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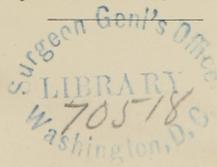
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MEDICAL STATISTICS.

PRELIMINARY REPORT
OF THE
MORTALITY EXPERIENCE
OF
THE MUTUAL LIFE
INSURANCE COMPANY OF NEW YORK.

FROM 1843 TO 1874.

BY G. S. WINSTON, M. D., AND E. J. MARSH, M. D.,
Of the Medical Department.



New York:
PRINTED BY ORDER OF THE BOARD OF TRUSTEES.
1875.

Entered, according to Act of Congress, in the year 1876, by
THE MUTUAL LIFE INSURANCE COMPANY OF NEW-YORK,
In the Office of the Librarian of Congress, at Washington.

To the Policyholders of The Mutual Life Insurance Company of New York, and the Public :

The present report of the experience of this Company, is the continuance of a design begun eighteen years ago. We then printed a volume compiled from our own experience and arranged by James Wynne, M. D., with some other matter bearing upon this subject.

In 1859 we published the experience of the Company for the first fifteen years of its history, from the records of the actuarial department.

The present publication is from the Medical department of the Company, and covers its entire mortality experience from 1843 to 1874.

Great professional tact and skill have been displayed by the Medical gentlemen whose names are signed to this report, in the arrangement and scientific classification of this mass of valuable material; and the results of their labors are most satisfactory to, and duly appreciated by, the Board of Trustees. These gentlemen have not only achieved results which are highly creditable to themselves, but which cannot fail to be serviceable to the Company in its future business. Their labors cover a period of an entire human generation, and embrace over 100,000 insured lives, with family histories, habits, occupations and other interesting points of vital statistics; all of which must have a special interest for persons engaged in life assurance.

The value of such full analyses and classifications of the results of experience must be apparent to all life insurance companies.

Life assurance, though largely developed, is yet but an experimental business in this country, in consequence, not only of the magnitude of the area over which policies are issued, the variety of climate, of occupations and habits of the people, but especially of the comparatively short period since 1843, when it began its active career.

Our actuary, Professor Bartlett, is engaged, with his staff, in preparing a reliable report of the experience of the Company from the records of his department, which will be published as soon as completed.

The two reports, that now printed by the Medical department, and the one from the Actuarial department, when published, will embody facts of the most important character for the attention and guidance of the Company in its future operations.

The following information, furnished by the Actuary, is very valuable, as showing the extent of the field in which the facts reported upon by the medical department transpired.

EXPERIENCE FROM BEGINNING—1st FEBRUARY 1843, TO THE 31st DECEMBER 1873,—
30 YEARS AND 11 MONTHS.

Number of lives insured.....	101,967
Number who have died.....	5,385
Number living in the Company at end of 1873.....	68,688
Number of years of life lived in the Company in the interval.....	578,112½
Average age at entrance of those now living.....	35 ³ / ₁₀

F. S. WINSTON, *President.*

PRELIMINARY REPORT.

F. S. WINSTON, Esq.,

President of The Mutual Life Insurance Company of New York.

SIR:—Having been instructed by you to collate the mortality statistics and records of deaths that have occurred among those insured in The Mutual Life Insurance Company since its foundation, and to arrange them in tabular form for convenience of reference, and to deduce such lessons as this experience of the past might teach for future guidance, we now submit some general tables and observations upon them.

The total number of assured lives to the end of 1873 is 101,967. There have died during the same period 5385, or five thousand two hundred and twenty-four males, and one hundred and sixty-one females. The cases of females are given in the first table while the subsequent ones include the males only. The females will be considered on a future occasion. We have omitted them in the general tables because they are few in number; and yet might, to some extent, if included, change the proportional mortality from different diseases, as they occur among males.

Table I. gives a list of causes of death, and numbers dying from each cause. The total numbers are subdivided into series of one thousand cases each in chronological sequence. This division was employed at first under the idea that errors could thus be more

easily avoided or discovered, and also that this chronological arrangement might show what, if any, difference existed between the experience of the first and last thousand losses of the company. By this subdivision some facts in the history of the company are prominently shown. For example: the numerous deaths from yellow fever, in the earlier years, when more insurances were taken in the Southern States; the epidemics of cholera; the losses from this disease, dysentery, and by casualty at the time of the first California emigration; the deaths from war casualties, diarrhœas and dysenteries, contracted in the army, as shown in the second series; and in the more recent series, the late epidemics of smallpox and cerebrospinal fever. The most important lesson, however, to be learned is the fallacy of basing conclusions on too small numbers, as is evidenced in the extreme variations in the occurrence of the common diseases; as, cholera morbus occasioning *ten* deaths in one series, and *two* in the next; erysipelas giving *ten* deaths in one series, and *nineteen* in the next; and similarly of many others.

In arranging the list of diseases, the classification is nearly the same as that known as Dr. Farr's, and used in the mortality statistics of the Board of Health of New York City, Brooklyn, and many other cities. The classification of the London College of Physicians was followed in the reports of the last United States Census, but is not yet generally adopted. It is very similar to Dr. Farr's, and could be easily substituted if desirable.

TABLE I.

TABLE OF DEATHS occurring in the MUTUAL LIFE INSURANCE COMPANY, from 1843 to 1873, inclusive, showing Causes of Deaths and Number Dying of each Cause, arranged in Chronological Series of 1,000 Cases.

DISEASES.	TOTAL.	I.	II.	III.	IV.	V.	VI.	FEMALES.
	1843-'73	1843-'62	1862-'68	1868-'70	1870-'71	1871-'73	1873	
TOTAL.....	5,224	1,000	1,000	1,000	1,000	1,000	224	161
Smallpox.....	38	4	8	3	6	17	..	..
Measles.....	1	1	..	..	..	..	..	..
Scarlet fever.....	10	4	2	2	1	1	..	1
Diphtheria and malignant sore throat	12	2	3	1	4	2	..	..
Typhus fever.....	30	12	9	3	3	2	1	1
— Typhoid fever.....	304	35	59	72	60	58	20	6
— Erysipelas.....	78	15	20	13	10	19	1	1
Pyæmia.....	11	..	..	2	4	5	..	..
Cerebro-spinal fever.....	22	..	3	..	1	15	3	1
Yellow fever.....	27	18	3	2	..	..	4	..
— Remittent fever.....	72	21	8	17	15	7	4	1
Intermittent fever.....	4	2	2	..	..	..	..	..
Congestive fever.....	37	7	11	7	4	4	4	3
Typho-malarial fever.....	3	..	3	..	..	..	..	..
Fever.....	28	12	4	4	4	4	..	2
Carbuncle.....	12	1	4	4	2	1	..	..
Influenza.....	1	..	..	1	..	..	..	..
— Dysentery.....	81	34	19	8	9	7	4	2
— Diarrhœa.....	53	18	19	5	4	7	..	2
— Cholera.....	67	43	16	5	1	1	1	2
Cholera morbus.....	22	4	1	10	2	3	2	2
Goitre.....	1	..	..	..	..	..	1	..
Malignant pustule.....	1	..	..	..	1	..	..	..
Glanders.....	1	..	..	..	..	1	..	..
Purpura hæmorrhagica.....	3	..	1	..	..	2	..	..
Alcoholism.....	31	9	5	8	4	..	5	1
Total Zymotic Diseases.....	950	242	200	167	135	156	50	25
Anæmia.....	7	2	4	..	..	1	..	..
— Cancer.....	91	7	20	17	16	27	4	..
— Dropsy.....	82	19	21	12	18	11	1	8
Gout.....	7	2	1	1	..	2	1	..
Rheumatism.....	20	4	2	3	8	3	..	1
Gangrene.....	4	..	1	1	..	1	1	..
Tubercular meningitis.....	1	..	..	..	..	1	..	..
Lumbar abscess.....	4	1	1	..	1	1	..	..

TABLE I.—(Continued.)

DISEASES.	TOTAL.	I.	II.	III.	IV.	V.	VI.	FEMALES.
	1843-'73	1843-'62	1862-'68	1868-'70	1870-'71	1871-'73	1873	
Scrofula.....	5	2	1	1	..	1	..	1
Tabes Mesenterica.....	17	3	6	2	4	2	..	..
Morbus Coxæ.....	2	1	..	1	..	..	..	..
Consumption.....	920	183	150	197	184	171	35	26
Total Constitutional Diseases.....	11,60	224	207	235	231	221	42	36
Apoplexy.....	307	58	50	58	57	69	15	6
Congestion of brain.....	110	23	19	16	26	21	5	1
Softening of brain.....	67	11	10	12	17	16	1	1
Paralysis.....	132	23	22	26	33	22	6	5
Disease of brain.....	82	16	19	13	21	11	2	1
Convulsions and epilepsy.....	32	5	12	6	6	3	..	1
Insanity.....	28	2	2	10	3	8	3	..
Anxiety.....	2	..	..	1	..	1	..	..
Fright.....	1	1	..	..	..	..	..	..
Encephalitis.....	64	9	7	19	13	13	3	2
Cerebro-spinal sclerosis.....	1	..	..	..	..	1	..	..
Cerebral embolism.....	1	..	..	..	..	1	..	..
Anæmia of brain.....	1	..	..	..	..	1	..	..
Effusion on brain.....	4	1	1	2	..	..	..	..
Neuralgia.....	3	2	..	1	..	..	..	..
Progressive muscular atrophy.....	2	..	1	1	..	..	..	..
Tetanus.....	..	..	..	..	..	..	..	1
Inflammation of spinal cord.....	4	..	1	..	2	1	..	..
Disease of spinal cord.....	7	1	2	..	3	1	..	1
Congestion of spinal cord.....	1	..	..	..	..	1	..	..
Total Diseases of Nervous System.....	849	152	146	165	181	170	35	19
Disease of heart.....	201	26	38	41	39	44	13	7
Peri-and endo-carditis.....	22	5	4	8	1	4	..	..
Hypertrophy of heart.....	17	5	5	2	3	2	..	..
Valvular disease of heart.....	12	..	..	10	2	..	..	..
Fatty degeneration of heart.....	13	1	5	3	..	4	..	..
Dropsy of heart.....	8	..	2	1	3	2	..	..
Rheumatism of heart.....	9	1	3	..	2	3	..	3
Atrophy of heart.....	2	..	..	..	..	1	1	..
Paralysis of heart.....	1	1	..	..	..	..	..	..
Abscess of heart.....	1	..	..	..	..	1	..	..
Angina pectoris.....	17	4	5	1	3	4	..	..
Aneurism of aorta.....	17	6	1	1	4	3	2	..
Rupture of aorta.....	1	..	..	..	1	..	..	..
Embolus of pulmonary artery.....	..	..	..	..	..	..	..	1
Phlebitis.....	4	2	1	1	..	..	..	..
Total Diseases of Circulatory System.....	325	51	64	68	58	68	16	11
Epistaxis.....	1	1	..	..	..	..	..	..
Disease of larynx.....	14	2	2	3	2	5	..	..
Bronchitis.....	47	11	5	10	10	10	1	2
Pleurisy.....	41	9	8	5	6	7	6	1

TABLE I.—(Continued.)

DISEASES.	TOTAL.	I.	II.	III.	IV.	V.	VI.	FEMALES.
	1843-'73	1843-'62	1862-'68	1868-'70	1870-'71	1871-'73	1873	
- Congestion of lungs.....	61	14	20	11	3	10	3	6
- Inflammation of lungs.....	388	36	72	61	87	115	17	15
Abscess of lungs.....	12	5	3	..	1	3	..	..
Hemorrhage of lungs.....	48	19	9	8	10	1	1	1
Disease of lungs.....	20	10	5	4	1	..	..	..
Emphysema and asthma.....	8	3	1	1	1	2	..	1
Pulmonary apoplexy.....	4	1	1	2	..	..	..	..
Gangrene of lungs.....	3	..	2	..	1	..	..	..
Edema of lungs.....	1	..	1	..	..	..	..	..
Total Diseases of Respiratory System	648	111	129	105	122	153	28	26
Inflammation of stomach.....	31	5	5	6	7	7	1	2
Ulceration of stomach.....	16	2	4	3	2	5	..	..
Disease of stomach.....	19	6	4	3	3	3	..	..
Hemorrhage of stomach.....	8	3	1	1	2	1	..	..
Congestion of stomach.....	1	..	..	1	..	..	..	..
Tumor of stomach.....	2	1	..	..	1	..	..	..
- Inflammation of bowels.....	94	25	24	17	20	6	2	4
Ulceration of bowels.....	16	6	3	1	5	1	..	..
Hemorrhage of bowels.....	16	5	4	4	1	1	1	..
Congestion of bowels.....	4	1	..	..	1	1	1	..
Disease of bowels.....	7	3	1	..	1	2	..	..
Obstruction of bowels.....	6	1	..	3	2	..	..	..
Perforation of bowels.....	2	..	..	1	..	1	..	..
- Peritonitis.....	57	4	9	11	11	16	6	4
Gastro enteritis.....	15	3	3	2	3	4	..	1
Disease of stomach and bowels.....	2	1	..	1	..	..	..	..
Hemorrhage ".....	1	..	..	..	1	..	..	..
Strangulated hernia.....	5	..	..	2	2	1	..	1
Colic, Tympanites and Constipation.	7	3	2	1	..	1	..	..
Dyspepsia.....	3	..	..	..	..	3	..	..
Gangrene of tongue.....	1	1	..	..	..	..	..	..
Stricture of œsophagus.....	1	..	1	..	..	..	..	..
Fistula in ano.....	2	..	..	..	..	1	1	..
Diseases of spleen.....	4	..	2	2	..	..	..	..
Leucocythæmia.....	2	..	..	..	1	1	..	..
Ascites.....	10	2	1	3	2	2	..	2
Abdominal tumor.....	2	1	..	1	..	..	..	..
Undefined diseases, abdomin'l organs	7	4	1	2	..	..	..	..
Jaundice.....	10	1	4	3	..	2	..	..
Inflammation of liver.....	31	2	5	7	12	5	..	1
Cirrhosis of liver.....	25	..	5	3	6	6	5	..
Abscess of liver.....	14	..	1	4	5	4	..	..
Disease of liver.....	45	5	9	11	11	7	2	1
Congestion of liver.....	10	4	1	1	3	..	1	..
Hypertrophy of liver.....	4	..	1	1	1	1	..	..
Acute yellow atrophy of liver.....	1	..	..	1	..	..	..	..
Fatty degeneration of liver.....	2	..	..	1	..	1	..	..
Biliary calculus.....	3	..	..	2	..	..	1	..
Obstruction of hepatic duct.....	1	..	..	1	..	..	..	..

