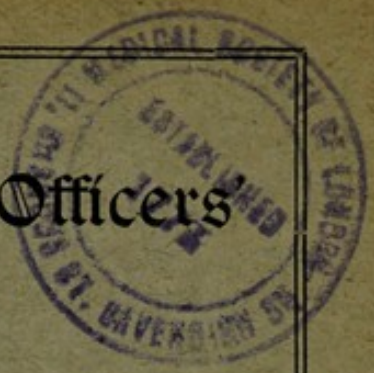
Longevity : race or environment / by H. Jossé Johnson, M.B. (Lond.) medical officer, Gresham Life Assurance Society.



Life Assurance Medical Officers' Association.

LONGEVITY.

RACE OR ENVIRONMENT.

BY

H. JOSSÉ JOHNSON, M.B. (Lond.)

(*Medical Officer, Gresham Life Assurance Society.*)

London:

Printed by C. E. GRAY,

32, Kennington Park Road, S.E.

1908.

Life Assurance Medical Officers' Association, London.

Paper read Wednesday, March 4th, 1908.

LONGEVITY.

Race or Environment.

By **H. JOSSÉ JOHNSON**, M.B. (Lond.)

(*Medical Officer, Gresham Life Assurance Society.*)

—*—

Mr. President and Gentlemen,

When your secretaries did me the honour to invite me to read a paper before this Society, they remarked that there were certain national characteristics, as well as racial differences, which frequently have to be taken into consideration when assessing lives for insurance.

Longevity is the only point we have to consider when assessing lives for insurance. What I felt I was invited to do, was to discuss some national and racial characteristics which have a bearing on this point. These differences are so much a matter of *environment* that without this factor, racial distinction cannot be discussed at all. Indeed, one might truly state, that each and every characteristic of *race* has been simply and solely due to difference of *environment* in the past.

For our purpose it is not necessary, nor even useful, to go back to prime causes. The differentiation into races is sufficiently marked as it stands. So we can take the nations as we find them now, and consider any racial peculiarities they may have, how these peculiarities are modified by environment, and what effect they

have on the longevity of the peoples in question. I therefore proposed to your secretaries that I should be allowed to express a few thoughts on *the relative influence of race and environment on longevity*. Hence the title of this paper.

I feel sure you will agree with me, that to approach this subject with any expectation of gaining useful knowledge involves lifting it out of the narrower limits of insurance statistics and experience, and looking at it from the wider standpoint of Demography. The subject is very far-reaching, and statistical material—which could provide a guide to even proximate certainty—so meagre, that I feel acutely I can this evening only touch upon the fringe of the matter. But I greatly hope that the few thoughts I have been able to throw together will be freely criticised and discussed, and so may form a basis for far greater and more accurate knowledge.

If all countries published such mortality statistics as is done by Holland, Belgium, Italy, France, &c., as well as here at home, there would be less difficulty in arriving at a more exact *value of life* among the different races. But statistics are available for only a small proportion of the peoples of the world, and we are obliged to feel our way and gain our experience of the *value of life* amongst the rest as best we may.

The only occasion upon which the subject of race and longevity has been touched upon in this Society was when Dr. Theodore Williams read a paper after his Presidential address in 1901. In that paper Dr. Williams commented upon the dietetic and other habits of some European nations. I shall not discuss that side of the question at all, because I am of opinion that nature and custom have gradually taught the peoples what form of diet best suits the climate in which they live and the work they have to do. The various food fads that of late years have sprung into fashion among us would seem to show that great latitude in the matter of diet is compatible with good health, each fad having its own firm adherents, who seem to thrive on their restricted or fantastic diet. So I think we may allow that what each country has found to work best in practice within its own boundaries is probably the most expedient for its inhabitants. Do we not all

when we go abroad for any length of time find that we naturally drop into the ways of the country in this respect, whilst to import and persist in our flesh diet in a hot country is to court illness?

Cleanliness, too—I mean the habit of frequent bathing—is more a question of custom than we are inclined to think at first, and its effect on longevity is overrated. There is no people so widely scattered as the Jews, nor one which has—deservedly or not, I will not say—earned a worse character for uncleanliness of person. Yet I shall present some figures later on which show, that among whatever people, and in whatever country they live, they compare most favourably as regards longevity.

Having added these suggestions to the valuable observations contained in Dr. Williams' paper, I ask your indulgence, whilst I attempt to analyse some variations of build and conditions of life that we can distinguish in races and nations, and then to discuss some causes of these variations, their relation to, and probable effect upon, longevity.

If we were attempting to gauge the probable longevity of groups of healthy men, of say 20 to 35 years of age, each group being of a different race or nationality, the points that would weigh most with us would be:—

I.—Heredity.
II.—The climate of the country.
III.—Other surroundings: occupation, education, &c.
IV.—The average height and weight.
V.—Chest development and capacity.
VI.—Proportion, *i.e.*, distribution of weight.

It will be convenient therefore to take these six points separately, and see which races or nations (if any) can be said to exceed or fall short of what may be considered a normal type, or an ideal type whose longevity would be most favourable.

I. **Heredity.**—This is a, probably *the*, most potent factor. If we could estimate the value of heredity in all the various races, the discussion of the other points would be vastly simplified. Unfortunately, heredity depends exactly upon that longevity of the race which we do not know, for want of properly compiled mortality

tables covering the whole subject. For the race with the greatest longevity will procreate individuals with more marked vital elasticity and increased capability of resistance to disease. I need only remind you of Sir Hermann Weber's dissertation on "Heredity in Relation to Life Insurance," with which he favoured this Society.

II. **The Climate.**—The climatic conditions under which a people live form an important factor. It would almost seem that—other things being equal—the hotter the climate, the more quickly does the vital elasticity get used up. Hufeland—an ancient authority, I admit—in his "Art of Prolonging Life," states that the proportion of very aged is greater in cold climates than in warm, and in moderately high altitudes with uniform temperature, than in the reverse. Great extremes of temperature, very high altitudes, great moisture, or extreme dryness, and sudden changes of temperature are unfavourable to great length of life; while uniformity and an average condition, particularly in regard to heat and cold, contribute in a very considerable degree to the prolongation of life. On islands—he says—mankind always becomes older than on continents lying within the same degree of latitude, and salt water is more favourable than fresh.

Though he wrote in the beginning of the 18th century, we must in the main agree with him, as we still lack exact data to prove or disprove his dicta.

Death rates give, I am aware, no direct idea of relative longevity, but the figures on Table I. are strikingly in accordance with his conclusions.

These figures are the average death rates per thousand, for the eleven years 1895 to 1905, for the various countries enumerated. They increase, as we see, almost without exception, as we travel south and east, that is, in Europe, inland and towards greater heat. There are only two notable exceptions, viz.:—Switzerland, which has a lower, and Spain, which has a higher, death-rate than the neighbouring countries. There are a few points which have a bearing on these exceptions. The Swiss are not congregated in large towns, but scattered, and largely pastoral in character; the mode of living is natural and much in the open-air; there are no

TABLE I.

Deaths per 1,000 of Population.

Average figure for years 1895—1905.	
Norway	15·2
Denmark	15·7
Sweden	15·8
Holland	16·8
England and Wales	17·0
Great Britain ...	17·2
Scotland	17·6
Belgium	17·7
Ireland	17·9
Switzerland	18·0
France	20·3
Prussia	20·4
German Empire ...	20·7
* Portugal	20·7
Baden	20·9
Würtemberg... ...	21·6
Saxony	21·6
Italy	22·7
Bavaria	23·6
Bulgaria	23·7
Servia	23·9
Austria	25·0
Roumania	26·6
Hungary	27·3
† Spain	27·6
‡ Russia in Europe, including Poland ...	32·3

* Continent only, 1895—1904. † No returns of still-births. ‡ 1895—1901.

large industries involving close sedentary work, except perhaps some lace-making in the north-east.

Spain has an infant mortality out of all proportion. I have failed to obtain the figures for the whole country, but take an example from amongst various towns whose statistics I have collected. Almeria, not the best nor the worst of these, shows for the decennial period 1895 to 1904, a death-rate for children, under 10 years of age, of 51·79 per cent. of the total deaths. (Contrast this with 33·98 per cent. in Belgium, or 43·8 per cent. in Italy, for the same class and period). It is made up thus :—

Under 1 year, 28·43 per cent.
1 to 4 years, 19·07 per cent.
5 to 9 years, 4·29 per cent.

