A statistical study of oral temperatures in school children with special reference to parental, environmental and class differences / by M.H. Williams and Karl Pearson.

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STUDIES IN NATIONAL DETERIORATION. IX.

A STATISTICAL STUDY OF ORAL TEMPERATURES IN SCHOOL CHILDREN WITH SPECIAL REFERENCE TO PARENTAL, ENVIRONMENTAL AND CLASS DIFFERENCES.

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APPENDIX OF TABLES

A Statistical Study of Temperatures in School Children with special reference to Class and Environmental Differences.

(1) *Introduction.* The data used in this paper were obtained from various sources. We classify them below:

(*A*) Temperatures taken by Dr M. H. Williams in the course of her work as Medical Inspector of Schools under the Worcestershire County Council, in the western half of the county. These cover 2649 temperatures recorded for girls and 2005 for boys. The children were distributed into 124 schools classed as urban, semi-urban and rural. The age, weight and height (without boots) of the children are given, their place in family, the number of brothers and sisters, and to some extent the family history, i.e. whether father and mother had suffered from rheumatism or rheumatic fever, and whether father and mother were "consumptive." Further the children were clinically examined apart from thermometry and classed as Rheumatic, ? Rheumatic and not Rheumatic, and again as Phthisical, ? Phthisical and not Phthisical. The following were the characters on which the diagnosis was based:

Pulmonary tuberculosis (Ph.), diagnosed on physical signs only, not symptoms. The common signs found are persistent localised basic dullness with râles.

? Pulmonary tuberculosis (? Ph.). This category includes (*a*) children with symptoms, but in whom there was failure to find signs, (*b*) cases believed to be those of arrested disease.

Rheumatism (Rh.), diagnosed on (*a*) a clear history of "growing pains," (*b*) mitral disease, (*c*) history of chorea.

? Rheumatism (? Rh.), was adopted to embrace those children in whom the evidence as to "growing pains" was contradictory, or in whom there were slight heart abnormalities suggestive of the conditions caused by the rheumatic toxin.

The diagnosis was wholly independent of the temperatures, which were not before the medical inspector when the diagnosis was made, one object of the inquiry being to test how far temperature may be used as an indication that examination as to phthisical or rheumatic conditions is desirable. Further the temperatures were repeated on the same children at intervals varying from one month to twenty-three, the average interval being five months and one week. The class of child dealt with is composed of those who attend the primary elementary schools in a district of mixed urban and rural population like the western half of Worcestershire. The ages of the children ran from 4 to 14, the bulk, however, being "leavers" at twelve years. Within the district itself, Lye and Stourbridge are manufacturing; Malvern is a residential watering place; Droitwich is of the same character with the addition of saltworks; Upton is a market-town, centre of an agricultural district; the rest is mainly agricultural, although coal is worked at Pensax, which is otherwise agricultural.

The temperatures were taken between 10 a.m. and 4 p.m. Kew-certified, $\frac{1}{2}$ minute thermometers were used. In all but a very few cases the room temperature was over 56° F. Six to twelve children were examined at one time; the temperatures were mouth temperatures, taken under the tongue for 10 minutes, with careful observation that the mouth was held closed.

(*B*) In order to compare the same class of the population under somewhat more uniform environmental conditions, leave was obtained to take the temperatures of the girls in the Royal Soldiers' Daughters' Home, Hampstead. We have heartily to thank the Committee for that privilege and to acknowledge the very courteous help given by the Lady Superintendent and staff of the Home. The temperatures were taken precisely as in case (*A*). The temperature of the room was recorded at the time of observation, and varied from 56° to 60° F. The girls ranged from 7 years to 16. Their heights and weights, both without boots, were ascertained, and the nature of their home environment was placed upon the recording sheet. This series is a most interesting one, and we only regret that it does not extend to more than 152 girls. The temperatures were taken by Miss Julia Bell in May, 1913.

(*C*) By the courtesy of the Headmistresses the temperatures of the girls in the great public school at St Andrews, both in the advanced school St Leonards and in the preparatory school St Katharine's, were taken with the 10 minutes' rule described under (*A*). The total number of girls dealt with was 298, with ages varying from 5 to 19. The time of record was 10 a.m. to 1 p.m. Weights and heights were also recorded. We have most heartily to thank the Headmistresses and staff of St Andrews for the time and energy they most generously gave to the investigation.

It will be seen that in (*A*), (*B*) and (*C*) we have material for comparing the temperatures of girls from two very different social grades. Further in (*B*) we have girls of a lower social grade, who have in the bulk been submitted for a considerable number of years to a uniform environment, with satisfactory feeding and medical treatment. In order to compare the boys of the public elementary schools with those of a different social class, an appeal was made for help to the Headmasters of several of our best known public schools. Eton found it impossible to spare the time necessary for such a lengthy investigation; this is the more to be regretted as the size of the school would have provided a splendid amount of valuable material.

(*D*) Mr M. J. Rendall, Headmaster of Winchester College, responded most sympathetically to our appeal and temperatures were taken, in the manner described under (*A*), of 324 boys classified according to their houses. Their ages range from 13 to 19. Weights and heights were not available at Winchester. The temperatures were in part taken from 8 to 9.15 a.m., in part from 8.30 to 9.30 p.m., but for the most part from 10.45 a.m. to 1.30 p.m. according to the possibility of getting the boys at a free moment. There was scarcely sufficient data to correct for time of observation. Boys of 14 to 15 appear to be almost 0°·2 lower at 8 to 9 a.m. than at 8 to 9 p.m., but boys of 17 to 18 have if anything a slightly higher temperature in the morning. The results were, however, too slender to permit of any correction for hour of day. We have again to express our high appreciation of the kindness of the Headmaster and staff of Winchester in this matter.

(*E*) By permission of the Headmaster of Charterhouse, and with the supervision of Mr Oswald Latter, both of whom we most heartily thank, the temperatures of 528 boys, ranging from 13 to 19, were taken at Charterhouse; the weights and heights were also recorded. Owing to the large number of boys and the special conditions attending the record at Charterhouse, it was not found possible to give more than five minutes to the thermometer per individual, and it appears probable that this reduction of insertion time has reduced the Charterhouse temperatures below those of Winchester by almost 0·3° to 0·4°. The latter temperatures were taken in March and the former in July, 1912.

(*F*) Lastly we have included in the investigation some of the data provided by John Davy, F.R.S., in his *Physiological Researches* published in London, 1863. Our reason for giving greater attention to this material than to more recently published work is that, as far as we know, no attempt has been made adequately to reduce it, notwithstanding the half-century which has elapsed since its issue. More recent work has been reduced, although very inadequately from the standpoint of modern statistical knowledge.

(2) *Influence of Temperature of Environment.* No records were taken in this investigation—except in the case of the inmates of the Royal Soldiers' Daughters' Home—of the room temperature. Yet the influence of this temperature deserves careful consideration*.

The most complete system of temperatures of an individual and of the air are those taken by John Davy and referred to under (*F*). It is true that Davy only made any long series on one individual, himself. In England, when aged 55, he took temperatures of himself daily for nine months at hours 7—8 a.m., 3—4 p.m. and 12 p.m. He made, when aged 55 to 58, similar observations from July 1845 to November 1848 in the Tropics. He had a specially constructed thermometer reading to tenths of a degree. He does not say how many minutes he used but remarks: "it is necessary that the thermometer remain in the mouth many minutes" (*loc. cit.* p. 13). Summing up his own observations in England, which, however, he subjected to no adequate statistical treatment, he considers that his results show that "the temperature under the tongue when under no disturbing influence is about its maximum on waking after the repose of the night† ; that it continues high but fluctuating more or less till towards nightfall; and that it is lowest about midnight. Its lowness at the last mentioned time is the more remarkable as the temperature of the room in which the observer sat at night was almost uniformly higher than of that which he occupied during the day" (*loc. cit.* p. 15).

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* There was a general instruction that the room temperature should not be below 56°.

† This is not in accord with the more recent observations of Jurgensen (1873), Schäfer (1898), Clifford Allbutt (1905), Bardswell and Chapman (1911), etc.: see p. 78.

Later (pp. 43—45) discussing the tropical data, he says that they show a marked difference from those for England. The lowest temperature occurs on waking in the morning and the highest at night. "Probably the low morning temperature of the body within the Tropics as shown above may be owing principally to three circumstances—to the depressing or lowering power of sleep, to the light bed covering used there, and the free circulation of the air in the room.......Moreover the higher temperature observed at night before going to rest may have conduced to the lower morning temperature noticed on rising, as the lower temperature at night in England with the opposite circumstances as to bed-clothing and air of sleeping room may have conduced to the higher temperatures recorded there" (*loc. cit.* p. 5).

Whatever may be thought of Davy's explanations it is clear that he, perhaps for the first time, dealt with the influence of air on body temperature. Further he considered the variation of temperature during different seasons of the year, the effect of physical exercise, food, excited and sustained attention, etc., on the temperature. He further measured pulse and respiration.

In order to avoid the daily change in temperatures, we have worked out the correlations between temperatures of air and body for three different times. It must be noted that the observations in the Tropics are almost four times as numerous as those in England, and consequently twice as reliable.

Table A gives the means and variabilities and Table B the correlations. From these the following regression equations for body temperature, T, in terms of air of room temperature, T', have been deduced.

England. 7—8 a.m. : $T = 98{\cdot}766 + {\cdot}00284\,(T' - 51{\cdot}024)$,
,, 3—4 p.m. : $T = 98{\cdot}590 + {\cdot}00911\,(T' - 56{\cdot}070)$,
,, 12 p.m. : $T = 97{\cdot}958 - {\cdot}00311\,(T' - 62{\cdot}812)$.
Tropics. 6—7 a.m. : $T = 98{\cdot}123 + {\cdot}01949\,(T' - 76{\cdot}811)$,
,, 12—2 p.m. : $T = 98{\cdot}905 + {\cdot}02805\,(T' - 83{\cdot}600)$,
,, 9—11 p.m. : $T = 98{\cdot}836 + {\cdot}03836\,(T' - 79{\cdot}380)$.

TABLE A. *Means and Variabilities.*

Locus and Hour	Means			Standard Deviations		
	Body Temp. T	Air Temp. T'	Pulse P	Body Temp. T	Air Temp. T'	Pulse P
England, 7—8 a.m.	98·766 ± ·011	51·024 ± ·377	58·243 ± ·163	·2512 ± ·0080	8·3934 ± ·2669	3·6136 ± ·1149
,, 3—4 p.m.	98·590 ± ·020	56·070 ± ·602	55·513 ± ·277	·2688 ± ·0144	7·9134 ± ·4246	3·6504 ± ·1959
,, 12 p.m.	97·958 ± ·013	62·812 ± ·160	55·621 ± ·211	·2792 ± ·0093	3·4181 ± ·1133	4·4954 ± ·1490
Tropics, 6—7 a.m.	98·123 ± ·004	76·811 ± ·049	55·185 ± ·063	·1894 ± ·0030	2·2203 ± ·0348	2·8326 ± ·0444
,, 12—2 p.m.	98·905 ± ·006	83·600 ± ·057	56·633 ± ·075	·2738 ± ·0044	2·4808 ± ·0401	3·2762 ± ·0530
,, 9—11 p.m.	98·836 ± ·007	79·380 ± ·051	61·125 ± ·116	·2976 ± ·0050	2·1672 ± ·0360	4·9416 ± ·0821

Table B. *Correlations.*

Locus and Hour	*T* and *T′*	*T* and *P*	*T′* and *P*	*T*, 7—8 a.m. and *T*, 12 p.m.	*T*, 7—8 a.m. one day and next
England, 7—8 a.m.	+ ·0948 ± ·0446	+ ·4674 ± ·0351	—	+ ·0464 ± ·0466	+ ·2140 ± ·0432
,, 3—4 p.m.	+ ·2682 ± ·0704	+ ·2685 ± ·0704	− ·1444 ± ·0743	—	—
,, 12 p.m.	− ·0381 ± ·0468	+ ·1241 ± ·0462	—	—	—
	T and *T′*	*T* and *P*	*T′* and *P*	*T*, 6—7 a.m. and *T*, 9—11 p.m.	*T*, 6—7 a.m. one day and next
Tropics, 6—7 a.m.	+ ·2285 ± ·0210	+ ·3642 ± ·0192	+ ·0336 ± ·0221	+ ·1099 ± ·0233	+ ·2027 ± ·0217
,, 12—2 p.m.	+ ·2722 ± ·0212	+ ·4820 ± ·0176	+ ·0751 ± ·0228	—	—
,, 9—11 p.m.	+ ·2974 ± ·0214	+ ·1577 ± ·0229	—	—	—

Taking the regression equations above we see: (*a*) that whether the temperatures be taken at rising, in the afternoon or at midnight, a variation of 10° Fahr. about the mean room temperature of those hours does not, in England, make a difference of more than 0°·03 to 0°·09 in the body temperature as taken for an adult in the mouth. (*b*) In the Tropics, probably, the room temperature is more important and a variation of 10° Fahr. in room temperature might mean in extreme cases a difference of 0°·2 to 0°·3 in body temperature. (*c*) The regression equation for the midnight temperatures in England would indicate that when the temperature was high in the room it was low in the body and *vice versa*. But in reality the correlation coefficient (− ·0381) is non-significant as compared with its probable error (± ·0468). It seems sufficient to assert that in England room temperature has little relation to body temperature at midnight. In the Tropics the late evening room temperatures (it is a pity that they were not also taken at midnight) are more highly correlated with body temperatures than early in the morning or at noon. How far differences of clothing on body or bed influence these divergences between England and the Tropics, we cannot say.

It will be seen that the variation with time of day can amount to 0°·8. This is of quite a different order—at any rate for England—to the variations associated with room temperature. We may conclude therefore, if differences only of 1/10 of a degree are in consideration, it is not needful to consider room temperatures in our own climate. Further, since the correlations between room and body temperatures even at a maximum are only very moderate (·3 at a maximum in the afternoon), but as room temperature has very considerable seasonal modification, we are unlikely to find much seasonal variation in body temperature. That no such high correlation exists will be found by merely examining Davy's figures. He, himself, concludes that body temperature is very little different for the different seasons (p. 15). Thus we may fairly dismiss season of observation and temperature of room, if we only draw inferences from several tenths of a degree Fahr. in differences of temperature.

Of the other points we have worked out from Davy's data we note:

(*a*) Between rising and afternoon temperatures there is a difference of 0°·8 in the Tropics, but only 0°·17 in England *on the average.*

Taking an individual, it is quite easy to find*, for normal health, variations from 0·2 to 0·4 or even more between 10 a.m. and 5 p.m. But these variations are by no means always in one sense. If one series of individuals were measured at 10.30 p.m. and a second series at 2 p.m. it is improbable that there would be a difference of more than 0°·2 Fahr. in the *average* temperatures of the two series. We were able to test this on the Winchester data by considering boys measured at 8—9.15 a.m., 10.45 a.m.—1.30 p.m. and 8.30—9.30 p.m. with the following results:

Age:	14	15	16	17	18
8—9.15 a.m.	98·22	98·62	98·44	98·67	98·40
10.45 a.m.—1.30 p.m.	98·66	98·46	98·40	98·21	98·52
8.30—9.30 p.m.	98·44	98·88	98·52	98·59	98·25

The data are sparse but suggest that the boys may have higher temperatures at 9 a.m. than in the forenoon and at any rate the data do not justify our correcting our material for observations at different hours.

Thus temperature differences of persons of the same ages of the order 0°·4 to 0°·6 may be taken when they appear on the average of fairly large numbers to mark some significant difference in general health, or in environment other than that summed up in time or season of observation or air temperature at time of observation.

(*b*) Davy's observations seem to show that on the average the rhythm in daily temperature is more influential in producing correlation between two temperatures of the *same* normal individual than extraneous disturbing factors. Thus the correlation between early morning and midnight temperatures was for England only +·046, and for the Tropics +·110; of which, only the latter is significant, having regard to the probable errors. On the other hand, the correlation between temperature one day in the early morning and the next day at the same time was +·214 ± ·043 in England and +·203 ± ·022 in the Tropics, both quite significant but not very

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* Clifford Allbutt and Bardswell and Chapman give about ½ a degree, but a range from 96·9 at 2 a.m. to 98·7 at 6 p.m. is not unusual. Tigerstedt talks of a range of 1·8 to 2·7 Fahr. as usual in the same individual on the same day and Allbutt's *System of Medicine* gives the daily variation as from 97 to 99·3. To some extent we doubt whether these results apply to children. Thus we find at Winchester, that the average temperature is 98·46, but the two houses where the temperatures were taken from 8—9 a.m. and 8.45—9.15 a.m. give 98·69 and 98·27 respectively, while the one house taken at 8.30 to 9.30 p.m. gives 98·54, the respective mean ages of these houses are 15·40, 15·91 and 16·02 and their temperatures corrected for age should be 98·48, 98·47 and 98·46. The differences are thus due neither to age nor to hour of observation. They may be due to sparsity of material. We think that the observation of the daily rhythm of children of different ages in good health—say 50 of each age and sex—would be of much value. Again the first 291 Worcestershire girls of 12 and 13 who had their temperatures taken between 10 and 12 a.m. gave a mean temperature of 99·65, and the first 228 Worcestershire girls of the same ages who had their temperatures taken from 2 to 4 p.m. gave a mean temperature of 99·68. There is thus little difference between these children's temperatures in fore- and afternoon.

marked correlations. On the other hand, as we shall show later, correlation between a first temperature and a subsequent temperature, when corrected for age and interval, is very sensible, i.e. temperature is personal and persistent, on the average, for a very considerable interval.

(*c*) As far as we are aware, no *quantitative* measure has yet been fully worked out of the relation between body temperature and pulse. It will be seen from Table B that its maximum amounts to nearly 0·5 in the scale of correlation, and this both in England and the Tropics. But the maximum in England as far as ascertained occurs between 7—8 a.m., while in the Tropics it is from 12—2 p.m. There result the following regression lines measuring the increase of temperature associated with greater frequency of pulse rate; and the increase in pulse rate associated with greater temperature:

England. 7—8 a.m.: $T = 98{\cdot}766 + {\cdot}0325\ (P - 58{\cdot}243)$,
Tropics. 12—2 p.m.: $T = 98{\cdot}905 + {\cdot}0383\ (P - 56{\cdot}633)$,
England. 7—8 a.m.: $P = 58{\cdot}243 + 6{\cdot}724\ (T - 98{\cdot}766)$,
Tropics. 12—2 p.m.: $P = 56{\cdot}633 + 5{\cdot}767\ (T - 98{\cdot}905)$.

Thus a rise of 10 per minute in the pulse rate is on the average accompanied by a rise of 0·3 to 0·4 in body temperature, and a rise of one degree in the temperature is on the average associated with a rise of 6 to 7 beats per minute in the pulse. It is highly probable, however, that ·47 to ·48 is not even the maximum correlation of pulse rate with temperature for the *same* normal individual and that further, if the correlation of pulse rate and temperature were taken at the time of maximum relation for a whole series of different normal individuals, we might obtain even higher association.

The problem deserves full statistical treatment in the case of series of both normal and diseased persons.

(*d*) The fact that, except at early morning observations, the pulse rate was higher in the Tropics than in England, suggested that air temperature might influence the pulse rate. Correlations were obtained for T' and P at 3—4 p.m. in England, and 6—7 a.m. and 12—2 p.m. in the Tropics, the values were negative in England and small and positive in the Tropics. There was thus no definite evidence attaching an increased pulse rate to higher external temperatures. The increased pulse rate in the Tropics—if really significant—cannot be associated with any physiological response to higher air temperature.

Tables I—XXI supply the tabulation of the records provided by Davy, and form the data from which the above results are reached. The data for England are sparse and might with advantage be repeated for a much more extensive period.

(3) *Individuality in Temperature.* One of the interesting points to be determined is whether in the long run an isolated temperature can be considered as to any extent characteristic of an individual. The most satisfactory method of answering this problem would be to obtain the average temperature of an individual for a week or fortnight, and repeat the observations at a year's interval; if this were done for 1000 cases of one sex, we should have a better measure of individuality in temperature

than we can obtain from our present data. It would be better undertaken on adults between 20 and 30 than on growing children. Of course the individuality here spoken of may be a physiological individuality of the healthy human being; it may, also, be due to persistent differences of environment and nurture, or again it may result from a permanent pathological condition. If the temperatures be taken at too short an interval then any transient bad health might tend to increase the apparent correlation of first and second temperatures. We have to consider therefore the influence on individuality of temperature of

(i) Pure physiological or normal individuality.
(ii) Temporary pathological conditions.
(iii) Permanent pathological conditions.
(iv) Environmental conditions.

We have not the data needful to answer fully the problems which turn on these factors, but some suggestive lights can be thrown upon them.

It will be remembered that Dr Williams' record diagnoses children as normal or not on clinical inspection, previous to thermometric examination. This will enable us to test to what extent the individuality of temperature is a result of chronic pathological conditions. Again, the intervals between first and second temperatures vary from a fortnight to two years. Now if we consider the difference between temperatures at a short interval of time and the difference between temperatures at a long interval of time, we should anticipate that temporary bad health would be manifested in temporary rise (or fall) of temperature, and thus the difference of temperature at two close examinations might be expected to be less than at two distant occasions. A temporary illness at one or other of these occasions showing an abnormal temperature would be unlikely to be repeated at the other visit if at a long interval. Generally speaking, if the visits were made at random, we should expect no correlation between either first or second temperature and the intervening interval. If on the other hand a child were re-examined, because it had an abnormal temperature, then we should anticipate a correlation between shortness of interval and high temperature at first visit. All these points can be examined on our data. We have not unfortunately any inspection of home conditions in the primary school data, but we have in the public school data some differentiation arising from the difference of individual "houses" which seems worth consideration from this standpoint.

We will consider these points in detail.

Tables XXII and XXIII give the correlation tables between 1st temperature (t_1) and 2nd temperature (t_2), respectively, with the interval (i) for all boys aged 12 and 13. We have for interval in months:

$$m_{t_1} = 99\cdot4875, \quad m_{t_2} = 99\cdot4355, \quad m_i = 5\cdot75,$$

$$\sigma_{t_1} = \cdot5343, \quad \sigma_{t_2} = \cdot4803, \quad \sigma_i = 2\cdot266,$$

$$r_{t_1 i} = +\cdot0354 \pm \cdot0476, \quad r_{t_2 i} = +\cdot0394 \pm \cdot0476,$$

$$r_{t_1 t_2} = +\cdot5238 \pm \cdot0346,$$

$${}_i\rho_{t_1 t_2} = +\cdot5231 \pm \cdot0346.$$

It will be manifest that the interval has no relation to either first or second temperature, for r_{t_1i} and r_{t_2i} are not significant having regard to their probable errors. Further, the correlation $r_{t_1t_2}$ of first and second temperatures is substantial, and is *in no way modified, if its partial value for constant interval be taken* (${}_i\rho_{t_1t_2}$).

The above results are for 200 boys, the first cases in which second temperatures were taken. But without troubling to demonstrate that the interval between observations is not appreciably correlated with first or second temperatures for the whole mass of the observations, we can show numerically and graphically that the difference of first and second temperatures has no appreciable relation to the interval of time—in other words, differences of temperatures at 12 months are no greater than differences at one or two months, i.e. illnesses lasting a month or two do not appear to give a spurious individuality to temperature, and the individuality in temperature is practically independent of the interval which elapses between observations. Of course we should anticipate that the second temperature would be slightly lower than the first, for, as we shall show later, temperature falls slowly with age in growing children.

Table C gives the data: m_d is the mean difference of temperature for a given interval between records, σ_d is the standard deviation of the differences for the same interval.

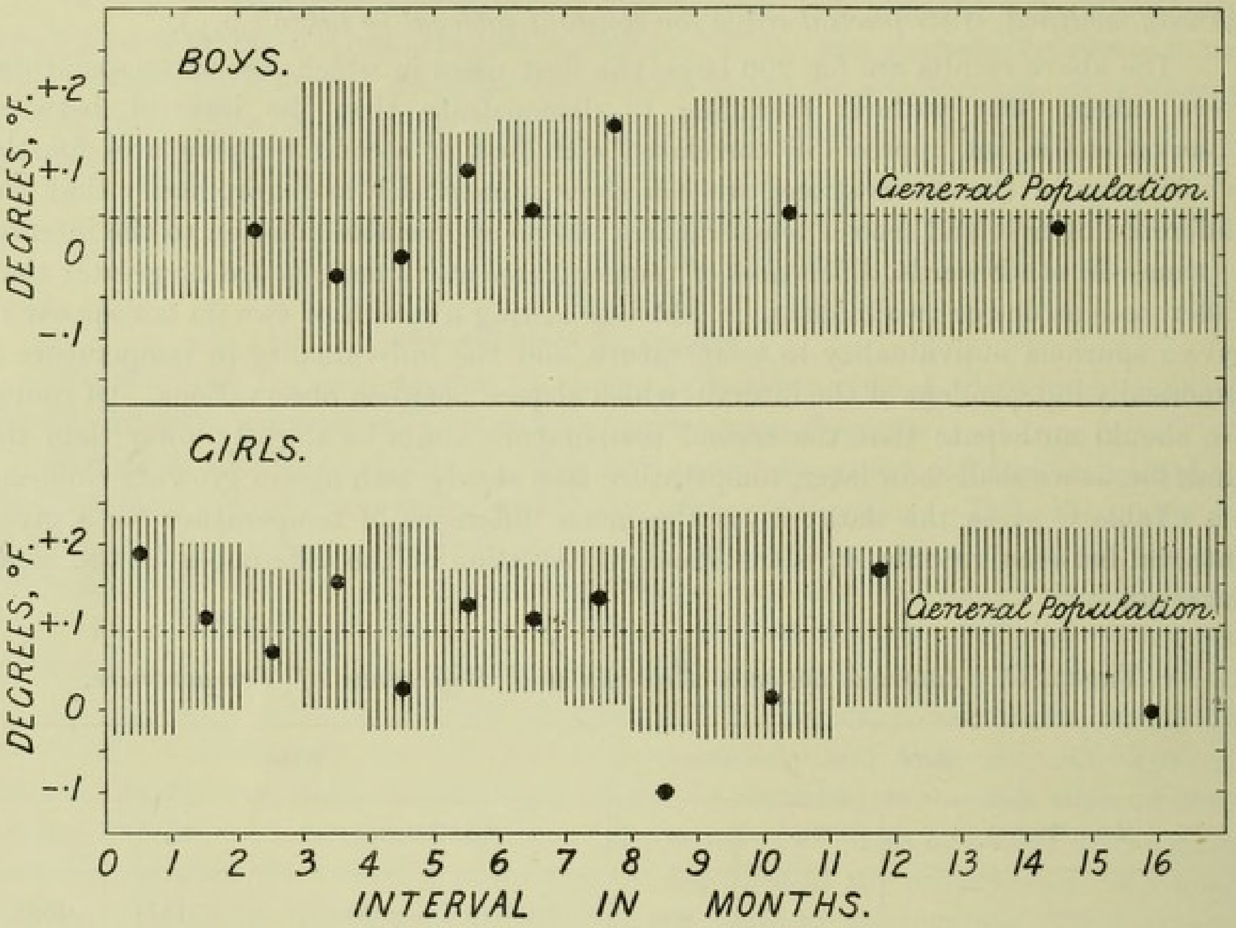
TABLE C. *Interval between Records and Difference of Temperature.*

Boys			Girls		
Mean Interval	m_d	σ_d	Mean Interval	m_d	σ_d
—	—	—	0·5 (< 1 month)	+ ·1871	·4568
—	—	—	1·5 (1—2 months)	+ ·1096	·4138
2·25 (< 3 months)	+ ·0297	·4393	2·5 (2—3 months)	+ ·0697	·4321
3·5 (3—4 months)	− ·0261	·4947	3·5 (3—4 months)	+ ·1528	·5405
4·5 (4—5 months)	− ·0026	·4312	4·5 (4—5 months)	+ ·0265	·4852
5·5 (5—6 months)	+ ·1017	·5125	5·5 (5—6 months)	+ ·1262	·3818
6·5 (6—7 months)	+ ·0533	·4863	6·5 (6—7 months)	+ ·1105	·4641
7·75 (7 and 8 months)	+ ·1575	·4127	7·5 (7—8 months)	+ ·1339	·4478
10·4 (9, 10 and 11 months)	+ ·0500	·4873	8·5 (8—9 months)	− ·1000	·4665
			10·1 (9 and 10 months)	+ ·0138	·3796
			11·75 (11 and 12 months)	+ ·1679	·4651
14·5 (12 up to 23 months)	+ ·0323	·4595	15·9 (13 up to 18 months)	− ·0027	·4072
All Intervals.........	+ ·0467	·4699	All Intervals.........	+ ·0950	·4504

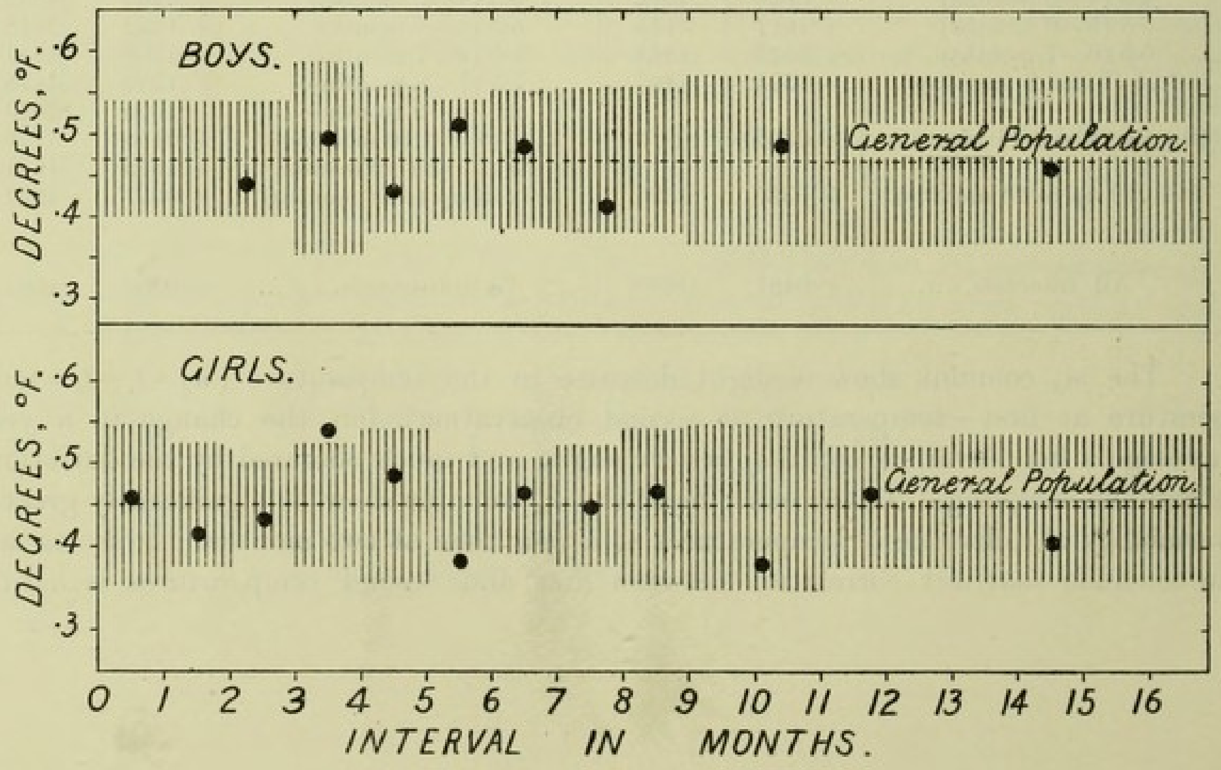
The m_d columns show a slight decrease in the temperature ($m_d = t_1 - t_2$ = temperature at first − temperature at second observation), but the change in a year (average a little over six months) is very slight and much obscured by the deviations of random sampling. On the other hand the σ_d columns show no significantly greater variability of difference of temperatures at a year than at two months. It seems safe to conclude that any correlation between first and second temperatures is hardly

DIAGRAM I. *Means and Standard Deviations of* Differences of Temperature at various intervals, *with* 2·5 *times their probable error.*

Means.



Standard Deviations.



affected by temporary short period variations and that the correlation we find between first and second temperatures is due either to physiological individuality, to permanent environmental conditions or to chronic pathological states. The accompanying Diagram I indicates graphically how little significance the interval between temperatures has either on their difference or on the variability of their difference. For the boys no standard deviation of an array, and no mean exceeds ± 2·5 times the probable error of a random sample. For the girls two standard deviations—those for 3·5 and 5·5 months' interval—differ in opposite direction by more than 2·5 times the probable error, and one mean that for 8·5 months. We should anticipate that a mean would fall outside these limits *twice* in our twenty trials *.

The actual data are given in Tables XXIV and XXV. We have looked at the matter from another standpoint, namely, by taking the differences of temperature *without regard to sign* for each interval we obtained.

TABLE D. *Arithmetic Differences of Temperatures and Intervals.*

Boys		Girls	
Interval	Mean Arithmetic Differences of Temperatures	Interval	Mean Arithmetic Differences of Temperatures
—	—	0·5	·42 ± ·03
—	—	1·5	·29 ± ·03
2·25	·33 ± ·03	2·5	·33 ± ·02
3·5	·39 ± ·04	3·5	·44 ± ·03
4·5	·40 ± ·03	4·5	·41 ± ·03
5·5	·40 ± ·03	5·5	·31 ± ·02
6·5	·40 ± ·03	6·5	·37 ± ·02
7·75	·35 ± ·03	7·5	·36 ± ·03
		8·5	·38 ± ·03
10·4	·37 ± ·04	10·1	·27 ± ·04
		11·75	·37 ± ·03
14·5	·34 ± ·04	15·9	·32 ± ·03
All Intervals	·36 ± ·01	All Intervals	·35 ± ·01

Having regard to the probable errors, there are practically no significant differences here. It looks as if the boys had the highest differences of temperatures for intermediate intervals, but this is only partially supported by the girls, and we conclude from this, as from the previous methods of examining the data, that it makes no *substantial* difference whether the temperature be taken a second time at an interval of two or of twelve months. Short period high or low persistent temperatures appear

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* If σ be the S.D. of the total population the probable errors have been found from $\cdot 67449\sigma/\sqrt{n}$ and $\cdot 67449\sigma/\sqrt{2n}$ for mean and standard deviation respectively, where n is the number of population in any array. The real values are somewhat different from these because σ is of course liable to error and as the array is part of the whole population, the more general formula, *Biometrika*, Vol. v. pp. 181—3, ought strictly to have been used, but the present method is sufficiently approximate here. By a slip of the draughtsman the last dot of Diagram I, *Standard Deviations, Girls*, has been placed at 14·5 instead of 15·9 months.

to be excluded when we take one to two months' interval. There is no need to correct for the length of interval. Thus when we correlate temperatures of first and second record, the correlation points to physiological individuality in temperature, to chronic pathological temperature states, or to persistent environmental effects. Transient temperature disturbances do not appear to influence the results for the length of intervals we have dealt with.

We now turn to the correlations between first and second temperatures. These are given in the case of 330 boys, 12 and 13 years old, in Table XXVI, and for 671 girls of the same ages in Table XXVII. These two tables contain *all* our material, regardless of whether the children were known or suspected to be pathological cases*. Tables XXVIII and XXIX give the data for boys and girls respectively clinically passed as "normal" and Tables XXX and XXXI for boys and girls respectively, known or suspected of pathological conditions. Table E below gives the chief constants for the six tables, XXVI—XXXI.

TABLE E. *Correlation of First and Second Temperatures.*

Constants	Boys			Girls		
	All Boys	Normal Cases	Pathological Cases	All Girls	Normal Cases	Pathological Cases
1st Temperature ...	99·502 ± ·019	98·900 ± ·031	99·661 ± ·017	99·641 ± ·014	99·003 ± ·026	99·776 ± ·013
2nd Temperature...	99·448 ± ·017	99·048 ± ·037	99·554 ± ·017	99·549 ± ·011	99·131 ± ·025	99·644 ± ·011
S. D. 1st Temp. ...	0·5101 ± ·0134	0·3757 ± ·0216	0·4130 ± ·0122	0·5310 ± ·0098	0·4129 ± ·0182	0·4486 ± ·0091
S. D. 2nd Temp. ...	0·4595 ± ·0121	0·4554 ± ·0262	0·3982 ± ·0118	0·4292 ± ·0079	0·3956 ± ·0174	0·3943 ± ·0080
Correlation of 1st and 2nd Temp.	·5319 ± ·0266	·3769 ± ·0697	·3613 ± ·0363	·6027 ± ·0166	·4118 ± ·0518	·4797 ± ·0221
Total Cases	330	69	261	671	117	554

Roughly, it will be seen, that only about a fifth of the cases of these children were clinically reported as "normal." Astounding as this may seem we defer for the present any discussion of this state of affairs in some of our public elementary schools until we place alongside these data similar data for children of another social class. Meanwhile we notice that the clinical diagnosis is to some extent confirmed by the significantly higher temperatures obtained for the cases clinically recorded as pathological. We may conclude from the above table that:

(*a*) Boys of 12 and 13 years of age, whether normal or pathological, have lower temperatures than girls of like ages.

(*b*) Girls of 12 and 13 years of age are not as a whole more variable about their mean temperatures than boys of these ages.

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* We must again remind the reader that diagnosis of abnormal states was made clinically without regard to temperatures.

(*c*) On these data, it is not demonstrable that for either boys or girls the pathological cases have more variable temperatures than the normal cases. *All* boys or *all* girls are more variable than normal or pathological cases because they form heterogeneous material.

(*d*) Taking the total populations of boys and of girls we have a very substantial correlation, about ·57, between first and second temperatures. But when we break up our material into normal and pathological groups, we see that approximately one-third of this is due to mixing heterogeneous material. The correlation of first and second temperatures in either the normal or pathological groups is quite significant and about ·4. Thus, while one-third of the individuality of temperature is due to chronic pathological influences, two-thirds of it are due to physiological individuality or to permanent environmental effects.

(*e*) The individuality of girls in temperature appears in every group greater than that of boys. This is, perhaps, hardly what would be anticipated; we should have expected, at any rate in some girls of this age, greater variability in temperature in the same individual, which would weaken the correlation. This is not the case, girls as a class have higher and not less variable temperatures than boys, but the individual girl appears to be more persistent in her temperature than the individual boy. It is conceivable that in the latter case the effects of more violent exercise may to some extent lessen the apparent individuality.

We have the following equations for the prediction of probable second temperature t_2 from first temperature t_1:

Boys : Whole population, ages 12 and 13 : $t_2 = 51{\cdot}777 + {\cdot}4791\, t_1 \pm {\cdot}222$.
Girls : ,, ,, ,, ,, $t_2 = 51{\cdot}009 + {\cdot}4872\, t_1 \pm {\cdot}184$.
Boys : Normal cases, ages 12 and 13 : $t_2 = 53{\cdot}886 + {\cdot}4569\, t_1 \pm {\cdot}264$.
Girls : ,, ,, ,, ,, $t_2 = 60{\cdot}072 + {\cdot}3945\, t_1 \pm {\cdot}231$.
Boys : Pathological cases, ,, ,, $t_2 = 64{\cdot}837 + {\cdot}3484\, t_1 \pm {\cdot}232$.
Girls : ,, ,, ,, ,, $t_2 = 57{\cdot}575 + {\cdot}4216\, t_1 \pm {\cdot}249$.

(4) *On the Permanent Environmental and Physiological Factors in Temperature Individuality.* Unfortunately no home observations have been made in the matter of environment in order to determine its influence on temperature. We are therefore forced to consider rather different methods of approaching environmental factors.

A given school * measures local environment, one school also can be described as in a well-to-do, another as in a very poor district. Tables XXXII and XXXIII give for boys and girls of ages 12 and 13 the temperature under each school. Treating the school as a measure of some unknown local environmental factor, we found the correlation ratio between school and temperature. There resulted

$$\eta = {\cdot}2117 \pm {\cdot}0317 \text{ for boys,}$$
$$\eta = {\cdot}2367 \pm {\cdot}0274 \text{ for girls.}$$

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* About 12 schools only could be taken in which enough children of the ages 12—13 had been measured to obtain reasonably accurate means.

Table F, arranged in order of temperature for girls, indicates the mean temperatures of the various schools. The weighted mean of the six schools with lowest temperature for girls is 99·51; and of the six schools for boys, where the girls have lowest temperature 99·46, while for the six schools where the girls have highest temperature, the boys have a slightly lower temperature, 99·43. On the other hand, if we put the boys' schools with the six lowest temperatures first, the weighted mean temperature is 99·33 and for the remaining six schools with the highest temperatures, 99·55; in this case, however, the girls' schools in like order give 99·63 and 99·56. We are compelled to conclude that if the significant η's indicated above be due to local environment, then that local environment tends to send boys' and girls' temperatures in opposite directions. What we appear so far then to have reached is a small but significant difference of temperature due to the special school quarters, or to the mode of exercising or observing the individual groups of boys and girls. It is not due to the local environment, or it would affect boys and girls alike. But a difficulty occurs here; all but three of the schools are described as "mixed"; only one semi-urban and two urban schools are "separate" (see M = "mixed" and S = "separate" in Table F). But several of the "mixed" schools, where there is considerable difference of temperature have very large numbers of children. Thus B has 340, E 300 and M 315. It seems hardly likely that the girls and boys at the stage of "leavers" go exactly to the same classes and teachers. If they do, it appears a very noteworthy fact that in these mixed schools there should be very significant temperature differences between boys and girls, and widely marked divergences between the percentages of the phthisical.

TABLE F. *Influence of School on Temperature. Children, aged* 12 *and* 13.

Index No. of School	Mean Temperature, Girls	Mean Temperature, Boys
B (Semi-urban) (M)	99·38	99·53
L (Rural) (M)	99·43	99·15
M (Urban) (M)	99·54	99·37
D (Rural) (M)	99·54	99·37
C (Urban) (S)	99·56	99·48
F (Rural) (M)	99·62	99·71
Weighted mean, 1st six	**99·51**	Weighted mean, above six... **99·46**
J (Semi-urban) (S)	99·67	99·36
H (Semi-urban) (M)	99·69	99·58
K (Semi-urban) (M)	99·70	99·71
E (Semi-urban) (M)	99·72	99·27
G (Rural) (M)	99·74	99·50
A (Urban) (S)	99·82	99·37
Weighted mean, 2nd six	**99·73**	Weighted mean, above six... **99·43**

We next inquired whether the schools with high mean temperature were associated with differentiated mean heights or weights. In the first place it seemed desirable to inquire by aid of the correlation ratio whether differentiated weights and heights were correlated with special schools at all. We found :

TABLE G. *Correlation-Ratios of School and Physical Quantities.*

Boys, aged 12		Girls, aged 12	
Height and School	Weight and School	Height and School	Weight and School
$\eta = \cdot 1104 \pm \cdot 0395$	$\eta = \cdot 0000 \pm \cdot 0400$	$\eta = \cdot 2907 \pm \cdot 0339$	$\eta = \cdot 3260 \pm \cdot 0331$

This table would appear to indicate that height and weight are not definitely associated with the individual schools in the case of boys, but that they are associated with the individual schools in the case of girls. This again does not seem to point to a general local environment, or to a class differentiation of schools, but rather to a differential treatment of the girls (as apart of course from the boys) either in their exercise and training or in the actual method of taking their temperatures.

If the differential temperatures of the children in the various schools were due to differential height or weight directly produced by the environmental conditions, we should anticipate that the closer relation of the school to the physical characters in girls would mean a closer relation of temperature in the school, but, as we have seen, the differences are very slight, ·24 as against ·21. Indeed if we take the mean school temperature with the mean school height and weight for children of 12, we find that the relationship is closer for the boys than for the girls. The numbers are :

TABLE H. *Correlations of Mean School Temperature with Mean School Heights and Weights.*

Boys, aged 12		Girls, aged 12	
Height and Temp.	Weight and Temp.	Height and Temp.	Weight and Temp.
+ ·1230 ± ·1918	+ ·2679 ± ·1807	+ ·0140 ± ·1947	+ ·1005 ± ·1927

These values are all *positive*, but only the correlation of mean weight of boys of 12 with their mean temperature has anything even suggestive of significance considering the probable errors. The following Table gives for boys and girls of 12 the mean height, weight and temperature of each school.