TABLE I.—(Continued.)

DISEASES.	TOTAL.	I.	II.	III.	IV.	V.	VI.	FEMALES.
	1843-'73	1843-'62	1862-'68	1868-'70	1870-'71	1871-'73	1873	
Rupture of gall bladder.....	1	..	..	..	..	1	..	..
Total Diseases of Digestive System	488	89	91	100	103	84	21	16
Bright's disease.....	82	..	11	28	19	16	8	..
Inflammation of kidneys.....	8	1	1	3	..	3	..	..
Abscess of kidneys.....	2	1	..	..	..	1	..	..
Tumor of kidney.....	1	..	1	..	..	..	..	..
Disease of kidneys.....	53	5	10	6	17	13	2	1
Diabetes.....	40	6	6	6	12	9	1	..
Addison's disease.....	1	..	..	1	..	..	..	..
Inflammation of bladder.....	8	2	2	2	2	..	..	1
Disease of bladder.....	6	..	1	..	4	1	..	..
Hemorrhage of bladder.....	1	..	..	1	..	..	..	..
Rupture of bladder.....	1	..	1	..	..	..	..	..
Urinary calculi.....	2	..	..	..	1	1	..	..
Gravel.....	2	1	1	..	..	..	..	..
Disease of prostate gland.....	7	2	1	2	1	..	1	..
Stricture of urethra.....	3	1	..	..	2	..	..	..
Gangrene of scrotum.....	1	..	1	..	..	..	..	..
Total Diseases of Urinary System	218	19	36	49	58	44	12	2
Debility, Exhaustion and Prostration	61	8	16	11	12	11	3	1
Abscess.....	21	5	4	5	2	3	2	..
Hemorrhage.....	5	2	..	1	1	1	..	..
Tumors.....	7	..	1	..	3	2	1	2
Inflammation of joints.....	2	..	2	..	..	..	..	..
Old age.....	13	..	..	3	6	4	..	2
Total.....	109	15	23	20	24	21	6	5
Accidents and Injuries.....	357	60	90	74	70	51	12	2
Suicides.....	59	11	4	14	11	17	2	..
Total violent deaths.....	416	71	94	88	81	68	14	2
Cause unknown or ill-defined.....	61	26	10	3	7	15	..	2
Childbirth and Puerperal Diseases..	..	..	..	..	..	..	..	17

In stating these causes of death, due allowance must be made for their probable and almost necessary inaccuracies. Carelessness in making out the certificates of death, ignorance on the part of many practicing physicians, and unavoidable doubts, owing to the inexactness of medical science, and changes in medical nomenclature and pathology, all tend to render any such mortality tables incorrect

in many details. Still, as the same elements exist, and in probably the same proportions in all cases, they do not interfere with the comparison of reports gathered from various sources.

The first general class—zymotic diseases—has been the cause of nine hundred and fifty deaths, and of these, the first series of 1,000 cases, viz.: from 1843 to 1862, gives by far the highest proportion, on account of the losses from yellow fever, cholera, and dysentery, which have prevailed subsequently to a very limited extent.

Typhoid fever caused very few deaths in the first series, but afterwards rapidly increased; while malarial fevers have considerably diminished.

There have been thirty-eight deaths from smallpox, half of which occurred during the recent epidemic of 1872 and 1873. The percentage of this disease in the total mortality is small, but still we believe it could be almost entirely done away with by strict insistence on successful revaccination of applicants.

Twenty-two deaths by cerebro-spinal fever are recorded, almost all during 1872 and 1873. This number will probably be increased by a further examination of cases, some deaths from this disease having been ascribed to meningitis.

In the first and second series, 1843 to 1868, there is quite a large number of deaths from diarrhœa and dysentery, which occurred chiefly among the California settlers, and the soldiers in the late war.

Thirty-one deaths are recorded as caused by alcoholism, meaning thereby its immediate effects, intemperance, or delirium tremens. It would be extremely desirable to ascertain how far it was a remote cause of premature death, if this were possible, but it certainly cannot be done by an examination of the certificates of death. As the use of alcoholic drinks is believed by many to be a most important factor in abridging the duration of life, it is a matter for serious consideration whether we can obtain any valuable statistics from the company's

records and experience, by comparing the length of life, and cause of death, arranged according to the habits of the individual at the time of application, or through life when known.

The second class—constitutional diseases—caused one thousand one hundred and sixty deaths in all, with no special prevalence for any one series, though with some fluctuations. Consumption caused nine hundred and twenty deaths, cancer ninety-one, dropsy eighty-two, rheumatism twenty, and gout only seven deaths.

Consumption has been the cause of far more deaths than any other disease, giving a percentage of 17.61 of the total mortality, while deaths recorded under other headings, but properly belonging to this, would swell the number to 20 per cent. This is a very large percentage, but still much smaller than that occurring in the population at large. In the report of the Board of Health of New York City, for 1871, the mortality from consumption is given as 13½ per cent of the total. But this is not a fair comparison for insurance purposes, for the reason that the large mortality of young children, from their peculiar diseases, makes the percentage of the diseases of adults comparatively small. A calculation of the deaths of adult males, taken from the above-mentioned report, gives consumption a percentage of 30.17 on the total mortality for this period of life. Our percentage of 17.61 seems to compare favorably with this.

The deaths from cancer have been ninety-one, and those from dropsy eighty-two. Dropsy is properly only a symptom, though often given as the disease causing death; and whenever the real cause could be ascertained, the case has been referred to its proper head.

The deaths from diseases of the nervous system were eight hundred and forty-nine, embraced principally under apoplexy, paralysis, and softening, congestion and disease of the brain. We believe these terms are used synonymously by many physicians, and should, therefore, be calculated together in our general tables. However, we

have as yet considered them apart in most cases. This class of diseases appears to have increased somewhat, though not materially, in number during the last few years, probably because more elderly persons are insured now than formerly.

In twenty-eight cases, insanity is recorded as the cause of death, while in addition several other insane persons committed suicide, and their cases are recorded under this title. The prevalence of this disease appears, from the series, to be irregularly fluctuating.

Three hundred and three deaths are attributed to some form of heart disease, and seventeen to thoracic aneurism. The number of these has increased in frequency of late years, and probably for the same reason mentioned in diseases of the brain. In two-thirds of the cases, "disease of the heart" alone is stated, while in one-third the special form of disease is mentioned.

Six hundred and forty-eight deaths are recorded from diseases of the respiratory organs; of these, three hundred and eighty-eight cases were from pneumonia, and forty-seven from bronchitis. It is most probable that those diseases are often confounded in diagnosis and death certificates. The number of deaths from pneumonia has constantly increased with almost every series, from thirty-six in the first, to one hundred and fifteen in the last. We are entirely unable to account satisfactorily for this increase. The deaths from abscess of lungs, hemorrhage of lungs, and disease of the lungs should, probably, all be included under consumption; but, for the present, we have placed them with diseases of the respiratory organs.

Diseases of the digestive organs have caused four hundred and eighty-eight deaths. They are recorded under very many names, and different affections, the diagnosis of which must have been doubtful, so that, for any practical purpose, they must be collected in large groups. We find here an example of the change of nomenclature and pathology, viz.: "inflammation of the bowels," which is frequently recorded in the earlier series, while in the latter peritonitis takes

its place to a certain extent, both names evidently referring to the same affection.

There were five deaths from hernia, in only one of which it is recorded that there existed a hernia at the time of insurance.

Diseases of the urinary organs have caused two hundred and eighteen deaths. Eighty-two were from "Bright's disease," and fifty-three from "disease of kidneys." It is noteworthy that, in the first series, extending from 1843 to 1861, there is not a single case reported of death from "Bright's disease," and only five from "disease of the kidneys." This is not because the disease did not exist and cause death, but only that up to a very late period it was not generally recognized by physicians, and deaths now attributed to Bright's disease were formerly recorded as "dropsy," "convulsions," "congestion of brain," etc.

The number of deaths from accidents and injuries was three hundred and fifty-seven, of which the second series, 1862 to 1868, gives the largest proportion—ninety; among these are included twenty-nine killed in battle. These accidental deaths should be still further subdivided to show the kind of accident producing death, but we have not yet been able to make such a list, many of them being merely recorded as "accident" or "casualty." In the last two years the deaths from this cause have greatly fallen off in number. The total number of deaths from suicide has been fifty-nine. The last series gives the largest proportion, but this is probably an accidental occurrence, as there is no regular or gradual increase with each series.

There have been thirteen deaths from "old age," and all have occurred within a very few years.

In examining a record of deaths occurring in an insurance company, it will, of course, be remembered that this can give no idea of the actual mortality experience of the company compared to the total number insured. This proportion must be elsewhere ascertained.

We have to deal only with the dead, and those surviving are not taken into the calculation. We hope to learn from these records, however, at what age each disease is most to be expected in each section of the country; what diseases are to be anticipated and guarded against; what, if any, may be the difference between natives and foreign-born in respect to longevity; how long the influence of the medical examination of applicants effects the mortality among assured lives.

Furthermore, we can learn the effect of occupation, hereditary tendencies, and physical condition and configuration. The first portion of these enquiries we have attempted to elucidate, and have prepared tables showing the experience of the company in these respects. The results are not very marked in all cases, and, sometimes, of doubtful value on account of the small number of cases examined. In compiling these tables it has not been thought necessary to consider each disease by itself on account of the large number of diseases recorded, and often, the small number of cases of each one of them; but the more important ones have been tabulated and the others consolidated into the nosological classes to which they belong. We have thus formed columns of thirty-seven diseases, or groups of diseases, and afterwards again consolidated these into fourteen groups, and considered these in four ways: 1st, age at death; 2d, nativity; 3d, residence at death; 4th, year of insurance at which death occurs.

Beginning with the 1st, we have formed three tables, marked II. III. IV. and one colored diagram, V. Table II. gives the causes of death, and the number of persons dying at each year of life; Table III. grouped in decennial periods of life; Table IV. causes of death consolidated and ages grouped in decennial periods; and the colored diagram illustrates the last table.

The table of individual years is interesting, but when thus divided up, the figures are too few to lead to useful results. When consolidated into decennial periods they become far more regular in their course,

TABLE II.

AGE AT DEATH.	TOTAL.	Typhoid and Typhus Fevers.	Malarial Fevers.	Erysipelas.	Dysentery.	Diarrhea.	Cholera.	Alcoholism.	Other Zymotic Diseases.	Dropsy.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy.	Congestion of Brain.	Paralysis, Softening and Diseases of Brain.	Epilepsy and Convulsions.	Other Diseases of Nervous System.	Diseases of the Heart.	Other Diseases of the Circulatory System.	Pneumonia.	Congestion of Lungs.	Bronchitis and Pleurisy.	Abscess, Hemorrhage, and Other Diseases of the Respiratory System.	Diseases of Stomach.	Diseases of Bowels.	Peritonitis.	Diseases of Liver.	Other Diseases of Digestive System.	Diabetes.	Diseases of Kidneys.	Other Diseases of Urinary System.	Abscess, Hemorrhage, Old Age, etc.	Pecility, Exhaustion and Prostration.	Accidents and Injuries.	Suicides.	Cause unknown or ill-defined.			
TOTAL.....	5224	334	116	78	81	53	67	31	190	82	91	920	67	307	110	281	32	119	303	22	388	61	88	81	30	77	144	57	147	63	40	145	33	48	61	357	59	61		
18	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19	7	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20	12	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
21	9	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22	27	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
23	27	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24	50	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
25	47	12	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
26	55	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27	78	11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
28	69	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
29	110	11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
30	100	6	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
31	118	12	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
32	119	6	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
33	124	10	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
34	150	13	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
35	100	16	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
36	168	6	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
37	155	10	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
38	167	9	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
39	168	16	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
40	149	10	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
41	157	10	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
42	128	10	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
43	163	7	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
44	161	11	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
45	155	9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
46	167	13	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
47	159	10	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
48	151	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
49	119	9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
50	141	3	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
51	114	9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
52	134	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

TABLE III.

AGE AT DEATH.	TOTAL.	Typhoid & Typhus Fever.	Malarial Fever.	Erysipelas.	Dysentery.	Diarrhœa.	Cholera.	Alcoholism.	Other Zymotic Diseases.	Dropsy.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy.	Congestion of Brain.	Paralysis, Softening, and Diseases of the Brain.	Epilepsy and Convulsions.	Other Diseases of Nervous System.	Diseases of Heart.	Other Diseases of the Circulatory System.
TOTAL ...	5,224	334	116	78	81	53	67	31	190	82	91	920	67	307	110	281	32	119	303	22
Percentage ...	...	6.39	2.22	1.49	1.55	1.01	1.28	.59	3.64	1.57	1.74	17.61	1.28	5.88	2.11	5.38	.61	2.28	5.86	.42
18 to 29 yrs.	488	68	9	5	10	3	7	3	20	1	2	167	9	8	9	7	5	8	9	...
Percentage	9.34	13.93	1.84	1.02	2.05	.61	1.43	.61	4.10	.20	.41	34.22	1.84	1.64	1.84	1.43	1.02	1.64	1.84	...
30 to 39 yrs.	1,429	104	39	21	30	11	27	13	57	9	14	358	16	36	34	49	15	30	48	5
Percentage	27.35	7.28	2.73	1.47	2.10	.77	1.89	.91	3.99	.63	.98	25.06	1.12	2.52	2.38	3.43	1.05	2.10	3.36	.35
40 to 49 yrs.	1,509	96	38	23	24	14	20	12	58	31	17	263	14	105	40	70	5	42	71	6
Percentage	28.89	6.36	2.52	1.52	1.59	.93	1.33	.79	3.84	2.05	1.13	17.43	.93	6.96	2.65	4.64	.33	2.78	4.71	.40
50 to 59 yrs.	1,100	45	18	20	12	11	13	3	47	25	38	101	15	95	19	84	3	26	90	8
Percentage	21.06	4.09	1.64	1.82	1.09	1.00	1.18	.27	4.27	2.27	3.45	9.18	1.36	8.64	1.73	7.64	.27	2.36	8.18	.73
60 to 69 yrs.	541	19	10	9	4	8	...	...	6	15	18	25	8	53	6	54	3	12	69	3
Percentage	10.36	3.51	1.85	1.66	.74	1.48	...	...	1.11	2.77	3.33	4.62	1.48	9.80	1.11	9.98	.55	2.22	12.75	.55
70 to 79 yrs.	127	2	2	...	1	5	...	...	2	1	2	6	5	10	2	16	1	1	16	...
Percentage	2.43	1.57	1.57	...	.79	3.94	...	...	1.57	.79	1.57	4.73	3.94	7.88	1.57	12.60	.79	.79	12.60	...
80 to 91 yrs.	8	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...
Percentage	.15	...	...	...	...	12.50	...	...	...	...	...	...	...	...	...	12.50	...	...	...	...
Unknown	22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Percentage	.42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

TABLE III.—(Continued.)

