		1	1	1			1	2					
163		2	3	1									
164		1	1				1	1					
165				1								1	
166	1	1								1			
167	1	1					1						
168	1						1						
169													
170	2												
Cases	94	93	92	40	49	35	32	12	14	4	4	2	2
Average age (months over 14 years)	5.1	5.4	5.0	5.7	5.0	5.1	5.3	6.0	6.1				
Average stature	153.5	152.3	152.8	154.0	151.6	151.9	153.6	156.5	152.1				
Corrected average for 14 years 6 months	153.7	152.4	153.0	154.1	151.8	152.1	153.8	156.5	152.1				

Statures of Toronto girls. Age, 15 years.

Stature in centimeters.	Order of birth.													
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	15th.
135	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
136	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
137	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
138	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
139	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
140	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
141	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
142	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
143	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
144	.....	1	1	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....
145	.....	.....	.....	1	1	1	.....	.....	.....	.....	.....	1	.....	.....
146	1	.....	3	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
147	.....	2	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....
148	3	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
149	1	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
150	3	2	.....	4	.....	2	.....	.....	.....	.....	.....	.....	.....	.....
151	4	1	1	4	.....	1	1	1	.....	1	.....	.....	.....	.....
152	4	6	.....	.....	3	1	1	3	.....	.....	.....	.....	.....	.....
153	3	4	.....	4	2	2	.....	.....	1	.....	.....	.....	.....	.....
154	2	2	5	1	3	1	.....	.....	.....	.....	.....	.....	.....	.....
155	10	4	3	4	1	2	.....	.....	.....	1	1	.....	1	1
156	4	2	3	3	1	1	.....	.....	1	.....	.....	.....	.....	.....
157	1	1	1	1	4	1	2	.....	.....	.....	.....	.....	.....	.....
158	5	4	2	1	.....	1	1	.....	.....	.....	.....	.....	.....	.....
159	3	3	2	1	4	.....	.....	.....	.....	.....	.....	.....	.....	.....
160	3	3	1	4	4	1	.....	.....	.....	.....	.....	1	.....	.....
161	2	1	1	3	1	.....	1	1	1	.....	.....	.....	.....	.....
162	5	.....	1	2	1	1	.....	.....	.....	1	.....	.....	.....	.....
163	1	1	3	2	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
164	3	1	1	.....	.....	.....	1	1	1	.....	.....	.....	.....	.....
165	1	.....	2	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
166	.....	1	2	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
167	.....	3	.....	1	2	.....	.....	.....	1	.....	.....	.....	.....	.....
168	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
169	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cases	92	45	34	39	28	16	11	9	5	3	1	2	1	1
Average age (months over 15 years)	5.1	5.2	5.5	4.9	5.3	5.9	5.4	.....	.....	.....	.....	.....	.....	.....
Average stature	155.1	155.5	156.4	155.8	156.8	153.0	156.5	.....	.....	.....	.....	.....	.....	.....
Corrected average for 15 years 6 months	155.2	155.6	156.5	155.9	156.9	153.0	156.6	.....	.....	.....	.....	.....	.....	.....

Statures of Toronto girls. Age, 16 years.

Stature in centimeters.	Order of birth.										
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
140	1										
141											
142											
143				1							
144	1										
145		1			1						
146	2										
147					1						
148				1							
149	1	2		3							
150	2						1				
151	1	2		1							
152	1	3					1				
153		1	2			1					
154	2	2	3	3							
155	2	5	1	1	1						
156	2	1	1		1	1	2				
157		3		1	1						
158	1		1	2							
159	4	1	2				2		1		
160	4	4		2		1	2				1
161	2	1	1				1	1			
162	4		2	1							
163	1	2								1	
164	1		1		1						
165	1	1	1	2							
166	1										
167							1				
168											
169											
170											
171											
172	1										
173											
174											
Cases	35	28	15	18	6	3	10	1	1	1	1
Average age (months over 16 years)	4.4	4.6	4.5	4.6			3.6				
Average stature	156.9	155.8	157.9	155.0			158.0				
Corrected average for 16 years 6 months	157.1	155.9	158.0	155.1			158.2				

In summarizing these tables I have corrected the statures so that they correspond exactly to the half-year period. In this manner the error due to the difference of period is eliminated.

