Solids.	Grains.
Iron perchloride	0.19
Magnesium chloride	1.84
Calcium chloride	2.98
Potassium chloride	.33
Sodium chloride	295.43
Strontium chloride	Trace.
Sodium bromide	.98
Total	312.55

Gases.	Cu. in
Free carbonic acid (in solution)	21.47
Carbonic acid in combination as carbonates	9.32
Total gases	30.79

This water possesses aperient, tonic, and diuretic properties. It is said, furthermore, to have a decided alterative influence on the economy. According to Dr. R. D. Webb, of Livingston, who has made a special study of the water for many years, it is highly beneficial in cases of chlorosis, malarial anæmia, affections involving the alimentary tract, the kidneys, and the bladder, and in nervous exhaustion. *James K. Crook.*

LOBELIA.—Indian Tobacco. "The leaves and tops of *Lobelia inflata* L. (fam. *Lobeliaceæ*) collected after a portion of the capsules have become inflated" (U. S. P.). This is an annual herb from 20 to 50 cm. (8 to 20 in.) high, with an upright, branching, leafy stem and thin ovate, nearly or quite sessile, slightly hairy leaves. Inflorescence composed of spike-like racemes, terminating the strongly excurrent stem and the branches, and making altogether a lax pyramidal, leafy panicle. Flowers small, consisting of a five-toothed calyx adherent to the ovary and becoming markedly inflated in fruit; a labiate corolla with a narrow tube open on the apparently upper side to its base, and a five-lobed border of which the two lobes next the fissure are erect, narrow, and pointed, the other three broader and spreading; stamens, five, syngenesious, ovary two-celled with innumerable microscopic ovules. Seeds very fine, light-brown, oblong, with a handsome reticulated testa. All parts of the plant contain, when fresh, an acrid, milky juice, and have an exceedingly sharp, peppery, tobacco-like taste. The seeds are rather more active than the rest of the plant and have been used separately. Lobelia is an abundant pasture weed, growing in most parts of the United States. The knowledge of its use was received from the aborigines, and is several centuries old.

Fig. 3227.—Lobelia inflata; Flowers and Fruit. (Baillon.)

Composition.—The most important ingredient of lobelia is the alkaloid *lobeline* ($C_{16}H_{24}NO$), "an oily yellowish fluid with a strong alkaline reaction, especially when in solution. In the pure state it smells slightly of the plant, but more strongly when mixed with ammonia. Its taste is pungent and tobacco-like, and when taken in minute doses it exercises in a potent manner the poisonous action of the drug. It dissolves in water, but more readily in alcohol or ether. It neutralizes acids and forms, with some, crystalline salts." Several of these salts are listed by manufacturers. Although volatile, it is decomposed by a high heat. Lobelia contains also *essential oil* and a doubtful substance, *lobelacrin*, probably a compound of lobeline and *lobelic acid*.

Action and Use.—This herb has had in times past an extensive employment in this country at the hands of irregular practitioners of the "Thompsonian" school, and the more modern "Eclectics." Despite its very active and dangerous qualities, it is still not infrequently called for as a family medicine. Regular physicians have never used it extensively, but neither has it been altogether neglected by them. It was in far more frequent demand fifty years ago than it is now. It is a nauseating expectorant, or a depressing emetic, much resembling tartar emetic. The nausea is primarily due to gastric irritation, and full doses are liable to be promptly vomited. Smaller doses produce burning and pain in the stomach, followed by nausea, lassitude, or depression, commonly cold perspiration and pallor, dizziness, rapid and weak respiration following temporary slowing. These systemic symptoms bear a general resemblance to those of tobacco sickness, whence the common name of the plant. The secondary nausea, often with painful and obstinate vomiting, is at least partly of central origin. There is no considerable increase of respiratory secretion, but spasmodic conditions, as of asthma, are relaxed. When the action is prolonged, as by repeated doses, the depression is profound, and there is paralysis of respiration, frequently with convulsions, dependent thereon. In children there are sometimes earlier convulsions, due to abdominal pain. Respiratory failure is the common cause of death. Gastric perforation has frequently occurred, with other indications of intense abdominal inflammation.

