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A METHOD OF SEPARATING THE RELATIVE AETIOLOGICAL EFFECTS OF BIRTH ORDER AND MATERNAL AGE, WITH SPECIAL REFERENCE TO MONGOLIAN IMBECILITY

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§ I

MONGOLIAN imbecility is a not very uncommon developmental abnormality which tends to affect children who are born at the end of a family, and the incidence of the condition increases as maternal age increases. There are, quite possibly, other human diseases or characters which occur frequently either at the beginning or at the end of sibships. Wright (1) observed that coat colour in guinea-pigs varied in association with the age of the dam, and a similar effect was observed in a certain type of polydactyly. Wright was able to show, by use of the method of partial correlation, that the number of pregnancies of the dam had no effect upon the incidence of these characters. In a paper recently published in the *Proceedings of the Royal Society* (2) an analysis of human data concerning mongolism was undertaken. Two alternative methods were used in this analysis. The first method corresponded to Wright's technique of partial correlation, but it was complicated by the necessity for reconstructing the data in order to allow for the varying sizes of human families and the mode of their selection. The first method had several disadvantages, which were avoided by using the second method suggested by Prof. R. A. Fisher. It was not, however, possible to deal with the second method in full in the paper just referred to, and, in particular, it was not possible to give an account of how the sampling errors of the expectations were obtained. The purpose of this paper is to describe Prof. Fisher's method in detail, so that it may be possible for a future investigator to repeat the process on fresh data concerning mongolism or any other condition in which maternal age or birth order is suspected of being aetiologically significant.

The data on which the calculations which follow are based are given as an appendix to this paper in the same form as that given in the paper referred to above. The data consist of 217 sibships containing at least one mongol each. In order that the results of family history investigation may be suitable for the application of the analytical method described here it is necessary for sibships to be recorded giving the order of birth of each individual child. Affected and normal children must be clearly distinguished and, when it is impossible to know whether offspring are affected or normal, they must be excluded: thus miscarriages and still-births will not appear as individuals in the data, but they will affect the birth ranks of recorded children. It is also essential to know the age of the mother at the birth of each recorded child.

If a disease frequently affects the children born at late maternal ages it will also affect children who have late birth rank rather than those born at the beginning of the family. The two variables, maternal age and birth rank, are so closely correlated with one another that they may be both significantly associated with the incidence of the condition. If one of the variables is more closely correlated with the incidence than the other, a reasonable hypothesis to test is that the more closely correlated variable is alone causally related to the incidence and that the other is merely correlated on account of its close association with this variable. In the present instance, mongolism is found to be more closely associated with maternal age than it is with birth order.

The method adopted here is to test the hypothesis that the probability of a mongol child depends upon maternal age in some manner unknown prior to the data, but that, for any given maternal age, it does not depend upon birth rank. To do this we compare the observed number of mongols in any given birth rank with the number which is to be expected from the hypothesis. The differences, if any, between these two sets of numbers will then be tested to ascertain whether they can be due to random sampling errors or whether they must be regarded as due to a residual effect of birth order.

§ II

Now follows a detailed description of the method of obtaining the expected number of mongols in a given birth rank, on the assumption that the probability of the occurrence of mongolism in a child depends only upon maternal age.

Let us suppose that there are a number of families containing only two children born at the maternal ages of, say, 32 and 42, respectively, and let us further suppose that one child only in each family is a mongol. Call p_{32} and p_{42} the probabilities that a mongol is born at these maternal ages. The relative frequencies of families in which the mongol is born at the maternal age 32 to those in which the mongol is born at 42 will be in the ratio

$$\frac{p_{32}}{1-p_{32}} : \frac{p_{42}}{1-p_{42}},$$

or, say, $x_{32} : x_{42}$, where x is proportional to $\frac{p}{1-p}$. In any such family, the expectation that the child born at maternal age 32 is a mongol is $\frac{x_{32}}{x_{32}+x_{42}}$. In general, for families containing only one mongol, the expectation that any given child is the affected one is $\frac{x}{S\,(x)}$, where $S\,(x)$ is the sum of the values of x for the different maternal ages represented in the family.

For families containing two mongols the expectations of mongols at each place will be

$$\frac{xS'\,(x)}{SS\,(xx')},$$

adding up to two, where $S'(x)$ is the sum of the other values, and $SS\ (xx')$ stands for the sum of all the products of the values, taken two at a time.

Given a series of x values, the expectation of mongolism can be calculated for each recorded child in the data. The following examples show the expectations in three sibships based on specific x values. The first example, No. 189, shows the process in its simplest form. The expectations add up to unity because there is one affected member. In Sibship No. 102, the process is exactly similar, in spite of the presence of twins. Sibship No. 198, has two affected members: the sum of the expectations adds up to two.

Sibship No. 189

Order of birth	Maternal age	Age grouping	Affected (M) Normal (N)	x value	Expectation (p)
1	28	C	N	7	0·006
2	30	D	N	21	0·018
3	32	D	N	21	0·018
4	36	E	N	97	0·082
5	38	E	N	97	0·082
7	40	F	N	326	0·276
9	45	G	M	614	0·519

Sibship No. 102

1	24	B	N	11	0·043
3	28	C	N	7	0·028
4	30	D	N	21	0·083
5	33	D	N	21	0·083
{6	35	E	N	97	0·382
{6	35	E	M	97	0·382

Sibship No. 198

3	31	D	M	21	0·187
4	34	D	N	21	0·187
5	38	E	N	97	0·716
6	44	F	M	326	0·910

The expectations thus calculated are summed up in two ways. In the first place, we add together all expectation values for individuals at a given maternal age, and the assigned values of x will be correct when the number of mongols observed at any given maternal age tallies with the sum of the expectations attributed to each child at that maternal age. This is the method by which we check the accuracy of a series of proposed x values. Secondly, when the correct x values have been ascertained, the sum of the expectations for all the children in any given birth rank can be compared with the number of mongols actually observed in that birth rank. In order to simplify the arithmetic, maternal ages were divided into five-yearly groups, 15–19, 20–24, etc., and these groups were labelled A–G. The x values were ascertained by successive approximation. The first series was estimated on the basis of the proportion of mongol to normal children in each maternal-age group. The sum of the x values is immaterial, but it was found convenient to arrange that they were of not more than three figures each. The first estimate is given under the first trial in Table I. The result of calculating the probabilities for each child in each family and summing them up is given under the corresponding S in the same table. In this first trial the x values in the maternal-age groups E, F, and G are too low because the sum of the probabilities of mongol children is in each case considerably less than the observed number. On the other hand, there is a corresponding excess of expectation in the age groups A–D. The x values for the second trial were obtained by increasing (or decreasing) the first series of values in direct proportion to the discrepancy between the first expectation estimate and the observed number of affected children in each maternal-age group. The second trial showed the same systematic error as the first, but the degree was much less. The third estimate was obtained by simple proportion by taking into account the discrepancies in the results of the first two

Table I

Age group	First trial		Second trial		Third trial		Final estimate		Observed number
	x_1	S	x_2	S	x_3	S	x_7	S	
A	83	3·69	46	3·20	19	3·04	24	2·98	3·00
B	31	16·87	22	15·48	8	12·52	11	12·87	13·00
C	19	19·50	12	16·03	5	13·39	7	13·82	14·00
D	33	29·11	28	28·29	14	23·27	21	26·58	27·00
E	104	59·48	106	63·00	82	63·85	97	64·14	64·00
F	321	76·99	319	78·46	330	86·05	326	81·46	81·00
G	407	18·35	467	19·55	542	21·87	614	22·17	22·00

trials. If d_1 represents the discrepancy in the first trial and d_2 the discrepancy in the second trial for a given age group, the corresponding x_3 was obtained according to the formula

$$x_3 = \frac{d_1 x_2 - d_2 x_1}{d_1 - d_2}.$$

By this means the systematic error was abolished.