TABLE I. *Mean Heights, Weights and Temperatures in Individual Schools.*

Boys, aged 12				Girls, aged 12			
School	Temperature	Height	Weight	School	Temperature	Height	Weight
L	99·21	53·59	68·91	B	99·39	54·65	69·45
E	99·28	54·00	71·25	L	99·51	56·14	72·83
M	99·35	54·06	71·66	M	99·55	54·04	71·67
J	99·36	54·80	73·90	C	99·56	54·77	71·50
A	99·37	54·97	71·91	D	99·58	55·86	76·59
D	99·45	54·89	74·50	F	99·59	55·53	69·82
C	99·48	55·36	70·29	H	99·68	54·55	68·90
B	99·53	54·74	71·26	K	99·68	55·18	71·97
H	99·55	55·28	69·72	J	99·68	54·81	70·74
F	99·63	54·69	72·50	G	99·71	57·69	84·50
G	99·65	53·62	71·81	E	99·72	52·21	63·29
K	99·71	54·00	73·00	A	99·83	55·72	73·09
Means	99·46	54·50	71·73	Means	99·62	55·09	72·03

It cannot be said that weight and height as a measure of the goodness of the environmental conditions of the children of a given locality have much to do with the differential temperatures of schools. This suggests that we should inquire whether apart from schools at all height and weight are associated with temperature. Still confining our attention to children of 12, we have the accompanying results:

TABLE J. *Correlation of Individual Temperatures with Individual Heights and Weights in Children aged* 12.

Boys, aged 12		Girls, aged 12	
Height and Temp.	Weight and Temp.	Height and Temp.	Weight and Temp.
$-·0175 \pm ·0207$	$-·0467 \pm ·0202$	$-·0685 \pm ·0190$	$-·0739 \pm ·0190$

Here the values are all *negative*, but very small. They are significant in the case of girls, hardly so in the case of boys, unless by inference from those of girls. It would seem that the slightly heavier and slightly taller children for the same year of age have a slightly lower temperature. Now we know that there is a quite definite but small decrease of temperature with age, and all these numbers may mean is that the slightly heavier and taller children are older, older in physique if not in actual months. On the other hand, we may have only got a slight amount of evidence that the higher temperatured children are pathological and as such have a feebler physique.

In order to test this point the children reported as "normals" were selected and the correlations of their heights and weights with their temperatures taken. There resulted the following correlations:

	Boys	Girls
Temperature and Weight	− ·0094 ± ·0477	− ·0028 ± ·0474
Temperature and Height	− ·0171 ± ·0476	− ·0685 ± ·0472

The weight and temperature have thus practically no correlation for normal children. Such relation as exists is due to pathological states, involving loss of weight and rise of temperature. With regard to height the small correlations are unchanged by the removal of the pathological cases. We conclude that, apart from disease, there appears to be a definite, although, on account of its smallness, quite valueless relation between stature and temperature. The taller children have a very slightly lower temperature; even this may be due to age, as previously suggested.

The point, however, to be emphasised is this, that whereas better physique in the individual child connotes slightly lower temperature, better average physique in the individual schools *appears*, if the values in Table H are to be considered significant, to indicate higher average temperature in the school. Now we should imagine that a good local environment would mean good average physique in a school, and this for children of a constant age, a somewhat lower mean temperature. We are compelled to infer that general local environment has very little to do with the differential temperatures observed in these elementary public schools *.

Besides the physique of the children, we may consider the question of environment as signified by urban and rural conditions.

TABLE K. *Influence of Urban Conditions.*

Character		Boys, aged 12 and 13			Girls, aged 12 and 13		
		Rural	Semi-urban	Urban	Rural	Semi-urban	Urban
Temperature	Mean	99·56 ± ·01	99·49 ± ·02	99·44 ± ·02	99·62 ± ·01	99·62 ± ·01	99·65 ± ·01
	S. D.	·511 ± ·009	·509 ± ·011	·525 ± ·014	·506 ± ·008	·463 ± ·009	·502 ± ·010
Weight † in lbs.	Mean	73·88 ± ·28	70·79 ± ·35	70·08 ± ·38	74·96 ± ·23	71·18 ± ·41	70·93 ± ·36
	S. D.	9·511 ± ·196	9·375 ± ·250	8·884 ± ·266	11·269 ± ·218	11·124 ± ·290	10·340 ± ·255
Height † in inches	Mean	54·84 ± ·08	54·47 ± ·10	54·40 ± ·12	55·72 ± ·08	55·05 ± ·11	54·65 ± ·11
	S. D.	2·692 ± ·055	2·703 ± ·072	2·724 ± ·082	3·053 ± ·059	3·006 ± ·078	3·117 ± ·077

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* It is conceivable, although not demonstrated, that, within certain limits, pyrexia is a sign of a beneficent process, and that, as a reaction of the organism, it occurs best in a good environment.

† The above results are all for children of age 12. Taking the same schools as a *whole*, we were struck with the low mean heights and weights of school E for girls and the high mean heights and weights of school G for girls, whereas in both schools there was no corresponding anomalies in the heights and weights of the boys of those schools, although both girls and boys were measured on the same machines. Remeasuring of such few girls as were available at an interval of 6 to 17 months did not indicate impossibilities of growth, and the one girl at school G who had gained 3″ and 15 lbs. in 17 months was found to have had special feeding up. One machine was found out of order, when examined after the interval, but as we had no guarantee that it was wrong when the original measurement was made, and as the correction required would only introduce further inconsistencies, it seemed best to allow the original material to stand for this school.

Now the results in Table K are of extraordinary interest. They show small but quite appreciable and continuous falls in weight and height as we pass from rural to urban schools. There is also a slightly decreasing variability in weight although this is not noticeable in height. But when we turn to temperature, although the boys show a slight fall in temperature between country and town, the girls show if anything a rise. Further, examining Table F, we find no consistent arrangement of urban, semi-urban and rural schools corresponding in the least to temperature classification. We are again compelled to conclude that the environmental conditions which sensibly affect the weight and height of children are not those which sensibly influence their temperatures.

We next turned to the question whether any indication could be found of environmental conditions indirectly through the size of the family. Where the family is large, there the food supply might be supposed smaller and this might tell indirectly on temperature. We obtained the following results :

TABLE L. *Correlation of Physical Characters and Size of Family.*

	Temperature and Size of Family. Ages 12 and 13	Weight and Size of Family. Age 12	Height and Size of Family. Age 12
Boys	− ·0152 ± ·0225	− ·0675 ± ·0256	− ·0688 ± ·0254
Girls	− ·0100 ± ·0206	− ·0353 ± ·0242	− ·1117 ± ·0239

It will be seen from this table that there appears to be a slight decrease of weight and height in members of large families; it is somewhat irregular in the case of the girls; but on the whole is significant, if of small practical importance to judge by these data. On the other hand there is no sensible relation between temperature and the size of family. We know that the elder born have a preponderance of certain types of disease over the later born, and it seemed worth while inquiring whether for children aged 12 and 13, there was any relation between their temperature and place in the family. The correlations were :

$$\text{Boys}^*: \ +{\cdot}0374 \pm {\cdot}0318, \qquad \text{Girls}: \ -{\cdot}0029 \pm {\cdot}0305.$$

Thus no relationship whatever was discoverable.

(5) *Pathological Factors in Temperature.* The reader will remember that the children were classified clinically and without regard to temperature into the categories normal, phthisical and rheumatic, and also as doubtfully phthisical and doubtfully rheumatic (Ph., Ph.?, Rh., Rh.? or N.). The weights and heights of these children were also ascertained. The data are given in Table XXX *bis* and the principal biometric constants in Table M.

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* In order to determine whether the result might arise from abnormal temperatures being more frequent at the start and finish of the family, i.e. skew regression, η was determined also; when corrected, it was zero.

TABLE M. *Height, Weight, Temperature and Pathological Conditions. Height and Weight at* 12 *years. Temperature at* 12 *and* 13 *years.*

Means	Height (inches)		Weight (lbs.)		Temperature	
	Boys	Girls	Boys	Girls	Boys	Girls
Normal	54·72 ± ·14	55·76 ± ·15	72·99 ± ·47	76·13 ± ·61	98·95 ± ·02	99·07 ± ·01
Phthisical (Ph. + Ph. ?)	54·22 ± ·09	54·90 ± ·10	70·89 ± ·31	71·55 ± ·35	99·67 ± ·01	99·74 ± ·01
Rheumatic (Rh. + Rh. ?)	55·07 ± ·09	55·37 ± ·08	73·26 ± ·31	72·74 ± ·29	99·63 ± ·01	99·74 ± ·01
Standard Deviations	Boys	Girls	Boys	Girls	Boys	Girls
Normal	2·898 ± ·098	3·200 ± ·107	9·754 ± ·330	11·124 ± ·290	0·394 ± ·011	0·401 ± ·010
Phthisical (Ph. + Ph. ?)	2 681 ± ·062	3·130 ± ·072	9·502 ± ·220	10·340 ± ·255	0·422 ± ·008	0·409 ± ·007
Rheumatic (Rh. + Rh. ?)	2·577 ± ·061	2·963 ± ·058	9·222 ± ·217	11·269 ± ·218	0·458 ± ·009	0·452 ± ·007

Now this table brings out some extremely interesting points. The temperature of both boys and girls is significantly higher in the pathological groups, although there is nothing as far as temperature is concerned to distinguish between the average temperature in the phthisical and rheumatic groups.

Thus the temperature confirms the clinical diagnosis. But if we turn to the Weight and Height columns we see for both boys and girls that only the phthisical show diminished physique. The rheumatic boys are heavier and taller than the normal, and although the weight and height of the rheumatic girls are not as large as those of the normal girls, there is not much difference in height; further the weight of the normal girls appears to be somewhat exaggerated relative to the boys.

Turning to the variabilities, we see that the pathological groups are more variable in temperature than the normal children, the rheumatic being more variable than the phthisical. But in height and weight, with the one exception of the rheumatic girls, the pathological groups are less variable than the normal children. Thus if we were dealing solely with a mixture of phthisical and normal children, we might have anticipated a quite considerable correlation between weight or height and temperature, but a condition like the rheumatic shows us that a higher temperature may be associated, as it is in boys, with greater weight and stature. It is probable that it is these different effects, under different pathological states, which produce the very low correlations between physique and temperature we have already noted.

We have seen that there is no appreciable relation between order of birth and temperature. We have data for 861 children, boys and girls aged 12 and 13, with regard to their order of birth and their pathological state. The data are very irregular and the normals are so relatively few that we have placed the doubtful phthisical and rheumatic cases with them and obtained the following results:

TABLE N. *Order of Birth and Pathological Percentages. Boys and Girls aged* 12 *and* 13.

	1	2 and 3	4 and 5	6 and 7	8, 9 and 10	11 and over
Definitely Phthisical and Rheumatic ...	119	141	79	55	40	15
Normal and not definitely Phthisical or Rheumatic ...	99	155	71	45	30	12
Percentages Pathological......	54·6	47·6	52·7	55·0	57·2	55·6

It would seem from this that at ages 12 and 13, the first-born are more likely to be phthisical or rheumatic than any child up to the 6th born, for the 6th to the 16th born, we have again an increased pathological incidence. Indeed out of eight children born, 13th to 16th, only two were reported free from phthisical or rheumatic symptoms.

As we see the regression between place and pathological condition is skew and thus the correlation would be likely to be small; worked out by biserial r from two-rowed tables, it is

$$\text{Boys: } +\cdot02, \quad \text{Girls: } +\cdot07,$$

the plus sign indicating that on the whole early place means a less healthy condition.

As there has been some recent criticism of the fact that the first-born child is less healthy than its successors, it may be well to record the infantile mortality in 4422 births in Sheffield classed in the same groups.

TABLE O. *Order of Birth and Infantile Mortality, Boys and Girls, Sheffield.*

	1	2 and 3	4 and 5	6 and 7	8, 9 and 10	11 and over
Alive at 12 months	554	1167	899	581	479	202
Dead..................	82	142	118	71	85	42
Percentage	12·9	10·8	11·6	10·9	15·1	17·2

Thus practically in both cases it is not until we reach the 8th child that the weakness of the individual, whether measured by infant mortality or by phthisical and rheumatic states at 12 and 13 years of age, exceeds sensibly that of the first-born.

Thus there seems a more substantial relation between order of birth and pathological state—although not in itself very important—than between temperature and order of birth. The latter is thus probably only secondary to the former.

The reader will probably have noted long before this stage the very large proportion of pathological cases in the schools examined. The reason for this turns partly on the fact that the population dealt with was physically and economically inferior, but mainly on the standpoint taken by the medical examiner. If the post-mortem room shows us that upwards of 80 °/ₒ of children by the age of 15 have suffered from tuberculous lesions, then at any given time a very considerable number of children ought to be starting, suffering or recovering from this attack of "puerile phthisis." A careful clinical investigation should be able to indicate its existence. When we find percentages of 14 to 25 children classed as phthisical and 16 to 17 as doubtfully phthisical, these numbers refer in the first place to "puerile phthisis" from which the great bulk of children, at least in towns, suffer and eventually recover. They do not refer, except in special cases, to that active form of phthisis which needs immediate treatment, and which probably leads in the bulk of cases to death within a few years. The present percentages are those of "puerile phthisis" and the rheumatism is that manifested by such symptoms as "growing pains" or slight heart lesions.

Bearing this in mind we can now examine the pathological condition of the children according to the class of school they belong to. Table P gives the chief results.

TABLE P. *Distribution of Pathological Cases according to type of School. Children aged* 12 *and* 13.

Condition	Urban		Semi-urban		Rural	
	Boys	Girls	Boys	Girls	Boys	Girls
Phthisical °/ₒ	30·3 } 44·2	25·4 } 42·4	22·3 } 33·6	13·7 } 30·1	23·6 } 40·2	16·1 } 30·5
? Phthisical °/ₒ	13·9	17·0	11·3	16·4	16·6	14·4
Non-phthisical °/ₒ ...	55·8	57·6	66·4	69·9	59·8	69·5
Rheumatic °/ₒ	19·0 } 25·6	29·1 } 36·5	33·3 } 43·7	41·0 } 51·4	29·6 } 41·0	39·9 } 50·3
? Rheumatic °/ₒ	6·6	7·4	10·4	10·4	11·4	10·4
Non-rheumatic °/ₒ ...	74·4	63·5	56·3	48·6	59·0	49·7
Total affected °/ₒ	69·8	78·9	77·3	81·5	81·2	80·8

Now this table indicates:

(i) that the condition diagnosed by the recorder as "phthisical" is more frequent in urban than rural schools, although it is high for boys in rural schools. The semi-urban schools appear to be more akin to the rural schools than to the urban;

(ii) that the condition diagnosed by the recorder as "rheumatic" is more frequent in rural than in urban schools, and the semi-urban schools again correspond more closely with the rural;

(iii) that the boys were diagnosed by the recorder in larger numbers than the girls as “phthisical” and the girls in larger numbers than the boys as “rheumatic.”

Owing to the relatively small amount of “rheumatism” in the towns, the number of pathological children in the towns is less than in the semi-urban districts, and the number in these, perhaps, slightly less than in the rural districts.

It should be noted that the percentages of pathological states are gigantic and must cover in the majority of cases transient cases of unfavourable diagnosis. As far as the semi-urban schools are concerned we remark that they cover schools on the borders of urban districts to which many purely rural children came in.

We now turn to the point: How far is the observed significant correlation between school and average temperature merely due to a greater number of pathological cases in that school?

It is desirable to keep the boys and girls separate in the discussion because they are clearly subject to different influences. Table Q gives the schools in order of average temperatures for boys and the corresponding percentages of pathological and normal cases. The “normal” cases here are *not* the 100 °/。 less those diagnosed as rheumatic and tuberculous, but also less those suffering from tonsils and a very small percentage of other troubles.

TABLE Q. *Analysis of Temperature and Pathological State in Individual Schools. Boys,* 12 *and* 13 *years.*

Schools in order of Mean Temperature	Class of School	Percentage of Ph. and ? Ph.	Percentage of Rh. and ? Rh.	Percentage of “ Normals’
L 99·15	Rural	28·0	28·0	36·0
E 99·27	Semi-urban	30·4	8·7	60·9
A 99·37	Urban	34·2	35·4	26·6
D 99·37	Rural	21·7	39·1	21·7
M 99·37	Urban	35·1	35·1	21·6
Mean 99·31	—	Mean 29·9	Mean 29·3	Mean 33·4
C 99·48	Urban	63·4	15·9	18·3
G 99·50	Rural	47·6	42·9	9·5
B 99·53	Semi-urban	40·9	38·6	18·2
H 99·58	Semi-urban	36·0	52·0	12·0
F 99·71	Rural	54·1	24·3	5·4
Mean 99·56	—	Mean 48·4	Mean 34·7	Mean 12·7

Schools J and K not classified for Ph. and Rh.

Now it will be obvious again from this table that the rural or urban condition of the school has very little indeed to do with the mean temperature of the boys in that school. But the mean temperature depends essentially on the number of children in the school diagnosed as pathological. In the five schools with high temperatures, only about one-eighth of the boys were passed as normal. In the schools with lower temperatures, nearly one-third were passed as normal. In the same two classes of schools 48 °/o and 30 °/o respectively were classed as "phthisical," 35 °/o and 29 °/o respectively as "rheumatic." While the five schools with least "phthisical" cases and most "normal" boys are the schools of lowest average temperature, this concordance is not that of the "rheumatism" diagnoses, three of the schools of highest temperature have less rheumatic percentage than some of the schools of low temperature. Indeed the five schools of lowest rheumatic percentage show an average temperature of 99·40 as against the 99·47 of the schools of highest rheumatic percentage. We may conclude therefore that a low temperature in a boys' public elementary school is a fair measure of its normal condition, and a high temperature is a rough measure of the extent of "puerile phthisis" prevalent therein.

We now turn to a similar table for the girls' schools, and it will be at once seen that the correspondence between order of school temperature and prevalence of pathological states is by no means so distinct as in the case of boys. In Table R while the schools with high temperature have more "rheumatic" girls and fewer "normal" girls than those with low average temperature, there are actually more girls diagnosed as "phthisical" in the schools with the lower average temperatures. Also there is nothing of the orderly sequence to be found here as in some of the columns for the boys' table. Generally higher temperature is a measure of fewer

TABLE R. *Analysis of Temperature and Pathological State in Individual Schools. Girls,* 12 *and* 13 *years.*

Schools in order of Mean Temperature	Class of School	Percentage of Ph. and ? Ph.	Percentage of Rh. and ? Rh.	Percentage of "Normals"
B 99·38	Semi-urban	15·6	68·9	11·1
L 99·43	Rural	22·5	52·5	25·0
M 99·54	Urban	29·0	54·8	12·9
D 99·54	Rural	56·7	16·4	23·9
C 99·56	Urban	46·4	33·9	16·1
F 99·62	Rural	51·2	26·8	22·0
Mean 99·51	—	Mean 36·9	Mean 42·2	Mean 18·5
J 99·67	Semi-urban	48·0	44·0	8·0
H 99·69	Semi-urban	26·5	67·6	2·9
K 99·70	Semi-urban	48·0	36·0	16·0
E 99·72	Semi-urban	13·6	59·1	22·7
G 99·74	Rural	24·0	52·0	16·0
A 99·82	Urban	50·0	36·5	10·8
Mean 99·73	—	Mean 35·0	Mean 49·2	Mean 12·7

"normal" children in the school, but in the case of girls the differences are far less orderly than in the case of boys. The method of percentages is always one of considerable danger and the above characteristically illustrates it, but there are not enough individual schools to calculate correlation coefficients. Thus if we invert our problem and take the mean temperatures of schools* classified in order of highest and lowest percentages of pathological conditions we obtain the following results:

TABLE S. *Mean Temperatures for Schools with Lowest and Highest Percentages of "Phthisis," "Rheumatism" and "Normality."*

	"Phthisis"		"Rheumatism"		"Normality"	
	Five with lowest °/。	Five with highest °/。	Five with lowest °/。	Five with highest °/。	Five with lowest °/。	Five with highest °/。
Boys	99·31	99·56	99·40	99·47	99·31	99·56
	Six with lowest °/。	Six with highest °/。	Six with lowest °/。	Six with highest °/。	Six with lowest °/。	Six with highest °/。
Girls	99·58	99·65	99·65	99·58	99·60	99·63

We see now that the six girls' schools with least percentages of phthisis have the lower average temperature, but the six girls' schools with the least rheumatism have the higher temperature. Indeed the six girls' schools with most "phthisis" are exactly the six with least "rheumatism," and thus the "phthisis" and "rheumatism" means are exactly interchanged! Something of this interchange is distinguishable in the boys. School C has most "phthisis" and nearly the least "rheumatism"; School D has most "phthisis" and less "rheumatism" than all but two; School F has the second highest "phthisis" record, but the third lowest "rheumatism" record.

The records of "phthisis" and "rheumatism" are indeed mutually exclusive, and this accounts for most of the anomalies. But we think that Table S suggests that temperature is not as simple a function of pathological state in girls as in boys, and the average higher temperature of girls (see p. 14) is to be borne in mind. It is conceivable that oncoming puberty in the girls produces temperature disturbances that obscure, more than in the case of boys at the ages 12 and 13, the direct influence of pathological states†.

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* We have already drawn the attention of the reader to the fact that the majority of the schools are described as "mixed"; we are here treating, however, the girls and boys of the same schools as separate entities. This seems absolutely needful in view of the fact of the very different percentages of "rheumatism" and "phthisis" and the different temperatures of boys and girls in the same "mixed" school. Without a very intimate local knowledge it is impossible to indicate how the boy and girl sections are differentiated, but such differentiation is obvious in the statistics.

† As confirmatory of this view we may cite Burton-Fanning and Champion (1903) who figure in a chart (Chart 11) the premenstrual rise, amounting to 0°·5. This rise occurs in normal as well as pathological cases.

From the statistical standpoint only, the diagnoses of "phthisis" and "rheumatism" cannot of course be independently established. But some points are worthy of consideration :

(i) Children undoubtedly in a very large percentage of cases do pass through attacks of "puerile phthisis." Has the medical examiner power to appreciate by purely clinical signs its existence? Undoubtedly the independent temperature examination does show a higher average temperature in the children classed as "phthisical."

(ii) The higher temperature shows also—although to a less marked extent—in the category of "rheumatic" children. The large percentage of "rheumatic" children is, however, *a priori* unlikely to meet with general acceptance. The fact that "puerile phthisis" exists is admitted, and its relation to individual schools, i.e. to medical visits at a time when a particular school was more or less a focus of infection, or passing through an epidemic, might account for the wide range of percentages found; it would certainly explain why the order of percentages is not the same in the boys' and the girls' sections of the same schools, which have populations drawn from the same home environments, but have not necessarily the same immediate school environment.

Can the high percentage of "rheumatic" children be statistically justified in any similar manner?

We have already seen that "rheumatism" in far less extent than "phthisis" is identified with the general pathological condition of the school as measured by its average temperature.

Now the family histories of the children were as far as possible taken, and inquiries were made as to the past history of father and mother with regard to phthisis, rheumatism and rheumatic fever. If the classification "rheumatism" in the children be intimately correlated with rheumatic symptoms in the parents, we shall have evidence that our category "rheumatism" is hereditary and is not an idle impression of the medical examiner, but a real diagnosis of an actually existing state. On the other hand we can have no record of the parents' "puerile phthisis," but a similar investigation would lead us to compare "puerile phthisis" in the child with "mortal phthisis" in the parent, a comparison by no means exactly analogous, because it is quite certain that the bulk of cases of puerile phthisis recover, although cases of puerile phthisis may be more likely to appear where (i) the parents' constitution is susceptible to mortal phthisis, (ii) the child comes in contact with mortal phthisis, or (iii) the puerile phthisis is a preliminary sign of a hereditary constitutional tendency to mortal phthisis. We shall now proceed to discuss this factor of heredity in the rheumatism and phthisis of childhood.

(6) *Hereditary Factor in the Rheumatism of Childhood.* The special difficulty first apparent is the record of rheumatic fever in the parents, but not in the offspring. Should rheumatic fever be placed on a different footing to the category rheumatism? This was tested on a first sample of 708 girls and 236 boys. The fundamental tables are :

TABLE T.

		Father				Mother		
		Rheumatic Fever	Rheumatic	Not Rheumatic	Totals	Rheumatic Fever	Rheumatic	Not Rheumatic
Daughter	Rheumatic	21	51	146	218	18	77	123
	Not Rheumatic	1	16	473	490	6	30	454
	Totals	22	67	619	708	24	107	577
Son	Rheumatic	7	23	42	72	1	25	46
	Not Rheumatic	4	8	152	164	4	15	145
	Totals	11	31	194	236	5	40	191

First: (*a*) we may consider rheumatic fever as only a type of rheumatism and form fourfold tables with our division between not-rheumatic and the sum of both categories, rheumatism and rheumatic fever. Secondly: (*b*) we may suppose rheumatic fever in the parent to be not a product of the constitution which produces rheumatism in the offspring, and to be part of the non-rheumatic category for the purposes of heredity. We find for fourfold tables, the correlations:

	Hypothesis (*a*)	Hypothesis (*b*)
Father and Son:	·66	·64
Father and Daughter:	·71	·61
Mother and Son:	·48	·53
Mother and Daughter:	·68	·63
Mean:	·63	·61

It will be clear that in all but one case—the mothers of sons, where there is something anomalous in the rheumatic fever column—rheumatic fever in the parent is a manifestation of the hereditary tendency to rheumatism, for we raise the correlation between parent and child by including it in the evidence for rheumatism in the parent. The mean of the four parental correlations for rheumatism is ·634. If we form a single table for both types of parents and both types of offspring we have:

TABLE U.

		Parent		
		Normal	Rheumatic	Totals
Offspring	Normal	1224	84	1308
	Rheumatic	357	223	580
	Totals	1581	307	1888

which leads to a correlation of ·656.

It is possible therefore to conclude that rheumatism is a markedly hereditary character. We are prepared for the reader crying pause, and suggesting that the rheumatism may be due to the common environment of parent and child. To test this we have investigated the correlation of rheumatism in husband and wife. The accompanying table gives the data for 1656 cases (1910—12).

TABLE V.

		Wife			
		Rheumatic Fever	Rheumatic	Not Rheumatic	Totals
Husband	Rheumatic Fever	7	17	74	98
	Rheumatic	12	65	150	227
	Not Rheumatic	65	244	1022	1331
	Totals	84	326	1246	1656

Finding tetrachoric r from a table divided between not-rheumatic and the rest, we have:

$$r = \cdot 136.$$

A confirmation of this low value was found by considering the table as a 3 × 3 contingency table and modifying for number of cells and class-index correlations. This gave

$$r = \cdot 147.$$

We must conclude that, if the whole of the correlation for husband and wife in the matter of rheumatism be due to environment and none to assortative mating, yet the parental correlation is 4 to 5 times as great, while yet husband and wife have been subjected longer than parent and child to the same environment! There seems little doubt that rheumatism is really a hereditary condition, and that higher temperatures due to this condition are rather part of the individuality than a result of the environment.

Tables T and U are taken from the Report of the Medical Inspector for Worcestershire for 1910. Dr Williams continued her inquiries as to rheumatism in parents and children in the years 1910—12. In these years the very rare (under 1 °/o) cases of rheumatic fever in the child were separately noted. Further there has been a continuous change in medical opinion with regard to the features which are to be diagnosed as rheumatic. Dr Williams herself remarks (29/9/13):

"I hope I have a better idea now as to which children are rheumatic than I had then. The difficulty is that the whole idea of the disease is changing....In 1911 Prof. Poncet published a book called *La Tuberculose Inflammatoire*, in which he describes various conditions which we used to call rheumatism, but which he says are tubercular. So far as possible I have since excluded these. They only occur among adults and so would not affect the children....Also I did not at first include 'growing pains' unless they happened at night. But the slighter cases do not happen at night, and so among the children ('rheumatic') I should now put many whom I did not put in 1909."

The essential difference—since the parents have roughly the same percentage of rheumatism—is the inclusion of "growing pains" which occur in the day. Further there is some alteration of method in the inquiry itself. In the first series the majority of cases of "rheumatism" in the children were children whose mothers or themselves on inquiry as to health complained of some symptom, which was clearly rheumatic, i.e. the disease was severe enough to make them realise that something was wrong. In the later series every child was directly asked: "Do you have growing pains?" and the nature of the pains was then investigated. This change of procedure would cause the inclusion of many cases of a slighter degree in the later than the earlier series. Dr Williams is herself inclined to believe that heredity is largely confined to the severer cases.

For these reasons we should not anticipate a very close agreement between the results of 1909 and the later results. The former included all ages over 8 and the ? Rh. were not formed as a separate category, nor was rheumatic fever differentiated from rheumatism in the case of the children.

If we take all the ages of the later data and class only under rheumatic and not-rheumatic for fourfold tables we find:

TABLE W.

		Father			Mother	
	Class	Rh. + Rh. F.	Not Rh.	Totals	Rh. + Rh. F.	Not Rh.
Son	Rh. F., Rh., ?Rh.	93	223	316	106	210
	Not Rh.	50	360	410	65	345
	Totals	143	583	726	171	555
Daughter	Rh. F., Rh., ?Rh.	125	329	454	156	298
	Not Rh.	45	401	446	70	376
	Totals	170	730	900	226	674

These give for tetrachoric r:

Father and Son: ·375; Father and Daughter: ·403.
Mother and Son: ·348; Mother and Daughter: ·363.

Mean of four values: ·372.

We now took the children aged 12 and 13 only with the same classification, see Table X, and found for tetrachoric r:

Father and Son: ·358; Father and Daughter: ·463.
Mother and Son: ·357; Mother and Daughter: ·363.
Mean of four values: ·385.

Thus the results are, if anything, slightly higher when we take children of 12 and 13 instead of all children, possibly because it may be easier to detect signs of rheumatism at the later ages.

TABLE X.

		Father			Mother	
	Class	Rh. + Rh. F.	Not Rh.	Totals	Rh. + Rh. F.	Not Rh.
Sons, aged 12 and 13	Rh. F. + Rh. + ?Rh.	66	170	236	76	160
	Not Rh.	36	265	301	44	257
	Totals	102	435	537	120	417
Daughters, aged 12 and 13	Rh. F. + Rh. + ?Rh.	99	277	376	118	258
	Not Rh.	23	283	306	42	264
	Totals	122	560	682	160	522

We can draw the inference that the age of the children selected does not significantly modify the intensity of the relation found for rheumatism between parent and offspring.

Many different methods of testing the later results for rheumatism were considered, but they were all confirmatory of the previous conclusions. For example the contingency tables for the 1912 data, ages 12 and 13 for all offspring, were formed, with rheumatic fever separately for parents and children. They are as follows:

TABLE Y.

		Fathers				Mothers		
		Rh. F.	Rh.	Not Rh.	Totals	Rh. F.	Rh.	Not Rh.
Offspring, aged 12 and 13	Rh. F.	2 (+ 1·72)	1 (+ ·23)	2 (– 1·95)	5	1 (+ ·80)	3 (+ 1·83)	1 (– 2·63)
	Rh.	25 (+ 5·74)	71 (+ 18·18)	249 (– 23·92)	345	19 (+ 5·24)	99 (+ 18·11)	227 (– 23·36)
	Not Rh.	8 (– 7·46)	24 (– 18·41)	245 (+ 25·87)	277	5 (– 6·04)	45 (– 19·94)	227 (+ 25·99)
	Totals	35	96	496	627	25	147	455

The contingency of each cell, placed in brackets under the frequencies, shows how Rheumatic Fever is properly classed with Rheumatism. The correlations were then determined by 3 × 3-fold mean square contingency corrected for class-index and number of cells with the following results as compared with fourfold tables, Rh. F. and Rh. classed together:

	Father and Offspring	Mother and Offspring
Contingency r:	·373	·312
Tetrachoric r:	·371	·316

Closer confirmation than that obtained by both processes could hardly be desired.

Now it will be clear that between the 1909 data and the later data, a very significant difference in the percentage of persons affected exists. We have

	1909	1910—1912
Percentage of Male Children:	30·5	43·5
Percentage of Adult Males:	13·9	19·2
Percentage of Female Children:	30·8	50·5
Percentage of Adult Females:	18·6	24·4

Obviously while there has been only a change of about 5 °/ₒ—6 °/ₒ in the percentages of adults acredited with rheumatism, there has been a 13 °/ₒ increase in the case of boys and a 20 °/ₒ increase in the case of girls. The remarkable reduction in the intensity of the relation between parent and offspring between the first and second set of observations cannot be due to any development of diagnosis which differentiated a certain class of children with symptoms previously attributed to rheumatism; nor, as we have seen, can it arise from dealing with different proportions of children in the several age groups. It appears to be due to the inclusion in the more recent data of a large number of children with symptoms which simulated rheumatism, but were not really rheumatism of the hereditary type.

In order to ascertain whether it was the class of children of doubtful rheumatism (? Rh.) who produced this change, we took out the children of 12 and 13 classed as (? Rh.) and threw them into the non-rheumatic class. We thus obtained Table Z and deduced the following values of tetrachoric r:

Father and Son: ·307; Father and Daughter: ·311.
Mother and Son: ·316; Mother and Daughter: ·375.
Mean of four values: ·327.

We accordingly conclude that the drop in the relationship between parent and offspring is not due to the inclusion of more non-rheumatic cases in the cases classed as doubtful, for if these be excluded the correlations are sensibly lowered; we have also seen that it is not due to differences in the age distributions of the two series of observations. Statistically it seems only capable of being accounted for by the inclusion in the diagnosis of a new group of children, or of a very much larger percentage of a group only feebly represented in the older observations confined to well-marked symptoms; this group simulates rheumatism, but has not rheumatism or not rheumatism at any rate of a hereditary character[*].

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[*] See p. 30 above.

We have seen already that the percentage of parents rheumatic does not very largely differ in the two series. But this might still be true and the relation between them with regard to rheumatism be much modified. Unfortunately we cannot now find out the husband and wife correlation for the 1909 material. We have investigated the *parental* association in rheumatism for the 1626 cases of the series 1910—1912, i.e. excluding the cases in which the child is not recorded. We found the following table agreeing so closely with that on p. 29 that it is of little control value.

TABLE Z.

		Father			Mother	
	Class	Rh. + Rh. F.	Not Rh.	Totals	Rh. + Rh. F.	Not Rh.
Sons, aged 12 and 13	Rh. F. + Rh.	50	123	173	58	115
	?Rh. + Not Rh.	52	312	364	62	302
	Totals	102	435	537	120	417
Daughters, aged 12 and 13	Rh. F. + Rh.	75	219	294	101	193
	?Rh. + Not Rh.	47	341	388	59	329
	Totals	122	560	682	160	522

TABLE V^{bis}.

		Mother			
		Rh. F.	Rh.	Not Rh.	Totals
Father	Rh. F.	7 (+ 2·28)	17 (− 1·72)	72 (− ·56)	96
	Rh.	11 (+ ·32)	63 (+ 20·69)	143 (− 21·02)	217
	Not Rh.	62 (− 2·60)	237 (− 18·97)	1014 (+ 21·58)	1313
	Totals	80	317	1229	1626

The numbers in brackets indicate the contingency in each cell and again demonstrate that rheumatic fever is properly included with the rheumatism, though of course far less markedly so than in the earlier case dealt with of parent and offspring. Worked as a contingency table with the coefficient of contingency corrected for number of cells and class-index we find the correlation = ·159. Worked as a fourfold table, with the division between not Rheumatic and the rest, we find tetrachoric r = ·148. Thus we have

Association of Rheumatism in Husband and Wife.

	1910—1912 Data (Table V).	1910—1912 Data (Table V^{bis}).
By Contingency:	·147	·159
Tetrachoric r:	·137	·148

Mean of four: ·148.

To further test the material we divide it into two nearly equal parts corresponding nearly to 1910—1911 and 1911—1912 data. We reached the following fourfold tables:

TABLE Z^{bis}.

		Mother		
	1910—1911	Rh. + Rh. F.	Not Rh.	Totals
Father	Rh. + Rh. F.	36	97	133
	Not Rh.	128	535	663
	Totals	164	632	796

$r = \cdot 134$.

		Mother		
	1911—1912	Rh. + Rh. F.	Not Rh.	Totals
Father	Rh. + Rh. F.	62	118	180
	Not Rh.	171	479	650
	Totals	233	597	830

$r = \cdot 144$.

It will be seen that tetrachoric r is substantially the same for the two halves of our material. On the other hand the relatively few data for 1913 appear to indicate an increase in the mother-father correlation, but before we can assert that this is real it is better to wait for more complete material. It would appear that the record in the case of husband and wife has been far more steady than in the case of children. There seems in the latter case to have been a substantial change in the nature of the diagnosis during the three years under consideration. The material so far discussed suggests the inclusion in the "rheumatic" groups of a far larger number of children with "growing pains."

During the progress of this paper, however, Dr Williams continued her observations and now recorded in each case the grounds of her diagnosis. We were thus placed in a position to analyse more closely what might possibly be the sources of the change.

An attempt was made to get closer to the source of the change observed in values in the parental correlation of rheumatism by an analysis of the various elements of this fuller diagnosis of "rheumatism" or "? rheumatism" in the children examined. Cases in which the grounds of the diagnosis were not stated—relatively few in number—were at first omitted. Tables AA and BB give the classified material. The following classes were used by Dr Williams:

? Rheumatism

a = Doubtful growing pains
b = Heart
c = Choreic movements
d = Nervousness
e = Abdominal pain
f = "Moithers" at night or Night Terrors
g = Sore throats

Rheumatism

A = Growing pains
B = Heart
C = Chorea
D = Nervousness
E = Abdominal pain
F = "Moithers" at night or Night Terrors
G = Sore throats
H = Nodules
J = Purpura

TABLE AA.

Son

		Rheumatic																						? Rheumatic									Not Rheumatic	Totals
		A	*AB*	*AC*	*AG*	*ABD*	*ACD*	*ABE*	*ABG*	*ABC*	*B*	*BD*	*BG*	*ABCD*	*BCG*	*ABCF*	*AD*	*BCD*	*C*	*BE*	*ABDE*	*ACDE*	Rh. F.	*a*	*ab*	*b*	*bd*	*be*	*bc*	*bg*	*bde*	*ad*		
Father	Rh. F.	—	8	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	2	—	—	—	—	—	—	14	27
	Rh.	3	29	—	—	3	1	—	3	1	1	—	—	—	—	1	—	—	1	—	—	—	1	—	—	11	—	—	1	—	2	—	19	77
	Not Rh	6	77	1	1	3	—	1	2	2	2	1	1	3	1	—	1	1	—	1	1	—	4	3	1	62	5	1	1	2	1	1	239	425
	Totals	9	114	1	1	6	1	1	5	4	3	1	1	3	1	1	1	1	1	1	1	1	6	3	1	75	5	1	2	2	3	1	272	529
Mother	Rh. F.	2	11	—	—	1	—	—	1	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	4	1	—	—	—	—	—	9	30
	Rh.	2	27	1	—	2	—	1	2	1	2	1	1	1	—	—	—	—	—	—	—	—	2	1	—	16	—	—	—	—	—	—	42	102
	Not Rh.	5	76	—	1	3	1	—	2	3	1	—	—	1	1	1	1	1	1	1	1	1	4	2	1	55	4	1	2	2	3	1	221	397
	Totals	9	114	1	1	6	1	1	5	4	3	1	1	3	1	1	1	1	1	1	1	1	6	3	1	75	5	1	2	2	3	1	272	529

TABLE BB.

Daughter

		Rheumatic																				? Rheumatic											Not Rheumatic	Totals
		A	*AB*	*AC*	*AD*	*AE*	*AG*	*ABC*	*ABD*	*ABE*	*ABG*	*B*	*BD*	*ADE*	*ABCJ*	*ACH*	*BDE*	*BCD*	*ABGF*	*ABDF*	Rh. F.	*a*	*ab*	*ae*	*b*	*bd*	*be*	*bc*	*bg*	*bdf*	*bde*	*bdg*		
Father	Rh. F.	—	12	1	—	—	—	1	3	1	1	3	—	—	—	—	—	—	—	—	2	—	—	—	1	1	1	1	—	—	—	—	6	34
	Rh.	6	33	2	—	2	1	—	6	3	1	3	—	—	—	—	—	1	—	1	1	—	2	—	20	3	2	2	1	—	—	—	20	110
	Not Rh.	12	102	1	2	2	—	1	6	4	1	5	1	1	1	1	1	1	1	—	4	2	1	1	58	17	—	—	1	1	2	2	255	487
	Totals	18	147	4	2	4	1	2	15	8	3	11	1	1	1	1	1	2	1	1	7	2	3	1	79	21	3	3	2	1	2	2	281	631
Mother	Rh. F.	2	6	—	—	—	—	—	2	—	—	1	1	—	—	—	—	—	—	—	2	—	—	—	5	—	—	1	—	—	—	—	6	26
	Rh.	1	49	1	1	—	1	1	6	5	2	1	—	1	1	1	1	—	—	—	3	1	1	—	17	9	—	2	—	—	—	1	28	134
	Not Rh.	15	92	3	1	4	—	1	7	3	1	9	—	—	—	—	—	2	1	1	2	1	2	1	57	12	3	—	2	1	2	1	247	471
	Totals	18	147	4	2	4	1	2	15	8	3	11	1	1	1	1	1	2	1	1	7	2	3	1	79	21	3	3	2	1	2	2	281	631

It will be seen at once from these tables that *b* and *B* are the essential factors of the diagnosis for ? Rh. and for Rh. It is only to a very secondary extent that *a* or *A* without *b* or *B* has been a factor. A diagnosis of rheumatism has only once been made without its involving heart trouble or "growing pains*." Unfortunately it has only been in the recent examinations that a written record of the basis of the diagnosis has been made, but it is fairly clear that any change in correlation between parent and child can only have arisen by a change in the appreciation of heart signs, the other categories have far too low frequencies. To illustrate this point the four following tables have been taken out:

TABLE CC.

Daughter

		Not Rheumatic	? Rheumatic		Rheumatic		Totals
			b as a factor	*a* without *b*	*B* as a factor	*A* without *B*	
Father	Not Rh.	255	82	3	128	19	487
	Rh. + Rh. F.	26	34	0	72	12	144
	Totals	281	116	3	200	31	631

N.B. Rheumatic Fever has been classed with "Rheumatic, *B* as a factor."

TABLE DD.

Daughter

		Not Rheumatic	? Rheumatic		Rheumatic		Totals
			b as a factor	*a* without *b*	*B* as a factor	*A* without *B*	
Mother	Not Rh.	247	80	2	119	23	471
	Rh. + Rh. F.	34	36	1	81	8	160
	Totals	281	116	3	200	31	631

N.B. Rheumatic Fever has been classed with "Rheumatic, *B* as a factor."

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* Injury to the heart has been diagnosed in the presence of a visible, diffuse impulse; apex beat at, or outside the nipple line; together with alterations in the character of the sounds. The majority of murmurs have been ignored.

TABLE EE.

Son

		Not Rheumatic	? Rheumatic		Rheumatic		Totals
			b as a factor	*a* without *b*	*B* as a factor	*A* without *B*	
Father	Not Rh.	239	73	4	100	9	425
	Rh. + Rh. F.	33	16	0	49	6	104
	Totals	272	89	4	149	15	529

N.B. Rheumatic Fever has been classed with "Rheumatic, *B* as a factor."

TABLE FF.

Son

		Not Rheumatic	? Rheumatic		Rheumatic		Totals
			b as a factor	*a* without *b*	*B* as a factor	*A* without *B*	
Mother	Not Rh.	221	68	3	95	10	397
	Rh. + Rh. F.	51	21	1	54	5	132
	Totals	272	89	4	149	15	529

N.B. Rheumatic Fever has been classed with "Rheumatic, *B* as a factor."

We see from these tables that 50·1 $^\circ/_\circ$ of the girls were diagnosed as rheumatic or ? rheumatic with the heart as a factor, and only 5·4 $^\circ/_\circ$ of the girls on the basis of growing pains as a factor, but not heart. The corresponding numbers of the boys are 45·0 $^\circ/_\circ$ and 3·6 $^\circ/_\circ$. Out of the total number of girls judged rheumatic, only 9·7 $^\circ/_\circ$ were judged so on evidence not involving the heart; and 7·4 $^\circ/_\circ$ is the like number for the boys. It would thus appear that, while more girls were judged rheumatic than boys, a larger proportion of girls than boys was judged so on account of factors which did not involve the heart. Thus, any error in "growing pains" analysis should have weakened the correlations of parents and daughter, rather than that of parents and son, which is the reverse of the state of affairs observed. The result suggests, if anything, that there has been an absence of "growing pains" in the boys*.

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* Do they possibly get more outdoor exercise and show this factor less markedly?

We will take first the four tables simply divided into rheumatic and non-rheumatic, they are:

Table GG.

		Daughter			Son		
		Not Rheumatic	Rheumatic	Totals	Not Rheumatic	Rheumatic	Totals
Father	Not Rh.	255	232	487	239	186	425
	Rh. + Rh. F.	26	118	144	33	71	104
	Totals	281	350	631	272	257	529
Mother	Not Rh.	247	224	471	221	176	397
	Rh. + Rh. F.	34	126	160	51	81	132
	Totals	281	350	631	272	257	529

These lead to the following correlations:

Father and Daughter = ·511; Father and Son = ·344.
Mother and Daughter = ·469; Mother and Son = ·247.

We see at once how markedly closer the girls are to their parents than the boys.

Now let us make a very stringent selection of those children to be called rheumatic; let us only include those with *B* as a factor. We find:

Table HH.

