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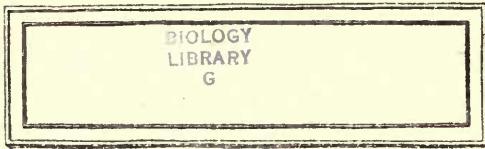
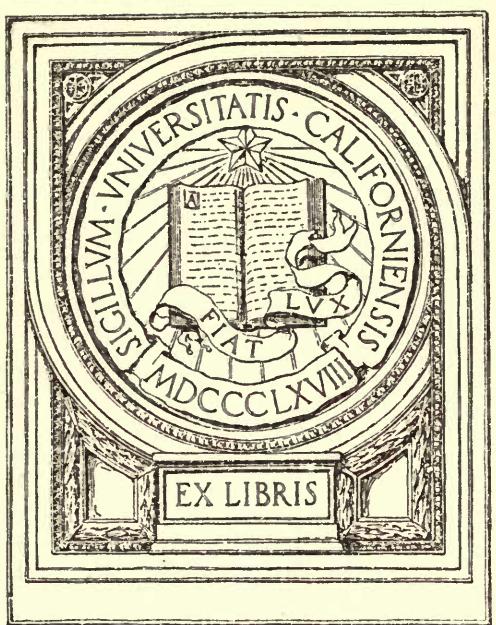
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1918

THE DURATION OF LIFE
AND
CONDITIONS ASSOCIATED WITH
LONGEVITY

A STUDY OF THE HYDE GENEALOGY

ALEXANDER GRAHAM BELL



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The Duration of Life
and
Conditions Associated with Longevity

A Study of the Hyde Genealogy

By
ALEXANDER GRAHAM BELL



WASHINGTON, D. C.
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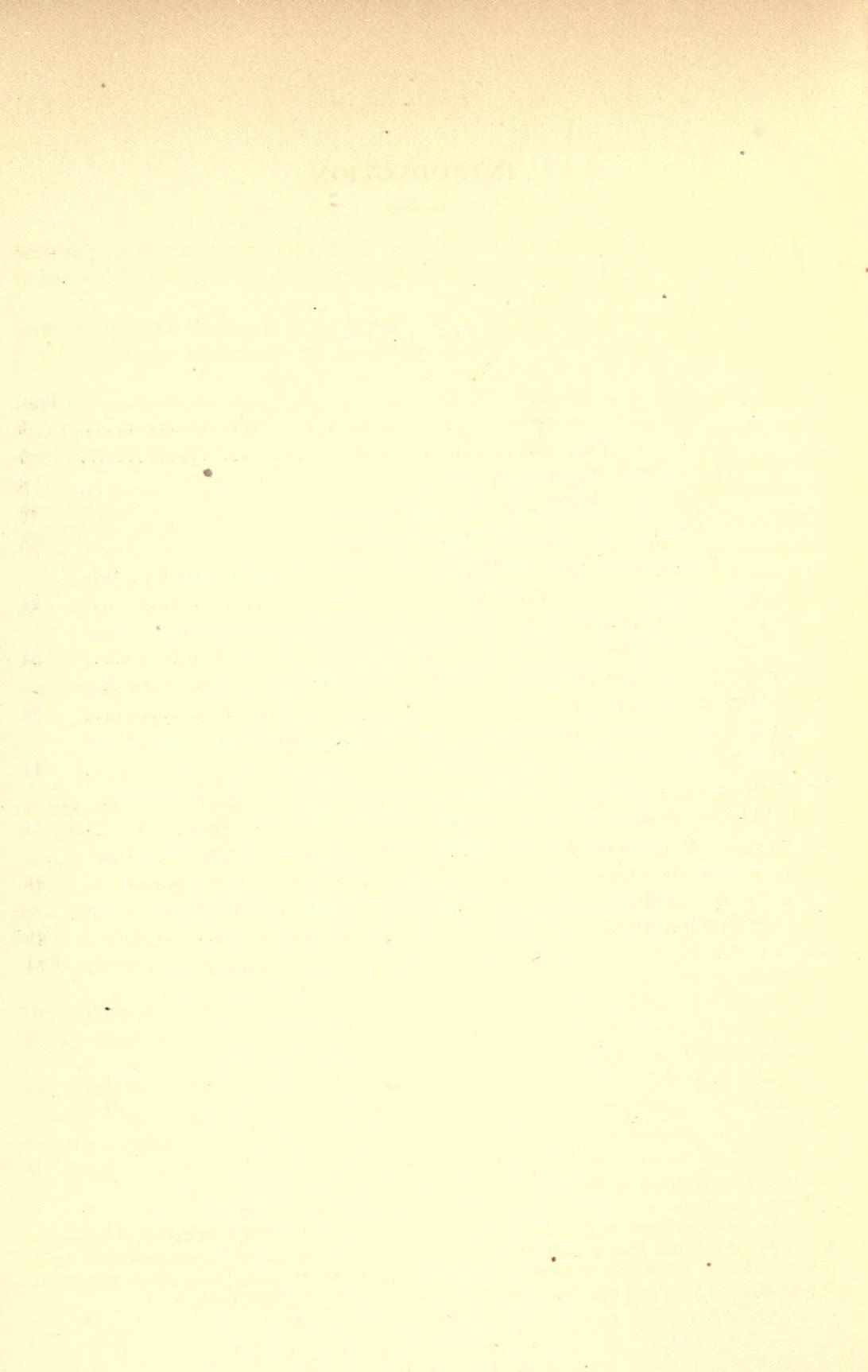
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INTRODUCTION

THE following work shows the results of an attempt to utilize one of our published genealogies for the preparation of statistics relating to the duration of life and to conditions associated with longevity.

The details have been taken from the "*Genealogy of the Hyde Family*," by Reuben H. Walworth, LL. D. (1864), a work relating to the descendants of William Hyde, one of the early settlers of Norwich, Conn., who died in 1681.

At first sight it would seem that but little information of general interest or value could be obtained from the records of a single family; but a little consideration will show that the descendants did not constitute a single family at all, and indeed had very little of the Hyde blood in them.

Even the children of William Hyde owed only half of their blood to him, and one-half to his wife. The grandchildren owed only one-quarter of their blood to William Hyde, and three-quarters to other people, &c. The descendants of the seventh generation, and there are hundreds of them, owed only 1/64th of their blood to William Hyde, and 63/64ths to the new blood introduced through successive generations of marriages with persons not of the Hyde blood at all.

It will thus be seen that the thousands of descendants noted in the Hyde Genealogy constitute rather a sample of the general population of the country than a sample of a particular family in which family traits might be expected to make their appearance.

THE DATA FOR THE HYDE STATISTICS

In many cases we find recorded in the Hyde Genealogy the year of birth and of death of the individuals, and of their fathers and mothers, and the date of marriage of the parents. From these details we can calculate the age at death of the individual, and of his parents; the age of his parents when he was born; the age of the parents at marriage, and the number of years after the marriage the person was born. We can also ascertain from the published Genealogy the sex of the individual and the number of his brothers and sisters. These details comprise all the data in the Hyde Genealogy which seemed to be capable of statistical analysis.

In making this investigation the details were copied upon cards, so as to facilitate the preparation of statistical tables. In all, 8,797 cards have been prepared, each relating to an individual mentioned in the Hyde Genealogy.

From these cards numerous statistical tables have been prepared in great detail; and the tables have been preserved in the *Beinn Bhreagh Recorder*, a typewritten Record Book for the preservation of the more important results of the author's experiments and researches; and a few copies have been deposited in different places so as to lessen the danger of destruction by fire.*

*One copy has been deposited in the Library of the *Smithsonian Institution*, Washington, D. C.; another in the *Genealogical Record Office* for the Collection and Preservation of Genealogical Records Pertaining to Long Life (office in the Volta Building, 1601 Thirty-fifth street, Washington, D. C.); and the others are in the hands of private individuals.

INTRODUCTION

As two of the copies are accessible to the public, it has been thought well not to burden the present work with detailed tables, but only to present short abstracts of the tables bringing out the general features and results, and to refer those who desire further details to the copies of the *Beinn Bhreagh Recorder* in the *Smithsonian Institution* and the *Genealogical Record Office*.

A list of the detailed tables that have been preserved in the *Beinn Bhreagh Recorder* is given in Appendix A.

GRAPHICAL DIAGRAMS

In glancing over detailed statistical tables like those shown in the *Beinn Bhreagh Recorder*, the mind is bewildered by the multiplicity of details that strike the eye, and we fail to get a general impression of the whole.

If, however, we express the figures by dots upon a graphical diagram, the details are seen in their proper relations to one another; and if we use large numbers and a small scale, we gain perspective.

We obtain, as it were, a *bird's-eye view* of the whole territory explored, and can note the general lay of the land, and the relation of one part to another in a way we could not do when traveling through the woods and valleys upon the ground.

A detailed statistical table brings us so close to the ground that we perceive details rather than general effects. A graphical diagram, on the other hand, reveals generalizations and subordinates details; and the larger the numbers represented and the smaller the scale employed, the more do we subordinate detail to the general effect as a whole.

For this reason it has been thought advisable in this work to use graphical diagrams upon a small scale, to illustrate the tables presented. The diagrams will express the generalizations perceived, and the tables give the details upon which the generalizations are based.

The author desires to express his indebtedness to Miss Mabel B. McCurdy, Miss Gretchen Schmidt, Miss Catherine D. Mackenzie, Mr. John Smallwood, Mr. Melville Bell Grosvenor, and Mr. A. W. Clime for valuable aid in preparing the tables and diagrams.

A. G. B.

1331 CONNECTICUT AVENUE,
WASHINGTON, D. C., November 1, 1917.

CHAPTER I

Period of Birth

This investigation relates to 8,797 persons mentioned in the Hyde Genealogy. In 7,437 cases the year of birth is known; and in 1,360 cases, although the exact date of birth is unknown, the period of birth has been approximately ascertained. (See Table 1.)

TABLE 1.—*Period of birth of 8,797 persons, showing the number and percentage born in the periods named.*

Period of birth.	Number.	Per cent.
Stated.....	8,797	100.0
Before 1750.....	869	9.9
1750 and before 1775.....	1,463	16.6
1775 and before 1800.....	2,471	28.1
1800 and before 1825.....	2,592	29.5
1825 and before 1850.....	1,268	14.4
1850 and after.....	134	1.5



FIG. 1

The majority of the persons noted were born in the eighteenth century or earlier (68 cases in the seventeenth century), and the remainder were born during the early part of the nineteenth century. Very few appeared after 1825.

The statistics thus relate mainly to generations that have passed away, and very few of the people considered can be now alive (1917).

The exact years of birth and other details may be ascertained by consulting the *Beinn Bhreagh Recorder*, Vol. VIII, pp. 133-138; 153-158; 187-219; 319-353; 387-414.

As this investigation relates to the duration of life and to conditions associated with longevity, it is not so important for us to ascertain when the people were born as the ages at which they died.

CHAPTER II

Duration of Life of Persons

Although 8,797 persons are included in the Hyde Statistics, the age at death is stated in only 2,965 cases. Aggregate years lived, 102,641. Average duration of life, 34.61 years. (B. B. Rec., IX, p. 99.)

In 5,832 cases the persons were either living when the Hyde Genealogy was published (1864) or the ages at death could not be ascertained. For an analysis of these cases by "latest age known to be living," see B. B. Rec., Vol. VIII, pp. 319-353.

TABLE 2.—Ages at death of 2,965 persons, by single years.

Age.	Number.	Age.	Number.	Age.	Number.	Age.	Number.	Age.	Number.
0.....	237	20.....	39	40.....	27	60.....	27	80.....	28
1.....	227	21.....	42	41.....	33	61.....	22	81.....	36
2.....	116	22.....	39	42.....	26	62.....	31	82.....	18
3.....	70	23.....	51	43.....	22	63.....	19	83.....	20
4.....	49	24.....	42	44.....	25	64.....	25	84.....	17
5.....	43	25.....	39	45.....	34	65.....	23	85.....	17
6.....	30	26.....	39	46.....	24	66.....	29	86.....	14
7.....	24	27.....	33	47.....	28	67.....	20	87.....	10
8.....	19	28.....	33	48.....	28	68.....	29	88.....	8
9.....	17	29.....	33	49.....	27	69.....	20	89.....	16
10.....	18	30.....	36	50.....	30	70.....	31	90.....	8
11.....	15	31.....	34	51.....	31	71.....	30	91.....	7
12.....	23	32.....	34	52.....	21	72.....	18	92.....	4
13.....	12	33.....	31	53.....	27	73.....	32	93.....	4
14.....	15	34.....	22	54.....	27	74.....	24	94.....	2
15.....	20	35.....	27	55.....	22	75.....	13	95.....	3
16.....	20	36.....	29	56.....	25	76.....	26	96.....	2
17.....	22	37.....	37	57.....	22	77.....	22	97.....	1
18.....	33	38.....	25	58.....	22	78.....	20	98.....	..
19.....	34	39.....	29	59.....	24	79.....	25	101.....	1

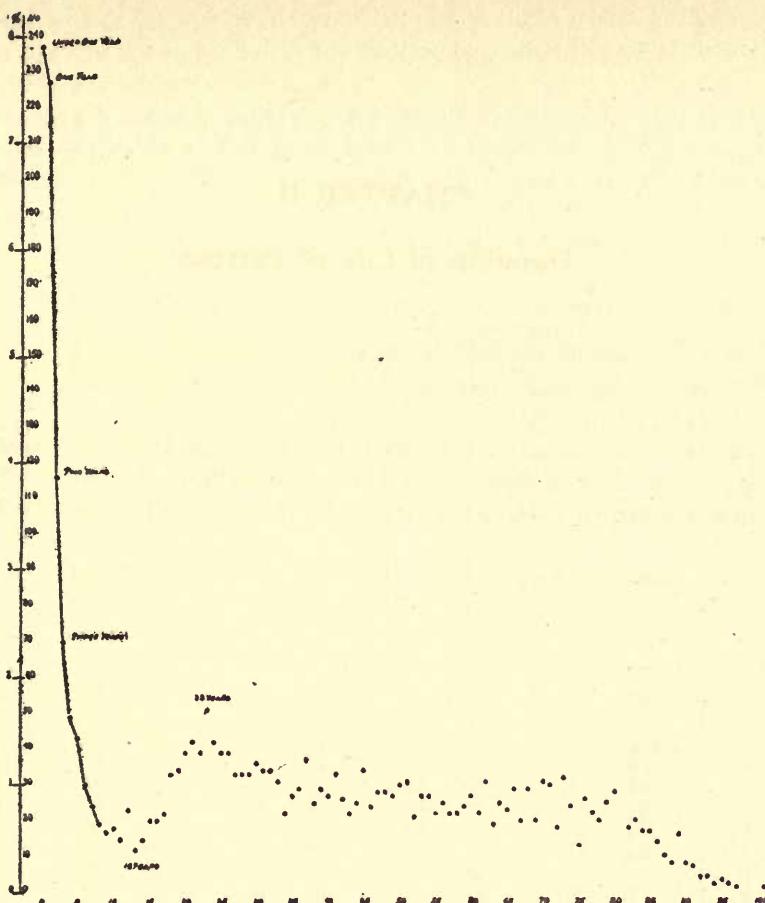


FIG. 2

A glance at the diagram, Fig. 2, enables us to realize at once the relatively enormous number of persons who died in infancy, before they were one year old. The number who died at the age of one was only slightly less; while the number who died at the ages of two and three, although considerably less, was still much greater than the number who died at any later age.