Four more trials were necessary—successively correcting x_3 again by the original proportional method—in order to obtain a result which corresponded with the totals in the original data so closely that the sum of the discrepancies, positive and negative, was less than 1 per cent. of the total number of cases. It is therefore to be inferred that the x values in the seventh trial correspond closely to the true relative probabilities of the birth of a mongol at different maternal ages (see Fig. 1).*

These final x values differ considerably from the actual proportion of mongols to total children in each age group, which are given directly by the data. The reason for this is that the families are selected by the presence of at least one affected member and are therefore not representative of the general population. It is interesting to compare the x values derived in this way with estimates of the probabilities of a mongol at different maternal

* The x values quoted in the writer's recent paper (2) on page 440 differ slightly from the final estimate recorded here in Table I. The subsequent calculations described both in that communication and in this were all based upon the numbers given here under x_7.

ages derived from comparing the maternal ages of a group of mongols with maternal ages at the births of children in the general population. Such estimates are given by Jenkins (3) for American and European data and they agree roughly with the present findings, though the initial decrease up to the maternal age of 25 in the present series of x values is not consistently demonstrated.*

After calculating the expectation of mongolism for every individual in each family from the x values, the expectations were added up according to birth rank. The sum of all the expectations allotted to first-born children, to second-born children, and so on, gives the

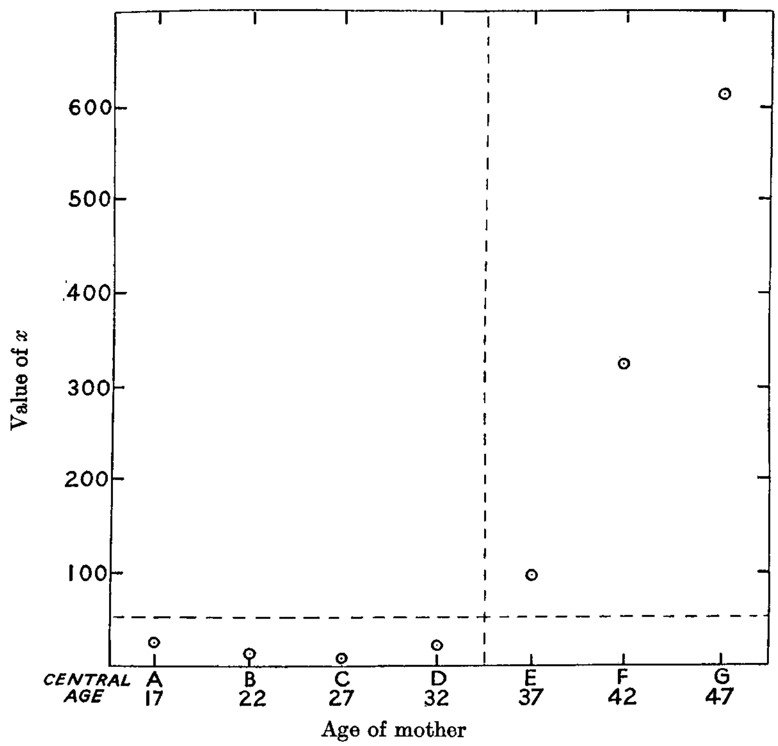

Fig. 1. Final estimate of values of x for maternal age groups

total expectation of mongolism in the whole series of families in each birth rank. The result of totalling the probabilities in this way is shown in the upright columns at the right-hand margin of Table II. On inspection it is found that there are too many first-born and too few third-, fourth- and fifth-born in the observed data. There is also an excess of observed mongols in the later birth ranks. It is necessary to enquire whether these discrepancies between observation and expectation are statistically significant. They may be due to a real tendency of the first-born children, or those born later than fifth, to be affected. On the

* The following relative frequencies can be inferred from the diagram in which Jenkins deals with Brousseau's large series of cases, A, 11; B, 12; C, 13; D, 29; E, 65; F, 250; G, 760. For the age group 50 to 55, the figure is estimated to be of the order of 3000.

other hand, they may be due to sampling errors. The residual effect of primogeniture, though small in comparison with the importance of maternal age, may be significant.

Table II

Birth rank	Maternal-age group							Calculated total	Observed total
	A	B	C	D	E	F	G		
1	2·92	7·33	4·44	2·34	4·94	1·00	1·00	23·97	26
2	0·03	4·23	4·90	6·84	4·45	6·35	—	26·80	27
3	0·03	1·12	1·78	5·84	7·94	12·11	1·94	30·76	28
4	—	0·19	1·48	3·30	11·32	6·00	1·00	23·29	23
5	—	—	0·76	3·05	6·04	6·65	0·54	17·04	13
6	—	—	0·26	2·30	7·99	8·89	2·21	21·65	23
7	—	—	0·18	1·37	8·55	8·06	0·94	19·10	20
8	—	—	0·02	0·80	4·57	9·55	2·43	17·37	19
9	—	—	—	0·63	4·07	4·83	3·25	12·78	13
10	—	—	—	0·09	2·11	5·02	1·90	9·12	9
11	—	—	—	0·02	0·83	3·24	0·42	4·51	5
12	—	—	—	—	0·85	2·55	0·55	3·95	2
13	—	—	—	—	0·37	3·42	1·86	5·65	6
14	—	—	—	—	0·11	1·86	1·57	3·54	4
15	—	—	—	—	—	1·32	0·91	2·23	4
16	—	—	—	—	—	0·61	—	0·61	0
17	—	—	—	—	—	—	1·65	1·65	2
Calculated total	2·98	12·87	13·82	26·58	64·14	81·46	22·17	224·02	—
Observed total	3	13	14	27	64	81	22	—	224

§ III

The sampling variance of the probability fraction (p) attached to any single individual is obtained by calculating $(p-p^2)$ in the ordinary way. In families containing a single mongol, the sampling variance for a pair of twins will be $(2p-4p^2)$: that is to say, the probabilities attached to the twins are added together before squaring. In the case where there are twins in families containing two mongols the case is a little more complicated: the sampling variance for the twin pair is $(2p-4p^2)$ with a quantity added representing twice the probability that both of the twins are mongols, which is $\dfrac{2x^2}{SS\,(xx')}$. The sums of the sampling variances calculated for individual children and twins in this way are shown in Table III. The totals of the rows give a set of values for the sampling variances of the number of mongols expected in each birth rank.

We have now to consider the fact that the totals of the columns have been fixed by the process of fitting x values, the object of which was to make these totals correspond as closely as possible to the observed numbers. The totals in the birth-rank columns, therefore, do not vary freely. In view of this restriction, a correction will be necessary in the sampling variances of the expected totals in the birth ranks. The variances in Table III are so large that the discrepancies between observed and expected numbers are in no case greater than twice the standard error and in the great majority of instances they are less than the standard error. If, however, allowance is to be made for the fixing of the totals of the columns, the sampling variance of the birth-rank totals will be considerably reduced and it is necessary to calculate the amount of this reduction. Until this is done we cannot regard the discrepancies in Table II as insignificant.

The reduction in the sampling variances of the birth-rank totals is ultimately due to covariances between the probabilities attached to pairs of children who occur in the same family. If two children occur in one sibship, with probabilities p and p' of their being mongols, the covariance of these probabilities is $(-pp')$. In order to ascertain the effect of the fixing of the column totals upon the total variances of the birth ranks we require to know (i) the covariances, due to grouping of maternal ages, which contribute to the

Table III. *Variances of expectations in Table II*

Birth rank	Maternal-age group							Total
	A	B	C	D	E	F	G	
1	1·10	4·21	2·48	1·91	0·78	—	—	10·48
2	0·03	2·99	2·75	4·04	2·00	0·97	—	12·78
3	0·03	1·00	1·59	3·91	3·42	1·84	0·06	11·85
4	—	0·18	1·32	2·40	5·17	1·82	—	10·89
5	—	—	0·72	2·45	3·87	1·96	0·25	9·25
6	—	—	0·25	1·91	4·19	3·31	0·57	10·23
7	—	—	0·16	1·25	4·52	3·27	0·06	9·26
8	—	—	0·02	0·69	3·25	3·52	0·90	8·38
9	—	—	—	0·42	2·62	2·12	1·42	6·58
10	—	—	—	0·09	1·72	1·73	0·69	4·23
11	—	—	—	0·02	0·72	1·65	0·24	2·63
12	—	—	—	—	0·72	1·70	0·25	2·67
13	—	—	—	—	0·32	1·77	0·95	3·04
14	—	—	—	—	0·10	1·20	0·92	2·22
15	—	—	—	—	—	0·86	0·48	1·34
16	—	—	—	—	—	0·42	—	0·42
17	—	—	—	—	—	—	0·66	0·66
Total	1·16	8·38	9·29	19·09	33·40	28·14	7·45	—

variances of age-group totals, (ii) the covariances of age-group totals one with another, and (iii) the covariances of each age-group total with each birth-rank total. These covariances are the sums of covariances of individual pairs of probabilities.