There have been two uses for lobelia, namely, as an emetic and as an antispasmodic of the depressing sort, applied chiefly to respiratory affections. As an emetic, it was formerly a common household remedy, used for the most trivial purposes, and fatal poisoning was common. This use is almost obsolete, being only occasionally resorted to in spasmodic croup. Its use in very small doses, combined with expectorant drugs, is still considerably resorted to, and is of advantage. If vomiting is desired, a full dose (gr. xx.–xxx.) should be given; otherwise the dose should be small (gr. i. to iij. or v.). Undesirable or dangerous results are most likely from doses just insufficient to cause vomiting, or from moderate doses repeated, so as to produce a cumulative effect. The official preparations are the fluid extract (doses as above, minims for grains), and the twenty-per-cent. tincture, used almost altogether as an expectorant in doses of ɱ v. to xxx. *Henry H. Rusby.*

LOCOMOTOR ATAXIA. See *Spinal Cord Diseases: Tabes Spinalis.*

LODI ARTESIAN WELL.—Fountain County, Indiana.

Post-Office.—Lodi. This is a station on the Indianapolis and St. Louis Railroad, 58 miles west of Indianapolis. The following analysis was made by Dr. J. C. Pohle:

One United States Gallon Contains:

Solids.	Grains.
Magnesium carbonate	0.66
Calcium carbonate	2.01
Sodium sulphate	2.13
Potassium sulphate	.80
Magnesium sulphate	3.26
Calcium sulphate	55.56
Calcium phosphate	1.20
Sodium chloride	502.46
Calcium chloride	47.93
Magnesium chloride	53.54
Magnesium bromide	.88
Silica	.52
Sulphur	.50
Nitrogenous organic matter	.80
Total*	672.25

This is a strong saline sulphureted water and quite analogous to that of the Kentucky Blue Lick waters. *James K. Crook.*

LOGWOOD.—Hæmatoxylon. *Campechy Wood.* The heart wood of *Hæmatoxylon Campechianum* L. (fam. *Leguminosæ*). This is a small, spreading, irregularly branched tree, with a dark rough bark on the trunk and larger branches, and light-brown, white-spotted twigs. Wood hard and close, divided into a light-colored alburnum and a red heart wood, the whole of the former being

rejected. It is a native of Central America, especially of Honduras and Yucatan. It takes one of its names from Campeche. It is also naturalized and cultivated in the West Indies, where it grows freely.

It is supposed that logwood was used by the aborigines for dyeing before the arrival of Europeans, but this is not known with certainty. It was, however, imported into England in the latter part of the sixteenth century, and shortly after interdicted for a time as yielding poor and fading colors. It was introduced into the London Pharmacopœia about a hundred and fifty years ago.

The collection is simple enough. The trees are felled when the trunks are as large as, or larger than, a man's thigh, the yellowish sap wood is chopped away, and the heart wood cut in billets three or four feet long and dried. In this shape it is imported and sent to the dye mills. When first cut, these logs are of a light-red color, but by exposure to the light and air they become dark-brown, and finally almost black upon the surface, sometimes dark-bronze and iridescent. The inside becomes, in time, a rich reddish-brown. In the course of manufacture it is cut, by heavy machines with rapidly revolving knives, into fine chips, in which condition, or in powder, it is purchased for pharmaceutical purposes. For dyeing purposes, these chips are cured by soaking them in water and then frequently turning them over to expose them to the atmosphere. The chemical changes which ensue largely unfit them for medicinal use. Such chips are distinguished by their dark or blackish metallic green or blue surface. Logwood has a sweetish astringent taste and colors the saliva pink.

Logwood contains about ten per cent. of a sweet-tasting, crystalline coloring substance, *hæmatoxylin*, readily soluble in hot water or alcohol, but nearly insoluble in cold water. It turns red upon exposure to sunlight, and gives violet solutions in the presence of alkalies and air, due to the formation of *hæmatein*. Melted with potash, it yields pyrogallic acid.