AGE AT DEATH.	Total.	Pneumonia.	Concession of Lungs.	Bronchitis and Pleurisy.	Abscess, Hemorrhage, Old age, &c.	Other Diseases of Respiratory System.	Diseases of Stomach.	Diseases of Bowels.	Peritonitis.	Diseases of Liver.	Other Diseases of Digestive System.	Diabetes.	Diseases of Kidneys.	Other Diseases of Urinary System.	Abscess, Hemorrhage, and Disease of Lungs.	Debility, Prostration, and Exhaustion.	Accidents and Injuries.	Suicides.	Cause unknown or ill-defined.
TOTAL ...	5,224	388	61	88	81	30	77	144	57	147	63	40	145	33	48	61	357	59	61
Percentage	....	7.43	1.17	1.68	1.55	.57	1.47	2.76	1.09	2.81	1.21	.77	2.78	.63	.92	1.17	6.84	1.13	1.17
18 to 29 yrs.	488	20	4	5	10	4	2	15	9	1	4	1	6	1	1	4	48	2	1
Percentage	9.34	4.10	.82	1.02	2.05	.82	.41	3.07	1.84	.20	.82	.20	1.23	.20	.20	.82	9.84	.41	.20
30 to 39 yrs.	1,429	93	16	23	35	7	17	46	16	27	19	7	21	5	6	8	128	22	17
Percentage	27.35	6.51	1.12	1.61	2.45	.49	1.19	3.22	1.12	1.89	1.33	.49	1.47	.35	.42	.56	8.96	1.54	1.19
40 to 49 yrs.	1,509	116	14	22	25	8	19	37	17	61	16	18	38	3	15	13	112	15	11
Percentage	28.89	7.69	.93	1.46	1.66	.53	1.26	2.45	1.13	4.04	1.06	1.19	2.52	.20	.99	.86	7.42	.99	.73
50 to 59 yrs.	1,100	95	18	24	6	9	24	28	9	40	12	7	43	8	7	22	51	14	10
Percentage	21.06	8.64	1.64	2.18	.55	.82	2.18	2.55	.82	3.64	1.09	.64	3.91	.73	.64	2.00	4.64	1.27	.91
60 to 69 yrs.	541	49	6	10	5	1	11	17	5	17	12	5	30	15	5	11	14	6	....
Percentage	10.36	9.06	1.11	1.85	.92	.18	2.03	3.14	.92	3.14	2.22	.92	5.54	2.77	.92	2.03	2.59	1.11	....
70 to 79 yrs.	127	15	3	3	....	1	3	1	1	1	....	2	7	1	10	3	4	....	....
Percentage	2.43	11.81	2.36	2.36	....	.79	2.36	.79	.79	.79	....	1.57	5.51	.79	7.88	2.36	3.15	....	....
80 to 89 yrs.	8	....	....	1	....	....	....	....	....	....	....	....	....	....	4	....	....	....	....
Percentage	.15	....	....	12.50	....	....	....	....	....	....	....	....	....	....	50.00	....	....	....	....
Unknown.	22	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Percentage	.42	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

TABLE IV.

AGE AT DEATH.	TOTAL.	Typhus & Typhoid Fevers.	Other Zymotic Diseases.	Consumption.	Cancer.	Other Constitutional Diseases.	Apoplexy.	Other Diseases of Nervous System.	Diseases of Circulatory System.	Pneumonia.	Other Diseases of Respiratory System.	Diseases of Digestive System.	Diseases of Urinary System.	Accidents and Suits.	Unclassified (Including Old Age).
TOTAL.....	5,224	334	616	920	91	149	307	542	325	388	260	488	218	416	170
Percentage.....		6.39	11.79	17.61	1.74	2.85	5.88	10.38	6.22	7.43	4.98	9.34	4.17	7.96	3.25
18 to 29 years.....	488	68	57	167	2	10	8	29	9	20	23	31	8	50	6
Percentage.....	9.34	13.93	11.68	34.22	.41	2.05	1.64	5.94	1.85	4.10	4.71	6.35	1.64	10.25	1.23
30 to 39 years.....	1,429	104	198	358	14	25	36	128	53	93	81	125	33	150	31
Percentage.....	27.35	7.28	13.86	25.06	.98	1.75	2.52	8.96	3.71	6.51	5.67	8.75	2.31	10.50	2.17
40 to 49 years.....	1,599	96	189	263	17	45	105	157	77	116	69	150	59	127	39
Percentage.....	28.89	6.36	12.52	17.43	1.13	2.98	6.96	10.40	5.10	7.69	4.57	9.94	3.91	8.42	2.58
50 to 59 years.....	1,100	45	124	101	38	40	95	132	98	95	57	113	58	65	39
Percentage.....	21.06	4.09	11.27	9.18	3.45	3.64	8.64	12.00	8.91	8.64	5.18	10.27	5.27	5.91	3.55
60 to 69 years.....	541	19	37	25	18	23	53	75	72	49	22	62	50	20	16
Percentage.....	10.36	3.51	6.84	4.62	3.33	4.25	9.80	13.86	13.31	9.06	4.07	11.46	9.24	3.70	2.96
70 to 79 years.....	127	2	10	6	2	6	10	20	16	15	7	6	10	4	13
Percentage.....	2.43	1.57	7.88	4.73	1.57	4.73	7.88	15.75	12.60	11.81	5.51	4.73	7.88	3.15	10.24
80 to 91 years.....	8	.....	1	.....	.....	.....	.....	1	.....	.....	1	1	.....	.....	4
Percentage.....	.15	.....	12.50	.....	.....	.....	.....	12.50	.....	.....	12.50	12.50	.....	.....	50.00
Unknown.....	22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22
Percentage.....	.42	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....



and age will be found one of the most, probably the most, important factor regulating the causes of mortality. In all the most important diseases, the number will be found to vary directly with the age.

The total numbers do not thus vary, although the proportions do for the reason that the chief proportion of those insured and exposed consists of middle-aged persons.

The diseases which show the most marked variations in the number of deaths are typhoid fever, consumption, accidental deaths on the one hand, and cancer, apoplexy, heart disease, pneumonia and disease of kidneys on the other.

DISEASE.	18 to 29 years.	60 to 69 years.
Typhoid fever.....	13.93	3.51
Consumption	34.22	4.62
Casualties	10.25	3.70
	58.41	11.83
Diseases of nervous system.....	7.58	23.66
Diseases of heart.....	1.85	13.31
Pneumonia	4.10	9.06
Diseases of urinary organs.....	1.64	9.24
	15.15	55.27

These comparative proportions are well shown in the accompanying colored diagram, arranged for each decennial period, and in which the relative proportions of most diseases are seen steadily and regularly increasing or diminishing.

In estimating the comparative frequency and mortality of these diseases occurring in the different periods of life, it must be remembered that they do not at all represent the actual frequency at the age given, but only the proportion as a cause of death. The table does not show necessarily that typhoid fever is more prevalent or fatal among the young than the old, although this is true and proved by other calculations. It only shows that of an equal number of

persons dying at the respective periods of life from eighteen to twenty-nine years, and from sixty to sixty-nine years, there will be four times as many deaths from typhoid fever among the younger. Consumption kills one-third of those dying in early manhood, and only one-twentieth of those dying in advanced life, and yet the actual mortality from this disease is nearly, if not quite, equal for both periods, that is, when taken from equal numbers of those living or exposed at the given ages.

With advancing life new diseases and causes of death appear, and these not only increase the total mortality, but also change the relative proportion of the various causes of death. The same diseases may continue to exist and to exert their former influence, but the prevalence of the new diseases diverts our attention from them and appears to make them less frequent.

The diagram shows how large a proportion of the scale is taken up by fevers and consumption in the earlier decades of life, and how small a proportion by diseases of the nervous and circulatory systems.

These proportions are seen to be gradually reversed with increasing age, but this may be, and is to a very large extent, occasioned not so much by a diminution of the first-named diseases as by an increase of the latter.

Young persons do *not* frequently die of apoplexy, paralysis, heart and kidney disease, as these arise largely from the tissue degenerations and changes incident to old age, and consequently the causes of death at an early period of life will be some acute fever, accident or consumption. Old persons die in larger proportions than the young; many may die of old age, and a few of consumption, and still the proportion of those dying of consumption, calculated on the number living, may be equal in both cases, though the percentage of deaths from this disease on the total number in the one case may be very large, and in the other very small.

This is a very important consideration, and often overlooked both by insurance companies and the profession, especially with regard to consumption, which has come to be considered by physicians and laity as a disease of youth, while for those past forty years of age it is thought the danger from this cause is comparatively slight.

In the experience of this company there have been 525 deaths from phthisis in persons under forty, and 395 above that age.

We have not yet been able to find or construct a reliable table showing the number of deaths from consumption in the population at large during each decennial period of life, but a few rough calculations that we have made indicate that deaths from this cause are of nearly equal percentage at all ages.

Dr. Fuller says that it is quite prevalent at advanced life. Dr. Chambers in his "*Decennium Pathologicum*" shows the same, and Dr. Sieveking, in his recent work on Life Insurance Examinations, says that Dr. Chambers' researches "prove that youth is not to be regarded as the harvest time for consumption, and that the proportionate mortality from that disease does not vary between the ages of fifteen and seventy as much as is generally supposed." And again, "we would warn the medical officer against yielding to the popular impression that this inquiry" (into hereditary tendency to consumption) "becomes unnecessary after full manhood is reached, as the danger of phthisis continues beyond the age of sixty." In the very last medical publication on Life Insurance, an examination of the causes of death in the Scottish Widow's Fund Life Assurance Society, Dr. Begbie says that in this experience "of 145 deaths from consumption as many occurred above as under forty years of age. * * It is worthy of remark that of the eleven members of this society whose death occurred from consumption above sixty years of age, only three had entered at the average age of insurers; the remaining eight insured above thirty-five, six of the eight above forty and two of the six above fifty." We have made these quotations and dwelt thus fully on this subject because we

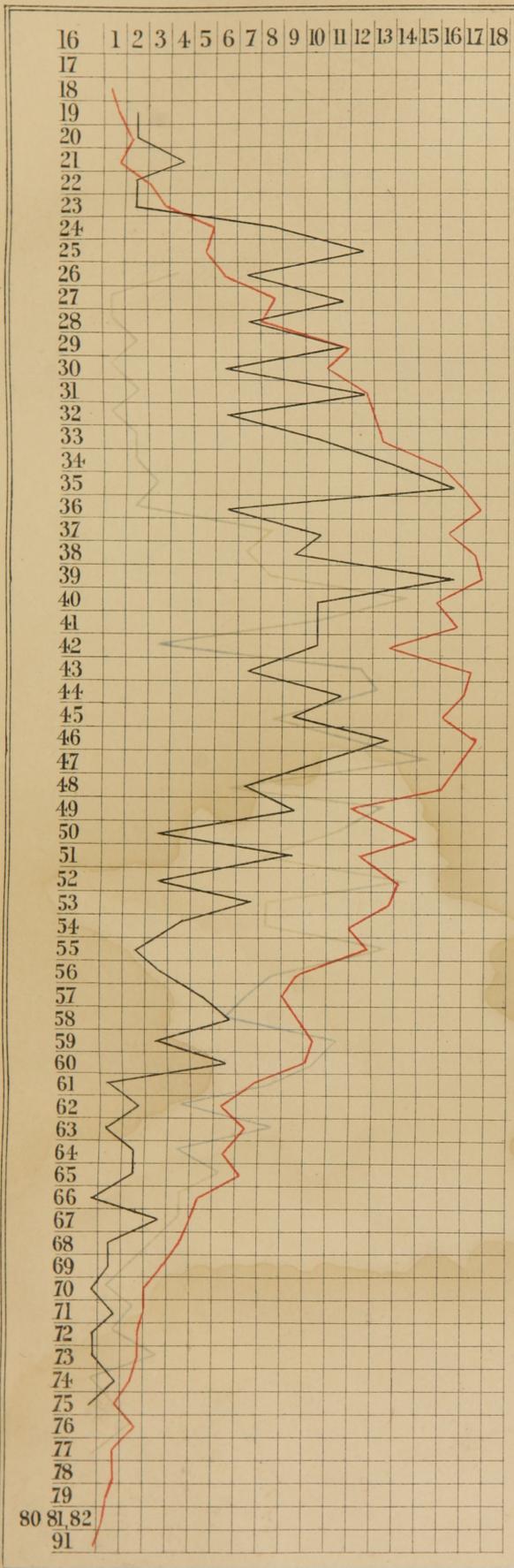
believe it of great importance, and we hope at a future time to elucidate it still further.

Pneumonia is probably also equally prevalent at all ages, but it is more frequently fatal with the old, and therefore forms a larger percentage of mortality at this time of life.

Casualties form a large percentage among the young, because they are more reckless, and more exposed to danger in travelling and active business occupations.