The covariances within the columns arise from the artificial grouping of maternal ages because children in the same family and of different birth ranks may fall within the same age group. The sampling variance of the total of any given column representing age group in Table II is, therefore, the sum of the variances of the type $(p-p^2)$ with a reduction representing twice the sum of the covariances for all pairs of children belonging to the same family and both falling within that particular age group. The sums of the covariances due to children in the same sibship who fall in different maternal-age groups represent the covariances of the age-group totals one with another. The covariance of any given row total with any given column total is the sum of all the variances of individuals in the particular age group and birth rank together with the negative covariances $(-pp')$ of such pairs of children in any sibship, one of which occurs in the given birth rank and the other of which occurs within the given maternal-age group.

The multiplicity of entries can be reduced by grouping the birth ranks. In the present instance an *a priori* grouping was chosen because it was thought that the reduction of the sampling variances of birth-rank totals might be sufficient to give significance to the discrepancies between the calculated and observed numbers. As it happens, it might have been wiser to have grouped birth ranks in such a way as to give the maximum opportunity for a significant deviation to occur, by compounding, for instance, the 1st and 2nd ranks and the 3rd to 5th ranks. The grouping actually chosen and the designations given to the groups were as follows:

Designation	Grouping of birth ranks
a	1
b	2, 3
c	4, 5, 6
d	7, 8, 9, 10
e	11 to 17

Table IV is derived from Table II by simple addition of numbers in the grouped birth ranks. The grouping of the birth ranks introduces a fourth type of covariance which concerns the grouped ranks' totals. It is due to the occurrence of children, belonging to the same family, who are in the same birth-rank group but who are in different maternal-age groups. The effect of this reduces the variance of the grouped birth ranks considerably.

Table IV. *Table II abridged*

Birth rank group	Maternal-age group							Calculated total	Observed total
	A	B	C	D	E	F	G		
a	2·92	7·33	4·44	2·34	4·94	1·00	1·00	23·97	26
b	0·06	5·35	6·68	12·68	12·39	18·46	1·94	57·56	55
c	—	0·19	2·50	8·65	25·35	21·54	3·75	61·98	59
d	—	—	0·20	2·89	19·30	27·46	8·52	58·37	61
e	—	—	—	0·02	2·16	13·00	6·96	22·14	23
Calculated total	2·98	12·87	13·82	26·58	64·14	81·46	22·17	224·02	—
Observed total	3	13	14	27	64	81	22	—	224

Some interesting points arise in the calculation of the covariances in the different families. In the first instance we will take a simple case where there is one mongol only in the sibship. The values have been taken to three decimal places.

Sibship No. 41

Birth rank	Maternal age	Age grouping	Birth-rank grouping	x value	Expectation
1	30	D	a	21	0·057
2	33	D	b	21	0·057
3	41	F	b	326	0·886

Covariance table

	Da	Db	Fb
Da	+0·054	−0·003	−0·051
Db	−0·003	+0·054	−0·051
Fb	−0·051	−0·051	+0·101

The variances ($p-p^2$) are positive and appear on the diagonal sloping from the top left hand corner to the bottom right-hand corner of the figure. The covariances, which appear in the other squares, are negative and are duplicated symmetrically. The sums of all the rows and the columns for a covariance table for any given family should add up to zero.

When two individuals occur in the same birth-rank group and in the same maternal-age group they now are treated in the same way as twins in ungrouped birth ranks: the probabilities are added together before squaring and the effect of this is equivalent to treating the individuals separately and subtracting the covariances within the grouped birth rank. The example, Sibship No. 99, shows how probabilities are added together in a family containing only one mongol. No further difficulty would have arisen had the family contained twins.

Sibship No. 99

Birth rank	Maternal age	Birth-rank and maternal-age grouping	x values	Expectation	Grouped expectation
1	25	Ca	7	0·039	0·039
2	27	Cb	7	0·039	0·078
3	29	Cb	7	0·039	
4	31	Dc	21	0·116	
5	32	Dc	21	0·116	0·348
6	33	Dc	21	0·116	
7	39	Ed	97	0·536	0·536

Covariance table

	Ca	Cb	Dc	Ed
Ca	+0·037	−0·003	−0·014	−0·021
Cb	−0·003	+0·072	−0·027	−0·042
Dc	−0·014	−0·027	+0·227	−0·187
Ed	−0·021	−0·042	−0·187	+0·249

Families with two mongols require special treatment. The covariance for any pair of children in a family where there are two mongols is the difference between the product of the probabilities, taken as negative ($-pp'$), and the probability of their both being mongols, taken as positive. The probability of their both being mongols is ascertained from their original relative probability values, x and x', and is

$$\frac{xx'}{SS\,(xx')}.$$

In consequence of this, the children in families where there are two mongols contribute less than the others to the totals both of the variances and of the covariances. Sibship No. 198

is an example of how the covariance is calculated when the sibship contains two mongols.

Sibship No. 198 (*two mongols*)

Birth rank	Maternal age	Birth-rank and maternal-age grouping	x value	Expectation
3	31	Db	21	0·187
4	34	Dc	21	0·187
5	38	Ec	97	0·716
6	44	Fc	326	0·910

Covariance table

	Db	Dc	Ec	Fc
Db	+0·152	−0·026	−0·093	−0·033
Dc	−0·026	+0·152	−0·093	−0·033
Ec	−0·093	−0·093	+0·203	−0·017
Fc	−0·033	−0·033	−0·017	+0·082

The covariance of Db with Ec is obtained thus,

$$-0{\cdot}187 \times 0{\cdot}716 + 21 \times 97/48929 = -0{\cdot}093,$$

for 48929 is the sum of the products of x values taken two at a time.

In a family containing two mongols, if two or more children fall in the same birth-rank grouping, it is best to calculate the covariance table with ungrouped birth ranks and to group these later. The calculation of the covariances in Sibship No. 177 exemplifies this process.

Sibship No. 177 (*two mongols*)

Birth rank	Maternal age	Birth-rank and maternal-age grouping	x values	Expectation
1	23	Ba	11	0·392
2	24	Bb	11	0·392
4	31	Dc	21	0·608
5	34	Dc	21	0·608

Covariance table (*birth ranks ungrouped*)

	Ba	Bb	Dc	Dc
Ba	+0·238	−0·073	−0·083	−0·083
Bb	−0·073	+0·238	−0·083	−0·083
Dc	−0·083	−0·083	+0·232	−0·067
Dc	−0·083	−0·083	−0·067	+0·232

Covariance table (*birth ranks grouped*)

	Ba	Bb	Dc
Ba	+0·238	−0·073	−0·166
Bb	−0·073	+0·238	−0·166
Dc	−0·166	−0·166	+0·330

After each family has been treated in the appropriate way, the totals of the variances and covariances in every maternal-age group and birth-rank group can be added up (Table V). From this large table we can derive three smaller tables (VI, VII and VIII). Table VI shows the new total variances of birth ranks, (aa), (bb), (cc), etc. Table VII shows the variances and covariances of the columns. The positive values, (AA), (BB), etc., on the diagonal of Table VII are the total variances of the columns: the remaining values in the table are the total covariances, (AB), (AC), (BC), etc., of the columns one with another and these are all negative. The covariances (Aa), (Ab), (Bc), etc., of the totals of the rows with the totals of the columns of Table IV are shown in Table VIII.