Reckoned on these figures, the mean age at death in Almeria would be 29·6 years. This is however entirely misleading, for during the same period 80·2 per cent. of the remainder lived to 30 years and upwards, and 42·5 per cent. lived to over 60 years. Shewing clearly that the infant mortality is at least partly responsible for the high death-rate in Spain. Another rather interesting circumstance may also have something to do with it. It is the custom in Spain for the mayor of each town to be made responsible for collecting and remitting the taxes, and he also makes the return of the number of inhabitants. If he is sound in his political views (*i.e.* of the same colour as the government) he makes the number as small as is consistent with safety, and it is accepted at headquarters. Whether he reduces the individual contributions of his constituents, and so gains popularity, or whether he feathers his own nest, I do not know. But the fact remains that though he can make his population nominally smaller, he cannot prevent them from dying, and so the deaths from the larger and true number are reckoned out at so many per thousand of the figure he returned, and the death-rate appears consequently larger than it should be. Further, Spain seems to be the only country of those noted, in which no return of still-births is made. I do not know whether they are included in the birth-rate, reckoned as deaths, or ignored altogether.

III. **Environment.**—The occupation and the distribution of the particular nationality or race would be important. Densely populated manufacturing districts would be less favourable than scattered pastoral communities. The march of sanitary science and preventive medicine and their general application would weigh in favour of a people. The stress, and wear and tear, which are inseparable from the strenuous life led by nations that engage in serious competition for the world's business, must not be lost sight of. They tell heavily against the Anglo-Saxon race and the nations of northern Europe, and in favour of the more phlegmatic and easy-going peoples who take "*mañana*" or "*kismet*" as their watchwords.

These factors—density of population and stress of occupation—generally go hand-in-hand with the redeeming advantages of education, the spread of sanitary science and habits, and of preventive medicine. These concomitants of civilisation seem to more than counterbalance the disadvantage of crowding together in large communities. A few figures will perhaps illustrate this more clearly. No country in Europe has reduced its death-rate more quickly than Holland.

In	1860—1869	it was	24·80
,,	1870—1879	,,	24·49
,,	1880—1889	,,	21·27
,,	1890—1899	,,	18·67
,,	1900—1904	,,	16·57
,,	1905	,,	15·32
,,	1906	,,	14·78

Now how can this startling improvement be accounted for? Can we not trace, by the dates when the death-rate decreased in two decades by 3 per mille, each, the influence of that great epoch in medicine, the recognition of the germ theory? This was and is, without exaggeration, the basis upon which the whole of preventive medicine rests. The drinking water supply is a very important factor in large communities, and in a country like Holland, low-lying, hard to drain, and full of smells from stagnant canals and dykes, especially necessary. Enormous strides have of late years been made in this respect, and we find that the larger communities

reap the benefit, for in Holland the death-rate in communities with more, or less, than 20,000 inhabitants was as follows :

Year	More than 20,000	Less than 20,000
1899	... 16·67	... 17·12
1900	... 17·—	... 18·36
1901	... 16·58	... 17·56
*1902	... 16·65	... 16·60
1903	... 14·93	... 15·96
1904	... 15·36	... 16·25
1905	... 14·28	... 15·93
1906	... 14·29	... 15·07

I do not wish to infer that improved water supply is answerable for all this difference, but that where sanitary science is practised and enforced, it more than counterbalances the disadvantages of crowding together.

A glance at Table II. will show that there is no direct relation between density of population and the death-rates on Table I.

There are many other factors, no doubt, in *environment*, but hardly any others of sufficiently general application to be mentioned now, except perhaps the alcohol habit. This is very much a matter of fashion in a nation, and the harm that is done by indulgence in it can be generally seen to be limited by the political frontier. Northern nations—except perhaps the Scandinavian—throw away, by abusing alcohol, an advantage which their cooler and more equable climate gives them. They artificially produce, by over stimulation with alcohol, a waste of vital elasticity similar to that from which southern nations suffer normally, owing to the higher temperature in which they have to live. The Italians, Swiss, Spaniards, and Portuguese are far more sober than the English, French, or North Germans. They take their alcohol in the more diluted form of natural unfortified wine instead of spirits.

IV. **Height and Weight.**—The difference in average height of the adult male of various white races is so small as to be negligeable

*This was a heavy Influenza year and seems to have affected the towns more than the country.

from our standpoint. Such slight differences as do exist are in favour of greater height in the Scandinavian and northern races,

TABLE II.

DENSITY OF POPULATION AT LAST CENSUS.

Country.	Per Sq. Kilometre.
Norway	7·0
Sweden	11·5
Russia in Europe ...	19·8
Spain	36·9
Bulgaria	41·9
Roumania	45·3
Servia	55·7
Portugal	56·5
Hungary	59·3
Denmark	66·4
France	73·6
Switzerland	82·7
Bavaria	86·0
Austria	87·2
Prussia	106·9
German Empire ..	112·1
Italy	113·3
Würtemberg... ...	118·0
Great Britain ...	131·8
Baden	133·0
Holland	156·9
Belgium	227·2
Saxony	300·7

compared with the Latins of the south. But it is probably less than we have been accustomed to believe. An inch, or at most two, would cover the average difference, as far as my experience of a

very large number of measurements of people of the various nations goes. I would suggest that the exaggerated idea of our greater height as a nation has arisen from an almost unconscious comparison drawn between the stature of our soldiers and those of foreign nations, say France, Belgium, Austria, Italy, &c. We say (or hear said) when we see a regiment in Brussels, "What little men these Belgians are!" failing for a moment to consider that, the one is a sample of the whole male population and the other (our own) a picked sample of selected individuals. The average height, of all races that we have to deal with, comes well within the limits which experience teaches us are not abnormal. The extremes—above 75 and under 60 inches—have proved a very short-lived class; they die out of all proportion to their expectation after the age of 55.

The average weight in white races does not vary much more than the average height. We are constantly being asked when recommending on cases of overweight from abroad, to consider that the average man of the country in question is naturally stout and well covered. The branch managers point out such heavy men in the street as normal men among their fellows. We are told that we are judging these men by a standard which is applicable only to Englishmen, and that this is unjust. We can only reply that judging by the statistics of the branch in question as far as they have been analysed, the same amount of overweight is more, and not less, detrimental to its clients than to Englishmen, because the weight is generally less symmetrically distributed. But allowing the contention that this greater weight is a national characteristic, the question—the only question really—still remains. Do men of this class of higher relative weights live as long, or offer the same resistance to disease, as men of the average standard? All experience goes to prove that we must answer this question in the negative.

Most Oriental peoples, especially natives of India, are lighter than Europeans of the same height and age, but the difference is not great—at most ten to twelve pounds—for medium heights.

V. **Chest Development and Capacity.**—It is generally accepted

that a well-built man has a thoracic circumference which measures at least half his height. Continental nations are more in accord with this proportion than we are. They do not vary much among themselves, but they certainly exceed us in the matter of chest measure, and it is most probably owing to their compulsory military training. Whether this military chest is altogether an advantage, I am not so sure. For some years now we have been making a point of having the limits of forced expansion of the chest properly filled up on our forms, and our branch chief medical examiners in the different countries have ably seconded our efforts. From the figures thus obtained, we find, that although the circumference of the chest in males of 20 to 35 years of age is, in a very large percentage of cases, more than half their height, yet their forced expansion is by no means so good as that of the Englishman, with his proportionately smaller circumference. This large, well formed, but somewhat rigid and inelastic chest, cannot be considered an unmixed advantage, when one remembers the greater liability to premature emphysema, bronchitis, &c.

Oriental peoples (most Indians, Egyptians, &c.) have generally a chest measure below the standard proportion.

VI. **Build:** *i.e.*, the distribution of weight as shewn by the relation of the height to the chest and abdominal measures. The much vexed question of overweight and underweight does not enter into build, as here defined. Build is an important characteristic of nations, which is affected by customs, especially those of diet and pastimes. It is as clearly defined as is practicable when certain measurements of the body are taken. The chief are that of the abdomen in comparison with that of the chest, and, as already mentioned, of this latter to the height. Most continental offices ask the measurement of the neck also.

We shall probably agree that no man ought to have, before 40 years of age, an abdominal measure in excess of his chest, and that we should prefer to have this absence of *embonpoint* maintained until well above that age. The predisposing causes of this unnatural enlargement can be classed as, I. Sedentary life; II. Excessive imbibition of fluids; III. A plentiful farinaceous and

fatty diet. The first cause is not marked in our countrymen, owing partly to their addiction to sports and bodily exercise, but is found pronounced in the well-to-do Turk and Egyptian and the Mahommedan in India, as well as one class of Parsees. Abdominal protuberance, due to excessive imbibition of fluids, is marked in Germans, Belgians, French, and many Dutchmen, in spite of their not leading such sedentary lives as the former class. Italians, owing to their farinaceous and fatty (oily) diet, get stout about the abdomen early, and Spaniards suffer from the same causes to a less degree.

One of the largest native companies in Germany makes use of a formula to judge the eligibility of risks from the point of view of abdominal measurements. The height is divided, by twice the abdominal measure minus the height. If the result is 5 or more it is accepted as normal, if 4 as some obesity, if 3 accentuated obesity, and less than 3 they decline the case. I only mention this to show what they consider normal among their countrymen. According to this formula a man of 5-ft. 5-in. whose normal chest measure would be 32½ inches could have an abdomen 6½ inches greater than his chest and remain "normal," and it would not be until his abdomen was 11 inches larger than his chest that he would be considered unacceptable.