Statures of Toronto boys, in millimeters. a

Age in years.	Average statures.	Difference between average statures and statures of—								
		First-born.	Second-born.	Third-born.	Fourth-born.	Fifth-born.	Sixth-born.	Seventh born.	Eighth-born.	Ninth-born.
5.5	1,062 (347)	+6 (59)	± 0 (86)	— 3 (74)	+6 (49)	— 2 (30)	—16 (20)	—14 (17)	—13 (14)	.....
6.5	1,111 (613)	+7 (128)	— 3(147)	— 4(108)	+2 (85)	+ 1 (67)	— 4 (36)	—13 (31)	—16 (23)	— 4 (18)
7.5	1,168 (846)	+3 (201)	+ 2(162)	± 0(119)	±0 (94)	— 5 (64)	+ 2 (58)	+ 1 (37)	— 6 (28)	—13 (17)
8.5	1,218 (934)	+2 (216)	+ 4(188)	— 2(159)	±0 (111)	—10 (79)	± 0 (64)	— 8 (64)	— 6 (35)	—19 (21)
9.5	1,267 (905)	+4 (240)	— 7(180)	± 0(137)	±0 (112)	—13 (87)	—11 (71)	—10 (48)	+ 3 (36)	—13 (25)
10.5	1,315 (839)	—3 (213)	+ 5(145)	— 1(140)	—6 (112)	— 8 (82)	+ 6 (75)	— 5 (44)	—15 (34)	+ 0 (19)
11.5	1,359 (817)	—1 (177)	+ 3(156)	— 2(125)	—8 (109)	— 2 (86)	— 8 (71)	+ 6 (39)	— 5 (28)	—15 (16)
12.5	1,401 (746)	—2 (173)	+ 1(141)	+ 2(120)	—6 (80)	+ 3 (48)	— 4 (64)	—11 (54)	—16 (32)	— 2 (19)
13.5	1,454 (596)	+7 (158)	+11(120)	—13 (84)	—1 (80)	+ 2 (45)	—14 (49)	—31 (25)	+18 (23)	+ 9 (12)
14.5	1,515 (387)	+5 (86)	+ 1 (70)	+ 5 (70)	+2 (44)	—14 (52)	—12 (28)	—15 (18)	— 5 (13)	.....
15.5	1,576 (170)	—1 (52)	— 1 (23)	—32 (24)	—8 (28)	+ 2 (30)	.....	.....	.....	.....

a The figures in parentheses are the number of cases.

Differences (in millimeters) between average statures of boys and statures of boys of various orders of birth, and their mean errors (as deduced from the Toronto observations).

Age in years.	First-born.	Second-born.	Third-born.	Fourth-born.	Fifth-born.	Sixth-born.	Seventh-born.	Eighth-born.	Ninth-born.
5.5	+6± 7.2	± 0± 6.1	− 3± 6.6	+6± 7.8	− 2± 9.0	−16±11.8	−14±12.7	−13±14.0	.....
6.5	+7± 4.7	− 3± 4.4	− 4± 5.0	+2± 5.6	+ 1± 6.2	− 4± 8.3	−13± 8.9	−16±10.2	− 4±11.5
7.5	+3± 4.0	+ 2± 4.4	± 0± 5.0	±0± 5.5	− 5± 6.6	+ 2± 6.9	+ 1± 8.5	− 6± 9.8	−13±12.4
8.5	+2± 4.2	+ 4± 4.5	− 2± 4.8	±0± 5.6	−10± 6.6	± 0± 7.2	− 8± 7.2	− 6± 9.6	−19±12.3
9.5	+4± 4.1	− 7± 4.6	± 0± 5.1	±0± 5.6	−13± 6.3	−11± 6.9	−10± 8.3	+ 3± 9.5	−13±11.3
10.5	−3± 4.7	+ 5± 5.5	− 1± 5.6	−6± 6.2	− 8± 7.1	+ 6± 7.4	− 5± 9.5	−15±10.8	+ 6±14.3
11.5	−1± 5.0	+ 3± 5.4	− 2± 5.9	−8± 6.3	− 2± 6.9	− 8± 7.6	+ 6±10.1	− 5±11.8	−15±15.5
12.5	−2± 5.7	+ 1± 6.3	+ 2± 6.5	−6± 7.9	+ 3±10.1	− 4± 8.1	−11± 9.6	−10±12.2	− 2±15.8
13.5	+7± 6.3	+11± 7.8	−13± 9.1	−1± 9.3	+ 2±12.1	−14±11.6	−31±15.9	+18±16.6	+ 9±22.6
14.5	+5±10.2	+ 1±10.8	+ 5±11.1	+2±13.6	−14±12.7	−12±16.8	−15±20.6	− 5±24.1	.....
15.5	−1±14.2	− 1±20.0	−32±20.6	−8±18.4	+ 2±21.3	.....	.....	.....	.....
Average	+2.3±1.6	±0.8±1.7	.....	.....	.....	.....	.....	.....	.....