		Daughter			Son		
		All the Rest	Rheumatic with factor *B*	Totals	All the Rest	Rheumatic with factor *B*	Totals
Father	Not Rh.	359	128	487	325	100	425
	Rh. + Rh. F.	72	72	144	55	49	104
	Totals	431	200	631	380	149	529
Mother	Not Rh.	352	119	471	302	95	397
	Rh. + Rh. F.	79	81	160	78	54	132
	Totals	431	200	631	380	149	529

These lead to the following correlations:

Father and Daughter = ·361; Father and Son = ·360.
Mother and Daughter = ·389; Mother and Son = ·277.

Now this classification has made no marked change in the boys' but a very noteworthy change in the girls' correlations. Since including the ? rheumatic with the non-rheumatic lowers much the girls' correlations, but tends to raise the boys', we conclude that with the girls the bulk of this class were rightly diagnosed as rheumatic, but in the boys their transfer having slightly bettered matters, we must conclude that they contain a considerable number of the really non-rheumatic. To test this point further we threw out altogether the ? rheumatic group from the boys, and considered as rheumatic only those diagnosed by at least *B*. The resulting tables are:

Table II.

		Son					Son		
		Rh. (*B* or *B*+)	Not Rh.	Totals			Rh. (*B* or *B*+)	Not Rh.	Totals
Father	Rh. or Rh. F.	49	33	82	Mother	Rh. or Rh. F.	54	51	105
	Not Rh.	100	239	339		Not Rh.	95	221	316
	Totals	149	272	421		Totals	149	272	421

The resulting correlations are:

Father and Son = ·427,
Mother and Son = ·323.

These show a very considerable increase on the values previously found, and we must, we hold, conclude that the lesser parental values of the correlation in the case of the son most probably marks not necessarily a lesser heredity, but a greater difficulty of accurate diagnosis in the case of the *genus*, boy.

If we take all the cases available, including the 43 girls and 28 boys for whom there was no record of the nature of the diagnosis, we have

Table JJ.

		Daughter			Son		
		Not Rheumatic	? Rh. + Rh. + Rh. F.	Totals	Not Rheumatic	? Rh. + Rh. + Rh. F.	Totals
Father	Not Rh.	255	262	517	239	207	446
	Rh. + Rh. F.	26	131	157	33	78	111
	Totals	281	393	674	272	285	557
Mother	Not Rh.	247	255	502	221	199	420
	Rh. + Rh. F.	34	138	172	51	86	137
	Totals	281	393	674	272	285	557

These lead to the following correlations :

Father and Daughter = ·504 ; Father and Son = ·340.
Mother and Daughter = ·454 ; Mother and Son = ·226.

These show that the inclusion of the cases in which the nature of the diagnosis was not put upon record makes no substantial change in the results. We now took the latest material, that for 1913 only, rather sparse, for it covers under 450 children, and grouped as in the last table.

TABLE KK.

		Daughter			Son		
		Not Rheumatic	?Rh. + Rh. + Rh. F.	Totals	Not Rheumatic	?Rh. + Rh. + Rh. F.	Totals
Father	Not Rh.	79	85	164	101	87	188
	Rh. + Rh. F.	7	51	58	9	26	35
	Totals	86	136	222	110	113	223
Mother	Not Rh.	78	92	170	93	84	177
	Rh. + Rh. F.	8	44	52	17	29	46
	Totals	86	136	222	110	113	223

These lead to the following correlations :

Father and Daughter = ·579 ; Father and Son = ·388.
Mother and Daughter = ·485 ; Mother and Son = ·223.

There is a slight increase in three out of the four correlations, but they are in substantial agreement with the last set of tables for all data of the recorded diagnosis period.

We now took the mother and son material, which gives the lowest value of the four parental tables and sought whether different classifications of the recorded diagnoses would modify the result. We first considered as rheumatic all cases having had rheumatic fever, or which were classed as rheumatic by means of at least both heart and growing pains factors ; we omitted all cases with no recorded grounds for diagnosis. The table is now :

TABLE LL.

		Son		
		All the Rest	AB or $AB+$	Totals
Mother	Not Rh.	306	91	397
	Rh. + Rh. F.	82	50	132
	Totals	388	141	529

The correlation is now ·251. It has not substantially changed from ·226.

Next, we considered all cases as rheumatic which showed at least heart trouble, i.e. B or b. The table was:

Table MM.

		Son		
		All the Rest	B, $B+$, b or $b+$	Totals
Mother	Not Rh.	234	163	397
	Rh. + Rh. F.	57	75	132
	Totals	291	238	529

The correlation is now ·229, and again it has not substantially changed from ·226.

It will be seen that little effect is produced whether we include the ? rheumatic with the rheumatic or not-rheumatic. We further tried the effect of halving it between the two; in this table, as we were only dividing into rheumatic and not-rheumatic, the cases with unrecorded reasons for diagnosis were included. We found:

Table NN.

		Son		
		Not Rheumatic + $\frac{1}{2}$ (? Rh.)	Rheumatic + $\frac{1}{2}$ (? Rh.)	Totals
Mother	Not Rh.	261	159	420
	Rh. + Rh. F.	62	75	137
	Totals	323	234	557

The correlation was now ·249, and we may, we think, safely conclude that little danger arises from obscurity in the doubtful cases, ? rheumatic. In order to test this question still further four other tables were worked out.

We turned to parents and daughter and included as rheumatic only those cases where there had been rheumatic fever, or where the diagnosis of rheumatism was based on both factors of heart and growing pains; all other diagnoses and all doubtful rheumatic cases were *excluded* from the table, which contained only definitely rheumatic and not-rheumatic cases. The two resulting tables are given below. We found for the correlations:

Father and Daughter = ·533; Mother and Daughter = ·540.

TABLE OO.

		Father		Mother		
		Not Rheumatic	Rh. + Rh. F.	Not Rheumatic	Rh. + Rh. F.	Totals
Daughter	Not Rh.	240	25	232	33	265
	Rh. F., *AB* or *AB* +	120	65	108	77	185
	Totals	360	90	340	110	450

It is clear that the father and daughter correlation has been somewhat raised (·511 to ·533) and the mother and daughter correlation still more (·469 to ·540). But the changes are of no essential importance and quite fail to effect our judgment of the general goodness of the diagnosis.

We next proceeded in precisely the same way, only we took for rheumatic only those cases where rheumatic fever was reported or where there had been heart trouble (B or $B+$). All other diagnoses and the ? Rh. cases were omitted from the table.

TABLE PP.

		Daughter		
		Not Rheumatic	Rh. F., *B* or *B* +	Totals
Mother	Not Rh.	240	128	368
	Rh. or Rh. F.	25	72	97
	Totals	265	200	465

The correlation of father and daughter was now = ·542.

Lastly we included in our table the ? rheumatic cases with heart trouble (b or $b+$), omitting all other cases.

We now have:

TABLE QQ.

		Daughter		
		Not Rheumatic	Rh. F., *B*, *B* +, *b* or *b* +	Totals
Father	Not Rh.	240	213	453
	Rh. or Rh. F.	25	106	131
	Totals	265	319	584

Here the correlation of father and daughter was = ·501, only slightly below that obtained by working with the whole material divided into the broadest categories.

Thus for various methods of analysing the material for mother and son, we have found the correlations :

·247, ·277, ·226, ·223, ·251, ·229 and ·249.

And for various methods of analysing the material for father and daughter :

·511, ·361*, ·504, ·579, ·533, ·542 and ·501.

We think it must be clear that the exact *nature* of the individual diagnosis has little if any bearing on the resulting correlation. In particular it cannot account for the two observed facts for which we have been seeking an explanation, namely :

(*a*) The resemblance of the daughter to parents being so much closer than that of son.

(*b*) The somewhat divergent values of the correlations obtained from three successive periods of observation.

This is brought out by the following table :

TABLE RR.

Period of Observation	Father and Son	Mother and Son	Father and Daughter	Mother and Daughter	Remarks
1909	·66	·48	·71	·68	See p. 27
1910 to 1912	·38	·35	·40	·36	See p. 29
1912 to 1913	·34	·23	·50	·45	See p. 39
1913 only	·39	·22	·58	·49	See p. 39
Entire Material	·43	·35	·56	·50	See Table SS below

The last line of correlations is deduced from the following totalised tables :

TABLE SS.

		Daughter			Son		
		Not Rheumatic	? Rh. + Rh. + Rh. F.	Totals	Not Rheumatic	? Rh. + Rh. + Rh. F.	Totals
Father	Not Rh.	953	560	1513	613	352	965
	Rh. + Rh. F.	69	248	317	71	149	220
	Totals	1022	808	1830	684	501	1185
Mother	Not Rh.	908	513	1421	583	340	923
	Rh. + Rh. F.	114	295	409	101	161	262
	Totals	1022	808	1830	684	501	1185

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* This is the case where (see p. 37) the ? rheumatic girls were thrown into the non-rheumatic. This does not test the "nature" of the diagnosis, but considers its accuracy and, perhaps, should be omitted.

which lead to the following correlations:

Father and Daughter = ·558; Father and Son = ·429.
Mother and Daughter = ·502; Mother and Son = ·352.

Now it will be clear from the above summary of data, that beginning with a high value of the relationship of parent and child in 1909, we find a minimum value in 1910 and 1911, and that in the case of parent and daughter there has been a tendency to return towards the old higher value since, but this is not so in the case of parent and son. The following percentages of rheumatism observed are also of some interest from this standpoint:

TABLE TT.

	Parents		Offspring	
Period	Mother	Father	Daughter	Son
1909	18·6	13·9	30·8	30·5
1910 to 1912	24·2	19·2	50·5	43·5
1912 to 1913	25·1	21·8	58·3	51·2
1913 only	22·0	20·9	38·7	49·3

It will be seen that the number of persons diagnosed as rheumatic has increased with the time—an exception of any importance occurring only in the case of relatively scanty (222 individuals) data for girls observed in part of 1913. There has undoubtedly been increased care in diagnosis and record, but it is very difficult to explain how the variations found in the correlations have arisen. If we take the mean value for the four series for the entire material, the correlation of parent and offspring for rheumatism is ·460, a value as the table below shows in good agreement with that for other characters, physical, mental and pathological. But this value must not be used to screen the real divergences between parents with son, and parents with daughter, or between observations made at different periods. These may be due to greater reticence as to aches and pains on the part of the boys, or to actually less developed symptoms*; again the meteorological conditions of the period of examination may be influential. These are only suggestions, we have no definite clue at present to the true explanation.

It seems safe to conclude that rheumatism is a markedly hereditary character, quite comparable on the average with other hereditary pathological conditions, but that further standardisation of diagnosis and observation of the conditions under which its symptoms are most manifest (especially in case of boys) are desirable.

The general conclusion undoubtedly is that the rheumatic factor must be largely looked upon as hereditary and not environmental. Even our values must approach

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* This is markedly suggested by the fact that the ?rheumatic category for the boys is clearly not so definitely rheumatic in their case as in the case of the girls (see p. 38). It is possible that the more energetic muscular action of the boys, both at work and at play, may cause some (temporary?) cardiac dilatation, which has been wrongly attributed to the action of the rheumatic toxin.

for heredity the minimum rather than the maximum limit. For the offspring are examined only *once* as children and possibly at an age when the rheumatic symptoms may not be markedly patent (see however Table AAA, p. 49); but the parent is questioned as to the experience of a large number of years. The result is that 5·4 °/₀ of the parents have had rheumatic fever, while under 0·8 °/₀ of children, aged 12 and 13, have had that experience*.

Further, the much larger percentage of children than of parents recorded as rheumatic indicates that the parents must not have noted the "growing pains" and other symptoms of their youth, for it is impossible to suppose that one-half, say, of the rheumatic girls alone survive to become parents, when such girls form 50 °/₀ of the community on the present record. We are thus finally compelled to consider that temperature excess due to rheumatism should be included largely under the hereditary factor, and not under that of environmental influence. The chief argument for this is that the average parental correlation is ·46, and the marital correlation only ·15, one-third of it.

TABLE UU.

	Character	Correlation	Authority	Data
Physical	Stature	·51	Pearson and Lee	Pearson's *F. R.*
	Span	·46	,, ,,	,,
	Forearm	·50	,, ,,	,,
	Eye Colour	·50	Pearson and Heron	*Biometrika*, Vol. IX. p. 242
Psychic	General Intelligence	·58	Pearson	Family Schedules
Pathological	Deaf-Mutism	·54	Schüster	Dr Fay's
	Insanity	·53	Heron	Dr Urquhart's
	,,	·47	Goring	Convict Prisons
	Mortal Phthisis	·50	Pearson	Dr Rivers'
	,, ,,	·50	Goring	Convict Prisons
	Rheumatism	·46	Present Memoir	Dr Williams'

(7) *Consideration of the Hereditary Factor in Puerile Phthisis.* We must now turn to the question of puerile phthisis. Here the inquiry is really most complex, for we are bound to believe that the vast majority of children pass safely through puerile phthisis, and, possibly, only a post-mortem examination would demonstrate that they had ever undergone it.

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* The following information as to deaths from rheumatic fever may be deduced from the 74*th Annual Report of the Registrar-General*, 1911, pp. 4 and 201:

Rheumatic Fever. Death-rates per 100,000 *living, England and Wales.*

Age......	0—5	5—10	10—15	15—20	20—25	25—35	35—45	45—55	55—65	65—75	75—
Male	2·2	5·7	9·0	6·6	4·3	4·4	5·1	5·5	5·8	3·5	3·4
Female	1·7	6·7	10·8	8·0	5·0	4·7	4·9	5·1	6·4	4·9	4·8

The greater liability of girls is thus confirmed, and the double mode, 10—15 and 55—65, is of interest. It is not possible to deduce from these data any statement as to relatively small *incidence* in childhood.

On the other hand the rheumatic state is far more persistent, and while only 3·4 $^{\circ}/_{\circ}$ of the parents of these school children have a record of phthisis, 22·0 $^{\circ}/_{\circ}$ showed rheumatism. Now about 50 $^{\circ}/_{\circ}$ of children show rheumatism, but only 37 $^{\circ}/_{\circ}$ are recorded as phthisical. Thus while the percentage of rheumatic children is double that of rheumatic parents, the percentage of phthisical children is *ten* times that of phthisical parents. Accordingly while rheumatism in the parent has something of the same nature as rheumatism in the child, the bulk of the parental cases of phthisis in the parent must refer to mortal phthisis, while those in the case of the child will refer to puerile phthisis, and while mortal phthisis has been shown[*] to be closely associated in parent and adult offspring—the correlation is about ·5, like the value we have found for rheumatism—there is *a priori* no reason for puerile phthisis in the child being very closely associated with mortal phthisis in the parent[†]. If we find it is so associated, we should anticipate either: (i) that the constitution liable to puerile is also more liable to mortal phthisis, or (ii) that puerile phthisis, being probably of infective origin, it will be more readily incurred where the parent has mortal phthisis.

We may first obtain some measure of the maximum of environmental effect from the following table:

TABLE VV.

		Wife		
		Phthisical	Not Phthisical	Totals
Husband	Phthisical	4	47	51
	Not Phthisical	55	1520	1575
	Totals	59	1567	1626

Tetrachoric r here takes the value ·177 ± ·082. This is very much the value we have found for other cases of assortative mating, and by no means demonstrates that this is necessarily the relationship due to infection. It is only slightly larger than the value ·148 of the correlation for rheumatism between husband and wife, and less than the value ·24 found by Pearson for insanity in husband and wife[‡]. At any rate we are safe in asserting that the maximum value for infection in *adults* cannot exceed the above correlation of ·177, which agrees practically with the value given by Goring for the prosperous poor, ·16[§], and is somewhat less than Pearson's ·24[||] for the middle classes.

In the problem of mortal phthisis, Goring and Pearson have shown that the

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[*] Tuberculosis, Heredity and Environment, *Eugenics Laboratory Lectures Series*, VIII. p. 19. (Dulau and Co., Soho Square.)

[†] Of course some allowance must be made for the reluctance of parents to confess to phthisis. But if we suppose 8 $^{\circ}/_{\circ}$ of the whole population to die of phthisis, that 3·4 $^{\circ}/_{\circ}$ of *parents* of relatively *young* children should have had or be suffering from phthisis does not seem an unreasonably small number.

[‡] Tuberculosis, Heredity and Environment, *Eugenics Laboratory Lectures Series*, VIII. p. 12. (Dulau and Co., Soho Square.)

[§] *Ibid.* p. 15.

[||] *Ibid.* p. 15.

correlation between phthisis in parent and child is about ·50[*], something like three times the value found for the marital correlation. And this may be used as an argument to show that infection by parents is not the chief factor in filial phthisis[†]. When we turn to our school children with 37 °/o recorded as probably affected with puerile phthisis, but only 3·4 °/o of their parents we confirm the view that parental infection cannot be the chief source of puerile phthisis. If we take children of *all ages*, we have the following tables:

TABLE WW. *Phthisis in Parents and Son.*

		Mother			Father	
		Ph.	Not Ph.	Totals	Ph.	Not Ph.
Son, all ages	Ph. + ? Ph.	16	269	285	15	270
	Not Ph.	11	430	441	6	435
	Totals	27	699	726	21	705

TABLE XX. *Phthisis in Parents and Daughter.*

		Mother			Father	
		Ph.	Not Ph.	Totals	Ph.	Not Ph.
Daughter, all ages	Ph. + ? Ph.	26	297	323	13	310
	Not Ph.	6	571	577	17	560
	Totals	32	868	900	30	870

Now these four tables are obviously very irregular. Using tetrachoric r we find for the correlation:

Mother and Son: ·230 ± ·071; Father and Son: ·353 ± ·074[‡].
Mother and Daughter: ·516 ± ·056[‡]; Father and Daughter: ·087 ± ·069.
Mean of four values: ·297.

Thus the values are substantially lower than for the case of rheumatism. At the same time the mean is substantially larger than that for husband and wife (·177), which is the maximum infectivity measure in the case of *adults* of this population.

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[*] Tuberculosis, Heredity and Environment, *Eugenics Laboratory Lectures Series*, VIII. p. 19. (Dulau and Co., Soho Square.)

[†] It must be remembered that the modal age of onset for these cases was 29 for men and 25 for women, so that the subjects were not children, but, like their parents, adults.

[‡] The probable errors were here all found by the long method (*Phil. Trans.* Vol. 195, A, p. 14); found by the short method (*Biometrika*, Vol. IX. p. 22) the values for the two with references to this footnote were ·074 and ·055 respectively.

If we judged by the values above, the mother, on the whole, is more influential than the father, but the father is more influential with the son than the mother is with the son, while the mother is far more influential with the daughter than the father is. The result is that the mean parental correlations of sons (·292) and of daughters (·302) are sensibly equal. Still the individual values are very erratic. If the result were due to infection and the phthisical mother had closer contact than the father with the children, why should the father be more influential than the mother with the son? The difficulties, however, appear to arise largely from the paucity of the tuberculous parent groups. The probable errors given above show how easily the deviations from the mean value ·297 might, except in the case of mother and daughter, have arisen from random sampling.

We now turn to the problem of how far limitation to a special age group, i.e. ages 12 and 13, modifies the correlations. We have the following tables:

TABLE YY. *Parents and Sons, aged* 12 *and* 13.

		Mother			Father	
		Ph.	Not Ph.	Totals	Ph.	Not Ph.
Sons	Ph. + ? Ph.	8	178	186	7	179
	Not Ph.	7	344	351	5	346
	Totals	15	522	537	12	525

TABLE ZZ. *Parents and Daughters, aged* 12 *and* 13.

		Mother			Father	
		Ph.	Not Ph.	Totals	Ph.	Not Ph.
Daughters	Ph. + ? Ph.	11	189	200	9	191
	Not Ph.	4	478	482	15	467
	Totals	15	667	682	24	658

These tables provide the following tetrachoric coefficients:

Mother and Son: ·208; Father and Son: ·252.
Mother and Daughter: ·463; Father and Daughter: ·103.
Mean of four values: ·256.

Thus while the parental and filial relation for rheumatism is practically the same if we take children of all ages or children of 12 and 13 only, that for phthisis is substantially modified when we confine our attention to the *later* ages 12 and 13 To confirm this the fourfold tables for children under 12 were worked out separately with the following results: Father and Son ·377, Mother and Son ·186, Father and Daughter ·116, Mother and Daughter ·482, with the mean value ·290 almost equal to that of all children together. In other words the *younger* children in the matter of puerile phthisis show a closer relationship to their parents than the older. The following table shows the percentages diagnosed as rheumatic and phthisical in each age group. The percentage of normals is also given, the remainder are made up of small percentages suffering from syphilis, tonsils, adenitis, etc.

TABLE AAA. *Percentages.*

Age Groups	Rh. + ? Rh.		Ph. + ? Ph.		Normal	
	Boys	Girls	Boys	Girls	Boys	Girls
4—5	35·2	17·2	60·6	77·6	1·4	5·2
6—7	29·1	21·8	59·8	73·6	6·0	3·6
8—9	42·5	38·2	49·4	48·8	3·4	8·1
10—11	41·8	43·7	44·8	42·0	9·0	11·8
12—13	38·9	47·2	41·1	35·6	19·4	16·8

Looking at the phthisical and ?phthisical column we see that in cases of both boys and girls the percentage of phthisis steadily *decreases*. This might suggest in a marked fashion the recovery from puerile phthisis, and the younger children do show a higher result for the parental relation than the older, because they are more frequently in the stage of puerile phthisis. But these percentages are largely vitiated by the fact that "ages 12—13" include *all* the children, while the younger groups, particularly ages 5—7, include a certain number of "specials," who may to some extent be "specials" for phthisis. On the other hand, while the rheumatic percentages for girls *increase* with age, they do so less steadily in the case of boys. Thus for rheumatism the most cases would be diagnosed at 12 and 13, while for phthisis the fewest. The number of normals in both sexes increases with age. These results will explain some of the differences reached in the previous discussion.

A further point of some interest is the influence on the rheumatic and phthisical categories of the children of both, one, or neither parent being affected. We have the following results for percentages of affected children:

TABLE BBB.

		Both Parents	Father only	Mother only	Neither Parent
Rheumatism	Sons	65·8 °/o	64·8 °/o	60·9 °/o	31·6 °/o
	Daughters ...	76·7	71·8	66·3	38·8
Phthisis	Sons	100·0 [*]	68·4	56·0	37·7
	Daughters	100·0 [*]	39·3	80·0	34·0

It is remarkable how little difference the doubling of the rheumatic parentage makes on the number of children diagnosed as rheumatic. Within the limits of the observational errors there is scarcely any difference between the percentages for both parents rheumatic and the father rheumatic. It seems impossible under such conditions for rheumatism to be of the nature of a Mendelian "recessive." For, if it were, all the offspring of rheumatic parents should be themselves rheumatic, and when a rheumatic parent married a non-rheumatic parent, the percentage of rheumatic offspring should be very much lowered. A little consideration will show that "dominance" in the Mendelian sense is equally impossible for rheumatism[†]. Similar considerations apply to the phthisis percentages, the wide differences between the influences of father and mother on son and daughter, respectively, being here difficult of interpretation. Puerile phthisis is, however, very different from rheumatism, and the marvel is that there is even such a high relation as exists between parent and child, when such large numbers of the children pass through the stage and undoubtedly recover from it.

Although the relation between puerile phthisis in the child and phthisis in the parent is not so marked as in the case of rheumatism, we still see that a certain amount of it is probably due to inheritance of a parental constitution; of course, not all of it can be due to parental infection, because so many children develop it, who have non-phthisical parents. Thus high temperatures—so far as they are associated with puerile phthisis—are not necessarily the result of any physical environment, but most probably arise from a special type of constitution encountering infection either at school or meeting place, or possibly through food (milk), and, perhaps, in a small number of instances, from their parents[‡].

If high temperatures in schools be chiefly due to the prevalence of rheumatic symptoms and of puerile phthisis in the children, and have little relation to the environmental conditions such as we have been able to measure, but are related to phthisis and rheumatism in the parents, then it would appear that the high temperature of a particular school is chiefly a measure:

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[*] Quite unreliable, there were only four children, two boys and two girls, who had both parents phthisical, and of these one boy and one girl were diagnosed as Ph., and one boy and one girl as ? Ph.

[†] Detailed pedigrees for family rheumatism are at present under consideration.

[‡] I.e. the number of infected parents is far too few to account for the very large number of infected children. Even if the infection of puerile phthisis be met outside school—in church or chapel or other place of assembly or again through home or food conditions,—the differentiation of boys and girls of the same neighbourhood at the same school suggests strongly that school conditions influence the response to infection.

(i) of enfeeblement or degeneracy, rather than directly of poverty, in the population of parents from which the school draws its children, and

(ii) of conditions relative to infection in the school itself*.

(8) *On the Exclusive Nature of Rheumatic and Phthisical Characters in Children.* There is a further interesting point with regard to rheumatism and phthisis in children. *No child is affected with both these conditions.* In 1909 Dr Williams noted in her Report that she believed the two diseases did not coexist†. In 1910 she wrote "children with recognisable pulmonary tuberculosis do not appear to suffer from the rheumatic poison. Presumably the two poisons are antagonistic. I do not know whether this antagonism persists in later life, but in children I have no doubt of it‡." In the thousands of children she has now examined, she has never seen a case in which she was certain the two diseases coexisted in an active stage, and only two in regard to which she was doubtful. These two were cases of bronchiectasis in which, if present, tubercle had been added. She considers it also possible that the disease she considered rheumatic in these two cases was a toxaemia due to toxins manufactured in the infected lungs. Recently, as she points out, these observations have been confirmed. In *Medical Diseases of Children* by Dr Miller of the Paddington Green Hospital for Children, published 1911, it is stated that rheumatism and tuberculosis are very seldom found active in the same subject, and there is some evidence to show that the one infection tends to protect against the other. In the *Practitioner* for January, 1912, Sir Dyce Duckworth writes, "one of the most remarkable features of the arthritic diathesis is its resistance to the inroads of tuberculosis.... The bacilli of tuberculosis will not flourish in a rheumatic soil...should they effect a lodgment in the body of an arthritic person, their progress is arrested and the lesion tends to indurate by certification or fibrosis." Accordingly Dr Williams, on the basis of her own observations and of the above definite statements, formulates the principle that in a child rheumatism and pulmonary tuberculosis do not coexist in active form.

We have now to ask how we can consider this matter from the statistical standpoint. It must be remembered that Dr Williams has diagnosed "rheumatism" and "phthisis" on clinical symptoms in a very large percentage of children, and that these diagnoses have invariably been exclusive. Now if they were not really exclusive, but more or less conditions screening each other, we might anticipate that some of the phthisical children might be really "rheumatic" and accordingly, possibly show some relation—of the marked hereditary kind already noticed—with rheumatic parents.

Accordingly we have formed the cross-correlations between rheumatism in parents and "phthisical" diagnosis in children and between phthisis in parents and the "rheumatic" diagnosis in children with the following results.

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* The difference in the percentages of incidence in boys and girls of the same neighbourhood render it difficult to assert that the bulk of cases are due to home infection.

† "Report for 1909 of School Medical Officer for Worcestershire."

‡ Ibid. 1910.

Table CCC.

		Mother			Father	
		Rh. F. + Rh.	Not Rh.	Totals	Rh. F. + Rh.	Not Rh.
Sons, all ages	Ph. + ? Ph.	47	238	285	38	247
	Not Ph.	124	317	441	105	336
	Totals	171	555	726	143	583
Daughters, all ages	Ph. + ? Ph.	50	273	323	37	286
	Not Ph.	176	401	577	133	444
	Totals	226	674	900	170	730

Table DDD.

		Mother			Father	
		Ph.	Not Ph.	Totals	Ph.	Not Ph.
Sons, all ages	Rh. F. + Rh. + ? Rh.	11	305	316	2	314
	Not Rh.	16	394	410	19	391
	Totals	27	699	726	21	705
Daughters, all ages	Rh. F. + Rh. + ? Rh.	6	448	454	13	441
	Not Rh.	26	420	446	17	429
	Totals	32	868	900	30	870

The eight tetrachoric r's were then worked for these eight fourfold tables with the results given below. The cross-correlations for rheumatism in parent and phthisical diagnosis in child and for phthisis in parent and rheumatic diagnosis in child were as follows:

With	Rheumatism in Mother	Rheumatism in Father
Phthisis in Son:	−·239	−·241
Phthisis in Daughter:	−·300	−·276
With	**Phthisis in Mother**	**Phthisis in Father**
Rheumatism in Son:	−·033	−·450
Rheumatism in Daughter:	−·381	−·080

Those for rheumatism in the parent and phthisis in the child are all fairly uniform about the mean value −·264. They show the remarkable law that rheumatism in the parent protects the child from phthisis in quite a sensible degree. Again the correlations of phthisis in the parent with rheumatism in the child are all negative with a mean − ·236, but they are more erratic than in the previous case, and would seem to indicate that phthisis in the mother protects the daughter from rheumatism far better than the son, while phthisis in the father protects the son from rheumatism far better than it protects the daughter.

However, the tables as a whole show the direction of the relations we should expect if rheumatism and phthisis be exclusive and both in a considerable measure hereditary.

(9) *On Further Relations of Height, Weight and Age to Temperature.* We have already shown that for children of age 12 the correlations of height and weight with temperature are insignificant. These results would appear to indicate that temperature is largely controlled by other factors than physical condition, assuming that height and weight may fairly be taken as some measure of physique.

We have endeavoured to verify this result by approaching the problem from a different standpoint, namely by finding the *partial* correlation of temperature and height, and temperature and weight for a constant age. This involves the interesting problem of the relationship of temperature to age. But the general problem of these partial coefficients is far more complicated than appears at first sight.

We find ourselves up against a difficulty which is likely to have growing seriousness with the present system of school inspection: namely the examination of "entrants" and "leavers" only. The result is that in every school investigation now made we do not obtain a random sample of the school population, but a sample in which children of 12 and 13, the "leavers," are immensely exaggerated*. We obtain in fact a bimodal distribution with modes at 6 and 12 years. The regression line of temperature on age will not be modified by this selection, except in so far as the reduction in numbers in many of the arrays corresponding to given ages reduces the value of their means. But if we want the correlation of age with any character it is obvious that the influence of selection will have to be allowed for. In order to do this we need the standard deviations of age in the true school population and in what we will term for want of a better name the E. O. Selection, as this selection is enforced by the Education Office regulations.

We will illustrate first the nature of this selection on our temperature data. We obtained the actual age distributions of the children in the schools examined, and they are given in the following table where of course the "entrants" have not come fully to Dr Williams:

TABLE EEE.

	Ages	3—4	4—5	5—6	6—7	7—8	8—9	9—10	10—11	11—12	12—13	13—14	14—15	Totals
Boys	Actual	158	470	829	967	989	1043	1047	990	1101	999	502	55	9150
	E. O. Selection	2	7	60	90	74	70	67	51	65	1315	200	4	2005
Girls	Actual	135	372	807	1023	929	924	1029	981	986	945	646	48	8825
	E. O. Selection	1	10	57	71	78	86	108	94	126	1705	310	3	2649

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* The system has many other disadvantages; there is not only a further piling up of "entrants" at

It must of course be remembered that the E. O. Selections are the result of several years' observing, while the actual population is that at a given instant (Jan. 31, 1913). Further, any child observed twice has been recorded twice, once at each age.

Now let m_a, m_t, σ_a, σ_t, r_{at} be the means, standard deviations and correlation coefficient for age and temperature in the actual school population, and let dashed letters measure the same quantities in the E. O. Selection as observed. Then we have no knowledge of m_t, σ_t and r_{at}, but we can find m_a and σ_a. We know m'_a, σ'_a, m'_t, σ'_t and r'_{at}. Since the regression line is constant, we have for its slope

$$r_{at}\sigma_t/\sigma_a = r'_{at}\sigma'_t/\sigma'_a = R_{at} \text{ say}.$$

Further, assuming the distribution homoscedastic, the standard deviation of any array will be $\sigma_t\sqrt{1-r^2_{at}}$, and this will be best found from the over-represented array of children at age 12, i.e.

$$\Sigma_{(12)} = \sigma_t\sqrt{1-r^2_{at}}.$$

Hence

$$r_{at}\,\Sigma_{(12)}/\sigma_a = R_{at}\sqrt{1-r^2_{at}},$$

or,

$$\frac{r^2_{at}}{1-r^2_{at}} = r'^2_{at}\frac{\sigma^2_a}{\sigma'^2_a}\frac{\sigma'^2_t}{\Sigma^2_{(12)}},$$

whence

$$r_{at} = \sqrt{\frac{r'^2_{at}\dfrac{\sigma^2_a}{\sigma'^2_a}\dfrac{\sigma'^2_t}{\Sigma^2_{(12)}}}{1+r'^2_{at}\dfrac{\sigma^2_a}{\sigma'^2_a}\dfrac{\sigma'^2_t}{\Sigma^2_{(12)}}}},$$

$$= r'_{at}\Big/\sqrt{r'^2_{at}+\frac{\sigma'^2_a}{\sigma^2_a}\frac{\Sigma^2_{(12)}}{\sigma'^2_t}}.$$

Thus r_{at} can be found. Then we have

$$\sigma_t = \Sigma_{(12)}/\sqrt{1-r^2_{at}}.$$

Further, the regression line is unchanged, or, since this is

$$t - m'_t = \frac{r'_{at}\sigma'_t}{\sigma'_a}(a - m'_a),$$

if we put $a = m_a$, it follows that t will be m_t. Thus

$$m_t = m'_t + \frac{r'_{at}\sigma'_t}{\sigma'_a}(m_a - m'_a)$$

gives us the mean temperature of the actual school population of all ages.

It will be clear that, if we deal with height or weight instead of temperature, we can find the true correlation of age and these characters in the same manner. Table FFF below gives the constants for both boys and girls for temperature, weight, height and ages. Tables XXXIV—XXXVI, XLI—XLII, XLIX—LI and LVI—LVII give the corresponding correlation tables*. As before, a and t refer to age and temperature; w and h refer to weight and height.

ages 6 to 8, but the children at intervening ages—few in number—are far from a random sample of the normal child. It is becoming more and more difficult to measure the effect of growth on any character in school children.

* The populations available were not of the same size for each correlation table.

TABLE FFF.

Boys				Girls			
E. O. Selection		Actual Population		E. O. Selection		Actual Population	
m'_t	99·558	m_t	99·660 *	m'_t	99·660	m_t	99·749 *
m'_a	11·580	m_a	9·056	m'_a	11·756	m_a	9·145
σ'_t	·5198	σ_t	·5265 *	σ'_t	·4994	σ_t	·5020 *
σ'_a	2·1169	σ_a	2·6782	σ'_a	1·8944	σ_a	2·6938
r'_{at}	− ·1645	r_{at}	− ·2055 *	r'_{at}	− ·1287	r_{at}	− ·1821 *
$_t\Sigma_{(12)}$	·5153	—	—	$_t\Sigma_{(12)}$	·4936	—	—
m'_w	67·618	m_w	55·452 *	m'_w	68·518	m_w	54·858 *
m'_a	11·587	m_a	9·056	m'_a	11·672	m_a	9·145
σ'_w	13·7152	σ_w	16·0105 *	σ'_w	15·0512	σ_w	18·3400 *
σ'_a	2·1674	σ_a	2·6782	σ'_a	1·9899	σ_a	2·6938
r'_{aw}	·7596	r_{aw}	·8041 *	r'_{aw}	·7147	r_{aw}	·7940 *
$_w\Sigma_{(12)}$	9·5192	—	—	$_w\Sigma_{(12)}$	11·1500	—	—
m'_h	53·403	m_h	48·587 *	m'_h	53·549	m_h	48·232 *
m'_a	11·593	m_a	9·056	m'_a	11·673	m_a	9·145
σ'_h	4·9226	σ_h	5·7612 *	σ'_h	5·1758	σ_h	6·4557 *
σ'_a	2·1639	σ_a	2·6782	σ'_a	1·9891	σ_a	2·6938
r'_{ah}	·8345	r_{ah}	·8825 *	r'_{ah}	·8083	r_{ah}	·8776 *
$_h\Sigma_{(12)}$	2·7097	—	—	$_h\Sigma_{(12)}$	3·0946	—	—

Temperatures are in degrees, weights in lbs. and heights in inches. It is needful to repeat the age constants as heights and weights were not taken in every case on the same children for whom temperatures were taken.

Values with an asterisk attached are deduced, not observed values.

It will be obvious at once from these returns how little knowledge can be safely gained from the E. O. Selection until the values have been corrected. But what is so manifest here in matters of weight and height, which we all know change with growth, is far less recognised when returns are made to the Education Office of the percentages of children with bad sight, teeth, etc., etc. Unless corrections are made for the E. O. Selection or the data directly limited to children of age 12, we are very liable to obtain quite erroneous impressions of the conditions of the general school population of the country.

We have now found the corrected values of the correlations between age on the one hand and temperature, weight and height. We must now proceed to correct the values of r'_{tw} and r'_{th} for the E. O. Selection, so that we may obtain the true relations between temperature and weight and height for the general school population. This again involves an important general proposition; for example, suppose we desired from an E. O. Selection in which the weights and number of carious teeth were taken to determine the influence of bad teeth on weight. We should require the partial correlation coefficient of weight and number of bad teeth for a constant age. Here both weight and number of bad teeth have already been submitted to the E. O. Selection. Our first step must be to determine the correlation of weight and number of carious teeth corrected for this selection. The fundamental formula for the influence of the selection of a character 1 on the correlation of characters 2 and 3 is*

$$\rho_{23} = \frac{r_{23} - \mu_1 r_{13} r_{12}}{\sqrt{1 - \mu_1 r^2_{12}}\sqrt{1 - \mu_1 r^2_{13}}},$$

where $\mu_1 = 1 - s^2_1/\sigma^2_1$,

s_1 being the standard deviation after selection.

Hence if ρ_{23} be given and r_{23} be the quantity to be found

$$r_{23} = \mu_1 r_{13} r_{12} + \rho_{23}\sqrt{1 - \mu_1 r^2_{12}}\sqrt{1 - \mu_1 r^2_{13}}.$$

In the case of temperature and weight, say, this runs

$$r_{tw} = \mu_a r_{at} r_{aw} + r'_{tw}\sqrt{1 - \mu_a r^2_{at}}\sqrt{1 - \mu_a r^2_{aw}}.$$

Here r_{at} and r_{aw} are the corrected values of r'_{at} and r'_{aw} for the E. O. Selection already found, and r'_{tw} is the correlation in that selected population of temperature and weight. Further μ_a is equal to $1 - \sigma'^2_a/\sigma^2_a$, where σ'_a is the standard deviation of ages of the population for which temperature and height are exactly determined in the E. O. Selection, and σ_a is the standard deviation of ages in the actual population.

The following table gives the requisite data:

TABLE GGG.

Boys	Girls
$\sigma'^2_a = 4{\cdot}2573$, $\sigma^2_a = 7{\cdot}1726$,	$\sigma'^2_a = 3{\cdot}6498$, $\sigma^2_a = 7{\cdot}2561$,
$\mu_a = {\cdot}40645$,	$\mu_a = {\cdot}49700$,
$r'_{at} = -{\cdot}1645$, $r_{at} = -{\cdot}2055$,	$r'_{at} = -{\cdot}1287$, $r_{at} = -{\cdot}1821$,
$r'_{aw} = +{\cdot}7596$, $r_{aw} = +{\cdot}8041$,	$r'_{aw} = +{\cdot}7147$, $r_{aw} = +{\cdot}7940$,
$r'_{ah} = +{\cdot}8345$, $r_{ah} = +{\cdot}8825$,	$r'_{ah} = +{\cdot}8083$, $r_{ah} = +{\cdot}8776$,
$r'_{wt} = -{\cdot}1560$, $r_{wt} = -{\cdot}1999$,	$r'_{wt} = -{\cdot}1051$, $r_{wt} = -{\cdot}1582$,
$r'_{ht} = -{\cdot}1439$, $r_{ht} = -{\cdot}1917$,	$r'_{ht} = -{\cdot}0902$, $r_{ht} = -{\cdot}1497$,
${}_a\rho_{wt} = -{\cdot}0597$,	${}_a\rho_{wt} = -{\cdot}0228$,
${}_a\rho_{ht} = -{\cdot}0224$.	${}_a\rho_{ht} = +{\cdot}0214$.

We may compare these values for the partial correlations of weight and height with temperature for constant age, with those actually obtained at age 12 or ${}_{(12)}\rho_{wt}$ and ${}_{(12)}\rho_{ht}$. We find

Boys	Girls
${}_{(12)}\rho_{wt} = -{\cdot}0467 \pm {\cdot}0202$	${}_{(12)}\rho_{wt} = -{\cdot}0739 \pm {\cdot}0190$
${}_{(12)}\rho_{ht} = -{\cdot}0175 \pm {\cdot}0207$	${}_{(12)}\rho_{ht} = -{\cdot}0685 \pm {\cdot}0190$

Although these numbers are not in absolute agreement with the partial coefficients from the complete data, they are sufficiently similar to confirm the view that body-temperature has for constant age very little relation to either height or weight.

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* Pearson: "The Influence of Selection on the Variability and Correlation of Organs," *Phil. Trans.* Vol. cc. A, p. 25.

A similar investigation can be made of the correlation between weight and height for the same age; proceeding in exactly the same manner we find:

Boys: $(\sigma'^2_a = 4\cdot 6822)$

$$r'_{hw} = \cdot 9017, \quad r_{hw} = \cdot 9247$$
$${}_a\rho_{hw} = \cdot 7691 \pm \cdot 0068$$
$${}_{(12)}\rho_{hw} = + \cdot 7732 \pm \cdot 0081$$

Girls: $(\sigma'^2_a = 3\cdot 9566)$

$$r'_{hw} = \cdot 8664, \quad r_{hw} = \cdot 9067$$
$${}_a\rho_{hw} = \cdot 7203 \pm \cdot 0074$$
$${}_{(12)}\rho_{hw} = + \cdot 7698 \pm \cdot 0076$$

The partial correlation of height and weight for boys of constant age derived from all ages is in good agreement with that obtained from age 12 only; the partial correlation of height and weight for girls of constant age, derived from all ages, is in less good agreement with that obtained from age 12 only. But it is in keeping with the lower values found for girls of the correlation of height and weight for constant age: see p. 60.

(10) *Comparison of Elementary School Data with Data obtained from Upper Middle Class Schools, and from Older Children.* The main points we have discussed are (i) the relation of temperature to height and weight for this additional material, (ii) the relation of height and weight to age, and then two environmental questions, (iii) whether the nature of the "house" in the particular school, involving a difference of environment and feeding, influences to any extent the temperatures of the children in that house, (iv) whether the nature of the home from which the children come has any influence on their individual temperature.

(i) *The Relation of Temperature to Height and Weight.*

In our present cases all the children in the schools dealt with were examined. There is accordingly no E. O. form of selection. The numbers concerned are very small and it is not possible to compare the general partial coefficient of correlation found with the actual value worked out for a given age. We find the following result:

TABLE HHH. *Temperature and Weight for Constant Age Partial Correlation Coefficients.*

School	Boys		Girls	
	Correlation	Regression	Correlation	Regression
Worcestershire Primary Schools	$^*-\cdot 0597 \pm \cdot 0172$	$T = 100\cdot 650 - \cdot 0249\,a - \cdot 0032\,w$	$^*-\cdot 0228 \pm \cdot 0158$	$T = 100\cdot 065 - \cdot 0285\,a - \cdot 0010\,w$
Royal Soldiers' Daughters' Home	—	—	$-\cdot 1642 \pm \cdot 0532$	$T = 99\cdot 368 - \cdot 0291\,a - \cdot 0079\,w$
St Leonards School	—	—	$-\cdot 0764 \pm \cdot 0438$	$T = 99\cdot 894 - \cdot 0101\,a - \cdot 0027\,w$
St Katharine's School	—	—	$-\cdot 1983 \pm \cdot 0810$	—
St Leonards and St Katharine's	—	—	$-\cdot 1899 \pm \cdot 0377$	$T = 99\cdot 748 - \cdot 0446\,a - \cdot 0052\,w$
Charterhouse, Godalming	$-\cdot 0471 \pm \cdot 0308$	$T = 98\cdot 913 - \cdot 0379\,a - \cdot 0017\,w$	—	—

* Values for age 12 only are: Boys $-\cdot 0467 \pm \cdot 0202$ and Girls $-\cdot 0739 \pm \cdot 0190$.

It will be clear from this table that, for correlation, the boys of the Worcestershire primary schools give the same result as those of Charterhouse. For the girls the Soldiers' Daughters agree fairly closely with those of St Andrews, but they appear to differ very considerably from the girls of the Worcestershire primary schools. The real source, however, of this difference lies, we believe, in the much larger range of ages. In the Soldiers' Daughters' Home we have girls from 6 to 16. The big girls' public school at St Andrews consists of St Leonards for the older girls, 13—19, and St Katharine's, the preparatory school, for girls, 5—14. When we take one of these schools only, St Leonards, the correlation drops to $-{\cdot}0764 \pm {\cdot}0438$ which is very close indeed to the value found, $-{\cdot}0739 \pm {\cdot}0190$, for the temperature and weight correlation of the Worcestershire girls aged 12. On the whole there is no reason for supposing any marked difference in correlation of weight and temperature between the boys of the working and those of the professional classes. In the case of the girls, those of the higher class schools do seem to show a higher correlation of weight and temperature; possible causes of this difference are better exercise and lower percentage of pathological cases. In both cases, if we confine our attention to the ranges 4 to 14 or 13 to 19, the correlations found are not of much importance.