Action and Use.—This substance is infinitely more used in the arts than in medicine, being an important dye and foundation for inks. In microscopical work, the purple solution of extract of logwood, or hæmatoxylin, is a favorite stain, acting with great rapidity and bringing into prominence the nuclei of cells. As a medicine, it is a mild and rather agreeable astringent, useful in subacute diarrhœa of children and in phthisis, but no better than a dozen other astringents, except that its taste commends it to children. The linen is very liable to be stained red when it is used. The extract is official (*Extractum Hæmatoxyli*, U. S. P.), made by exhausting with boiling water and evaporating to solidity. *W. P. Bolles.*

LOJA OR LOXA BARK. See *Cinchona.*

LONDONDERRY LITHIA SPRINGS.—Rockingham County, New Hampshire.

Location.—Londonderry.

This spring is evidently not used as a resort, but its waters have become widely celebrated and are extensively sold. The following analysis was made by Prof. H. Halvorson:

One United States Gallon* Contains:

Solids.	Grains.
Calcium sulphate	25.13
Potassium carbonate	18.33
Calcium bicarbonate	7.29
Magnesium carbonate	7.53
Aluminum sulphate	5.05
Lithium bicarbonate	7.29
Iron carbonate	1.85
Potassium sulphate	.30
Sodium chloride	.83
Silica	1.25
Organic matter	None.
Total	74.85

Carbonic acid gas, 62.84 cubic inches.

* The original analysis was estimated in grains per imperial gallon.

The analysis shows a very potent and valuable mineral water, possessing the virtues of an antacid, diuretic, and ferruginous tonic. It has been found beneficial in a wide range of diseases, but notably those due to the uric-acid diathesis. The best effects of the water have been observed in gout and rheumatism, in neuralgic pains, in gravel, and in giddiness, headache, insomnia, and other manifestations denoting the lithæmic state. Being entirely free from organic matter, the water is well adapted for domestic use. Although not used as a resort, the proprietors of the spring extend a welcome to visitors and are pleased to show them through their extensive bottling plant. *James K. Crook.*

LONGEVITY.—(L. *Longævus*, of great age, aged, from *longus*, long, and *ævum*, an age, the life of a man.) The word longevity has two meanings. It is sometimes used to designate the natural duration of life,—the length of life that an organism might attain if not destroyed by accident nor attacked by disease. The usual meaning of the term, however, is the duration of adult life beyond the ordinary limit, or the attainment of extreme old age.

The idea of a natural duration of life involves the question of natural death. This question is discussed fully elsewhere (see *Death, Physiological Theories of*); but it may be noted here that, while most physiologists are of the opinion that each organism begins its existence endowed with a capacity for living only to the end of a definitely limited period, this limit has never been determined and its existence is purely hypothetical. The evidence for such a limit is obtained, first, from the well-known facts that organisms on the average do not persist as individuals beyond a certain period, the average duration of life being characteristic for each species, and that likewise for each species there is a certain extreme duration of life beyond which no individual has been known to exist.

Secondly, there are observations like Minot's on the growth of guinea-pigs (see *Growth*) which show that at the beginning of individual existence an organism possesses certain functions at a maximum of efficiency, and that this efficiency begins to decline at once, rapidly at first, and then more and more gradually, until death ends all functions.

Thirdly, we have the line of evidence that has produced probably the most impression. This is furnished by the experiments of Maupas on Infusoria. Maupas found that if Infusoria were fed, but prevented from conjugating, they would continue to multiply by fission for a large number of generations. But at length this power of growth and multiplication would become impaired, and finally the organisms would become so weakened as to lose all power of multiplication and death would follow. But this catastrophe could be averted by allowing the Infusoria to conjugate with others of a different stock (see *Impregnation*). Then there was a rejuvenescence and the organisms would begin life anew with fresh vigor. These experiments of Maupas, then, seem to furnish at the same time a demonstration of natural death and an explanation of the importance of sexual reproduction. According to this view, by the union of two gametes, or of an egg and spermatozoon, the protoplasm acquires a supply of "vitality" that is gradually dissipated by the activities of the organism. The somatic cells of the higher forms must finally use up their vitality and die, but the species is prevented from becoming extinct by the sexual cells, which are set apart in order that they may undergo rejuvenescence by conjugation with similar cells from another individual, and thus begin a new cycle of life. But Maupas' results have not passed without adverse criticism. Besides Weismann's criticisms (see this Handbook, vol. iii., p. 381), we have the experiments of Joukowsky, who reared several species of Infusoria for many generations without conjugation. He observed a culture of *Pleurotrichia lanceolata* for eight months and during that time four hundred and fifty-eight generations were produced entirely by fission. And we have the very recent experi-