As we have above remarked, the occurrence of a greater number of deaths from a given disease, among the young, does not prove that the disease is more prevalent or fatal at that age, for the reason that the number living at the younger age is greater. (We are now speaking of mortality in general and not of life insurance experience.) For a similar reason the occurrence of more numerous deaths from a given disease at more advanced periods of life, does prove that such disease is more frequent or fatal then. Such we find to be the case in our tables for apoplexy and paralysis, diseases of the heart and kidneys, and pneumonia. At what particular age tendency to apoplexy, paralysis, disease of heart and kidneys begins cannot be proved by these figures, although they seem to point to the period between thirty-five and forty years for apoplexy and kidney diseases, and forty-five years for diseases of the heart. We have taken two of the diseases mentioned—typhoid fever and apoplexy—and given a diagram, VI., with lines, representing their proportional mortality for each year of life, and also a line for the mortality from all causes. These lines indicate not only the general progressive course of the disease, but also the extreme fluctuations from year to year.

Tables No. VII., VIII., and IX., give the causes of death arranged according to the nativities of those dying, with the percentage of diseases prevailing in each nationality, and the relative percentage of the native and foreign born for each disease.



EXPLANATION

The left hand figures represent the Ages.
 The figures on top the number of deaths for
 Apoplexy & Typhoid Fever. And for the general
 Mortality $\frac{1}{10}$ the actual number.

The Black Line indicates Typhoid Fever.
 " Blue " " Apoplexy.
 " Red " " The General Mortality.

80 81 82
 91

TABLE VII.

NATIVITY.	Typhoid and Typhus Fevers.	Malarial Fevers.	Erysipelas.	Dysentery.	Diarrhea.	Cholera.	Alcoholism.	Other Zymotic Diseases.	Dropsy.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy.	Congestion of Brain.	Paralysis, Softening of Brain.	Epilepsy and Convulsions.	Other Diseases of the Nervous System.	Diseases of the Heart.	Other Diseases of the Circulatory System.
TOTAL.....	334	116	78	81	53	67	31	190	82	91	920	67	307	110	281	32	119	303	22
United States.....	280	95	61	62	46	55	19	128	51	59	709	48	215	83	211	23	85	228	15
Canada.....	2	1	1	.....	.....	1	1	4	.....	2	13	.....	5	1	3	1	1	4	1
England & Wales.....	4	5	2	4	2	3	3	14	6	5	24	5	11	7	13	1	8	12	3
Scotland.....	2	.....	2	2	1	1	1	3	2	1	15	2	13	1	6	1	1	7	.....
Ireland.....	10	4	5	5	2	3	3	8	6	5	51	2	7	7	8	.....	9	16	2
Germany.....	31	9	5	3	.....	4	3	26	13	17	76	7	43	9	24	5	13	26	1
France.....	.....	1	.....	1	.....	.....	.....	.....	.....	1	3	1	1	1	3	1	1	2	.....
Switzerland.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	1	1	.....	3	.....	.....	.....	.....
Italy.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....
Holland.....	7	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denmark.....	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norway and Sweden.....	9	1	.....	.....	.....	.....	.....	1	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....
Sweden.....	8	.....	.....	.....	.....	.....	.....	1	1	.....	3	.....	.....	.....	.....	.....	.....	.....	.....
Russia.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Poland.....	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bohemia.....	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hungary.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Turkey.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
East Indies, Mauritius and Oceanica.....	6	.....	.....	.....	.....	.....	.....	1	.....	.....	2	.....	1	.....	.....	.....	.....	.....	.....
West Indies.....	4	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South America.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
At Sea.....	2	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Unknown.....	82	2	1	2	1	.....	1	2	1	1	14	.....	10	1	7	.....	.....	3	.....

TABLE VII.—(Continued.)

NATIVITY.	Total.	Pneumonia.	Congestion of Lungs.	Bronchitis and Pleu- risy.	Abscess, Hemorrhage, and Disease of Lungs.	Other Diseases of Res- piratory System.	Diseases of Stomach.	Diseases of Bowels.	Peritonitis.	Diseases of Liver.	Other Diseases of Di- gestive System.	Diabetes.	Diseases of Kidneys.	Other Diseases of Uri- nary System.	Abscess, Hemorrhage, Old Age, &c.	Debility, Exhaustion, Prostration.	Accidents and Injuries.	Suicides.	Cause unknown or ill- defined.
TOTAL.....	5,224	388	61	88	81	30	77	144	57	147	63	40	145	33	48	61	357	59	61
United States.....	3,917	283	52	62	62	21	58	113	37	109	49	30	112	26	35	48	260	47	40
Canada.....	59	3	1	2	2	1	1	1	1	1	1	1	1	1	1	1	5	1	1
England & Wales.....	227	13	1	5	3	1	2	7	6	9	5	2	5	4	3	4	19	3	4
Scotland.....	93	5	2	1	1	1	3	1	1	1	2	1	5	2	2	1	8	1	1
Ireland.....	238	18	1	6	5	1	9	3	3	8	1	1	5	1	2	3	13	1	4
Germany.....	501	51	3	8	5	7	4	14	10	14	4	5	9	1	4	2	35	6	4
France.....	31	4	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1
Switzerland.....	20	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Italy.....	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Holland.....	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Denmark.....	9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1
Norway and Sweden.....	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Russia.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Poland.....	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bohemia.....	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Hungary.....	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Turkey.....	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
East Indies, Mauritius and Oceanica.....	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
West Indies.....	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
South America.....	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
At Sea.....	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Unknown.....	82	3	1	3	1	1	1	2	1	3	1	1	3	1	1	1	5	3	7

TABLE VIII.

NATIVITY.	TOTAL.	Typhoid and Typhus Fever.	Malarial Fever.	Erysipelas.	Dysentery.	Diarrhoea.	Cholera.	Alcoholism.	Other Zymotic Diseases.	Dropsy.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy.	Congestion of Brain.	Paralysis, Softening of Brain.	Epilepsy and Convulsions.	Other Diseases of Nervous System.	Diseases of Heart.	Other Diseases of Circulatory System.
TOTAL.....	5,224	334	116	78	81	53	67	31	190	82	91	920	67	307	110	281	32	119	303	22
Percentage.....	.....	6.39	2.22	1.49	1.55	1.01	1.28	.59	3.64	1.57	1.74	17.61	1.28	5.88	2.11	5.38	.61	2.28	5.80	.42
United States..	3,917	280	95	61	62	46	55	19	128	51	59	709	48	215	83	211	23	85	228	15
Percentage..	74.98	7.15	2.42	1.56	1.58	1.17	1.40	.49	3.27	1.30	1.51	18.10	1.23	5.49	2.12	5.39	.59	2.17	5.82	.38
Germany	501	31	9	5	3	.....	4	3	26	13	17	76	7	43	9	24	5	13	26	1
Percentage..	9.59	6.19	1.80	1.00	.60	.....	.80	.60	5.19	2.59	3.39	15.17	1.40	8.58	1.80	4.79	1.00	2.59	5.19	.20
Ireland.....	238	10	4	5	5	2	3	3	8	6	5	51	2	7	7	8	.....	9	16	2
Percentage..	4.56	4.20	1.68	2.10	2.10	.84	1.26	1.26	3.36	2.52	2.10	21.43	.84	2.94	2.94	3.36	.....	3.78	6.72	.84
England and Wales....	227	4	5	2	4	2	3	3	14	6	5	24	5	11	7	13	1	8	12	3
Percentage..	4.35	1.76	2.20	.88	1.76	.88	1.32	1.32	6.17	2.64	2.20	10.57	2.20	4.85	3.08	5.73	.44	3.52	5.29	1.32
Scotland	93	2	.....	2	2	1	1	1	3	2	1	15	2	13	1	6	1	1	7	.....
Percentage..	1.78	2.15	.....	2.15	2.15	1.08	1.08	1.08	3.23	2.15	1.08	16.13	2.15	13.98	1.08	6.45	1.08	1.08	7.53	.....
Other Countries and Unknown	248	7	3	3	5	2	1	2	11	4	4	45	3	18	3	19	2	3	14	1
Percentage..	4.75	2.82	1.21	1.21	2.02	.81	.40	.81	4.44	1.61	1.61	18.14	1.21	7.26	1.21	7.66	.81	1.21	5.64	.40
United States..	3,917	280	95	61	62	46	55	19	128	51	59	709	48	215	83	211	23	85	228	15
Percentage..	74.98	83.83	81.90	78.20	76.54	86.79	82.09	61.28	67.37	62.20	64.83	77.07	71.64	70.03	75.45	75.09	71.87	71.43	75.25	68.18
Foreign	1,307	54	21	17	19	7	12	12	62	31	32	211	19	92	27	70	9	34	75	7
Percentage..	25.02	16.17	18.10	21.80	23.46	13.21	17.91	38.72	32.63	37.80	35.17	22.93	28.36	29.97	24.55	24.91	28.13	28.57	24.75	31.82

TABLE VIII.—(Continued.)

NATIVITY.	TOTAL.	Pneumonia.	Congestion of Lungs.	Bronchitis and Pleurisy.	Abscess, Hemorrhage, and Disease of Lungs.	Other Diseases of Respiratory System.	Diseases of Stomach.	Diseases of Bowels.	Peritonitis.	Diseases of Liver.	Other Diseases of Digestive System.	Diabetes.	Diseases of Kidneys.	Other Diseases of Urinary System.	Abscess, Hemorrhage, Old Age, etc.	Debility, Prostration and Exhaustion.	Accidents and Injuries.	Suicides.	Causes unknown or ill-defined.
TOTAL.....	5,224	388	61	88	81	30	77	144	57	147	63	40	145	33	48	61	357	59	61
Percentage.....	7.43	1.17	1.17	1.68	1.55	.57	1.47	2.76	1.09	2.81	1.21	.77	2.78	.63	.92	1.17	6.83	1.13	1.17
United States.....	3,917	283	52	62	62	21	58	113	37	109	49	30	112	26	35	48	260	47	40
Percentage.....	74.98	7.22	1.33	1.58	1.58	.54	1.48	2.88	.94	2.78	1.25	.77	2.86	.66	.89	1.22	6.63	1.20	1.02
Germany.....	501	51	3	8	5	7	4	14	10	14	4	5	9	1	4	2	35	6	4
Percentage.....	9.59	10.18	.60	1.60	1.00	1.40	.80	2.79	2.00	2.79	.80	1.00	1.80	.20	.80	.40	6.99	1.20	.80
Ireland.....	238	18	1	6	5	1	9	2	3	8	1	.....	8	1	2	3	13	.....	4
Percentage.....	4.56	7.56	.42	2.52	2.10	.42	3.78	.84	1.26	3.36	.42	.....	3.36	.42	.84	1.26	5.46	.....	1.68
England & Wales.	227	13	.....	5	3	1	2	7	6	9	5	2	5	4	3	4	19	3	4
Percentage.....	4.35	5.73	.....	2.20	1.32	.44	.88	3.08	2.64	3.97	2.20	.88	2.20	1.76	1.32	1.76	8.37	1.32	1.76
Scotland.....	93	5	2	1	1	.....	1	3	.....	1	2	.....	5	.....	2	.....	8	.....	1
Percentage.....	1.78	5.37	2.15	1.08	1.08	.....	1.08	3.23	.....	1.08	2.15	.....	5.37	.....	2.15	.....	8.60	.....	1.08
Other Countries } and Unknown }	248	18	3	6	5	.....	3	5	1	6	2	3	6	1	2	4	22	3	8
Percentage.....	4.75	7.26	1.21	2.42	2.02	.....	1.21	2.02	.40	2.42	.81	1.21	2.42	.40	.81	1.61	8.87	1.21	3.22
United States.....	3,917	283	52	62	62	21	58	113	37	109	49	30	112	26	35	48	260	47	40
Percentage.....	74.98	72.94	85.24	70.45	76.54	70.00	75.32	78.47	64.91	74.15	77.78	75.00	77.24	78.79	72.92	78.69	72.83	79.66	65.57
Foreign.....	1,307	105	9	26	19	9	19	31	20	38	14	10	33	7	13	13	97	12	21
Percentage.....	25.02	27.06	14.76	29.55	23.46	30.00	24.68	21.53	35.09	25.85	22.22	25.00	22.76	21.21	27.08	21.31	27.17	20.34	34.43

TABLE IX.

NATIVITY.	Total.	Typhoid and Typhus Fevers.	Other Zymotic Diseases.	Consumption.	Cancer.	Other Constitutional Diseases.	Apoplexy.	Other Diseases of Nervous System.	Diseases of Circulatory System.	Pneumonia.	Other Diseases of Respiratory System.	Diseases of Digestive System.	Diseases of Urinary System.	Accidents and Suits.	Unclassified (including Old Age).
TOTAL.....	5,224	334	616	920	91	149	307	542	325	388	260	488	218	416	170
Percentage.....		6.39	11.79	17.61	1.74	2.85	5.88	10.38	6.22	7.43	4.98	9.34	4.17	7.96	3.25
United States.....	3,917	280	466	709	59	99	215	402	243	283	197	366	168	307	123
Percentage.....		7.15	11.90	18.10	1.51	2.53	5.49	10.26	6.20	7.22	5.03	9.34	4.29	7.84	3.14
Germany.....	501	31	50	76	17	20	43	51	27	51	23	46	15	41	10
Percentage.....		6.19	9.98	15.17	3.39	3.99	8.58	10.18	5.39	10.18	4.59	9.18	2.99	8.18	2.00
Ireland.....	238	10	30	51	5	8	7	24	18	18	13	23	9	13	9
Percentage.....		4.20	12.60	21.43	2.10	3.36	2.94	10.08	7.56	7.56	5.46	9.66	3.78	5.46	3.78
England and Wales.....	227	4	33	24	5	11	11	29	15	13	9	29	11	22	11
Percentage.....		1.76	14.54	10.57	2.20	4.85	4.85	12.78	6.61	5.73	3.97	12.78	4.85	9.69	4.85
Scotland.....	93	2	10	15	1	4	13	9	7	5	4	7	5	8	3
Percentage.....		2.15	10.75	16.13	1.08	4.30	13.98	9.68	7.53	5.37	4.30	7.53	5.37	8.60	3.23
Other Countries and Unknown.....	248	7	27	45	4	7	18	27	15	18	14	17	10	25	14
Percentage.....		2.82	10.89	18.14	1.61	2.82	7.26	10.89	6.05	7.26	5.65	6.85	4.03	10.08	5.65

Of the entire mortality, those born in the United States give 75 per cent.; Germany, $9\frac{1}{2}$; Ireland, $4\frac{1}{2}$; England, $4\frac{1}{3}$; Scotland, $1\frac{3}{4}$ per cent. Total, United States, 75; Foreign-born, 25 per cent. The circumstance of nativity seems, in the large majority of cases, to have very little influence on the cause of death, and it is remarkable how slight a variation from the seventy-five per cent. there is for most of the diseases. The following exceptions seem most noteworthy: In typhoid and malarial fevers, diarrhœa, cholera, and pneumonia, the percentage of the United States rises to or above eighty, and in cancer, alcoholism, dropsy and peritonitis it falls below seventy per cent.