In the process of deriving Tables VI, VII and VIII from Table V, the negative cells and positive cells are compounded. Thus, in order to find the total variance (bb) of the grouped birth ranks 2 and 3, we add together (Ab Ab), (Bb Bb), (Cb Cb), etc., i.e. $0{\cdot}063+3{\cdot}687+4{\cdot}306+\ldots$ etc., and we subtract twice (Bb Cb), (Cb Db), etc., i.e. $2\times(0{\cdot}220+0{\cdot}177+\ldots$ etc.). To obtain the sampling variance of column A, (AA), we add together 1·094 and 0·063 and subtract 0·002 twice over. The total covariance, (Fe), of the column F with the row e is given by adding together all the entries which are in columns designated F and in rows designated e in Table V. This total covariance is $+2{\cdot}597$, which is the sum of (Fe De), $-0{\cdot}015$; (Fe Ee), $-1{\cdot}192$; (Fe Fe), $+5{\cdot}989$; (Fd Ge), $-0{\cdot}188$ and (Fe Ge), $-1{\cdot}997$.

It is now necessary to calculate what deduction from the total variance of any given row is to be made on account of its covariance with the columns, whose totals are fixed. For example, we shall deduct from the total variance of the first birth rank, (aa), a value V_a which is obtained from the equation

$$V_a = \alpha_1\,(\mathrm{Aa}) + \alpha_2\,(\mathrm{Ba}) + \alpha_3\,(\mathrm{Ca}) + \ldots + \alpha_7\,(\mathrm{Ga}),$$

where (Aa), (Ba), etc. are the covariances of rows and columns given in Table VIII and where α_1, α_2, etc. are the sampling regressions of the numbers of mongols in the given birth-rank group, a, on the numbers of mongols in various age groups. The sampling regressions α_1, α_2, etc. are obtained from the following series of simultaneous equations:

$$\text{(i)}\quad (\mathrm{AA})\,\alpha_1 + (\mathrm{AB})\,\alpha_2 + (\mathrm{AC})\,\alpha_3 + \ldots + (\mathrm{AG})\,\alpha_7 = (\mathrm{Aa}),$$

$$\text{(ii)}\quad (\mathrm{BA})\,\alpha_1 + (\mathrm{BB})\,\alpha_2 + (\mathrm{BC})\,\alpha_3 + \ldots + (\mathrm{BG})\,\alpha_7 = (\mathrm{Ba}),$$

$$\text{(iii)}\quad (\mathrm{CA})\,\alpha_1 + (\mathrm{CB})\,\alpha_2 + (\mathrm{CC})\,\alpha_3 + \ldots + (\mathrm{CG})\,\alpha_7 = (\mathrm{Ca}),$$

$$\text{(iv)}\quad (\mathrm{DA})\,\alpha_1 + (\mathrm{DB})\,\alpha_2 + (\mathrm{DC})\,\alpha_3 + \ldots + (\mathrm{DG})\,\alpha_7 = (\mathrm{Da}),$$

$$\text{(v)}\quad (\mathrm{EA})\,\alpha_1 + (\mathrm{EB})\,\alpha_2 + (\mathrm{EC})\,\alpha_3 + \ldots + (\mathrm{EG})\,\alpha_7 = (\mathrm{Ea}),$$

$$\text{(vi)}\quad (\mathrm{FA})\,\alpha_1 + (\mathrm{FB})\,\alpha_2 + (\mathrm{FC})\,\alpha_3 + \ldots + (\mathrm{FG})\,\alpha_7 = (\mathrm{Fa}),$$

$$\text{(vii)}\quad (\mathrm{GA})\,\alpha_1 + (\mathrm{GB})\,\alpha_2 + (\mathrm{GC})\,\alpha_3 + \ldots + (\mathrm{GG})\,\alpha_7 = (\mathrm{Ga}),$$

The variances and covariances in Table VII, which form the coefficients of α_1, α_2, etc. in these equations, should add up to zero, and thus we really possess one redundant equation and there are only six unknowns. The totals in Table VII actually deviate a little from zero. The discrepancies, however, are so small that we can with safety reject one of the

Table V. *Table of variance and covariance*

	Aa	Ab	Ba	Bb	Bc	Ca	Cb	Cc	Cd	Da	Db	Dc	Dd	De	Ea	Eb	Ec	Ed	Ee	Fa	Fb	Fc	Fd	Fe	Ga	Gb	Gc	Gd	Ge
Aa	1·094	0·002	—	0·574	0·027	—	0·095	0·126	—	—	—	0·006	0·100	—	—	—	0·014	0·031	0·010	—	—	—	0·044	0·048	—	—	—	—	0·013
Ab	0·002	0·063	—	—	0·001	—	—	0·002	—	—	—	—	—	—	—	—	—	0·009	0·019	—	—	—	—	0·031	—	—	—	—	—
Ba	—	—	4·205	1·044	—	—	0·867	0·287	0·036	—	0·172	0·546	0·193	—	—	0·001	0·290	0·374	0·007	—	0·030	0·041	0·201	0·063	—	—	0·008	0·025	0·016
Bb	0·574	—	1·044	3·687	0·013	—	0·220	0·387	—	—	—	0·283	0·167	0·001	—	—	0·194	0·384	0·019	—	—	0·032	0·157	0·154	—	—	—	0·010	0·046
Bc	0·027	0·001	—	0·013	0·179	—	—	0·015	—	—	—	0·001	0·047	—	—	—	—	0·016	0·007	—	—	—	—	0·032	—	—	—	—	0·018
Ca	—	—	—	—	—	2·488	0·796	—	—	—	0·828	0·104	—	—	—	0·193	0·258	0·060	—	—	0·062	0·114	0·036	—	—	—	0·007	0·017	—
Cb	0·095	—	0·867	0·220	—	0·796	4·306	0·104	0·027	—	0·177	0·449	0·094	—	—	0·096	0·550	0·331	0·003	—	0·039	0·114	0·217	0·056	—	—	0·012	0·042	0·014
Cc	0·126	0·002	0·287	0·387	0·015	—	0·104	2·074	—	—	—	0·251	0·178	—	—	—	0·121	0·345	0·013	—	—	—	0·095	0·093	—	—	—	0·007	0·039
Cd	—	—	0·036	—	—	—	0·027	—	0·173	—	—	—	0·071	—	—	—	—	—	0·009	—	—	—	—	0·017	—	—	—	—	0·014
Da	—	—	—	—	—	—	—	—	—	1·912	0·386	—	—	—	—	0·718	0·171	0·010	—	—	0·386	0·173	0·047	—	—	—	0·018	—	—
Db	—	—	0·172	—	—	0·828	0·177	—	—	0·386	5·671	0·220	—	—	—	0·406	1·536	0·012	—	—	0·315	0·610	0·299	—	—	0·600	0·041	0·069	—
Dc	0·006	—	0·546	0·283	0·001	0·104	0·449	0·251	—	—	0·220	6·231	0·084	—	—	—	1·181	1·704	0·012	—	—	0·091	0·840	0·218	—	—	—	0·196	0·039
Dd	0·100	—	0·193	0·167	0·047	—	0·094	0·178	0·071	—	—	0·084	2·177	—	—	—	—	0·433	0·068	—	—	—	0·271	0·299	—	—	—	—	0·163
De	—	—	—	0·001	—	—	—	—	—	—	—	—	—	0·022	—	—	—	—	0·006	—	—	—	—	0·015	—	—	—	—	—
Ea	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0·779	0·045	0·025	—	—	—	0·510	0·152	—	—	—	—	0·047	—	—
Eb	—	—	0·001	—	—	0·193	0·096	—	—	0·718	0·406	—	—	—	0·045	4·597	1·195	—	—	—	0·706	0·889	0·101	—	—	—	0·199	0·044	—
Ec	0·014	—	0·290	0·194	—	0·258	0·550	0·121	—	0·171	1·536	1·181	—	—	0·025	1·195	11·659	0·768	—	—	—	2·267	2·011	0·144	—	—	0·330	0·606	—
Ed	0·031	0·009	0·374	0·384	0·016	0·060	0·331	0·345	—	0·010	0·012	1·704	0·433	—	—	—	0·768	9·432	0·062	—	—	—	2·310	1·637	—	—	—	0·379	0·563
Ee	0·010	0·019	0·007	0·019	0·007	—	0·003	0·013	0·009	—	—	0·012	0·068	0·006	—	—	—	0·062	1·661	—	—	—	—	1·192	—	—	—	—	0·230
Fa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Fb	—	—	0·030	—	—	0·062	0·039	—	—	0·386	0·315	—	—	—	0·510	0·706	—	—	—	—	2·445	0·398	—	—	—	—	—	—	—
Fc	—	—	0·041	0·032	—	0·114	0·114	—	—	0·173	0·610	0·091	—	—	0·152	0·889	2·267	—	—	—	0·398	5·561	0·349	—	—	—	0·155	0·170	—
Fd	0·044	—	0·201	0·157	—	0·036	0·217	0·095	—	0·047	0·299	0·840	0·271	—	—	0·101	2·011	2·310	—	—	—	0·349	8·661	—	—	—	—	1·510	0·188
Fe	0·048	0·031	0·063	0·154	0·032	—	0·056	0·093	0·017	—	—	0·218	0·299	0·015	—	—	0·144	1·637	1·192	—	—	—	—	5·989	—	—	—	—	1·997
Ga	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Gb	—	—	—	—	—	—	—	—	—	—	0·600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0·600	—	—	—
Gc	—	—	0·008	—	—	0·007	0·012	—	—	0·018	0·041	—	—	—	0·047	0·199	0·330	—	—	—	—	0·155	—	—	—	—	0·818	—	—
Gd	—	—	0·025	0·010	—	0·017	0·042	0·007	—	—	0·069	0·196	—	—	—	0·044	0·606	0·379	—	—	—	0·170	1·510	—	—	—	—	3·079	—
Ge	0·013	—	0·016	0·046	0·018	—	0·014	0·039	0·014	—	—	0·039	0·163	—	—	—	—	0·563	0·230	—	—	—	0·188	1·997	—	—	—	—	3·340