The regression equations show us that, whereas a year of age makes on an average a reduction of ·029° in the temperature, a pound in weight only makes a reduction of ·0036°, but the annual growth is about 5 lbs. to 7 lbs. Hence weight has slightly less influence than age on temperature.

It is as well also to look at the matter from the inverse aspect, namely, when we consider weight as a function of age and temperature. Here the equations are:

$$\text{Boys}\begin{cases}\text{Worcestershire:} & w = 122{\cdot}281 + 4{\cdot}7447a - 1{\cdot}1017t\\ \text{Charterhouse:} & w = 88{\cdot}021 + 10{\cdot}3885a - 1{\cdot}3351t\end{cases}$$

$$\text{Girls}\begin{cases}\text{Worcestershire:} & w = 56{\cdot}843 + 5{\cdot}3883a - {\cdot}5139t\\ \text{Soldiers' Daughters':} & w = 317{\cdot}141 + 8{\cdot}1019a - 3{\cdot}3856t\\ \text{St Leonards} & w = 255{\cdot}350 + 5{\cdot}1322a - 2{\cdot}1696t\\ \text{St Andrews} & w = 712{\cdot}560 + 5{\cdot}8124a - 6{\cdot}9559t\end{cases}$$

Or, a year of age makes a difference of 5 to 10 lbs. in weight, and a degree of temperature only 0·5 to 7 lbs. difference. The total annual fall of temperature is, however, only ·02 to ·07 of a degree[*].

The general conclusion is, as before, that the influence of temperature on physical characters is not large.

Turning now to stature we have the following results:

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[*] All the equations show that for constant age, increased temperature means reduced weight, but the extent of reduction is largely peculiar to class, school and sex.

TABLE III. *Temperature and Height for Constant Age Partial Correlation Coefficients.*

School	Boys		Girls	
	Correlation	Regression	Correlation	Regression
Worcestershire Primary Schools	$-\cdot 0224 \pm \cdot 0172$	$t = 100\cdot 158 - \cdot 0323\,a - \cdot 0043\,h$	$+\cdot 0214 \pm \cdot 0158$	$t = 99\cdot 960 - \cdot 0411\,a + \cdot 0034\,h$
Royal Soldiers' Daughters' Home	—	—	$-\cdot 2394 \pm \cdot 0516$	$t = 100\cdot 923 + \cdot 0519\,a - \cdot 0460\,h$
St Katharine's School	—	—	$-\cdot 0589 \pm \cdot 0840$	—
St Leonards School	—	—	$-\cdot 1274 \pm \cdot 0434$	$t = 100\cdot 370 - \cdot 0034\,a - \cdot 0299\,h$
St Leonards and St Katharine's	—	—	$-\cdot 1595 \pm \cdot 0381$	$t = 100\cdot 908 - \cdot 0279\,a - \cdot 0320\,h$
Charterhouse, Godalming	$-\cdot 0455 \pm \cdot 0305$	$t = 99\cdot 364 - \cdot 0410\,a - \cdot 0090\,h$	—	—

It will be seen that while the Charterhouse boys agree fairly with those of the Worcestershire primary schools in indicating no significant relation between temperature and stature, the girls of the Soldiers' Daughters' Home and St Leonards show sensible correlations, although not of a very marked kind, while the girls in the Worcestershire primary schools exhibit little correlation. It must be remembered, however, that St Leonards and the Soldiers' Daughters' Home have many girls far beyond the ages of those in the primary schools, and it seemed desirable to test whether the difference noted was in any way due to this age difference. It could not be the result of a class difference, because the children in the Worcestershire primary schools must approach nearer to those in the Soldiers' Daughters' Home than do the St Leonards girls. Accordingly, although the data are very insufficient, the correlation of height and temperature, for constant age, of the 64 girls in St Katharine's, who range from 5 to 14 years, was separately determined to compare with the Worcestershire girls, who are more nearly of the same ages. The resulting value was $-\cdot 0589$, much closer to the Worcestershire value.

For the Worcestershire children we find:

$$\text{Boys:}\quad h = 43\cdot 167 + 1\cdot 8936a - \cdot 1177t$$
$$\text{Girls:}\quad h = 15\cdot 558 + 2\cdot 1076a + \cdot 1343t$$

Thus in boys for the same age, the stature is less for an increase of temperature, but for girls it is greater. This point wants working out with more ample material at the younger ages. It should be taken in conjunction with the fact that the boys' schools with increasing temperature showed (p. 24) increasing percentages of pathological conditions, but this result was much less marked in the girls' schools (p. 25). The possible association of this with temperature variations due to oncoming puberty in the case of the girls has been mentioned on p. 26. This may also influence those schools with older children on p. 61, in which for a given stature there is increased weight with age.

If t be temperature, h = height, w = weight and a = age, then the following are the constants for St Katharine's:

$$m_t = 98{\cdot}850^\circ, \quad m_h = 55{\cdot}814 \text{ inches}, \quad m_w = 78{\cdot}100 \text{ lbs.}, \quad m_a = 10{\cdot}973 \text{ yrs.},$$
$$\sigma_t = {\cdot}6586^\circ, \quad \sigma_h = 5{\cdot}5579 \text{ inches}, \quad \sigma_w = 21{\cdot}1743 \text{ lbs.}, \quad \sigma_a = 27{\cdot}5625 \text{ months},$$
$$r_{at} = -{\cdot}3238, \quad r_{ah} = +{\cdot}8909, \quad r_{aw} = +{\cdot}7629, \quad r_{th} = -{\cdot}3138,$$
$$r_{tw} = -{\cdot}3683, \quad {}_ar_{th} = -{\cdot}0589, \quad {}_ar_{tw} = -{\cdot}1983.$$

(ii) *Relation of Height and Weight to Age in the two Classes of Schools.* The following correlations were obtained:

TABLE JJJ.

School	Sex	Weight with Age	Height with Age	Height with Weight	Height with Weight for Constant Age
Worcestershire...	♂	·8041 ± ·0059	·8825 ± ·0037	·9247 ± ·0024	·7691 ± ·0068
Charterhouse ...	♂	·6785 ± ·0166	·6162 ± ·0189	·8577 ± ·0082	·7598 ± ·0130
Worcestershire...	♀	·7940 ± ·0057	·8776 ± ·0035	·9067 ± ·0027	·7203 ± ·0074
R. S. D. Home...	♀	·9027 ± ·0101	·8887 ± ·0115	·9405 ± ·0063	·7518 ± ·0238
St Andrews	♀	·6476 ± ·0227	·8361 ± ·0118	·8517 ± ·0107	·7422 ± ·0175
St Leonards	♀	·4478 ± ·0352	·4065 ± ·0368	·5411 ± ·0312	·4395 ± ·0356
St Katharine's ...	♀	·7629 ± ·0352	·8909 ± ·0174	·8747 ± ·0198	·6981 ± ·0432

The Worcestershire results for boys' and girls' height and weight with age are in close agreement with each other. Both of course are the values corrected for the E. O. form of selection. The partial correlations of height with weight for constant age are also in good agreement, with the one exception of St Leonards. The Worcestershire children's correlations, found from all ages and corrected for selection as in the above table, agree well with the direct value for boys, less well with that for girls, i.e.

Boys: ·7732 ± ·0081, Girls: ·7698 ± ·0076,

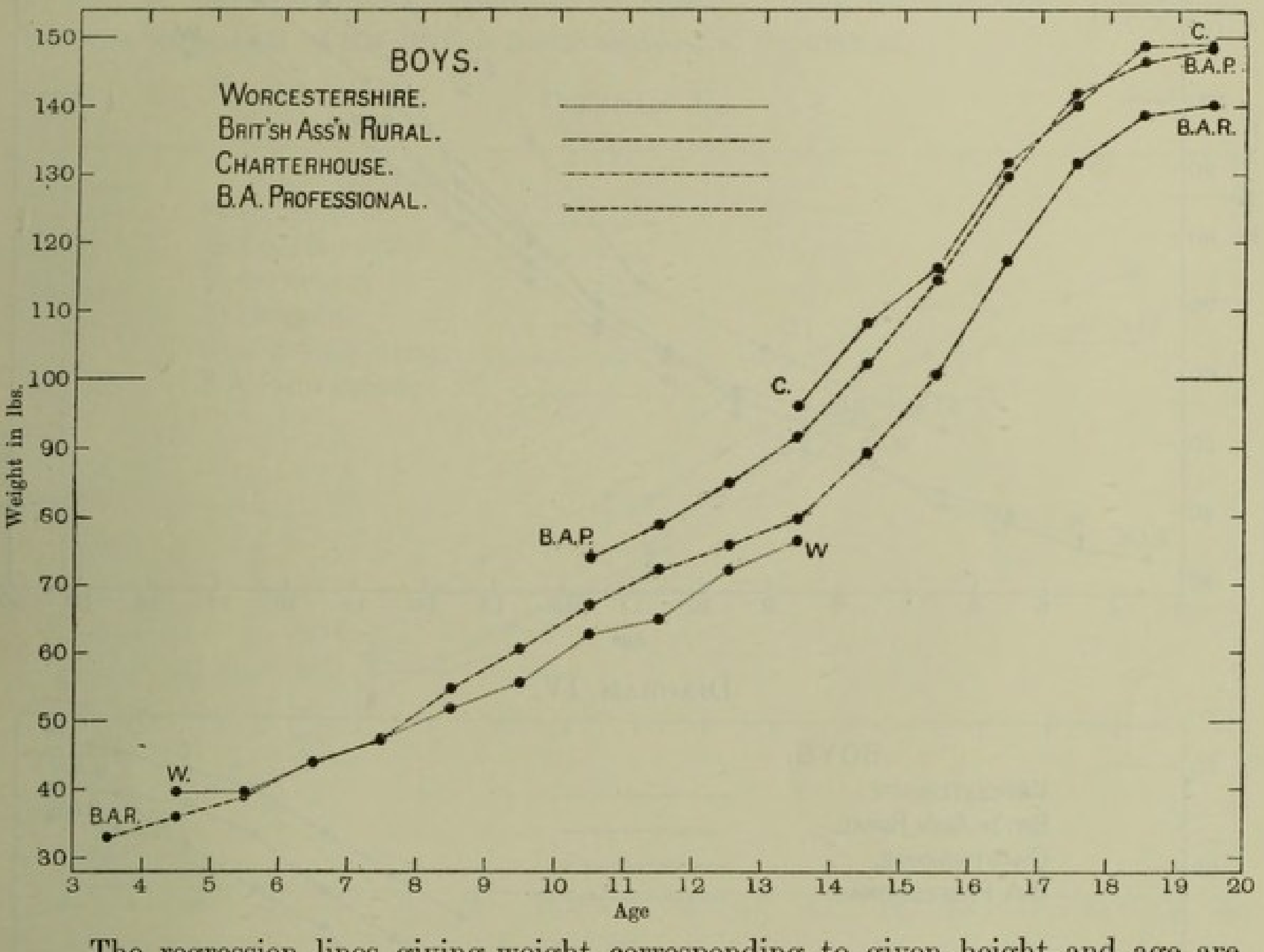
found for the correlation of height and weight at age 12.

The source of the low values found throughout for St Leonards can only be very partially explained on the basis of the older ages of these girls (13—18). We notice that Charterhouse (ages 13—19) gives relatively low values for weight and height with age. Also if we throw St Katharine's in with St Leonards, so as to get a range of ages 5—18 ("St Andrews"), we much raise our correlations, although that of weight with age still remains low. But the height and weight for constant age correlation does not as in other cases approach to the usual value. The whole difficulty seems to lie in the very unusual correlation for height and weight of the

St Leonards girls. Table LXXVI shows how remarkable is the "scatter" of each array in this case. Part of the result is undoubtedly due to the greater age-concentration, but we hold that there is undoubtedly some other factor at work, which we have failed to unriddle.

Generally, we think, the conclusion can be drawn that the correlation of height and weight for children of the like ages is not sensibly modified by social differences, which connote considerable environmental differences.

Diagram II.



The regression lines giving weight corresponding to given height and age are as follows:

Worcestershire Boys: $w = -\ 72{\cdot}952 -\ {\cdot}3204a + 2{\cdot}7025h$
Charterhouse Boys: $w = -222{\cdot}413 + 3{\cdot}7288a + 4{\cdot}2712h$
Worcestershire Girls: $w = -\ 69{\cdot}827 -\ {\cdot}0503a + 2{\cdot}5946h$
Soldiers' Daughters: $w = -104{\cdot}345 + 2{\cdot}8999a + 2{\cdot}7836h$
St Andrews Girls: $w = -195{\cdot}277 - 2{\cdot}1019a + 5{\cdot}4531h$
St Leonards Girls: $w = -114{\cdot}433 + 3{\cdot}1592a + 2{\cdot}9246h$

Three out of the six equations, involving young children, show that for a given height the weight is less when the age is greater. We have at present a very long series of heights, weights and ages in hand dealing further with this point.

Diagram III.

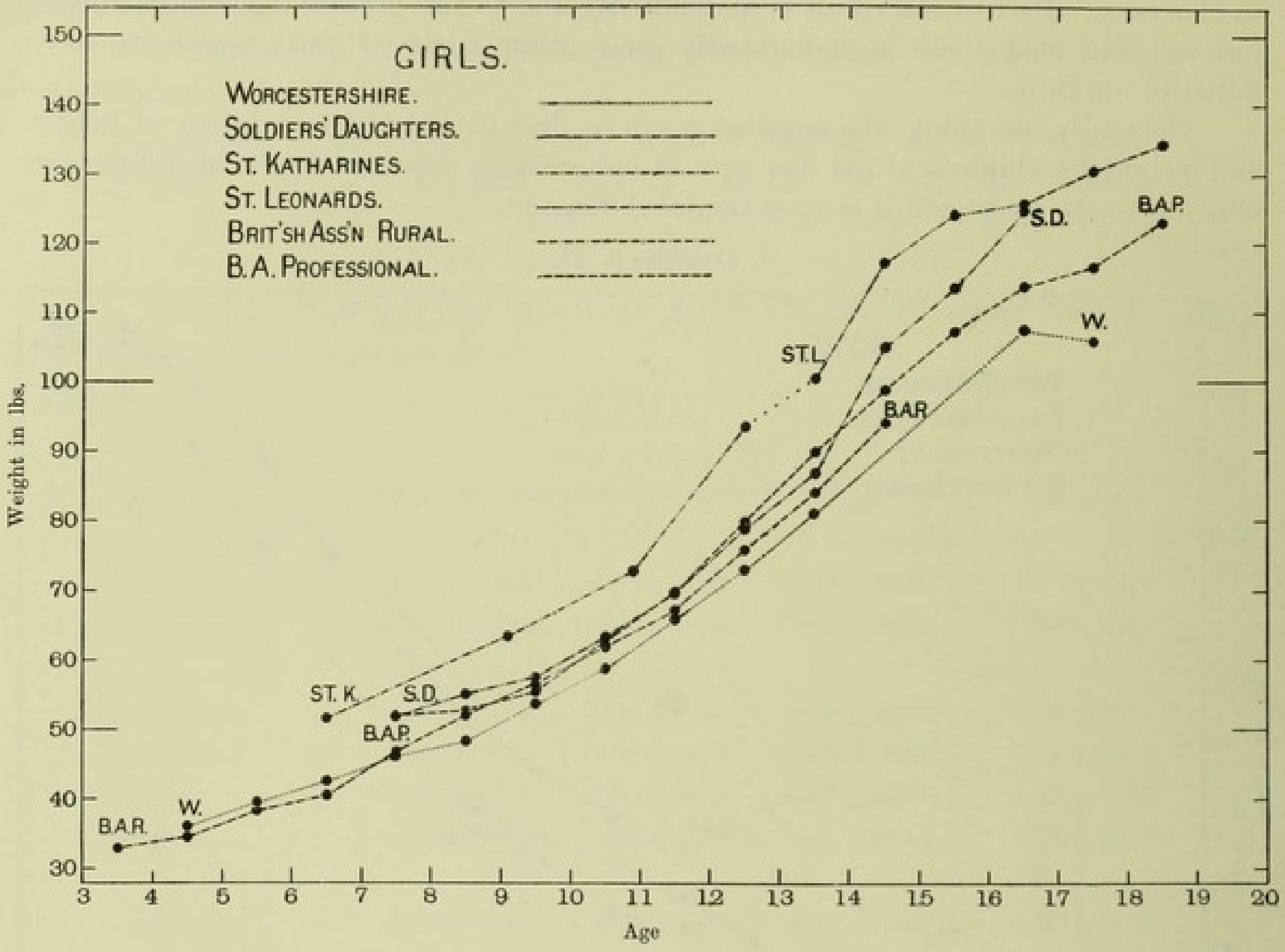
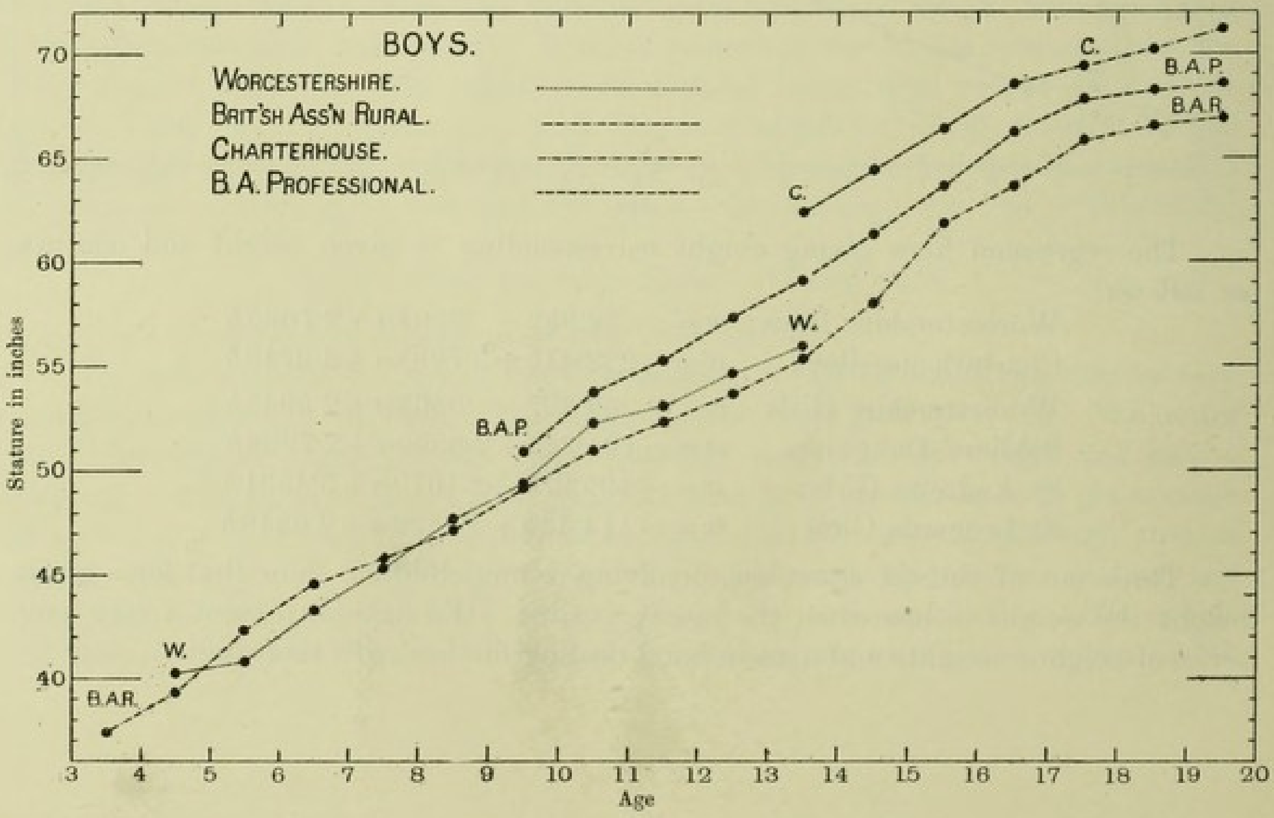


Diagram IV.



Diagrams II—V show the weight and height plotted to age of the different classes of school.

In Diagram III the polygons give respectively the weight (*a*) of the Worcestershire girls, (*b*) of the Soldiers' Daughters, (*c*) of the British Association measurements* of the Labouring Classes in the country, (*d*) of the St Andrews girls plotted to their ages, and (*e*) British Association Professional Classes*.

It will be seen that the standard of the Professional Classes in Great Britain of 30 years ago appears much below that of the St Leonards girls and is much closer to that of the Institution Population of to-day. The Worcestershire population remains below that of the British Association rural population.

DIAGRAM V.

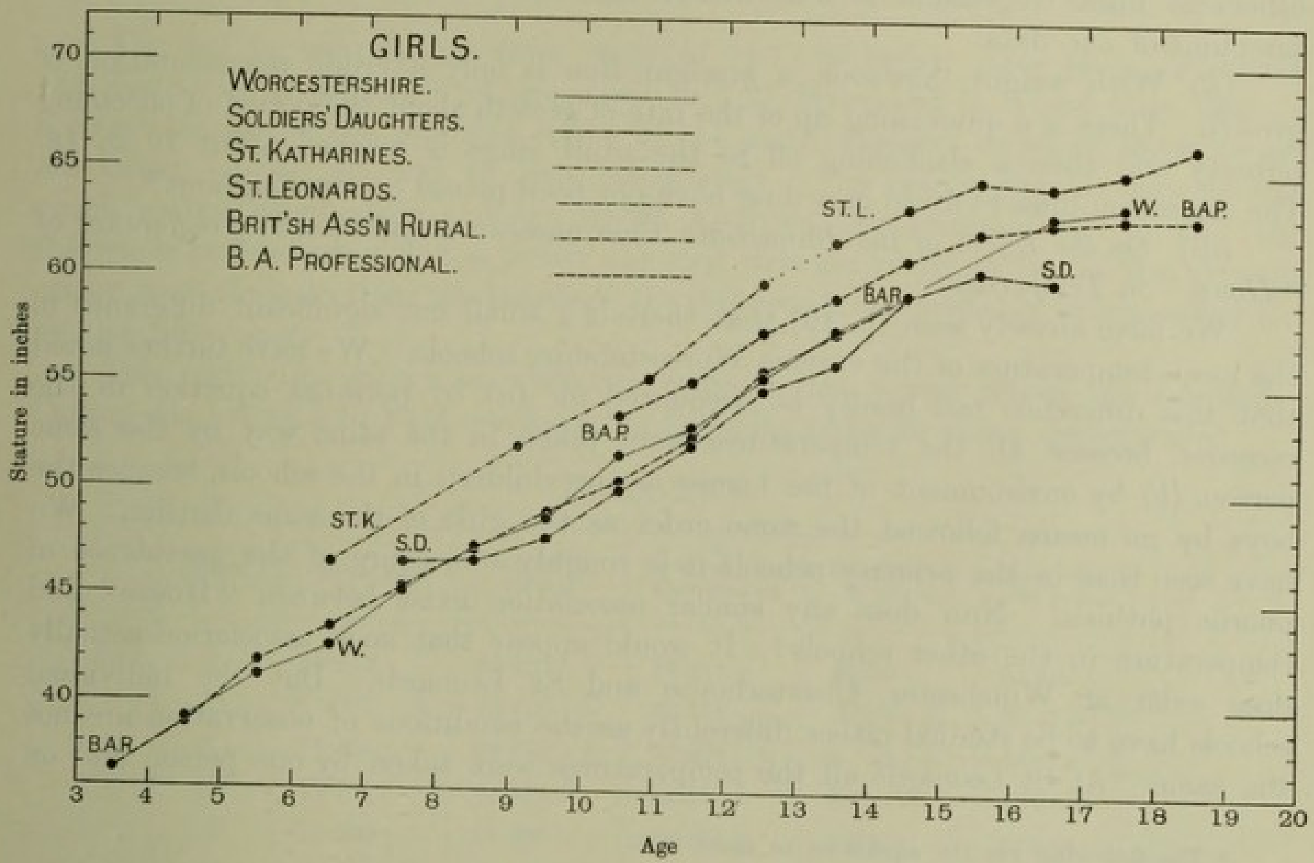


Diagram V gives graphs of the same children's heights plotted to their ages. Here the same difference between the St Leonards girls and the British Association Professional Classes is observable. But for stature the British Association Rural Population and the Worcestershire girls run close together. On the other hand the Soldiers' Daughters are defective in stature. We might suggest that, as many come from poor or bad homes, they are short by inheritance but heavy by good feeding compared with the non-institutional children.

Diagram II shows the weights plotted to age of (*a*) the Worcestershire boys, (*b*) the children of the Country Labouring Classes taken from the British Association

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* See B. A. *Report*, 1883, pp. 38—41.

measurements, (*c*) the Professional Classes taken from the British Association measurements, and (*d*) Charterhouse boys. Again we see that Charterhouse or modern professional class boys are somewhat above the professional class standard of 1883, but not nearly so much as in the case of the girls, while the British Association rural classes stand above the Worcestershire boys for weight.

Diagram IV gives graphs of the same boys' heights plotted to their ages. Here Charterhouse for height stands well above the 1883 professional class boys and the Worcestershire boys beyond the age of 8 somewhat above the British Association rural classes. We conclude that:

(α) While growth in height is fairly linear, this is not true of weight. When growth begins to cease at 17—18 years, then the height graphs begin to flatten; otherwise linear regression is well within the limits of variation due to random-sampling of our data.

(β) With weight, however, a straight line is only a crude representation of growth. There is a quickening up of the rate of growth about the period of oncoming puberty and then a slackening off as the adult stage is reached about 16 to 18. The regression lines to avoid crowding have not been placed on the diagrams[*].

(iii) *On the Effect of the Immediate Environment as measured by difference of "House" on Temperature.*

We have already seen (p. 19) that there is a small but significant difference in the mean temperature of the various Worcestershire schools. We have further noted that this difference can hardly be accounted for (α) by personal equation in the recorder, because all the temperatures were taken in the same way by the same person, (*b*) by environment of the homes of the children in the schools, because the boys by no means followed the same order as the girls of the same district. We have seen that in the primary schools it is roughly a measure of the prevalence of puerile phthisis. Now does any similar association exist between "House" and temperature in the other schools? It would appear that such association actually does exist at Winchester, Charterhouse and St Leonards. But the individual schools have to be studied rather differently as the conditions of observation are not the same. At St Leonards all the temperatures were taken by one person and on

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[*] The following are the equations to these lines:

Boys

Weight

Worcestershire : $w = 11\cdot923 + 4\cdot8067a$
Charterhouse : $w = -43\cdot302 + 10\cdot4065a$

Height

Worcestershire : $h = 30\cdot895 + 1\cdot8984a$
Charterhouse : $h = 41\cdot965 + 1\cdot5642a$

Girls

Weight

Worcestershire : $w = 5\cdot422 + 5\cdot4068a$
Soldiers' Daughters : $w = -19\cdot824 + 8\cdot2252a$
St Katharine's : $w = 0\cdot928 + 7\cdot0329a$
St Leonards : $w = 41\cdot031 + 5\cdot1842a$
St Andrews : $w = 19\cdot431 + 6\cdot3508a$

Height

Worcestershire : $h = 28\cdot997 + 2\cdot1033a$
Soldiers' Daughters : $h = 30\cdot354 + 1\cdot9139a$
St Katharine's : $h = 32\cdot160 + 2\cdot1557a$
St Leonards : $h = 53\cdot161 + \cdot6922a$
St Andrews : $h = 39\cdot376 + 1\cdot5499a$

the same plan; at Charterhouse they were done by the various house-matrons and we have less guarantee of uniformity of method, or of absolute reliability of result.

St Andrews. In the preparatory school, St Katharine's, we find three groups of girls, namely those in the Lodge, in Chattan House, and the Day Girls. These give the following results:

House	Mean Age	Mean Temperature
Day Girls	9·18	99·11
The Lodge Girls	11·45	98·72
The Chattan House Girls...	11·47	98·67

The fall in temperature from 99·11 to 98·72 is rather more than we should anticipate with a difference of age equal to 2·27 years, but it is not more than is accountable for by the probable errors of the small numbers on which these means are based, i.e. 27, 20, and 17 girls respectively. The reader should examine the graph giving temperature and age for St Andrews: see Diagram VII, p. 72. On the whole remembering that *a priori* the day girls are likely to be on the average rather more delicate than the boarders, the differences can probably be accounted for by age differences.

The matter is otherwise when we come to the senior school, St Leonards. Calling the houses I to VIII, we have the following order for mean temperature:

TABLE KKK

House	Mean Age		Temperature for Age		Observed Mean Temperature		Mean Weight in stones		Mean Height in inches	
I	15·833	15·758	98·432	98·412	98·212	98·272	8·856	8·738	64·076	64·016
II	15·567		98·409		98·267		8·792		63·717	
III	15·864		98·402		98·303		8·705		64·288	
IV	15·767		98·404		98·307		8·600		63·983	
V	15·900	16·002	98·401	98·398	98·463	98·553	8·936	8·832	64·086	64·205
VI	15·654		98·407		98·523		8·385		63·385	
VII	16·288		98·392		98·594		9·015		64·682	
VIII	16·167		98·394		98·630		8·991		64·667	

Here the "Houses" with the greater average temperatures have the greater average age, and a comparison with the temperatures corrected shows that the differences are far beyond, and in the opposite sense to, those we should anticipate. In the same way the greater weights and heights are associated with the higher house temperatures and not the lower, as in the case of the elementary schools. We have already seen that the individual with a high temperature has on the average a slightly lower weight and stature[*]. It is desirable to ascertain whether the increased weight and stature of the "houses" with higher temperature could be explained by the somewhat greater ages of the girls in those houses. The difference in age is ·244 years = 2·93 months. Girls at St Leonards grow 1·30 lbs. per month and ·06 inches per month on the average. Hence, a difference in age of 2·93 months should correspond to 3·8 lbs. and ·18 inches; the actually recorded differences are ·094 stone = 1·32 lbs. and ·19 inches. Or, the difference of stature is what we might expect from differences of ages, and the difference of weight is a good deal less than we should expect from the age difference. It seems safe to infer, that although at St Leonards there are significant temperature differences in the houses[†], which are not the result of differences of age, for they are in the opposite sense, yet these differences are not associated with significant weight or stature differentiation in the houses.

The correlations found for the various characters are:

$$\begin{aligned}\eta \text{ for house and temperature} &= \cdot 2738,\\ \eta \text{ for house and age} &= \cdot 0000,\\ \eta \text{ for house and weight} &= \cdot 0000,\\ \eta \text{ for house and height} &= \cdot 0000.\end{aligned}$$

Here by $\eta = \cdot 0000$, we understand that $\overline{\eta}^2$ found in the usual way is less than the corrective factor $(\kappa - 1)/N$, where κ is the number of arrays and N the size of the population. We conclude that there is practically no differentiation of houses except by temperature[‡]. If we directly correlate house mean temperature with house mean weight and house mean stature, assuming the eight houses to have equal weight, we find:

$$\begin{aligned}r \text{ for mean house temperature and mean weight} &= \cdot 2609 \pm \cdot 2222,\\ r \text{ for mean house temperature and mean stature} &= \cdot 4066 \pm \cdot 1990,\end{aligned}$$

neither really significant having regard to their probable errors, and further as yet uncorrected for house mean age.

The general fact that temperature is to a sensible but slight degree associated with individual houses, but scarcely with the physique of the house, corresponds closely to what we have found for the Worcestershire schools. But the difference in the professional class schools appears to be that the high temperature does not seem to be associated with the prevalence of a pathological state, but a low or sub-mean temperature to mark houses, if anything, with a sub-mean stature and weight.

A precisely similar investigation was now made for Winchester, where we have unfortunately only the ages, not the weights or statures of the boys. In the table

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[*] The sole exception to this rule is the Worcestershire girls' height and temperature series, with a slight positive correlation, but this is opposed by the correlation for age 12 of height and temperature for the same girls.

[†] The probable errors of the mean temperatures of the houses are about ·06, so that many differences are significant.

[‡] This does not prevent the possibility of differentiating by weight or stature one *group* of houses from a second.

below the observed and calculated temperatures for the various "houses" are given. It will be seen at once that the observed temperatures of the boys in the various houses have an even greater range than those of the St Leonards girls. The value of η after correction is now ·3375, a value somewhat larger than that at St Leonards.

TABLE LLL.

House	Mean Age		Mean Temperature observed		Temperature corrected for ages	
VII	16·043	15·852	98·169	98·300	98·460	98·467
IV	15·396		98·183		98·485	
X	15·909		98·269		98·465	
VIII	15·616		98·435		98·476	
II	16·297		98·443		98·451	
I	16·016		98·544		98·461	
V	15·611	15·883	98·570	98·686	98·476	98·466
XI	16·012		98·610		98·461	
IX	15·792		98·667		98·470	
VI	15·398		98·691		98·484	
III	16·600		98·890		98·436	

It will be seen that the influence of age is very slender and wholly unable to account for the differences between the various "houses*." Nor can we account for them by the possible differences of room temperature (see p. 6), nor by differences of times of observation, for two houses dealt with absolutely at the same hour, VI and X for example, may differ more than two houses like I and II taken respectively at 8.30 p.m. and 10 a.m. Something of course is due to random sampling on relatively small series; the probable error of the mean temperature of the "house" varies round ·06, which will account for something but not all of the observed differences.

Again the question of personal equation of the recorder arises, and may have been to some extent influential. But from internal evidence the records appear to have been carefully made, and we do not feel able—in view of the fact that like differences were observed in Worcestershire and at St Leonards with one recorder only—to press this point. We believe there is here, as at St Leonards, sufficient evidence to indicate a differential house temperature.

We now turn to Charterhouse. Here the boys were divided into eleven groups, and internal evidence of the records seems to indicate that there was considerable personal equation in the work of determination†.

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* It is the houses with the higher temperature which on the whole have the greater average ages.

† At Charterhouse the temperatures were taken by the matrons of each house, and all were not equally interested in an experiment which made a large demand on their time. Mr Oswald H. Latter, who had given his aid in organising the observations, most kindly offered to repeat the whole series personally, but has been prevented up to the present time by the pressure of family business.

The following table gives the Charterhouse results:

TABLE MMM.

House	Mean Age		Mean Temperature		Mean Weight in stones		Mean Height in inches	
I	16·031	16·229	97·373	97·861	8·760	8·901	66·633	67·146
II	16·178		97·776		8·956		67·517	
III	16·288		97·992		8·870		67·375	
IV	16·500		98·055		8·844		66·729	
V	16·150		98·110		9·075		67·475	
VI	16·553		98·155		Not given		Not given	
VII	16·500	16·313	98·162	98·340	9·481	9·189	68·726	67·635
VIII	16·316		98·184		9·066		67·290	
IX	16·580		98·288		9·430		67·940	
X	16·136		98·456		8·800		67·218	
XI	16·033		98·611		9·167		67·000	

Now these results are very noteworthy: between the five lowest temperature and the five highest temperature houses there is a difference of 0°·479; this should mark that the first five houses had boys of an older age than the last five houses, for temperature falls with age. On the contrary, the first five houses have the lower age by ·084 of a year = about one month. Further, to judge by the Worcestershire returns, higher temperature meaning pathological conditions, the higher temperature houses should have the lower weight and stature. On the contrary we find that the group of higher temperature houses have the greater weight and greater stature. Can this difference be accounted for by the somewhat greater ages of the boys in the higher temperature group of houses? We can answer this question from the regression lines of weight and height for age obtained from the Charterhouse data themselves. The boys grow at the rate of 0·86 lbs. per month and 0·13 inches per month. The observed differences corresponding to the ·084 year, or about one month age difference, are: 0·29 stone = 4·06 lbs. and 0·49 inches, i.e. about four times as great. Clearly they cannot be due to the slight age difference. At Charterhouse as elsewhere greater weight and greater stature in the individual mark a lower temperature even after correction for the age of the individual boy (see pp. 57 and 59). But lower average temperature for the individual house means lower weight and lower stature for that house. Undoubtedly the Charterhouse temperatures are in the bulk below their proper value; the total average for the school is only 98·088 as against the Winchester 98·461, or the St Leonards 98·401. But there is no reason why the temperatures of the sub-mean houses should be accompanied by sub-mean weights and sub-mean statures, if we were dealing merely with personal equation of the recorders. If we were dealing with a higher temperature due to pathological conditions present in some houses, we should anticipate lower weight and stature in those houses. This is certainly not the case. We can only record that in certain houses with sub-mean temperatures, the weight and stature also appear to be sub-mean also.

Numerically we have at Charterhouse:

$$\eta \text{ for house and temperature} = \cdot 5131,$$

a value undoubtedly exaggerated by personal equation, but probably at least as significant as the values at Winchester or St Leonards.

η for house and age = ·0000,
η for house and weight = ·0710,
η for house and height = ·0805,
r for house temperature and house weight = ·4320 ± ·1735,
r for house temperature and house height = ·2424 ± ·2008.

The probable errors of the last two are large as we are dealing with only ten houses, but the individual house temperatures, house weights and house heights are based each on about 50 observations. They are again uncorrected for age, but this fact makes no significant difference*.

(iv) *On the Influence of the Home from which the Children are drawn.* We do not know the home environment of the children in the Worcestershire schools, but we are able to deal with the home conditions of 108 girls in the Soldiers' Daughters' Home. These girls are, of course, living in the Home, but the Lady Superintendent most kindly provided for us some description of the parentage in the cases of these girls, classifying the homes by the habits of the parents, their poverty, and the dirt and disorder of the home. The classes of home provided were Very Good, Good, Poor, Very Poor, Bad and Very Bad. The numbers seemed insufficient to give more than a double class which we took as (i) Good and Very Good, and (ii) Poor, Very Poor, Bad and Very Bad. The following table resulted:

TABLE NNN.

Temperatures

	97		98										99										100			Totals
	·8	·9	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9	·0	·1	·2	·3	·4	·5	·6	·7	·8	·9	·0	·1	·2	
(i)	1	—	1	1	1	2	2	—	5	5	2	5	5	5	7	3	6	3	4	5	—	2	—	—	—	65
(ii)	—	—	—	—	1	—	2	3	3	—	5	3	2	2	4	5	6	—	3	1	—	1	—	1	1	43
Totals	1	—	1	1	2	2	4	3	8	5	7	8	7	7	11	8	12	3	7	6	—	3	—	1	1	108

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* The correlation, for example, of mean house temperature with mean house age at Charterhouse is + ·1229, and of mean house weight with mean house age is + ·5461. Whence the correlation of mean house weight and mean house temperature for constant mean house age is ·4389, hardly changed from the total value ·4320 above.

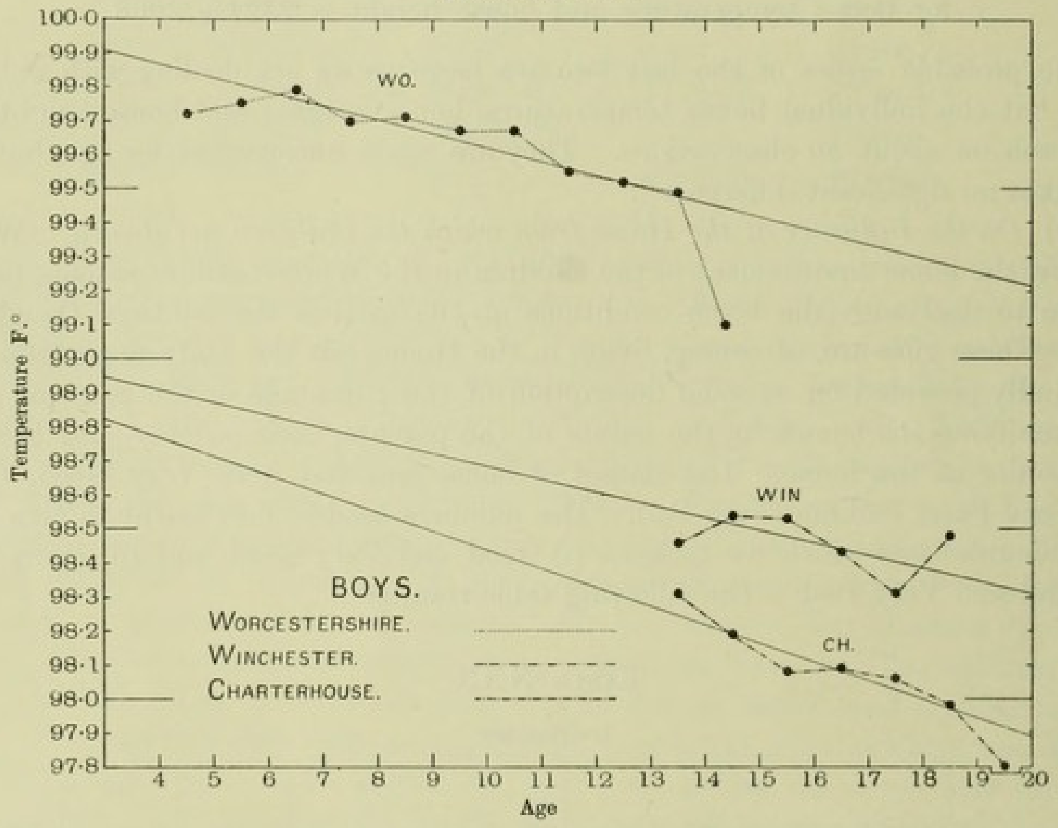
The mean temperature $\overline{m}$ of the population = 99·0750,
The mean temperature m (i) of the girls of the better class homes = 99·0538,
The mean temperature m (ii) of the girls of the worse class homes = 99·1070,
The correlation found by the bi-serial method is

$$r = +\cdot 0707,$$

the higher temperature following the worse home.

Clearly the relation between *original* home and present temperature of the Institution child is not so close as the relation of temperature to house in the public schools. But it suggests that we may find higher temperature associated with lower type of home although the result is probably of the order of the unknown probable error.

DIAGRAM VI.



(11) *Comparison of absolute Temperatures at each Age for Children in the Public Elementary Schools and in Middle Class Schools.* If we take the average temperature *without regard to age* we find:

	Temperature	Average Age
Worcestershire Boys	99·660	9·06
Worcestershire Girls	99·749	9·15
Soldiers' Daughters	99·097	11·82
St Andrews (St Leonards and St Katharine's) (Girls)	98·497	14·85
Winchester Boys	98·461	16·02
Charterhouse Boys	98·088	16·28
St Leonards, only (Girls)	98·401	15·90
St Katharine's, only (Girls)	98·850	10·97

But little can be judged from the returns thus examined, except the general principle that temperature falls with increasing age. For comparisons to be of service we must take equal age groups in each class of school. Unfortunately the higher class schools begin just where the elementary schools leave off, and the comparison has to be made rather on the general sweep of the graphs than on actual data for corresponding years. The mean temperatures for each year are given in the following table, but those with an asterisk attached depend on such small numbers that little weight can be given them. The correlations and regressions are given in Table PPP.

TABLE OOO.