* * *

These are a few of the characteristics peculiar to nations of Europe which we can distinguish, and which we should deem of value, if we were adjudging the probable longevity of groups of their people. These characteristics (except the unknown quantity under the first heading—heredity—and the radical difference of build between European and Oriental races,) depend upon environment.

Table III. shows the relative mortality per 1000 at ages 30 to 75 of various nations. I have taken as far as possible the same countries and arranged them in the same order as on Table I. The figures are translated from curves made by the late Mr. A. H. Smee, of the "Gresham," and relate to the period 1881 to 1890. For the sake of clearness I have disregarded all fractions of less than a half,

TABLE III.

Comparative Mortality, Various Countries. 1881—1890 Period.

(From Smee's Curves).

At Age	Norway.	Sweden.	Denmark.	Holland.	Ireland.	Scotland.	England.	Belgium.	Switzerland.	France.	Prussia.	Saxony.	Würtemberg.	Italy.	Bavaria.	Austria.	Spain.	Hungary.
20	7	5·5	6	5·5	6·5	6·5	5	6	6	7	6	5	5	7·5	6	7·5	8·5	9·5
25	8	6	7	6·5	8	7·5	6·5	7	7·5	8	7	7	6·5	8	7·5	9	10	10·5
30	8	6·5	7·5	7·5	9·5	9	8	8	8·5	9·5	8·5	8·5	8	8·5	8·5	10	10·5	10·5
35	8	7	8	8	10	10	9·5	9	10	10	10·5	10	9	8·5	10	11	11·5	11·5
40	8	8	9	9·5	10·5	11	12	11	12	11	12	11·5	10·5	9·5	11·5	13	13	13
45	9	9·5	10·5	11·5	12·5	13·5	14	12	13·5	12·5	13·5	14	12	11	13	15·5	14·5	16·5
50	11·5	11·5	13	13	15	16·5	17	14·5	17	15·5	17	18·5	16·5	14·5	16·5	20·5	19·5	22
55	15	15	17	17·5	22	22·5	24	19·5	23	20	23	23·5	22·5	19·5	22·5	25·5	24·5	27
60	21	21·5	25	25·5	28	29·5	31	27·5	34	28	32·5	39·5	32	29·5	33	38·5	39·5	—
65	30	31·5	36	37·5	46·5	41	46·5	40	48·5	41·5	47	46	47·5	44·5	49·5	52	55	—
70	41	48	53	57	65	58	62	60	75	62	70	77	72·5	66·5	75	79	87	—
75	61·5	77	78	85	100*	84	93	91·5	100*	92	95·5	100*	100*	100*	100*	100*	100*	—

* The expression 100 * conveys that the mortality was more than 100, but the exact figure was not given.

and altered them to their nearest half number, which is quite near enough for a comparison such as we want.

Do these figures, which show considerable variations for the different countries, coincide with Hufeland's dicta as well as the death-rates appeared to? Can we account for any of these variations in the light of the points we have been considering? I think we can answer both these questions in the affirmative, at least to a marked degree.

As you will observe, the lists of countries on these three tables do not altogether correspond, and present certain difficulties when we come to compare them, notably Table III. which is at best only approximate. I have included them because they embrace all countries for which such figures are available and are interesting in themselves. For purposes of comparison other tables are appended which are not open to the same objections. These latter —Nos. IV. to X.—are more complete and more recent, they are compiled from the latest statistics published by the various governments; mostly dated 1907. The countries have been arranged in the same order throughout. The available statistics for Spain, Portugal and Hungary did not suffice for their inclusion on Tables VI., VII. and VIII., but I submit on separate tables the deaths, in age blocks, for Spain and Hungary in the year 1905, and for Portugal for 1902-3-4. If these figures are used for comparison, they present the three countries in the most favourable light possible, but even so Spain and Hungary maintain their unenviable position at the bottom of the list; Spain being, on the whole, better than Hungary.

Table IV. includes thirteen countries and four periods. It shows the death-rate, whether general, under one year, or under five years, to be constantly diminishing. The birth-rate also diminishes, but to a less degree. So much less is the decrease in the birth-rate, that the excess of the birth- over the death-rate is a constantly increasing number, except in France and Switzerland. This can only be due to the progress of preventive medicine, the march of sanitary science and the education of the people in matters of hygiene. This table does not more nearly concern us at present.

TABLE IV.

Death and Birth Rates in some European Countries.

Four Periods Compared.

Country.	Death Rates.												Birth Rates.							
	Per 1000 of Population.				Under one year per 1000 exposed.				Under five years per 1000 exposed.				Per 1000 of Population.				Excess over Death Rate.			
	1871 to 1880	1881 to 1890	1891 to 1900	1901 to 1905	1871 to 1880	1881 to 1890	1891 to 1900	1901 to 1905	1871 to 1880	1881 to 1890	1891 to 1900	1901 to 1905	187 to 1880	to 1890	1891 to 1900	1901 to 1905	1871 to 1880	1881 to 1890	1891 to 1900	1901 to 1905
Norway	17	17	16·3	14·5	106	98	84		42	41	30		31	31	30·4	28·6	14	14	14·1	14·1
Denmark	19·4	18·6	17·5	14·7	138	135	125		49	48	38		31·5	31·9	30·2	28·9	12·1	13·3	12·7	14·2
Sweden	18·2	16·9	16·1	15·5	138	121	96		51	43	34		30·5	29	27·2	26·1	12·3	12·1	11·1	10·6
England and Wales	21·4	19·1	18·2	16·0	155	142	150		61	55	52		35·4	32·5	29·9	28·1	14	13·4	11·7	12·1
Holland	24·3	21·0	18·4	16·1	205	178	145		77	66	49		36·2	34·2	32·5	31·6	11·9	13·2	14·1	15·5
Belgium	22·6	20·5	19·2	16·9	147	160	152		64	59	51		32·2	30·1	29	27·7	9·6	9·6	9·8	10·8
Switzerland ..	23·5	20·8	19·0	17·7		167	138		63	54	42		30·8	28·1	28·1	28·1	7·3	7·3	9·1	10·4
France	23·7	22·1	21·5	19·6	172	166	164	150	65	64	49		25·4	23·9	22·2	21·3	1·7	1·8	0·7	1·7
Prussia	26·6	24·7	21·9	19·8	205	203	194		87	84	66		39	37·4	36·8	35·1	12·4	12·7	14·9	15·3
Italy	29·9	27·2	24·2	21·9	210	195	177	170	97	86	76	66	36·9	37·8	35	32·6	7·0	10·6	10·8	10·7
Austria	31·5	29·5	26·6	24·3	259	250	218		111	104	80		39	38	37·2	35·6	7·5	8·5	10·6	11·3
Hungary		32·5	29·9	26·2		219	211			118	84		43·5	43·9	40·6	37·2		11·4	10·7	11·0
Spain	31·4	30·0	28·3	26·1										36·4	35·3	35·3		6·4	7·0	9·2

Table V. shows the constant increase in density of population for the same countries during four periods. It merely emphasises the fact, that there is no direct relation, at present, between death-rate and density of population.

TABLE V.

Density of Population.

Some European Countries. Four Periods Compared.

Per Sq. Kilometre.

Country.	1871—1880.	1881—1890.	1891—1900.	Last Census.
Norway ...	6	6·2	6·9	7·0
Denmark ...	51	56	64	66·4
Sweden ...	10·2	10·7	11	11·5
England and Wales ...	172	193	215	216
Holland ...	123	139	157	156·9
Belgium ...	187	206	227	227·2
Switzerland...	66·3	69·9	75·7	82·7
France ...	70	71·6	72	73·6
Prussia ...	78	86	99	106·9
Italy... ...	98	106	113	113·3
Austria ...	74	79	87	87·2
Hungary ...	48	54	59	59·3
Spain ...	33	35	37	36·9

Table VI. shows the number surviving out of a generation of 100,000 at 20, 30, 40, &c., up to 100 years. Two periods are compared, not in every case quite the same periods, but so nearly so that it does not, I hope, interfere with the usefulness of the table.

TABLE VI.

Survivors at Successive Ages of each 100,000 Births.

Various European Countries. Two Periods Contrasted.