The diagram conveys the general impression that there were critical periods in the lives of these persons, when the liability to death was greater than at other times.

The period of early childhood was evidently a very dangerous period. After the age of three had been safely passed the danger diminished very greatly until the age of puberty was reached. Then came another dangerous period, the period of adolescence, reaching its maximum danger point at or about the age of twenty-three years.

Beyond this point the curve pursued a substantially horizontal direction with numerous oscillations of slight amplitude until extreme old age was reached.

The minor irregularities of the curve, Fig. 2, result largely from the small numbers involved in the determination of any point in the diagram and from the largeness of the scale.

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By grouping the details together we can secure larger figures, and by plotting them upon a smaller scale we can reduce non-significant variations of the curve to a very great degree.

This is well shown by Table 3, illustrated by Fig. 3, in which the ages at death are given by five-year periods instead of by single years; and in which the scale is reduced to only one-tenth of what it was in Fig. 2.

TABLE 3.—*Ages at death of 2,965 persons, by five-year periods.*

Ages at death.	Number.	Ages at death.	Number.
Stated.....	2,965		
Under 5.....	699	50 and under 55.....	136
5 and under 10.....	133	55 and under 60.....	115
10 and under 15.....	83	60 and under 65.....	124
15 and under 20.....	129	65 and under 70.....	121
20 and under 25.....	213	70 and under 75.....	135
25 and under 30.....	177	75 and under 80.....	106
30 and under 35.....	157	80 and under 85.....	119
35 and under 40.....	147	85 and under 90.....	65
40 and under 45.....	133	90 and under 95.....	25
45 and under 50.....	141	95 and over.....	7

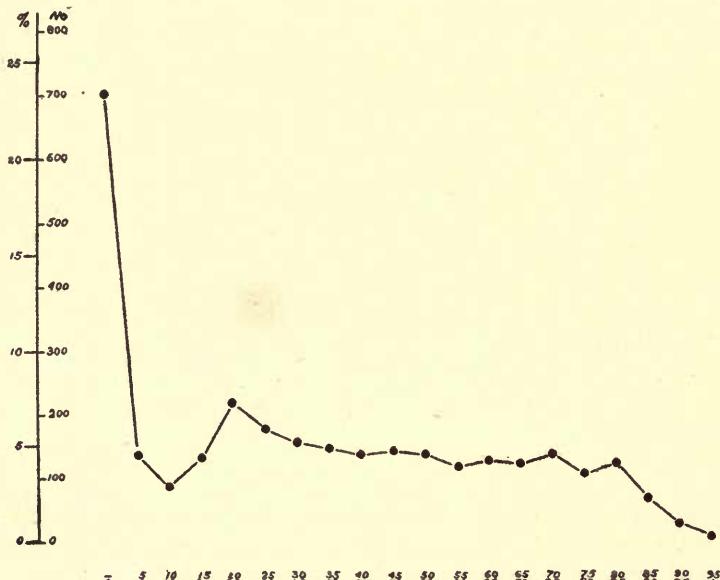


FIG. 3

While the main features of Fig. 2 reappear in the diagram, Fig. 3, the minor irregularities of the curve (Fig. 2) are practically extinguished, showing that they have little or no significance.

As a general result, we may note that after the age-period 20-25 years had been safely passed, Fig. 3, the number of deaths for each age-period remained remarkably constant until extreme old age was reached.

In order to obtain a bird's-eye view of our subject, we should of course use the largest figures available and plot them upon a small scale.

In Table 4 the ages at death are given by twenty-year periods instead of by five-year periods, as in Table 3, or by single years, as in Table 2. The diagram Fig. 4 thus gives us a more generalized view than the diagrams Figs. 3 or 2.

TABLE 4.—*Ages at death of 2,965 persons, by twenty-year periods.*

Ages at death.	Number.	Per cent.
Stated.....	2,965	100.0
Under 20.....	1,044	35.2
20 and under 40.....	694	23.4
40 and under 60.....	525	17.7
60 and under 80.....	486	16.4
80 and over.....	216	7.3

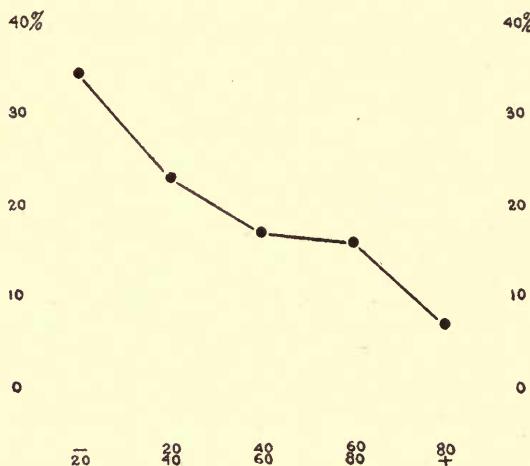


FIG. 4

From Table 4 we learn that the majority (58.6 per cent) of the persons whose deaths are noted died before they were 40 years of age; and, as has already been stated, the average age at death of the whole was only 34.6 years.

No less than 35.2 per cent died in childhood, before reaching the age of twenty; and only 7.3 per cent lived to be eighty years of age or older.

A characteristic feature of the curve in Fig. 4 is the slight peak produced at the age-period 60-80 years.

CHAPTER III

Duration of Life of Males and Females

In the Hyde Statistics the sex is stated in 8,630 cases; 4,431, or 51.3 per cent, were males, and 4,199, or 48.7 per cent, females. (B. B. Rec., VIII, 153.)

In 2,958 cases the sex and age at death were both stated. In these cases 1,606, or 54.3 per cent, were males, and 1,352, or 45.7 per cent, were females.

The number of years lived by the 1,606 males aggregated 57,531, and the aggregate years lived by the 1,352 females amounted to 45,119 years.

Average duration of life: Males, 35.8 years; females, 33.4 years. The males, upon the average, lived longer than the females.

In Table 5 the returns of males and females are analyzed by age at death by twenty-year groups, so as to show what proportion of the males died during the age-periods named, and what proportion of the females.

TABLE 5.—Ages at death of 1,606 males and 1,352 females, by twenty-year periods, showing the number and proportion who died at the age-periods named.

Ages at death.	Number.		Per cent.	
	Male.	Female.	Male.	Female.
Stated.....	1,606	1,352	100.0	100.0
Under 20....	545	492	33.9	36.4
20 and under 40....	348	346	21.7	25.5
40 and under 60....	298	227	18.5	16.8
60 and under 80....	290	196	18.1	14.5
80 and over.....	125	91	7.8	6.8

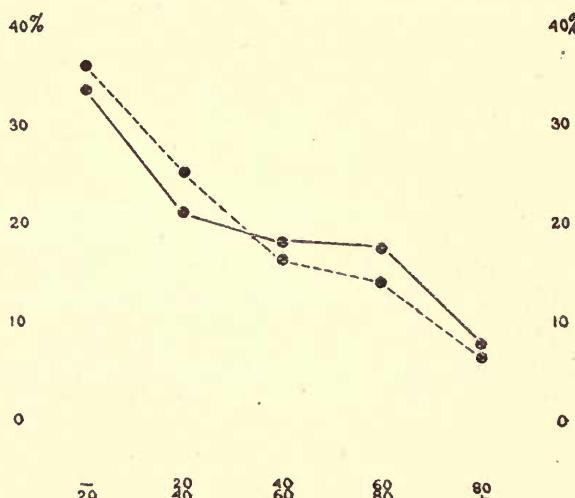


FIG. 5

In the diagram, Fig. 5, the continuous line refers to males, and the broken line to females; and the most characteristic feature seems to be the crossing of the two lines in the middle of the diagram, and the consequent reversal of the relations of the sexes on either side of the crossing point.

It will also be noticed that the peak in the curve at the 60-80 period of life observed in Fig. 4 is more pronounced in the case of the males than the females (see Fig. 5).

The general result revealed by Fig. 5 seems to be that a larger proportion of females than of males died before reaching middle life and a smaller proportion afterwards.

Here it may be well to observe that the diagram does not indicate that a larger number of females than of males died in the earlier periods, for this would not be true. A larger proportion, not a larger number. The curves represent percentages, not absolute numbers; and, as a matter of fact, the majority of the persons who died at each of the age-periods named were males.

Take, for example, the case of those who died young: 545 males and 492 females died before they were twenty years old. Here the males are in excess.

But 545 is 33.9 per cent of 1,606 (the total number of males); and 492 is 36.4 per cent of 1,352 (the total number of females). A larger proportion of the females died than of the males.

The reverse seems to have been the case where the deaths occurred in infancy. (See Table 6.)

Two hundred and thirty-one persons died in infancy, before they were one year old. Of these, 142, or no less than 61.5 per cent, were males; and 89, or only 38.5 per cent, were females.

Such a disproportion between the sexes arises more from the fact that there were more males than females to begin with (1,606 males, 1,352 females) than from any very much greater susceptibility of the males to death at this period. It is true that the susceptibility was greater, but not so great as suggested by the above figures; for, after all, the proportion of males who died during the first year of life before reaching the age of one was comparatively small (8.8 per cent); and the proportion of females (6.6 per cent), although smaller, was not so very much less.

Then, again, the proportion of males who died at the age of one year constituted 8.0 per cent of the males; and the proportion of females who died at the same age (7.2 per cent), although less, was not very much less. At the age of two the female deaths began to predominate.

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TABLE 6.—*Ages at death of 1,606 males and 1,352 females by single years, showing the number and percentage who died in early childhood, under five, by single years.*

Ages at death.	Number.		Per cent.	
	Male.	Female.	Male.	Female.
Stated.....	1,606	1,352	100.0	100.0
Under 1.....	142	89	8.8	6.6
1 and under 2.....	128	98	8.0	7.2
2 and under 3.....	62	54	3.9	4.0
3 and under 4.....	38	32	2.4	2.4
4 and under 5.....	23	26	1.4	1.9
Under 5.....	393	299	24.5	22.1

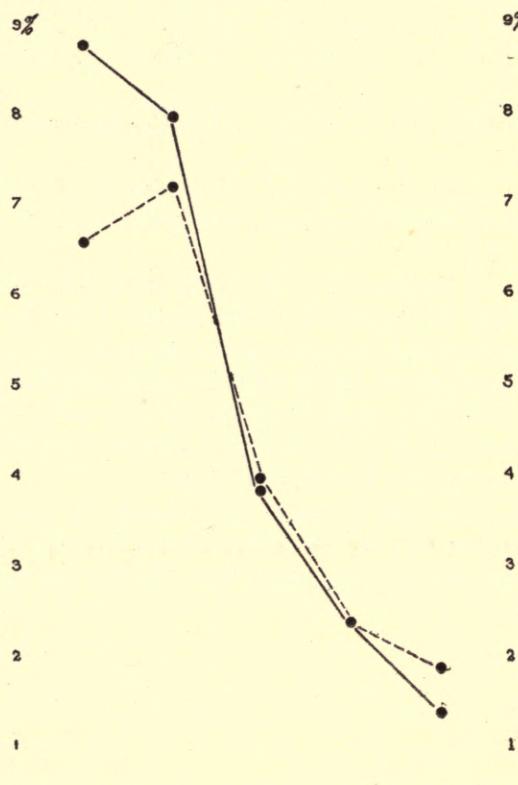


FIG. 6

The excessive mortality of males was confined to the period of infancy before reaching the age of two. (See crossing point of the male and female lines in Fig. 6.)

As the liability of males and females to death seems to have been different at different periods of life, it may be well to examine the matter in more detail. (See Table 7.)

TABLE 7.—*Ages at death of 1,606 males and 1,352 females, by five-year periods, showing the number and proportion who died during the age-periods named.*

Ages at death.	Number.		Per cent.	
	Male.	Female.	Male.	Female.
Stated.....	1,606	1,352	100.0	100.0
Under 5....	393	299	24.5	22.1
5 and under 10....	63	70	3.9	5.2
10 and under 15....	36	47	2.2	3.5
15 and under 20....	53	76	3.3	5.6
20 and under 25....	117	96	7.3	7.1
25 and under 30....	86	91	5.4	6.7
30 and under 35....	74	83	4.6	6.1
35 and under 40....	71	76	4.4	5.6
40 and under 45....	63	70	3.9	5.2
45 and under 50....	82	59	5.1	4.4
50 and under 55....	82	54	5.1	4.0
55 and under 60....	71	44	4.4	3.2
60 and under 65....	69	55	4.3	4.1
65 and under 70....	79	42	4.9	3.1
70 and under 75....	81	54	5.1	4.0
75 and under 80....	61	45	3.8	3.3
80 and under 85....	71	48	4.4	3.6
85 and under 90....	37	28	2.3	2.1
90 and under 95....	14	11	0.9	0.8
95 and over.....	3	4	0.2	0.3

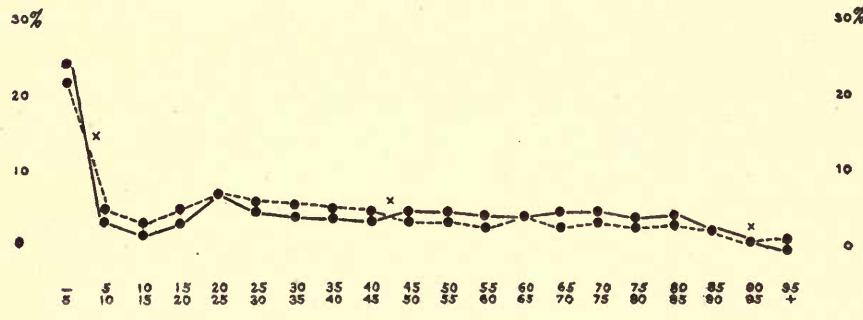


FIG. 7

In Table 7 the ages at death are shown by five-year periods instead of by twenty-year periods, as in Table 5; and it will be observed that characteristic fluctuations of the male and female curves appear in Fig. 7 that do not show on the more generalized diagram, Fig. 5.