Ages	3—4	4—5	5—6	6—7	7—8	8—9	9—10	10—11	11—12
Girls									
Worcestershire......	—	99·90*	99·65	99·85	99·81	99·84	99·83	99·69	99·71
Soldiers' Daughters	—	—	—	—	98·83*	99·42	99·29	99·14	99·24
St Katharine's	—	—	99·10*	99·25*	99·30*	99·10*	99·23	99·00	98·40
St Leonards	—	—	—	—	—	—	—	—	—
St Andrews	—	—	99·10*	99·25*	99·30*	99·10*	99·23	99·00	98·40
Boys									
Worcestershire.. ...	—	99·72*	99·75	99·79	99·70	99·71	99·67	99·67	99·55
Winchester	—	—	—	—	—	—	—	—	—
Charterhouse	—	—	—	—	—	—	—	—	—

TABLE OOO (*continued*)

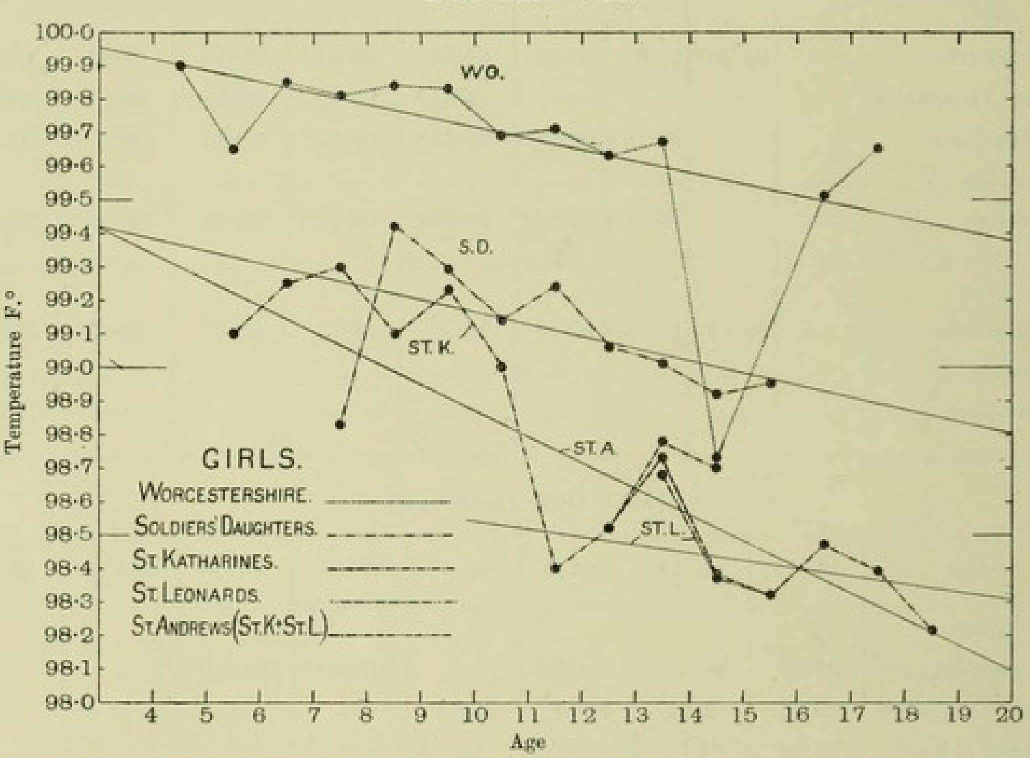
Ages	12—13	13—14	14—15	15—16	16—17	17—18	18—19	19—20
Girls								
Worcestershire......	99·63	99·57	98·73*	—	[99·51]†	[99·65]†	—	—
Soldiers' Daughters	99·06	99·01	98·92	98·95	—	—	—	—
St Katharine's	98·52	98·78	98·70*	—	—	—	—	—
St Leonards	—	98·68	98·37	98·32	98·47	98·39	98·10	—
St Andrews	98·52	98·73	98·38	98·32	98·47	98·39	98·10	—
Boys								
Worcestershire......	99·52	99·49	99·10*	—	—	—	—	—
Winchester	—	98·46	98·54	98·53	98·43	98·31	98·48	—
Charterhouse	—	98·31	98·19	98·08	98·09	98·06	97·98	97·80*

* Very inadequate numbers.

† These are based on 35 scholarship girls, of whom no less than 10 belonged to the tuberculous and 12 to the rheumatic groups; 13 only were passed as normal. But little stress can be laid on these 16 to 18 individuals.

These results are exhibited in Diagrams VI—VIII*. It will be at once clear that at each age the girls of the poorer classes have a higher temperature than those of the professional classes, but that girls of the poorer classes living in an institution have an intermediate temperature. There can be little doubt that the source of these differences hardly lies *directly* in nourishment, but in the prevalence of pathological conditions, in particular of puerile phthisis and rheumatism. As we have seen the difference of temperature in the "houses" of public schools appears to be rather associated with prevalence of sub-normal than super-normal temperatures, and may possibly—since these temperatures are *positively* associated with weight and height—be due to the more or less continuous physiological influence of differences of food and warming conditions†.

DIAGRAM VII.



The Class difference of absolute temperatures is, we think, almost certainly due to differing degrees of prevalence of rheumatism and of puerile phthisis. With regard to the former we have seen that it is largely hereditary, and that in the latter there is a sensible influence of parental phthisis. In the case of puerile phthisis, however, we think there is some evidence of school influence as apart from home, and should think that the possibility of school epidemics of puerile phthisis would be well worth investigation. The first suggestion being that the percentages of puerile phthisis in the different schools should be recorded continuously.

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* Diagram VIII indicates how the younger girls have a higher temperature than the younger boys—at least for the poor classes; but the elder boys a higher temperature than the elder girls—at least for the wealthier classes.

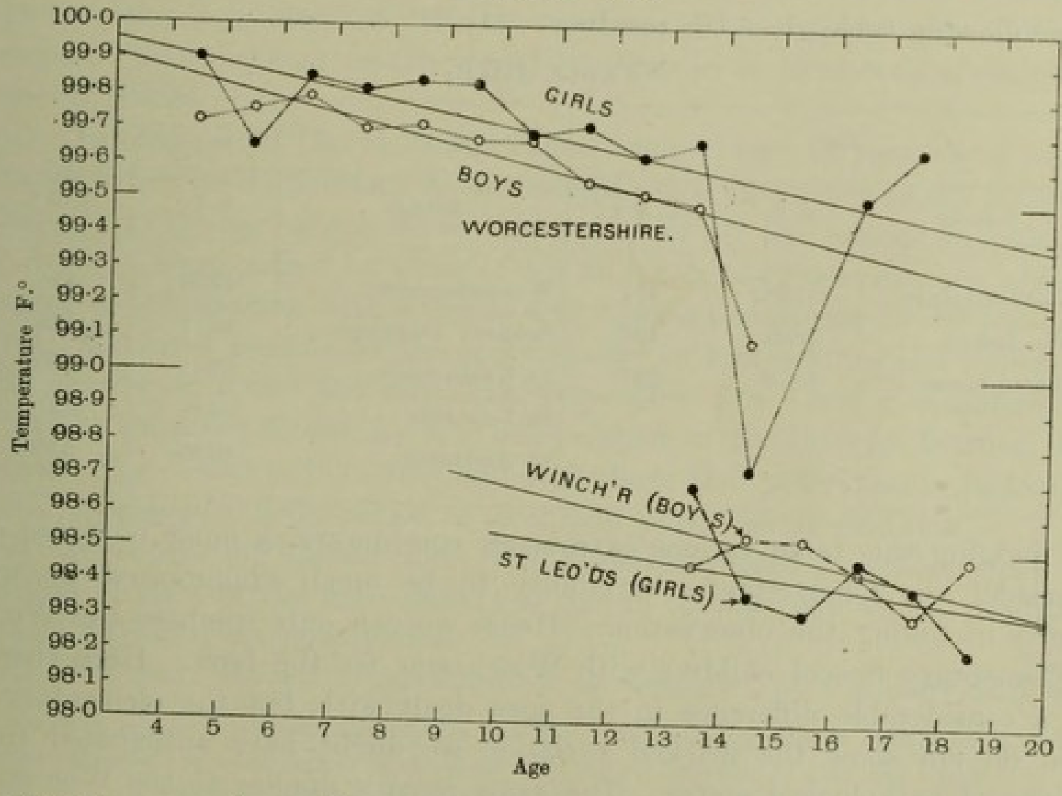
† The differences are larger than could be possibly associated with room or time temperature influences.

The reader will note how significantly the Charterhouse returns fall below those from Winchester. That the whole difference is not due to more careless record is clear; for, if it were, the observed correlations between weight and height with temperature and the continuous and almost parallel fall with age (cf. Winchester, Diagram VI) would not appear. The thermometers were the same as those used at Winchester, i.e. one minute Kew certificate thermometers, but there is little doubt that the difference 0°·37 on the whole set of observations (less 0°·01 due to difference of age, the Charterhouse boys being 0·26 year older) results from the fact, that the mouth temperatures were, owing to difficulties as to time, in this case limited to five

TABLE PPP. *Age and Temperature.*

Material	Ages used	Correlation	Regression Line
Worcestershire Girls ...	3—14	− ·1821 ± ? *	$T = 100{\cdot}059 - {\cdot}0339a$
Soldiers' Daughters	6—16	− ·1875 ± ·0528	$T = 99{\cdot}525 - {\cdot}0362a$
St Katharine's	5—14	− ·3238 ± ·0755	$T = 99{\cdot}869 - {\cdot}0928a$
St Leonards	13—19	− ·0659 ± ·0439	$T = 98{\cdot}784 - {\cdot}0241a$
St Andrews	5—18	− ·3550 ± ·0341	$T = 99{\cdot}647 - {\cdot}0775a$
Worcestershire Boys ...	3—14	− ·2055 ± ? *	$T = 100{\cdot}026 - {\cdot}0404a$
Winchester	13—19	− ·1125 ± ·0370	$T = 99{\cdot}056 - {\cdot}0372a$
Charterhouse	13—19	− ·1368 ± ·0288	$T = 98{\cdot}987 - {\cdot}0552a$

DIAGRAM VIII.



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* See p. 56. These are values corrected for E O. Selection.

minutes instead of the ten minutes enforced in the other examinations[*]. . Applying the correction of 0°·36 to the Charterhouse returns we find :

TABLE QQQ.

	13—14	14—15	15—16	16—17	17—18	18—19	19—20
Winchester ...	98·46	98·54	98·53	98·43	98·31	98·48	?
Charterhouse...	98·67	98·55	98·44	98·45	98·42	98·34	98·16[†]

This brings the Charterhouse data into complete accord with the Winchester, and it seems probable that, on the average, a minute thermometer of the kind used would record 0°·36 more, if kept in the mouth 10 instead of 5 minutes.

(12) *Comparison of Variabilities in Temperature in the two types of Schools.* We now turn to the important question of the range or variability of temperature at a constant age. The best manner of determining this appeared to us, having regard to the paucity of much of our data, to obtain the standard deviation σ_τ of temperature, and correct it by the correlation of age and temperature, i.e. to find

$$\Sigma_\tau = \sigma_t \sqrt{(1 - r^2_{at})}.$$

The following table gives the results :

TABLE RRR.

Boys			Girls		
Schools	S. D.	C. of V.	Schools	S. D.	C. of V.
Worcestershire...	·5153[‡]	·517	Worcestershire.........	·4936[‡]	·495
Winchester	·4886	·496	Soldiers' Daughters...	·4621	·466
Charterhouse ...	·5876	·597	St Katharine's.........	·6231	·630
			St Leonards......... ..	·4886	·497
			St Andrews	·5239	·530

In judging this table various extraneous considerations must be given weight. We consider the Charterhouse variability to be much exaggerated by want of uniformity in taking the observation. Hence we can only compare the Worcestershire Elementary School children with Winchester for the boys. Here there is, of course, a considerable difference in the ages dealt with, but the elementary school children do not show the marked variation we might have anticipated from the prevalence of pathological states. The same remark applies to the Worcestershire girls ; they are, it is true, more variable than the Soldiers' Daughters, who have the

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[*] This is a less difference than Burton-Fanning and Gurney Champion give (*Lancet*, March 28, 1903): see their Chart I. But no statement is made by them of the state or age of the single patient tested, nor as to what is the abscissa of the chart.

[†] Very inadequate numbers.

[‡] These values of course agree with the S. D. of children at age 12, for the correlations for corrected population were found from them : see p. 55.

minimum variability of the whole set of series, but they are markedly less variable than the St Katharine's girls*, who are about two years older on the average, and have practically the same variability as the St Leonards girls, who are much older. We may, we think, reasonably hold that while the elementary school children have sensibly higher temperatures than those of a socially higher class, they have no greater variability, the distribution as a whole, as it were, being shifted to a higher point of the thermometric scale. We hold that there is no substantial differentiation to be found on the basis of variability between social classes. Indeed, if we could trust Charterhouse and St Katharine's entirely, we might have to face greater variability in the middle class schools—a result to have been *a priori* anticipated on the ground that natural selection would be less intense. Clearly there is here a field for much fuller and more definite investigations.

(13) *Summary of Conclusions.* While fully admitting the defects of the data studied in this paper, i.e. the insufficient frequency at certain ages, the fact that the temperatures were of necessity mouth temperatures†, and in the case of one series do not fulfil the standard of observation laid down, we yet believe that several conclusions and some suggestions for further work can be drawn from our material.

(i) We feel that very careful observations on the daily rhythm of temperature in large numbers of children of different ages would be of great value. We do not feel confident that the same results would be obtained as have been already found in the case of adults.

(ii) To judge from Davy's observations, temperature of room is of very small importance, when its fluctuations do not exceed those customary in our houses.

(iii) Davy's observations show that a rise of 10 per minute in pulse rate is on the average accompanied by a rise of 0·3 to 0·4 in body temperature, and a rise of one degree in temperature with a rise of 6 to 7 beats per minute in the pulse.

(iv) We have considered the individuality in temperature and shown that the correlation between a first and second temperature = ·5 to ·6 and is considerable. This is not due to transient illness, for it is independent of the interval between the temperatures. We conclude from this and other facts that individuality in temperature is due to physiological constitution or to chronic pathological condition.

(v) By separating normal cases from those diagnosed as pathological, we concluded that about $\frac{1}{3}$ of the individuality is due to chronic pathological conditions and about $\frac{2}{3}$ to physiological constitution.

(vi) We next turned to environment as measured by the individual school or

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* We have not been able to account for the high variability of the St Katharine's temperatures, which were taken by the same person in the same way and all between 10 a.m. and 1 p.m.

† We are fully aware of the amount of literature on the subject of temperature taking whether in the axilla or groin, the mouth, the rectum, or in the flowing urine, and while the first is of little value and the rectal may be most accurate (Pembrey and others, *Guy's Hospital Reports*, Vol. LVII. p. 283), it is clear that the oral temperature is the sole temperature which it is possible to record by mass observations in schools. The fact that temperatures thus found are significantly differentiated by individuality, by pathological state, by immediate environment, and by earlier home conditions is sufficient to indicate that some useful purposes can be served by dealing with oral temperatures in school children.

"house." This should be the same influence in boys' and girls' schools of the same district. We found a sensible relation between school and temperature but that the girls and boys of the same district did not show tendencies in the same sense. The observed differences therefore appear to attach themselves to the school or school-room or school treatment* rather than to the district. There were also practically negligible correlations between weight and height in the school and temperature, and such as existed were *positive*, or the school with the higher average temperature had the better average physique. This is what we should expect if it resulted from low school temperatures being due to insufficient nutrition and not from high school temperatures being due to pathological conditions marking a lowered physique.

(vii) For the individual a high temperature means slightly lower weight and height. This is practically due to the presence of pathological conditions, for it ceases to exist sensibly if we select normal children.

(viii) While height and weight were modified favourably by the transition from urban to rural schools, but little influence could be noted on temperature.

(ix) There was a possibly sensible decrease of weight and height as the size of family increased but no sensible modification in temperature. Nor was there any relation between temperature and order of birth.

(x) Children diagnosed as phthisical or rheumatic were found *a posteriori* to be those with higher temperatures. Only the phthisical, not the rheumatic children showed lowered physique as judged by height and weight.

(xi) Puerile phthisis was more often diagnosed in urban than rural schools and rheumatism in rural than urban schools. The boys were diagnosed more frequently as "phthisical" than the girls, and the latter more frequently than the former as "rheumatic."

(xii) It was found that the difference in average temperature from one school to a second depended in the case of the boys slightly on the prevalence of rheumatism, but in the main on the percentage of cases diagnosed as having puerile phthisis. With the girls there was less discoverable influence of pathological conditions, and what there was was more due to rheumatism than to puerile phthisis. It is suggested that oncoming puberty in the case of the girls produces temperature disturbances which obscure pathological states more than in the case of the boys of the same ages (12 and 13).

(xiii) While we were not able to detect in our data differential physique corresponding to a differential environment, but believe the differential temperatures of the various schools to be due to (*a*) different percentages of rheumatism, and (*b*) to epidemics of puerile phthisis in the individual schools, we considered it desirable to investigate the relation of these factors to parental conditions. We found that the rheumatic diathesis was inherited in a marked manner from parent to child. The average relation between parent and child was three to four times as intense as that between husband and wife. This suggests that it is true heredity and not co-environment which lies at the bottom of the filial resemblance.

(xiv) The filial resemblance between adult phthisis in the case of the parents

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* Ventilation, exercise, means of getting to school, etc.

and puerile phthisis in the case of the child is substantially greater than that found for marital resemblance, but it is only about half that found for rheumatism in parent or child or that deduced by Pearson and Goring for adult or mortal phthisis in parent and child. We therefore conclude that puerile phthisis is not like rheumatism in the main an hereditary condition. It is due to an infection to which probably those whose parents have suffered from adult phthisis are more liable. And puerile phthisis—from which the bulk of children must recover—is thus markedly less hereditary than mortal phthisis, which has been shown to be as hereditary as insanity or rheumatism. As children grow older the percentage credited with puerile phthisis appears to grow smaller and smaller. The exact ratio of the decrease cannot be found from the Worcestershire data.

(xv) The rheumatic and the phthisical diagnosis in children appear to be exclusive, and the occurrence of the rheumatic diathesis in a parent appears substantially to protect the child either from the onset or the persistence of puerile phthisis.

(xvi) A marked divergence was found in the rheumatic diagnoses between the conditions for different years and between children of the two sexes. While the percentages of parents affected did not change markedly, those of both boys and girls increased by 50 °/。 during the period of the record, and this increase was accompanied by a modification of the intensity of heredity—of a very marked character in the case of the boys.

Very elaborate reductions were made of the various factors of the diagnoses in order to determine the source of this variation. In the first place, while puerile phthisis appears to decrease*, rheumatism increases almost in the inverse ratio from 4 to 13 years. Puerile phthisis seems to die out and rheumatism becomes more obvious. There are stages when the diagnosis is difficult to make. With increasing experience the recorder has probably been able to make a bigger entry of ? rheumatic. We show that this has not substantially modified the inheritance relation for the girls, but it has done so for the boys. We suspect that it is harder to obtain a satisfactory diagnosis in the case of the boy than in that of the girl, and this seems borne out by the statistical investigations.

(xvii) We next compared the results for primary school-children with those from middle-class public schools such as Winchester, Charterhouse and St Andrews. The temperature of the poorer class children is undoubtedly higher at each age, but their variability in temperature is no greater.

We suspect this higher temperature to be due to the greater prevalence in the poorer classes of puerile phthisis and rheumatism, but we have made no diagnosis of these in the public schools. Our reason for this belief is that we consider the correlations found between average height and weight and average temperature for the various houses in these schools are possibly due to sub-normal temperatures associated with differences of nutrition, for there is a marked absence of the high temperatures found in the primary schools. It does not appear conceivable (see the graphs) that the

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* Certainty on this point is not possible from our present data, owing to selection of the younger children.

younger ages of the children of the higher social classes could give (unless there is marked discontinuity at about 12 years of age) anything like the same high temperatures as the elementary school children of those ages provide.

(xviii) To sum up, we think there is a real and marked difference in temperature between the children of the higher and lower social classes. We do not think that this is directly due to differences of home environment or of nourishment, but to the far greater prevalence of puerile phthisis and of rheumatism in the poorer children. The rheumatism is probably a markedly hereditary character, and the puerile phthisis is in part also hereditary, but in part also due to greater risk of infection in certain of the primary schools or to a school environment favouring the development of an infection received elsewhere. The poor are largely poor because of their defective physique, and the segregation of those with defective physique cannot be obviated, as long as the birth-rate is not directly determined by the physique of parents. With regard to the marked high temperature of certain of the elementary schools, we suspect that they run through epidemics of puerile phthisis at different seasons and with different grades of severity. It may be well questioned whether the school medical officer should not know the average temperature of the scholars in each individual school, possibly in each classroom, and on its rise to excessive value investigate carefully both possible sources of infection in pupils and teachers, as well as any unfavourable circumstances in the school environment. The average temperature of the children in a public elementary school taken every four months for a year or two would probably throw much light on the problem of puerile phthisis, and certainly enable us better to determine how far school or home environment was responsible. The relatively low correlation between parent and child for phthisical diathesis, and the non-parallel results for boys and girls of the same school suggest that the source must be sought primarily within the schoolroom itself, and only secondarily in the home.

WORKS BEARING ON CERTAIN POINTS DISCUSSED IN THIS PAPER.

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APPENDIX OF CORRELATION TABLES.

TABLE I. *Temperature of Room and Body Temperature. Davy's Data. England. 7—8 a.m.*

Temperature of Room, T′

Temperature of Body, T

	36—37	38—39	40—41	42—43	44—45	46—47	48—49	50—51	52—53	54—55	56—57	58—59	60—61	62—63	64—65	66—67	68—69	70—71	72—73	Totals
98·1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
98·2	—	—	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
98·3	—	—	—	1	—	1	—	—	1	—	—	1	—	—	—	—	—	—	—	4
98·4	—	—	3	2	—	1	1	1	2	—	—	—	1	1	—	—	—	—	—	12
98·5	—	3	2	5	1	1	1	1	1	—	—	1	1	3	—	—	—	—	—	20
98·6	1	1	1	5	2	2	3	3	—	2	—	2	1	4	1	—	—	—	—	28
98·7	—	—	5	2	6	4	—	6	4·5	—	—	2	6	3	3	1	1	—	—	43·5
98·8	—	2	1	6	5	5	2	1	3·5	2	1	2	3	7	—	—	2	1	—	43·5
98·9	—	1	1	1	—	3	1	—	1	2	—	2	2	—	—	—	—	1	—	15
99·0	—	—	—	5	6	3	2	1	2	1	—	3	5	3	3	—	—	—	1	35
99·1	—	—	—	—	1	2	2	—	—	2	—	—	—	—	—	—	—	—	—	7
99·2	—	—	—	1	—	2	2	1	—	—	—	—	—	1	—	—	—	—	—	7
99·3	—	—	1	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	3
99·4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
99·5	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1
99·6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
99·7	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
99·8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
99·9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
100·0	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
Totals	1	8	15	29	22	24	15	15	17	10	1	13	19	22	7	1	3	2	1	225

TABLE II. *Temperature of Room and Body Temperature. Davy's Data. England. 3—4 p.m.*

Temperature of Room, T′

Temperature of Body, T

	32—33	34—35	36—37	38—39	40—41	42—43	44—45	46—47	48—49	50—51	52—53	54—55	56—57	58—59	60—61	62—63	64—65	66—67	68—69	70—71	72—73	Totals
97·7	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
97·8	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
97·9	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
98·0	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	2
98·1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
98·2	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1	—	—	—	—	2
98·3	—	—	—	—	—	—	—	—	—	—	2	1	—	—	1	—	—	—	—	—	—	4
98·4	—	1	—	—	—	1	—	—	1	1	—	—	—	—	—	2	—	—	1	—	—	7
98·5	—	—	—	—	—	—	1	—	—	1	—	1	—	1	2	3	—	—	—	—	—	9
98·6	—	—	—	—	—	—	—	—	1	—	3	2	—	2	1	—	—	—	1	—	—	10
98 7	1	—	—	—	1	—	—	1	2	1	3	4	—	1	1	—	1	1	1	2	—	20
98·8	—	—	—	—	—	—	—	—	—	—	—	2	1	1	4	2	—	—	—	—	1	11
98·9	—	—	—	—	—	—	—	—	1	—	—	1	—	2	—	1	1	—	—	—	—	6
99·0	—	—	—	—	—	—	—	—	—	—	—	1	—	1	1	1	—	—	—	—	—	4
Totals	1	1	0	0	1	3	2	2	5	4	8	12	1	9	10	9	4	1	3	2	1	79

TABLE III. *Temperature of Room and Body Temperature. Davy's Data. England.* 12 *p.m.*

Temperature of Room, T'

Temperature of Body, T

	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	Totals
97·0	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
97·1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
97·2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
97·3	—	—	—	—	—	—	—	—	1	—	—	—	1	—	—	1	—	—	1	—	—	4
97·4	—	—	—	—	—	—	—	—	—	—	1	—	3	—	—	—	—	—	—	—	—	4
97·5	—	—	—	—	—	1	—	—	—	—	2	—	2	1	—	2	—	—	—	—	—	8
97·6	—	—	—	—	—	—	—	—	—	—	3	—	2	2	—	—	—	1	1	—	—	9
97·7	—	—	—	—	—	—	—	—	1	—	4	1	4	1	2	1	—	—	5	1	—	20
97·8	—	—	—	—	—	—	—	—	1	—	2	1	3	1	3	—	2	1	4	—	1	19
97·9	—	—	—	—	—	1	—	—	3	1	3	2	7	5	—	2	1	—	2	—	—	27
98·0	—	—	—	—	—	1	—	—	3	—	8	—	5	2	4	—	2	1	3	—	—	29
98·1	—	—	—	—	—	—	—	—	2	—	7	2	4	—	2	3	3	—	6	—	1	30
98·2	—	—	—	—	—	1	—	—	1	—	6	1	5	1	4	4	1	—	3	1	1	29
98·3	1	—	—	—	—	—	—	—	1	—	2	1	3	1	3	—	—	1	2	—	—	15
98·4	—	—	—	—	—	—	—	—	1	—	1	1	—	—	—	—	1	—	1	—	—	5
98·5	—	—	—	—	—	—	—	—	—	—	2	—	1	—	1	1	—	—	—	—	—	5
98·6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
98·7	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Totals	1	0	0	0	0	4	1	0	14	1	41	9	41	14	19	14	11	4	28	2	3	207

TABLE IV. *Temperature of Room and Body Temperature. Davy's Data. Tropics.* 6—7 *a.m.*

Temperature of Room, T'

Temperature of Body, T

	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	Totals
97·5	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—	—	2
97·6	—	—	—	—	—	—	1	—	—	—	1	—	—	—	—	—	2
97·7	1	—	2	—	—	2	1	1	1	—	5	2	1	—	—	—	16
97·8	—	—	—	—	1	5	8	—	2	9	10	4	—	—	—	—	39
97·9	—	1	—	3	2	8	16	22	9	24·5	23	8	7	—	—	—	123·5
98·0	1	—	1	1	3	10	14	18	13	26·5	42	13	5	—	—	—	147·5
98·1	—	—	—	3	1	10	15	22	19	28	45	32	5	1	—	—	181
98·2	—	—	—	—	5	6	12	22	17	22	35·5	54	11	—	1	—	185·5
98·3	—	—	—	1	7	3	6	15	12	14	26·5	28·5	8	3	—	1	125
98·4	—	—	—	—	—	5	—	6	6	12	8	12·5	10	1	1	—	61·5
98·5	—	—	—	—	—	1	3	2	1	2	9	8	6	—	1	—	33
98·6	—	—	—	—	—	—	—	—	1	—	4	1	—	—	—	—	6
98·7	—	—	—	—	—	—	—	—	—	1	1	—	1	—	—	—	3
98·8	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1
Totals	2	1	3	8	19	50	76	108	82	139	212	163	54	5	3	1	926

TABLE V. *Temperature of Room and Body Temperature. Davy's Data. Tropics.* 12—2 *p.m.*

Temperature of Room, T'

Temperature of Body, T

	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	Totals
97·9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
98·0	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1
98·1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
98·2	—	—	—	—	1	2	1	1	1	—	—	—	—	—	—	—	—	6
98·3	—	—	—	—	1	—	1	2	1	3	2	1	1	—	1	—	—	13
98·4	—	—	—	—	—	—	1	1	8	5	4	—	2	—	1	—	—	22
98·5	—	—	—	—	2	1	3	2	5	9	5	6	3	1	2	—	—	39
98·6	—	1	—	—	1	—	3	3	7	11	8	6	6	10	—	—	—	56
98·7	—	—	—	2	2	—	4	4	10	16	20	11	20	14	6	1	—	110
98·8	—	—	2	—	2	1	3	9	5	22	20	13	19	20	4	—	—	120
98·9	—	—	—	—	2	—	1	4	13·5	15·5	17	15	22	29	7	2	—	128
99·0	—	—	1	—	—	1	5	5	11	6	11	12	24	25	12	3	1	117
99·1	—	—	—	—	—	1	—	5	2	8	13	14	17	25	10	1	—	96
99·2	1	—	1	—	1	1	—	1	7	11	11	8	14	9	4	2	—	71
99·3	—	—	—	—	—	—	—	1	2	7	6	3	10	7	5	3	—	44
99·4	—	—	—	—	—	—	1	—	—	3	3	3	1	7	2	2	—	22
99·5	—	—	—	—	—	—	—	—	—	—	3	2	—	2	2	2	1	12
99·6	—	—	—	—	—	—	—	—	1	1	—	1	1	1	2	1	—	8
99·7	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—	3
Totals	1	1	4	2	12	7	23	38	73·5	117·5	123	99	140	150	58	17	3	869

TABLE VI. *Temperature of Room and Body Temperature. Davy's Data. Tropics.* 9—11 *p.m.*

Temperature of Room, T'

Temperature of Body, T

	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	Totals
97·7	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
97·8	—	—	—	—	—	1	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	3
97·9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
98·0	—	—	—	—	—	—	—	—	—	1	1	2	1	—	1	—	—	—	—	—	—	—	6
98·1	—	—	—	—	—	—	1	—	2	—	—	1	—	2	—	—	—	—	—	—	—	—	6
98·2	—	—	—	—	—	—	—	—	1	1	3	2	1	—	·5	—	—	—	—	—	—	—	8·5
98·3	—	—	—	—	1	—	1	—	2	1	1	2	4	2	·5	—	—	—	—	—	—	—	14·5
98·4	—	—	—	—	—	—	—	1	3	4	6	10	5	3	1	—	—	—	—	—	—	—	33
98·5	—	—	—	—	—	—	—	2	4	15	11	14	7	7	6	—	—	—	—	—	—	—	66
98·6	1	—	—	1	—	—	1	2	4	4	18	8	14	6	5	—	—	—	—	—	—	—	64
98·7	—	—	—	—	—	1	—	1	5	8	19	13	17	18	13	—	1	—	—	—	—	—	96
98·8	—	—	—	1	—	—	1	4	4	13	27	9	15	22	12	3	—	—	—	—	—	—	111
98·9	—	—	—	—	—	—	—	2	4	20	22	19	14·5	17	23	6	—	—	—	—	—	—	127·5
99·0	—	—	—	—	—	—	—	2	4	8	21	10	20·5	25	16	2	2	—	—	—	—	—	110·5
99·1	—	—	—	—	—	—	2	2	—	5	11	5	12	13	8	3	—	—	—	—	—	—	61
99·2	—	—	—	—	—	—	—	1	2	5	4	8	6	11	13	3	2	—	1	—	—	1	57
99·3	—	—	—	—	—	—	—	—	2	2	3	2	4	6	11	3	—	—	—	—	—	—	33
99·4	—	—	—	—	—	—	—	—	—	—	1	—	3	2	7	1	—	—	—	—	—	—	14
99·5	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	—	—	2
99·6	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3	—	1	—	—	—	—	—	5
99·7	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
99·8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
99·9	—	—	—	—	—	—	—	—	—	—	—	—	—	2	1	—	—	—	—	—	—	—	3
Totals	1	0	0	2	1	2	6	17	39	88	148	105	125	138	122	21	6	0	1	0	0	1	823

TABLE VII. *Pulse Rate and Body Temperature. Davy's Data. England.* 7—8 *a.m.*

Pulse Rate, *P*

Temperature of Body, *T*	50—51	52—53	54—55	56—57	58—59	60—61	62—63	64—65	66—67	68—69	70—71	72—73	Totals
98·1	—	1	—	—	—	—	—	—	—	—	—	—	1
98·2	2	—	1	—	—	—	—	—	—	—	—	—	3
98·3	—	—	—	1	3	—	—	—	—	—	—	—	4
98·4	1	—	4	3	1	3	—	—	—	—	—	—	12
98·5	—	2	2	9	4	1	2	—	—	—	—	—	20
98·6	—	2	9	3	7	4	—	3	—	—	—	—	28
98·7	1	3	7·5	9	11	8	4	—	—	—	—	—	43·5
98·8	—	2	11·5	10	3	10	2	1	4	—	—	—	43·5
98·9	—	2	1	2	4	4	1	1	—	—	—	—	15
99·0	—	—	2	5	9	12	4	2	1	—	—	—	35
99·1	—	—	—	1	1	3	1	1	—	—	—	—	7
99·2	—	—	1	2	1	2	—	—	1	—	—	—	7
99·3	—	—	—	—	—	—	2	—	1	—	—	—	3
99·4	—	—	—	—	—	—	—	—	—	—	—	—	0
99·5	—	—	—	—	—	—	1	—	—	—	—	—	1
99·6	—	—	—	—	—	—	—	—	—	—	—	—	0
99·7	—	—	—	—	—	—	—	—	—	—	1	—	1
99·8	—	—	—	—	—	—	—	—	—	—	—	—	0
99·9	—	—	—	—	—	—	—	—	—	—	—	—	0
100·0	—	—	—	—	—	—	—	—	—	—	—	1	1
Totals	4	12	39	45	44	47	17	8	7	0	1	1	225

TABLE VIII. *Pulse Rate and Body Temperature. Davy's Data. England.* 3—4 *p.m.*

Pulse Rate, *P*

Temperature of Body, *T*	48—49	50—51	52—53	54—55	56—57	58—59	60—61	62—63	64—65	Totals
97·7	—	1	—	—	—	—	—	—	—	1
97·8	—	—	—	—	1	—	—	—	—	1
97·9	—	—	—	—	1	—	—	—	—	1
98·0	—	—	—	1	1	—	—	—	—	2
98·1	—	—	—	—	1	—	—	—	—	1
98·2	—	—	1	1	—	—	—	—	—	2
98·3	—	—	1	2	—	—	1	—	—	4
98·4	—	2	2	2	—	—	—	—	1	7
98·5	1	3	2	1	1	1	—	—	—	9
98·6	—	2	3	2	1	2	—	—	—	10
98·7	1	—	4	3	4	3	4	1	—	20
98·8	—	—	2	4	1	2	2	—	—	11
98·9	—	—	—	—	1	1	2	2	—	6
99·0	1	—	—	—	1	1	1	—	—	4
Totals	3	8	15	16	13	10	10	3	1	79

TABLE IX. *Pulse Rate and Body Temperature. Davy's Data. England.* 12 *p.m.*

Pulse Rate, P

Temperature of Body, T	46—47	48—49	50—51	52—53	54—55	56—57	58—59	60—61	62—63	64—65	66—67	68—69	70—71	Totals
97·0	—	—	—	—	—	1	—	—	—	—	—	—	—	1
97·1	—	—	—	—	—	—	—	—	—	—	—	—	—	0
97·2	—	1	—	—	—	—	—	—	—	—	—	—	—	1
97·3	—	—	—	—	2	1	—	—	—	—	1	—	—	4
97·4	—	—	1	—	—	1	1	1	—	—	—	—	—	4
97·5	—	—	—	3	4	—	—	1	—	—	—	—	—	8
97·6	—	—	3	1	3	—	2	—	—	—	—	—	—	9
97·7	—	2	2	6	3	2	2	1	1	1	—	—	—	20
97·8	—	2	2	5	4	2	1	1	1	—	—	—	1	19
97·9	2	2	5	3	5	2	3	2	2	—	—	—	1	27
98·0	—	3	4	1	5	3	8	2	1	1	1	—	—	29
98·1	—	1	4	3	7	3	2	3	4	1	2	—	—	30
98·2	—	1	3	3	6	5	5	3	3	—	—	—	—	29
98·3	—	—	1	4	5	2	1	2	—	—	—	—	—	15
98·4	—	—	1	—	1	1	1	1	—	—	—	—	—	5
98·5	—	—	—	—	1	2	—	1	1	—	—	—	—	5
98·6	—	—	—	—	—	—	—	—	—	—	—	—	—	0
98·7	—	—	—	—	—	—	—	1	—	—	—	—	—	1
Totals	2	12	26	29	46	25	26	19	13	3	4	0	2	207

TABLE X. *Pulse Rate and Body Temperature. Davy's Data. Tropics.* 6—7 *a.m.*

Pulse Rate, P

Temperature of Body, T	46—47	48—49	50—51	52—53	54—55	56—57	58—59	60—61	62—63	64—65	66—67	68—69	70—71	Totals
97·5	—	—	—	—	1	1	—	—	—	—	—	—	—	2
97·6	—	—	—	1	1	—	—	—	—	—	—	—	—	2
97·7	—	—	4	4	5	—	3	—	—	—	—	—	—	16
97·8	—	—	3	21	11	3	1	—	—	—	—	—	—	39
97·9	—	2	11·5	42	40	22	2	2	1	—	1	—	—	123·5
98·0	1	—	10·5	47	43	36	6	1	—	2	—	—	1	147·5
98·1	—	—	7	39	62	46	14	10	2	—	1	—	—	181
98·2	—	—	8	27	66	62	14	8·5	—	—	—	—	—	185·5
98·3	—	—	4	22	37	38	8·5	8·5	4	2	1	—	—	125
98·4	—	—	—	3	16	17	15·5	6	3	—	1	—	—	61·5
98·5	—	—	—	6	5	6	6	5	4	—	1	—	—	33
98·6	—	—	—	—	3	1	—	1	—	—	—	—	1	6
98·7	—	—	—	—	—	—	—	1	—	1	—	1	—	3
98·8	—	—	—	—	1	—	—	—	—	—	—	—	—	1
Totals	1	2	48	212	291	232	70	43	14	5	5	1	2	926

TABLE XI. *Pulse Rate and Body Temperature. Davy's Data. Tropics.* 12—2 *p.m.*

Pulse Rate, *P*

Temperature of Body, *T*	48—49	50—51	52—53	54—55	56—57	58—59	60—61	62—63	64—65	66—67	68—69	70—71	72—73	74—75	76—77	Totals
97·9	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
98·0	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1
98·1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
98·2	—	1	3	2	—	—	—	—	—	—	—	—	—	—	—	6
98·3	—	1	4	6	1	1	—	—	—	—	—	—	—	—	—	13
98·4	—	3	7	6	5	1	—	—	—	—	—	—	—	—	—	22
98·5	1	4	8	13	8	2	3	—	—	—	—	—	—	—	—	39
98·6	1	3	11	19	16	5	1	—	—	—	—	—	—	—	—	56
98·7	1	6	19	29	37	12	3	2	—	—	1	—	—	—	—	110
98·8	—	8	14	25	51	14	5	3	—	—	—	—	—	—	—	120
98·9	—	3	13	32	45	17	13	4	1	—	—	—	—	—	—	128
99·0	—	1	10	26	45	17	10	4	3	—	—	1	—	—	—	117
99·1	—	2	—	20	29	18	19	5	2	1	—	—	—	—	—	96
99·2	—	—	2	6	16	20	17	5	4	—	—	1	—	—	—	71
99·3	—	1	—	2	16	12	5	3	2	2	—	—	—	—	1	44
99·4	—	—	—	2	2	8	5	3	—	2	—	—	—	—	—	22
99·5	—	—	—	—	1	3	4	1	—	1	1	—	—	1	—	12
99·6	—	—	—	1	—	3	1	3	—	—	—	—	—	—	—	8
99·7	—	—	—	—	—	—	1	1	—	1	—	—	—	—	—	3
Totals	3	33	91	189	272	134	88	34	12	7	2	2	0	1	1	869

TABLE XII. *Pulse Rate and Body Temperature. Davy's Data. Tropics.* 9—11 *p.m.*

Pulse Rate, *P*

Temperature of Body, *T*	50—51	52—53	54—55	56—57	58—59	60—61	62—63	64—65	66—67	68—69	70—71	72—73	74—75	76—77	78—79	80—81	Totals
97·7	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
97·8	—	—	—	1	1	—	—	1	—	—	—	—	—	—	—	—	3
97·9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
98·0	—	1	—	—	1	2	—	2	—	—	—	—	—	—	—	—	6
98·1	—	—	1	—	—	1	1	1	1	—	—	1	—	—	—	—	6
98·2	—	—	—	1	1	1	1·5	—	—	—	3	—	—	1	—	—	8·5
98·3	1	1	1	2	2	5	1·5	—	1	—	—	—	—	—	—	—	14·5
98·4	1	1	6	2	5	9	1	3	1	—	1	—	—	1	—	2	33
98·5	—	2	6	15	13	12	5	3	—	—	3	2	1	2	1	1	66
98·6	—	2	9	10	13	15	5	1	3	—	3	—	—	1	—	2	64
98·7	—	1	12	21	19	17	10	9	3	1	2	—	1	—	—	—	96
98·8	1	2	7	25	19	26	14	5	7	—	2	1	1	1	—	—	111
98·9	—	3	4	24	13	31	28	12	5	2	2·5	1	—	—	1	1	127·5
99·0	—	—	4	9	17	28	19	12	11	3	2·5	1	1	2	—	1	110·5
99·1	—	—	1	5	12	16	13	6	3	1	4	—	—	—	—	—	61
99·2	—	—	1	2	7	17	12	8	4	2	1	1	—	1	1	—	57
99·3	—	—	—	2	4	8	7	4	5	—	2	1	—	—	—	—	33
99·4	—	—	—	—	2	4	1	4	2	—	—	—	—	1	—	—	14
99·5	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—	—	2
99·6	—	—	—	—	—	—	2	—	3	—	—	—	—	—	—	—	5
99·7	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
99·8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
99·9	—	—	—	—	—	1	—	—	—	—	1	—	1	—	—	—	3
Totals	3	13	52	119	131	193	121	71	50	9	28	8	5	10	3	7	823

TABLE XIII. *Temperature of Room and Pulse Rate. Davy's Data. England.* 3—4 *p.m.*

Temperature of Room, T^r

Pulse Rate, P	32—33	34—35	36—37	38—39	40—41	42—43	44—45	46—47	48—49	50—51	52—53	54—55	56—57	58—59	60—61	62—63	64—65	66—67	68—69	70—71	72—73	Totals
48—49	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	3
50—51	—	—	—	—	—	1	—	—	—	1	1	—	—	1	1	3	—	—	—	—	—	8
52—53	—	—	—	—	—	—	—	—	2	1	1	2	1	1	4	2	1	—	—	—	—	15
54—55	—	—	—	—	—	—	1	1	2	—	1	2	—	1	2	1	—	—	2	2	1	16
56—57	—	—	—	—	1	2	—	—	—	1	1	1	—	3	1	1	1	1	—	—	—	13
58—59	—	—	—	—	—	—	1	1	1	—	3	2	—	—	1	1	—	—	—	—	—	10
60—61	1	—	—	—	—	—	—	—	—	—	1	1	—	2	1	1	2	—	1	—	—	10
62—63	—	—	—	—	—	—	—	—	—	1	—	1	—	1	—	—	—	—	—	—	—	3
64—65	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Totals	1	1	0	0	1	3	2	2	5	4	8	12	1	9	10	9	4	1	3	2	1	79

TABLE XIV. *Temperature of Room and Pulse Rate. Davy's Data. Tropics.* 6—7 *a.m.*

Temperature of Room, T^r

Pulse Rate, P	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	Totals
46—47	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
48—49	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	2
50—51	—	—	1	—	—	2	2	4	4	14	15	5	1	—	—	—	48
52—53	—	—	—	—	6	15	21	20	16	35	60	25	13	1	—	—	212
54—55	2	—	1	3	6	8	28	32	24	46	63	61	15	1	1	—	291
56—57	—	1	—	4	6	17	16	32	24	32	43	42	13	1	—	1	232
58—59	—	—	1	1	—	4	6	13	7	5	11	16	4	1	1	—	70
60—61	—	—	—	—	1	3	3	6	3	2	11	9	3	1	1	—	43
62—63	—	—	—	—	—	—	—	—	3	1	5	2	3	—	—	—	14
64—65	—	—	—	—	—	—	—	1	1	1	1	—	1	—	—	—	5
66—67	—	—	—	—	—	1	—	—	—	1	1	1	1	—	—	—	5
68—69	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
70—71	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	2
Totals	2	1	3	8	19	50	76	108	82	139	212	163	54	5	3	1	926

TABLE XV. *Temperature of Room and Pulse Rate. Davy's Data. Tropics.* 12—2 *p.m.*

Temperature of Room, T'

Pulse Rate, P	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	Totals
48—49	—	—	—	—	—	—	—	—	1	—	—	2	—	—	—	—	—	3
50—51	—	—	—	1	—	1	3	4	2	5	4	1	4	4	3	1	—	33
52—53	—	1	—	—	4	2	4	3	7	13	9	9	16	18	3	2	—	91
54—55	—	—	2	1	5	2	8	9	17	21	28	23	24	35	11	3	—	189
56—57	—	—	2	—	2	—	4	11	24	47	29	32	49	48	20	3	1	272
58—59	1	—	—	—	—	—	2	8	10	9	20	16	29	27	9	3	—	134
60—61	—	—	—	—	—	—	1	1	9·5	15·5	15	11	10	13	6	4	2	88
62—63	—	—	—	—	—	1	—	1	3	3	10	2	6	5	3	—	—	34
64—65	—	—	—	—	1	—	—	1	—	3	4	—	2	—	1	—	—	12
66—67	—	—	—	—	—	—	—	—	—	1	1	3	—	—	2	—	—	7
68—69	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1	—	2
70—71	—	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	—	2
72—73	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
74—75	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
76—77	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
Totals	1	1	4	2	12	7	23	38	73·5	117·5	123	99	140	150	58	17	3	869

TABLE XVI. *Temperature of Room and Pulse Rate. Davy's Data. England.* 3—4 *p.m.*

Temperature of Room, T'

Pulse Rate, P	32—33	34—35	36—37	38—39	40—41	42—43	44—45	46—47	48—49	50—51	52—53	54—55	56—57	58—59	60—61	62—63	64—65	66—67	68—69	70—71	72—73	Totals
48—49	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	3
50—51	—	—	—	—	—	1	—	—	—	1	1	—	—	1	1	3	—	—	—	—	—	8
52—53	—	—	—	—	—	—	—	—	2	1	1	2	1	1	4	2	1	—	—	—	—	15
54—55	—	—	—	—	—	—	1	1	2	—	1	2	—	1	2	1	—	—	2	2	1	16
56—57	—	—	—	—	1	2	—	—	—	1	1	1	—	3	1	1	1	1	—	—	—	13
58—59	—	—	—	—	—	—	1	1	1	—	3	2	—	—	1	1	—	—	—	—	—	10
60—61	1	—	—	—	—	—	—	—	—	—	1	1	—	2	1	1	2	—	1	—	—	10
62—63	—	—	—	—	—	—	—	—	—	1	—	1	—	1	—	—	—	—	—	—	—	3
64—65	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Totals	1	1	0	0	1	3	2	2	5	4	8	12	1	9	10	9	4	1	3	2	1	79

TABLE XVII. *Temperature of Room and Pulse Rate. Davy's Data. Tropics.* 12—2 *p.m.*

Temperature of Room, T'

Pulse Rate, P	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	Totals
48—49	—	—	—	—	—	—	—	—	1	—	—	2	—	—	—	—	—	3
50—51	—	—	—	1	—	1	3	4	2	5	4	1	4	4	3	1	—	33
52—53	—	1	—	—	4	2	4	3	7	13	9	9	16	18	3	2	—	91
54—55	—	—	2	1	5	2	8	9	17	21	28	23	24	35	11	3	—	189
56—57	—	—	2	—	2	—	4	11	24	47	29	32	49	48	20	3	1	272
58—59	1	—	—	—	—	—	2	8	10	9	20	16	29	27	9	3	—	134
60—61	—	—	—	—	—	—	1	1	9·5	15·5	15	11	10	13	6	4	2	88
62—63	—	—	—	—	—	1	—	1	3	3	10	2	6	5	3	—	—	34
64—65	—	—	—	—	1	—	—	1	—	3	4	—	2	—	1	—	—	12
66—67	—	—	—	—	—	—	—	—	—	1	1	3	—	—	2	—	—	7
68—69	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1	—	2
70—71	—	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	—	2
72—73	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
74—75	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
76—77	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
Totals	1	1	4	2	12	7	23	38	73·5	117·5	123	99	140	150	58	17	3	869

TABLE XVIII. *Temperature in Morning and Temperature at Night. Davy's Data. England.*

Temperature at 12 p.m.