It appears, therefore, that the result is not quite certain, since the error is great as compared to the average difference. Since for later-born children the errors of the average are very great, I have not carried out the calculation. For first-born girls I obtain the following results:

Statures of Toronto girls, in millimeters.

Age in years	Average statures.	Differences between average stature and stature of— First-born.	Second-born.	Third-born.	Fourth-born.	Fifth-born.	Sixth-born.	Seventh born.	Eighth-born.	Ninth-born.
6.5	1,104 (597)	+ 3 (125)	+7 (120)	− 5 (87)	− 3 (67)	− 5 (53)	+ 1 (31)	−13 (31)	+ 1 (17)	−20 (12)
7.5	1,160 (759)	+ 3 (169)	−3 (156)	− 1(117)	+ 3 (95)	− 5 (59)	− 3 (38)	− 3 (39)	+ 7 (21)	+13 (10)
8.5	1,207 (834)	+14 (177)	−5 (141)	+ 2(125)	− 2(101)	− 6 (77)	− 3 (46)	+ 3 (47)	− 1 (22)	− 9 (22)
9.5	1,253 (875)	+ 7 (222)	+4 (147)	+ 3(119)	± 0 (98)	− 5 (82)	− 7 (58)	−17 (48)	−10 (27)	− 2 (25)
10.5	1,309 (822)	+ 1 (185)	−1 (141)	− 3(130)	+ 2 (97)	+ 9 (60)	+ 9 (58)	− 4 (36)	− 7 (25)	+16 (15)
11.5	1,361 (876)	+ 6 (203)	+3 (158)	−10(135)	+ 6(114)	+ 4 (91)	+ 2 (62)	+ 2 (49)	+ 8 (23)	+ 5 (24)
12.5	1,419 (824)	+ 6 (157)	−1 (160)	+ 4(143)	− 1(107)	−10 (73)	− 4 (51)	+ 6 (44)	−14 (37)	−21 (33)
13.5	1,480 (665)	+ 9 (139)	−7 (130)	± 0 (99)	+ 7 (88)	− 5 (78)	+ 8 (45)	+ 1 (29)	+ 3 (22)	+18 (19)
14.5	1,533 (443)	+ 4 (94)	−9 (93)	− 3 (82)	+ 8 (40)	−15 (49)	−12 (35)	+ 5 (32)	+32 (12)	−12 (14)
15.5	1,560 (247)	− 8 (62)	−4 (45)	+ 5 (34)	− 1 (39)	+ 9 (28)	−30 (16)	+ 6 (11)	.....	.....
16.5	1,567 (123)	+ 4 (35)	−8 (28)	+13 (15)	−16 (18)	.....	.....	.....	.....	.....

I have calculated the mean errors of the differences for first-born children only.

Differences (in millimeters) between the average statures of girls and the statures of first-born girls, and their mean errors.