The diagram, Fig. 7, reveals characteristic likenesses and differences of the sexes in respect to death:

Likenesses: The analysis by five-year periods brings out two well-marked periods of life when the danger of death was greater than at other times for both sexes. The dan-

ger was greatest at the very beginning of life and all through the period of early childhood; and, in both sexes, a secondary maximum appeared at the age-period 20-25 years. This corresponds to the danger peak shown in Fig. 2 at or about the age of 23 years.

Differences: Beginning at the beginning of life, the danger of death was greater for the male than the female during the period of infancy (under two years).

After the age of two the female was in greater peril than the male during the whole period of childhood, at the age of puberty, and during the period of adolescence up to the age-period 20-25 years, when the proportion who died was about the same in the two sexes.

There is this difference, however, that the age-period 20-25 years forms, in the male curve, quite a sharp peak, which is absent in the female curve. This is suggestive of some cause of death operating more powerfully upon males than females at this period of life.

The danger of death continued to be greater for the female during the whole of the child-bearing period, up to the age-period 40-45, after which the two lines crossed. This formed the central crossing place, and then the male line came to the top.

After 45 a larger proportion of males than of females died at each age-period until the age-period 90-95 was reached. Then, again, the two lines crossed; and the few winners in life's race who survived the age of 95 were largely females.

It is true that this last reversal in the relation of the sexes rests upon very slim evidence, so far as the Hyde Statistics are concerned. Only seven persons in all, three males and four females, are noted who lived to be 95 years of age or older; but the gradual approximation of the male and female lines after middle life affords additional evidence that a real crossing point was being approached. Other evidence also is available which apparently demonstrates that such a reversal of the sexes at this period of life is a real phenomenon.

The records pertaining to long life, collected by the Genealogical Record Office, include returns from 1,470 nonagenarians and centenarians. (B. B. Rec., XVIII, p. 303.)

For details concerning the individual cases, see B. B. Rec., XVI, 70, 190, 217, 270, 382; XVII, 24, 106, 185, 265, 335, 350; XVIII, 2, 158, 281, 300.

TABLE 8.—1,470 Nonagenarians and Centenarians, showing their ages by five-year periods, and the percentage male and female.

Age.	Number.			Per cent.		
	Total.	Male.	Female.	Total.	Male.	Female.
Stated.....	1,470	708	762	100.0	48.2	51.8
90 and under 95....	879	448	431	100.0	51.0	49.0
.95 and under 100....	302	149	153	100.0	49.3	50.7
100 and over.....	289	111	178	100.0	38.4	61.6

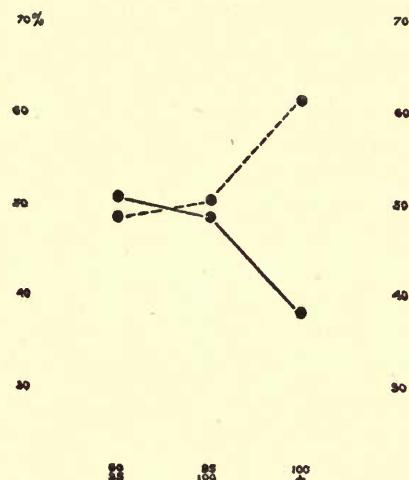


FIG. 8

These returns show that the majority of the persons who died between the ages of 90 and 95 were males, whereas the majority of those who lived to be 95 or older were females.

Of course this, by itself, does not necessarily mean that a larger proportion of females than of males survived the age of 95; but we may safely infer so from the well-known fact that females constitute only a minority of the whole population born.

With this point in mind, the fact that more females than males live to be older than 95 indicates that the proportion of females living to this great age is really greater than the proportion of males, and thus affords confirmatory evidence that the third crossing point in Fig. 7, at or about the age-period 90-95, represents a real reversal in the relation of the sexes at this period of life in spite of the smallness of the figures which support it in the Hyde Statistics.

The tables heretofore presented relate to deaths; but it might be well before concluding this chapter upon sex to give some attention to the proportion alive at each age.

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TABLE 9.—Duration of life of 1,606 males and 1,352 females, showing the number and proportion who were alive at the ages mentioned.

Ages.	Number living.		Per cent living.	
	Male.	Female.	Male.	Female.
Living at birth.....	1,606	1,352	100.0	100.0
Living at 5 years..	1,213	1,053	75.5	77.9
Living at 10 years..	1,150	983	71.6	72.7
Living at 15 years..	1,114	936	69.4	69.2
Living at 20 years..	1,061	860	66.1	63.6
Living at 25 years..	944	764	58.8	56.5
Living at 30 years..	858	673	53.4	49.8
Living at 35 years..	784	590	48.8	43.7
Living at 40 years..	713	514	44.4	38.1
Living at 45 years..	650	444	40.5	32.9
Living at 50 years..	568	385	35.4	28.5
Living at 55 years..	486	331	30.3	24.5
Living at 60 years..	415	287	25.9	21.3
Living at 65 years..	346	232	21.6	17.2
Living at 70 years..	267	190	16.7	14.1
Living at 75 years..	186	136	11.6	10.1
Living at 80 years..	125	91	7.8	6.8
Living at 85 years..	54	43	3.4	3.2
Living at 90 years..	17	15	1.1	1.1
Living at 95 years..	3	4	0.2	0.3

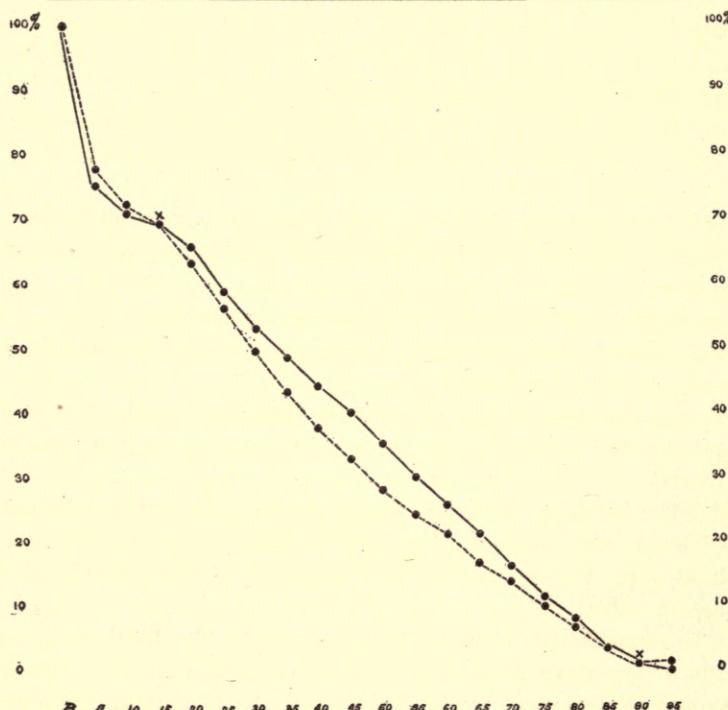


FIG. 9

Table 9 shows the number and proportion of the males and females who were alive at the ages stated, and the results are shown graphically in Fig. 9.

Starting at birth (B), when the whole (100 per cent) of the males and females appeared, both sexes were cut down very severely during the first few years of life, so that at the age of five only 77.9 per cent of the females remained alive, and a still smaller percentage of the males (75.5 per cent). Between one-fourth and one-fifth of the whole number born had disappeared before the age of five had been reached.

At ten years of age the proportion of females surviving was still slightly greater than the proportion of males; but at fifteen years of age both sexes were upon an equality again. About 69 per cent of each sex were living at fifteen years of age.

Here the lines crossed; and the proportion who lived to be twenty years of age was greater among the males than the females. A larger proportion of males than of females lived to adult life.

During the whole of adult life the male population was cut down at a remarkably regular rate until the age of ninety years was reached.

The female population, after reaching the age of twenty-five, was cut down at a sensibly greater rate than the males, the two lines diverging from one another, until, at or about the age of forty-five, the maximum divergence occurred. This divergence undoubtedly resulted from dangers to which the females were exposed during the child-bearing period, which did not affect the male population at all.

After the age of forty-five the two lines gradually approached one another until at the age of ninety they crossed. During this period the male line continued its steady downward course without fluctuation. Indeed, it formed almost a straight line from the age of twenty-five to ninety. The fluctuations appeared in the female line alone. From the age of forty-five to ninety the females died off at a sensibly less rate than the males, with the result that at about the age of ninety years the proportion of males and females living was again about the same (1.1 per cent).

At this age the lines crossed, and the proportion of females who lived to be ninety-five years of age or older was greater than the proportion of males.

Can we reach any general conclusion respecting the relative duration of life of the males and females? Was the vitality of the male, for example, superior to that of the female or *vice versa*?

The Hyde Statistics afford a double answer to the question.

The answer depends upon whether we take the average duration of life or the absolute duration as our test of vitality.

If the average duration of life is our test, then the vitality of the male was undoubtedly superior; for he lived, upon the average, to a greater age (males, 35.8 years; females, 33.4 years).

If, on the other hand, the ability to live to extreme old age be taken as the test, the vitality of the female was superior; for, although females formed only a minority of the whole population born, they constituted the majority of those who lived to be ninety-five years of age or older.

It should be remembered, however, that the people who lived to this advanced age constituted only a very small proportion of the total population born, less than one-third of 1 per cent; and the question arises: Are we justified in judging the whole by so small a part?

CHAPTER IV

Duration of Life of Fathers and Mothers

The Hyde Statistics contain details concerning 8,797 persons, and in 5,024 cases the father's age at death is stated. Average age at death of father, 67.7 years.

In 3,958 cases the mother's age at death was known. Average age at death of mother, 64.4 years.

The fathers, on the average, lived longer than the mothers.

Here it may be well to observe that the figures do not indicate the number of fathers and mothers. There were not, for example, 5,024 fathers, but 5,024 persons who had fathers whose ages at death were known. Many, if not most, of these persons were alive when the Genealogy was published, but their fathers were dead. Some of them undoubtedly had the same father, so that it is perfectly certain that there were not 5,024 fathers in all, but a very much smaller number. The same remarks apply to the mothers. There were not 3,958 mothers, but a very much smaller number.*

Under these circumstances it may perhaps be well to explain how the average ages at death have been ascertained. Take the cases of the fathers for example:

The ages of the fathers are simply added together just as though each of the 5,024 persons had a separate and distinct father, different from the others. By this process we arrive at the "aggregate years lived by the fathers," namely, 340,271 years. Dividing this by the number of persons (5,024), we reach 67.7 years as the average father's age at death.

Here the objection may be raised that, because some of the persons have the same father, "the aggregate years lived by the fathers" is not correct. This criticism, however, does not apply to "the average age at death."

Supposing, for example, that ten persons are reported whose fathers lived to be 70 years of age, and let them turn out to be all of them the children of the same father.

We put down the aggregate years lived by the fathers as 700 (although, of course, no single father lived to be 700 years of age); and, dividing 700 by 10 (the number of persons), we arrive at the conclusion that the average father in these cases lived to be 70 years of age. This, of course, is correct, whether there were ten fathers or only one.

In 3,958 cases we know the age of the mother at death. By a similar process we find the aggregate years lived by the mothers to be 254,919, and the average age at death 64.4 years.

* A re-examination of these cases shows that the actual number of fathers involved was only about 795, and the actual number of mothers about 671. Average duration of life: Fathers, 65.0 years; mothers, 60.8 years.

The higher averages arrived at in this chapter result from the fact that the older fathers and mothers were the most fertile, and left more descendants behind them, proportionately, than the others. (See Chapter VI.)

Table 10 shows the number and percentage of persons having fathers and mothers who died at the age-periods named.

TABLE 10.—*Analysis of 5,024 persons, showing the number and proportion having fathers who died at the age-periods mentioned; also 3,958 persons, showing the number and proportion having mothers who died at the age-periods mentioned.*

Father's age at death.	Persons whose fathers died at the age-periods named.		Mother's age at death.	Persons whose mothers died at the age-periods named.	
	Number.	Per cent.		Number.	Per cent.
Stated.....	5,024	100.0	Stated.....	3,958	100.0
Under 20.....	Under 20.....	3	0.1
20 and under 40.....	188	3.7	20 and under 40.....	442	11.2
40 and under 60.....	1,246	24.8	40 and under 60.....	1,005	25.4
60 and under 80.....	2,340	46.6	60 and under 80.....	1,597	40.3
80 and under 100.....	1,250	24.9	80 and under 100.....	905	22.9
100 and over.....	100 and over.....	6	0.1

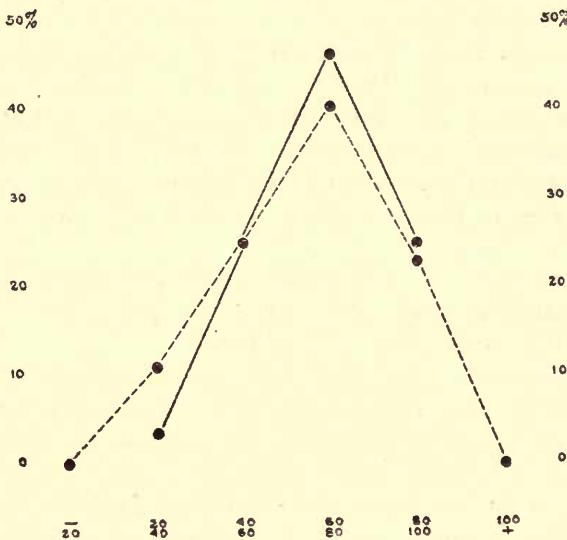


FIG. 10

In Fig. 10 the continuous line refers to fathers and the broken line to mothers.

Likenesses: The two lines resemble one another in coming to a sharp peak at the age-period 60-80, showing that a very large proportion of the persons (over 40 per cent) had fathers and mothers who died between 60 and 80.

Differences: No persons are noted whose fathers died before twenty years of age or after one hundred; whereas there were persons whose mothers died at these age-periods, so that the line for the mothers extends further at either end than the line for the fathers.

The proportion having mothers who died before forty is greater than the proportion having fathers who died during that period.

The lines cross at the age-period 40-60, and the proportion having mothers who died after sixty years of age is less than the proportion having fathers up to the age-period 80-100.

Here the fathers' line stops; whereas the mothers' line goes on, indicating that the lines cross again in old age, and that a larger proportion of persons had mothers who lived to extreme old age than fathers.

The fathers, of course, were males, and the mothers females, and it is interesting to compare the results noted for fathers and mothers with those arrived at in Chapter III for males and females generally. For example, compare Fig. 10 with Fig. 5.

In Fig. 10, relating to parents, both the male and female lines rise to a sharp peak at the age-period 60-80, and slope down rapidly on either side. In Fig. 5, however, the 60-80 period shows as only a very subordinate peak, and both the male and female lines slope up rapidly to the left.