ments of Calkins upon *Paramœcium caudatum*, which he has reared through from three hundred and sixty to four hundred generations and apparently may continue indefinitely by the simple expedient of a change of diet. He finds that Paramœcium passes through more or less regular cycles of activity and weakness. The period of weakness ends in death provided the diet (the bacteria in hay infusion) remains the same. But a change of diet to beef extract restores the weakened functions of growth and division without conjugation. Moreover, he finds that conjugation alone does not produce rejuvenescence, for normal conjugation between two gametes fed on hay infusion does not restore the weakened activities, if the same diet is continued, but is soon followed by death. But a change of diet to beef extract for a time results in normal life and activity.* Finally, in the Amœba and Bacteria we have examples of unicellular organisms in whose life history conjugation appears never to have occurred, and the banana is an example of a multicellular organism of complex structure utterly incapable of sexual reproduction and which has probably been so for a long period, and yet its protoplasm continues to grow and multiply asexually with full vigor. Moreover, in man himself it is not clear that old age and death are due to any inherent property of the living substance. A man is said to be as old as his arteries. But the stiffening of the arteries is due to the increase of connective tissue or the deposition of inorganic salts. This interferes with the proper adjustments of blood pressure and disturbs the nutrition and respiration of the cells. The consequent weakening of functions is as much the result of the action of the environment and as little inherent as the poisoning effect of bacterial products or other injuries in disease.

"Natural death," then, would seem to be a thing of doubtful existence, and, so long as this is the case, an attempt to discover the "natural duration of life" which it is supposed to terminate would appear to be futile.

Turning to the other meaning of longevity, What is meant by extreme old age? Man is the only organism for which there is a sufficient number of records of the duration of life to supply the necessary data for the statistical study of this question. Pearson has shown that if we take a number of persons born during the same year, say a thousand, and plot the number of deaths of these persons during each succeeding year, we shall obtain a "mortality curve," which, for English males at least, presents two points of maximum frequency. One of these is in the first year of life (theoretically nine months before birth) and the other in the seventy-second year. We are concerned here with the period of most frequent death in old age only. (For the expectation of life at different ages see *Vital Statistics*.) Pearson has resolved the mortality curve for English males mathematically into five component curves. (See his work on "The Chances of Death, etc.") The curve of old-age deaths that Pearson obtained in this way begins very gradually at about the twentieth year and rises to a maximum in the seventy-second. Thence it falls off somewhat more rapidly and ends at 106.5 years. Thus theoretically the extreme limit of human life would appear to be 106.5 years, but, as Pearson remarks, one cannot place much reliance upon this limit, for he found that a slight change in the form of the curve would extend the limit as much as ten years. As a matter of fact, as we shall see later, the extreme duration of human life is apparently considerably greater than that. It will be noticed that this curve is unsymmetrical, or skew, the mean being in the sixty-seventh year. The slope of the curve is measured by a standard deviation of thirteen years and five months, and its skewness is measured by the difference between the mean and the point of maximum frequency which is 0.345 of the standard deviation. These results enable one to select a certain duration of life as typical for old men. We may select as our type either the mean of this curve, sixty-seven years, or its mode, seventy-two years; and we may define *longevity* as the duration of life beyond this typical limit.

In the Report of the Massachusetts State Board of Health for 1897, Dr. S. W. Abbott gives tables of the frequency of deaths of both males and females at each year of age from 0 to 100 based upon the returns of the State census of 1895 and the reported deaths from 1893 to 1897. Curves plotted from these tables are similar in form to Pearson's mortality curve for English males. In Abbott's tables the maximum frequency for adult males is in the seventy-second year, and for adult females it is in the seventy-third year.

That the attainment of longevity is not infrequent is shown by the following figures taken from the final report of the eleventh census of the United States.

TABLE I.—DEATHS DURING THE CENSUS YEAR ENDED MAY 31ST, 1890. MALES.