N.B. All entries except in the leading diagonal are to be read as negative.

Table VI. *Variance of grouped birth-rank totals, corrected for grouping*

Symbol	Birth rank	Variance
(aa)	1	10·478
(bb)	2, 3	16·233
(cc)	4, 5, 6	17·698
(dd)	7, 8, 9, 10	13·574
(ee)	11 to 17	4·132

Table VII. *Variances and covariances of age-group totals*

	A	B	C	D	E	F	G	Total
A	+1·153	−0·602	−0·223	−0·106	−0·083	−0·123	−0·013	+0·003
B	−0·602	+5·957	−1·812	−1·410	−1·292	−0·710	−0·123	+0·008
C	−0·223	−1·812	+7·188	−2·152	−1·979	−0·843	−0·152	+0·026
D	−0·106	−1·410	−2·152	+14·633	−6·257	−3·564	−1·126	+0·018
E	−0·083	−1·292	−1·979	−6·257	+23·938	−11·919	−2·398	+0·010
F	−0·123	−0·710	−0·843	−3·564	−11·919	+21·162	−4·020	−0·017
G	−0·013	−0·123	−0·152	−1·126	−2·398	−4·020	+7·837	+0·005
Total	+0·003	+0·008	+0·026	+0·018	+0·010	−0·017	+0·005	+0·053

Table VIII. *Covariances of age-group totals and birth-rank totals*

	a	b	c	d	e	Total
A	+1·092	−0·608	−0·176	−0·184	−0·121	+0·003
B	+2·560	+1·339	−1·918	−1·610	−0·363	+0·008
C	+0·281	+1·375	−0·025	−1·347	−0·258	+0·026
D	−0·423	+1·469	+1·629	−1·859	−0·798	+0·018
E	−1·428	−1·418	+2·388	+2·641	−2·173	+0·010
F	−1·907	−1·673	−1·132	+2·098	+2·597	−0·017
G	−0·151	−0·477	−0·742	+0·262	+1·113	+0·005
Total	+0·024	+0·007	+0·024	+0·001	−0·003	+0·053

equations, for example, No. (vii). The effect of this rejection is to throw any discrepancies, above or below zero in the totals of the columns and rows in Table VII, into the values of the G variances. In order to save the labour of solving six new simultaneous equations to obtain the sampling regressions for each row, we solve once and for all the six sets of simultaneous equations such that, in each set, the expressions on the left-hand sides are as follows:

$$(AA)\ \alpha_1 + \alpha\ (AB)\ \alpha_2 + (AC)\ \alpha_3 + \ldots + (AF)\ \alpha_6,$$

$$(BA)\ \alpha_1 + (BB)\ \alpha_2 + (BC)\ \alpha_3 + \ldots + (BF)\ \alpha_6,$$

$$\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$$

$$(FA)\ \alpha_1 + (FB)\ \alpha_2 + \alpha\ (FC)\ \alpha_3 + \ldots + (FF)\ \alpha_6.$$

In each successive set of equations one of the right-hand expressions, taken in order, is equated to unity, and the other expressions are equated to zero(4). The solutions of these sets of equations may be written in the form of a matrix which is the inverse of the matrix formed by the coefficients of α_1, α_2 in the equations (i) to (vii) with row and column G of

Table VII left out. The inverted matrix is given in Table IX. If we term the coefficients in Table IX μ_{AA}, μ_{AB}, etc., the sampling regression, α_1, for instance, is obtained from the equation

$$\alpha_1 = \mu_{AA}\,(Aa) + \mu_{BA}\,(Ba) + \mu_{CA}\,(Ca) + \ldots + \mu_{FA}\,(Fa).$$

Similarly,

$$\alpha_2 = \mu_{AB}\,(Aa) + \mu_{BB}\,(Ba) + \ldots + \mu_{FB}\,(Fa).$$

By using the inverted matrix again in a similar way, we can easily obtain the solutions, $\beta_1, \beta_2, \beta_3, \ldots, \beta_6$, of a set of fresh equations for finding the sampling regressions of the number of mongols in the birth-rank group, b, on the numbers of mongols in the age-group totals. If we multiply α_1, α_2, etc., by the corresponding covariances and add the products in accordance with the formula for V_a given above, we obtain the amount of variance which has to

Table IX. *Inverse of Table VII, A to F, considered as a matrix*

	A	B	C	D	E	F
A	1·08053	0·25681	0·20856	0·160530	0·141506	0·129938
B	0·25681	0·341133	0·205274	0·162547	0·143008	0·129036
C	0·20856	0·205274	0·313851	0·171325	0·148925	0·133342
D	0·160530	0·162547	0·171325	0·205514	0·140395	0·126897
E	0·141506	0·143008	0·148925	0·140395	0·161929	0·126400
F	0·129938	0·129036	0·133342	0·126897	0·126400	0·150214

Table X. *Table VIII with sampling regressions added underneath*

	a	b	c	d	e
A	+1·092 +1·3782	−0·608 −0·2085	−0·176 −0·2356	−0·184 −0·5453	−0·121 −0·3759
B	+2·560 +0·6907	+1·339 +0·4030	−1·918 −0·2444	−1·610 −0·5268	−0·363 −0·3132
C	+0·281 +0·3020	+1·375 +0·3970	−0·025 +0·0455	−1·347 −0·4371	−0·258 −0·2948
D	−0·423 +0·1101	+1·469 +0·2461	+1·629 +0·1821	−1·859 −0·2671	−0·798 −0·2622
E	−1·428 +0·0308	−1·418 +0·0754	+2·388 +0·1694	+2·641 −0·0250	−2·173 −0·2431
F	−1·907 −0·0109	−1·673 +0·0330	−1·132 +0·0648	+2·098 +0·0018	+2·597 −0·0828
G	−0·151 0·000	−0·477 0·000	−0·742 0·000	+0·262 0·000	+1·113 0·000

be deducted from the variances of a given birth rank total on account of the fixing of the age-group totals. Table X shows the covariances as in Table VIII with the appropriate sampling regressions attached to them. The deductions, V_b, V_c, etc., were calculated for each successive birth-rank group in the same way that V_a had been calculated and the application of these deductions to the variances of the grouped birth-rank totals is shown in Table XI.