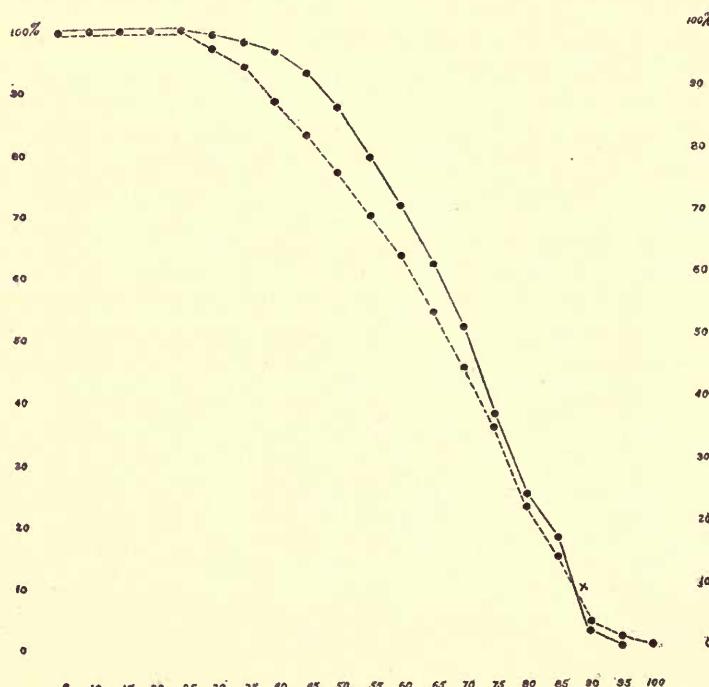
In interpreting this result, we may say that Fig. 5 indicates that a very large percentage both of males and females, in fact the majority of them, died before forty years of age; whereas Fig. 10 shows that only a small percentage had fathers or mothers who died before forty. The explanation of this difference is obvious when we consider the undoubted fact that no married people died in infancy or early childhood; whereas, among males and females generally, the majority died in the earlier years of life.

There is another difference between Fig. 5 and Fig. 10 that is worthy of note. Fig. 5 shows that only a small percentage of the males and females lived to be eighty years of age or older (7.8 per cent of the males and 6.8 per cent of the females); whereas Fig. 10 indicates that the percentage having fathers and mothers who lived to be old was quite large: 24.9 per cent had fathers and 23.0 per cent had mothers who lived to be eighty or older.

We have hitherto considered the ages at death of the fathers and mothers, and it may be well now to examine the number and proportion having fathers and mothers who were alive at the different ages stated.

TABLE 11.—*Analysis of 5,024 persons, showing the number and proportion having fathers who were living at the ages specified; also analysis of 3,958 persons, showing the number and proportion having mothers who were living at the ages specified.*

Ages of parents.	Persons whose fathers were living at the ages specified.		Persons whose mothers were living at the ages specified.	
	Number.	Per cent.	Number.	Per cent.
Living at birth.....	5,024	100.0	3,958	100.0
Living at 5 years..	5,024	100.0	3,958	100.0
Living at 10 years..	5,024	100.0	3,958	100.0
Living at 15 years..	5,024	100.0	3,958	100.0
Living at 20 years..	5,024	100.0	3,955	99.9
Living at 25 years..	5,019	99.9	3,933	99.4
Living at 30 years..	5,006	99.7	3,832	96.8
Living at 35 years..	4,918	97.9	3,723	94.0
Living at 40 years..	4,836	96.3	3,513	88.7
Living at 45 years..	4,663	92.9	3,285	82.9
Living at 50 years..	4,385	87.4	3,047	76.9
Living at 55 years..	3,986	79.4	2,778	70.1
Living at 60 years..	3,590	71.5	2,508	63.3
Living at 65 years..	3,110	62.0	2,165	54.6
Living at 70 years..	2,604	51.9	1,808	45.6
Living at 75 years..	1,901	37.9	1,426	36.0
Living at 80 years..	1,250	24.9	911	23.0
Living at 85 years..	542	10.8	417	10.5
Living at 90 years..	154	3.1	157	3.9
Living at 95 years..	21	0.4	57	1.4
Living at 100 years..	6	0.1



THE DURATION OF LIFE

Fig. 11 shows that all of the fathers were living at the age of twenty and nearly all of the mothers (99.9 per cent had mothers who were living at twenty).

From this point onwards the proportion having fathers living at the different ages named was greater than the proportion having mothers right up to old age; but the lines cross between eighty-five and ninety years, and the proportion having mothers who lived to be ninety years of age or over was greater than the proportion having fathers who lived to be so old.

It is interesting to compare Fig. 11, relating to fathers and mothers, with the corresponding Fig. 9, concerning males and females generally.

CHAPTER V

Duration of Life of Persons Compared with the Duration of Life of Their Parents

FATHERS

There were 2,287 cases in which the ages at death of the persons and the ages at death of their fathers were stated; and Table 12 shows what proportion of the persons had fathers who died at the various age-periods named.

TABLE 12.—Analysis of 2,287 cases in which the ages at death of the persons and of their fathers were both stated; analysis by person's age at death, showing the number and percentage having fathers who died at the age-periods named.

Person's age at death.	Father's age at death.				
	Stated.	- 40	40-60	60-80	80+
Stated.....	2,287	66	522	1,056	643
Under 20.....	669	20	189	299	161
20 and under 40.....	538	18	140	269	111
40 and under 60.....	467	12	116	215	124
60 and under 80.....	428	13	57	196	162
80 and over.....	185	3	20	77	85

<i>Percentages.</i>					
Stated.....	100.0	2.9	22.8	46.2	28.1
Under 20.....	100.0	3.0	28.2	44.7	24.1
20 and under 40.....	100.0	3.4	26.0	50.0	20.6
40 and under 60.....	100.0	2.6	24.8	46.0	26.6
60 and under 80.....	100.0	3.0	13.3	45.8	37.5
80 and over.....	100.0	1.6	10.8	41.6	46.0

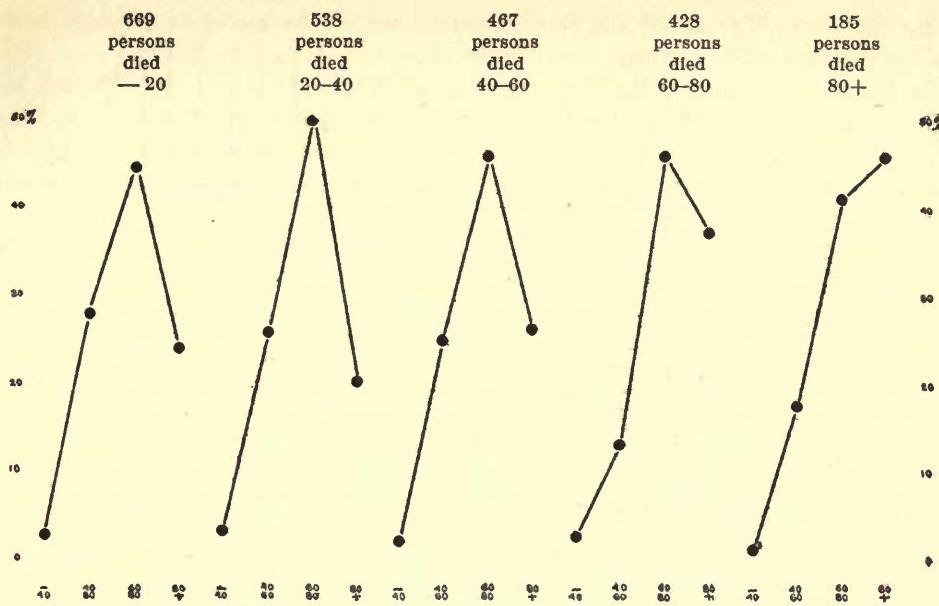


FIG. 12

NOTE.—First dot in each diagram shows the percentage having fathers who died —40. Second dot the percentage having fathers who died 40-60. Third dot the percentage having fathers who died 60-80. Fourth dot the percentage having fathers who died 80+.

Fig. 12 contains a series of five diagrams. The first refers to persons who died young (under 20); the last relates to persons who lived to be old (80+); and the intermediate diagrams refer to persons who died during the intermediate age-periods named.

Likenesses: The curves all agree in rising very rapidly to the third dot, which indicates the percentage having fathers who died between sixty and eighty years of age.

In most of the diagrams the 60-80 period forms quite a sharp peak, the lines sloping downwards on either side; but, in the last diagram, the fourth dot is distinctly higher than the third.

Differences: The chief differences relate to the position of the fourth dot relatively to the others. The fourth dot exhibits a systematic displacement upwards as we proceed from one diagram to the other.

If we imagine the line connecting the third and fourth dots to be pivoted upon the third dot as an axis, then, as we proceed from the first to the last diagram, this line seems to show a tendency to swing upwards to the right like the hand of a watch moving in the wrong direction, until, in the last diagram, the fourth dot proves to be distinctly higher than the third.

This gradual displacement upwards of the fourth dot seems to be the chief characteristic of the whole series of curves.

Interpretation: The fourth dot represents the percentage having fathers who lived to be old (80+).

The gradual and systematic displacement upwards of this fourth dot indicates that the proportion having fathers who lived to be old increased with the length of life of the individual. The persons who lived the longest had the largest proportion of long-lived fathers.

THE DURATION OF LIFE

MOTHERS

In Table 13 the indications are still more clear of a correlation between the duration of life of the individual and the duration of life of his mother.

TABLE 13.—*Analysis of 1,805 cases in which the ages at death of the persons and of their mothers were both stated; analysis by person's age at death, showing the number and percentage having mothers who died at the age-periods named.*

Person's age at death.	Mother's age at death.				
	Stated.	-40	40-60	60-80	80+
Stated.....	1,805	191	435	713	466
Under 20.....	511	88	129	199	95
20 and under 40.....	407	42	104	176	85
40 and under 60.....	379	27	92	159	101
60 and under 80.....	360	26	80	129	125
80 and over.....	148	8	30	50	60

Percentages.					
Stated.....	100.0	10.6	24.1	39.5	25.8
Under 20.....	100.0	17.2	25.2	39.0	18.6
20 and under 40.....	100.0	10.3	25.6	43.2	20.9
40 and under 60.....	100.0	7.1	24.3	42.0	26.6
60 and under 80.....	100.0	7.2	22.2	35.9	34.7
80 and over.....	100.0	5.4	20.3	33.8	40.5

511 407 379 360 148
persons persons persons persons persons
died died died died died
— 20 20-40 40-60 60-80 80+

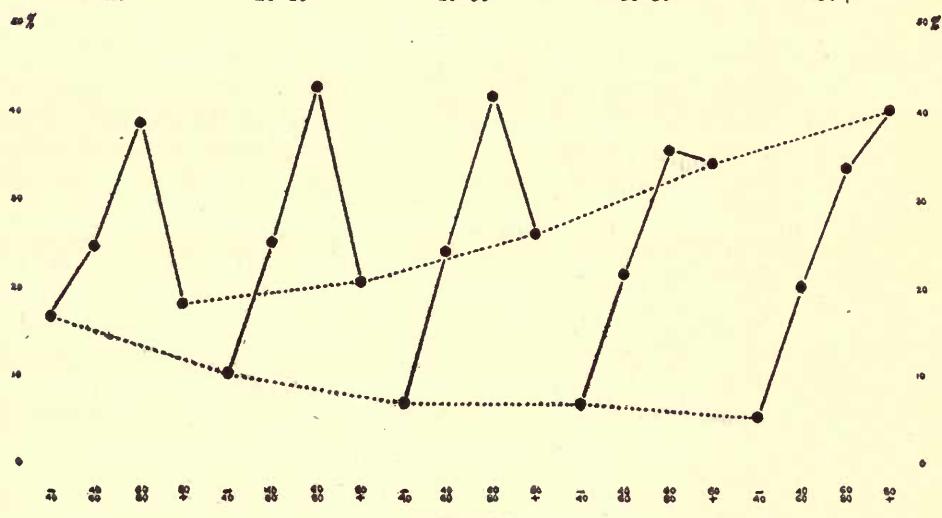


FIG. 13

NOTE.—First dot in each diagram shows the percentage having mothers who died —40. Second dot the percentage having mothers who died 40-60. Third dot the percentage having mothers who died 60-80. Fourth dot the percentage having mothers who died 80+.

In Fig. 13, not only do the fourth dots form a progressively rising series, but the first dots a progressively descending series. See the broken lines connecting the diagrams.

The first dot in each diagram represents the percentage having mothers who died early in life (under 40 years), and the fourth dot expresses the percentage having mothers who lived to be old (80+).

The persons who died young (see first diagram in Fig. 13) had a larger proportion of mothers who died early in life than the persons who lived to be old (last diagram), and the persons who died at the intermediate age-periods had an intermediate proportion of mothers who died under forty. Thus the broken line connecting the first dots in the diagrams forms a progressively descending line.

We may interpret this to mean that the persons who died young (under twenty) had a larger proportion of short-lived mothers than the persons who died at any later period of life.

The persons who lived to be old (see last diagram in Fig. 13) had a larger proportion of mothers who lived to be old than the persons who died young (see first diagram), and the persons who died at the intermediate age-periods had an intermediate proportion of mothers who lived to be old. Thus the broken line connecting the last dots in the diagrams forms a progressively ascending line.

This indicates that the persons who lived to be old had a larger proportion of long-lived mothers than the persons who died at any earlier period of life.

There was thus a distinct correlation between the duration of life of the individual and the duration of life of his mother.

BOTH PARENTS

There were 1,594 cases in which the ages at death of the persons and the ages at death of both parents were known. (For detailed table showing the individual ages at death of these persons and of their fathers and mothers, see B. B. Rec., Vol. XII, pp. 239-269.)

One hundred and thirty-nine of these persons, or 8.7 per cent, lived to be eighty years of age or older.

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TABLE 14.—Analysis of 1,594 cases in which the ages at death of the persons and of both of their parents were stated, showing the number and percentage of persons who lived to be eighty years of age or older.