Ages.	Number of deaths.	Rate per 100,000 deaths.
All ages	458,992*	100,000
60 to 65	19,746	4,302
65 to 70	20,012	4,360
70 to 75	19,625	4,276
75 to 80	16,418	3,576
80 to 85	11,460	2,497
85 to 90	5,834	1,271
90 to 95	1,988	433
95 and over	811	177

It will be noticed that in this series the maximum occurs between the sixty-fifth and seventieth years of age.

These figures are not very reliable, especially because many infant deaths are probably not reported, which would make the rates per 100,000 somewhat too high. Yet they serve fairly well to show the relative frequency with which the different degrees of old age are attained in this country, including various sections and all races. Lady Glenesk has tabulated the ages at death reported in the obituary column of the *Morning Post* (London) during the ten years from 1887 to 1896. She counted in all 76,806 deaths, of which 10,806, or 14.5 per cent., were at 80 years or over, and were distributed as follows:

TABLE II.—DEATHS ADVERTISED IN THE *Morning Post*, 1887–1896, AT EIGHTY YEARS AND OVER.

Age.	Number of deaths.	Age.	Number of deaths.	Age.	Number of deaths.
80	1,333	89	490	97	54
81	1,196			98	35
82	1,200	90	385	99	23
83	1,069	91	277		
84	1,040	92	233	100	10
		93	185	101	5
85	807	94	128	102	11
86	818			103	3
87	754	95	86	104	1
88	587	96	74	105	2

Arranging these deaths in five-year groups and calculating the rate per 10,000 reported cases, we obtain the following results:

TABLE III.

Ages.	Number of deaths.	Rate per 10,000 deaths.
80 to 84	5,838	760
85 to 89	3,456	455
90 to 94	1,226	159
95 to 99	272	36
100 and over	32	4

It will be noticed that in this list thirty-two persons, or four in ten thousand, are credited with having lived a hundred years or more.

* Total number of deaths of males at known ages.

* Later, Calkins has carried his series of Paramœcium without conjugation beyond the six hundred and twentieth generation. At that generation there came a period of depression that beef extract failed to overcome, but the culture was finally restored to full vitality by the application of an extract of calves' brains. Experiments are now in progress to determine what substances in these extracts have this restorative effect upon *Infusoria*.

In addition to these, Lady Glenesk tabulated the deaths of centenarians reported in the news paragraphs of the *Morning Post* from 1887 to 1896. There were 233 of them, distributed as follows:

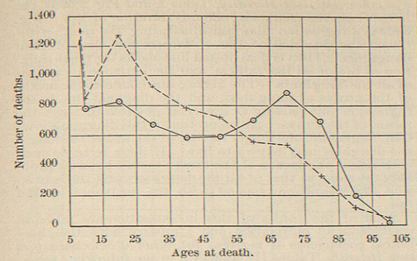

FIG. 3228.—Comparison of the Mortality Curves of Colored Males (dotted line) and Native-Born White Males having Both Parents Native Born, the continuous line showing the relative frequency of deaths per 10,000 deaths of each race at various ages grouped in ten-year periods. (Calculated from data of the Eleventh United States Census.)

TABLE IV.

Ages over.	Number.	Ages over.	Number.
100	50	107	7
101	32	108	4
102	33	109	8
103	23	110	12
104	20	"Upward of 100"	15
105	14		
106	15	Total	233

There are on record a number of persons who are reported to have lived over one hundred and ten years.

Tracy cites the case of Noah Raby at the Piscataway poor-farm, in New Jersey, who is said to be (in 1902) one hundred and twenty-nine years old; and Lady Glenesk gives a detailed account of Marie Durand Girard, known locally as "La Mère Girard," who according to the parish register of St. Just-de-Claix (Isère, France) was born September 22d, 1760. She celebrated the hundredth anniversary of her marriage on the 13th of January, 1885, that is in her one hundredth and twenty-fifth year. The date of her death is not given, but seems to have occurred during that year.

It is not safe, however, to place much reliance upon the exactness of records of extreme old age. This was demonstrated by some results obtained in connection with the New York State census of 1875. The records of persons reported in 1875 as over a hundred were traced back through three censuses. The following table, quoted from Tracy, gives some examples of the results obtained:

TABLE V.