Years of Age	Norway.		Sweden.		England and Wales.		Holland.		Belgium.		Switzerland.		France.		Prussia.		Italy.		Austria.	
	1881 to 1890	1896 to 1902	1881 to 1890	1898 to 1903	1881 to 1890	1897 to 1904	1881 to 1889	1897 to 1904	1881 to 1890	1897 to 1904	1881 to 1888	1897 to 1904	1889 to 1898	1897 to 1904	1881 to 1890	1897 to 1904	1882 to 1891	1897 to 1904	1881 to 1890	1897 to 1908
20	75369	81227	75121	79555	72580	74532	68376	75180	70869	74984	72270	77895	69392	74207	62968	69630	58722	66623	55629	63140
30	69707	75658	70674	74767	68180	71236	63976	71348	65976	70895	67100	73430	64161	68926	58693	65983	54102	62080	50832	58509
40	64156	69927	65773	69836	62003	66137	58638	66969	60297	66084	60717	67875	58376	63148	52958	61342	49477	57461	45355	53371
50	58445	64067	59737	63973	53767	58371	52214	61185	53317	59574	52815	60202	51557	56140	46000	54778	44017	52081	38526	46957
60	50115	56245	51174	55638	42231	47364	43485	52295	43754	49578	41514	48332	41912	46293	36141	44767	36107	44148	29136	37566
70	37049	42464	36951	41803	26166	29917	29274	36509	28816	33416	24843	30148	26514	30474	22059	28917	22662	29435	16490	23012
80	19267	22397	16406	20031	9575	11790	11644	15079	10673	12852	7350	10195	8990	10729	7012	10544	6799	9828	4945	7341
90	3205	4529	2097	3059	1182	1260	1336	1755	1032	1384	607	1020	981	836	641	1136	431	744	403	664
100	—	153	—	81	—	67	—	9	—	19	—	5	—	13	—	20	—	15	—	25

TABLE VII.

Mortality Figure in Age Periods, per 1,000 exposed.

Some European Countries. Period 1897—1904.

(*Except Norway, 1896—1902, and Sweden, 1898—1903*).

Country.	20 to 25	25 to 30	30 to 35	35 to 40	40 to 45	45 to 50	50 to 55	55 to 60	60 to 65	65 to 70	70 to 75	75 to 80	80 to 85	85 to 90	90 to 95	95 upw'ds
Norway	7·01	7·19	7·45	8·19	8·42	8·93	11·17	14·24	23·57	31·27	47·17	75·34	117·02	175·60	100·47	355·94
Sweden	6·12	6·32	6·56	6·98	7·92	9·48	11·85	15·41	22·72	33·00	55·57	84·80	136·30	204·59	270·16	601·6
England and Wales ..	4·13	4·87	6·38	8·30	10·76	14·02	17·52	23·62	36·91	52·54	72·48	104·16	164·35	236·81	236·82	236·79
Holland	5·04	5·43	5·72	6·81	8·28	9·61	13·39	17·63	27·02	42·93	66·25	99·62	157·61	225·57	330·40	359·56
Belgium	5·46	5·76	6·36	7·54	8·96	11·58	15·54	20·35	30·30	46·07	71·60	106·89	166·92	230·14	310·78	380·08
Switzerland	5·61	6·18	7·02	8·49	10·69	13·05	17·86	24·40	36·26	55·23	81·90	122·38	172·21	235·39	333·85	456·90
France	7·35	7·43	8·07	9·21	10·51	12·80	16·14	21·78	31·96	49·20	75·20	122·06	184·85	263·30	324·98	333·52
Prussia	5·06	5·69	6·39	8·23	9·76	12·64	16·74	23·05	33·77	51·14	75·19	115·57	165·98	231·06	298·96	322·97
Italy	6·93	7·20	7·38	7·96	9·07	10·40	14·02	18·66	31·18	47·38	81·67	124·00	189·12	263·97	313·98	324·04
Austria	7·27	7·98	8·41	9·84	11·19	14·12	18·33	25·67	37·37	57·53	84·71	130·72	177·24	247·86	279·65	305·55

TABLE VIII.

Sequence of Comparative Mortality at Various Ages.

Period 1897—1904.

Countries arranged in the order of General Death Rate—All Ages.

Country.	20 to 25	25 to 30	30 to 35	35 to 40	40 to 45	45 to 50	50 to 55	55 to 60	60 to 65	65 to 70	70 to 75	75 to 80	80 to 85	85 to 90	90 to 95	Over 95
Norway	8	7	8	5	2	1	1	1	2	1	1	1	1	1	1	6
Sweden	6	6	5	2	4	2	2	2	1	2	2	2	2	2	3	10
England and Wales ..	1	1	3	7	9	9	8	8	9	8	5	4	4	7	2	1
Holland	2	2	1	1	1	3	3	3	3	3	3	3	3	3	9	7
Belgium	4	4	2	3	3	5	5	5	4	4	4	5	5	4	6	8
Switzerland	5	5	6	8	8	8	9	9	8	9	9	8	7	6	8	9
France	10	9	9	9	7	7	6	6	6	6	7	7	8	9	10	5
Prussia	3	3	4	6	6	6	7	7	7	7	6	6	6	5	5	3
Italy	7	8	7	4	5	4	4	4	5	5	8	9	10	10	7	4
Austria	9	10	10	10	10	10	10	10	10	10	10	10	9	8	4	2

TABLE IX.

Hungary.—Statistics for 1905.

Percentage of Deaths and Death Rate per 1000 at Various Ages.

Population, 20,340,044. Total Deaths, 560,921.

Ages.	Per cent. of Total Deaths.		Per 1000 of Population.	
Under 1 year ...	29·53		8·14	
From 1 to 2 years ...	7·96		2·19	
„ 2 „ 3 „ ...	3·80		1·05	
„ 3 „ 4 „ ...	2·37		0·65	
„ 4 „ 5 „ ...	1·65		0·45	
Under 5 years ...		45·31		12·48
From 5 to 6 years ...	1·22		0·34	
„ 6 „ 7 „ ...	0·97		0·27	
„ 7 „ 9 „ ...	2·18		0·60	
Under 10 years ...		49·68		13·69
From 10 to 19 years ...	5·26		1·45	
Under 20 years ...		54·94		15·14
From 20 to 29 years	5·59		1·54	
„ 30 „ 39 „	4·38		1·21	
„ 40 „ 49 „	5·25		1·45	
„ 50 „ 59 „	6·83		1·88	
„ 60 „ 69 „	9·81		2·70	
Under 70 years ...		86·80		23·92
From 70 to 74 years	5·04		2·43	
„ 75 „ 79 „	3·78			
Under 80 years ...		95·62		26·35
From 80 to 84 years	2·59		1·06	
„ 85 „ 89 „	1·24			
Under 90 years ...		99·45		27·41
From 90 to 99 years	0·49		0·15	
Over 100 years ...	0·04			
Age unknown ...	0·02	100·00		27·56

Table VII. gives the mortality figure per 1000 exposed for the latter of these two periods and for the same countries. The age blocks are, however, in fives instead of decennial periods as on the former table.

Table VIII.—The multiplicity of figures on the last table makes comparison rather difficult. On this one I have expressed the order of their sequence by a single figure. It can be read at a glance and it is on this that I propose to base a few observations, in which I shall attempt to apply broadly the points considered as national differences and characteristics.

TABLE X.

Spain.—Statistics for 1905.

Percentage of Deaths and Death Rate per 1000 at Various Ages.

Population, 16,000,000. *Total Deaths, 385,370.*

Ages.	Per cent. of Total Deaths.		Per 1000 of Population.	
Under 1 year ...	24·77		5·96	
From 1 to 4 years ...	16·80		4·04	
„ 5 „ 19 „ ...	7·26		1·75	
Under 20 years ...		48·83		11·75
From 20 to 39 years ...	10·33		2·49	
„ 40 „ 59 „ ...	12·63		3·04	
Under 60 years ...		71·79		17·28
Over 60 years ...	27·44	99·23	6·61	23·89
Age unknown ...	0·77	100·00	0·19	24·08

The statistics do not include the whole of the inhabitants of Spain. They are compiled from returns covering 16,000,000 people. The population of Spain at last census—1900—was 18,607,674.

TABLE X. (A)

PORTUGAL.—TOTAL DEATHS, DEATH RATES, RATES OF MORTALITY FOR THE YEARS 1902-3-4 IN AGE BLOCKS.