Age at death of parents.	Number of persons.	Number of persons lived 80+.	Per cent of persons lived 80+.
Stated.....	1,594	139	8.7
Lived to be 80+:			
Neither parent.....	827	44	5.3
One parent (not other).....	583	57	9.8
Both parents.....	184	38	20.6
Father (not mother).....	337	38	11.3
Mother (not father).....	246	19	7.7

PERCENTAGE OF PERSONS WHO LIVED TO BE 80+

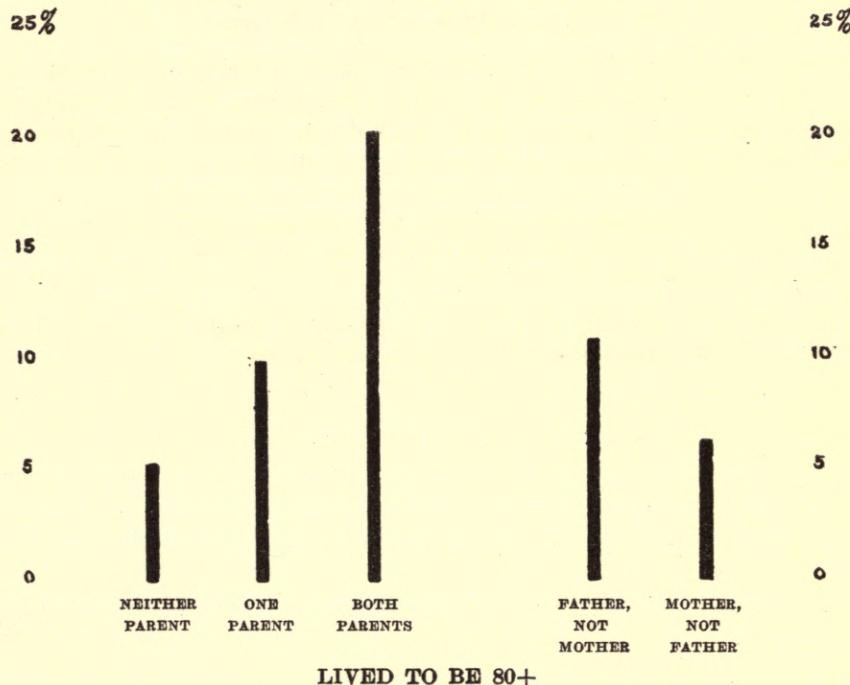


Fig. 14

In Table 14 the 1,594 persons are divided into three groups:

Where neither parent lived to be eighty, 5.3 per cent of the persons lived to be eighty or older (827 cases).

Where one parent (but not the other) lived to be eighty or older, 9.8 per cent of the persons lived to be eighty or older (583 cases).

Where both parents lived to be eighty or older, 20.6 per cent of the persons lived to be eighty or older (184 cases).

We have here indubitable evidence that heredity was involved in the production of longevity in these cases.

The tendency to longevity seems to have been inherited more strongly through the father than the mother.

Where the father (but not the mother) lived to be eighty or older, 11.3 per cent of the persons lived to be eighty or older (337 cases).
Where the mother (but not the father) lived to be eighty or older, 7.7 per cent of the persons lived to be eighty or older (246 cases).

Another point revealed by Table 14 is well worthy of study. Considering the 1,594 cases as a whole, we find that only 8.7 per cent of these persons lived to be eighty or older.

It is therefore somewhat surprising to find that no less than 767 of these persons, or 48.1 per cent (nearly one-half of the whole), had parents who lived to be eighty or older.

Fathers (not mothers), 337; mothers (not fathers), 246; both parents, 184; total, 767 cases.

The importance of heredity as a factor in producing longevity is so obvious as to justify a more detailed examination of the cases referred to.

THE DURATION OF LIFE

TABLE 15.—Analysis of 1,594 cases in which the age at death and the fathers' and mothers' ages at death are all stated, showing the number of persons having fathers and mothers who died at the age periods named, and the average duration of life of the persons and of their fathers and mothers.

Age of parents at death.		Number of cases.	Aggregate years lived			Average years lived		
Fathers.	Mothers.		By persons.	By fathers.	By mothers.	By persons.	By fathers.	By mothers.
Stated.....		1,594	64,717	113,057	105,214	40.6	70.9	66.0
—60	—60	128	4,202	6,518	5,688	32.8	50.9	44.4
—60	60-80	120	4,010	6,140	8,526	33.4	51.2	71.0
—60	80+	74	2,689	3,726	6,421	36.3	50.3	86.8
60-80	—60	251	8,984	16,947	10,814	35.8	67.5	43.1
60-80	60-80	328	12,477	23,467	23,278	38.0	71.5	71.0
60-80	80+	172	7,737	12,140	14,700	45.0	70.6	85.5
80+	—60	131	5,541	11,154	5,912	42.3	85.1	45.1
80+	60-80	206	9,384	17,391	14,423	45.5	84.4	70.0
80+	80+	184	9,603	15,574	15,452	52.7	84.6	84.0

CONDENSED TABLE

NUMBER OF CASES

AVERAGE DURATION OF LIFE

MOTHER'S AGE AT DEATH		
—60	60-80	80+
131	206	184
251	328	172
128	120	74

MOTHER'S AGE AT DEATH		
—60	60-80	80+
42.3	45.5	52.7
35.8	38.0	45.0
32.8	33.4	36.3

FATHER'S AGE AT DEATH

—60 60-80 80+

A STUDY OF THE HYDE GENEALOGY

31

Plan for a three dimensional diagram illustrating Table 15

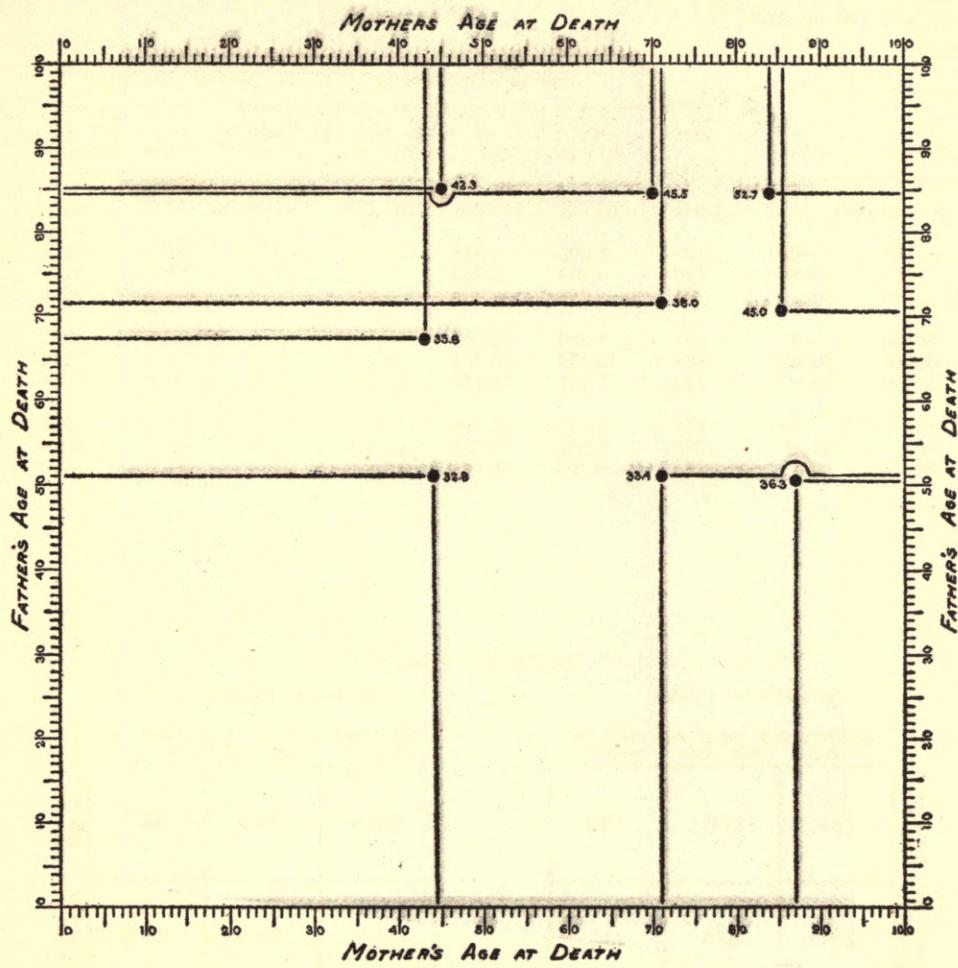


FIG. 15

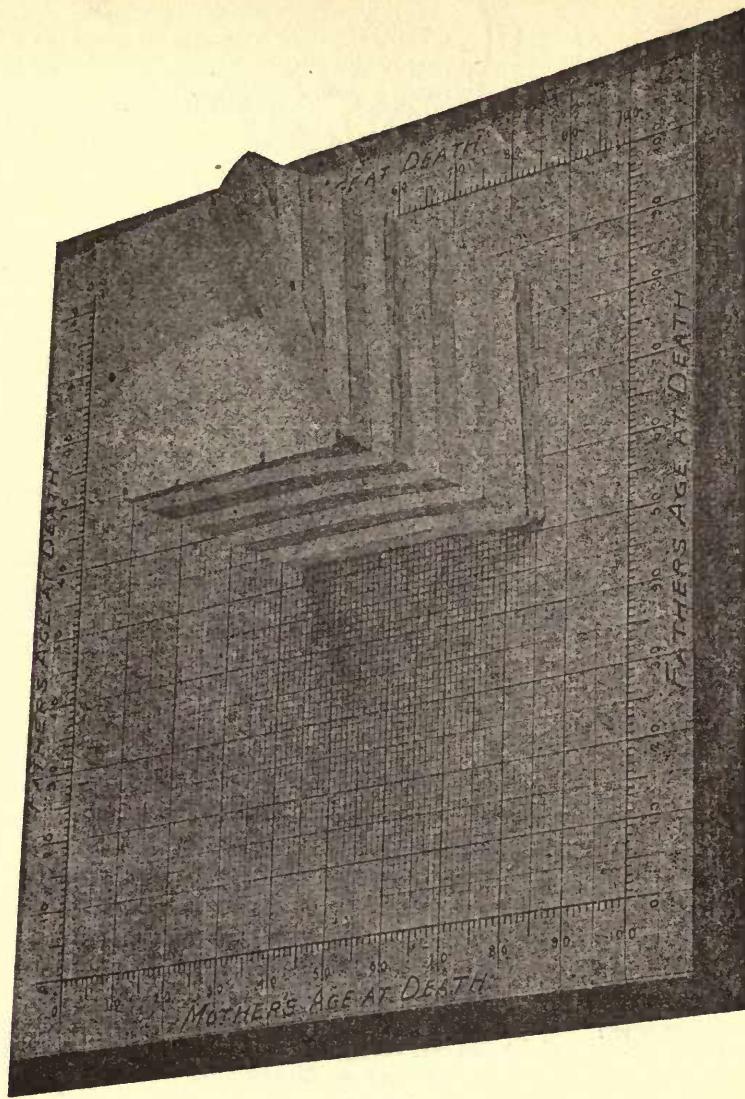


FIG. 15a

Photograph of a stereogram or three dimensional diagram illustrating Table 15

NOTE.—Three dimensional diagram: The horizontal components indicate the average duration of life of the fathers and mothers, and the vertical component the average duration of life of the offspring.

For example, take the lowest dot on the left-hand side of the diagram, Fig. 15a. The vertical height of this dot above the plane of the paper is 32.8, upon the scale adopted, and this means that the persons in this group lived on the average 32.8 years. The horizontal components of this dot are shown in Fig. 15 and indicate upon the same scale the average ages at death of the fathers and mothers; fathers 50.9 years, mothers 44.4 years.

Or, again, take the highest dot on the right-hand side of the diagram 15a. The vertical height is 52.7, indicating that the persons represented in this group lived on the average 52.7 years. By reference to Fig. 15 the horizontal components are seen to be fathers 84.6 years, mothers 84.0 years.

In Fig. 15a this point forms quite an elevated peak, indicating that the offspring of parents, both of whom lived to be old, were very much longer lived on the average than the offspring of parents who died at earlier periods of life.

The 1,594 persons referred to in Table 15 lived on the average 40.6 years, their fathers 70.9 years; and their mothers 66.0 years.

In order to secure large enough numbers upon which to calculate averages, the 1,594 persons have been divided into only nine groups, arranged according to the ages at death of the parents.

For example, the condensed table is divided into nine compartments or boxes. It will be observed that the number 128 has been placed in one of these compartments; and, by reference to the margin, it will be found that this compartment is devoted to cases having fathers and mothers who did not live to be sixty years of age. The figures mean that there were 128 persons who had fathers and mothers who both died under sixty.

By reference to the detailed part of the table it will be found that the aggregate years lived by these 128 persons amounted to 4,202 years; and dividing this by 128, we reach the conclusion that the average age at death in these cases was 32.8 years.

In the condensed table this result (32.8) has been placed in the proper compartment relating to fathers and mothers who both died under sixty. (See condensed table for average duration of life.)

Contrast with this the result obtained with the 184 persons whose parents, both of them, lived to be eighty years of age or older. The average duration of life in these cases was 52.7 years.

Where both parents died under sixty, the persons on the average lived only 32.8 years (128 cases).

Where both parents lived to be eighty or older, the persons on the average lived 52.7 years (184 cases).

Where the parents died at the intermediate age-periods noted, the average duration of life of the persons was intermediate.

The results indicate that the duration of life of the person was directly correlated with the duration of life of both parents, and that the influence of the father was greater than that of the mother.

Where the father lived to be eighty or older and the mother died under sixty, the persons lived on the average 42.3 years (131 cases).

Where the mothers lived to be eighty or older and the fathers died under sixty, the persons lived on the average 36.3 years (74 cases).

The persons whose parents both lived to be old were the longest lived on the average.

CHAPTER VI

Duration of Life of Fathers and Mothers Compared with the Number of Children Born to Them

FATHERS

In several thousand cases (5,024) the age of the father at death was known (see Table 10); but the number of fathers was not known because many of the persons were the children of the same father.

A special examination of the card catalogue of the Hyde Genealogy has been made to eliminate duplicate fathers and thus ascertain the actual number of fathers involved.

Each card contained the name of a person, the name of his father, the name of his mother, and the total number of children born to these parents. It was found, however, that duplication of the fathers could not be entirely avoided, because some of the fathers had married more than once and had families by each marriage.

This difficulty was overcome by noting the number of fathers and the number of marriages, and calculating the average number of children per father and per marriage.

There were only 795 fathers in all, but they had contracted 843 marriages resulting in offspring. (See Table 16.)

TABLE 16.—843 fertile marriages of 795 males, showing the number of children produced from fathers who died at the age-periods named, and the average number of children per father and per marriage.