Table XI

Birth-rank group	Sampling variance (aa), (bb), etc	Deductions due to covariance of age-group totals (V_a, V_b, etc.)	Fully corrected variance (aa) − V_a, (bb) − V_b, etc.	Standard error $\sqrt{(aa) - V_a}$, etc.
a	10·478	3·288	7·190	2·681
b	16·233	1·412	14·821	3·850
c	17·698	1·137	16·561	4·069
d	13·574	1·972	11·602	3·406
e	4·132	0·758	3·374	1·837

The reduced sampling errors can now be compared with the differences between observed and expected numbers of mongols in each birth-rank group. The final result is as follows:

Birth rank	Observed number of mongols	Expected number of mongols	Difference	Standard error
1st	26	23·97	+2·03	2·68
2nd or 3rd	55	57·56	−2·56	3·85
4th, 5th or 6th	59	61·98	−2·98	4·07
7th to 10th	61	58·37	+2·63	3·41
11th to 17th	23	22·14	+0·86	1·84
Total	224	224·02	—	—

In no case does the difference exceed the standard error, and the correspondence between the observed and expected numbers of mongols is satisfactory. If birth rank has any influence on the incidence of mongolism, this influence is too slight to be detected in the present quantity of data.

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APPENDIX

Affected individuals (mongols) in bold type. Normal individuals in ordinary type.

Serial Number	Sex	Maternal age																													
		17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
1	f.	.	.	.	.	.	.	.	.	.	.	4	.	5	.	6	.	7	.	8	.	10	.	11	12	.	13	.	**14**	.	.	.	.
2	m.	.	.	.	.	1	.	2	.	.	.	3	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	m.	.	.	**1**	.	2	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**7**	.	.	.	.	.	.	.	.	.	.	.
5	m.	.	.	.	.	1	.	**2**	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6	m., f.	.	.	.	.	.	.	.	2	.	4	.	.	6	.	.	.	.	.	.	8	.	**9**	.	.	**10**	.	.	.	.	.	.	.
7	m.	.	.	.	.	1	2	.	3	.	4	.	5	.	.	6	.	.	7	.	8	.	9	.	.	.	**11**	.	.	.	.	.	.
8	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	3	.	**4**	.	5	.	6	.	.	.	.	.	.	.	.
9	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	5	.	.	.	.	.	.	.	.	.	.	**7**	.	.	.
10	m.	.	.	.	.	1	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	**3**	.	.	.	.	.	.
11	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**1**	2	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.
12	f.	.	.	.	.	.	.	1	2	.	3	.	.	5	.	6	.	.	8	.	.	9	.	.	.	.	12	.	.	.	.	**13**	.
13	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	**3**	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	**3**	.	.	.	.	.	.	.	.	.	.	.	.	.	.
15	f.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	**3**	.	.	.	.	.	.	.	.	.	.	.
16	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	.	3	.	.	**4**	.	.	.	.	.
17	m.	.	.	.	.	.	.	1	.	2	.	3	.	.	4	.	.	5	.	6	.	.	**7**	.	.	.	.	.	.	9	.	.	.
18	f.	.	.	1	.	.	3	.	.	.	.	4	.	.	5	6	.	7	.	8	.	.	.	9	.	.	**10**	.	.	.	.	.	.
19	m.	1	2	3	4	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	10	11	.	12	.	.	**13**	.	.	.	.	.	.
20	m., f.	.	.	.	.	.	.	.	.	1	2	3	.	.	.	4	.	**5**	.	6	.	.	**7**	.	.	.	.	.	.	.	.	.	.
21	f.	.	.	.	.	.	.	.	.	1	.	**2**	.	3	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.
22	m.	.	.	.	.	.	.	.	1	.	.	.	.	2	.	3	.	.	.	4	.	5	.	.	.	.	.	**6**	.	.	.	.	.
23	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**1**	.	.	.	.	.	.	.	.	.	.	.	.	.
24	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	3	.	4	.	.	.	.	.	.	.	**6**	.	.	.
25	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**1**	.	.	.	.	.	.	.	.
26	f.	.	.	.	.	.	.	1	.	2	.	.	.	3	.	.	.	.	5	.	.	.	**6**	.	.	.	.	.	.	.	.	.	.
27	f.	.	.	.	.	.	.	.	1	.	2	.	3	.	.	.	.	5	.	6	.	.	.	.	.	.	.	.	.	.	.	**8**	.
28	f.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	.	.	.	4	.	.	.	.	.	7	.	.	**8**	.	.	.	.	.
29	m.	.	.	.	.	.	.	.	.	.	.	1	.	2	.	3	.	.	.	.	.	.	.	**5**	.	.	.	.	.	6	.	.	.
30	m.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	2	.	.	.	.	.	.	.	**3**	.	4	.	.	5	.	.	.	.
31	f.	.	.	.	.	.	2	.	3	.	.	.	5	.	6	.	.	.	7	.	.	.	.	.	.	**8**	.	.	.	.	.	.	.
32	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**1**	.	.	.	.	.	.	.	.	.
33	f.	.	.	.	.	1	.	.	2	.	3	.	.	4	5	.	.	.	.	.	.	.	.	.	7	.	**8**	.	.	9	.	.	.
34	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	**2**	.	.	.	.	.	.
35	m.	.	.	.	.	.	.	.	.	.	1	.	.	3	.	5	.	.	.	6	.	.	**7**	.	.	.	9	.	.	.	.	.	.
36	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**2**	.	.	.	.	.
37	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**4**	.	.
38	f.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	**2**	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	m.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	2	.	.	.	**4**	.	.	.	.	.	.	.	.	.
40	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	**2**	.	.	.	.	.	.	.	.	.	.	.	.
41	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	.	.	.	.	.	**3**	.	.	.	.	.	.	.
42	m.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	7	.	.	8	.	.	.	**10**	.	.
43	f.	.	.	.	.	.	.	.	1	2	3	.	.	4	.	**6**	7	.	8	.	.	9	.	.	.	.	.	.	.	.	.	.	.
44	m.	.	.	.	.	.	.	**1**	2	3	.	4	.	5	.	.	.	.	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.
45	m.	.	.	.	.	.	.	.	1	.	2	.	.	3	.	4	.	5	.	6	.	.	**7**	.	.	.	.	.	.	.	.	.	.
46	m.	.	.	.	1	.	.	.	.	.	4	5	.	6	.	.	.	7	.	.	.	.	.	.	**8**	.	.	.	.	.	.	.	.
47	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	2	.	.	.	**4**	.	.	.	.	.	.
48	m.	.	.	1	.	.	2	.	3	.	5	.	6	.	7	.	8	9	.	10	.	.	.	.	12	.	**13**	.	14	.	15	.	.
49	m.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	2	.	.	.	3	.	.	4	.	.	.	.	**5**	.	.	.	.
50	m.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	.	.	.	**4**	.	.	.	.	.	.	.	.	.	.

APPENDIX (continued)