AGE PERIOD.	Populat'n in 1900.	1902.				1903.				1904.			
		Total Deaths.	Percentage of all Deaths.	Rates per 1000		Total Deaths.	Percentage of all Deaths.	Rates per 1000		Total Deaths.	Percentage of all deaths.	Rates per 1000	
				of each age.	of total populat'n			of each age.	of total populat'n			of each age.	of total populat'n
Under 1 year	120390	22793	22·9	189·3	4·5	23677	23·3	196·7	4·7	21446	22·4	178·1	4·3
1—5 years ...	465287	17358	17·5	37·3	3·4	19470	19·2	41·8	3·9	16125	16·9	34·7	3·2
5—10 years ...	562866	3123	3·2	5·5	0·6	3014	3·0	5·3	0·6	2726	2·8	4·9	0·6
10—20 years...	1018005	3921	3·9	3·8	0·7	3623	3·6	3·5	0·7	3621	3·6	3·6	0·7
20—40 years...	1409507	10274	10·4	7·3	2·4	9874	9·7	7·0	2·0	9908	10·3	7·0	2·0
40—60 years...	959216	12206	12·3	12·7	2·4	11529	11·4	12·0	2·3	11788	12·3	12·3	2·3
Over 60 years	469920	27729	27·9	59·0	5·5	29598	29·2	63·0	5·9	29959	31·2	63·7	5·9
Age unknown	11076	1821	1·9	164·4	0·3	646	0·6	58·2	0·1	440	0·5	39·7	0·1
TOTALS ...	5016267	99225	100·0		19·8	101431	100·0		20·2	96013	100·0		19·1

These Rates are vitiated by the fact that no increase of population has been allowed for

From an insurance point of view it is the more advanced ages hat concern us most, and in this connection Table VIII. is interesting. The countries are arranged in sequence of their general death-rate, nd the columns of figures represent the sequence of the mortality ate in each age block. We notice how after very considerable ariations at lower and middle ages, the sequence tends to return to hat of the death-rate and Hufeland's dicta. Take age 75 to 80 which by biblical authority we may look upon as real old age) and ve see Hufeland fully justified, Switzerland taking its place as nferior to Prussia and France. Whilst from 70 to 85 years of age oth these rough guides (Hufeland and the general death-rate) come wonderfully near the mark.

To take the countries seriatim. The **Scandinavian** race stands so easily first that we must concede it some superior innate vitality. The Norseman has always been looked upon as a hardy individual, and no doubt there is something in it. There is, however, a heavier loss of life in the ages from 20 to 35, when compared with countries which they far surpass at the later ages, that looks as though race were being greatly modified by environment. 20 to 35 should be the prime of the vigour and strength of the human animal. If the mortality figure at this age is high, it means that the weaklier ones are being weeded out by climatic hardship, contagious disease or ignorance in one form or another. Having passed this age of special stress, the survivors certainly have a longevity which is in excess of all other nations. Is it race or survival of the fittest by natural selection ?

Holland comes next, and, at all ages that we are considering, takes a most enviable place. The flatness of his country would seem to be the only thing among the points we have considered which is against the Dutchman, but doubtless the national lack of imagination and "phlegm"—which save so much mental wear and tear—far more than make up for this.

England shows a contrast to the Scandinavian countries in ages 20—35. The weeding-out process of hardship and ignorance is not so apparent. But from age 40—65 the mortality is high, and this

I think can be fairly ascribed to the strenuous business life and the wear and tear inseparable from it.

Belgium. The mortality figures here are as satisfactory as they are astonishing. There is a level maintained all through life, even to extreme age, which would not have been expected in a people so densely crowded together, engaged in business pursuits and manufacturing industries, and who do not spare themselves either in business or in pleasure. True, their climate is equable, the sea near, and the country inland varied; whilst the shortness of distances and cheap locomotion render change and variety easy of access to all. But we must find something deeper, and underlying all this, to account for such good results. Education is good, local government is almost paternal, military training is not carried to excess, and "sport," in our sense of the term, plays a large part in filling up their leisure time; but to my mind it is here, *breed*, that tells. Every breeder of animals knows that he must, if he wishes to keep up his strain, constantly import fresh blood, and he also knows, that however fine his pure bred stock may be from a fancy point of view that for hardiness, strength, or endurance, it cannot vie with a settled and distinct cross of two good allied stocks. I do not mean a mongrel, of course, but a distinct cross which has passed through some generations. Now it is exactly this cross which the population of Belgium presents. They are a mixture of Flemish and French principally, and how evenly they are mixed in the country, can be seen from the fact that in the census of 1900, 2,574,805 inhabitants spoke French only, and 2,822,005 spoke Flemish only, whilst 801,587 spoke both languages. This is, I think, the best example we have up to now, of the probable influence of breed or race on longevity.

Prussia and Switzerland do not seem to offer any special points for note. I am at a loss to account for the extraordinary high mortality below age 40 in **France.** Is it possible that what we are pleased to call "morals" has anything to do with it? Otherwise, Prussia, France, and Switzerland fall naturally into those positions in which the climate and the physical situation of the countries have placed them.

Italy presents a curve exactly the reverse of England, and the converse of the arguments I then used would apply here. The easy-going nature and the good mortality of middle age, go hand in hand.

Austria shows no variation, and is easily last. Vienna is the only town of any importance that has a death-rate below 20, whilst most districts and places are far above this. The great variation of temperature, and ignorance, especially of hygiene, account for the high death-rate in the country districts.

* * *

It would seem, then, that the mortality figures, like the death-rates, can be all fairly explained by variations of environment. It is not until we come to such radical differences of build as are noticeable between Oriental and European peoples, that there is anything which cannot be fairly ascribed to environment—education, climate, habits, diet, &c.,—rather than to any racial peculiarity, unless the Scandinavian longevity be ascribed to race or that of the Belgians to breed. We cannot so far say that race has any definite value as a factor, but if we can find data of the longevity of one race under varied conditions, or of various races under the like or the same environment, then we can perhaps estimate more clearly.

My thoughts naturally turned to our own countrymen, in our colonies in all parts of the world, to form an example of a race under varied environment. Statistics are, however, almost wanting for any comparison such as was needed. Those I could find were so vitiated, for our purpose, by the inclusion of immigrant adult lives, men in their prime and generally picked as being fitted for hard work, that I had to abandon the idea.

Fortunately there is another race which fulfils the conditions we need. No race, people, or nation—call them what you will—has been fated to live under more varied circumstances and surroundings than the Jews, yet their longevity has become proverbial. The literature of the subject is voluminous, and all writers accept it as a fact. In the U.S. census of 1890 two tables appear, giving the expectation of life of Jews in that country compared with the general population of Mass:. They deal with a Jewish community of 60,630 people only, over a period of five years, and cannot therefore be accepted as scientifically accurate, but taking them as only approximately true they go a long way to prove the superior longevity

of the Jew in that country. I have not transcribed the tables as they take up so much space.

In Algeria; statistics published by the French government show for the period 1888 to 1899.

Rates per 1000.

	Births.	Deaths.	Average Annual Excess of Births per 100.
European -	34·4	27·9	6·5
Israelites -	52·9	31·7	21·2

TABLE XII.

Vital Statistics of Buda-Pesth, 1886—1895.

Rate per 1,000 of Population.

Total Deaths 139,479, of which Jews, 18,635.

Comparative Mortality Table.			
Ages.	Jews.	Catholics.	Protestants.
0—4	70·9	147·6	131·2
5—9	7·8	14·6	14·2
10—14	3·1	4·3	4·6
15—19	4·7	7·2	6·3
20—24	6·4	11·3	10·4
25—29	7·0	12·4	10·7
30—34	7·9	14·6	12·5
35—39	11·2	19·1	16·7
40—44	13·5	22·9	21·6
45—49	15·2	27·4	26·8
50—54	18·6	31·3	30·8
55—59	30·8	42·2	41·7
60 upwards	67·8	79·2	79·5
All Ages ...	18·4	32·5	27·8

TABLE XIII.

STATISTICS OF HUNGARY, PUBLISHED 1906. POPULATION 20,256,669.

MARRIAGE, BIRTH AND DEATH RATES PER 1,000.

VARIOUS CREEDS.—TWO PERIODS.

Creed.	Number.	1896—1900.			1901—1905.		
		Marriage.	Birth.	Death.	Marriage.	Birth.	Death.
Roman Catholic	10,518,195	8·7	40·9	27·7	8·7	38·6	26·2
Greek Catholic	1,947,972	8·0	41·1	31·0	8·4	39·6	28·4
Evangelical Reformed ...	2,540,589	8·4	36·2	26·3	8·5	34·0	25·7
Other Reformed	1,329,349	9·0	36·2	25·3	8·6	33·7	24·5
True Greek Church ...	2,924,837	7·9	38·7	31·8	9·1	37·5	29·2
"Unitarius"	71,460	7·8	34·6	24·8	7·8	32·3	23·9
Israelites	907,741	8·4	35·2	17·5	7·9	31·4	16·7
No Creed	16,526	8·5	39·4	27·9	8·6	37·2	26·2
	20,256,669						

TABLE XIV.

STATISTICS OF HUNGARY PUBLISHED 1906. POPULATION 20,256,669.

MARRIAGE, BIRTH AND DEATH RATES PER 1,000.

Various Nationalities.—Two Periods.