Father's age at death.	Number of fathers.	Number of marriages.	Number of children.	Number of children.	
				Per father.	Per marriage.
Stated.....	795	843	5,041	6.3	6.0
Under 40.....	69	71	192	2.8	2.7
40 and under 60.....	207	213	1,243	6.0	5.8
60 and under 80.....	343	369	2,356	6.9	6.4
80 and over.....	176	190	1,250	7.1	6.6

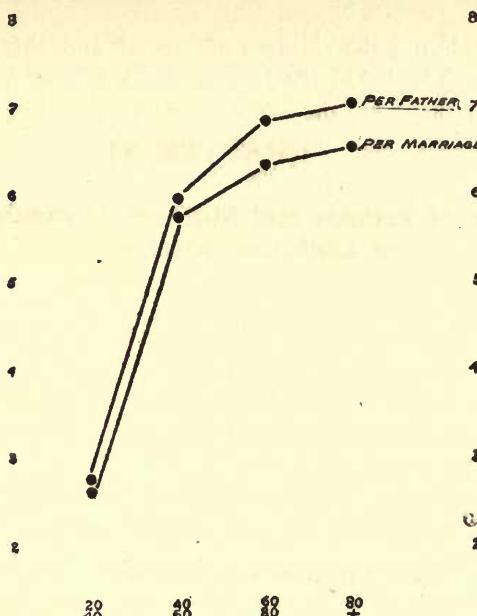


FIG. 16

Table 16 relates to 843 fertile marriages of 795 males; 5,041 children were produced. Average: 6.3 children per father, or 6.0 children per marriage.

Aggregate years lived by the 795 fathers, 51,668 years. Average duration of life of fathers, 65.0 years.

The fathers who died under forty years of age had on the average 2.8 children apiece (69 cases).

The fathers who lived to be eighty or older had on the average 7.1 children apiece (176 cases).

The fathers who died at the intermediate age-periods had on the average families of intermediate size.

There was thus a direct correlation between the duration of life of the fathers and the number of children born to them.

Here a complication arises, due to the fact that some of the fathers married more than once and had children by each marriage. Fig. 16 shows that the average number of children born to the older fathers was somewhat increased from this cause, the curve for the average number of children per father being sensibly higher than that for the average number of children per marriage. The latter curve, however, is of the same general character as the former, showing a distinct rise in the average number of children in the older cases.

Fathers died under forty. Average, 2.7 children per marriage (71 cases).

Fathers died between forty and sixty. Average, 5.8 children per marriage (213 cases).

Fathers died between sixty and eighty. Average, 6.4 children per marriage (369 cases).

Fathers lived to be eighty or older. Average, 6.6 children per marriage (190 cases).

The effect of considering the children of second and third marriages as distinct families reduced the average size of the family in the case of fathers who married more than once; and yet the curve for the average number of children per marriage continually goes up, showing that, quite independently of this complicating cause, there was a distinct correlation between the size of the family and the duration of life of the father.

The longer-lived fathers, on the average, had the largest families.

MOTHERS

The correlation between the duration of life of the mother and the number of children born to her is still more obvious than in the case of the fathers, because the complicating condition referred to above is absent.

It is safe to say that no females had children after they reached middle life, the conclusion of the child-bearing period (say forty-five years); so that in the cases of women who married again late in life there would be no offspring by these later marriages.

We cannot suppose, for example, that a mother who died at fifty would have had more children had she lived to be sixty, seventy, or eighty years of age or older, even though she might have married half a dozen times, and young husbands, too.

Table 17 relates to 671 fertile marriages of 671 females; 4,022 children were produced. Average, 6.0 children per marriage.

Aggregate years lived by the 671 mothers, 40,805 years. Average duration of life of mothers, 60.8 years.

The Hyde Genealogy gives us some account of the second marriages of males, especially where they bore the name of Hyde; but few cases of second fertile marriages of females are recorded. In Table 17, therefore, we are unable to distinguish between the number of children per mother and the number of children per marriage.

TABLE 17.—671 fertile marriages of 671 females, showing the number of children produced from mothers who died at the age-periods named, and the average number of children per marriage.

Mother's age at death.	Number of marriages.	Number of children.	Number of children per marriage.
Stated.....	671	4,022	6.0
Under 40....	130	439	3.4
40 and under 60....	164	1,018	6.2
60 and under 80....	244	1,612	6.6
80 and over.....	133	953	7.2

8

8

7

7

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5

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4

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3

3

40 60 80

80

FIG. 17

The mothers who died under forty had on the average 3.4 children per marriage (130 cases). The mothers who died between forty and sixty had on the average 6.2 children per marriage (164 cases).

The mothers who died between sixty and eighty had on the average 6.6 children per marriage (244 cases).

The mothers who lived to be eighty or older had on the average 7.2 children per marriage (133 cases).

CHAPTER VII

Duration of Life of Persons Compared with the Ages of the Parents at Marriage

FATHERS

There were 2,605 cases where the person's age at death and the father's age at marriage were both stated.

These 2,605 persons lived 91,126 years. Average duration of life of persons, 35.0 years.

TABLE 18.—2,605 cases where the person's age at death and the father's age at marriage were both stated, showing the number having fathers who married at the age-periods named, the aggregate years lived by the persons, and their average ages at death.

Father's age at marriage.	Number of persons.	Aggregate years lived.	Average years lived.
Stated.....	2,605	91,126	35.0
Under 25....	1,072	39,299	36.6
25 and under 30....	963	33,049	34.3
30 and under 35....	346	12,322	35.6
35 and under 40....	114	3,481	30.5
40 and over.....	110	2,975	27.0

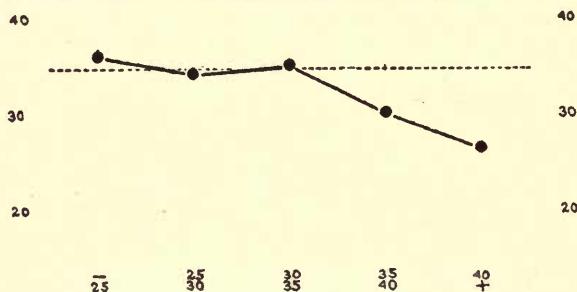


FIG. 18

Fig. 18 shows that the persons whose fathers married early in life lived on the average to be older than the others.

The persons whose fathers married before they were twenty-five lived on the average 36.6 years (1,072 cases).

The persons whose fathers married after they were forty years of age lived on the average 27.0 years (110 cases).

The persons whose fathers married at the intermediate age-periods lived on the average to intermediate ages.

There was thus a correlation of an inverse kind between the age at death of the person and the age at marriage of his father. The average duration of life was greater, as the father was younger at marriage.

There were only 23 cases where the father married before he was twenty; but these persons, on the average, were the longest lived of all. Average duration of life, 45.8 years.

Although there is an irregularity in the curve shown in Fig. 18, where the fathers married between thirty and thirty-five years of age, the general trend of the curve is distinctly downwards with increase of age at marriage; and the indications are very clear that in the case of the fathers early marriage was a condition favorable to the production of long-lived children.

MOTHERS

There were 2,309 cases where the person's age at death and the mother's age at marriage were both stated. Average duration of life of the persons, 34.6 years.

TABLE 19.—*2,309 cases where the person's age at death and the mother's age at marriage were both stated, showing the number having mothers who married at the age-periods named, the aggregate years lived by the persons, and their average ages at death.*

Mother's age at marriage.	Number of persons.	Aggregate years lived.	Average years lived.
Stated.....	2,309	79,976	34.6
Under 20....	712	25,837	36.3
20 and under 25....	1,070	37,185	34.7
25 and under 30....	421	13,635	32.4
30 and over.....	106	3,315	31.3

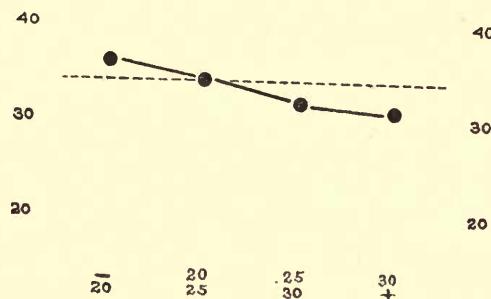


FIG. 19

In Fig. 19 we have proof of a correlation, of an inverse kind, between the duration of life of the person and the age at marriage of the mother.

The persons whose mothers married before they were twenty lived on the average 36.3 years (712 cases).

The persons whose mothers married after they were thirty years of age lived on the average 31.3 years (106 cases).

The persons whose mothers married at the intermediate age-periods lived on the average to intermediate ages.

The curve in Fig. 19 forms almost a straight line, sloping downwards from left to right, and indicates very clearly that the average duration of life of the persons was greater, as the mother was younger at marriage.

We have too few cases to decide the lower limit of mothers' age at marriage consistent with the production of long-lived offspring; but the persons whose mothers married at sixteen and seventeen were the longest lived of any of the groups examined.

The persons whose mothers married at seventeen lived on the average 39.3 years (141 cases).

The persons whose mothers married at sixteen lived on the average 40.8 years (45 cases).

In Tables 18 and 19 we have undoubted proof that the persons whose parents married young were, on the average, longer lived than the persons whose parents married later in life.

It thus appears that early marriage was a condition distinctly favorable to longevity in the offspring.

CHAPTER VIII

Duration of Life of Persons Compared with the Ages of the Parents When the Persons Were Born

FATHERS

In 2,756 cases the person's age at death and the age of the father when the person was born were both stated. Average duration of life of the persons, 35.4 years.

TABLE 20.—2,756 cases where the person's age at death and the age of the father when the person was born were both stated, showing the number born to fathers of the ages specified, the aggregate years lived by the persons, and their average ages at death.

Father's age when person was born.	Number of persons.	Aggregate years lived.	Average years lived.
Stated.....	2,765	97,793	35.4
Under 25....	180	7,132	39.6
25 and under 30....	601	23,000	38.3
30 and under 35....	642	23,640	36.8
35 and under 40....	572	19,747	34.5
40 and under 45....	409	12,894	31.5
45 and under 50....	235	7,383	31.4
50 and over.....	126	3,997	31.7



FIG. 20

The youngest fathers, on the average, had the longest-lived offspring.

The persons whose fathers were under twenty-five years of age when the persons were born lived on the average 39.6 years.

The persons whose fathers were between forty and forty-five years of age when the persons were born lived on the average 31.5 years.

The persons whose fathers were of intermediate ages when the persons were born lived on the average to intermediate ages.

THE DURATION OF LIFE

There was thus an apparent correlation, of an inverse kind, between the duration of life of the person and the age of the father when the person was born, down to fathers of 40-45 years of age; and there the correlation stops. (See Fig. 20.) The line is practically horizontal beyond the age-period 40-45.

The evidences of correlation are so marked upon the whole that we would naturally expect the curve to go down steadily to the very end, and thus indicate that the offspring of the oldest fathers were on the average the shortest lived; but the curve does not do so.

The general trend of the curve in Fig. 20 is distinctly downwards from left to right; and the horizontality of the last part of the curve is suggestive of some cause operating to interfere with the normal descent of the curve in the case of the older fathers.

Here an explanation suggests itself from a consideration of the fact that children are the product of two parents, not one alone.

It is very obvious, for example, that where the fathers were over fifty years of age when their children were born the mothers were certainly much younger.

The fathers who were over forty years of age when their children were born had on the average wives who were younger than themselves. (See B. B. Rec., Vol. XX, pp. 2-36.)

MOTHERS

In 2,386 cases the person's age at death and the age of the mother when the person was born were both stated. Average duration of life of the persons, 34.9 years.

TABLE 21.—*2,386 cases where the person's age at death and the age of the mother when the person was born were both stated, showing the number born to mothers of the ages specified, the aggregate years lived by the persons, and their average ages at death.*

Mother's age when person was born.	Number of persons.	Aggregate years lived.	Average years lived.
Stated.....	2,386	83,116	34.9
Under 25....	525	20,822	38.7
25 and under 30....	603	22,073	36.6
30 and under 35....	561	18,829	33.6
35 and under 40....	422	14,161	33.6
40 and over.....	275	7,731	28.1

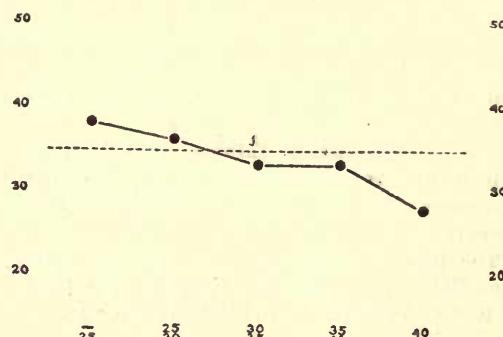


FIG. 21

The youngest mothers, on the average, had the longest-lived offspring.

The persons whose mothers were under twenty-five years of age when the persons were born lived on the average 38.7 years.

The persons whose mothers were forty years of age or older when the persons were born lived on the average 28.1 years.

The persons whose mothers were of intermediate ages when the persons were born lived on the average to intermediate ages.

There was thus a distinct correlation, of an inverse kind, between the duration of life of the person and the age of the mother when the person was born; and in this case the curve slopes downwards to the very end, indicating not only that the youngest mothers had the longest-lived offspring, but that the oldest mothers had the shortest-lived offspring. (See Fig. 21.)

There is, however, in this case a curious irregularity of the curve where the mothers were between thirty-five and forty years of age when their children were born, resembling somewhat a similar irregularity in Fig. 18 referring to the father's age at marriage. Whether there is any connection between these irregularities is not clear; but in both cases the absolute numbers are sufficiently large to give significance to the averages. These irregularities therefore mean something, but the interpretation is not obvious.

The youngest mothers, on the average, had the longest-lived children; but we have too few cases to enable us to decide the extreme lower limit of age consistent with the production of long-lived offspring. The following cases, however, are significant:

The persons whose mothers were only eighteen years of age when the persons were born lived on the average 44.1 years (19 cases).

The persons whose mothers were only seventeen years of age when the persons were born lived on the average 44.6 years (13 cases).

Thus both in the case of the fathers and mothers it becomes obvious that youth is a condition favorable to the production of long-lived offspring. The younger fathers and mothers had on the average the longest-lived children.

CHAPTER IX

Duration of Life of Persons Compared with the Number of Years After the Marriage of the Parents the Persons Were Born

There were 2,757 cases in which the age at death of the person was known, and also the number of years after the marriage of the parents the person was born. Average duration of life of these persons, 34.4 years.

TABLE 22.—2,757 cases where the person's age at death and the number of years after the marriage of the parents the person was born were both stated, showing the number of persons born the specified years after the marriage of their parents, the aggregate years lived by the persons, and their average ages at death.