The deaths from alcoholism are chiefly among foreigners, and in the following order of nationality: England, Ireland, Scotland and Germany.

Consumption varies considerably; it gives the largest proportional mortality among the natives of Ireland, and the smallest among the English.

Apoplexy gives the largest percentage among the Scotch, and the smallest among the Irish, and the same holds good for diseases of the nervous system in general.

The foreign-born give a much higher mortality from cancer than natives; 35.17 per cent. instead of the usual average of 25. Among foreigners, the Germans give the highest proportion and the Scotch the lowest.

Heart diseases prevail almost uniformly among all nationalities.

For diseases of the digestive organs, Ireland gives the largest percentage of diseases of the stomach, and the smallest for diseases of the bowels.

Scotland gives the largest proportion of diseases of the kidneys.

Accidental deaths occur equally among all nationalities. The native born, the Germans, and the English give nearly the same proportion of suicides. The Irish and Scotch do not afford a single instance.

The deaths among persons of other nationalities than those above

TABLE XI.

RESIDENCE AT DEATH.	TOTAL.																		
	Typhoid and Typhus Fever.	Malarial Fever.	Erysipelas.	Dysentery.	Diarrhœa.	Cholera.	Alcoholism.	Other Zymotic Diseases.	Dropsy.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy.	Congestion of Brain.	Paralysis, Softening, and Disease of Brain.	Epilepsy and Convulsions.	Other Diseases of the Nervous System.	Diseases of Heart.	Other Diseases of Circulatory System.
TOTAL.....	334	116	78	81	53	67	31	190	82	91	920	67	307	110	281	32	110	303	22
Percentage.....	6.39	2.22	1.49	1.55	1.01	1.28	.59	3.64	1.57	1.74	17.61	1.28	5.88	2.11	5.38	.61	2.28	5.80	.42
Maine to Connecticut.....	59	12	12	12	6	3	2	24	13	22	166	17	49	10	48	10	16	53	4
Percentage.....	15.81	1.45	1.45	1.45	.73	.36	.24	2.24	1.57	2.66	20.10	2.06	5.93	1.21	5.81	1.21	1.94	6.41	.48
New York.....	1,471	90	22	25	11	16	15	9	46	27	27	23	99	37	88	4	43	98	6
Percentage.....	28.16	1.49	1.70	.74	1.08	1.02	.61	3.12	1.84	1.84	17.81	1.56	7.73	2.51	5.98	.27	2.92	6.66	.41
New Jersey and Pennsylvania	736	47	20	6	8	7	3	28	10	18	142	10	51	20	37	6	14	48	1
Percentage.....	14.09	2.71	.81	.81	1.08	.95	.41	3.80	1.36	2.44	19.39	1.36	6.93	2.71	5.03	.81	1.90	6.52	.14
Delaware to Texas.....	431	13	12	5	14	7	2	27	6	5	70	2	21	7	27	5	6	19	2
Percentage.....	8.25	2.78	1.16	1.16	3.25	1.62	.46	6.26	1.39	1.16	16.24	.46	4.87	1.62	6.26	1.16	1.39	4.41	.46
Ohio, Indiana and Illinois.....	622	58	21	10	2	13	7	19	12	6	108	3	34	11	19	2	16	25	3
Percentage.....	11.91	3.37	1.61	1.61	.32	2.09	1.12	3.05	1.93	.96	17.36	.48	5.46	1.77	3.05	.32	2.57	4.02	.48
Michigan to Minnesota.....	366	27	7	8	11	4	4	2	9	4	71	4	15	11	17	2	6	22	1
Percentage.....	7.00	1.91	2.19	3.00	1.09	1.09	.55	2.46	1.09	1.37	19.40	1.09	4.10	3.00	4.64	.55	1.64	6.01	.27
Kentucky, Tennessee, Missouri and Arkansas.....	254	12	10	2	15	2	9	21	3	3	28	5	14	8	16	...	7	10	...
Percentage.....	4.86	3.94	.79	5.90	.79	3.54	...	8.27	1.18	1.18	11.02	1.97	5.51	3.15	6.30	...	2.76	3.94	...
California and Oregon.....	280	19	7	7	...	5	3	9	5	4	45	2	14	1	18	...	5	18	4
Percentage.....	5.36	2.50	2.50	2.50	...	1.78	1.07	3.21	1.78	1.43	16.07	.71	5.00	.36	6.43	...	1.78	6.43	1.43
Other West'n States & Territories.....	67	6	3	1	1	1	1	2	...	...	5	...	...	3	2	...	4	2	...
Percentage.....	1.28	4.48	1.49	1.49	...	1.49	...	2.98	...	...	7.46	...	...	4.48	2.98	...	5.97	2.98	...
Foreign Countries & Unknown	171	3	2	3	1	3	3	5	2	1	23	1	10	2	9	3	2	8	1
Percentage.....	3.27	1.17	1.17	1.75	.58	1.75	1.75	2.92	1.17	.58	13.45	.58	5.85	1.17	5.26	1.75	1.17	4.68	.58

TABLE XI.—(Continued.)

RESIDENCE AT DEATH.	RESIDENCE AT DEATH.														Cause unknown or ill-defined.				
	Total.	Pneumonia.	Congestion of Lungs.	Bronchitis and Pleurisy.	Abscess, Hemorrhage, and Disease of Lungs.	Other Diseases of Respiratory System.	Diseases of Stomach.	Diseases of Bowels.	Peritonitis.	Diseases of Liver.	Other Diseases of Digestive System.	Diabetes.	Diseases of Kidneys.	Other Diseases of Urinary System.		Abscess, Hemorrhage, Old Age, etc.	Debility, Prostration, and Exhaustion.	Accidents and Injuries.	Suicides.
TOTAL	5,224	388	61	88	81	30	77	144	57	147	63	40	145	33	48	61	357	59	61
Percentage	7.43	1.17	1.68	1.55	1.55	.57	1.47	2.76	1.09	2.81	1.21	.77	2.78	.63	.92	1.17	6.84	1.13	1.17
Maine to Connecticut	826	65	7	14	9	3	12	11	7	24	5	12	26	5	11	5	57	8	7
Percentage	15.81	7.86	.84	1.69	1.08	.36	1.45	1.33	.84	2.90	.60	1.45	3.14	.60	1.33	.60	6.90	.96	.84
New York	1,471	102	22	28	24	12	15	32	23	36	14	13	66	11	17	20	58	18	12
Percentage	28.16	6.93	1.49	1.90	1.63	.82	1.02	2.17	1.56	2.45	.95	.88	4.49	.74	1.15	1.36	3.94	1.22	.82
New Jersey and Pennsylvania	736	53	8	11	12	5	8	27	10	23	6	5	21	3	8	14	31	5	4
Percentage	14.09	7.20	1.09	1.49	1.63	.68	1.09	3.67	1.36	3.12	.81	.68	2.85	.41	1.09	1.90	4.21	.68	.54
Delaware to Texas	431	31	6	8	9	2	13	15	...	11	11	1	7	3	3	7	39	4	6
Percentage	8.25	7.19	1.39	1.85	2.09	.46	3.01	3.48	...	2.55	2.55	.23	1.62	.69	1.62	9.05	.93	1.39	
Ohio, Indiana and Illinois	622	62	9	12	9	1	8	26	8	20	9	4	9	4	3	5	42	6	6
Percentage	11.91	9.97	1.45	1.93	1.45	.16	1.29	4.18	1.29	3.21	1.45	.64	1.45	.64	.48	.80	6.75	.96	
Michigan to Minnesota	366	30	2	6	5	1	8	15	3	11	5	3	4	3	2	2	26	10	...
Percentage	7.00	8.19	.55	1.64	1.37	.27	2.19	4.10	.82	3.00	1.37	.82	1.09	.28	.55	7.10	2.73	...	
Kentucky, Tennessee, Missouri, and Arkansas	254	17	4	1	4	...	6	6	2	5	6	...	1	1	2	3	31	...	...
Percentage	4.86	6.69	1.57	.39	1.57	...	2.36	2.36	.79	1.97	2.36	...	.39	.39	.79	1.18	12.20	...	
California and Oregon	280	16	2	4	5	2	3	6	...	9	4	1	9	2	1	3	31	6	3
Percentage	5.36	5.71	.71	1.43	1.78	.71	1.07	2.14	...	3.21	1.43	.36	3.21	.71	.36	1.07	11.07	2.14	
Other West'n States & Territories	67	7	...	1	2	1	1	3	2	3	1	...	...	...	...	1	15	...	...
Percentage	1.28	10.45	...	1.49	2.98	1.49	1.49	4.48	2.98	4.48	1.49	...	...	...	...	1.49	22.39	...	
Foreign Countries and Unknown	171	5	1	3	2	3	3	3	2	5	2	1	2	1	1	1	27	2	23
Percentage	3.27	2.92	.58	1.75	1.17	1.75	1.75	1.75	1.17	2.92	1.17	.58	1.17	.58	.58	15.79	1.17	13.45	

TABLE XII.

RESIDENCE AT DEATH.	RESIDENCE AT DEATH.													Total.	Typhus and Typhoid Fevers.	Other Zymotic Diseases.	Consumption.	Cancer.	Other Constitutional Diseases.	Apoplexy.	Other Diseases of the Nervous System.	Diseases of the Circulatory System.	Pneumonia.	Other Diseases of the Respiratory System.	Diseases of the Digestive System.	Diseases of the Urinary System.	Accidents and Suicides.	Unclassified, (including Old Age).
	334	616	920	91	149	307	542	325	388	260	488	218	416																170
TOTAL.....	5,224	6,334	9,200	91	149	307	542	325	388	260	488	218	416	170														
Percentage.....	6.39	11.79	17.61	1.74	2.85	5.88	10.38	6.22	7.43	4.98	9.34	4.17	7.96	3.25														
Maine to Connecticut.....	826	59	166	22	30	49	84	57	65	33	59	43	65	23														
Percentage.....	15.81	7.14	20.09	2.66	3.63	5.93	10.17	6.90	7.87	3.99	7.14	5.21	7.87	2.78														
New York.....	1,471	90	262	27	50	99	172	104	102	86	120	90	76	49														
Percentage.....	28.16	6.11	17.81	1.84	3.40	6.73	11.09	7.07	6.93	5.84	8.16	6.12	5.17	3.33														
New Jersey and Pennsylvania.....	736	47	142	18	20	51	77	49	53	36	74	29	36	26														
Percentage.....	14.09	6.38	19.29	2.44	2.71	6.93	10.46	6.66	7.26	4.89	10.05	3.94	4.89	3.53														
Delaware to Texas.....	431	13	70	5	8	21	45	21	31	25	50	11	43	16														
Percentage.....	8.25	3.01	16.70	1.16	1.85	4.87	10.44	4.87	7.19	5.80	11.60	2.55	9.97	3.71														
Ohio, Indiana and Illinois.....	622	58	108	6	15	34	48	28	62	31	71	17	48	14														
Percentage.....	11.91	9.32	13.18	.96	2.41	5.46	7.72	4.50	9.97	4.98	11.41	2.73	7.72	2.25														
Michigan to Minnesota.....	366	27	45	71	8	15	36	23	30	14	42	10	36	4														
Percentage.....	7.00	7.38	12.29	1.37	2.19	4.10	9.84	6.28	8.19	3.83	11.47	2.73	9.84	1.69														
Kentucky, Tennessee, Missouri and Arkansas.....	254	12	28	3	8	14	31	10	17	9	25	2	31	5														
Percentage.....	4.86	4.72	23.23	1.18	3.15	5.51	12.20	3.94	6.69	3.54	9.84	.79	12.20	1.97														
California and Oregon.....	280	19	38	4	7	14	24	22	16	13	22	12	37	7														
Percentage.....	5.36	6.79	13.57	1.43	2.50	5.00	8.57	7.86	5.71	4.64	7.86	4.29	13.21	2.50														
Other West'n States & Territories.....	67	6	5	.....	.....	.....	9	2	7	4	10	.....	15	1										
Percentage.....	1.28	8.95	11.94	.....	.....	.....	13.43	2.98	10.45	5.97	14.92	.....	22.39	1.49										
Foreign Countries and Unknown.....	171	3	23	1	3	10	16	9	5	9	15	4	29	25														
Percentage.....	3.27	1.75	13.45	.58	1.75	5.85	9.36	5.26	2.92	5.26	8.77	2.34	16.96	14.62														

mentioned have been too few to form a basis for any calculations. In the list nearly every European country is represented, also the East and West Indies, Canada, and South America, in numbers varying from two (Hungary) to thirty-one (France).

Tables X., XI., XII., show the causes of death, and residences at time of death. In the first table each state and territory and foreign country is enumerated, with the numbers dying of each disease, while in the second and third, they are consolidated. The states have been grouped according to geographical position and the number of cases they give, and the diseases consolidated into the same groups as previously.

The states are grouped as follows:

- 1st. The New England States.
- 2d. New York.
- 3d. New Jersey and Pennsylvania.
- 4th. Delaware to Texas, embracing all the Southern States except those mentioned in seventh group.
- 5th. Ohio, Indiana, and Illinois.
- 6th. Michigan, Wisconsin, Iowa, and Minnesota.
- 7th. Kentucky, Tennessee, Missouri, and Arkansas.
- 8th. California and Oregon.
- 9th. The remaining Western States and Territories.
- 10th. Foreign countries and unknown.