Temperature at 7—8 a.m.	97·2	97·3	97·4	97·5	97·6	97·7	97·8	97·9	98·0	98·1	98·2	98·3	98·4	98·5	98·6	98·7	Totals
98·1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
98·2	—	—	—	1	—	—	1	—	1	—	—	—	—	—	—	—	3
98·3	—	—	—	—	—	—	1	1	2	—	—	1	—	—	—	—	5
98·4	—	—	—	—	—	2	—	3	2	2	2	—	—	—	—	—	11
98·5	—	—	—	1	2	2	1	2	5	2	2	—	1	1	—	—	19
98·6	—	—	—	2	—	3	2	3	4	3	4	2	—	1	—	—	24
98·7	—	2	2	1	2·5	8	2	4	3	2	7	5	1	1	—	—	40·5
98·8	—	1	—	2	1·5	3	7	7	1	8	4	1	2	1	—	—	38·5
98·9	—	1	—	—	1	2	—	1	3	3	2	2	—	—	—	—	15
99·0	—	—	2	1	2	1	3	3	7	4	5	3	1	1	—	—	33
99·1	—	—	—	—	—	—	—	1	1	2	1	1	—	—	—	1	7
99·2	1	—	—	—	—	—	—	1	1	2	1	—	—	—	—	—	6
99·3	—	—	—	1	—	—	1	1	—	—	—	—	—	—	—	—	3
99·4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
99·5	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1
99·6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
99·7	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
99·8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
99·9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
100·0	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
Totals	1	4	4	9	9	21	19	28	30	30	28	15	5	5	0	1	209

TABLE XIX. *Temperature on two consecutive Days at same Time. Davy's Data. England. 7—8 a.m.*

Temperature on Following Day

Temperature on First Day	98·1	98·2	98·3	98·4	98·5	98·6	98·7	98·8	98·9	99·0	99·1	99·2	99·3	99·4	99·5	99·6	99·7	99·8	99·9	100·0	Totals
98·1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
98·2	—	—	—	—	—	—	1	2	—	—	—	—	—	—	—	—	—	—	—	—	3
98·3	—	—	—	—	—	—	1	1	1	2	—	—	—	—	—	—	—	—	—	—	5
98·4	—	1	—	1	3	—	1	3	—	3	—	—	—	—	—	—	—	—	—	—	12
98·5	—	—	—	1	3	3	5	3	1	2	—	—	1	—	—	—	—	—	—	—	19
98·6	—	1	2	2	5	3	3	5	—	5	1	2	—	—	—	—	—	—	—	—	29
98·7	—	—	—	4	1	8	10	11·5	4	3	—	1	—	—	1	—	—	—	—	—	43·5
98·8	—	—	—	2	7	7	8	7·5	6	4	1	—	—	—	—	—	—	—	—	—	42·5
98·9	1	—	—	—	—	4	2	1	1	2	—	2	1	—	—	—	—	—	—	—	14
99·0	—	—	1	1	1	3	7	5	—	11	2	2	—	—	—	—	—	—	—	—	33
99·1	—	—	—	—	1	—	1	—	1	2	1	—	—	—	—	—	1	—	—	—	7
99·2	—	—	1	—	—	—	1	3	—	1	1	—	—	—	—	—	—	—	—	—	7
99·3	—	1	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	3
99·4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
99·5	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
99·6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
99·7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
99·8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
99·9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
100·0	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1
Totals	1	3	4	11	21	29	41	44	14	35	7	7	2	0	1	0	1	0	0	1	222

TABLE XX. *Temperature in Morning and Temperature at Night. Davy's Data. Tropics.*

Temperature at 9—11 p.m.

Temperature at 6—7 a.m.	97·7	97·8	97·9	98·0	98·1	98·2	98·3	98·4	98·5	98·6	98·7	98·8	98·9	99·0	99·1	99·2	99·3	99·4	99·5	99·6	99·7	99·8	99·9	Totals
97·5	—	—	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	2
97·6	—	—	—	—	—	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	2
97·7	—	1	—	1	—	—	2	—	—	—	2	2	3	—	—	1	—	1	—	—	—	—	—	13
97·8	—	—	—	—	—	—	1	2	4	3	4	4	7	7	1	—	2	—	—	—	—	—	—	35
97·9	—	—	—	2	2	4	3	5	11	8	12	16	17	14·5	10	6	3	1	—	—	—	—	—	114·5
98·0	1	—	—	2	—	—	3	5	7	14	9	16	28	21·5	14	6	6	—	—	—	—	—	—	132·5
98·1	—	—	—	1	—	1	1	10	14	7	26	15	21	24	12	17	3	4	—	1	—	—	—	157·
98·2	—	—	—	—	2	3	3	4	13	18	10·5	20	26	18	14	14	7	6	1	3	1	—	—	163·5
98·3	—	—	—	—	2	—	—	5	10·5	7	19·5	22	8	9	5	6	5	2	—	1	—	—	3	105
98·4	—	1	—	—	—	—	—	1	1·5	4	12	8	9·5	8·5	2	4	2	—	1	—	—	—	—	54·5
98·5	—	—	—	—	—	—	—	—	4	2	—	6	6	4	3	2	5	—	—	—	—	—	—	32
98·6	—	—	—	—	—	—	—	1	—	1	—	1	1	2	—	—	—	—	—	—	—	—	—	6
98·7	—	—	—	—	—	·5	·5	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	2
98·8	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1
Totals	1	2	0	6	6	8·5	14·5	33	66	64	95	111	127·5	109·5	61	57	33	14	2	5	1	0	3	820

TABLE XXI. *Temperature on two Consecutive Days at same Time. Davy's Data. Tropics. 6—7 a.m.*

Temperature on Following Day

Temperature on First Day	97·5	97·6	97·7	97·8	97·9	98·0	98·1	98·2	98·3	98·4	98·5	98·6	98·7	98·8	Totals
97·5	—	—	—	1	—	—	—	1	—	—	—	—	—	—	2
97·6	—	—	—	—	2	—	—	—	—	—	—	—	—	—	2
97·7	—	—	—	2	3	1	2	4·5	·5	2	—	—	—	—	15
97·8	—	—	—	6	11	2	6	9	3	1	1	—	—	—	39
97·9	—	1	6	8	22	29	29	9·5	9	5	2	—	—	1	121·5
98·0	—	—	4	2	18·5	31·5	30	27·5	18	6	6	—	—	—	143·5
98·1	—	1	3	5	32	27	33	33	23	11	3	3	—	—	174
98·2	1	—	1·5	6	12	30	31	47	27	13	3	2	—	—	173·5
98·3	—	—	1·5	1	10	11	23	30	21	10·5	11	—	1	—	120
98·4	—	—	—	2	4	5	13	10	8	7·5	5	1	1	—	56·5
98·5	—	—	—	2	5	5	6	7	5	3	—	—	—	—	33
98·6	1	—	—	1	—	2	—	—	1	—	1	—	—	—	6
98·7	—	—	—	—	1	—	—	—	·5	·5	—	—	—	—	2
98·8	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1
Totals	2	2	16	37	120·5	143·5	173	178·5	116	59·5	32	6	2	1	889

TABLE XXII. *First Temperature and Interval between records. Dr Williams' Data. All Boys. Ages 12 and 13.*

First Temperature

Interval in Months	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	Totals
1	—	—	—	—	—	1	—	2	2	2	1	—	—	—	8
2	—	—	4	1	1	2·5	6	2·5	6	4	4·5	3·5	—	2	37
3	—	—	2	—	—	3	3	3	3	2	1	—	1	1	19
4	—	—	1	1	—	4	2	5	5	2	5	—	—	1	26
5	1	—	—	1	1	7	4·5	6·5	3	5·5	5	1·5	1	—	37
6	—	—	4	1	2·5	4	1·5	6·5	1·5	3	4·5	1·5	—	2	32
7	—	—	—	—	—	—	1·5	3	1·5	1·5	9	2·5	—	1	20
8	—	—	—	—	1	2	1	2	1	—	·5	·5	—	—	8
9	—	—	2	—	—	—	2	1	1	2	1	1	—	—	10
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
11	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
12	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1
13	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
Totals	1	0	13	4	5·5	23·5	22·5	31·5	24	23	32·5	10·5	2	7	200

TABLE XXIII. *Second Temperature and Interval between records. Dr Williams' Data. All Boys. Ages* 12 *and* 13.

Second Temperature

Interval in Months	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	Totals
1	—	—	—	—	—	1	—	1	3	1	2	—	—	—	—	—	8
2	—	—	5·5	1·5	—	5·5	3	3·5	4·5	5	5	1·5	—	2	—	—	37
3	—	—	—	—	—	2	4	3	4	3	2	—	1	—	—	—	19
4	—	—	—	1	—	5	3	4	3·5	3·5	4	1	1	—	—	—	26
5	1	1	2	1	1	7	3	9	8	1	2	—	—	—	—	1	37
6	—	—	—	3	—	9	2	7	5	3	2	1	—	—	—	—	32
7	—	—	—	—	—	2	—	6	6	3	3	—	—	—	—	—	20
8	—	—	—	1	—	1	1	3	—	1	1	—	—	—	—	—	8
9	—	—	—	—	—	—	3	1	3	1	1	—	—	1	—	—	10
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
11	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
12	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1
13	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
Totals	1	1	7·5	7·5	1	32·5	19	37·5	39	21·5	22	3·5	3	3	0	1	200

TABLE XXIV. *Difference in Temperature and Interval between records. Dr Williams' Data. All Boys. Ages* 12 *and* 13.

Interval in Months

Difference in Temperature, $t_1 - t_2$	>1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Totals
+1·4	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
+1·2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
+1·0	—	—	2	1	—	·5	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5·5
+ ·8	·5	—	2·5	—	2	2·5	4	2	1·5	1	—	—	—	1	—	—	—	1	—	—	—	—	—	—	18
+ ·6	·5	—	3·5	3	2	11	5	3	·5	—	1	1	3	—	—	—	1	—	—	—	—	—	—	—	34·5
+ ·4	—	1	3·5	1	8	5·5	5·5	4·5	1	2	1	—	2	1	—	—	—	—	—	—	—	—	—	—	36
+ ·2	·5	1	12·5	5	4	11·5	8·5	4·5	1	2	5	1	1	1	—	—	—	·5	—	—	—	—	—	—	59
0	·5	4	13	3	6	12·5	6·5	3·5	2	1	2	3	5	—	1	—	—	3	1	—	—	—	—	—	67
− ·2	1	—	4	4	9	3·5	6	9·5	2	1	—	1	1	1	—	—	—	1·5	—	—	—	—	—	·5	45
− ·4	1	1	3·5	2	2·5	4	2·5	—	1	1	—	1	1	—	—	—	—	—	—	—	—	—	—	·5	21
− ·6	—	1	3·5	2	2·5	5	4	1	1	1	—	1·5	2	—	—	—	—	—	—	—	—	—	—	—	24·5
− ·8	—	—	2	1	2	1	·5	—	—	1	—	·5	—	—	—	—	—	—	·5	—	—	—	—	—	8·5
−1·0	—	—	2	—	1	—	1·5	—	—	—	—	—	—	—	—	—	—	—	·5	—	—	—	—	—	5
−1·2	—	—	—	1	—	1	1	—	—	2	—	—	1	—	—	—	—	—	—	—	—	—	—	—	6
−1·4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
−1·6	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Totals	4	8	52	23	39	60	45	30	10	12	9	9	16	4	1	0	1	6	2	0	0	0	0	1	332

TABLE XXV. *Difference in Temperature and Interval between records. All Girls. Ages 12 and 13. Dr Williams' Data.*

Interval in Months

Difference in Temperature, $t_1 - t_2$	>1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Totals
+1·4	—	1	1	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	4
+1·2	1	—	—	—	—	1	·5	2	—	—	—	—	—	—	—	—	—	—	—	4·5
+1·0	1·5	1	1	5	—	1	4·5	·5	—	—	—	2	—	—	1	—	—	—	—	17·5
+ ·8	2·5	3	3	2	2	2·5	3·5	2	1·5	—	1	2	1	—	—	—	—	—	—	26
+ ·6	2	3·5	12·5	6	4	9·5	10	5	2	—	1	6·5	—	1	1	—	—	—	—	64
+ ·4	6	5·5	12·5	8·5	6·5	19·5	10·5	9	2	3	1	7·5	2	1	—	—	4	1	—	99·5
+ ·2	5·5	6	22·5	4	4·5	23·5	13	13·5	7·5	3·5	2	8·5	—	—	—	—	3	2	1	120
0	4	19	19·5	10	4	24·5	17·5	8	5	1·5	7	8·5	4	2	1	1	—	1·5	3	141
− ·2	4·5	7·5	20·5	7	2	7·5	11	10	4·5	1	4	2	2	—	1	—	2	2·5	—	89
− ·4	1·5	3·5	8	2·5	6	7·5	8·5	2·5	1·5	1·5	—	2	4	—	1	—	1	—	—	51
− ·6	1·5	1	5·5	3·5	3	3·5	3	·5	5	1·5	—	1	1	3	1	—	1	—	—	35
− ·8	—	—	1	2·5	1	2	2	—	2·5	—	—	—	—	—	—	—	—	—	—	11
−1·0	—	·5	1	—	—	—	1	3	1·5	—	—	—	—	1	—	—	—	—	—	8
−1·2	1	·5	—	1	1	1	1	—	—	1	—	—	—	—	—	—	—	—	—	6·5
−1·4	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
−1·6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
−1·8	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Totals	31	52	109	53	34	103	86	56	33	13	16	42	14	8	6	1	11	7	4	679

TABLE XXVI. *First and Second Temperatures. All Boys. Ages 12 and 13. Dr Williams' Data.*

Second Temperature

First Temperature	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	Totals
98·0	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
98·2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
98·4	—	—	3	5	—	5	3	—	3	—	—	—	—	—	—	—	19
98·6	1	—	2	2	—	·5	—	1	·5	—	—	—	—	—	—	—	7
98·8	—	—	·5	1·5	1	1·5	1	1	1·5	·5	1	—	—	—	—	—	9·5
99·0	—	—	3	2	—	13	3	5	4	·5	2	—	—	—	—	—	32·5
99·2	—	—	2	—	—	5·5	6·25	11·75	2	5	2	—	1	—	—	—	35·5
99·4	—	—	—	3	—	9·5	8·25	10·75	7·5	1	8	—	—	1	—	1	50
99·6	—	—	—	—	—	7	4	14	13·5	5·5	10	1	—	2	—	—	57
99·8	—	—	1	—	—	4	2	2·5	12·5	7·5	5·5	·5	—	—	—	—	35·5
100·0	—	—	—	—	—	3·25	1·75	13·5	13	10·75	8·75	3·5	1	—	—	—	55·5
100·2	—	—	—	—	—	·25	·75	5	4·5	2·75	1·75	·5	—	—	—	—	15·5
100·4	—	—	—	—	—	—	—	—	—	2	1	—	—	—	—	—	3
100·6	—	—	—	—	—	—	—	—	1	3	1	1	2	—	—	—	8
100·8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
101·0	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
Totals	1	1	11·5	13·5	1	49·5	30	64·5	64	38·5	41	6·5	4	3	0	1	330

TABLE XXVII. *First and Second Temperatures. All Girls. Ages* 12 *and* 13. *Dr Williams' Data.*

Second Temperature

First Temperature	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2	Totals
98·0	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
98·2	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	2
98·4	—	—	4	1	—	4·5	3·5	3	3	—	—	—	—	—	—	—	—	19
98·6	—	—	1	1	1·5	3	3·5	—	—	1	—	—	—	—	—	—	—	11
98·8	—	—	—	2	2·5	7	3	2·5	—	1·5	·5	—	—	—	—	—	—	19
99·0	—	—	2	2	4	21	14·5	7	3·5	3·5	1·5	—	—	—	1	—	—	60
99·2	—	—	—	3	1	14·5	14·5	16	7	5·5	2	—	—	—	—	—	—	63·5
99·4	—	—	—	—	·5	8·5	9·25	14·75	9·5	3·5	7	1	—	—	—	—	—	54
99·6	—	—	—	—	—	6	14·25	20·25	36·75	11·25	19·5	4·5	—	1	—	—	—	113·5
99·8	—	—	1	—	·5	2·5	8	9·5	27·25	15·25	14	4	1	1	—	1	—	85
100·0	—	—	—	—	—	5	5	14·25	35	21·5	21·5	8·75	2	1·5	—	—	—	114·5
100·2	—	—	—	—	—	1	3·5	8·25	14·5	20	15	7·75	3·5	·5	—	—	—	74
100·4	—	—	—	—	—	1	—	4·5	5	10·5	2·5	5	2	—	—	—	—	30·5
100·6	—	—	—	—	—	—	—	2·5	1	2	3·5	3·5	1	—	—	—	—	13·5
100·8	—	—	—	—	—	—	—	—	—	1·5	1	—	—	1·5	—	—	—	4
101·0	—	—	—	—	—	—	—	—	2	—	—	—	—	1·5	—	—	—	3·5
101·2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
Totals	3	0	8	9	10	74	80	102·5	145·5	97	88	34·5	9·5	7	1	1	1	671

TABLE XXVIII. *First and Second Temperatures. Normal Boys. Ages* 12 *and* 13. *Dr Williams' Data.*

Second Temperature

First Temperature	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	Totals
98·0	—	1	—	—	—	—	—	—	—	—	—	1
98·2	—	—	—	—	—	—	—	—	—	—	—	0
98·4	—	—	3	4	—	5	3	—	1	—	—	16
98·6	1	—	1	1	—	—	—	1	—	—	—	4
98·8	—	—	·5	1·5	1	1	1	1	1	—	1	8
99·0	—	—	2	—	—	8·5	2	4	2	—	—	18·5
99·2	—	—	2	—	—	3	—	4	—	1	2	12
99·4	—	—	—	2	—	3·5	—	1	·5	—	1	8
99·6	—	—	—	—	—	—	—	—	·5	—	—	·5
99·8	—	—	—	—	—	—	—	—	—	—	—	0
100·0	—	—	—	—	—	—	—	1	—	—	—	1
Totals	1	1	8·5	8·5	1	21	6	12	5	1	4	69

TABLE XXIX. *First and Second Temperatures. Normal Girls. Ages 12 and 13. Dr Williams' Data.*

Second Temperature

First Temperature	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	Totals
98·0	3	—	—	—	—	—	—	—	—	—	—	3
98·2	—	—	—	—	—	—	—	—	—	—	—	0
98·4	—	—	3	1	—	2·5	3·5	3	3	—	—	16
98·6	—	—	—	—	1·5	1·5	1	—	—	—	—	4
98·8	—	—	—	2	2·5	7	3	2·5	—	·5	·5	18
99·0	—	—	2	2	2·5	11·5	6	4	—	2	1	31
99·2	—	—	—	3	—	7	2·5	4	3	1	1	21·5
99·4	—	—	—	—	·5	3·5	1	3·5	2	—	1	11·5
99·6	—	—	—	—	—	·5	2	·5	3	—	—	6
99·8	—	—	—	—	—	—	1·5	1	·5	—	—	3
100·0	—	—	—	—	—	—	1	—	·75	·25	—	2
100·2	—	—	—	—	—	—	·5	—	·25	·25	—	1
Totals	3	0	5	8	7	33·5	22	18·5	12·5	4	3·5	117

TABLE XXX. *First and Second Temperatures. Pathological Boys. Ages 12 and 13. Dr Williams' Data.*

Second Temperature

First Temperature	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	Totals
98·4	—	1	—	—	—	—	2	—	—	—	—	—	—	—	3
98·6	1	1	—	·5	—	—	·5	—	—	—	—	—	—	—	3
98·8	—	—	—	·5	—	—	·5	·5	—	—	—	—	—	—	1·5
99·0	1	2	—	4·5	1	1	2	·5	2	—	—	—	—	—	14
99·2	—	—	—	2·5	6·25	7·75	2	4	—	—	1	—	—	—	23·5
99·4	—	1	—	6	8·25	9·75	7	1	7	—	—	1	—	1	42
99·6	—	—	—	7	4	14	13	5·5	10	1	—	2	—	—	56·5
99·8	1	—	—	4	2	2·5	12·5	7·5	5·5	·5	—	—	—	—	35·5
100·0	—	—	—	3·25	1·75	12·5	13	10·75	8·75	3·5	1	—	—	—	54·5
100·2	—	—	—	·25	·75	5	4·5	2·75	1·75	·5	—	—	—	—	15·5
100·4	—	—	—	—	—	—	—	2	1	—	—	—	—	—	3
100·6	—	—	—	—	—	—	1	3	1	1	2	—	—	—	8
100·8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
101·0	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
Totals	3	5	0	28·5	24	52·5	59	37·5	37	6·5	4	3	0	1	261

TABLE XXX *bis*. *Temperature and Pathological Condition. Boys and Girls. Ages 12 and 13. Dr Williams' Data.*

Temperature

Pathological Condition		98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2	101·4	101·6	101·8	102·0	Totals
Boys	Rh. & ? Rh.	—	1	15·5	5·5	1·5	36·5	58·5	87	125	64·5	101	40	10	14·5	1·5	1	—	—	—	—	1	564
	Ph. & ? Ph.	1	—	8	6	—	37·5	48·5	90·5	124	110·5	102	45	15	14	—	4	—	—	—	—	—	606
	N.	4	2	53·5	25	20·5	84	55·5	35	9·5	1	5	1	—	—	—	—	—	—	—	—	—	296
	Totals	5	3	77	36·5	22	158	162·5	212·5	258·5	176	208	86	25	28·5	1·5	5	—	—	—	—	1	1466
Girls	Rh. & ? Rh.	1	1	9	8	3·5	53·5	64·5	95	163	130·5	189·5	86·5	32	21	4·5	7·5	1	—	1	—	—	872
	Ph. & ? Ph.	—	—	8	—	3·5	34·5	42·5	100	157	140	122·5	79·5	35	12	4·5	3	2	—	—	—	—	744
	N.	5	—	35	14·5	32·5	92·5	71·5	42·5	22	8	8	1·5	—	1	—	—	—	—	—	—	—	334
	Totals	6	1	52	22·5	39·5	180·5	178·5	237·5	342	278·5	320	167·5	67	34	9	10·5	3	—	1	—	—	1950

TABLE XXXI. *First and Second Temperatures. Pathological Girls. Ages 12 and 13. Dr Williams' Data.*

Second Temperature

First Temperature	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2	Totals
98·2	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	2
98·4	1	—	—	2	—	—	—	—	—	—	—	—	—	—	—	3
98·6	1	1	—	1·5	2·5	—	—	1	—	—	—	—	—	—	—	7
98·8	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
99·0	—	—	1·5	9·5	8·5	3	3·5	1·5	·5	—	—	—	1	—	—	29
99·2	—	—	1	7·5	12	12	4	4·5	1	—	—	—	—	—	—	42
99·4	—	—	—	5	8·25	11·25	7·5	3·5	6	1	—	—	—	—	—	42·5
99·6	—	—	—	5·5	12·25	19·75	33·75	11·25	19·5	4·5	—	1	—	—	—	107·5
99·8	1	—	·5	2·5	6·5	8·5	26·75	15·25	14	4	1	1	—	1	—	82
100·0	—	—	—	5	4	14·25	34·25	21·25	21·5	8·75	2	1·5	—	—	—	112·5
100·2	—	—	—	1	3	8·25	14·25	19·75	15	7·75	3·5	·5	—	—	—	73
100·4	—	—	—	1	—	4·5	5	10·5	2·5	5	2	—	—	—	—	30·5
100·6	—	—	—	—	—	2·5	1	2	3·5	3·5	1	—	—	—	—	13·5
100·8	—	—	—	—	—	—	—	1·5	1	—	—	1·5	—	—	—	4
101·0	—	—	—	—	—	—	2	—	—	—	—	1·5	—	—	—	3·5
101·2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
Totals	3	1	3	40·5	58	84	133	93	84·5	34·5	9·5	7	1	1	1	554

TABLE XXXII. *Temperature and School. All Girls. Ages 12 and 13. Dr Williams' Data.*

Temperature

School	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2	Totals
A	—	—	—	—	5	7	6·5	13·5	10	14·5	5·5	4	5	1	2	—	74
B	—	—	1	—	17	4	4·5	8·5	2	7	1	—	—	—	—	—	45
C	—	3	—	—	2	3	12·5	19·5	3	12	1	—	—	—	—	—	56
D	—	3	—	2	9·5	8·5	11	6	7·5	12	6·5	3	—	—	—	—	69
E	—	—	—	—	—	4	3·5	2·5	2	7·5	2·5	—	—	—	—	—	22
F	—	1	2	·5	3·5	3	5	8·5	5	5·5	2	4	1	—	—	—	41
G	—	—	—	—	1	2	7	1	2	8	3	—	1	—	—	—	25
H	—	2	—	—	1	2	2	8	9	4	4	2	—	—	—	—	34
J	—	1	—	1	7·5	6·5	6·5	14·5	11·5	15·5	7·5	2·5	1	—	—	—	75
K	—	—	1	—	2	—	3	5	7	2	4	1	—	—	—	—	25
L	1	1	1	4	3	5	9·5	10	3·5	4	—	—	1	—	—	1	44
M	—	1	1	—	4	3	5	5	3	6	2	1	—	—	—	—	31
Totals	1	12	6	7·5	55·5	48	76	102	65·5	98	39	17·5	9	1	2	1	541

TABLE XXXIII. *Temperature and School. All Boys. Ages 12 and 13. Dr Williams' Data.*

Temperature

School	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	Totals
A	3	1	7	3	2	8	9	7	14	14	4·5	·5	2	3	—	1	79
B	1	—	2	1	—	6·5	1·5	4	14	3	7	2	—	—	—	2	44
C	—	—	2	2	1	11	11	12	17	12·5	10·5	2	1	—	—	—	82
D	—	—	1	—	—	5	2	6	5	3	1	—	—	—	—	—	23
E	—	—	1	3	1	4	2	4	4	1·5	2	·5	—	—	—	—	23
F	—	—	—	—	—	3	3	6	8	5	4·5	2·5	1	3	—	—	36
G	—	—	1	1	—	2	3	4	5	2·5	1·5	—	—	2	—	—	22
H	—	—	1	—	1	1	3	4	3	5	6	1	—	—	—	—	25
J	—	—	—	—	—	2·5	·5	—	1	—	·5	·5	—	—	—	—	5
K	—	—	—	—	1	—	—	2	—	4	4	—	—	—	—	—	11
L	—	—	6	2	1	1	2	3	7	2	1	—	—	—	—	—	25
M	—	—	2	3	—	4	5	7	10	—	5	1	—	—	—	—	37
Totals	4	1	23	15	7	48	42	59	88	52·5	47·5	10	4	8	0	3	412

TABLE XXXIV. *Worcestershire Girls. Dr Williams' Data.*

Temperature

Age	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2	101·4	101·6	101·8 —102·6	102·8	103·0	Totals
3—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
4—	—	—	—	—	—	—	—	—	2	3	—	2	—	2	1	—	—	—	—	—	—	—	—	10
5—	1	—	—	1	—	—	2	6	8	14	9	8	3	4	—	—	1	—	—	—	—	—	—	57
6—	—	—	—	2	1·5	·5	1	4	5	10	8	23	6	4	3	1	—	1	1	—	—	—	—	71
7—	—	1	—	—	—	—	3	3·5	7·5	16·5	10	24	7·5	4	—	—	—	—	—	—	—	—	1	78
8—	—	—	—	1	1	1	2	4	8	13	12	26·5	9·5	6	1	—	—	—	—	—	—	1	—	86
9—	—	—	—	—	—	4	1	6	9	19	17·5	25	14·5	8	2	1	1	—	—	—	—	—	—	108
10—	—	—	—	1	3	·5	7·5	4·5	8·5	16	16	29	6	1	—	—	1	—	—	—	—	—	—	94
11—	—	—	—	—	2	2·5	7·5	14	15	27·5	14·5	22	9	7	2	—	2	—	—	—	—	—	1	126
12—	—	5	1	43·5	17	33·5	161	150·5	199·5	297·5	239	298·5	152	59	28·5	6	9·5	3	—	1	—	—	—	1705
13—	—	1	—	9·5	5·5	7	24·5	33	46·5	59	43·5	40·5	21	9·5	5·5	3	1	—	—	—	—	—	—	310
14—	—	—	—	1	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
Totals	1	7	1	59	30	50	210·5	225·5	309	475·5	369·5	498·5	228·5	104·5	44	11	15·5	4	1	1	0	1	2	2649

TABLE XXXV. *Worcestershire Girls. All ages. Dr Williams' Data.*

Temperature

Height in Inches

	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2	101·4	101·6	101·8—102·6	102·8	103·0	Totals
35—36	1	—	—	—	—	—	—	—	2	2	—	4	—	1	1	—	—	—	—	—	—	—	—	11
37—38	—	—	—	—	—	—	—	—	1	—	—	2	—	—	1	—	—	—	—	—	—	—	—	4
39—40	—	—	—	1	—	—	1	—	5	3	1	6	—	—	—	—	—	—	—	—	—	—	—	17
41—42	—	—	—	2	—	—	1	3	4	8	7	7	1	5	1	—	1	—	—	—	—	—	—	40
43—44	—	—	—	—	1·5	3·5	1	5	3	18	10	15·5	5·5	7	2	—	—	—	—	—	—	—	—	72
45—46	—	—	—	—	—	1	2	1	4	8·5	4	10	4·5	2	—	—	—	—	1	—	—	1	—	39
47—48	—	—	—	1	—	1	3	2	4	13	5	16	13	3	—	—	1	—	—	—	—	—	—	62
49—50	—	—	—	1	1	—	7	7·5	11	24	14	30·5	14·5	5	4	—	—	—	—	—	—	—	—	119·5
51—52	—	1	—	5	1	3	15	12·5	20	22·5	29	48	21	11	4	1	3	—	—	—	—	—	—	197
53—54	—	—	1	7	3	5·5	32	18·5	31·5	63	48·5	62·5	37·5	15·5	5·5	1	3	—	—	1	—	—	1	337
55—56	—	1	—	19	7	7·5	26	34	43	64·5	48·5	77	29	13·5	11	2	3	1	—	—	—	—	—	387
57—58	—	2	—	3	2	6	22	33	27·5	44·5	30	48	30·5	11·5	3	2	—	1	—	—	—	—	—	266
59—60	—	1	—	8	2	5·5	15·5	20	25·5	24·5	29·5	26·5	15·5	8	2	—	2	—	—	—	—	—	—	185·5
61—62	—	—	—	1	1·5	2·5	2	3	7	6·5	7·5	7·5	6·5	4	2·5	2	·5	—	—	—	—	—	—	54
63—64	—	—	—	—	—	—	4	3	2	—	3	3	1	—	—	1	—	—	—	—	—	—	—	17
65—66	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	2
67—68	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	2
69—70	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
71—72	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Totals	1	5	1	48	19	35·5	131·5	143·5	191·5	303	237	363·5	179·5	88·5	37	9	13·5	2	1	1	0	1	1	1813

TABLE XXXVI. *Worcestershire Girls. All ages. Dr Williams' Data.*

Temperature

Weight in lbs.

	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2	101·4	101·6—102·6	102·8	103·0	Totals
26—29	1	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	3
30—33	—	—	—	1	—	—	—	—	2	1	—	—	—	—	2	—	—	—	—	—	—	—	6
34—37	—	—	—	1	—	—	1	1	3	3	4	7	—	2	—	—	—	—	—	—	—	—	22
38—41	—	—	—	—	—	—	2	6	4	10·5	7·5	9·5	3·5	6	2	—	1	—	—	—	—	—	52
42—45	—	—	—	1	1	2	1	3	4	13	5	14	6	6	2	—	—	—	1	—	—	—	59
46—49	—	1	—	—	·5	2·5	4	·5	6·5	11	8	19	7	2	—	1	—	—	—	—	1	—	64
50—53	—	—	—	1	—	—	4	4	4	15	9	16	10	3	—	—	—	—	—	—	—	—	66
54—57	—	—	—	2	1	1·5	6	5·5	6·5	22	4·5	20	15	7	3	—	4	—	—	—	—	—	98
58—61	—	—	—	4	2	2	7	4	10	28	23	41·5	19	6·5	2	—	1	—	—	—	—	—	150
62—65	—	—	1	5	4	1	16·5	11	22	29	29·5	41	20	6	4	1	—	—	—	—	—	1	192
66—69	—	—	—	6	1	3	14	17	21·5	33	33	32·5	14·5	10	6·5	1	2	1	—	—	—	—	196
70—73	—	—	—	7	2	4·5	20	17	24	51·5	21	41·5	23	8·5	3	—	2	1	—	—	—	—	226
74—77	—	—	—	3	4	3	14	19	24·5	20·5	22·5	36·5	17	7	5	—	1	—	—	—	—	—	177
78—81	—	2	—	9	—	4	11	15·5	17	18·5	26	30·5	17	11	3·5	1	1	—	—	—	—	—	167
82—85	—	1	—	3	1	4·5	9	10·5	14	18	12	19	10	2·5	2	2·5	—	—	—	—	—	—	109
86—89	—	—	—	1	2	1	6·5	14	12	14·5	15	11·5	6·5	6	1	—	—	—	—	—	—	—	91
90—93	—	1	—	1	—	2	6·5	6·5	7	6·5	9·5	4·5	9·5	2	1	—	1	—	—	—	—	—	58
94—97	—	—	—	1	—	2	2	2	5	4·5	4·5	10·5	·5	3	—	—	—	—	—	—	—	—	35
98—101	—	—	—	1	—	1	—	3	3	2	2	3	1	1	1	2	—	—	—	—	—	—	20
102—105	—	—	—	—	—	—	1	—	—	—	1	—	—	—	—	·5	·5	—	—	—	—	—	3
106—109	—	—	—	—	—	—	1	—	—	—	—	4	—	—	—	—	—	—	—	—	—	—	5
110—113	—	—	—	—	—	1	1	—	·5	·5	—	—	—	—	—	—	—	—	—	—	—	—	3
114—117	—	—	—	1	·5	·5	—	—	1	1	1	—	—	—	—	—	—	—	—	—	—	—	5
118—121	—	—	—	—	—	—	1	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—	4
Totals	1	5	1	48	19	35·5	128·5	140·5	192·5	306	238	361·5	179·5	89·5	38	9	13·5	2	1	0	1	1	1811

TABLE XXXVII. *Worcestershire Girls. Age 12. Dr Williams' Data.*

Temperature

Height in Inches

	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2	101·4	101·6	Totals
47—48	—	—	—	—	1	—	1	3	3	1	1·5	4·5	1	—	—	—	—	—	—	16
49—50	—	—	1	—	—	5	—	6·5	14	7·5	16·5	9	4	3	—	—	—	—	—	66·5
51—52	—	—	5	—	3	10	7·5	15	14·5	20	30	13	6	3	—	3	—	—	—	130
53—54	—	1	7	3	5·5	30	16·5	24	51·5	41·5	51·5	32·5	14·5	4·5	1	2	—	—	1	290
55—56	1	—	17	6	6	23·5	27·5	35·5	50	46·5	69·5	24·5	12·5	10	2	2	1	—	—	334·5
57—58	2	—	2	1	5	18	27·5	22·5	35	26	39	27	7	2·5	2	—	1	—	—	217·5
59—60	1	—	5	—	4·5	12·5	18	19·5	17	23·5	23·5	11	7	1	—	1	—	—	—	144·5
61—62	—	—	—	1·5	1·5	1	3	4	5·5	6·5	5·5	6·5	2	2·5	1	·5	—	—	—	41
63—64	—	—	—	—	—	2	1	1	—	2	2	1	—	—	—	—	—	—	—	9
65—66	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1
67—70	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
71—72	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
Totals	4	1	37	11·5	26·5	102	103	131	194·5	174·5	239	129	54	26·5	6	8·5	2	0	1	1251

The totals are the same in Tables XXXVII and XXXVIII, but the individuals are not in every case the same as height is occasionally given without weight and vice versâ.

TABLE XXXVIII. *Worcestershire Girls. Age 12. Dr Williams' Data.*

Temperature

Weight in lbs.

	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2	101·4	101·6	Totals
42—45	—	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	—	—	—	2
46—49	—	—	—	—	1	1	—	—	1	2	—	—	—	—	—	—	—	—	—	5
50—53	—	—	—	—	—	—	1	1	5	2	6·5	4·5	—	—	—	—	—	—	—	20
54—57	—	—	2	—	1·5	4	·5	5·5	12·5	1	9	10	5	2	—	3	—	—	—	56
58—61	—	—	4	2	1	6	1	8	16	14·5	23	14	2·5	1	—	—	—	—	1	94
62—65	—	1	4	2	1	15·5	11	14	24	24·5	30	15	5	4	1	—	—	—	—	152
66—69	—	—	6	1	3	13	13	18·5	25·5	30	29	13·5	10	5·5	1	2	1	—	—	172
70—73	—	—	6	2	4	18·5	15	19	44·5	21	36·5	20	7·5	3	—	1	1	—	—	199
74—77	—	—	3	3	3	10	18	21	17	21·5	33	14·5	7	4	—	1	—	—	—	156
78—81	2	—	8	—	4	11	11	14	14	23	27	14·5	8	2·5	1	1	—	—	—	141
82—85	1	—	2	1	3·5	6	10·5	11	16	10	17	9	1	1·5	2·5	—	—	—	—	92
86—89	—	—	—	—	—	6·5	11·5	8	11	13	10	5	4	1	—	—	—	—	—	70
90—93	1	—	—	—	1	4·5	4·5	6	5	6	3·5	7·5	1	1	—	—	—	—	—	41
94—97	—	—	1	—	2	1	1	4	1	2	8·5	·5	3	—	—	—	—	—	—	24
98—101	—	—	1	—	1	—	2	2	1	2	1	1	—	1	—	—	—	—	—	12
102—105	—	—	—	—	—	1	—	—	—	1	—	—	—	—	·5	·5	—	—	—	3
106—109	—	—	—	—	—	1	—	—	—	—	4	—	—	—	—	—	—	—	—	5
110—113	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
114—117	—	—	—	·5	·5	—	—	—	1	1	—	—	—	—	—	—	—	—	—	3
118—121	—	—	—	—	—	1	1	—	1	—	—	—	—	—	—	—	—	—	—	3
Totals	4	1	37	11·5	26·5	102	101	132	195·5	174·5	239	129	54	26·5	6	8·5	2	0	1	1251

TABLE XXXIX. *Worcestershire Girls. Ages* 12 *and* 13. *Dr Williams' Data.*

Temperature

No. in Family

	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2	101·4	101·6	Totals
1	—	—	—	—	—	3	3	2	10	5	8	2	—	2	—	—	1	—	—	36
2	—	—	1	2	—	5	9	11	21	12	19	8·5	2·5	4	1	2	—	—	—	98
3	3	—	1	1	2	4	12	13	20	19	22	11	1	3	—	1	—	—	—	113
4	—	—	3	1	3	10	15	15·5	33·5	33	30	6	6	—	2	1	—	—	—	159
5	1	—	—	—	—	13	13	13	31	19	24	15	7	3	—	—	—	—	—	139
6	—	—	3	1	—	17	10	15·5	28·5	14	14	12	6	1	—	1	—	—	1	124
7	—	—	2	—	—	9	12	20	20	8·5	20·5	7	3	2	1	2	—	—	—	107
8	—	—	—	1	1	6	5	15	11	10	20·5	8·5	4	3	—	—	2	—	—	87
9	—	—	1	—	—	10	5	13	5	6	11	4	2	—	—	—	—	—	—	57
10	—	—	—	—	—	4	8	6	12	8	8	4	1	1	—	1	—	—	—	53
11	—	—	—	—	—	5	3	4	6	3	7	1	2	1	—	—	—	—	—	32
12	—	—	—	1	1	5	3	6	1	4	3	4	1	2	1	2	—	—	—	34
13	—	—	—	—	—	2	1	—	4	2	4	2	1	1	—	—	—	—	—	17
14	—	—	—	—	—	·5	·5	2	2	—	—	—	—	—	—	—	—	—	—	5
15	—	—	—	—	—	—	1	—	—	—	1	1	—	—	—	—	—	—	—	3
16	—	—	—	—	—	—	—	1	—	—	1	—	—	—	—	—	—	—	—	2
17	—	—	—	—	—	—	—	1	—	—	2	—	—	—	—	—	—	—	—	3
Totals	4	0	11	7	7	93·5	100·5	138	205	143·5	195	86	36·5	23	5	10	3	0	1	1069

TABLE XL. *Worcestershire Girls. Ages* 12 *and* 13. *Dr Williams' Data.*

Temperature

Position in Family

	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2	Totals
1st	—	2	1	11	13	15	22	23	25	5	—	5	—	1	—	123
2nd	2	1	—	4	12	14	22	17	9	12	2	—	—	—	—	95
3rd	4	1	—	5	8	4	12	15	11	8	2	—	—	1	—	71
4th	1	—	—	3	5	6	10	4	12	4	1	—	—	—	—	46
5th	—	—	—	4	2	6	7	5	8	1	—	1	—	—	—	34
6th	—	2	—	5	4	7	5	3	5	2	3	1	—	—	—	37
7th	—	—	—	2	6	4	4	—	3	4	—	—	1	2	—	26
8th	—	—	2	5	—	2	1	3	2	3	—	1	—	—	2	21
9th	—	—	—	1	3	3	—	1	2	—	—	1	1	—	—	12
10th	—	—	—	1	2	1	1	—	—	1	—	—	—	—	—	6
11th	—	—	—	2	—	1	—	—	2	—	—	—	—	—	—	5
12th	—	—	—	—	1	2	1	3	1	—	—	—	—	—	—	8
13th	—	—	—	—	—	1	—	—	—	—	—	1	—	—	—	2
14th	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	2
15th	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1
16th	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
Totals	7	6	3	43	56	69	85	74	81	40	8	10	2	4	2	490

TABLE XLI. *Worcestershire Girls. Dr Williams' Data.*

Height in Inches

Age	35—36	37—38	39—40	41—42	43—44	45—46	47—48	49—50	51—52	53—54	55—56	57—58	59—60	61—62	63—64	65—66	67—68	69—70	71—72	Totals
3	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
4	1	5	4	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13
5	6	—	10	21	15	1	—	—	—	—	—	—	—	—	—	—	—	—	—	53
6	4	—	5	17	25	4	3	—	1	—	—	—	—	—	—	—	—	—	—	59
7	—	2	3	4	16	15	9	7	2	—	—	—	—	—	—	—	—	—	—	58
8	—	—	—	1	14	10	12	9	5	1	1	2	—	—	—	—	—	—	—	55
9	—	—	—	—	9	7	18	18	12	3	3	—	—	—	—	—	—	—	—	70
10	—	—	—	—	—	1	2	11	25	10	1	1	1	—	—	—	—	—	—	52
11	—	1	—	1	—	1	5	6	22	19	14	6	4	1	—	—	1	—	—	81
12	—	—	—	—	—	·5	17·5	71	141	308·5	345·5	224·5	148·5	45	10	1	—	—	1	1314
13	—	—	—	—	—	1	—	4	4	15	33·5	42·5	37	12	8	1	—	—	—	158
14	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
Totals	12	8	22	46	80	40·5	66·5	126	212	356·5	398	276	191·5	58	18	2	1	0	1	1915

TABLE XLII. *Worcestershire Girls. Dr Williams' Data.*

Weight in lbs.