Age.	Difference.	Mean error.	Age.	Difference.	Mean error.
6.5	+ 3	±4.7	13.5	+ 9	± 6.7
7.5	+ 3	±4.5	14.5	+ 4	± 7.2
8.5	+14	±4.6	15.5	− 8	± 8.3
9.5	+ 7	±4.6	16.5	+ 4	±10.3
10.5	+ 1	±5.1			
11.5	+ 6	±5.1	Average	+5.3	± 1.9
12.5	+ 6	±6.1			

This result is much more certain than that obtained by means of the measurements of boys. When we combine both we find that the difference of stature between the average of all the children and the average of the first-born children is in favor of the latter. The amount is 3.6 mm., with a mean error of ±1.2 mm. It is therefore certain that first-born children are somewhat taller than later-born children, but the amount of the difference is not definitely known.

It is of interest to investigate the constitution of families. I have done so by recording for each age the number of children, according to the order of their birth.

Classification of Toronto boys according to age and order of birth.

Age in years.	Order of birth.															
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.	15th.	17th.
4.5	17	22	26	15	7	7	5	3	1	.....	.....	.....	.....	1	.....	.....
5.5	59	86	74	49	36	20	17	14	8	3	1	2	1	1	.....	.....
6.5	128	147	108	85	67	36	31	23	18	9	7	2	3	1	.....	.....
7.5	201	162	119	94	64	58	37	28	17	9	4	3	3	3	.....	.....
8.5	216	188	159	111	79	64	64	35	21	19	5	6	1	1	.....	.....
9.5	240	180	137	112	87	71	48	36	25	15	6	2	2	.....	.....	.....
10.5	213	145	140	112	82	75	44	34	19	10	7	3	2	.....	2	.....
11.5	177	156	125	109	86	71	39	28	16	11	6	4	3	1	.....	1
12.5	173	141	120	80	48	64	54	32	19	10	5	5	.....	1	.....	.....
13.5	158	120	84	80	45	49	25	23	12	9	4	3	3	1	.....	.....
14.5	86	76	70	44	52	28	18	13	9	2	2	.....	.....	.....	.....	.....
15.5	52	23	24	28	20	6	9	7	3	2	3	1	.....	.....	.....	.....
16.5	8	10	8	3	2	2	4	3	.....	1	1	.....	1	.....	.....	.....
Cases	1,728	1,456	1,203	931	675	551	395	270	168	109	51	31	18	10	2	1
Per cent of the whole number	22.7	19.1	15.8	12.2	8.9	7.2	5.2	3.7	2.2	1.4	0.7	0.4	0.2	0.1	.....	.....

Total number of cases, 7,608.

Classification of Toronto girls according to age and order of birth.

Age in years.	Order of birth.																
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.	15th.	16th.	17th.	19th.
4.5	32	19	19	9	12	5	7	6	3	.....	.....	.....	.....	.....	.....	.....	.....	.....
5.5	74	86	77	54	25	22	12	10	10	5	2	1	1	.....	.....	.....	.....	1
6.5	125	120	87	67	53	31	31	17	12	10	3	1	.....	.....	.....	.....	1	.....
7.5	169	156	117	95	59	38	39	21	10	11	9	2	1	1	.....	1	.....	.....
8.5	177	141	125	101	77	46	47	22	22	17	5	1	1	1	1	.....	.....	.....
9.5	222	147	119	98	82	58	48	27	25	9	9	5	2	.....	.....	.....	.....	.....
10.5	185	141	130	97	60	58	36	25	15	15	10	7	1	.....	.....	.....	.....	.....
11.5	203	158	135	114	91	62	49	23	24	15	6	.....	.....	.....	.....	.....	.....	.....
12.5	157	160	143	107	73	51	44	37	33	11	8	4	1	1	1	.....	.....	.....
13.5	139	130	99	88	78	45	29	22	19	16	7	4	1	1	.....	.....	.....	.....
14.5	94	93	82	40	49	35	32	12	14	4	4	2	2	.....	.....	.....	.....	.....
15.5	62	45	34	39	28	16	11	9	5	3	1	2	1	.....	1	.....	.....	.....
16.5	35	28	15	18	6	3	10	1	1	1	1	.....	.....	.....	.....	.....	.....	.....
Cases	1,664	1,424	1,182	927	693	470	395	232	192	117	65	29	11	4	3	1	1	1
Per cent of the whole number	22.5	19.2	16.0	12.5	9.4	6.3	5.3	3.1	2.6	1.6	0.9	0.4	0.1	0.1	.....	.....	.....	.....