Serial number	Sex	Maternal age 17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
51	m.	.	.	.	.	.	.	.	.	1	.	2	.	3	4	.	.	.	.	5	6	.	.	.	.	.	.	.	.	.	.	.	.
52	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	.	.	4	.	.	5	.	.
53	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	.	.	3	.	.	.	.	.	.	.
54	f.	.	.	.	.	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55	f.	.	.	.	.	1	.	.	2	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
56	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	4	.	.	.	5	.	7	.	.	.	.	.	.	.	.
57	f.	.	.	.	.	.	2	.	3	.	4	5	.	6	.	7	.	8	.	9	.	.	.	.	.	11	.	.	.	12	.	.	.
58	f.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.
59	m.	.	.	.	.	.	.	1	.	2	.	.	3	.	.	5	6	.	.	7	.	8	.	.	.	.	.	.	.	.	.	.	.
60	m.	.	.	.	1	.	.	2	.	3	4	.	.	.	.	.	5	6	.	7	.	.	8	9	.	10	.	.	.	.	.	.	.
61	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	.	.	.	3	.	.	.	.	.	.	.	.	.
62	f.	.	.	1	.	.	2	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
63	f.	.	.	.	1	2	.	3	.	6	.	7	8	.	9	.	.	.	11	12	.	.	14	.	.	.	15	16	.	.	.	.	.
64	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	4	.	5	.	.	6	.	.	.	.	.	.	.	.
65	m.	.	.	.	.	.	1	2	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
66	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	2	.	.	.	.	.	.	.
67	f.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	.	.	.	.	3	.	.	.	5	.	7	.	.	.	8	.	.	.
68	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.
69	f.	.	.	.	.	.	.	.	.	1	.	2	.	.	3	.	.	.	.	.	.	.	4	.	.	.	.	5	.	.	.	.	.
70	f.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	3	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71	f.	.	.	.	1	.	2	.	.	.	.	.	4	.	.	.	5	.	7	.	.	8	.	.	.	10	.	.	.	.	.	.	.
72	f.	.	1	.	.	.	.	.	3	.	.	.	.	.	.	.	.	4	.	5	.	.	6	.	7	.	.	.	.	.	.	.	.
73	m.	.	.	.	.	1	.	2	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.
74	f.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	2	.	3	.	.	.	.	.	.	.	.
75	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	4	.	5	.	6	.	7	.	.	8	.	.	.	.	.	.	.
76	m.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	.	.	3	.	.	.	4	.	.	.	.	.	6	.	.	.	.	.
77	m.	.	.	.	.	.	.	1	2	.	.	3	.	.	4	.	5	.	6	.	.	7	.	8	.	9	.	.	.	.	.	.	.
78	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6	.	7	.	8	9	.	.	10	.	.	.	.	.	.	.
79	f.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	3	.	4	5	.	.	.	.	6	.	.	.	.	7	.	.	.	.
80	f.	.	.	.	.	.	.	.	1	.	.	.	2	.	3	4	.	5	.	.	.	.	6	.	.	.	.	.	.	.	.	.	.
81	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.
82	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	12	.	13	.	.	.	.	.	.	.
83	m.	.	.	.	.	.	.	1	.	2	.	4	.	5	.	.	.	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
84	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	5	.	6	.	7	.	.	.	.	.	.	.	.
85	m.	.	.	1	.	.	2	.	3	.	4	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
86	m.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	2	.	.	.	3	.	4	.	5	.	.	.	.	.	.	.	.	.
87	f.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
88	f.	.	.	1	.	2	3	.	4	.	.	5	.	.	6	.	7	.	.	9	.	.	10	.	11	.	.	.	.	.	.	.	.
89	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	3	.	.	.	.	.	.	.	.
90	f.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	3	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.
91	f.	.	.	.	.	.	.	2	3	.	5	.	.	.	7	8	.	.	.	10	11	.	12	.	14	.	.	15	.	.	17	.	.
92	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
93	f.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
94	f.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	2	.	.	.	.	4	.	.	5	.	.	.	.	6	.	.	.	.
95	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8	.	.	.	.
96	m.	.	.	.	.	.	.	.	.	.	1	.	2	.	3	.	4	.	5	.	6	.	7	.	.	.	.	.	8	.	9	.	.
97	m.	.	.	.	.	.	.	.	.	1	.	2	.	4	.	.	5	.	.	6	7	8	.	.	.	.	.	.	.	9	.	.	.
98	m.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.
99	m.	.	.	.	.	.	.	.	.	1	.	2	.	3	.	4	5	6	.	.	.	.	.	7	.	.	.	.	.	.	.	.	.
100	m.	.	.	.	.	.	.	.	1	.	.	.	5	.	.	6	.	.	7	.	.	8	.	.	9	.	10	.	.	.	.	.	.

Serial number	Sex	Maternal age																													
		17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
101	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	.	.	3	4	.	.	.	.	.	5	.	.	.	.
102	m.	.	.	.	.	.	.	.	1	.	.	.	3	.	4	.	.	5	.	6, 6	.	.	.	.	.	.	.	.	.	.	.	.	.
103	m.	.	.	.	1	.	.	3	.	.	.	.	5	.	7	.	8	.	.	.	.	.	.	.	9	.	.	.	.	.	.	.	.
104	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.
105	m.	.	.	.	.	.	.	.	1	.	2	.	.	.	.	.	.	.	.	3	.	4	.	5	.	.	.	.	.	.	6	.	.
106	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.
107	m.	.	.	.	.	.	1	.	2	.	3	.	5	.	6	.	7	.	9	.	10	.	11	.	.	.	13	.	.	.	.	.	.
108	f.	.	.	.	.	.	.	.	1	.	2	3	.	4	.	.	6	.	.	7	8	.	.	9	.	.	11	.	.	13	.	.	.
109	m.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	5	.	.	.	.	.	.
110	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	12	.	13	.	14	.	.	.
111	m.	.	.	.	.	.	.	1	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.	.	.
112	f.	.	.	.	.	.	.	3	4	.	.	.	6	.	.	.	7	.	.	8	.	.	10	.	11	.	.	.	.	.	.	.	.
113	m.	.	.	.	.	.	.	.	.	.	.	1	.	2	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.
114	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
115	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.
116	m.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	3	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.
117	f.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
118	m.	.	.	.	.	2	.	3	.	.	.	.	.	.	.	5	.	.	.	7	.	.	.	.	.	11	.	.	.	.	.	.	.
119	f.	.	.	.	.	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
120	m.	.	.	.	1	2	.	.	.	.	3	.	.	4	.	5	.	6	.	7	.	8	.	.	.	.	.	.	.	.	.	.	.
121	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	3	.	.	.	.	.	.	.	.	.
122	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	9	.	.	.	10	.
123	m.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	3	4	.	.	.	.	6	.	.	.	.	.	.	.	.
124	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	3	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.
125	m.	.	.	.	.	.	.	2	.	.	.	4	.	.	5	.	.	7	8	.	.	10	.	.	.	12	.	.	.	.	13	.	.
126	m.	.	.	.	.	1	.	2	3	.	4	5	.	.	.	.	6	7	.	8	9	.	.	10	.	.	.	.	.	.	.	.	.
127	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	3	.	.	.	4	.	.	.	.	.	.	.	.	.
128	m.	.	.	.	.	.	.	.	.	.	2	.	.	.	3	.	.	4	.	5	.	6	.	.	.	7	.	.	.	.	8	.	.
129	m.	.	.	.	.	.	1	.	.	.	3	.	.	.	5	.	.	.	8	.	.	9	.	10	.	.	.	.	.	.	.	.	.
130	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
131	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	.	.	.	.	3	.	.	.	.	.	.	.
132	f.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	3	.	.	5	.	.	.	.	.	.	.	.	8	.	.	.	.	.
133	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	3	.	.	5	.	.	6	.	7	.	8	.	.	.	9	.
134	m.	.	.	.	.	.	.	.	.	2	.	.	.	4	.	5	.	.	.	.	.	.	.	.	.	10	.	.	.	.	.	.	.
135	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7	8	.	9	.	10	.	11	.	.	.
136	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	6	.	7	.	8	9	.	.	10	.	.	.	.	.	.	.
137	f.	.	.	.	.	.	.	1	.	.	.	.	2	.	3	.	.	4	.	5	6	.	7	.	8	.	.	.	.	.	.	.	.
138	f.	.	.	.	.	1	.	.	.	2	.	3	.	.	4	.	.	.	.	.	5	.	.	6	.	.	7	.	.	.	.	.	.
139	m., m.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	.	3	.	.	4	.	.	5	.	6	.	7	.	.	.	.
140	f.	.	.	.	.	.	.	1	.	.	.	2	.	.	3	.	.	.	.	.	.	.	.	4	.	.	.	.	5	.	.	.	.
141	m.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
142	f.	.	.	.	1	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
143	m.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	3	.	.	.	.	.	.
144	m., m.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	6	.	7	8	.	.	.	9, 9	.	.	.	.	10	.	.	.
145	f.	.	.	.	.	.	1	2	3	4	.	5	.	6	.	7	.	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
146	m.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
147	m.	.	.	.	2	.	.	.	3	4	.	5	.	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.	.	.	.	.	.
148	m.	.	.	.	.	.	.	2	.	3	.	4	.	.	6	.	7	.	.	8	9	.	.	.	.	.	.	.	.	.	.	.	.
149	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	6	.	7	.	.	.	.	.	.
150	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	3	.	.	.	.	4	.	.	.	6	.	.	.	.