Number of years after marriage of parents person was born.	Number of persons.	Aggregate years lived.	Average years lived.
Stated	2,757	94,749	34.4
0 years.....	62	2,168	35.0
1 year.....	304	10,588	34.8
Less than 2...	366	12,756	34.9
2 and less than 4...	413	14,221	34.4
4 and less than 6...	352	13,197	37.9
6 and less than 8...	332	12,083	36.4
8 and less than 10...	260	8,951	34.4
10 and less than 12...	218	6,973	32.0
12 and less than 14...	196	6,801	32.0
14 and less than 16...	170	5,598	32.9
16 and less than 18...	144	4,765	33.1
18 and less than 20...	119	4,114	34.6
20 and more.....	187	5,290	28.3
Less than 10...	1,723	61,208	35.5
10 and less than 20...	847	28,251	33.3
20 and more.....	187	5,290	28.3

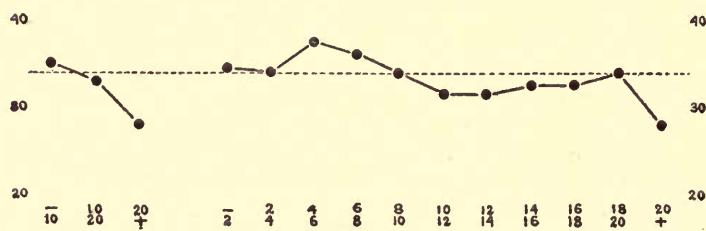


FIG. 22

The persons who were born less than ten years after the marriage of their parents were on the average longer lived than those born later in married life. (See first diagram in Fig. 22.)

Persons born less than ten years after the marriage of their parents. Average duration of life, 35.5 years (1,723 cases).

Persons born between ten and twenty years after the marriage of their parents. Average duration of life, 33.3 years (847 cases).

Persons born twenty or more years after the marriage of their parents. Average duration of life, 28.3 years (187 cases).

Table 22 throws some light upon the duration of life of first-born children as compared with others. (See second diagram in Fig. 22.)

Persons born the same year as the marriage of their parents or the year after may safely be assumed to be first-born children. Average duration of life in these cases, 34.9 years (366 cases).

Thus the persons who were undoubtedly first-born children were fully equal in vitality to the average of the whole, or rather they lived upon the average as long—in fact, a little longer.

In Fig. 22 the horizontal line shows the average duration of life of the whole 2,757 persons (34.4 years).

Persons born less than two years after the marriage of their parents. Average duration of life, 34.9 years. This is slightly above the average of the whole (366 cases).

Persons born two and three years after the marriage of their parents. Average duration of life, 34.4 years, just the average of the whole (413 cases).

Persons born four and five years after the marriage of their parents. Average duration of life, 37.9 years. This is considerably above the average of the whole; in fact, the highest average of any of the groups shown in Table 22 (352 cases).

Persons born six and seven years after the marriage of their parents. Average duration of life, 36.4 years. This is above the average of the whole, but not quite up to the average of the last group named (332 cases).

Persons born eight and nine years after the marriage of their parents. Average duration of life, 34.4 years, just the average of the whole (260 cases).

Persons born less than ten years after the marriage of their parents, the summation of the above groups, lived on the average 35.5 years (1,723 cases). While this is above the average of the whole, only two of the above groups show averages markedly greater than the average of the whole.

Why persons born four and five years after the marriage of their parents should on the average have been longer lived than the persons born earlier or later in married life is a mystery that needs explanation.

The children, too, born six and seven years after the marriage of their parents were also longer lived than the children born later in married life.

There is another unexplained feature about Fig. 22.

It is very obvious that upon the whole the children born after ten years of married life were shorter lived than those born less than ten years after the marriage of their parents; but why the curve should here go up instead of down, so that the children born eighteen and nineteen years after the marriage of their parents should prove to be as long lived as the average of the whole, is a mystery indeed.

There were 119 cases of persons born eighteen and nineteen years after the marriage of their parents, and this seems a sufficiently large number to make the average mean something. Average duration of life, 34.6 years, slightly above the average of the whole.

There can be no question here of old fathers with young wives. These persons were born eighteen and nineteen years after the marriage of their parents, from which it is obvious that the mothers as well as the fathers were eighteen and nineteen years older than when they were married. The mothers certainly were not young.

The regularity of the oscillation of the curve (second diagram in Fig. 22) strongly confirms the belief that we are here dealing with a real oscillation, whatever it means, and not merely with an accidental irregularity due to basing averages upon too small numbers. An examination of Table 22 will show that the absolute numbers involved in the determination of each point in the diagram are sufficiently large to make the averages mean something.

CHAPTER X

Duration of Life of Persons Compared with Number in Family (Siblings)

SIBLINGS

It is unfortunate that we have no word in the English language, excepting the very awkward and recently invented term "sibling," to express the relationship of the children of the same parents to one another independently of sex.

Suppose a person had two brothers and three sisters, then he had five siblings, and the total number of siblings in the family was six. The person was one of a family of six children.

In order to avoid the inconvenience of employing a little-understood term, we shall in the present investigation use the expression "number in family" for "number of siblings in family"; the "family" consisting of the person and his brothers and sisters.

There were 2,964 cases in which the person's age at death and the number in family were both stated. (See Table 23.)

TABLE 23.—Duration of life of persons compared with number in family (siblings).

Number in family (siblings).	Total persons.	Persons' age at death.				
		-20	20-40	40-60	60-80	80+
Stated.....	2,964	1,044	693	525	486	216
1	41	24	9	2	4	2
2	85	36	21	16	8	4
Less than 3.....	126	60	30	18	12	6
3 and less than 5.....	313	113	80	60	45	15
5 and less than 7.....	584	207	143	107	93	34
7 and less than 9.....	694	229	175	123	117	50
9 and less than 11.....	683	224	152	122	119	66
11 and less than 13.....	396	133	84	73	71	35
13 or more.....	168	78	29	22	29	10

Percentages.						
Stated.....	100.0	35.2	23.4	17.7	16.4	7.3
1	100.0	58.5	22.0	4.9	9.7	4.9
2	100.0	42.4	24.7	18.8	9.4	4.7
Less than 3.....	100.0	35.5	24.5	18.3	15.9	5.8
3 and less than 5.....	100.0	36.1	25.5	19.2	14.4	4.8
5 and less than 7.....	100.0	47.6	23.8	14.3	9.5	4.8
7 and less than 9.....	100.0	33.0	25.2	17.7	16.9	7.2
9 and less than 11.....	100.0	32.8	22.2	17.9	17.4	9.7
11 and less than 13.....	100.0	33.6	21.2	18.4	17.9	8.9
13 or more.....	100.0	46.4	17.3	13.1	17.3	5.9

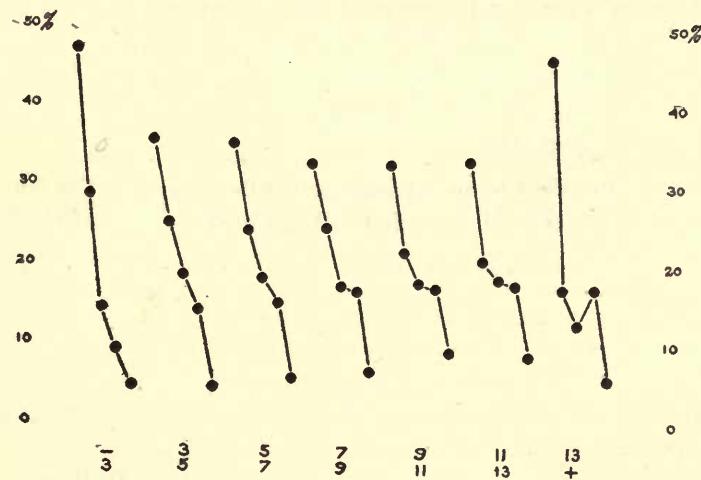


FIG. 23

Fig. 23 contains a series of seven diagrams. The first refers to persons belonging to small families containing only one or two children. The last relates to persons belonging to very large families containing thirteen or more children; and the intermediate diagrams to persons belonging to families of intermediate size.

In each diagram the first dot expresses the percentage of persons who died young, under twenty; the last dot the percentage of persons who lived to be eighty years of age or older; and the intermediate dots the percentage of persons who died at the intermediate age-periods named in Table 23.

Both in the case of very small families (containing only one or two children) and in the case of very large families (containing thirteen or more children), the proportion of persons who died young was very large and the proportion who lived to be old small. (See Fig. 23.)

The majority of the persons who were the only children of their parents died young (58.5 per cent), but there were only 41 cases. There were 126 persons belonging to small families containing only one or two children. No less than 47.6 per cent of these persons died in childhood under twenty, and only 4.8 per cent lived to be eighty or older. There were 168 persons belonging to very large families containing thirteen or more children. No less than 46.4 per cent of these persons died in childhood under twenty, and only 5.9 per cent lived to be eighty or older.

The proportion who died young was least, and the proportion who lived to be old greatest, where the persons belonged to families containing nine and ten children.

There were 683 persons belonging to families containing nine and ten children. 32.8 per cent of these persons died young under twenty; and this is the smallest proportion dying in childhood of any of the groups shown in Table 23. 9.7 per cent of these persons lived to be eighty or older; and this is the largest proportion living to old age in any of the groups shown in Table 23.

The proportion who lived to be old increased with the size of the family up to families containing nine and ten children, and fell again in the case of the larger families.

CHAPTER XI

Conclusion ; Summary of the Chief Points Touched Upon in the Preceding Chapters

The 8,797 persons dealt with in the Hyde Statistics were born chiefly in the eighteenth century and the early part of the nineteenth century. Only a small proportion appeared after 1825. Most of these persons were either living in 1864, when the Hyde Genealogy was published, or their ages at death could not be ascertained; so that the full duration of life is only known in about one-third of the cases.

There were 2,965 persons whose ages at death were known. Average duration of life of these persons, 34.6 years.

35.2 per cent of these persons died before they were twenty years of age, and 7.3 per cent lived to be eighty or older.

There were critical periods in the lives of these persons when the danger of death was greater than at other times. The danger was greatest in infancy, especially during the first year of life; and a second danger period appeared during adolescence, reaching its maximum danger point at or about the age of twenty-three years.

Both the males and females show an increase in the number and proportion of deaths occurring during adolescence, and in both cases the maximum appears at the age-period 20-25 years. But the death curve for males exhibits quite a sharp peak at this point which is absent from the female curve, suggesting some cause of death at this period of life affecting males more powerfully than females. Unfortunately the statistics do not give us any information concerning causes of death.

There were 1,806 males whose ages at death were known. Average duration of life of these males, 35.8 years.

There were 1,352 females whose ages at death were known. Average duration of life of these females, 33.4 years.

The males upon the average lived longer than the females, and yet more females than males lived to extreme old age.

A larger proportion of females than of males died in childhood before reaching the age of twenty years, in spite of an excessive mortality of males during the period of infancy. Thus a larger proportion of males than of females lived to adult life.

THE DURATION OF LIFE

A larger proportion of females than of males died between the ages of twenty and forty. Females, of course, were exempt from military service; but they were exposed, during the child-bearing period, to dangers which did not affect the male population at all.

A larger proportion of females than of males lived to be ninety-five years of age or older. The few winners in life's race were largely females.

There were 795 fathers whose ages at death were known. Average duration of life of these fathers, 65.0 years.

There were 671 mothers whose ages at death were known. Average duration of life of these mothers, 60.8 years.

The fathers, on the average, lived longer than the mothers; and yet more mothers than fathers lived to extreme old age.

Heredity was deeply involved in the production of longevity.

Where neither parent lived to be eighty, about 5 per cent of the known offspring lived to be eighty or older (5.3 per cent).

Where one parent, but not the other, lived to be eighty or older, about 10 per cent of the known offspring lived to be eighty or older (9.8 per cent).

Where both parents lived to be eighty or older, about 20 per cent of the known offspring lived to be eighty or older (20.6 per cent).

The influence of the father seemed to be somewhat greater than that of the mother.

Where the father (but not the mother) lived to be eighty or older, 11.3 per cent of the known offspring lived to be eighty or older.

Where the mother (but not the father) lived to be eighty or older, 7.7 per cent of the known offspring lived to be eighty or older.

Where the father died over eighty and the mother died under sixty, the children produced by these parents lived on the average 42.3 years.

Where the mother died over eighty and the father died under sixty, the children produced by these parents lived on the average 36.3 years.

The average duration of life of offspring was greatest where the parents were long lived, least where the parents were short lived, and intermediate where the parents died at intermediate age-periods.

There was thus a direct correlation between the duration of life of parents and the duration of life of their offspring.

The average duration of life of the offspring was greater as the parents were younger at marriage.

The average duration of life of the offspring was greater as the parents were younger when the children were born.

The children born during the first ten years of married life were, on the average, longer lived than those born later.

Thus virility on the part of the parents had something to do with the duration of life of the offspring.

Children born between four and eight years after the marriage of their parents were, upon the average, longer lived than those born earlier or later in married life.

First-born children were fully up to the average of the whole in vitality and lived as long.

The majority of the persons who were the only children of their parents died young; but there were only 41 cases.

Both in very small families (containing only one or two children) and in very large families (containing thirteen or more children) the proportion who died young was very large and the proportion who lived to be old small.

The proportion who lived to be old increased with the size of the family up to families containing nine and ten children, and fell again in the case of larger families.

Parents who died early in life had comparatively small families, because on the average they did not live long enough to develop their full reproductive powers.

Fathers who died under forty had on the average 2.8 children apiece.

Mothers who died under forty had on the average 3.4 children apiece.

The average number of children produced increased with the duration of life of the parents, even in cases where the parents had passed the reproductive period of life.

Where the fathers died between forty and sixty, 6.0 children per father were produced.

Where the fathers died between sixty and eighty, 6.9 children per father were produced.

Where the fathers lived to be eighty or older, 7.1 children per father were produced.

Where the mothers died between forty and sixty, 6.2 children per mother were produced.

Where the mothers died between sixty and eighty, 6.6 children per mother were produced.

Where the mothers lived to be eighty or older, 7.2 children per mother were produced.

There was thus a direct correlation between the duration of life of the parents and the number of offspring born to them. The longer-lived parents were the most fertile.

Only a small proportion of the population born lived to be old; but a large proportion came from long-lived parents.

There were 1,606 males whose ages at death were known. 7.8 per cent of these males lived to be eighty or older.

There were 1,352 females whose ages at death were known. 6.8 per cent of these females lived to be eighty or older.

There were 5,024 persons whose fathers' ages at death were known. 24.9 per cent of these persons had fathers who lived to be eighty or older.

There were 3,958 persons whose mothers' ages at death were known. 23.0 per cent of these persons had mothers who lived to be eighty or older.

The males of one generation became, of course, the fathers of the next generation. At least some of them did; but some did not marry and others had no offspring.

If, then, the above percentages should hold good for two successive generations, it is obvious that less than 7.8 per cent of the males of one generation would become the fathers of 24.9 per cent of the whole population born in the next generation, and that less than 6.8 per cent of the females would become the mothers of 23.0 per cent of all the children born in the next generation.

There were 1,594 cases where the ages at death of the persons and the ages at death of both parents were known.

8.7 per cent of these persons lived to be eighty or older.

32.7 per cent of these persons had fathers who lived to be eighty or older.

27.0 per cent of these persons had mothers who lived to be eighty or older.