The last group is too extensive and the cases too few in any one country, for any useful comparison, and therefore our remarks will refer solely to the others.

Typhoid fever extends over all sections of the country with the least mortality in the Southern states, and with the greatest mortality in the Western, Northwestern and New England states. Malarial fevers least in New England and New York, and extensively in the Western states. Of both these diseases the Pacific states give an average percentage of mortality. Of the other zymotic diseases, the New Eng-

land states give a mortality a little under the average. The middle and Pacific states closely approximate it, and the Southern and Western states exceed it—probably owing to the deaths from cholera and yellow fever. Kentucky, Tennessee, and Missouri and the Northwestern and Pacific states give by far the largest proportion of dysentery.

Consumption averages nearly the same in all sections of the country, varying most where the figures are smallest and consequently least reliable. The percentage on the total mortality being 17.61, the extreme variations are 20.09 in the New England states, and 7.46 in the extreme Western states and territories. Kentucky, Tennessee and Missouri also give a comparatively small mortality from this disease.

The deaths from apoplexy vary little according to the section of the country, being a little above the average in New York, New Jersey, and Pennsylvania, and below it in the Southern and Northwestern states. The percentage on the total mortality is 5.88, for New Jersey and Pennsylvania 6.93, for the Northwestern states, 4.10. However, in the latter the proportion of deaths from congestion of the brain is above the average. For other diseases of the brain California gives a proportion a little above the average.

The percentage for diseases of the heart and circulatory system being 6.22 of the total mortality, California gives the highest proportion, 7.86; New York 7.07, and Kentucky, etc., 3.94.

Pneumonia gives a percentage on total mortality of 7.43, and as occurring locally with the following extremes: Western states and territories, 10.45; California and Oregon, 5.71.

There is no evident reason for this extreme difference occurring under such similar circumstances, and it is most probably owing to the small number of cases from which the calculations are made. Of the other sections, New York gives a percentage below the average, and Ohio, Indiana, and Illinois above it.

For diseases of the digestive organs, New England, New York, and California give a proportion below the average, while the Southern,

TABLE XIII.

DEATHS DURING YEAR OF INSURANCE.	TOTAL.																		
	Typhoid and Ty- phus Fevers.	Malarial Fevers.	Erysipelas.	Dysentery.	Diarthrea.	Cholera.	Alcoholism.	Other Zymotic Dis- eases.	Dropsy.	Cancer.	Consumption.	Other Constitu- tional Diseases.	Apoplexy.	Congestion of Brain.	Paralysis, Softening, and Disease of Brain.	Epilepsy and Con- vulsions.	Other Diseases of Nervous System.	Diseases of Heart.	Other Diseases of Circulatory System.
TOTAL.....	334	116	78	81	53	67	31	190	82	91	920	67	397	110	281	32	119	303	22
1st year.....	63	18	6	13	6	19	6	30	5	7	43	2	35	14	13	2	11	17	4
2d ".....	62	22	6	17	5	12	4	29	7	3	102	7	20	10	25	4	12	22	1
3d ".....	43	11	7	11	3	4	3	23	9	5	122	7	28	8	22	3	12	16	...
4th ".....	28	8	9	7	2	11	3	23	7	6	134	6	32	14	26	2	12	29	2
5th ".....	489	9	7	7	5	5	2	13	9	3	104	9	26	14	28	5	14	32	1
6th ".....	418	27	6	4	3	4	2	10	6	13	98	4	20	19	26	1	10	33	2
7th ".....	321	21	11	6	3	3	1	10	4	7	56	7	19	6	15	2	6	19	2
8th ".....	242	10	4	3	2	1	1	8	2	5	53	...	12	1	13	1	9	10	1
9th ".....	157	9	4	4	2	1	2	5	4	3	31	2	8	4	7	1	4	14	2
10th ".....	175	8	4	5	2	2	...	8	3	8	30	4	15	4	12	2	3	7	1
11th ".....	128	5	4	...	2	2	4	2	1	3	24	2	9	2	7	...	3	11	...
12th ".....	137	9	1	3	2	1	...	5	4	3	25	3	10	1	8	...	2	6	3
13th ".....	81	1	3	...	2	1	1	6	3	1	18	3	2	1	3	4	1	7	...
14th ".....	98	2	2	...	2	1	...	4	3	2	10	...	11	3	9	2	4	6	1
15th ".....	85	7	1	...	3	...	...	1	4	3	9	1	8	4	8	1	2	4	...
16th ".....	84	1	1	...	1	1	...	1	4	...	14	...	6	1	9	1	2	10	...
17th ".....	90	2	2	3	...	3	2	3	1	2	12	...	6	3	4	1	1	9	...
18th ".....	59	2	2	...	...	...	2	...	...	3	6	1	2	2	11	...	2	8	...
19th ".....	70	...	3	1	...	1	...	1	2	2	5	1	6	2	11	...	2	6	...
20th ".....	49	1	1	1	1	1	...	3	...	3	8	1	4	2	4	...	1	6	1
21st ".....	41	1	1	1	1	...	...	...	1	...	2	...	2	1	4	...	1	6	...
22d ".....	54	1	1	1	1	...	...	...	1	...	3	...	5	...	7	...	1	4	...
23d ".....	53	3	1	1	1	...	...	1	1	2	3	1	3	1	3	...	1	8	1
24th ".....	38	2	...	...	...	...	...	2	2	3	1	1	4	1	2	...	2	4	...
25th ".....	42	1	2	...	1	1	...	1	1	...	3	2	4	1	5	...	1	3	...
26th ".....	19	...	...	...	1	1	...	1	...	1	1	1	...	1	1	...	...	2	...
27th ".....	21	...	...	...	1	1	...	...	...	2	1	1	1	1	3	...	...	3	...
28th ".....	8	1	...	...	...	...	...	...	1	...	1	1	1	1	...	...	...	1	...
29th ".....	6	...	...	...	...	...	...	...	...	1	1	1	2	...	...	...	...	...	...
30th ".....	1	...	...	...	...	...	...	...	...	...	1	1	1	...	...	...	...	...	...
31st ".....	2	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
Unknown.....	22	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...

TABLE XIII.—(Continued.)

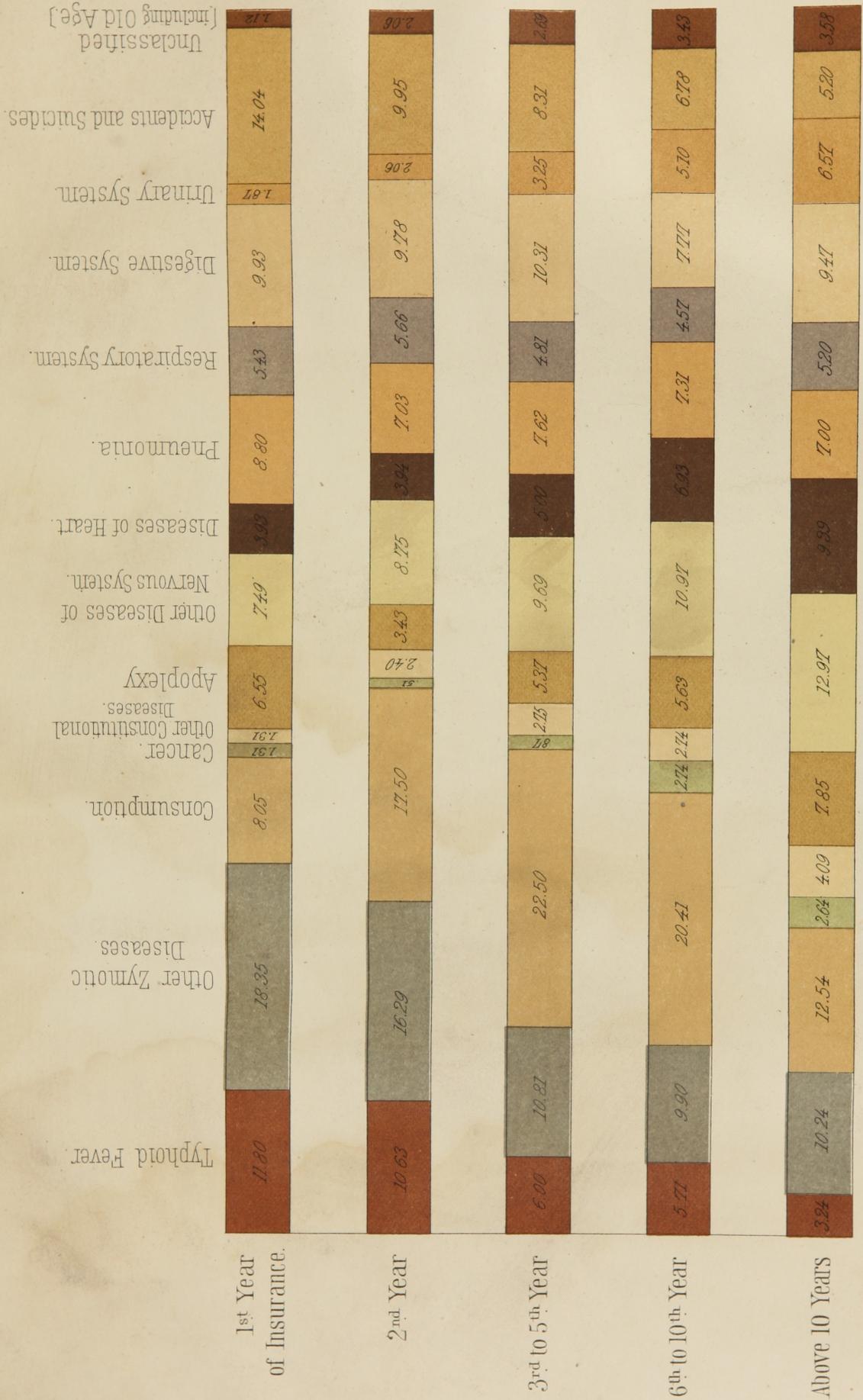
DEATHS DURING YEAR OF INSURANCE.	TOTAL.	Pneumonia.	Congestion of Lungs.	Bronchitis and Pleurisy.	Abscess, Hemor- rhage, and Dis- ease of Lungs.	Other Diseases of Respiratory Sys- tem.	Diseases of Stomach.	Diseases of Bowels.	Peritonitis.	Diseases of Liver.	Other Diseases of Digestive System.	Diabetes.	Diseases of Kid- neys.	Other Diseases of Urinary System, etc.	Abscess, Hemor- rhage, Old Age, etc.	Debility, Prostra- tion, and Ex- haustion.	Accidents and In- juries.	Suicides.	Cause unknown or ill-defined.
TOTAL	5224	388	61	88	81	30	77	144	57	147	63	40	145	33	48	61	357	59	61
1st year.....	534	47	8	7	11	3	7	24	7	10	5	2	7	1	1	1	62	13	4
2d ".....	583	41	7	9	12	5	13	19	5	19	2	3	7	2	2	7	53	5	3
3d ".....	550	39	5	5	8	6	9	25	12	19	7	3	15	1	4	6	38	6	5
4th ".....	551	46	5	16	4	1	7	10	5	16	4	3	8	4	7	8	42	11	3
5th ".....	489	37	4	10	10	3	6	15	9	17	4	5	10	3	3	1	31	5	0
6th ".....	418	31	5	2	6	...	4	7	3	9	5	3	15	2	1	3	24	3	3
7th ".....	321	19	4	7	5	2	5	4	2	14	3	5	8	1	5	4	26	3	3
8th ".....	242	24	2	7	3	...	6	4	2	5	...	3	9	2	1	8	20	2	3
9th ".....	157	7	1	2	6	...	1	7	...	6	2	1	7	1	2	3	4	1	1
10th ".....	175	15	2	1	4	1	...	3	3	6	3	1	7	2	2	3	5	1	3
11th ".....	128	7	4	4	2	1	1	3	1	4	3	1	4	...	2	...	11	...	1
12th ".....	137	10	3	3	3	2	1	3	...	6	1	...	4	...	2	...	4	...	...
13th ".....	87	4	1	1	...	2	2	2	...	2	2	1	3	...	1	3	4	...	...
14th ".....	98	3	1	2	2	1	2	1	1	2	2	1	4	...	1	1	10	2	1
15th ".....	85	6	...	1	...	1	3	...	2	1	1	1	4	...	...	1	3	...	...
16th ".....	84	6	2	1	...	1	...	...	1	2	1	2	4	...	...	2	4	...	1
17th ".....	90	5	3	...	...	2	2	4	...	2	3	2	5	...	...	2	4	...	1
18th ".....	59	4	2	2	...	1	1	2	...	1	1	...	4	...	...	1	2	...	1
19th ".....	70	8	1	...	2	...	...	1	1	4	...	...	4	...	...	2	1	...	...
20th ".....	49	4	...	...	...	...	...	1	1	2	...	...	...	...	...	2	1	...	...
21st ".....	41	5	...	...	...	1	1	2	1	2	1	...	2	...	...	1	1	...	...
22d ".....	54	6	...	2	...	...	2	1	1	2	1	2	2	...	...	1	1	...	...
23d ".....	53	9	...	1	1	...	2	1	1	3	1	1	3	...	...	1	3	...	...
24th ".....	38	2	2	3	1	1	...	1	1	1	1	1	1	...	3	...	2	...	...
25th ".....	42	4	...	...	...	1	...	...	1	1	2	1	2	...	...	2	...	...	...
26th ".....	19	...	...	...	...	...	1	1	1	1	1	1	1	...	...	1	1	...	...
27th ".....	21	2	...	1	...	...	...	1	...	1	1	1	1	...	...	...	1	...	...
28th ".....	8	...	1	1	...	...	...	...	...	...	1	1	3	...	...	...	...	...	...
29th ".....	6	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...
30th ".....	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...
31st ".....	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Unknown.....	22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	22

TABLE XIV.