Numbers of cases.	AGES RETURNED.			
	1860.	1865.	1870.	1875.
1	79	83	96	102
8	82	80	94	100
9	80	100	94	108
28	78	86	96	101
36	78	90	97	105
44	56	70	70	100
46	65	90	97	102

It seems probable that the large number reported at 110 in the table from the *Morning Post* is due to a combination of the tendencies to exaggerate old age and to report ages in round numbers.

That longevity is greater among women than among men is demonstrated by statistics. For example, comparing the deaths of men and women over 80 years of age in proportion to the total deaths of men and women respectively at known ages reported in the eleventh census of the United States, we find of men 4377.6 per 100,000 and of women 5257.4 per 100,000. The same thing is shown by the tables of expectation of life. The Massachusetts table for the years 1893–97 gives for women at 75 years of age an expectation of life of 8.29 years, while for men it is only 7.37 years. The corresponding figures in the English table for 1871–80 (Dr. W. Ogle) are 6.87 and 6.34, respectively.

The dependence of longevity upon racial characteristics is brought out very clearly by a study of the returns of deaths in the United States census. In the following table we have compared the number of deaths of white and colored males in ten-year periods. In order to have as homogeneous a population as possible we have taken only white males who were native born and had both parents native born. The census unfortunately does not distinguish between pure bred negroes and those of mixed blood, so our colored population is to that extent heterogeneous. During the census year ended May 31st, 1890,

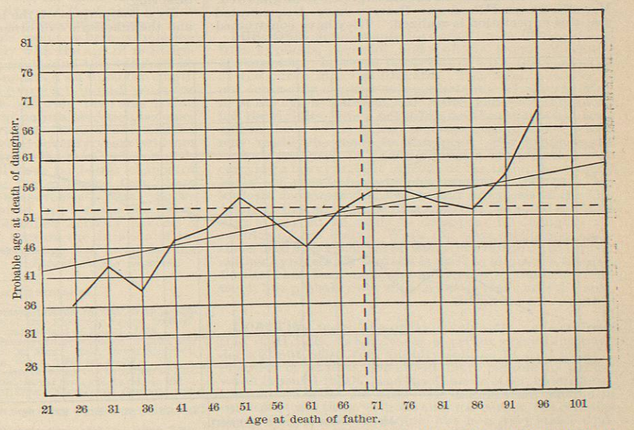

FIG. 3229.—Regression Diagram showing the Probable Age at Death of Daughters of Fathers Dying at Various Ages. (After Beeton and Pearson.)

the total deaths reported of native-born white males of native parentage, of which the ages at death are known, was 159,650. Of colored males the total deaths at known ages was 58,791.

TABLE VI.—DEATHS OF WHITE AND COLORED MALES IN TEN-YEAR PERIODS.

Ages.	White, Native Born. Both Parents Native.		Colored.	
	Number of deaths.	Per 10,000 deaths.	Number of deaths.	Per 10,000 deaths.
5 to 15	12,464	781	4,992	849
15 to 25	13,220	829	7,476	1,272
25 to 35	10,720	672	5,428	923
35 to 45	9,363	586	4,605	783
45 to 55	9,436	591	4,249	723
55 to 65	11,209	702	3,283	558
65 to 75	14,126	885	3,151	536
75 to 85	11,069	693	1,939	330
85 to 95	83,055	191	676	115
95 and over	179	11	268	46

The results contained in the third and fifth columns of this table are represented graphically in Fig. 3228. The solid line is an empirical mortality curve for American white males, the dotted line a similar curve for colored males, the great infant mortality being neglecthe in both. It will be noticed that the forms of the curves are quite different. The white curve has its maximum in the 65–75 period, corresponding to the experience in England and Massachusetts, and another less marked maximum between 15 and 25. The colored curve has a very pronounced maximum in the 15–25 period, and thence descends in a nearly straight line toward a zero somewhere beyond 95, crossing the white curve at about 55 years. In other words, taking the deaths reported during a single year, it is found that the number of white males who have lived over 55 years is largely in excess of the number of colored males who have lived so long. The exact proportion is as 2,482 to 1,485, or about 5 to 3. That this is not an unusual condition is shown by the fact that similar results were obtained in the previous census.