Age	26—29	30—33	34—37	38—41	42—45	46—49	50—53	54—57	58—61	62—65	66—69	70—73	74—77	78—81	82—85	86—89	90—93	94—97	98—101	102—105	106—109	110—113	114—117	118—121	Totals
3—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
4—	—	5	4	2	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13
5—	3	1	11	22	12	2	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	53
6—	—	3	6	18	17	12	1	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	60
7—	—	1	6	9	10	9	15	5	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	57
8—	—	—	1	7	11	14	11	7	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	55
9—	—	—	—	1	10	12	17	4	15	10	1	1	—	—	—	—	—	—	—	—	—	—	—	—	71
10—	—	—	—	—	2	5	3	10	16	9	5	—	—	1	1	—	—	—	—	—	—	—	—	—	52
11—	—	—	—	—	—	3	4	11	15	13	8	8	7	5	6	1	1	—	—	—	—	—	—	—	82
12—	—	—	—	—	2	6	22	56	102	164	182	202	165	149	96	72	42	25	13	3	5	2	3	3	1314
13—	—	—	—	—	—	1	—	4	3	9	12	16	17	23	12	21	16	12	8	—	—	1	2	1	158
14—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	1
Totals	3	11	28	59	65	65	74	98	159	206	208	227	189	178	115	94	59	37	21	3	5	4	5	4	1917

TABLE XLIII. *Worcestershire Girls. All Ages. Dr Williams' Data.*

Weight in lbs.

Height in Inches	26—29	30—33	34—37	38—41	42—45	46—49	50—53	54—57	58—61	62—65	66—69	70—73	74—77	78—81	82—85	86—89	90—93	94—97	98—101	102—105	106—109	110—113	114—117	118—121	Totals
35—36	2	3	3	—	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12
37—38	—	4	2	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8
39—40	—	3	11	6	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	21
41—42	1	1	10	25	5	3	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	46
43—44	—	—	2	26	33	16	3	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	81
45—46	—	—	—	2	13	14	9	1	2·5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	41·5
47—48	—	—	—	—	3	12	27	13	8·5	—	—	1	—	—	1	—	—	—	—	—	—	—	—	—	65·5
49—50	—	—	—	—	1	10·5	26	34·5	31	18	5	1	—	—	—	—	—	—	—	—	—	—	—	—	127
51—52	—	—	—	—	1	8·5	7	33·5	58	52·5	34·5	10	4	2	1	—	—	—	—	—	—	—	—	—	212
53—54	—	—	—	—	2	1	1	10	47	88	83·5	66	40	9	5	—	4	—	—	—	—	—	—	—	356·5
55—56	—	—	—	—	1	—	—	3	6	34·5	63	103	81	61	31	10	2·5	3	—	—	—	—	—	—	399
57—58	—	—	—	—	—	—	1	1	3	8	17	38	45	69	38	30·5	13·5	10	2	—	—	—	—	—	276
59—60	—	—	—	—	—	—	—	1	1	4	4	9	17	37	27	40·5	25	14	6	1	2	2	2	—	192·5
61—62	—	—	—	—	—	—	—	—	—	—	—	—	2	—	12	11	10	9	5	2	1	1	2	3	58
63—64	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1	3	1	7	—	2	1	—	1	17
65—66	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1	—	2
67—68	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	2
69—70	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
71—72	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1
Totals	3	11	28	60	63	66	74	98	159	206	209	228	189	178	115	93	59	37	21	3	5	4	5	4	1918

TABLE XLIV. *Worcestershire Girls. Age 12. Dr Williams' Data.*

Weight in lbs.

Height in Inches	42—45	46—49	50—53	54—57	58—61	62—65	66—69	70—73	74—77	78—81	82—85	86—89	90—93	94—97	98—101	102—105	106—109	110—113	114—117	118—121	Totals
45—46	—	—	—	—	·5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·5
47—48	—	—	9	3	3·5	—	—	1	—	—	1	—	—	—	—	—	—	—	—	—	17·5
49—50	—	2·5	8	20·5	23	11	5	1	—	—	—	—	—	—	—	—	—	—	—	—	71
51—52	1	3·5	3	22·5	33	34·5	27·5	9	4	2	1	—	—	—	—	—	—	—	—	—	141
53—54	1	—	1	7	35	80	71·5	62	34	9	4	—	4	—	—	—	—	—	—	—	308·5
55—56	—	—	—	3	4	29·5	58	90	73	51	24	9	2	2	—	—	—	—	—	—	345·5
57—58	—	—	1	—	2	5	15	31	36	56	34	24·5	10	8	2	—	—	—	—	—	224·5
59—60	—	—	—	—	1	4	4	8	16	31	22	29·5	18	9	3	1	2	—	—	—	148·5
61—62	—	—	—	—	—	—	—	—	2	—	10	8	7	6	3	2	1	1	2	3	45
63—64	—	—	—	—	—	—	1	—	—	—	—	1	1	—	4	—	2	1	—	—	10
65—66	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1
67—70	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
71—72	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1
Totals	2	6	22	56	102	164	182	202	165	149	96	72	42	25	13	3	5	2	3	3	1314

TABLE XLV. *Worcestershire Girls. Age* 12. *Dr Williams' Data.*

Height in Inches

No. in Family	45—46	47—48	49—50	51—52	53—54	55—56	57—58	59—60	61—62	63—64	65—66	67—70	71—72	Totals
1	—	—	—	3	6	8	7	5	1	—	—	—	—	30
2	—	1	3	3	13	20	13	12	5	3	—	—	—	73
3	—	—	4	4	16	30	10	9	2	3	—	—	—	78
4	—	1	5·5	12	26	25·5	28	12	5	—	1	—	—	116
5	—	1	2	9	22·5	25·5	21	8	4	1	—	—	—	94
6	—	—	8	11	24·5	24·5	14	8	3	—	—	—	—	93
7	—	—	1	9	22	23	11	6	1	—	—	—	—	73
8	·5	·5	3	6	11	22	9	7	3	—	—	—	1	63
9	—	—	·5	3·5	11	8	12	4	—	1	—	—	—	40
10	—	—	5	5	10	8	6	8	1	—	—	—	—	43
11	—	—	4	2·5	3·5	3	5·5	2·5	—	1	—	—	—	22
12	—	—	2	3	2	8	5	4	1	—	—	—	—	25
13	—	—	3	2	7	1	—	1	—	—	—	—	—	14
14	—	—	—	—	2	1	1	—	—	—	—	—	—	4
15	—	—	—	—	2	—	—	—	1	—	—	—	—	3
16	—	—	—	1	—	1	—	—	—	—	—	—	—	2
17	—	—	—	1	—	2	—	—	—	—	—	—	—	3
Totals	·5	3·5	41	75	178·5	210·5	142·5	86·5	27	9	1	0	1	776

TABLE XLVI. *Worcestershire Girls. Age* 12. *Dr Williams' Data.*

Weight in lbs.

No. in Family	42—45	46—49	50—53	54—57	58—61	62—65	66—69	70—73	74—77	78—81	82—85	86—89	90—93	94—97	98—101	102—105	106—109	110—113	114—117	118—121	Totals
1	—	—	—	—	3	6	5	5	1	1	2	4	—	1	—	—	2	—	—	—	30
2	—	1	1	4	6	4	9	7	9	8	7	7	3	1	2	—	1	1	—	—	71
3	—	1	—	3	8	3	10	15	9	10	7	4	6	—	2	—	1	—	—	—	79
4	1	—	—	1	8	19	16	20	14	9	9	9	7	2	—	—	—	—	1	—	116
5	—	1	1	1	6	12	16	17	13	14	4	4	1	2	2	—	—	—	—	—	94
6	—	1	2	1	7	13	13	11	16	10	6	7	2	2	2	—	—	—	—	1	94
7	—	—	—	4	7	7	12	14	11	9	4	—	2	3	—	—	—	—	—	—	73
8	—	—	1	2	7	8	10	11	7	7	3	2	2	1	1	—	1	—	—	—	63
9	—	1	—	—	1	3	8	7	1	4	6	4	3	1	—	—	—	1	—	—	40
10	—	—	1	5	2	5	5	7	2	6	2	4	2	1	—	1	—	—	—	—	43
11	—	—	1	2	3	2	2	2	—	2	4	3	1	—	—	—	—	—	—	—	22
12	—	—	—	2	—	1	3	1	8	3	3	1	1	2	—	—	—	—	—	—	25
13	—	—	—	—	1	6	3	2	—	1	—	1	—	—	—	—	—	—	—	—	14
14	—	—	—	1	—	—	1	—	—	2	—	—	—	—	—	—	—	—	—	—	4
15	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	1	3
16	—	—	—	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	2
17	—	—	—	1	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	3
Totals	1	5	7	27	60	89	114	121	91	86	58	51	30	16	9	1	5	2	1	2	776

The totals in Tables XLV and XLVI are the same, but the individuals represented differed in four cases.

Table XLVII. *Worcestershire Girls. Age 12. Dr Williams' Data.*

Height in Inches

School	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62—63	64	Totals
A	—	1	1	—	1	1	3	6	5	8	9	7	4	5	5	2	—	—	58
B	—	—	—	1	3	1	2	4	3	4	4	5	1	2	—	1	—	—	31
C	—	—	—	1	2	3	3	5	4	7	6	6	2	3	1	—	—	—	43
D	—	1	—	—	1	—	1	1	—	4	4	1	4	2	2	—	—	—	21
E	—	—	2	1	3	2	2	2	2	3	2	—	—	—	—	—	—	—	19
F	—	—	—	—	—	1	3	1	3	4	1	1	1	—	2	2	—	—	19
G	—	—	—	—	—	—	1	1	—	2	2	2	1	—	3	4	—	—	16
H	—	—	—	2	1	1	1	2	4	3	—	2	2	1	—	—	—	1	20
J	—	—	2	1	2	—	1	9	6	6	3	4	—	4	2	2	—	—	42
K	—	—	—	—	—	—	1	4	4	1	1	3	1	2	—	—	—	—	17
L	—	—	—	1	—	—	—	1	4	—	5	4	3	1	2	—	—	—	21
M	·5	·5	—	—	1	2·5	2·5	3·5	4	3	1·5	1	1·5	1·5	1	—	—	—	24
Totals	·5	2·5	5	7	14	11·5	20·5	39·5	39	45	38·5	36	20·5	21·5	18	11	0	1	331

Table XLVIII. *Worcestershire Girls. Age 12. Dr Williams' Data.*

Weight in lbs.

School	42—45	46—49	50—53	54—57	58—61	62—65	66—69	70—73	74—77	78—81	82—85	86—89	90—93	94—97	98—101	102—117	118—121	Totals
A	—	—	1	1	7	2	9	10	8	9	6	3	2	—	—	—	—	58
B	1	2	1	1	3	1	5	6	3	2	3	3	—	—	—	—	—	31
C	—	—	—	1	4	8	5	12	2	5	3	1	1	—	1	—	—	43
D	—	—	—	—	1	2	1	3	4	5	2	4	—	—	—	—	—	22
E	—	—	2	3	3	3	4	3	—	1	—	—	—	—	—	—	—	19
F	—	—	1	1	1	6	2	1	3	—	2	1	1	—	—	—	—	19
G	—	—	—	—	—	—	2	1	2	2	4	—	1	2	1	—	1	16
H	—	1	—	—	4	3	4	3	1	1	1	1	1	—	—	—	—	20
J	—	—	3	1	3	6	6	8	3	7	1	3	—	1	—	—	—	42
K	—	—	—	—	1	2	4	6	—	1	1	2	—	—	—	—	—	17
L	—	—	—	—	1	5	1	4	3	4	2	1	—	—	—	—	—	21
M	—	1	—	1	2	3	4	3	2	4	1	2	—	1	—	—	—	24
Totals	1	4	8	9	30	41	47	60	31	41	26	21	6	4	2	0	1	332

Table XLIX. *Worcestershire Boys. Dr Williams' Data.*

Temperature

Age	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2	101·4—101·8	102·0	102·2	Tota
3—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	
4—	—	—	—	—	—	—	1	2	2	—	—	—	2	—	—	—	—	—	—	—	
5—	—	—	—	—	—	2	6	12	7	8	20	1	1	—	2	1	—	—	—	—	6
6—	—	—	1	2	1	7	10	9	9	13	12	10	5	5·5	1·5	3	—	—	—	1	9
7—	—	—	3	—	1	4·5	4·5	9	16	6	14·5	8·5	4	3	—	—	—	—	—	—	7
8—	—	—	—	—	—	8	3	11	15	11	10·5	6·5	2	1	—	—	2	—	—	—	7
9—	1	—	—	—	1	2	9	11·5	14·5	4	15	4	1	3	—	1	—	—	—	—	6
10—	—	—	1	1	—	5	7	5	8	4	10	5	2	2	—	1	—	—	—	—	5
11—	—	—	1	2	3	8	4	10	15	6	10	2	1	2	—	1	—	—	—	—	6
12—	5	2	67·5	27	20	142·5	149	192	226·5	160	196·5	73	21	23·5	2·5	5	—	—	2	—	131
13—	—	1	10·5	9·5	2	21·5	16·5	27·5	46·5	20·5	22	13·5	4	5	—	—	—	—	—	—	20
14—	—	—	—	1	—	—	2	1	—	—	—	—	—	—	—	—	—	—	—	—	
Totals	6	3	84	42·5	28	200·5	212	291	360·5	232·5	310·5	123·5	43	45	6	12	2	0	2	1	200

TABLE L. *Worcestershire Boys. All ages. Dr Williams' Data.*

Temperature

	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2	101·4—101·8	102·0	102·2	Totals
35—36	—	—	—	—	—	1	1	1	—	—	1	—	—	1	—	—	—	—	—	—	5
37—38	—	—	—	—	—	—	1	—	1	1	2	—	—	—	—	—	—	—	—	—	5
39—40	—	—	1	—	—	1	5	4	3	2	8	3	1	1	—	1	—	—	—	—	30
41—42	—	—	—	—	—	2	4·5	7·5	1	6	5	1	2	2	1	1	2	—	—	1	36
43—44	—	—	—	—	—	2·5	6	4·5	12	3	7·5	4·5	2	3	1	2	—	—	—	—	48
45—46	—	—	2	—	1	2	3	5·5	10·5	8	10	3	3	1·5	·5	—	—	—	—	—	50
47—48	—	—	2	1	—	5	8	4	14	4	11	2	1	—	—	—	—	—	—	—	52
49—50	—	—	5	·5	2	7	11·5	16·5	20·5	13·5	18	5·5	1·5	2	—	—	—	—	—	—	103·5
51—52	—	—	12	8	1	19·5	19	31	38·5	19·5	34·5	12	4	4	1	1	—	—	—	—	205
53—54	3	—	11	4·5	7·5	38	40·5	51	50·5	46·5	55	25	8·5	10	—	3	—	—	1	—	355
55—56	1	—	15	8·5	4	24·5	38·5	39·5	58·5	36·5	48·5	18·5	3	11·5	1·5	1	—	—	—	—	310
57—58	1	—	20	3·5	4·5	20	16·5	27	39·5	26·5	34·5	16	3	4	—	—	—	—	—	—	216
59—60	—	2	1·5	3·5	2	9·5	11	7	19	9	5·5	8·5	2	1	—	—	—	—	1	—	82·5
61—62	—	—	4	1	1	3·5	5·5	4	4	3	1·5	1·5	1	—	—	—	—	—	—	—	30
63—64	—	—	—	1	—	1	2	—	—	—	—	—	—	—	—	—	—	—	—	—	4
65—66	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Totals	5	2	73·5	31·5	23	136·5	174	202·5	272	178·5	242	100·5	32	41	5	9	2	0	2	1	1533

TABLE LI. *Worcestershire Boys. All ages. Dr Williams' Data.*

Temperature

	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2	101·4—101·8	102·0	102·2	Totals
30—33	—	—	—	—	—	—	1	—	—	1	1	—	—	2	—	—	—	—	—	—	5
34—37	—	—	1	—	—	1	3	2	—	1	6	2	1	1	—	1	—	—	—	—	19
38—41	—	—	—	—	—	2	5·5	8	6·5	7	5	2	2	—	2	1	2	—	—	1	44
2—45	—	—	1	—	1	3·5	5·5	8	12	7	11·5	2·5	3	4	—	1	—	—	—	—	60
6—49	—	—	1	—	—	3	7·5	4·5	10	3	12	5	1	—	—	1	—	—	—	—	48
0—53	—	—	3	1	—	4	4	7	12	6	10	2	2	1·5	·5	—	—	—	—	—	53
4—57	—	—	1	3	—	4	6	5	13	5	9·5	5	1·5	2	—	1	—	—	—	—	56
8—61	—	—	5·5	2·5	2	11·5	19	19	25	16	22·5	5·5	1·5	5	1	—	—	—	—	—	136
2—65	1	—	5	3	4	25	15	22	33	20·5	25	15·5	9	3	—	1	—	—	—	—	182
6—69	1	—	10	1	2	13	23·5	29	29	24	35	8·5	1	5	—	1	—	—	1	—	184
0—73	3	—	11·5	4	1·5	17·5	27·5	28·5	39·5	29	35	13	1	8·5	·5	1	—	—	—	—	221
4—77	—	—	8	4	4·5	14	23·5	18	30	29	26·5	10·5	1	4	1	—	—	—	—	—	174
8—81	—	—	8	5	2·5	12·5	13	18	23	12	14·5	12·5	4	2	—	—	—	—	—	—	127
2—85	—	—	6	4·5	2·5	15·5	9·5	13	11	6·5	16	6·5	1	2	—	—	—	—	—	—	94
6—89	—	—	3	—	1	5	3·5	8·5	14	4	5	5	1	—	—	—	—	—	1	—	51
0—93	—	—	4·5	·5	—	3·5	4·5	4	12	4	1	2	1	1	—	—	—	—	—	—	38
4—97	—	1	1	—	2	2·5	·5	6	3	2·5	5·5	2	1	—	—	—	—	—	—	—	27
8—101	—	—	2	1	—	—	1	1	—	—	—	2	—	—	—	—	—	—	—	—	7
2—105	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
6—109	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
0—113	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	2
4—117	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
otals	5	2	72·5	30·5	23	137·5	175	201·5	273	177·5	241	101·5	32	41	5	8	2	0	2	1	1531

TABLE LII. *Worcestershire Boys. Age* 12. *Dr Williams' Data.*

Temperature

Height in Inches	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2—101·8	102·0	Totals
47	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
48	—	—	—	—	—	1	3	1	5	—	1	—	—	—	—	—	—	—	11
49	—	—	—	—	1	2	1	1	1	—	1	—	—	1	—	—	—	—	8
50	—	—	5	—	1	1	7·5	6·5	7	8·5	6	2·5	·5	1	—	—	—	—	46·5
51	—	—	4	3	—	7·5	6·5	8·5	10	6	12	4	2	—	—	1	—	—	64·5
52	—	—	8	1·5	1	11	9·5	15	20·5	11·5	14·5	5	2	1	1	—	—	—	101·5
53	—	—	5·5	—	2·5	13·5	10·5	18·5	19	15	22·5	11	2	4	—	1	—	1	126
54	3	—	5·5	2	2·5	16·5	25	24·5	22·5	22·5	26	9·5	4·5	3	—	1	—	—	168
55	1	—	5	1·5	2	13	15	14·5	21	18·5	25·5	10	—	3	1	—	—	—	131
56	—	—	8	6	2	9	18	21	26	16	21	8	2	6·5	·5	1	—	—	145
57	—	—	7	2	2	10·5	10	16·5	19	12·5	19	6·5	3	1	—	—	—	—	109
58	—	—	8	1	1	6	4·5	7·5	12	11·5	11·5	4·5	—	1	—	—	—	—	68·5
59	—	—	—	1	2	4	4	4	11	2	2	3	—	1	—	—	—	—	34
60	—	1	1	—	—	3	4	1	5	6	1	3	1	—	—	—	—	1	27
61	—	—	2	—	1	2	3	2	1	2	—	1	—	—	—	—	—	—	14
62	—	—	—	—	—	·5	·5	2	1	—	—	—	1	—	—	—	—	—	5
63	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
64	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
65	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
Totals	4	1	59	19	18	102·5	123	143·5	181	132	163	68	18	22·5	2·5	4	0	2	1063

TABLE LIII. *Worcestershire Boys. Age* 12. *Dr Williams' Data.*

Temperature

Weight in lbs.	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2—101·8	102·0	Totals
46—49	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	2
50—53	—	—	2	1	—	1	2	2	5	1	—	—	—	—	—	—	—	—	14
54—57	—	—	—	—	—	2	1	1	3	1	3·5	2	1·5	1	—	1	—	—	17
58—61	—	—	5·5	1·5	2	8·5	17	14·5	14·5	12	15·5	4·5	·5	3	1	—	—	—	100
62—65	1	—	5	2	3	22	12	16	29	18·5	19·5	10	6	2	—	—	—	—	146
66—69	—	—	9	—	2	12	18·5	25	19	20	30	7·5	1	5	—	1	—	1	151
70—73	3	—	11·5	3·5	—	15·5	24·5	24·5	35·5	25	32·5	11·5	1	4·5	·5	1	—	—	194
74—77	—	—	6	3	3·5	10·5	21	16	20	26	26·5	9·5	1	3	1	—	—	—	147
78—81	—	—	8	4	2·5	9·5	12	16	21	11	13·5	11·5	4	2	—	—	—	—	115
82—85	—	—	5	3	2	13·5	7·5	9	10	6·5	13	3·5	—	1	—	—	—	—	74
86—89	—	—	1	—	1	2	2·5	8·5	12	4	4	4	1	—	—	—	—	1	41
90—93	—	—	2	—	—	3·5	3·5	3	9	4	1	2	1	1	—	—	—	—	30
94—97	—	—	1	—	2	2·5	·5	6	3	2	3	—	1	—	—	—	—	—	21
98—101	—	—	2	1	—	—	1	1	—	—	—	2	—	—	—	—	—	—	7
102—105	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
106—109	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Totals	4	1	58	19	18	102·5	124	142·5	182	131	162	68	18	22·5	2·5	3	0	2	1060

TABLE LIV. *Worcestershire Boys. Ages* 12 *and* 13. *Dr Williams' Data.*

Temperature

No. in Family	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2—101·8	102·0	Totals
1	—	—	1	—	1	4	4	4	8	6	8	2	3	—	—	—	—	—	41
2	—	—	4	2	1	8	9	6	15	7	13·5	4·5	—	1	1	—	—	—	72
3	—	—	5	2	2	8	11	14	19	13	11	6	1	1	—	1	—	—	94
4	—	—	10	9	2	16	10	18	18	15	15	5	3	3	—	—	—	—	124
5	—	—	3	1	2	11	11·5	17·5	22	17	13	4	2	2	—	—	—	—	106
6	—	—	6	2	—	9	13	8	26	12	22	9	1	2	—	1	—	—	111
7	—	—	2	1	—	7	13	23	19	3	11·5	2·5	2	4	—	—	—	—	88
8	1	—	2	—	1	12	12	13	19	6	15	5	—	1	1	—	—	1	89
9	—	—	1	1	—	6	6	7	11	5	9	3	2	1	—	1	—	—	53
10	—	—	2	1	—	3	4·5	8·5	6	4·5	5·5	1	—	—	—	2	—	—	38
11	—	—	2	—	1	6	2	3	7	3	3	—	1	—	—	—	—	—	28
12	1	—	—	—	—	3	4	6	1	2	1	1	—	—	—	—	—	—	19
13	—	—	1	1·5	·5	1	—	4	6	3	3	—	—	—	—	—	—	—	20
14	—	—	1	2	—	1	—	2	2	—	—	—	—	—	—	—	—	—	8
15	—	—	—	—	—	—	—	—	2	1	—	1	—	—	—	—	—	—	4
16	—	—	—	—	—	—	—	—	—	—	1	—	—	1	—	—	—	—	2
Totals	2	0	40	22·5	10·5	95	100	134	181	97·5	131·5	44	15	16	2	5	0	1	897

TABLE LV. *Worcestershire Boys. Ages* 12 *and* 13. *Dr Williams' Data.*

Temperature

Position in Family	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	100·2	100·4	100·6	100·8	101·0	101·2—101·8	102·0	Totals
1st	6	5	1	12	15	14	19	8	12	7	2	2	—	—	—	—	103
2nd	2	1	2	8	13	13	18	9	15	6	2	—	—	—	—	—	89
3rd	2	—	1	7	8	12	13	6	10	4	—	2	—	—	—	—	65
4th	6	4	—	5	4	9	13	7	4	2	—	—	—	1	—	—	55
5th	—	—	—	5	3	8	9	2	8	2	—	—	—	—	—	—	37
6th	—	—	—	—	5	6	4	2	4	—	—	1	—	—	—	—	22
7th	1	—	—	6	3	6	3	2	4	—	1	—	—	—	—	1	27
8th	—	—	—	1	3	5	3	—	1	3	—	—	—	1	—	—	17
9th	—	—	—	2	3	2	2	—	2	1	—	—	—	—	—	—	12
10th	1	—	—	—	1	3	2	—	—	2	—	—	—	—	—	—	9
11th	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	2
12th	—	—	—	2	—	—	2	1	1	—	—	—	—	—	—	—	6
13th	1	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	3
14th	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Totals	20	11	4	48	58	79	90	37	61	27	5	5	0	2	0	1	448

TABLE LVI. *Worcestershire Boys. Dr Williams' Data.*

Height in Inches

Age	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	Totals
3—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
4—	—	—	—	1	1	3	3	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9
5—	—	4	4	2	4	16	13	8	10	3	2	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	67
6—	1	1	—	—	2	8	7	5	11	11	8	7	4	2	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	69
7—	—	—	—	—	1	—	3	2	5	5	10	9	5	6	2	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	50
8—	—	—	—	—	—	—	2	—	1	3	5	5	1	7	5	5	3	1	2	1	—	—	—	—	—	—	—	—	—	—	—	41
9—	—	—	—	—	—	—	—	—	1	—	1	3	8	8	8	6	3	4	5	—	—	1	—	1	—	—	—	—	—	—	—	49
10—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	4	4	4	4	3	5	6	—	1	—	—	—	—	—	—	—	—	32
11—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	2	2	4	5	7	8	8	1	4	—	—	—	—	—	—	—	—	43
12—	—	—	—	—	—	—	—	—	—	—	—	—	1	12	9	49·5	69·5	105·5	129	177	146	150	113	72·5	35	27	14	5	1	1	1	1118
13—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	7	7	4	14	20	15	11	11	20·5	14·5	6	8	3	1	1	—	146
14—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—	2	—	—	—	—	—	4
Totals	1	5	5	3	8	27	28	16	28	22	27	24	20	38	32	77·5	91·5	123·5	160	211	175	163	130	94	49·5	35	22	8	2	2	1	1629

TABLE LVII. *Worcestershire Boys. Dr Williams' Data.*

Weight in lbs.

Age	26—29	30—33	34—37	38—41	42—45	46—49	50—53	54—57	58—61	62—65	66—69	70—73	74—77	78—81	82—85	86—89	90—93	94—97	98—101	102—105	106—109	110—113	114—117	Totals
3—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
4—	—	1	1	4	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9
5—	1	6	15	22	18	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	67
6—	—	1	6	14	24	15	7	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	69
7—	—	1	2	5	12	13	10	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	52
8—	—	—	—	3	2	11	9	7	6	3	—	—	—	—	—	—	—	—	—	—	—	—	—	41
9—	—	—	—	1	2	4	12	11	11	6	1	—	1	—	—	—	—	—	—	—	—	—	—	49
10—	—	—	—	—	—	1	2	8	3	7	6	2	2	—	—	1	—	—	—	—	—	—	—	32
11—	—	—	—	—	—	2	—	2	9	9	12	4	4	1	—	—	—	—	—	—	—	—	—	43
12—	—	—	—	—	—	2	15	21	104	158	158	204	155	124	75	43	30	21	7	—	1	—	—	1118
13—	—	—	—	—	—	—	—	3	6	13	16	27	23	12	18	9	8	6	—	1	—	2	1	145
14—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	3	—	—	—	—	—	—	—	—	4
Totals	1	9	24	49	62	53	55	63	139	196	193	238	185	137	96	53	38	27	7	1	1	2	1	1630

TABLE LVIII. *Worcestershire Boys. All Ages. Dr Williams' Data.*

Weight in lbs.

Height in Inches	26—29	30—33	34—37	38—41	42—45	46—49	50—53	54—57	58—61	62—65	66—69	70—73	74—77	78—81	82—85	86—89	90—93	94—97	98—101	102—105	106—109	110—113	114—117	Totals
35—36	1	1	—	2	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6
37—38	—	4	2	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9
39—40	—	3	16	10	5	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	35
41—42	—	1	7	21	14	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	45
43—44	—	—	1	14	22	15	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	54
45—46	—	—	—	2	14	19	15	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	53
47—48	—	—	—	—	3	12	22	15	5	—	—	2	—	1	—	—	—	—	—	—	—	—	—	60
49—50	—	—	—	—	1	4	9	28	50·5	11·5	5	·5	—	—	—	—	—	—	—	—	—	—	—	109·5
51—52	—	—	—	—	—	1	5	13	51·5	78·5	36·5	24	4·5	1	—	—	—	1	—	—	—	—	—	216
53—54	—	—	—	1	—	—	1	3	25	84·5	82·5	98	48	21	5	1	—	—	—	—	—	—	—	370
55—56	—	—	—	—	—	—	2	1	7	18·5	53	92·5	79·5	51	24·5	4	3	—	1	—	—	—	—	337
57—58	—	—	—	—	—	—	—	—	—	3	15	17	50	47·5	43·5	25	14	8	1	—	—	—	—	224
59—60	—	—	—	—	—	—	—	—	—	1	—	2	3	13·5	20	20	11	10	2	—	1	—	—	83·5
61—62	—	—	—	—	—	—	—	—	—	—	—	1	—	2	3	3	8	8	2	1	—	—	1	29
63—64	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	2	—	3
65—66	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
Totals	1	9	26	50	64	54	56	62	140	197	193	237	185	137	96	53	37	27	6	1	1	2	1	1635

TABLE LIX. *Worcestershire Boys. Age 12. Dr Williams' Data.*

Weight in lbs.

Height in Inches	46—49	50—53	54—57	58—61	62—65	66—69	70—73	74—77	78—81	82—85	86—89	90—93	94—97	98—101	102—105	106—109	Totals
47	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
48	—	4	2	4	—	—	2	—	—	—	—	—	—	—	—	—	12
49	1	1	1	6	—	—	—	—	—	—	—	—	—	—	—	—	9
50	1	3	5	28	8·5	4	—	—	—	—	—	—	—	—	—	—	49·5
51	—	2	4	20	26·5	13	2	2	—	—	—	—	—	—	—	—	69·5
52	—	2	6	18	40	17·5	17·5	2·5	1	—	—	—	1	—	—	—	105·5
53	—	—	—	18·5	31	31·5	26·5	17·5	3	—	1	—	—	—	—	—	129
54	—	—	3	3·5	32·5	36	57	25·5	16	3·5	—	—	—	—	—	—	177
55	—	1	—	4	13·5	29	43	29	20	5·5	—	1	—	—	—	—	146
56	—	1	—	2	3	15	41	35	29	18	3	2	—	1	—	—	150
57	—	—	—	—	2	10	11	28·5	28	18	8	5	2·5	—	—	—	113
58	—	—	—	—	1	1	3	12	15	14	14	7	4·5	1	—	—	72·5
59	—	—	—	—	—	—	1	2	7	8	9	7	1	—	—	—	35
60	—	—	—	—	—	—	—	1	3	5	7	3	5	2	—	1	27
61	—	—	—	—	—	—	—	—	2	3	—	4	3	2	—	—	14
62	—	—	—	—	—	—	—	—	—	—	1	—	4	—	—	—	5
63	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	1
64	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
65	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1
Totals	2	15	21	104	158	158	204	155	124	75	43	30	21	7	0	1	1118

TABLE LX. *Worcestershire Boys. Age* 12. *Dr Williams' Data.*

Height in Inches

No. in Family	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	Totals
1	—	—	1	2	2	3	4	2	6	3	2	—	1	—	1	—	—	—	27
2	—	2	—	3·5	7	6·5	7	5·5	10·5	6	7	3	2	1	—	1	—	—	62
3	2	1	1	3	3	7	9·5	12·5	12	11	8	1	2	1	1	—	—	—	75
4	1	—	6	3	5·5	10·5	13	8	19	9	8	3	1	3	1	—	—	—	91
5	—	—	2	11	6	15	11	5	10	6	7	3	1	2	1	—	—	—	80
6	—	2	2·5	5	5	8·5	17·5	13·5	9	11	5	2	1	—	—	—	—	—	82
7	1	—	1	6	8	4·5	11·5	9	14	5	3	2	3	—	—	—	—	—	68
8	—	—	2	4	6	9	14·5	12·5	6	7	4	6	1	—	—	—	—	1	73
9	—	—	5	1	4	7	5	6	9	3	—	3	3	—	—	—	—	—	46
10	1	—	1	2	5	2	4	3	3	4	2	—	1	1	—	—	—	—	29
11	—	—	—	1	5	—	5	3	3·5	2·5	1	1	1	—	—	—	—	—	23
12	—	—	—	1	3	—	3	3	1	2	—	—	1	—	—	—	—	—	14
13	—	1	—	1	1	1	3	4	1	·5	·5	—	1	—	—	—	—	—	14
14	—	—	1	—	1	—	—	1	—	1	1	—	—	—	—	—	—	—	5
15	—	—	—	—	—	—	2	1	—	—	—	1	—	—	—	—	—	—	4
16	—	—	—	—	1	1	—	1	—	—	—	—	—	—	—	—	—	—	3
Totals	5	6	22·5	43·5	62·5	75	110	90	104	71	48·5	25	19	8	4	1	0	1	696

TABLE LXI. *Worcestershire Boys. Age* 12. *Dr Williams' Data.*

Weight in lbs.

No. in Family	46—49	50—53	54—57	58—61	62—65	66—69	70—73	74—77	78—81	82—85	86—89	90—93	94—97	98—101	Totals
1	—	1	—	—	5	3	6	5	2	—	1	2	1	1	27
2	1	—	—	6	5	9	10	13	7	6	1	1	1	1	61
3	—	—	3	5	7	8	12	7	15	6	3	4	4	—	74
4	—	1	—	13	15	11	10	18	4	7	6	1	3	1	90
5	—	—	1	9	14	14	13	6	10	3	5	1	2	1	79
6	—	2	2	5	9	8	25	12	9	3	4	3	—	—	82
7	—	—	2	6	9	11	13	11	7	5	—	2	1	1	68
8	—	—	1	6	13	12	9	9	8	6	5	3	1	—	73
9	—	—	4	3	7	8	8	7	2	3	3	1	—	—	46
10	—	1	—	3	4	5	1	5	4	4	—	—	1	—	28
11	—	1	1	—	6	2	5	2	2	2	—	1	1	—	23
12	—	—	1	3	1	—	5	—	1	2	—	1	—	—	14
13	—	—	—	3	2	3	2	2	—	—	—	—	2	—	14
14	—	—	—	1	1	—	1	—	1	—	—	—	—	—	4
15	—	—	—	—	—	1	1	—	2	—	—	—	—	—	4
16	—	—	—	—	—	—	1	1	—	1	—	—	—	—	3
Totals	1	6	15	63	98	95	122	98	74	48	28	20	17	5	690

TABLE LXII. *Worcestershire Boys. Age* 12. *Dr Williams' Data.*

Height in Inches

School	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62—63	64	Totals
A	—	—	2	6	2	4	13	15	8	9	6	1	1	1	—	—	68
B	—	—	—	1	6	4	5	5	6	3	3	—	1	—	—	—	34
C	—	—	3	3	3	6	8	8	6	7	5	1	2	3	—	1	56
D	—	—	—	—	2	—	2	1	1	3	—	—	—	—	—	—	9
E	—	1	—	3	2	1	—	4	3	—	1	1	—	—	—	—	16
F	—	—	—	—	2	3	4	1	4	1	—	—	1	—	—	—	16
G	2	—	—	2	—	1	3	—	1	4	—	—	—	—	—	—	13
H	—	—	1	2	1	1	1	2	5	1	2	—	1	1	—	—	18
J	—	—	—	1	—	1	1	—	—	1	—	1	—	—	—	—	5
K	—	—	—	1	1	1	2	2	—	—	1	—	—	—	—	—	8
L	—	—	2	1	2	3	2	5	—	2	—	—	—	—	—	—	17
M	—	—	·5	2·5	3·5	2	4	7	4	1	·5	—	—	—	—	—	25
Totals	2	1	8·5	22·5	24·5	27	45	50	38	32	18·5	4	6	5	0	1	285

TABLE LXIII. *Worcestershire Boys. Age* 12. *Dr Williams' Data.*

Weight in lbs.

School	46—49	50—53	54—57	58—61	62—65	66—69	70—73	74—77	78—81	82—85	86—89	90—93	94—97	98—101	Totals
A	—	—	3	2	12	8	19	8	6	6	2	1	1	—	68
B	—	1	—	—	9	4	12	2	2	2	—	—	1	1	34
C	1	1	—	7	8	11	5	11	7	4	—	1	—	—	56
D	—	—	—	—	—	2	2	2	1	—	1	—	—	—	8
E	—	—	—	4	1	2	3	2	—	3	1	—	—	—	16
F	—	—	1	—	—	5	5	3	—	1	—	—	—	1	16
G	—	2	—	—	—	4	1	1	2	2	1	—	—	—	13
H	—	1	1	1	3	2	4	4	1	—	—	—	1	—	18
J	—	—	—	—	1	—	3	—	—	—	—	1	—	—	5
K	—	—	—	—	1	1	3	1	1	1	—	—	—	—	8
L	—	—	—	4	3	2	1	5	2	—	—	—	—	—	17
M	—	—	—	3	2	3	9	4	2	1	—	—	1	—	25
Totals	1	5	5	21	40	44	67	43	24	20	5	3	4	2	284

TABLE LXIV. *St Andrews (St Leonards and St Katharine's).*

Temperature

Weight in Stones

	96·4	96·6	96·8	97·0	97·2	97·4	97·6	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	Totals
2·5— 3·0	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
3·0— 3·5	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	1	—	1	4
3·5— 4·0	—	—	—	—	—	—	—	—	—	—	1	—	—	1	—	—	2	—	4
4·0— 4·5	—	—	—	—	—	—	—	—	—	—	1	1	—	3	—	1	—	4	10
4·5— 5·0	—	—	—	—	—	—	—	—	—	—	2	—	1	1	—	1	1	—	6
5·0— 5·5	—	—	—	—	—	—	—	—	1	—	2	—	—	1	—	—	1	1	6
5·5— 6·0	—	—	—	—	—	—	—	1	—	—	3	—	—	2	1	1	2	1	11
6·0— 6·5	—	—	—	—	—	1	—	—	1	—	2·5	2	—	3·5	—	1	—	—	11
6·5— 7·0	—	—	—	—	—	—	—	1	3·5	—	4	—	1	·5	1	—	—	1	12
7·0— 7·5	—	1	—	—	—	·5	—	1	3	—	8	2	1	7	—	—	—	—	23·5
7·5— 8·0	—	—	—	·5	—	·5	—	1	2·5	3	9	2·5	3	1	—	—	—	—	23
8·0— 8·5	—	—	1	·5	1	1	1	·5	3·5	3·5	14	3·5	—	5·5	1	1	—	—	37
8·5— 9·0	—	—	—	1	1	—	—	2·5	2·5	3·5	15	3	3	7	2	—	—	—	40·5
9·0— 9·5	—	—	—	·5	2	·5	1	—	5·5	—	16·5	4	4	11·5	—	1	—	—	46·5
9·5—10·0	—	—	—	·5	—	·5	—	·5	3·5	2	14	2	3	4	—	—	—	—	30
10·0—10·5	—	—	—	1	—	1	—	3·5	1	2	8	2	—	2·5	—	—	—	—	21
10·5—11·0	—	—	—	—	—	—	—	—	2	1	—	1	1	1·5	—	—	—	—	6·5
11·0—11·5	—	—	—	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	2
11·5—12·0	—	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—	—	—	2
12·0—12·5	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Totals	1	1	1	4	4	5	2	13	29	15	101	24	18	54	5	7	6	8	298

TABLE LXV. *St Andrews (St Leonards and St Katharine's).*

Height in Inches

Age

	43—44	45—46	47—48	49—50	51—52	53—54	55—56	57—58	59—60	61—62	63—64	65—66	67—68	69—70	71—72	Totals
5—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	2
6—	1	1	2	—	—	—	—	—	—	—	—	—	—	—	—	4
7—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	2
8—	—	—	1	2	1	—	—	—	—	—	—	—	—	—	—	4
9—	—	—	—	1·5	·5	3	1	1	—	—	—	—	—	—	—	7
10—	—	—	—	2	2	2	3	2	—	—	—	—	—	—	—	11
11—	—	—	—	—	—	—	3	1	1	—	1	—	—	—	—	6
12—	—	—	—	—	1	—	—	4	2	4	1	1	—	—	—	13
13—	—	—	—	—	—	—	1	2	4·5	9·5	12	1	—	—	—	30
14—	—	—	—	—	—	—	—	·5	7·5	16·5	12·5	14	5	1	—	57
15—	—	—	—	—	—	—	—	—	1	6	19·5	18	6	1·5	—	52
16—	—	—	—	—	—	—	—	—	2	9	13	20	4·5	1·5	—	50
17—	—	—	—	—	—	—	—	—	·5	4·5	14	22	6	2	—	49
18—	—	—	—	—	—	—	—	—	—	—	4	2·5	2·5	—	1	10
19—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	1
Totals	2	2	4	5·5	5·5	5	8	10·5	18·5	49·5	77	78·5	25	6	1	298

TABLE LXVI. *St Andrews (St Leonards and St Katharine's).*

Weight in Stones

Age	2·5—3·0	3·0—3·5	3·5—4·0	4·0—4·5	4·5—5·0	5·0—5·5	5·5—6·0	6·0—6·5	6·5—7·0	7·0—7·5	7·5—8·0	8·0—8·5	8·5—9·0	9·0—9·5	9·5—10·0	10·0—10·5	10·5—11·0	11·0—11·5	11·5—12·0	12·0—12·5	Totals
5—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
6—	—	1	1	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4
7—	—	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
8—	—	1	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4
9—	—	—	—	3	1	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	7
10—	—	—	2	3	2	2	1	1	—	—	—	—	—	—	—	—	—	—	—	—	11
11—	—	—	—	—	1	1	2	1	—	—	—	1	—	—	—	—	—	—	—	—	6
12—	—	—	—	1	—	—	5	1	1	2	—	1	1	1	—	—	—	—	—	—	13
13—	—	—	—	—	—	1	2	5	6	5	5	3	1·5	1·5	—	—	—	—	—	—	30
14—	—	—	—	—	—	—	—	2·5	4·5	9	6	8	9·5	7·5	5	4	—	1	—	—	57
15—	—	—	—	—	—	—	—	·5	·5	3·5	5·5	10	10·5	8	5	6	1·5	—	—	1	52
16—	—	—	—	—	—	—	—	—	—	4	4·5	5	12	10·5	8	3	1	1	1	—	50
17—	—	—	—	—	—	—	—	—	—	—	2	8·5	5·5	13·5	9·5	5	4	—	1	—	49
18—	—	—	—	—	—	—	—	—	—	—	—	·5	·5	3·5	2·5	3	—	—	—	—	10
19—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
Totals	1	4	4	10	6	6	11	11	12	23·5	23	37	40·5	46·5	30	21	6·5	2	2	1	298