48.1 per cent of these persons had parents one or both of whom lived to be eighty or older.

If these proportions should hold true for two successive generations, then less than 8.7 per cent of the people of one generation would become the fathers or mothers of nearly half of the population born in the next generation (48.1 per cent).

The above illustrations indicate that long-lived people, though few in number, may profoundly affect the composition of the whole population born in the next generation.

The statistics indicate that a tendency to longevity is an inheritable characteristic, capable of being handed down from parents to children.

What is really inherited is probably a tough, wiry constitution that enables the fortunate possessor to survive the multitudinous ills that flesh is heir to and live on to the extreme limit of human life. From this point of view the attainment of old age is extremely significant. The last survivors of a whole generation are people who have by the very fact of their surviving to old age proved themselves to be resistant to disease. They have been exposed to the diseases and accidents that have cut off the vast majority of their fellows before their prime, but have not succumbed.

The statistics indicate that this disease-resistant quality is inherited by offspring; and, through the superior fecundity of the long lived, distributed very generally throughout the population.

Here we have evidence of the existence of a natural process at work among human beings tending to improve the vigor and vitality of succeeding generations.

A. G. B.

APPENDIX A

The Hyde Material in the Beinn Bhreagh Recorder

Two series of detailed tables have been preserved in the *Beinn Bhreagh Recorder*:

1. "Statistics from the Hyde Genealogy," compiled at various times by Miss Mabel B. McCurdy, Miss Gretchen Schmidt, Miss Catherine D. Mackenzie, Mr. John Smallwood, Mr. Melville Bell Grosvenor, and Mr. A. W. Clime. All the tables were prepared under the personal direction and supervision of Alexander Graham Bell, who did his best to verify the results.

2. "Studies of the Hyde Statistics," by Alexander Graham Bell.

The following is a list of the tables referred to, together with a description showing the nature of the material contained in them:

Statistics.			Studies.		
Table.	Vol.	Page.	Table.	Vol.	Page.
1	VIII	133	—	VIII	287
2	VIII	153	A	IX	98
3	VIII	187	B	IX	172
4	VIII	319	C	IX	177
5	VIII	387	D	IX	182
6	IX	20	E	IX	232
7	IX	143	F	IX	265
8	IX	244	G	IX	280
9	X	11	H	IX	315
10	X	318	I	IX	327
11	XI	107	J	X	55
12	XII	28a	K	XI	46
13	XII	239	L	XI	361
14	XVII	42	M	XII	344
15	XVIII	275	N	XII	415
16	XVIII	334	O	XX	94
17	XX	2	P	XX	118
18	XX	22	Q	XX	153
19	XX	25	R	XX	159
20	XX	29	S	XX	176
21	XX	134	T	XX	180
			U	XX	187
			V	XX	192
			W	XX	195
			X	XX	201

A Description of the Detailed Tables Preserved in the Beinn Bhreagh Recorder, Showing the Nature of the Material Contained in Them

1. STATISTICS FROM THE HYDE GENEALOGY

TABLE 1.—Period of birth. B. B. Rec., VIII, 133–138.

TABLE 2.—Sex: By period of birth. B. B. Rec., VIII, 153–158.

TABLE 3.—Age at death: By sex and period of birth. B. B. Rec., VIII, 187–219.

TABLE 4.—Duration of life: By sex and period of birth. (This includes the “latest age known to be living.”) B. B. Rec., VIII, 319–353.

TABLE 5.—Number in family: By sex, period of birth, and age at death. B. B. Rec., VIII, 387–415.

TABLE 6.—Age at death: By age of father and mother at death and by sex. B. B. Rec., IX, 20–28.

TABLE 7.—Age at death: By father's age when person was born. B. B. Rec., IX, 143–171.

TABLE 8.—Age at death: By mother's age when person was born. B. B. Rec., IX, 244–264.

TABLE 9.—Age at death: By father's age at marriage. B. B. Rec., X, 11–35.

TABLE 10.—Age at death: By mother's age at marriage. B. B. Rec., X, 318–334.

TABLE 11.—Analysis of 2,287 cases in which the age at death and the father's age at death are both stated, with average ages at death. B. B. Rec., XI, 107–124.

TABLE 12.—Analysis of 1,806 cases in which the age at death and the mother's age at death are both stated, with average ages at death. B. B. Rec., XII, 28a–42.

TABLE 13.—Analysis of 1,594 cases in which the age at death and the fathers' and mothers' ages at death are all stated, with average ages at death of the persons and of their fathers and mothers. B. B. Rec., XII, 239–269.

TABLE 14.—Analysis of 1,594 cases in which the ages at death of the persons and of their fathers and mothers are all stated: Arranged by the persons' ages at death. B. B. Rec., XVII, 42–75.

TABLE 15.—Analysis of 5,024 cases in which the father's age at death is known, with aggregate years lived by the fathers and average age at death of the fathers. B. B. Rec., XVIII, 275–280. (Incorrectly given in the Recorder as Table 14.)

TABLE 16.—Analysis of 3,958 cases in which the mother's age at death is known, with aggregate years lived by the mothers and average age at death of the mothers. B. B. Rec., XVIII, 334–340.

TABLE 17.—Age at death: And fathers' and mothers' ages at marriage. B. B. Rec., XX, 2–21.

TABLE 18.—Number of persons having fathers and mothers who married at the ages named. B. B. Rec., XX, 22–24.

TABLE 19.—Analysis of 2,169 cases, showing the number of persons having fathers and mothers who married at the ages stated and the aggregate number of years lived by the persons. B. B. Rec., XX, 25–28.

TABLE 20.—Number of persons having fathers and mothers who married at the ages named, arranged according to the difference of age of the parents; the aggregate years lived by the persons and their average ages at death. B. B. Rec., XX, 29–36.

TABLE 21.—Analysis of 488 fertile marriages where the ages at death of the married partners were both known and the number of children produced, showing the number of marriages, the number of children, and the number of children per marriage. B. B. Rec., XX, 135-140.

Abstracts of the detailed tables in the *Beinn Bhreagh Recorder*, with graphical diagrams. B. B. Rec., XIX, 242-268.

2. STUDIES OF THE HYDE STATISTICS

TABLE —.—Number living at each age, number died at each age, and per cent died at each age. (A study of Table 3.) B. B. Rec., VIII, 287-298.

TABLE A.—Average age at death. (A study of Table 3.) B. B. Rec., IX, 98-103.

TABLE B.—Average age of males at death. (A study of Table 3.) B. B. Rec., IX, 172-176.

TABLE C.—Average age of females at death. (A study of Table 3.) B. B. Rec., IX, 177-181.

TABLE D.—Total: By age at death of both parents and by sex. (A study of Table 6.) B. B. Rec., IX, 182-184.

TABLE E.—Age at death: By father's and mother's ages at death. (A study of Table 6.) B. B. Rec., IX, 232-237.

TABLE F.—Age of father when person was born: By average age at death. (A study of Table 7.) B. B. Rec., IX, 265-279.

TABLE G.—Age at death: By average age of father when person was born. (A study of Table 7.) B. B. Rec., IX, 280-300.

TABLE H.—Age of mother when person was born: By average age at death. (A study of Table 8.) B. B. Rec., IX, 315-326.

TABLE I.—Age at death: By average age of mother when person was born. (A study of Table 8.) B. B. Rec., IX, 327-346.

TABLE J.—Number of years after marriage of parents person was born: By average age at death. (A special study.) B. B. Rec., X, 55-90.

TABLE K.—Mother's age at marriage: By average age at death. (A study of Table 10.) B. B. Rec., XI, 46-87.

TABLE L.—Father's age at marriage: By average age at death. (A study of Table 9.) B. B. Rec., XI, 361-387.

TABLE M.—Number in family: By age at death. (A study of Table 5.) B. B. Rec., XII, 344-353.

TABLE N.—Sex: By age at death. (A study of Table 3.) B. B. Rec., XII, 415-421.

TABLE O.—Analysis of 1,594 cases in which the ages at death of the persons and of both of their parents were stated, showing the number and percentages of persons who lived to be eighty years of age or older. (A study of Table 13.) B. B. Rec., XX, 94-99.

TABLE P.—Analysis of 1,594 cases in which the ages at death of the persons and of both of their parents were stated, showing the number of persons having fathers and mothers who died at the age-periods named, and the average duration of life of the persons and of their fathers and mothers. (A study of Table 13.) B. B. Rec., XX, 118-121.

TABLE Q.—An analysis of 843 fertile marriages of 795 males, showing the number of children produced from fathers who died at the age-periods named and the average number of children per father and per marriage. (A study of Table in B. B. Rec., XIX, 267.) B. B. Rec., XX, 153-158.

TABLE R.—An analysis of 671 fertile marriages of 671 females, showing the number of children produced from mothers who died at the age-periods named and the average number of children per marriage. B. B. Rec., XX, 159-162.

TABLE S.—Analysis of 2,605 cases where the person's age at death and the father's age at marriage were both stated, showing the number having fathers who married at the age-periods named, the aggregate years lived by the persons, and their average ages at death. (A study of Table in B. B. Rec., XIX, 261.) B. B. Rec., XX, 176-179.

TABLE T.—Analysis of 2,309 cases where the person's age at death and the mother's age at marriage were both stated, showing the number having mothers who married at the age-periods named, the aggregate years lived by the persons, and their average ages at death. (A study of Table in B. B. Rec., XIX, 262.) B. B. Rec., XX, 180-182.

TABLE U.—Analysis of 2,756 cases where the person's age at death and the age of the father when the person was born were both stated, showing the number born to fathers of the ages specified, the aggregate years lived by the persons, and their average ages at death. (A study of Table in B. B. Rec., XIX, 263.) B. B. Rec., XX, 187-191.

TABLE V.—Analysis of 2,386 cases where the person's age at death and the age of the mother when the person was born were both stated, showing the number born to mothers of the ages specified, the aggregate years lived by the person, and their average ages at death. (A study of Table in B. B. Rec., XIX, 264.) B. B. Rec., XX, 192-194.

TABLE W.—Analysis of 2,757 cases where the person's age at death and the number of years after the marriage of the parents the person was born were both stated, showing the number of persons born the specified years after the marriage of their parents, the aggregate years lived by the persons, and their average ages at death. (A study of Table in B. B. Rec., XIX, 265.) B. B. Rec., XX, 195-200.

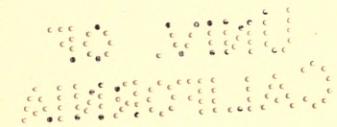
TABLE X.—Duration of life of persons compared with number in family (siblings). (A study of Table in B. B. Rec., XIX, 266.) B. B. Rec., XX, 201-204.

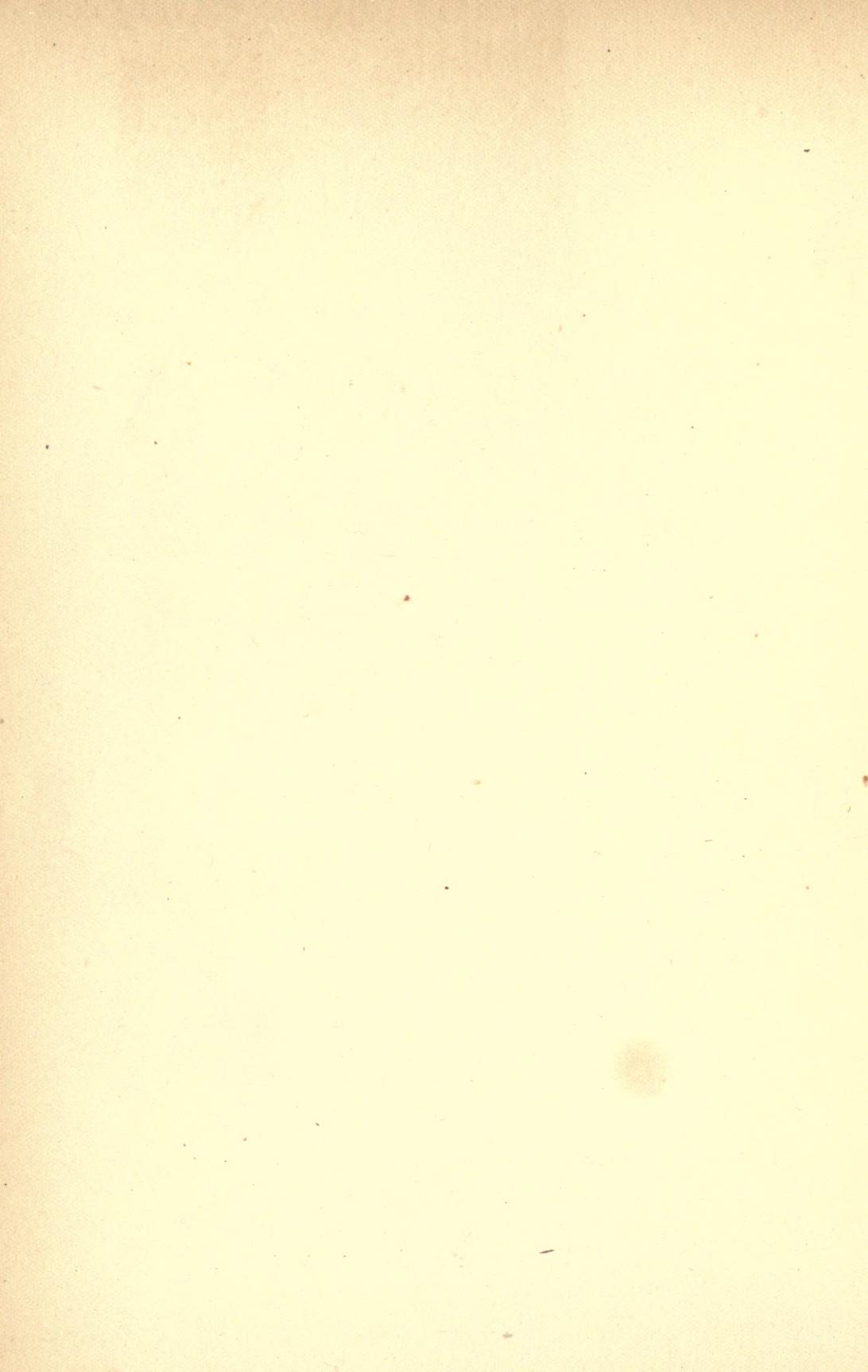
Conclusion of the Hyde Investigation. B. B. Rec., XX, 229-242.

A complete copy of the *Beinn Bhreagh Recorder* is preserved in the Library of the Smithsonian Institution, Washington, D. C., where it is accessible to the public.

The card catalogue used in the preparation of the foregoing tables has been preserved in the Genealogical Record Office, Volta Building, 1601 Thirty-fifth street, Washington, D. C., where it is available for further research work by others.

A. G. B.
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