If longevity is correlated with racial characteristics, we should expect it to be correlated also with family characteristics, that is, we should expect it to be inherited. Miss Beeton and Professor Pearson have demonstrated that this expectation is realized. They have constructed a number of correlation tables and regression diagrams such as are used in the study of the inheritance of stature, eye color, etc. (see *Heredity*, Table I. and Fig. 2,606), but in this case the character taken is duration of life. Fig. 3229 is a regression diagram illustrating the relation between the duration of life of fathers and that of their daughters. The vertical dotted line marks the mean duration of life of all the fathers, and the horizontal one that of all the daughters. The zigzag line connects the means of the arrays of daughters, and the diagonal line is the regression line passing as nearly as possible through the means of the arrays. An inspection of this diagram shows that, in general, the longer the life of the father the longer the daughter may expect to live. If there were no such correlation, the means of the arrays would be most probably the same as that of all the daughters and the regression line would correspond with the horizontal dotted line.

Some of the results of this investigation are given in coefficients of correlation and compared with the theoretical coefficients of heredity for other other characters (see *Heredity*, Tables III. and IV.) in the following table:

TABLE VII.

Relatives.	Coefficient of correlation.	Theoretical.
Father and adult son	0.1353 ± 0.0209	*0.3
Father and adult daughter	.1301 ± .0195	.3
Mother and adult son	.1313 ± .0190	.3
Mother and adult daughter	.1493 ± .0202	.3
Adult brothers	.2853 ± .0196	.4
Adult sisters	.3322 ± .0185	.4
Adult brother and sister	.2319 ± .0145	.4

It will be noticed that in the cases of collateral inheritance the coefficients obtained correspond more nearly with the theoretical values than in direct inheritance. This is further illustrated by a comparison of Fig. 3230, with Fig. 3229. Beeton and Pearson explain this phenomenon by the supposition that brothers or sisters are more apt to live under similar conditions than are parents and offspring.

By a comparison of the inheritance of duration of life and the inheritance of other characters, Pearson has been able to calculate how much of the death rate is selective, that is, dependent upon the constitutional pecularities of the people dying, and how much is nonselective, that is, due to purely external causes. He estimates that from fifty to eighty per cent. of the death rate is selective, a result, if confirmed, of great importance for the theory of natural selection (see *Evolution*).

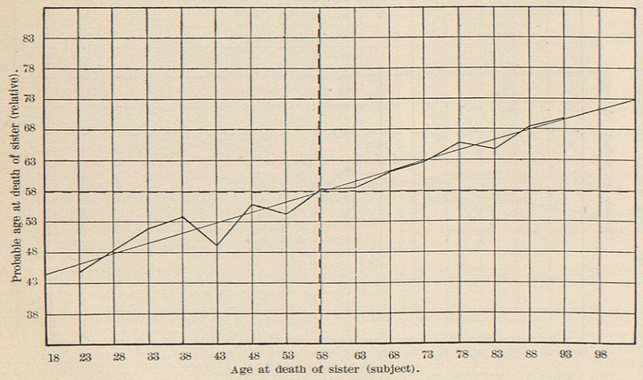

FIG. 3230.—Regression Diagram showing the Correlation between the Ages at Death of Sisters. (After Beeton and Pearson.)

In the course of their studies on the inheritance of the duration of life Beeton and Pearson ran across a remarkable relation between duration of life and position in the family; that is, they found that in general elder brothers or sisters are longer-lived than their younger brothers or sisters, respectively.

Moreover, they found that, in general, the greater the interval between births the greater will be the difference in the duration of life.

Finally, it is evident that a person dying at an early age cannot leave a large family, but it has been shown (Beeton, Yule, and Pearson, 1901; Powys, 1901) that there is a correlation between size of family and longevity extending beyond the period of child-bearing (Fig. 3221). In the Whitney family of Connecticut, "American Quakers,"