Serial number	Sex	Maternal age																															
		17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
151	f.	.	1	.	2	.	3	.	4	.	5	.	.	.	7	8	.	9	.	.	10	.	**11**	.	.	.	.	.	16	.	.	**17**	.
152	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	5	.	.	.	.	.
153	f.	.	.	.	.	.	1	.	.	.	2	.	.	3	.	.	.	.	**4**	.	.	.	.	.	.	.	.	.	.	.	.	.	.
154	f.	.	.	.	.	.	.	.	.	.	1	.	.	3	.	.	.	4	.	.	6	.	.	7	.	.	.	.	**8**	.	.	.	.
155	m.	.	.	.	.	.	.	.	.	1	.	2	.	.	.	.	.	.	4	.	.	.	.	.	**5**	.	.	.	.	.	.	.	.
156	f.	.	.	.	.	.	4	.	.	6	.	.	7	8	.	9	.	10	.	.	.	.	13	.	.	.	.	.	.	**17**	.	.	.
157	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**11**	.	12	13	.	14	.	.	.	.	.	.	.
158	m.	.	.	.	.	.	.	.	.	3	.	.	6	.	7	.	.	.	.	8	.	10	.	.	.	12	.	**15**	.	.	.	.	.
159	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	**3**	.	.	4	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.
160	f.	.	.	.	.	.	.	.	.	1	2	.	3	.	4	.	.	.	5	**6**	.	.	.	7	.	.	.	.	.	.	.	.	.
161	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	**2**	.	.	.	.	.	.
162	f.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	**2**	.	.	.	.	.	.	.	.	.	.	.	.
163	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	**2**	.	3	.	.	.	.	.	.	.
164	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	6	.	**7**	.	.	.	.	.	.	.	.	.
165	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	3	5	.	6	.	.	.	**8**	.	.	.	.	.	.
166	m.	.	.	.	.	.	.	.	1	.	2	.	.	.	.	.	5	.	.	.	.	.	**7**	.	.	.	8	.	.	.	.	.	.
167	m.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	**3**	.	.	.	.	.	.	.	.	.	.	.	.	.	.
168	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	**4**	.	.	.	.	.	.
169	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	**5**	.	.	6	.	.	.	.	.	.	.	.
170	f.	.	.	.	.	.	.	.	.	.	1	.	.	**2**	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
171	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	**2**	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.
172	m.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	.	**3**	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
173	m.	.	.	.	.	.	.	.	1	.	2	.	3	.	.	.	4	.	.	5	.	.	.	.	.	.	.	.	**6**	.	.	.	.
174	m.	.	.	.	1	2	.	.	.	.	.	.	.	.	.	6	.	.	7	.	.	.	.	.	.	**8**	.	9	.	.	.	.	.
175	m.	.	.	.	.	.	.	.	.	.	.	**2**	.	3	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.
176	m.	.	.	.	1	.	.	.	.	.	.	.	4	.	5	.	6	.	7	.	**8**	.	.	.	.	.	.	.	.	.	.	.	.
177	f., f.	.	.	.	.	.	.	**1**	2	.	.	.	.	.	.	**4**	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.
178	m.	.	.	.	1	.	**2**	.	3	.	4	.	.	.	.	6	.	.	.	9	.	.	.	.	.	.	.	.	.	.	.	.	.
179	m.	.	.	.	.	.	.	.	.	1	.	.	2	.	3	.	.	4	.	**5**	.	.	.	.	.	.	.	.	.	.	.	.	.
180	m.	.	.	.	.	.	.	.	1	2	.	3	.	4	.	5	.	6	.	.	8	9	.	.	.	.	12	.	13	.	**14**	.	.
181	m.	.	.	.	.	.	.	.	.	.	.	2	.	.	3	.	.	.	.	5	.	.	.	.	**7**	.	.	8	.	.	.	.	.
182	m.	.	.	1	.	3	.	4	.	5	.	.	**6**	.	.	.	7	.	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.
183	f.	.	.	.	.	.	.	.	.	.	1	.	2	.	3	.	4	.	5	.	6	.	7	.	.	8	.	.	{9, **9**	.	.	.	.
184	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**3**	.	.	.	.	.	.
185	m.	.	.	.	2	.	.	.	4	.	.	5	.	6	.	.	.	.	.	8	.	.	10	.	.	11	.	.	**13**	.	14	.	.
186	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	**4**	.	.	.	.	.	.	.	.	.	.
187	m.	.	.	.	.	.	.	1	.	2	.	3	.	4	.	.	6	.	8	.	9	.	.	**10**	.	12	.	.	.	.	.	.	.
188	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	**3**	.	4	.	.	.	6	.	.	.	.	.
189	m.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	.	3	.	.	.	4	.	5	.	7	.	.	.	.	**9**	.	.	.
190	m.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	5	.	.	**6**	.	.	.	.	.	.	.	.	.	.	.	.	.
191	m.	.	.	.	.	.	.	1	.	.	.	**3**	**4**	.	.	.	5	.	.	7	.	.	.	.	.	.	.	.	.	.	.	.	.
192	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**1**	.	.	.	.	.	.	.	.	.	.
193	f.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	3	**4**	.	.	.	.	.	.	.	.	.	.	.
194	m.	.	.	.	.	2	.	.	.	.	.	5	.	7	.	.	9	.	10	.	11	.	.	12	**13**	.	.	.	.	.	.	.	.
195	m.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	**2**	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
196	m.	.	.	.	.	.	1	.	.	3	.	.	7	.	.	.	**9**	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
197	m.	.	.	.	.	1	.	2	3	.	4	.	5	.	6	.	.	.	.	.	.	**7**	.	.	.	.	.	.	.	.	.	.	.
198	m., f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**3**	.	.	4	.	.	.	5	.	.	.	.	.	**6**	.	.	.	.
199	f.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	4	5	.	.	.	.	.	.	**7**	.	.	.	.	.	.	.	.
200	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	**3**	.	.	.	.	.

APPENDIX (continued)

Serial number	Sex	Maternal age																													
		17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
201	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	.	3	.	.	**4**	.	.	.	.	.	.	.	.	.	.	.
202	f.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	2	.	.	.	.	.	.	.	**3**	.	.	.	.	.	.
203	m.	.	.	.	.	.	**1**	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
204	m.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	**3**	.	.	.	.	.	.	.	.	.	.	.
205	f.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	3	4	.	.	.	5	.	.	.	**6**	.	.	.	.	.	.	**8**	.
206	m.	.	.	**1**	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
207	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	**1**	.	.	.
208	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	4	.	6	7	.	.	.	**8**	.	.	.	.	.	.
209	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	**2**	.	.	.	.	.	.	.	.
210	m.	.	.	.	.	.	.	.	.	1	.	2	.	.	.	.	.	.	.	.	3	.	.	**4**	.	.	.	.	.	.	.	.	.
211	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	9	10	.	.	.	.	.	13	.	.	.	.	.	14	.	.	.	**15**	.
212	f.	.	.	.	.	.	.	.	.	.	.	.	1	.	**2**	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
213	m.	.	.	.	.	.	.	.	.	.	.	4	.	.	5	.	6	.	.	**7**	.	.	.	.	.	.	.	.	.	.	.	.	.
214	m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	3	.	.	.	.	.	**6**	.	.	.	.	.	.
215	m.	.	.	.	1	.	2	.	.	3	.	.	.	.	.	.	.	.	.	8	.	9	.	10	.	11	.	12	.	.	13	.	**14**
216	f.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	6	7	.	.	10	.	.	.	.	.	14	**15**	.	.	.	.	.
217	m., m.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	{**3** {**3**	.	.
Normal individuals		1	3	6	14	17	16	26	42	39	41	40	38	41	51	42	48	45	42	49	34	28	32	27	21	18	12	11	8	8	6	1	.
Affected individuals		.	.	**3**	**1**	**3**	**4**	**4**	**1**	.	**3**	**6**	**3**	**2**	**2**	**4**	**6**	**6**	**9**	**13**	**8**	**15**	**14**	**14**	**18**	**16**	**23**	**12**	**12**	**7**	**8**	**6**	**1**
Total		1	3	9	15	20	20	30	43	39	44	46	41	43	53	46	54	51	51	62	42	43	46	41	39	34	35	23	20	15	14	7	1