DEATHS DURING YEAR OF INSURANCE.	Total.																		
	Typhoid and Typhus Fever.	Malarial Fevers.	Erysipelas.	Dysentery.	Diarrhœa.	Cholera.	Alcoholism.	Other Zymotic Dis- eases.	Dropsy.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy.	Congestion of Brain.	Paralysis, Softening, and Disease of Brain.	Epilepsy and Convul- sions.	Other Diseases of Ner- vous System.	Diseases of Heart.	Other Diseases of Cir- culatory System.
TOTAL.....	334	116	78	81	53	67	31	190	82	91	920	67	307	110	281	32	119	303	22
Percentage.....	6.39	2.22	1.49	1.55	1.01	1.28	.59	3.64	1.57	1.74	17.61	1.28	5.88	2.11	5.38	.61	2.28	5.80	.42
1st Year.....	63	18	6	13	6	19	6	30	5	7	43	2	35	14	13	2	11	17	4
Percentage.....	11.80	3.37	1.12	2.43	1.12	3.56	1.12	5.62	.93	1.31	8.05	.37	6.55	2.62	2.43	.37	2.06	3.18	.75
2d Year.....	62	22	6	17	5	12	4	29	7	3	102	7	20	10	25	4	12	22	1
Percentage.....	10.63	3.77	1.03	2.92	.86	2.06	.68	4.97	1.20	.51	17.50	1.20	3.43	1.71	4.29	.68	2.06	3.77	.17
2d to 5th Year...	96	28	23	25	10	20	8	59	22	14	360	22	86	31	76	10	38	77	3
Percentage.....	6.00	1.75	1.44	1.56	.62	1.25	.59	3.69	1.37	.87	22.50	1.37	5.37	1.94	4.75	.62	2.37	4.81	.19
5th to 10th Year.	75	26	22	14	11	10	6	41	19	36	268	17	74	32	73	7	32	83	8
Percentage.....	5.71	1.98	1.67	1.07	.84	.76	.46	3.12	1.45	2.74	20.41	1.29	5.63	2.44	5.56	.53	2.44	6.32	.61
Above 10 Years..	38	22	21	12	21	6	7	31	29	31	147	19	92	23	94	9	26	104	6
Percentage.....	3.24	1.88	1.79	1.02	1.79	.51	.60	2.64	2.47	2.64	12.54	1.62	7.85	1.96	8.02	.77	2.22	8.88	.51

TABLE XIV.—(Continued.)

DEATHS DURING YEAR OF INSURANCE.	TOTAL.	Pneumonia.	Congestion of Lungs.	Bronchitis and Pleu- risy.	Abscess, Hemorrhage, and Disease of Lungs.	Other Diseases of Res- piratory System.	Diseases of Stomach.	Diseases of Bowels.	Peritonitis.	Diseases of Liver.	Other Diseases of Di- gestive System.	Diabetes.	Diseases of Kidneys.	Other Diseases of Uri- nary System.	Abscess, Hemorrhage, Old Age, &c.	Debility, Prostration, and Exhaustion.	Accidents and Inju- ries.	Suicides.	Cause unknown or ill-defined.
TOTAL	5,224	388	61	88	81	30	77	144	57	147	63	40	145	33	48	61	357	59	61
Percentage.....		7.43	1.17	1.68	1.55	.57	1.47	2.76	1.09	2.81	1.21	.77	2.78	.63	.92	1.17	6.84	1.13	1.17
1st Year	534	47	8	7	11	3	7	24	7	10	5	2	7	1	1	1	62	13	4
Percentage.....	10.22	8.80	1.50	1.31	2.06	.56	1.31	4.49	1.31	1.87	.93	.37	1.31	.19	.19	.19	11.61	2.43	.75
2d Year.....	583	41	7	9	12	5	13	19	5	12	8	3	7	2	2	7	53	5	3
Percentage....	11.16	7.03	1.20	1.54	2.06	.86	2.23	3.26	.86	2.06	1.37	.51	1.20	.34	.34	1.20	9.09	.86	.51
2d to 5th Year...	1,600	122	14	31	22	10	22	50	26	52	15	11	33	8	14	15	111	22	14
Percentage....	30.62	7.62	.87	1.94	1.37	.62	1.37	3.12	1.62	3.25	.94	.69	2.06	.50	.87	.94	6.94	1.37	.87
5th to 10th Year.	1,313	96	14	19	24	3	16	27	10	36	13	13	46	8	11	21	79	10	13
Percentage....	25.13	7.31	1.07	1.45	1.83	.23	1.22	2.06	.76	2.74	.99	.99	3.50	.61	.84	1.60	6.02	.76	.99
Above 10 Years..	1,172	82	18	22	12	9	19	24	9	37	22	11	52	14	20	17	52	9	5
Percentage....	22.43	7.00	1.54	1.88	1.02	.77	1.62	2.05	.77	3.16	1.88	.94	4.44	1.19	1.71	1.45	4.44	.77	.43
Unknown																			22



Western, and Northwestern States give a proportion much above it. The reverse is the case with diseases of the kidneys, in which the first mentioned States run above the average, while the Western States fall below it.

Of deaths from accidents and injuries the proportion on the total mortality is 6.83 per cent., and of this class of causes of death New York gives the smallest proportion, 3.94, and the extreme Western States and Territories the largest, 22.39 per cent. California and Oregon give 11.07, and Kentucky, Tennessee and Missouri, 12.20.

The total number of suicides is 59, and the percentage on the total 1.13, which is exceeded in New York (1.22), the Northwestern (2.73), and the Pacific States (2.14), while in the other sections of the country it falls below.

We will now consider in tables XIII., XIV. and XV., the causes of deaths arranged and consolidated, with the numbers and proportions of each for every year of insurance.

These tables should be among the most important, as we might expect to find from them the influence and effect of the original medical examinations of applicants. We have grouped them into five divisions; the first consisting of those who die in the first year of insurance only; the second those who die in the second year; the third, from the third to fifth year, both inclusive; the fourth, from the fifth to the tenth year; and the fifth, those who have been insured above ten years. It might be presumed that all those who were suffering from any disease, had been rejected by the medical examiner at the time of insurance, but in practice it will be found that in some few cases the existence of disease has been overlooked either by the carelessness of the examiner or the false statements and concealment of symptoms on the part of the applicant. Thus, alcoholism and cancer give a larger percentage of deaths in the first year than for some time after; and yet, as cancer is usually a chronic disease, and death from

alcoholism follows after a long period of indulgence, there must, in most of the cases, have been some neglect or concealment to have procured the policy of insurance. With regard to consumption, the mortality during the first year is comparatively small, the average percentage being 17.61, and for the first year 8.05, while the actual mortality from this disease during the first year is forty-three deaths out of the thousands insured by the company. On the other hand, the proportion of deaths from this cause rises rapidly in the second year to 17.50 per cent., and continues still further to increase. These figures seem to show that, notwithstanding all the care taken by the company and its medical examiners, it is chiefly successful in excluding those who have some symptoms of consumption present at the time, while a large number of those who have a tendency to the disease are freely admitted to the benefits of insurance.

There are some causes of death with regard to which it is evident that the selection effected by the medical examiners will have little influence—for instance, typhoid and other fevers, acute inflammations of the lungs and digestive organs, accidents, &c.

Some of these may be guarded against by considering the special residences and occupations of applicants, but in general, the most rigid examination will fail to separate those likely to die from these causes; consequently, the large proportions of deaths occurring soon after insurance should be from these and similar causes, while the more chronic diseases should occasion the mortality among those who have been insured for many years.

By examination of the tables we find this to be the case. Deaths by zymotic diseases and accident form a percentage of 44.19 during the first year of insurance and 18.68 after the tenth year, while diseases of the circulatory, nervous and urinary systems, give a percentage of 36.78 for the later period and 19.84 for the earlier. It must be remembered, however, that we have proved that there are these same differences between the diseases of youth and advanced life, and that the

causes of death at early ages and the first years of insurance, and those of advanced life and after many years of insurance, are almost exactly the same. We believe, however, that age is not the main element in determining the cause of death, but that the medical selection is more important on account of some well marked exceptions to the rule of diseases as affected by age alone.

We have already spoken of consumption, which is the principal cause of death among the young, but gives only a small percentage for the first year of insurance; and, again, apoplexy increases uniformly in accordance with the age, but the proportion during the first year of insurance is equal to that of the later periods.

The mortality from heart diseases increases directly with the years insured from a percentage of 3.18 in the first year, to 8.88 in the period above ten years of insurance. The percentage during the first year seems to be larger than ought to occur after a careful examination. Pneumonia occasions a large number of deaths at every period of insurance, with the highest percentage during the first year.

Diseases of the digestive organs, taken together, acute and chronic, give nearly the same proportional mortality for each period; diseases of the liver, however, increase in number with the years of insurance.

Diseases of the kidneys and other urinary organs give a very small percentage for the earlier years of insurance, and increase rapidly in the later periods; the percentage being 1.87 for the first, and 6.57 for the last. Of the 59 deaths by suicide, 13 occurred during the first year of insurance, being a percentage of 22.03, while that of the entire mortality for the same period is only 10.22.

The colored diagram XVI. represents to the eye the course and prevalence of each class of diseases through the different periods of insurance.

We have now gone over and attempted to elucidate the statistical

tables that we have compiled. We think they are of much value, and display in a clear light the past experience of the Company in important particulars. All these facts, however, give only a small part of the valuable information contained in the Company's mortuary records. The questions of business and occupation, physical condition and conformation, previous diseases, and, most difficult of all, hereditary tendencies to longevity and special causes of death have not been yet touched upon.

Moreover, each disease must be analyzed by itself, and all its causes traced out with the effect of counterbalancing or aggravating influences. For example, it has been shown by our statistics that early manhood gives a very large percentage of mortality from consumption; and, again, that New England gives a larger percentage from the same disease than Kentucky and Tennessee. Does New England afford a larger mortality *because* a younger class of men insure in that section, and the reverse is the case in Kentucky and Tennessee? or, does the climate actually influence the disease? Again, foreigners have died of cancer in larger proportions than the native born. Old persons have died in larger numbers from this disease than the young. How do these facts modify our conclusions?

We cite these instances merely to show how thorough the analysis should be before entirely reliable conclusions can be drawn. With your approval, we will proceed to investigate these questions and will give you the results in due season.

G. S. WINSTON, M. D.,

E. J. MARSH, M. D.

ACTUARIAL STATISTICS.

TRUSTEES AND OFFICERS
OF THE
MUTUAL LIFE INSURANCE COMPANY OF NEW-YORK.

DECEMBER 31, 1875.

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Vice-President.

FREDERICK S. WINSTON,

President.

BROADWAY, CORNER OF LIBERTY STREET.

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JOHN A. FONDA, *Cashier.*

REPORT
OF THE
MORTUARY EXPERIENCE
OF
THE MUTUAL LIFE

INSURANCE COMPANY OF NEW-YORK.

FROM 1843 TO 1874.

BY WM. H. C. BARTLETT, LL.D.,
Actuary.

New-York:

PRINTED BY ORDER OF THE BOARD OF TRUSTEES.

1875.

Entered, according to Act of Congress, in the year 1876, by
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In the Office of the Librarian of Congress, at Washington.

THE MUTUAL LIFE INSURANCE COMPANY OF NEW-YORK,

140 TO 146 BROADWAY.

NEW-YORK, December 31, 1875.

TO THE POLICY-HOLDERS AND THE PUBLIC :

A preliminary report containing the mortality experience of this Company, prepared by the Medical Department, was issued a few months since.

The report from the Actuarial Department, then in course of preparation, has since been completed, and both are now presented in this volume.

While the distinguished learning and ability of our Actuary had secured entire confidence in the methods and developments of this report, he preferred and suggested that he submit the same in all its details to the critical examination of a person whose eminent mathematical attainments, intimate acquaintance with vital statistics and practical knowledge of Life Insurance, would detect whatever of error in principle or inaccuracy of deduction it might contain.

Professor C. F. McCay, LL.D., was, accordingly, selected, and his letter giving the results of his critical examination is appended to this introduction.

It is believed that these statements from the Actuarial and the Medical Departments of the Company set forth, with truth and accuracy, the facts of its mortuary history.