TABLE LXVII. *St Andrews (St Leonards and St Katharine's).*

Weight in Stones

Height in Inches	2·5—3·0	3·0—3·5	3·5—4·0	4·0—4·5	4·5—5·0	5·0—5·5	5·5—6·0	6·0—6·5	6·5—7·0	7·0—7·5	7·5—8·0	8·0—8·5	8·5—9·0	9·0—9·5	9·5—10·0	10·0—10·5	10·5—11·0	11·0—11·5	11·5—12·0	12·0—12·5	Totals
43—44	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
45—46	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
47—48	—	2	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4
49—50	—	—	2	2·5	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5·5
51—52	—	—	1	2·5	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5·5
53—54	—	—	—	2	1	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5
55—56	—	—	—	1	2	3	2	—	—	—	—	—	—	—	—	—	—	—	—	—	8
57—58	—	—	—	—	—	1	5	3	—	1·5	—	—	—	—	—	—	—	—	—	—	10·5
59—60	—	—	—	—	—	—	3	2	2·5	6·5	1	—	2	—	1	·5	—	—	—	—	18·5
61—62	—	—	—	—	—	—	1	5·25	3·75	8	9	10	4·5	5·5	2	·5	—	—	—	—	49·5
63—64	—	—	—	—	—	—	—	·75	5·25	4·75	9·75	14·5	15·5	15	4	3·5	1·5	2	·5	—	77
65—66	—	—	—	—	—	—	—	—	·5	2·75	2·25	11·5	14	16·5	14	12·5	3	—	1·5	—	78·5
67—68	—	—	—	—	—	—	—	—	—	—	1	1	2·5	8	8	3	1	—	—	·5	25
69—70	—	—	—	—	—	—	—	—	—	—	—	—	2	1·5	1	—	1	—	—	·5	6
71—72	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
Totals	1	4	4	10	6	6	11	11	12	23·5	23	37	40·5	46·5	30	21	6·5	2	2	1	298

TABLE LXVIII. *St Andrews (St Leonards and St Katharine's).*

Temperature

Age	96·4	96·6	96·8	97·0	97·2	97·4	97·6	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	Totals
5—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1	2
6—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	1	1	4
7—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	1	—	2
8—	—	—	—	—	—	—	—	—	—	—	1	—	—	1	—	2	—	—	4
9—	—	—	—	—	—	—	—	—	—	—	—	1	—	2	1	1	1	1	7
10—	—	—	—	—	—	—	—	—	—	—	4	1	1	1	—	—	1	3	11
11—	—	—	—	—	—	1	—	—	1	—	1	1	—	2	—	—	—	—	6
12—	—	1	—	—	1	—	—	1	—	—	4	—	—	3	1	—	1	1	13
13—	—	—	—	—	—	—	—	—	3	1	10	1	2	8	1	2	1	1	30
14—	—	—	—	—	—	2	1	4	10	5	15	4	7	8	1	—	—	—	57
15—	1	—	1	1	1	—	—	5	5	2	22	3	2	7	1	1	—	—	52
16—	—	—	—	1	—	—	1	1	4	4	20	6	2	11	—	—	—	—	50
17—	—	—	—	—	1	2	—	1	6	3	20	6	4	6	—	—	—	—	49
18—	—	—	—	2	1	—	—	1	—	—	2	—	—	3	—	1	—	—	10
19—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
Totals	1	1	1	4	4	5	2	13	29	15	101	24	18	54	5	7	6	8	298

TABLE LXIX. *St Andrews (St Leonards and St Katharine's).*

Temperature

Height in Inches	96·4	96·6	96·8	97·0	97·2	97·4	97·6	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	Totals
43—44	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	2
45—46	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1	2
47—48	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	1	1	4
49—50	—	—	—	—	—	—	—	—	—	—	—	1	1	1·5	—	1	1	—	5·5
51—52	—	—	—	—	—	—	—	—	—	—	2	—	—	1·5	—	—	1	1	5·5
53—54	—	—	—	—	—	—	—	—	—	—	1	—	—	1	—	1	—	2	5
55—56	—	—	—	—	—	—	—	—	1	—	3	—	—	2	1	—	—	1	8
57—58	—	—	—	—	—	—	—	—	—	—	4	2	·5	2	—	—	1	1	10·5
59—60	—	—	—	—	—	1	—	4	2	—	3·5	—	·5	5·5	—	1	1	—	18·5
61—62	—	—	—	—	1	1	—	—	5	5	19	4	2	9·5	1	1	1	—	49·5
63—64	—	1	1	2	1	1	—	2·5	10	4	27·5	7	6	9	2	2	—	1	77
65—66	—	—	—	1·5	—	2	1	3·5	7	6	28	7	5	16·5	1	—	—	—	78·5
67—68	·5	—	—	·5	2	—	1	1	2	—	11	2	3	2	—	—	—	—	25
69—70	·5	—	—	—	—	—	—	1	2	—	1	—	—	1·5	—	—	—	—	6
71—72	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1
Totals	1	1	1	4	4	5	2	13	29	15	101	24	18	54	5	7	6	8	298

TABLE LXX. *St Leonards.*

Temperature

		96·4	96·6	96·8	97·0	97·2	97·4	97·6	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	Totals
School House	I	—	—	—	1	—	1	1	2	7	3	14	1	2	1	—	—	—	—	33
	II	—	—	1	1	—	2	—	3	2	1	11	3	2	4	—	—	—	—	30
	III	1	—	—	2	—	—	—	—	5	1	15	3	2	4	—	—	—	—	33
	IV	—	—	—	—	2	—	—	2	4	5	10	1	2	4	—	—	—	—	30
	V	—	—	—	—	1	1	1	3	4	1	9	3	2	7	1	1	—	1	35
	VI	—	—	—	—	—	—	—	—	2	2	3	2	—	4	—	—	—	—	13
	VII	—	—	—	—	—	—	—	—	2	—	13	6	6	6	—	—	—	—	33
	VIII	—	—	—	—	—	—	—	2	1	2	9	1	1	8	1	2	—	—	27
	Totals	1	0	1	4	3	4	2	12	27	15	84	20	17	38	2	3	0	1	234

TABLE LXXI. *St Leonards.*

Weight in Stones

		5·5—6·0	6·0—6·5	6·5—7·0	7·0—7·5	7·5—8·0	8·0—8·5	8·5—9·0	9·0—9·5	9·5—10·0	10·0—10·5	10·5—11·0	11·0—11·5	11·5—12·0	12·0—12·5	Totals
School House	I	—	1	1	4	1	4·5	4·5	6·5	6·5	3	—	—	1	—	33
	II	—	—	—	3	4·5	5	3·5	8	2·5	2·5	—	1	—	—	30
	III	—	·5	1·5	5	3·5	4	5·5	4·5	3·5	3	1	—	—	1	33
	IV	—	—	2	2·5	5·5	5·5	4·5	3	3	2	2	—	—	—	30
	V	—	·5	3·5	1	1	4	6·5	8·5	5	3	—	1	1	—	35
	VI	—	·5	·5	1	2·5	2	3·5	2	—	1	—	—	—	—	13
	VII	—	—	—	3	4	3	5·5	5	6·5	4·5	1·5	—	—	—	33
	VIII	1	—	—	1	—	5	6	7	3	2	2	—	—	—	27
	Totals	1	2·5	8·5	20·5	22	33	39·5	44·5	30	21	6·5	2	2	1	234

TABLE LXXII. *St Leonards.*

Height in Inches

		58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	Totals
School House	I	1·5	·5	1·5	1·5	3·5	3·5	5·5	4·5	5·5	3·5	1	1	—	—	—	33
	II	—	—	2	3	4	2·5	6·5	8	2	1	1	—	—	—	—	30
	III	—	—	1	2·5	3	7·5	6	3	4	3	1·5	·5	1	—	—	33
	IV	—	2	1	—	9	2	2	5	3	2·5	2·5	1	—	—	—	30
	V	—	—	1	2·5	2·5	8	5·5	8	4·5	1·5	1·5	—	—	—	—	35
	VI	—	1	—	2	·5	1	5·5	1	2	—	—	—	—	—	—	13
	VII	—	—	1	2	1	7	2·5	8	5·5	3	1·5	1·5	—	—	—	33
	VIII	—	—	2·5	·5	1·5	2·5	4	7	5·5	1·5	—	1	—	·5	·5	27
	Totals	1·5	3·5	10	14	25	34	37·5	44·5	32	16	9	5	1	·5	·5	234

Table LXXIII. *St Leonards.*

School House

		I	II	III	IV	V	VI	VII	VIII	Totals
Age	13—	3	1	3	1	3	3	1	2	17
	14—	8	13	5	10	8	3	4	4	55
	15—	6	5	13	5	8	2	7	6	52
	16—	9	6	2	9	6	1	10	7	50
	17—	6	4	9	4	8	2	11	5	49
	18—	—	1	1	1	2	2	—	3	10
	19—	1	—	—	—	—	—	—	—	1
	Totals	33	30	33	30	35	13	33	27	234

Table LXXIV. *St Leonards.*

Height in Inches

		58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	Totals
Age	13—	1	—	3·5	1·5	2·5	4·5	4	—	—	—	—	—	—	—	—	17
	14—	·5	3·5	3	5·5	10	5	7·5	8·5	5·5	4	1	1	—	—	—	55
	15—	—	—	1	2·5	3·5	9·5	10	11·5	6·5	2	4	1·5	—	—	—	52
	16—	—	—	2	3	6	9·5	3·5	12·5	7·5	3·5	1	1·5	—	—	—	50
	17—	—	—	·5	1·5	3	5	9	12	10	5	1	1	1	—	—	49
	18—	—	—	—	—	—	·5	3·5	—	2·5	·5	2	—	—	·5	·5	10
	19—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1
	Totals	1·5	3·5	10	14	25	34	37·5	44·5	32	16	9	5	1	·5	·5	234

Table LXXV. *St Leonards.*

Weight in Stones

		5·5—6·0	6·0—6·5	6·5—7·0	7·0—7·5	7·5—8·0	8·0—8·5	8·5—9·0	9·0—9·5	9·5—10·0	10·0—10·5	10·5—11·0	11·0—11·5	11·5—12·0	12·0—12·5	Totals
Age	13—	1	1·5	3·5	4	4	1	1·5	·5	—	—	—	—	—	—	17
	14—	—	·5	4·5	9	6	8	9·5	7·5	5	4	—	1	—	—	55
	15—	—	·5	·5	3·5	5·5	10	10·5	8	5	6	1·5	—	—	1	52
	16—	—	—	—	4	4·5	5	12	10·5	8	3	1	1	1	—	50
	17—	—	—	—	—	2	8·5	5·5	13·5	9·5	5	4	—	1	—	49
	18—	—	—	—	—	—	·5	·5	3·5	2·5	3	—	—	—	—	10
	19—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
	Totals	1	2·5	8·5	20·5	22	33	39·5	44·5	30	21	6·5	2	2	1	234

TABLE LXXVI. *St Leonards.*

Weight in Stones

Height in Inches	5·5—6·0	6·0—6·5	6·5—7·0	7·0—7·5	7·5—8·0	8·0—8·5	8·5—9·0	9·0—9·5	9·5—10·0	10·0—10·5	10·5—11·0	11·0—11·5	11·5—12·0	12·0—12·5	Totals
58	—	1	—	·5	—	—	—	—	—	—	—	—	—	—	1·5
59	—	—	1·5	2	—	—	—	—	—	—	—	—	—	—	3·5
60	1	—	—	4·5	1	—	2	—	1	·5	—	—	—	—	10
61	—	·75	1·25	2·5	3·5	3·5	1	1	—	·5	—	—	—	—	14
62	—	·25	1·25	4·5	5·5	5·5	3·5	2·5	2	—	—	—	—	—	25
63	—	·5	3	·5	6	5·25	6·25	6·25	2·25	2	1·5	·5	—	—	34
64	—	—	1	3·25	3·75	6·25	9·25	8·75	1·75	1·5	—	1·5	·5	—	37·5
65	—	—	·5	1·75	·25	7	9	11	7·5	4	2	—	1·5	—	44·5
66	—	—	—	1	1	4·5	4	5·5	6·5	8·5	1	—	—	—	32
67	—	—	—	—	1	1	2·5	4·5	5·5	1·5	—	—	—	—	16
68	—	—	—	—	—	—	—	3·5	2·5	1·5	1	—	—	·5	9
69	—	—	—	—	—	—	2	1·5	1	—	—	—	—	·5	5
70	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1
71	—	—	—	—	—	—	—	—	—	·5	—	—	—	—	·5
72	—	—	—	—	—	—	—	—	—	·5	—	—	—	—	·5
Totals	1	2·5	8·5	20·5	22	33	39·5	44·5	30	21	6·5	2	2	1	234

TABLE LXXVII. *St Leonards.*

Temperature

Age	96·4	96·6	96·8	97·0	97·2	97·4	97·6	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	Totals
13—	—	—	—	—	—	—	—	—	2	1	5	1	2	4	—	1	—	1	17
14—	—	—	—	—	—	2	1	4	10	5	14	4	7	7	1	—	—	—	55
15—	1	—	1	1	1	—	—	5	5	2	22	3	2	7	1	1	—	—	52
16—	—	—	—	1	—	—	1	1	4	4	20	6	2	11	—	—	—	—	50
17—	—	—	—	—	1	2	—	1	6	3	20	6	4	6	—	—	—	—	49
18—	—	—	—	2	1	—	—	1	—	—	2	—	—	3	—	1	—	—	10
19—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
Totals	1	0	1	4	3	4	2	12	27	15	84	20	17	38	2	3	0	1	234

TABLE LXXVIII. *St Leonards.*

Temperature

Height in Inches	96·4	96·6	96·8	97·0	97·2	97·4	97·6	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	Totals
58	—	—	—	—	—	—	—	—	—	—	—	1	·5	—	—	—	—	—	1·5
59	—	—	—	—	—	—	—	1	1	—	—	—	·5	1	—	—	—	—	3·5
60	—	—	—	—	—	—	—	2	1	—	1·5	—	—	4·5	—	1	—	—	10
61	—	—	—	—	—	—	—	—	2·5	1	6	3	1	·5	—	—	—	—	14
62	—	—	—	—	—	1	—	—	2·5	4	10	1	1	4·5	1	—	—	—	25
63	—	—	—	1·5	1	—	—	1·5	4	1·5	11·5	4	3·5	3·5	—	1	—	1	34
64	—	—	1	·5	—	1	—	1	5	2·5	16	2	2·5	4	1	1	—	—	37·5
65	—	—	—	—	—	—	—	1·5	5	4	19	3·5	2·5	9	—	—	—	—	44·5
66	—	—	—	1·5	—	2	1	2	2	2	8	3·5	2·5	7·5	—	—	—	—	32
67	—	—	—	·5	1	—	1	—	1	—	7·5	2	2	1	—	—	—	—	16
68	·5	—	—	—	1	—	—	1	1	—	3·5	—	1	1	—	—	—	—	9
69	·5	—	—	—	—	—	—	1	1	—	1	—	—	1·5	—	—	—	—	5
70	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1
71	—	—	—	—	—	—	—	·5	—	—	—	—	—	—	—	—	—	—	·5
72	—	—	—	—	—	—	—	·5	—	—	—	—	—	—	—	—	—	—	·5
Totals	1	0	1	4	3	4	2	12	27	15	84	20	17	38	2	3	0	1	234

TABLE LXXIX. *St Leonards.*

Temperature

Weight in Stones	96·4	96·6	96·8	97·0	97·2	97·4	97·6	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	Totals
5·5—6·0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	1
6·0—6·5	—	—	—	—	—	—	—	—	1	—	·5	1	—	—	—	—	—	—	2·5
6·5—7·0	—	—	—	—	—	—	—	1	3·5	—	2	—	1	—	—	—	—	1	8·5
7·0—7·5	—	—	—	—	—	·5	—	1	3	—	6	2	1	7	—	—	—	—	20·5
7·5—8·0	—	—	—	·5	—	·5	—	1	2·5	3	8	2·5	3	1	—	—	—	—	22
8·0—8·5	—	—	1	·5	1	1	1	·5	2·5	3·5	14	2·5	—	3·5	1	1	—	—	33
8·5—9·0	—	—	—	1	1	—	—	2·5	2·5	3·5	15	3	3	7	1	—	—	—	39·5
9·0—9·5	—	—	—	·5	1	·5	1	—	5·5	—	16·5	4	4	10·5	—	1	—	—	44·5
9·5—10·0	—	—	—	·5	—	·5	—	·5	3·5	2	14	2	3	4	—	—	—	—	30
10·0—10·5	—	—	—	1	—	1	—	3·5	1	2	8	2	—	2·5	—	—	—	—	21
10·5—11·0	—	—	—	—	—	—	—	—	2	1	—	1	1	1·5	—	—	—	—	6·5
11·0—11·5	—	—	—	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	2
11·5—12·0	—	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—	—	—	2
12·0—12·5	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Totals	1	0	1	4	3	4	2	12	27	15	84	20	17	38	2	3	0	1	234

TABLE LXXX. *Royal Soldiers' Daughters' Home.*

Height in Inches

Age	42—43	44—45	46—47	48—49	50—51	52—53	54—55	56—57	58—59	60—61	62—63	Totals
6—	1	—	—	—	—	—	—	—	—	—	—	1
7—	—	2	5	2	—	—	—	—	—	—	—	9
8—	—	3·5	3·5	4	—	—	—	—	—	—	—	11
9—	—	1	11	7	4	1	—	—	—	—	—	24
10—	—	—	1·5	6·5	3·5	3·5	1	—	—	—	—	16
11—	—	—	—	1	8·5	1·5	4	—	1	—	—	16
12—	—	—	—	·5	2	2·5	1	4	1	1	—	12
13—	—	—	—	—	1	5·5	8·5	7·5	5·5	1·5	1·5	31
14—	—	—	—	—	—	—	—	5·5	4	5·5	3	18
15—	—	—	—	—	—	—	—	—	5	2	4	11
16—	—	—	—	—	—	—	—	—	1	2	—	3
Totals	1	6·5	21	21	19	14	14·5	17	17·5	12	8·5	152

TABLE LXXXI. *Royal Soldiers' Daughters' Home.*

Weight in Stones

Age	3·0—3·5	3·5—4·0	4·0—4·5	4·5—5·0	5·0—5·5	5·5—6·0	6·0—6·5	6·5—7·0	7·0—7·5	7·5—8·0	8·0—8·5	8·5—9·0	9·0—9·5	Totals
6—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
7—	2	6	1	—	—	—	—	—	—	—	—	—	—	9
8—	1	5	5	—	—	—	—	—	—	—	—	—	—	11
9—	—	9·5	12·5	2	—	—	—	—	—	—	—	—	—	24
10—	—	1	8·5	4·5	1	1	—	—	—	—	—	—	—	16
11—	—	—	3	5	6	2	—	—	—	—	—	—	—	16
12—	—	—	—	3	3	2	2	2	—	—	—	—	—	12
13—	—	—	—	3	4	7	5·5	5·5	3·5	1·5	1	—	—	31
14—	—	—	—	—	—	1	—	3	4	6	3	1	—	18
15—	—	—	—	—	—	—	—	1	2	2	2	2	2	11
16—	—	—	—	—	—	—	—	—	—	—	1	—	2	3
Totals	4	21·5	30	17·5	14	13	7·5	11·5	9·5	9·5	7	3	4	152

TABLE LXXXII. *Royal Soldiers' Daughters' Home.*

Height in Inches

Weight in Stones	42—43	44—45	46—47	48—49	50—51	52—53	54—55	56—57	58—59	60—61	62—63	Totals
3·0—3·5	1	2	1	—	—	—	—	—	—	—	—	4
3·5—4·0	—	3·5	14	3	1	—	—	—	—	—	—	21·5
4·0—4·5	—	1	6	16	6	1	—	—	—	—	—	30
4·5—5·0	—	—	—	1·5	9	7	—	—	—	—	—	17·5
5·0—5·5	—	—	—	·5	3	5·5	5	—	—	—	—	14
5·5—6·0	—	—	—	—	—	—	7	4·5	1·5	—	—	13
6·0—6·5	—	—	—	—	—	·25	·75	5·5	1	—	—	7·5
6·5—7·0	—	—	—	—	—	·25	1·25	3·5	5	1·5	—	11·5
7·0—7·5	—	—	—	—	—	—	·25	2·75	3	1·5	2	9·5
7·5—8·0	—	—	—	—	—	—	·25	·75	2·5	3·5	2·5	9·5
8·0—8·5	—	—	—	—	—	—	—	—	4·5	2·5	—	7
8·5—9·0	—	—	—	—	—	—	—	—	—	1	2	3
9·0—9·5	—	—	—	—	—	—	—	—	—	2	2	4
Totals	1	6·5	21	21	19	14	14·5	17	17·5	12	8·5	152

TABLE LXXXIII. *Royal Soldiers' Daughters' Home.*

Temperature

Age	97·8	97·9	98·0	98·1	98·2	98·3	98·4	98·5	98·6	98·7	98·8	98·9	99·0	99·1	99·2	99·3	99·4	99·5	99·6	99·7	99·8	99·9	100·0	100·1	100·2	Totals
6—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
7—	—	—	—	—	1	—	—	—	4	—	—	—	—	—	3	1	—	—	—	—	—	—	—	—	—	9
8—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	1	1	2	—	3	—	—	2	—	—	—	11
9—	—	—	—	1	—	—	—	1	1	—	1	—	2	2	4	—	2	1	4	3	—	1	—	—	1	24
10—	—	—	—	—	—	1	—	—	1	2	—	2	1	2	—	1	1	—	2	3	—	—	—	—	—	16
11—	—	—	—	—	—	—	1	1	—	1	—	—	—	2	1	2	3	3	—	1	1	—	—	—	—	16
12—	—	—	—	—	—	—	1	1	—	—	1	2	—	1	2	2	—	1	1	—	—	—	—	—	—	12
13—	1	—	1	—	2	—	1	1	2	1	2	3	2	1	1	2	5	1	3	1	—	—	—	1	—	31
14—	—	—	—	1	—	2	2	—	1	2	1	—	2	—	1	1	3	1	—	—	—	—	—	1	—	18
15—	—	—	—	—	—	—	1	—	1	1	3	1	1	—	1	1	1	—	—	—	—	—	—	—	—	11
16—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	1	—	—	—	—	—	—	—	—	3
Totals	1	0	1	2	3	3	6	4	10	8	9	10	8	9	14	11	18	7	13	8	1	3	0	2	1	152

TABLE LXXXIV. *Royal Soldiers' Daughters' Home.*

Temperature

Height in Inches	97·8	97·9	98·0	98·1	98·2	98·3	98·4	98·5	98·6	98·7	98·8	98·9	99·0	99·1	99·2	99·3	99·4	99·5	99·6	99·7	99·8	99·9	100·0	100·1	100·2	Totals
42—43	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
44—45	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1·5	·5	1·5	—	1	—	—	1	—	—	—	6·5
46—47	—	—	—	—	1	—	—	—	3	·5	—	1	2	1	1·5	·5	·5	1	4	2	—	2	—	—	1	21
48—49	—	—	—	—	—	—	·5	1	2	1·5	1	1	—	2	3·5	2	2	1	1·5	2	—	—	—	—	—	21
50—51	—	—	—	—	—	—	·5	—	1	1	—	2	1	1	3	1	2	2	2·5	1	1	—	—	—	—	19
52—53	—	—	—	1	—	—	—	—	—	—	1	1	1	1·5	1·5	2	1·5	—	1·5	2	—	—	—	—	—	14
54—55	—	—	—	—	1·5	1	1	2	·5	1	1	—	—	·5	1	1	2·5	—	·5	—	—	—	—	1	—	14·5
56—57	1	—	—	1	·5	—	1	—	·5	1	—	—	1	2	1	2	2	1·5	1	1	—	—	—	·5	—	17
58—59	—	—	—	—	—	1	3	·5	—	1	1	3	·5	—	1	1	2·5	1·5	1	—	—	—	—	·5	—	17·5
60—61	—	—	—	—	—	—	—	·5	1·5	1	4	1	·5	1	—	—	2·5	—	—	—	—	—	—	—	—	12
62—63	—	—	1	—	—	1	—	—	1·5	—	—	1	2	—	—	1	1	—	—	—	—	—	—	—	—	8·5
Totals	1	0	1	2	3	3	6	4	10	8	9	10	8	9	14	11	18	7	13	8	1	3	0	2	1	152

TABLE LXXXV. *Royal Soldiers' Daughters' Home.*

Temperature

Weight in Stones	97·8	97·9	98·0	98·1	98·2	98·3	98·4	98·5	98·6	98·7	98·8	98·9	99·0	99·1	99·2	99·3	99·4	99·5	99·6	99·7	99·8	99·9	100·0	100·1	100·2	Totals
3·0—3·5	—	—	—	—	1	—	—	—	—	—	1	—	—	—	1	—	—	—	1	—	—	—	—	—	—	4
3·5—4·0	—	—	—	—	—	—	—	—	4	1	—	1	2	1	2	2	2	—	2·5	2	—	1	—	—	1	21·5
4·0—4·5	—	—	—	1	—	—	—	—	1	2	1	1	1	1·5	5	1	3	4	4·5	2	—	2	—	—	—	30
4·5—5·0	—	—	—	—	—	—	—	1	1	1	1	2	—	1·5	2	2	1	—	2	2	1	—	—	—	—	17·5
5·0—5·5	—	—	—	—	—	—	1	1	—	—	—	1	1	2	1	2	3	—	—	1	—	—	—	1	—	14
5·5—6·0	—	—	—	—	—	1	3	1	—	1	1	—	1	—	1	1	2	—	1	—	—	—	—	—	—	13
6·0—6·5	1	—	—	—	1	—	—	—	—	—	—	—	—	2	—	—	1	2	·5	—	—	—	—	—	—	7·5
6·5—7·0	—	—	—	—	1	—	2	—	—	—	1	2	—	—	1	1	1	1	·5	1	—	—	—	—	—	11·5
7·0—7·5	—	—	1	1	—	—	—	1	·5	1	1	1	1	—	—	1	1	—	—	—	—	—	—	—	—	9·5
7·5—8·0	—	—	—	—	—	2	—	—	1·5	1	2	—	—	—	1	1	—	—	—	—	—	—	—	1	—	9·5
8·0—8·5	—	—	—	—	—	—	—	—	1	1	1	—	1	—	—	—	2	—	1	—	—	—	—	—	—	7
8·5—9·0	—	—	—	—	—	—	—	—	1	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	3
9·0—9·5	—	—	—	—	—	—	—	—	—	—	—	2	—	1	—	—	1	—	—	—	—	—	—	—	—	4
Totals	1	0	1	2	3	3	6	4	10	8	9	10	8	9	14	11	18	7	13	8	1	3	0	2	1	152

TABLE LXXXVI. *Charterhouse.*

Temperature

Weight in Stones	96·0	96·2	96·4	96·6	96·8	97·0	97·2	97·4	97·6	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	Totals
5·0—5·5	—	—	—	—	—	—	—	—	—	—	—	—	·5	—	—	1	—	—	—	1·5
5·5—6·0	—	—	1	—	—	1	—	—	—	·5	1·5	—	1·5	1	—	—	—	—	—	6·5
6·0—6·5	—	—	—	—	—	·5	3·25	1·25	—	1·5	1·5	2	7·5	—	—	3	—	—	—	20·5
6·5—7·0	—	—	—	—	—	1·5	1·25	1·75	—	·5	4	1	8·5	2	1	5·5	1	—	—	28
7·0—7·5	—	—	—	—	—	4·5	1	1·5	1	·5	13·5	3	8·5	4	2	3·5	1	—	1	45
7·5—8·0	—	—	—	—	—	2·5	·5	2·5	—	1	9·5	1	11·5	1	2·5	4	—	1	—	37
8·0—8·5	—	1	—	·5	—	6	3·5	3·5	·5	1	10·5	1·5	16·5	2·5	3·5	2	1	1	—	54·5
8·5—9·0	1	—	—	·5	—	1·5	1·5	—	2	3·5	5·5	4·5	12	6	1·5	1·5	—	·5	—	41·5
9·0—9·5	—	—	—	—	—	3·5	1·5	2	2	2·5	13	6	15	3·5	4·5	1·5	1	·5	—	56·5
9·5—10·0	1	—	—	—	—	2·5	2	3·5	2	2	6	4·5	11·5	3·5	—	3	·5	—	—	42
10·0—10·5	—	—	—	—	1	5	2	4	3	1	11·5	2·5	13·5	1·5	—	1·5	·5	—	—	47
10·5—11·0	—	—	—	1	1	5	·5	3·5	1	3·5	11	1·5	7·5	—	1	2	—	—	—	38·5
11·0—11·5	—	—	—	—	—	1·5	1	4·5	5	·5	6·5	1·5	7	1	2	1·5	—	—	—	32
11·5—12·0	—	—	—	—	—	—	·5	2·5	1·5	1	4	—	5	1	—	1	—	—	—	16·5
12·0—12·5	—	—	—	—	—	—	1	1	·5	—	2	—	1	—	—	1	—	—	—	6·5
12·5—13·0	—	—	—	—	—	—	1	—	·5	—	—	—	—	—	—	·5	—	—	—	2
13·0—13·5	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	·5	—	—	—	1·5
Totals	2	1	1	2	2	35	20·5	31·5	19	19	100	30	127	27	18	33	5	3	1	477

TABLE LXXXVII. *Charterhouse.*

Temperature

Height in Inches	96·0	96·2	96·4	96·6	96·8	97·0	97·2	97·4	97·6	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	Totals
57	—	—	—	—	—	—	—	—	—	—	—	—	—	·5	—	—	—	—	—	·5
58	—	—	—	—	—	1	—	—	—	—	1	—	1	·5	1	—	1	—	—	5·5
59	—	—	—	—	—	—	—	—	—	1	2·5	—	—	—	—	1	—	—	—	4·5
60	—	—	1	—	—	—	2·5	—	—	—	1·5	1	2	—	—	2·5	—	—	—	10·5
61	—	—	—	—	—	—	1·5	1	—	—	2	—	7·5	—	—	·5	1	—	—	13·5
62	—	—	—	—	—	2	—	4	—	—	6	2	5·5	2	1	3	1	—	1	27·5
63	—	—	—	—	—	3	·5	·5	—	1	8	1	6	1	—	2·5	1	—	—	24·5
64	—	1	—	—	—	1	1	2	1	1	3	2	11	1	2	2·5	—	—	—	28·5
65	—	—	—	—	—	2	2	1	—	—	9·5	2·5	8·5	3	1	3	1·5	—	—	34
66	—	—	—	1	—	3·5	2	1	—	2	5·5	2·5	13	1	2	3·5	·5	—	—	37·5
67	1	—	—	—	—	2·5	2	—	—	1	4	4·5	12	7	4	·5	—	—	—	38·5
68	1	—	—	1	—	4	1·5	2	2	—	12	4· 5	12·5	4	1	3·5	—	1	—	50
69	—	—	—	—	—	5	4·5	5	3	3	12	4	10·5	4	1	1·5	—	2	—	55·5
70	—	—	—	—	1	2·5	1	3	2·5	3	11	2	14	1	1	2	1	—	—	45
71	—	—	—	—	1	5	—	4·5	4·5	3	8·5	3	10·5	3	3	1	—	—	—	47
72	—	—	—	—	—	2·5	—	3·5	3	1·5	9·5	1	7	1	—	3	—	—	—	32
73	—	—	—	1	—	1	1	3·5	2	3·5	2	·5	2	—	1	3	—	—	—	20·5
74	—	—	—	—	—	—	—	·5	1	—	2	·5	4	—	—	—	—	—	—	8
75	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	2
76	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
77	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
Totals	2	1	1	3	2	35	20·5	31·5	19	20	101	32	128	29	18	33	7	3	1	487

TABLE LXXXVIII. *Charterhouse.*

Temperature

Age	96·0	96·2	96·4	96·6	96·8	97·0	97·2	97·4	97·6	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	Totals
13—	—	—	—	—	—	1	—	—	—	2	2	1	6	1	—	2	1	—	—	16
14—	—	—	1	1	—	6	4·5	6·5	2	1	26	5·5	33·5	6	8	8	4	1	—	114
15—	1	—	—	1	—	12	5·5	6·5	3	5	21	8	23	9	1	12	1	2	1	112
16—	—	1	—	—	—	5·5	3·5	9	2	8	25	10	33	5·5	4·5	4·5	·5	1	—	113
17—	—	—	—	—	2	4	4	8	6	2	19	11	22	6	5	4	—	—	—	93
18—	1	—	—	—	—	6	4	2	6	3	14	4·5	12·5	3·5	2·5	3	1	—	—	63
19—	—	—	—	1	—	1	—	4	2	—	3	2	3	1	—	—	—	—	—	17
Totals	2	1	1	3	2	35·5	21·5	36	21	21	110	42	133	32	21	33·5	7·5	4	1	528

TABLE LXXXIX. *Charterhouse.*

Temperature

School House	96·0	96·2	96·4	96·6	96·8	97·0	97·2	97·4	97·6	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	Totals
I	2	1	—	2	1	19	3·5	4·5	—	—	7	1	7	1	—	—	—	—	—	49
II	—	—	1	1	1	4	5	7	8	6	10	—	13	1	1	1	—	—	—	59
III	—	—	—	—	—	4	3	2	4	1	20	1	11	4	—	2	—	—	—	52
IV	—	—	—	—	—	3	2	10	1	5	12	6	7	2	4	4	1	—	1	58
V	—	—	—	—	—	3	6	1	2	3	—	6	6	5	3	4	1	—	—	40
VI	—	—	—	—	—	·5	1	3·5	2	1	8	10	4	3	3	·5	·5	1	—	38
VII	—	—	—	—	—	2	—	5	2	—	14	2	20	5	—	3	—	—	—	53
VIII	—	—	—	—	—	—	1	1	—	4	13	6	7	—	4	2	—	—	—	38
IX	—	—	—	—	—	—	—	2	2	1	7	7	24	3	1	3	—	—	—	50
X	—	—	—	—	—	—	—	—	—	—	14	—	27	1	—	9	—	3	—	54
XI	—	—	—	—	—	—	—	—	—	—	5	3	7	7	5	5	5	—	—	37
Totals	2	1	1	3	2	35·5	21·5	36	21	21	110	42	133	32	21	33·5	7·5	4	1	528

Table XC. *Charterhouse.*

Weight in Stones

		5·0—5·5	5·5—6·0	6·0—6·5	6·5—7·0	7·0—7·5	7·5—8·0	8·0—8·5	8·5—9·0	9·0—9·5	9·5—10·0	10·0—10·5	10·5—11·0	11·0—11·5	11·5—12·0	12·0—12·5	12·5—13·0	13·0—13·5	Totals
School House	I	—	2	1	3·5	4	5·5	10	3	2	5·5	4	4	3·5	·5	·5	—	—	49
	II	—	1·5	3·5	1	8	1·5	6·5	4·5	5	8	5·5	6	4·5	·5	—	—	—	56
	III	—	2	2	1·5	6	4	7·5	4	7	5	6	2·5	1·5	—	2·5	·5	—	52
	IV	·5	1	2·5	5	4	3·5	6·5	6·5	5·5	6·5	5·5	5	2	1	1	—	—	56
	V	—	—	4	1	2	5	2·5	5·5	5	3·5	4·5	1·5	1	2·5	—	1	1	40
	VII	1	—	—	2·5	1·5	1	5·5	5·5	10·5	3·5	9·5	6	3	3	·5	—	—	53
	VIII	—	—	1·5	1·5	5	4·5	4·5	1·5	5·5	4·5	1·5	·5	3·5	2	1	·5	·5	38
	IX	—	—	2	·5	7	2·5	3·5	4·5	5	2·5	6·5	4	9	2	1	—	—	50
	X	—	—	3	6·5	3·5	9	5	4	7	3·5	·5	6	2	4·5	·5	—	—	55
	XI	—	—	1	5	4	·5	3	2·5	4	·5	3·5	3	2	1	—	—	—	30
	Totals	1·5	6·5	20·5	28	45	37	54·5	41·5	56·5	43	47	38·5	32	17	7	2	1·5	479

Table XCI. *Charterhouse.*

Height in Inches

		57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	Totals
School House	I	—	1	1	1	1	4	5	2	3	5	3	7	3	4	4	2	3	—	—	—	—	49
	II	—	—	—	4	·5	2·5	2	6	2	3·5	3	7·5	7	5·5	6	6	2·5	—	—	—	—	58
	III	·5	·5	·5	·5	2	3	2	2	5·5	3·5	3	7	6·5	4	3·5	3·5	3·5	·5	·5	—	—	52
	IV	—	2	1	3	3	5	1	3	2	3·5	4	5·5	8·5	7	5	2·5	2·5	·5	—	—	—	59
	V	—	—	—	—	2	3	2	5	3	4	2	1	5	1	6	2	2	—	—	1	1	40
	VII	—	—	1	—	—	2	2	1	2·5	3·5	4·5	5·5	8·5	5·5	5·5	5	2·5	4	—	—	—	53
	VIII	—	—	1	—	—	2	5	2·5	1·5	4·5	2·5	3	6	2	2	3	1·5	1	·5	—	—	38
	IX	—	1	—	1	1	2	—	2	8	4	1	3	5	10	6	1	3	1	1	—	—	50
	X	—	—	—	1	3	3	3	3	4	3	8	8	4	4	4	5	—	1	1	—	—	55
	XI	—	1	—	—	1	1	2·5	2	3·5	3	7·5	2·5	2	2·5	5·5	2	—	—	—	—	—	36
	Totals	·5	5·5	4·5	10·5	13·5	27·5	24·5	28·5	35	37·5	38·5	50	55·5	45·5	47·5	32	20·5	8	3	1	1	490

TABLE XCII. *Charterhouse.*

Weight in Stones

Age

	5·0—5·5	5·5—6·0	6·0—6·5	6·5—7·0	7·0—7·5	7·5—8·0	8·0—8·5	8·5—9·0	9·0—9·5	9·5—10·0	10·0—10·5	10·5—11·0	11·0—11·5	11·5—12·0	12·0—12·5	12·5—13·0	13·0—13·5	Totals
13—	1	·5	4	2	1·5	2·5	1·5	—	—	—	—	—	—	—	—	—	—	13
14—	—	3·5	13·5	11·5	22·5	12	21	10	8	2·5	2·5	1	—	—	—	—	—	108
15—	·5	2 5	3	11·5	12·5	14·5	10·5	11	14·5	6·5	8	1	1	·5	·5	—	—	98
16—	—	—	—	3	6·5	5	13	12·5	11·5	14·5	13	10	4·5	5·5	1	—	—	100
17—	—	—	—	—	1	2	7·5	5·5	16	10	13·5	12·5	7	6·5	2	1	·5	85
18—	—	—	—	—	—	—	1	2·5	6·5	8	8·5	11	15·5	3·5	2·5	1	—	60
19—	—	—	—	—	1	1	—	—	—	1·5	1·5	3	4	1	1	—	1	15
Totals	1·5	6·5	20·5	28	45	37	54·5	41·5	56·5	43	47	38·5	32	17	7	2	1·5	479

TABLE XCIII. *Charterhouse.*

Height in Inches

Age

	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	Totals
13—	—	1	3	1	1·5	2·5	2	1	—	—	1	1	1	—	—	—	—	—	—	—	—	15
14—	·5	2·5	1	5·5	8·5	14	14	11	11	14·5	10·5	8·5	3·5	3	2	—	—	—	—	—	—	110
15—	—	2	·5	4	1·5	7	7·5	8·5	13	4	8·5	15·5	14	8·5	3	5·5	—	—	1	—	—	104
16—	—	—	—	—	2	2	—	6	7·5	11·5	7·5	8·5	15·5	11·5	9	8	9	1	1	—	—	100
17—	—	—	—	—	—	2	1	1	3·5	6	6·5	7	12	11·5	17·5	9·5	4	2·5	—	—	1	85
18—	—	—	—	—	—	—	—	—	—	1·5	3·5	8·5	9	9	14	7·5	4·5	3·5	—	—	—	61
19—	—	—	—	—	—	—	—	1	—	—	1	1	·5	2	2	1·5	3	1	1	1	—	15 .
Totals	·5	5·5	4·5	10·5	13·5	27·5	24·5	28·5	35	37·5	38·5	50	55·5	45·5	47·5	32	20·5	8	3	1	1	490

TABLE XCIV. *Charterhouse.*

Height in Inches

Weight in Stones	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	Totals
5·0—5·5	—	·5	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1·5
5·5—6·0	—	1·5	1	1·5	1	1	·5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6·5
6·0—6·5	—	1	1·5	4	6·5	6	1	—	—	·5	—	—	—	—	—	—	—	—	—	—	—	20·5
6·5—7·0	—	1	—	3	2·5	5	6	5	3·5	1	—	1	—	—	—	—	—	—	—	—	—	28
7·0—7·5	·5	·5	—	1	2·5	10·5	7·5	10·5	4·5	2·5	2	2	—	—	—	—	—	—	—	—	—	44
7·5—8·0	—	—	1	—	—	3	6	6·5	9	4	3·5	1	2	1	—	—	—	—	—	—	—	37
8·0—8·5	—	—	—	—	—	1	2·5	4·75	10·25	13	7	6·5	6·5	1·5	1	·5	—	—	—	—	—	54·5
8·5—9·0	—	—	—	—	—	—	·5	1·75	2·5	8·5	11·75	5	5	2·5	2·5	1·5	—	—	—	—	—	41·5
9·0—9·5	—	—	—	—	—	—	·5	—	3·25	4	7·75	12·5	11	4·25	9·75	3·5	—	—	—	—	—	56·5
9·5—10·0	—	—	—	—	—	—	—	—	1	2	1·25	7	12·75	8·25	6·75	2·5	1·5	—	—	—	—	43
10·0—10·5	—	—	—	—	—	—	—	—	1	1	1·75	9	8·25	14	4	5	1	2	—	—	—	47
10·5—11·0	—	—	—	—	—	—	—	—	—	—	2	1	3	7·75	8·75	9	7	—	—	—	—	38·5
11·0—11·5	—	—	—	—	—	—	—	—	—	—	—	1	2·5	5·5	10	6·5	4·5	1·5	—	—	·5	32
11·5—12·0	—	—	—	—	—	—	—	—	—	—	—	1·25	1·25	·25	4·25	2·5	2·5	3	1·5	—	·5	17
12·0—12·5	—	—	—	—	—	—	—	—	—	—	—	·25	·25	—	—	1	2·5	1·5	1·5	—	—	7
12·5—13·0	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1	—	—	—	—	2
13·0—13·5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	·5	—	—	1	—	1·5
Totals	·5	4·5	4·5	9·5	12·5	26·5	24·5	28·5	35	36·5	37	47·5	53·5	45	47	32	20·5	8	3	1	1	478

TABLE XCV. *Winchester.*

Temperature

Age	96·6	96·8	97·0	97·2	97·4	97·6	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	Totals
13—	—	—	—	1	—	3·5	1·5	—	1	5·5	4·5	1·5	3	2	·5	1	—	—	25
14—	—	—	1	—	2	3	2	2	10·5	15	11·5	9	8·5	4·5	2	2	·5	·5	74
15—	—	—	—	·5	·5	1	2	4	5	23·5	8·5	6	9	3	·5	1	·5	—	65
16—	—	—	1	—	1·5	4·5	3	5	5·5	21·5	8·5	6	6	4·5	2	—	—	—	69
17—	1	—	—	—	—	4·5	4	7	4	19·5	5·5	1·5	5	1	1	—	—	—	54
18—	—	—	—	—	—	1	1	4	2	11·5	3·5	3·5	2·5	1	—	—	·5	·5	31
19—	—	—	—	—	—	—	1	1	1	1	1	1	—	—	—	—	—	—	6
Totals	1	0	2	1·5	4	17·5	14·5	23	29	97·5	43	28·5	34	16	6	4	1·5	1	324

TABLE XCVI. *Winchester*.

Temperature

School House	96·6	96·8	97·0	97·2	97·4	97·6	97·8	98·0	98·2	98·4	98·6	98·8	99·0	99·2	99·4	99·6	99·8	100·0	Totals
I	—	—	—	—	—	1	—	2·5	3·5	11	4	2	6	1	·5	·5	—	—	32
II	1	—	1	—	1·5	3·5	6	6·5	6	11	7·5	6	10·5	3	2·5	1	·5	·5	68
III	—	—	—	—	—	—	—	—	—	3	1	1·5	1	1·5	1	·5	·5	—	10
IV	—	—	—	1	1	2	2	2	2	9	5	—	—	—	—	—	—	—	24
V	—	—	—	—	—	1	—	4	1	8	6	6	5	2	—	—	—	—	33
VI	—	—	—	—	—	—	—	—	5	2	4	4	4	2	1	—	—	—	22
VII	—	—	—	—	—	8	5·5	3·5	4·5	6·5	2	3	—	1	—	—	·5	·5	35
VIII	—	—	—	—	—	—	—	—	·5	20·5	5	—	—	—	—	—	—	—	26
IX	—	—	—	—	—	—	—	—	2·5	10	2	1·5	4	3	·5	·5	—	—	24
X	—	—	1	·5	1·5	2	1	2·5	4	11·5	3	2	2·5	·5	—	—	—	—	32
XI	—	—	—	—	—	—	—	2	—	5	3·5	2·5	1	2	·5	1·5	—	—	18
Totals	1	0	2	1·5	4	17·5	14·5	23	29	97·5	43	28·5	34	16	6	4	1·5	1	324

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