Total number of cases, 7,411.

Total number of children examined, arranged according to order of birth.

	Order of birth.																
	1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.	15th.	16th.	17th.	19th.
Cases	3,392	2,880	2,385	1,858	1,368	1,021	790	511	360	226	116	60	29	14	5	1	2	1
Per cent of the whole number	22.6	19.2	15.9	12.4	9.1	6.8	5.3	3.4	2.4	1.5	0.8	0.4	0.2	0.1	.....	.....	.....	.....
Mean error.	±0.3	±0.3	±0.3	±0.3	±0.2	±0.2	±0.2	±0.1	±0.1	±0.1	±0.1	.....	.....	.....	.....	.....	.....	.....

Number of boys examined	7,608
Number of girls examined	7,411
Total	15,019

From these data we can obtain an insight into the constitution of families in Toronto. The difference between the number of first and second born children shows the number of mothers having one child only; the difference between the second and third born children gives the number of mothers who have two chil-

dren, etc. In this manner the following table has been obtained, showing the per cent of mothers having one child, two children, etc.

Number of children.	Per cent of mothers.	Mean error.	Number of children.	Per cent of mothers.	Mean error.
1	15.1	±0.6	10	3.2	±0.3
2	14.6	± .6	11	1.7	± .2
3	15.5	± .6	12	.9	± .2
4	14.5	± .6	13	.4	± .1
5	10.2	± .5	14	.3	.....
6	6.8	± .5	15	.1	.....
7	8.2	± .5	16	.1	.....
8	4.5	± .4	17	.0	.....
9	3.9	± .3			

It is of interest to compare the number of children according to the order of their birth in various cities. I have tabulated for this purpose a number of children in Oakland, Cal., according to the order of their birth, and found the following result:

	Toronto.	Oakland, Cal.
Per cent of first-born children	22.6	26.4
Per cent of second-born children	19.2	22.3
Per cent of third-born children	15.9	17.0
Per cent of fourth-born children	12.4	12.3
Per cent of fifth and later born children	30.0	22.0

It appears from this table that families in Toronto are much larger than those in Oakland, Cal. There are 26.4 per cent of first-born children in Oakland as compared to 22.6 per cent of first-born children in Toronto, while fifth and later born children form only 22 per cent of the total population in Oakland, and in Toronto they form 30 per cent. This indicates that the size of the families is considerably smaller in Oakland than in Toronto. It is difficult to judge what the social causes of this phenomenon may be. The general conditions of life and the nationalities composing the population certainly have a great influence upon the size of families. In order to investigate this question, I have tabulated the Toronto girls according to their order of birth and nationality. The results of this tabulation are given in the following table:

Nationality (in per cent) of grandparents of Toronto girls.

Order of birth.	English.	Scotch.	Irish.	Canadian.
First-born	2,628 (39.0%)	1,112 (16.5%)	1,614 (23.9%)	838 (12.4%)
Second-born	2,411 (41.0%)	888 (15.1%)	1,397 (23.8%)	670 (11.4%)
Third-born	1,992 (40.8%)	815 (16.7%)	1,145 (23.5%)	510 (10.5%)
Fourth-born	1,664 (43.0%)	679 (17.5%)	892 (23.1%)	311 (8.0%)
Fifth-born	1,324 (46.3%)	474 (16.6%)	694 (24.3%)	180 (6.3%)
Sixth-born	870 (44.9%)	343 (17.5%)	470 (24.3%)	104 (5.3%)
Seventh-born	814 (49.0%)	256 (15.7%)	334 (20.5%)	92 (5.6%)
Eighth-born	453 (48.3%)	149 (15.9%)	251 (26.8%)	35 (3.7%)
Ninth-born	384 (49.0%)	133 (17.0%)	154 (19.7%)	42 (5.4%)
Tenth-born	240 (48.4%)	90 (13.9%)	129 (26.0%)	18 (3.6%)
Eleventh-born	127 (45.4%)	48 (17.1%)	72 (25.7%)	6 (2.1%)
Twelfth and later born	127 (43.2%)	51 (17.4%)	57 (19.4%)	29 (9.9%)