Nationality.	Number.	1895—1900.			1901—1905.		
		Marriage.	Birth.	Death.	Marriage.	Birth.	Death.
Magyar	9,436,558	8·6	39·2	26·2	8·6	36·8	25·2
German	2,131,270	8·7	37·0	25·1	8·6	34·2	23·5
Slav	2,076,520	9·0	43·7	29·8	8·2	40·3	28·0
Wallach	2,914,628	7·5	36·9	31·1	8·5	35·9	27·8
Ruthenian	454,676	7·7	43·2	27·7	7·9	41·1	27·0
Croatian	1,766,690	9·1	40·7	29·8	9·1	39·0	27·2
Serb	1,093,479	9·2	43·7	34·1	9·9	41·3	31·9
Romany	382,848	6·1	33·3	22·6	7·6	33·8	24·4
	20,256,669						

It is only when separated into creeds that we can recognise this striking peculiarity of the Hebrew race. For comparison I append another table where the same population is divided according to nationality, from which it can be seen that no one of the native races greatly exceeds another in death rate.

In the report of the Dutch Government published in 1907, the following figures appear :—

TABLE XV.

Comparative Mortality Table of the Three Chief Religions in Holland.

Ages.	Protestants.		Roman Catholics		Jews.	
	M.	F.	M.	F.	M.	F.
Below 20	100	100	138	136	59	47
20 to 29	100	100	94	92	77	41
30 to 39	100	100	102	110	77	70
40 to 49	100	100	109	113	101	90
50 to 79	100	100	104	107	102	91
Over 80	100	100	103	103	94	92

The Protestant mortality is taken as 100 and the others reduced to terms of this. The relative numbers of each class in the population are Protestants 3,361,038, Catholics 1,961,204, Jews 113,816. The total population of Holland being 5,501,701. If these figures are reduced to a mortality figure for all ages, it reads: Protestants 100, Catholics 118, Jews 78.

We cannot look at these last tables, those of Holland, Hungary, and Buda-Pesth, without trying to account in some way for the striking differences. It is not hard to find one good reason at least. The whole Mosaic Law is one vast hygienic code, wrapped up in

forms and ceremonies and fastened upon the people as their religion. The choice of diet, its method of killing and the inspection of food, the ceremonial ablutions and changing of raiment, the disposal of the dead and the relation of the sexes, have all been made a part of their religion. By this means they have quite unconsciously and without general education always enjoyed advantages, such as modern science is now giving to other peoples by raising and adding to their general knowledge. As to the converse of this being true for the second column, and perhaps accounting for its unenviable position, I will say nothing.

Russian civil state extracts give Jews a mortality of 16·1, whilst that for the whole kingdom is 26·2. No reliance can be placed on these figures as correct, but they are probably fairly proportionate. I only quote them because the number of Jews in Russia is so large.

We may, I think, accept the fact of the longevity of the Israelitish race being quite above the average. If so, then we have a people, living under the most varied conditions, exhibiting the proof to us that there is a factor,—heredity or race—which can rise superior to environment in the determination of longevity.

It is, we must remember, a factor which takes time to make itself felt, for we know that when individuals of a race are put, and kept, under a different environment, the earlier generations suffer an increased death-rate, and it is only the very fittest that survive. Why do Anglo-Indians send their children back home whenever possible? It is not only for education, but because they become weedy and sickly, and die in large numbers if kept in India.

A table in the U.S. census 1900 illustrates this greater frailty of the early generations very clearly.

TABLE XVI.

COMPARATIVE MORTALITY OF NATIVE AND FOREIGN WHITE POPULATION.

CENSUS 1900. RATES PER 1000.

Ages.	Pure Native Stock.	Mixed Native and Foreign Stock.	Pure Foreign Stock.
0—4	45·0	53·3	*
5—14	3·9	3·9	3·8
15—24	5·5	6·1	5·6
25—34	7·1	10·4	8·2
35—44	8·7	12·6	11·6
45—64	17·4	18·8	25·8
65 upwards	80·4	87·6	90·3

* The number of foreign born was too small for the calculation of accurate rates.

U.S. CENSUS OF 1890. DEATH RATES PER 100.

All whites...	20·22
Both parents native born	18·15
One or both parents foreign born	23·45

U.S. CENSUS OF 1890. AVERAGE AGE AT DEATH.

Both parents native born—	
Males	34·19 years
Females	34·95 „
One or both parents foreign born—	
Males	10·12 years
Females	11·28 „

These figures prove the greater mortality of the first generation, and this frailty would naturally only be overcome gradually, each succeeding generation suffering less than the one before.

The Jews have had a lengthened period in which to become acclimatised to their various surroundings, and so their race is found to have told on their comparative longevity wherever it can be tested. Their heredity has been assisted by another form of environment besides the hygienic uses of the Mosaic code, which, fortunately, no other white race has been subjected to,—namely systematic persecution. They have from the days of their Egyptian bondage and Babylonian captivity, had to exist under the hardest conditions, often being subjected to slavery, privation and enforced labour, crowded together in ghettos, robbed and maltreated. All these afflictions have weeded out their weakest members and so bestowed upon them in the long run, a toughness, a vitality, a resistance to disease, a clearness of intellect and keenness of perception, which we must all have noticed for ourselves. Attempted persecution of other races has always ended in fighting, when the strongest and fittest are killed off, but with the Hebrew it is not so; he does not fight, he suffers, and has for his reward a heritage of longevity which has become proverbial.

Turning from consideration of the same race under varying conditions, can we learn anything from the study of different races living under the same environment? The immigrant races that have peopled the United States, afford us the only example for which any statistics are available, and they are very interesting.

The coloured race has been there long enough to become acclimatised, and has, by not inter-marrying to any extent with whites, been kept pure.

We must therefore conclude that its race-longevity, and resistance to disease is poor. It shows itself in a very marked manner, when contrasted with that of the white population.

TABLE XVII.

COMPARATIVE MORTALITY OF WHITE AND COLOURED POPULATION.
U.S. CENSUS 1900. PER 1000 OF POPULATION.

Ages.	White.	Coloured.	* Relative Mortality of Coloured Population.
0—4	49·7	118·5	237
5—14	4·1	9·8	240
15—24	5·9	15·6	260
25—34	8·6	16·9	196
35—44	11·1	21·0	190
45—64	21·5	37·6	170
65 upwards	86·0	108·6	126

* Relative number of deaths among the coloured population to every 100 deaths among the same number of the white population.

Other races or nationalities contrasted in the same way present much more favourable mortality.

TABLE XVIII.

COMPARATIVE MORTALITY OF THE PRINCIPAL NATIVITIES. *
U.S. CENSUS 1900. RATES PER 1000 OF POPULATION.

Ages.	U. S. White.	German.	Irish.	Scandi-navian.	Italian.	Polish.
0—4	43·0	47·6	56·1	37·0	80·7	36·7
5—14	3·7	3·7	4·5	3·7	4·9	2·0
15—24	5·0	4·8	7·5	5·7	6·6	2·7
25—34	6·4	7·4	12·2	7·4	7·1	3·5
35—44	7·5	9·6	15·0	9·0	9·2	5·0
45—64	14·6	20·3	30·6	16·9	17·2	9·7
65 upwards	65·9	81·8	96·9	67·3	66·1	40·9

* The nationalities are taken from the birthplace of mother.

TABLE XIX.

COMPARATIVE MORTALITY FROM CERTAIN DISEASES.
U.S. CENSUS. RATES PER 100,000 OF POPULATION.

	Ages.	U.S. White	U.S. Colrd.	Germany	Ireland	Italy.	Poland
MALARIAL FEVER.	15—24	4·2	48·7	4·7	4·3	3·7	1·5
	25—34	3·2	32·6	3·6	3·2	5·4	1·6
	35—44	3·0	34·3	3·6	2·4	1·5	—
	45 upw'ds	8·2	77·4	10·5	13·3	12·0	3·2
CONSUMPTION.	Under 15	27·5	246·0	26·6	42·2	50·7	11·4
	15—44	162·5	587·4	205·9	428·0	149·9	67·4
	45—64	131·8	518·0	207.5	340·9	157·0	103·9
	65 upw'ds	176·4	548·7	235·3	324·7	144·7	243·2
CANCER & TUMOUR.	45—64	155·3	159·0	238·6	232·2	119·4	92·3
	65 upw'ds	374·9	290·6	561·5	479·9	392·7	263·5
DISEASES OF WOMEN.*	15—44	12·5	36·6	15·2	13·2	25·5	8·1
	45—64	19·4	35·8	18·1	12·4	24·0	9·2
	65 upw'ds	14·8	20·7	16·5	17·8	—	—

* Per 100,000 of female population.

The latter tables, XVIII. and XIX., accentuate what has previously been stated with regard to longevity and resistance to disease of the Jewish race, as the vast majority of the Polish emigrants to the States are Jews. With this exception, the figures prove that races which are new to their environment show a greater mortality than the white race that has become acclimatised. We must not lose sight of the fact that the figures on Table XVIII., as regards

the foreign stocks, refer to the first generation only, and we see by Table XVI. that this generation has an increased vulnerability. When later they become merged with the general population, this greater mortality disappears and the resulting white population presents a resistance and a longevity which compare very favourably indeed with the mortality of the original stocks from which it is made up.

These data give I think a basis for summing up generally the relative position and value of race and environment in their influence on longevity.