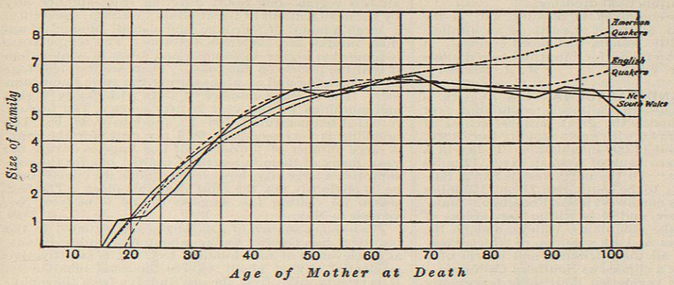

FIG. 3231.—Theoretical Curves for Duration of Life of Mothers and Number of Offspring, America, Great Britain, New South Wales; With New South Wales Experience. (After Powys.)

it was found that the average number of children to each parent increased with the duration of life of both fathers and mothers up to 85 or 90 years. This does not mean, of course, that children were produced at these advanced ages, but simply that there is a correlation between fertility and the qualities that lead to longevity. In England and New South Wales the results are somewhat different, the correlation ceasing for English mothers in the period between 55 and 60 and for mothers in New South Wales between 65 and 70, the same as for English fathers, that is, parents living to these ages have as large families on the average as those living longer.

It will be noticed that this point, where correlation ceases, corresponds very nearly with the age of most frequent deaths of adult white people, and this suggests an explanation of the apparent limitation set upon the length of human life. If a person living a hundred years has no better chance of leaving offspring than one living seventy years, it is evident that natural selection becomes inoperative at seventy, or, rather, those characteristics that tend to prolong life beyond seventy years will not have a selective value so far as the next generation is concerned, and therefore will have no better chance of preservation in the struggle for existence than those which tend to shorten life to the seventieth year. So we may regard human life as limited, not because the living substance is incapable of continued activity beyond a certain number of years, but because the duration of individual existence beyond a certain age is of no advantage to the species.

Robert Payne Bigelow.

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LORANTHACEÆ.—(*The Mistletoe Family.*) A peculiar family of some twenty genera and five hundred species of parasitic plants, mostly of the tropics. They are of great interest to botanists and a number are quite ornamental, but they are of little economic importance. The extremely viscid berries of *Viscum album* L., the European mistletoe, and of other members of the family, are used for making bird-lime. The herbage of this plant has been employed as an antispasmodic from ancient times, but its repute is largely mythical and it is now scarcely used. It contains no substance worthy of note as a physiological agent. American mistletoe, *Phoradendron flavescens* (Pursh) Nutt., of the southern United States, has been considerably employed in doses of 1 to 4 gm. (gr. xv. to lx.), either in infusion or in the fluid extract form, as a substitute for ergot, in labor, as an emmenagogue, and for cerebral congestion. The writer has found various other species of the genus similarly employed, and also as galactagogues, by the natives in various parts of South America.

Henry H. Rusby.

LORDOSIS signifies anterior curvature as distinguished from kyphosis, posterior, and scoliosis, lateral curvature of the spine. Lordosis is curvature with the convexity of the curve directed forward. The term, however, is not commonly applied to opisthotonos. Lordosis is almost always a transient curvature, and probably never has the rigidity which not infrequently attends kyphosis and scoliosis. It is chiefly a compensating curve which may readily be made to disappear. For instance, the lordosis produced in walking down a steep incline or in carrying a heavy weight in front of the body, the "saddle back" of pseudo-hypertrophic muscular paralysis, the lordosis accompanying flexion and ankylosis of the hip-joint, or that seen in the lower part of the spine in Pott's disease may all be made to disappear by changing the position of the body. While the term scoliosis is sometimes used as a synonym of lateral curvature of the spine, neither kyphosis nor lordosis is used to indicate a disease. Lordosis has been made the subject of mechanical treatment, but probably not with any important useful result.

Adoniram B. Judson.

LORETIN—meta-iodo-ortho-oxychinolin ana-sulfonic acid (C_9H_4IOH, $SO_3H.N$)—is a yellow crystalline powder without odor, very slightly soluble in cold water (1 in 1,000) or alcohol, somewhat more soluble in boiling water (about 1 in 200), and insoluble in ether, chloroform, benzol, and oils. Its salts with alkalies are soluble in water, but not those with the alkaline earths. It contains thirty-six per cent. of iodine, but is a very stable compound even in direct sunlight. With ferric chloride it makes a deep green color. By experiments on animals