Order of birth.	American.	German.	French.	Miscellaneous.	Total.
First-born	234 (3.5%)	140 (2.0%)	30 (0.4%)	157 (2.3%)	6,753
Second-born	194 (3.3%)	143 (2.4%)	32 (0.6%)	143 (2.4%)	5,878
Third-born	144 (3.0%)	136 (2.8%)	18 (0.9%)	123 (2.5%)	4,883
Fourth-born	122 (3.2%)	82 (2.1%)	18 (0.5%)	100 (2.6%)	3,868
Fifth-born	62 (2.2%)	51 (1.8%)	12 (0.4%)	63 (2.2%)	2,860
Sixth-born	57 (2.9%)	45 (2.3%)	5 (0.3%)	55 (2.8%)	1,964
Seventh-born	54 (3.3%)	46 (2.8%)	6 (0.4%)	31 (2.0%)	1,633
Eighth-born	24 (2.6%)	5 (0.5%)	.....	21 (2.2%)	938
Ninth-born	27 (3.4%)	17 (2.2%)	2 (0.3%)	24 (3.1%)	783
Tenth-born	15 (3.0%)	8 (1.0%)	2 (0.4%)	15 (3.0%)	496
Eleventh-born	9 (3.2%)	4 (1.4%)	2 (0.7%)	12 (4.3%)	280
Twelfth and later born	5 (1.7%)	8 (2.7%)	4 (1.4%)	13 (4.4%)	294

When we group these results so as to equalize the number of cases approximately, treating the three first-born children separately, forming the fourth group by combining the fourth and fifth born children, and including all the later-born children in one group, we find the following results:

Nationality (in per cent) of grandparents of Toronto girls.

Order of birth.	English.	Scotch.	Irish.	Canadian.	American.	German.	French.	Miscellaneous.	Cases.
First born	39.0	16.5	23.9	12.4	3.5	2.0	0.4	2.3	6,753
Second born	41.0	15.1	23.8	11.4	3.3	2.4	0.6	2.4	5,878
Third born	40.8	16.7	23.5	10.5	3.0	2.8	0.9	2.5	4,883
Fourth and fifth born	44.4	17.1	23.6	7.3	2.7	2.0	0.4	2.4	6,728
Sixth and later born	47.3	16.4	23.0	5.1	3.0	2.1	0.3	2.7	6,388
Total	42.5	16.4	23.6	9.3	3.1	2.3	0.5	2.5	30,630

That is to say, the percentage of Scotch, Irish, American, German, French, and miscellaneous grandparents remains the same for all the children, no matter what the order of their birth may be. There is, however, a fundamental difference in the distribution of English and Canadian children. Among the first-born children, 39 per cent of the grandparents are of English birth. Among the later-born children, 47 per cent are of English birth. This indicates that in families whose grandparents are of English birth we find a greater number of children than among the other nationalities. The reverse is the case among the Canadians. There is among the later-born children a decided decrease in the number of grandparents of Canadian birth. This indicates that the families of Canadian descent are small. It is very peculiar that these differences are found only among the English and Canadians, and that there are no differences in distribution among all the other nationalities.

This table is of importance also as showing that the difference in stature between first-born children and later-born children can not be ascribed to the influence of differences in nationality. The change of proportion of English and Canadian blood in the grand total is so slight that we can not possibly assume that it will materially modify the average stature of the people. We may therefore safely say that the difference in stature between first-born and later-born children is not influenced by complications resulting from the influence of nationality.