Environment is the immediate factor, and makes itself most felt and evident at once. It also acts more remotely in that it weeds out the unfit and weakly, and so improves the stock of any race.

Race is the remote and determining factor which can and does predominate any environment for greater longevity (*e.g.*, Jews) or for lesser (*e.g.*, Negroes), when compared with the mass of the population under the same environment.

The question how far race itself is only the effect of environment acting upon countless generations, really does not concern us practically. Races are, for our purpose, differentiated sufficiently, and what we want and hope for, are accurate statistics of mortality of all nations and races. When we have these we shall possess something far more definite to work upon when making our insurance forecasts, than we have at present.

I am indebted to Mr. F. L. Hoffman, Statistician, Prudential Life Assurance of America, for the tables extracted from the U.S. census.

DISCUSSION.

THE CHAIRMAN: I am sure the Society is very grateful to D Jossé Johnson for his elaborately worked out paper on a very im portant subject. As the time for closing the meeting is very nea I will only refer to one passage near the commencement of th paper, namely, where the author says: "Frequent bathing is mor a question of custom than we are inclined to think at first, and it effect on longevity is over-rated." But is it, and has it ever beer over-rated? There is an old proverb (I do not know who was th author)—a Latin hexameter line: "*Balnea, vina, Venus, corrumpun corpora nostra*," which may be translated: "Baths, wine, and women destroy our bodies." Of course, the explanation of tha saying is not difficult to see. In late Roman times baths went hand in hand with increasing luxury and with the degeneration o the ruling classes. Even nowadays I suspect that many people feel an excessive desire for baths because they habitually indulge some- what too much in the way of eating and drinking. That, I believe, amply accounts for so excellent an institution as bathing not appearing to favour longevity.

DR. THEODORE WILLIAMS: There is much material for comment in this paper, and I think it is a pity not to spend a little time to- night in its discussion. I therefore propose that we prolong the meeting for half an hour for that purpose.

(After a short discussion the prolongation of the meeting was agreed to.)

DR. THEODORE WILLIAMS: As I proposed the prolongation of the meeting, I suppose I must say a few words by way of opening the discussion. I need hardly say that I have listened with the greatest interest to the paper. It is crammed full of information, gathered from many parts of the world, and put together in a very

concise form. As we see by the volumes of statistics the author has shown us, he has read a good deal and translated many tables, and put into the paper a large amount of work—so much, indeed, that it struck me, when I read the proof that was sent round to the members, there was quite enough material for two papers, if not more.

With regard to the paper generally, there is one trouble that afflicts all our papers, and it is this. In insurance work we have to deal, practically, with the upper classes, *i.e.*, those who are able to afford insurance. Certainly some offices deal with the lower classes, but the great mass of our insurance work is done in connection with what I may call the privileged classes, and our insurance statistics relate chiefly to that class. On the other hand, all our public statistics with reference to birth-rates, death-rates, and so on, deal with the whole people, the great mass of whom are the working classes. We have always to meet that difficulty. Whether it is the birth-rate or the death-rate, the working-class population forms so large a majority that public statistics practically deal with the life of the working population and not with that of the privileged classes. Of course, we cannot blame Dr. Johnson for that, because such information is all we can get at present. The statistics we get from the Insurance Offices on assured lives are more valuable for our purposes.

With regard to the main question, that of heredity, I think there is a great deal in heredity, but as Dr. Johnson says, it is very difficult to discover its exact bearing. Certainly with regard to the Jews it makes its effect felt; there is no doubt, I think, that they have, through years of persecution and hard living, rid the race of some of its weakest features, and developed a comparatively strong and hardy people.

As to the many subjects dealt with, I might be allowed to say a word on physical development as shown by height, weight, and chest measurement. I was not aware—and I am glad to be told—that height and chest measurement in the British people are not, as we have generally thought, in advance of Continental nations.

According to the author, this is connected with the subject of military training. I am sorry to hear that, but if it is so, it is a very strong argument, it seems to me, in favour of taking up the military training of our young men. It was most interesting to hear of the German methods of measuring up their candidates and the great proportion that are larger round the stomach than round the chest. One of the great features in chest measurement amongst mountain races is its great size. I have examined many mountaineers and collected a good deal of information about hill races. Amongst the guides of Chamonix I found enormous chest measurements, 42 inches and 43 inches being quite common, and in some cases even more. They were, it is true, selected men and some of the best guides in the district. Looking through some of the measurements of the Army Service in Switzerland, I was also astonished at the large chest measurements that were tabulated. Large chests have been noticed, too, in the Himalayas and in the Andes, and amongst other mountain races. This large chest measurement is due possibly to continual inhalation of rarefied air; these races breathe rather faster than people of the lower lands, and in time the lungs become expanded and a certain amount of hypertrophy takes place.

You do not get emphysema under those conditions. In these mountaineers it was all genuine lung hypertrophy.

The Chairman: I take it the enlargement of the chest in emphysema is a compensatory hypertrophy. People with emphysema get their chests enlarged by fighting against the disease.

Dr. Theodore Williams: That is no doubt true, but in the case of diseased lung, the enlargement is due to the formation of emphysema; in the case of healthy lung, to the formation of hypertrophy. I should like now to say a few words with regard to the figures given for the various countries. In Norway you see a wonderfully low death-rate, and we have to discover the causes. In the first place, the Norwegians, with the exception of the few

residing in Christiania, live in the country. There is hardly such a thing as a town in Norway. The villages are composed of a collection of wooden huts, chalets, and there is very little brick or stone used in building. Living in the country, they no doubt live very healthy lives. The early mortality I expect is due to pneumonia or something of that sort—I have never made out really what it is. The whole population, as I say, lives in the open country; outside Christiania there is hardly a town of any size, for Bergen and Christiansund are quite scattered places. The Swedish figures are not quite so good. In Sweden they have factories, which Norway has not got. There is also a greater aggregation of the population in some parts of Sweden, though not an excessive aggregation. When we come to Holland it is rather startling, and I confess I do not see why Holland should have such a low death-rate. The only thing I can urge, in addition to what has been said already, is that the Dutch are wonderful people for living well, and that the wealth of the country is very much more evenly divided. There is very little poverty in Holland. When Charles II. was in exile there, the talk turned once upon Holland being overwhelmed by the great French marshals, and Charles said, "Providence will always take care of Holland because she is so good to her poor." That is true to-day; she is exceedingly good to her poor. The Dutch people are very philanthropic, and there are no really very poor people, or very few, and the nourishment of the lower classes is better than it is in this country. That is the only explanation I can give. The climate is very bad; in some parts there is a good deal of malaria. The water supply is well attended to, because it is vital to them to have good water, and probably that has some effect. Belgium I am afraid I cannot explain, and I do not quite accept the explanation of the author. I know Belgium very well; I have lived there for long periods at various times and have gone a good deal into some of the municipal questions. I have always understood that the two races were very distinct and rather held apart. I think the author is quite right about the stress of life in England; yet we come out uncommonly well.

With regard to southern countries, I think it is not wonderful

that their mortality is high, looking at the lack of hygienic principles in the conditions under which they live. The only thing in their favour is that they live a great deal in the open air, more so than the northern people.

In conclusion, I must express my obligations to Dr. Johnson for his kind mention of my name in the paper and for giving us such an admirable contribution, because he has carried out what I hoped would come when I read my paper. I hoped it would evoke some information on this great subject, and Dr. Johnson's paper is a very good instalment. I look forward to further contributions on the same subject, so that we may gain in time a body of valuable information of great assistance to us when dealing with the lives of other than British citizens.

Dr. Hingston Fox: The subject of this valuable paper is new to our Transactions. It covers a wide range, and the material has been collected, I am sure, with much labour. I hope it will be followed in the future by further work in fuller illustration of the matters contained in it. In offering criticism on some points, I would plead in the first instance for a fuller description of some of the statistical tables, making it clear whether both sexes are included, and quoting authorities for the returns given. I do not know whether Mr. Smee's table, compiled when he was at the Gresham office, refers to assured lives only. [Dr. Johnson dissented.] I cannot follow the author's view on the subject of diet. He thinks that what each country has found to work best in practice is the most expedient. That implies an unlimited choice, but as a matter of fact we known that climatic and other conditions govern the range of diet available. I may illustrate this by extreme cases. The dwellers on the ice-bound coasts of Labrador or on some ocean island, have little choice. It is necessity rather than choice which fixes their diet for them, and so in a lesser degree in other cases. Hence food may play an important part in that environment which determines the comparative mortality of different nations. Then the author laid stress on vital elasticity as a cause or con-

omitant of over-average longevity. Now I do not think that such ongevity is necessarily associated with much vital activity, with ctive or successful lives, or even with vigorous or healthy lives. That may seem a startling statement. Let me justify it. I have been making some pedigree researches during the last two or three ears, and I will mention two types of life that one finds amongst thers in family histories. There is one type of a person of some orce of character, who succeeds in the struggle for existence, making is own position in life, and showing much vital energy, or vital lasticity, to use the author's phrase. He marries young, and has large family, and his children also show vigour and activity and nake their mark in the world. This type of man does not live to old age: he dies at 55 or soon after 60 years. I do not say that all nen who shew these qualities die thus early, but I have found a lass of whom that is true.

Dr. Johnson: Will you define what you mean by vital elasticity, nd let us see whether we mean the same by it? What I mean is he amount of life that a man has in him, not the movement he is apable of. Your type of man uses up his vital activity in rearing is family, and in his work.

Dr. Hingston Fox: Vital elasticity is surely closely connected with vital force, and with that adaptation to, and control of, nvironment which brings success in its widest sense. Well, then, find in pedigrees a second type of men, who shew over-average ongevity. Their life, instead of having a wide range, and displaying orce and activity, pursues a comparatively monotonous course, with narrow range of action. Such persons often do not marry, or hey marry late, and have few children or none, and they live their uiet and uneventful life to an advanced age, exhibiting, I should ay, very little vital elasticity. I am aware that there are others in whom a very active life is compatible with great longevity, but I m describing a type which is a common one. Take again the nmates of workhouses and asylums, who live so long. Is it by irtue of vital elasticity, or is it not rather due to a uniform and

undisturbed life, in which such elasticity is absent? I pass from that point. With regard to the statistical tables, I would submit that some of them have but little bearing on the particular enquiry to which this paper is devoted. The death-rate at all ages is a very imperfect and fallacious guide to the longevity of a community, at any rate to the longevity of adults, which is what concerns us in relation to life assurance work. Infantile mortality is quite irrelevant. What are really to the purpose, and have been given by Dr. Johnson in Tables VII. and VIII. are the death-rates at various adult ages in different European countries. From these the comparative longevity of the nations can fairly be inferred, and the author has earned our thanks for collecting the returns, and putting them before us in this clear form. Then the author uses the expression "medium duration of life," a new phrase to me; is it equivalent to mean duration of life? If it is calculated from the ages at death given in the text, it is not the mean duration of life, but the mean age of death, which is a different thing.

Dr. Johnson: That is what it should be. I translated the phrase from the Spanish, where I found it.

Dr. Hingston Fox: With regard to the table of density of population, we should take into account not merely the density but also the distribution. For example, there are some countries in which, although the density of population is great, the inhabitants are well distributed over the land. I think that this applies in some degree to Holland and even to Belgium, which come low down in Dr. Johnson's table. We should expect to find a lower mortality here than where the density of population is attended by the aggregation of the inhabitants into large centres.

The comparison of the mortality statistics of various countries, as laid before us in the paper, is of great interest. But there are so many factors to be taken into account that one can draw safe conclusions only with much caution. Let me give one or two illustrations. With regard to Norway, the considerably increased mortality between the ages of 20 and 35 years, contrasting with the

lower mortality at more advanced ages, suggests to me the influence of emigration. We know that a great many, perhaps most, of the younger and more active men leave the sterile Scandinavian soil for other countries, especially across the Atlantic, where they can get more scope for work. Now if a selected and picked class of young adults go away, that which is left behind at these ages has a lessened average resisting power than that which is normal for the race; sufficiently less, I should say, to increase the mortality at that epoch of life. The increased mortality reported from France during the quinquenniads of age between 20 and 40 years has been attributed with some probability to a question of "morals." Let me put it this way. We have the fact of a very low birth-rate. By some cause or causes the normal sexual activity of the French people is disturbed or disordered, so that this low birth-rate is produced. During the age-period of sexual activity we find an increased death-rate. Does this not suggest that these causes, whatever they are, act prejudicially upon the average physical resisting power of the population at these ages, so as to give them a higher mortality than those of the same age in other countries? In regard to Belgium, I agree with Dr. Theodore Williams. The line of demarcation between the Flemish and Walloon provinces is so fairly clear as to invalidate, I think, Dr. Johnson's theory of a cross between the two races. But we owe the writer of the paper hearty acknowledgments for the way in which he has brought the subject before us.

Dr. Jossé Johnson, in reply, said: My intention when I wrote this paper was not to talk of insurance mortality alone. It was impossible to do so if I tried to consider usefully what was put in my mind by Mr. Shillitoe. He said to me that now and again foreigners, Hindoos and Parsees, came to be insured, and asked how one was to judge a case of that sort, as there were no insurance statistics. That is perfectly true; there are none. One has to go outside insurance statistics to find out how much that life is likely to be worth, and you can only estimate its value from general, and

not insurance, statistics. But if you are dealing with the upper classes in England and you have only to adjudicate upon such lives, I envy you exceedingly, for you have something solid to go upon; you have the insurance statistics which have been gathered from all Insurance Offices for years past, and your forecasts are by the law of averages rendered practical certainties. But when one has to recommend upon these untabulated lives it is quite another thing. Then, I would find out that the open-air life will not account for the whole of the good mortality in Norway, because when we find them transported across the seas, no matter where they go, the Scandinavian race seems to come out next to the Jews as the most long-lived. Other peoples enjoying equal natural advantages (*e.g.* Swiss) have not so good a mortality. It is not only in their own country that they live for a long time.

Dr. Theodore Williams: I think there is something in that, but you see in America they largely take up ranges and farms and that sort of thing and still live the open-air life. Some, it is true, go into factories, but most of them are in the open-air. I have come across large settlements of them in the United States. It is supposed that there are more Norsemen in the United States than there are in Norway at the present moment, or about 2½ millions in Norway and about 2½ millions in the States.

Dr. Johnson: I forget exactly whether it was Dr. Williams or Dr. Hingston Fox who made a remark about the choice of diet in each country. My words were that "I think we may allow that what each country has found to work best in practice within its own boundaries is probably the most expedient for its inhabitants." I was not thinking of outlandish countries where practically we do not insure people at all or where they are cut off from ordinary things. But probably even there it would be more expedient to eat what there was than to starve, and certainly more conducive to longevity. I was thinking of the difference in diet between an Englishman who eats for the most part flesh food and the Italian

who eats very largely farinaceous food. They find that such food is better for a hot climate; they have better health, and they can do more work with it, while we find in this country that we can do better on a beef steak. That is all I meant by the choice of diet. We may be sure that where there is a choice nature will point out to the man, and not always gently, what is best for him. With regard to vital elasticity, by that I mean that stock of vital force which each man has in him. He may use it up rapidly or slowly. He may in the workhouse lead a regular life and use it up exceedingly slowly or he may get an annuity and use it up more slowly still. He may expend it more quickly by a vigorous and active life or by excesses of any kind, either laudable or vicious. Nature takes no count of motives. As to the tables, except where otherwise stated, they refer to whole populations, therefore to both sexes. They have no relation, as I said before, to insurance statistics; they are pure demography as far as I have been able to gather them together. With regard to some of the tables being irrelevant to the matter, or some of the death-rate tables being irrelevant, I cannot agree, because when statistics are collected at all, the first thing any country does is to collect its death-rates. You get those in a reliable form long before you get the deaths in age periods, or mortality tables, and if we find, by comparing reliable mortality tables as we get them with the death-rates of the same country that they are related in various ways and correspond in many particulars, especial points, and beyond certain ages, we have at any rate some sort of lead when we first go into a country where the death-rates are the only statistics available. I am quite at one with Dr. Hingston Fox as to the death-rate in the early ages in France. I have not the least doubt myself that it has to do with what we are pleased to call "morals," as I put it, that is to say, the sexual function. I fancy Dr. Williams was mistaken in thinking that I put France in the death-rate above England.

Dr. Theodore Williams: I referred to the second column.

Dr. Johnson: I made a great mistake if I did.

Dr. Theodore Williams: I was referring to the sequence of death-rates. Great Britain is 6.

Dr. Johnson: And France is 11.

Dr. Theodore Williams: I beg your pardon.

Dr. Johnson: I am very much obliged to you for the kind hearing you have given me in the matter of this very lengthy paper. I hoped to have had a great deal more time because there are many important points I should like to have mentioned with regard to the statistics of the different countries of the Continent, and why so many of those statistics are unreliable. The absolutely unreliable one is Russia. Bulgaria and Turkey, anything from Greece and Servia, and certainly anything in the Balkans or east of Hungary, are so partial as to be quite unreliable. Hungary itself is fairly good, and publishes very elaborate statistics, but when I tell you that more than one-third of the persons the causes of whose deaths are calmly put into the statistics are not medically certified by a doctor at all—the cause of death being stated by some relative or friend—you will gather how reliable they are. It is well to receive with great caution statistics of any country where the generality of the people do not have any proper means of recording the dates of birth. Individuals soon get foggy about their own ages and know actually nothing about parents and progenitors. Hence have arisen the myths one so often hears about the number of centenarians in some Eastern countries.

The meeting then adjourned.