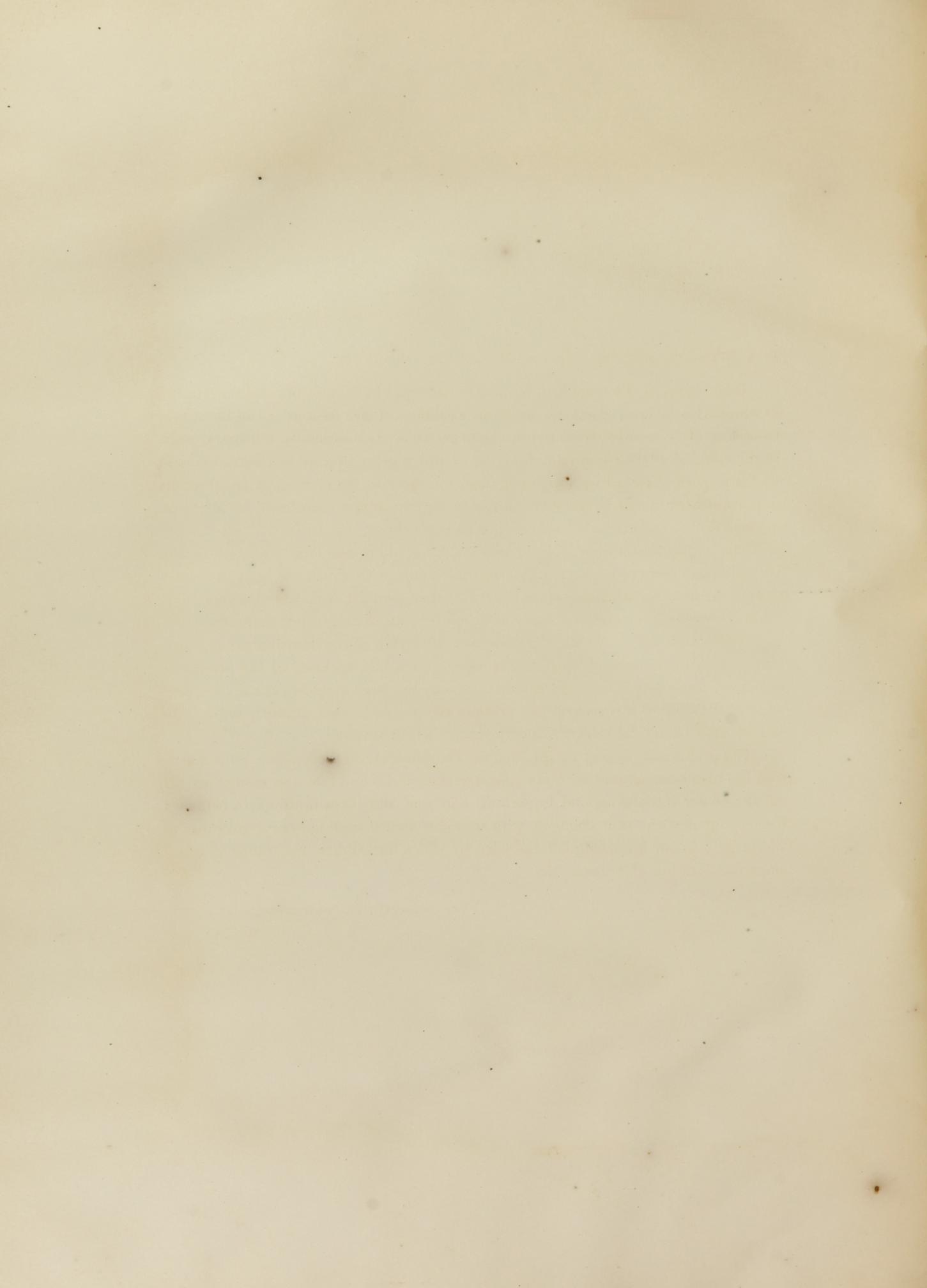
If they shall satisfy those interested in its affairs of the soundness of the principles on which its business has been conducted, and of the integrity and fidelity of its management, and if they shall be found to contain information serviceable to its contemporaries, the past labors and anxieties of the Executive Officers in the service of this pioneer institution will not be unrewarded.

F. S. WINSTON,
President.

NOTE.—The following figures give the monetary condition of the Company, and the relations of the amounts of insurance, assets and returns for over-payments, to one another, at the different epochs named in the first column :

February 1st.	Amount of Insurance in Force.	Assets.	Dividends, or Surplus Returned
1848	9,997,813	551,575	352,186
1853	17,599,773	2,060,649	576,356
1858	30,481,302	4,685,909	1,303,616
1863	40,047,197	9,225,120	3,000,000
1868	194,341,614	25,319,320	7,719,707
January 1st.			
1873	264,591,882	58,550,059	15,624,163
1874	289,505,836	65,609,838	2,991,197
1875	301,928,726	72,446,970	3,539,664
			<hr/>
			Returned for over-payments, 35,106,889
			Amount paid for death claims, matured endowments, and annuities, 26,594,909
			<hr/>
			Total sum returned to policy-holders, \$61,701,798

The number of deaths reported by the medical officers differs from that finally given by the Actuary. The former only includes those deaths the claims on account of which had been paid; the latter embraces all deaths reported, including claims paid and those not due and unadjusted.



BALTIMORE, December 4th, 1875.

F. S. WINSTON, Esq., President of M. L. I. Co., New-York

DEAR SIR: At the request of Professor Bartlett, I have carefully and thoroughly examined his official report on the vital statistics of the Mutual Life Insurance Company of New-York, from the commencement of its business in February, 1843, to the close of 1873—comprising a period of thirty years and eleven months—and find it in perfect accord with my own views in regard to the method of treating this important matter, and fully concur in the deductions drawn therefrom, as set forth in the Professor's letter addressed to you on this subject.

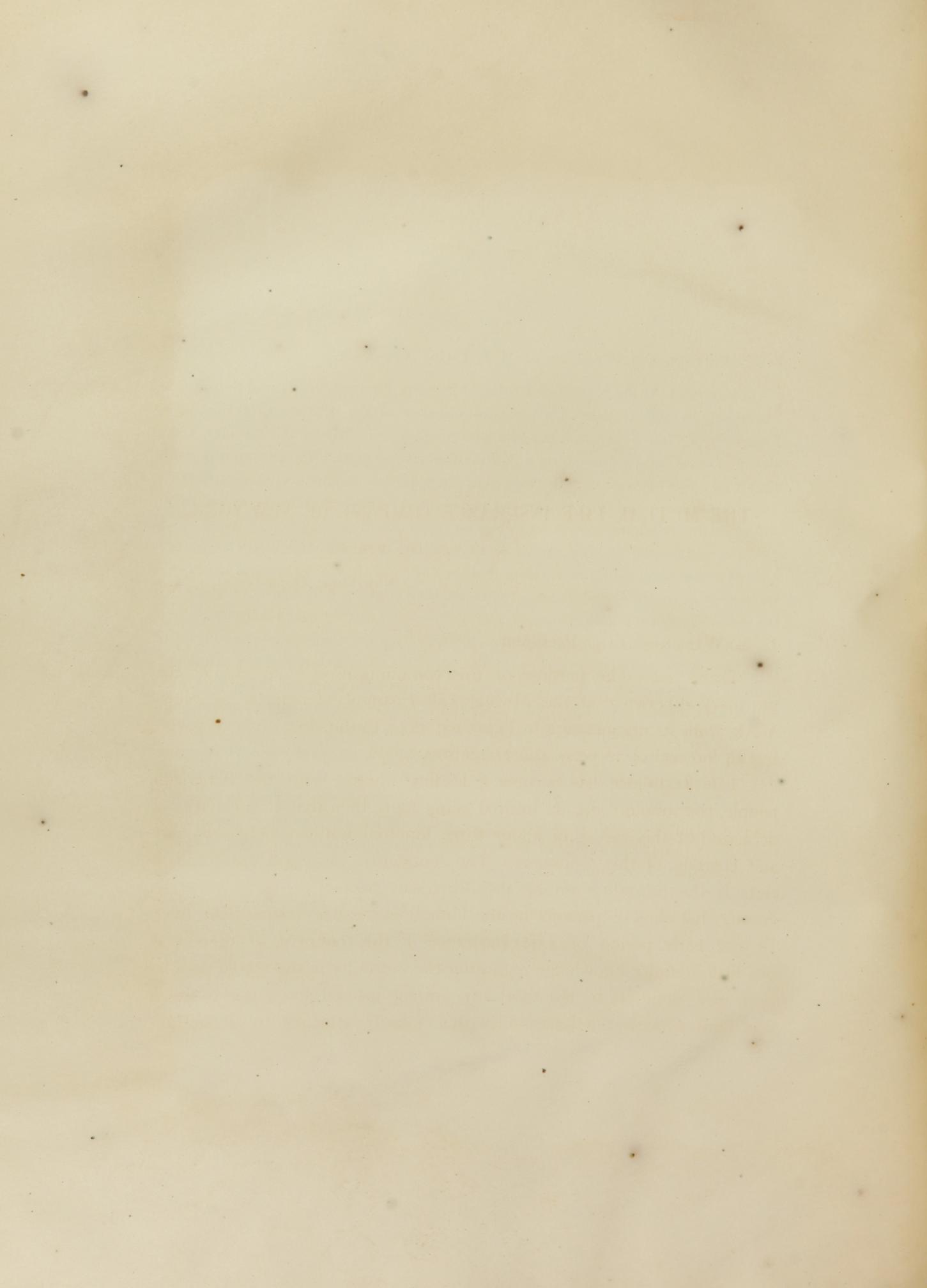
The value and importance of this contribution to the vital statistics of the United States seem to me very great; and the ability with which the facts have been treated, so as to reveal and develop the truths they contain, will add very much to the well-deserved reputation already achieved by your distinguished Actuary.

And permit me, in closing my labor, to avail myself of the occasion to congratulate you on the abundant evidence this investigation has disclosed of the prudence, economy, and wisdom with which your Company has been managed in the past, and which have made it a source of just pride to the people of this country, and a subject of admiration and respect to the insurance world abroad.

The preliminary report of the Medical Department, on these same vital statistics, has also been submitted to my consideration, and I find that the results so far developed are interesting and important, and that the investigations in which I found your medical staff engaged, with so much ability and industry, promise to add largely to our knowledge of the laws by which hereditary and other diseases affect the duration of human life.

Very respectfully, yours, etc.,

C. F. McCAY.



THE MUTUAL LIFE INSURANCE COMPANY OF NEW-YORK,

ACTUARY'S DEPARTMENT,

NEW-YORK, December 31, 1875.

F. S. WINSTON, Esq., President:

DEAR SIR: The purpose of this communication is to present the mortuary experience of the Mutual Life Insurance Company of New-York, from its organization in February, 1843, to the close of 1873, covering an interval of 30 years and 11 months.

Life Insurance has become a leading interest with the American people, the amount already insured being more than that of the national debt, and of this vast sum about three hundred millions fall to the care and custody of this Company. The foundation on which the business rests is the mortality among the American people, or, more properly, among that class of persons in the United States who insure their lives. In the early period of Life Insurance in this country, as there was but little definite knowledge regarding the mortality in our whole population, and none as to the mortality among insured lives, the business was tainted with the uncertainty that usually attaches to deductions

from insufficient experience. The computations were based upon Mortality Tables constructed from observations among a foreign population differing from our own people in habits of living, in the comforts they enjoyed, and in the climate to which they were exposed. For these and other reasons, these tables have never had that degree of confidence here which they seem to enjoy at home. A table, therefore, which shall truthfully express the rate of mortality among insured lives in this country is desirable, and the experience of this Company will prove a valuable contribution to the materials for its construction.

A first step towards this end was taken by the publication of the Company's experience during the fifteen years ending in 1858. That experience was limited, as the business had been comparatively small, and in some particulars exceptional. But from this experience was deduced in part what is called the American Table, which was adopted at first by the Company with some hesitation, and only after material modification. In the year 1867, however, it was made the basis for premiums, and has since been used in its present form for all Insurance computations in this Company. It has also been extensively used by other companies, and is now the legal standard for valuations in this and several other States. But the observations were too limited to justify more than the hope that it might prove a true exponent of future mortality among assured lives in this country. Some comparisons between the total experience of this Company and the American Table will appear in this Report, for the reasons above stated.

OTHER COMPARISONS.

Occasional reference is also made to other Tables of Mortality, and to statistics published in Great Britain. These are,

First. The Combined Experience Mortality Table, which was formed from "the combined experience" of seventeen British offices, collected by a committee of the English Institute of Actuaries, appointed

by that society in 1838, whose report was published in 1843. The committee treated of policies only. The number of lives belonging to that experience was never known. This table has been much esteemed, and is the legal standard in Massachusetts.

Second. The New Actuaries' Table, which combines the experience of twenty English offices, and was prepared by a committee of the same institute and published in 1869. This table has for its basis a larger range of experience among assured lives than any yet published. It places the rate of mortality generally lower than any with which we are acquainted.

Third. Ten Scotch Offices' Experience, collected for the same institute and published in 1872 by Mr. Meikle.

Fourth. Dr. Farr's English Life Table, No. 3, Males, constructed from the total population of England and Wales.

RANGE, DURATION, AND CHARACTER OF EXPERIENCE.

Since the publication of this Company's experience, in 1858, the number of years of its existence has doubled, and its observations have increased sevenfold. At that time the number of policies issued was 19,772; at the close of the present investigation it is 152,149.

In the early history of the Company, some risks were accepted from the extreme Southern and South-western States of the Union, and some of emigrants to California by the Isthmus of Panama; and since that period some below the latitude of thirty-five degrees—but not below thirty-two—and permits have been given to persons already insured to visit the tropical regions of South-America, the East and West Indies, and other places where the climate risk was above the normal standard; also during the late civil war, permission was given to many of the insured to join the army, and a considerable number died in battle, from exposure in the army and diseases contracted in the war: but none of these cases have been excluded from this report, which is a complete

and faithful record of every insurance effected by the Company. Some policies have, indeed, been issued and cancelled which are not included in the report now submitted, but in these cases no risk was assumed, and the exclusion is therefore proper and necessary to a true and exact history of our mortuary experience.

A comparison with British offices of some important items will appear in the following summary :

	Ten Scotch Offices.	New Actuaries', Males.	Combined Experience.	Mutual Life of N. Y.
Entrants.....	91,198	130,243	62,537	101,967
Retirants.....	18,589	35,024	Near a third.	27,764
Deaths.....	11,947	20,521	Near a sixth.	5,515
Remaining ...	60,662	74,698	Above half.	68,688

The percentage of those retiring and remaining at the end of the observations does not differ much in all of these cases, but the deaths are much smaller in the Mutual Life than in the others, probably because it has had fewer exposures at the later ages of life and at the older ages of insurance.

The English offices have divided their risks into healthy and diseased lives, and into male and female, and the Scotch offices have made other subdivisions. But as this Company insures only select, healthy lives, and the female risks were only about three per cent of the whole number, all the exposures and deaths have been included in one general result.

It has sometimes happened, doubtless, that through oversight, carelessness, or fraud, some inferior and defective risks have been taken, but as the aim has been steady and uniform to insure none but sound and healthy applicants, whose habits of life are good, it is proper to designate all entrants in this Company as healthy lives.

The average age of the British companies, with which comparison is made, is considerably greater than that of this Company, and they have not made so rapid a growth ; consequently recent insurances form a larger part of our experience than of theirs. But the difference is not

so great as this statement would lead one to expect. The average duration of the combined Scottish policies on healthy lives was 8.54 years; of the twenty English offices, 9.12 years; of the fifteen British offices, less than $5\frac{1}{2}$ years, or, including the Amicable and Equitable, the two oldest offices existing, less than $8\frac{1}{2}$ years, while that of the Mutual Life is 5.64 years, or about two thirds of each of the others.

This Company had been doing business nearly thirty-one years. The oldest of the ten Scotch companies had existed forty-eight years, but as the observations of the remaining nine must enter into the general average duration, it may be said that our history embraced nearly as large a variety of seasons, and of healthy and sickly years, as the combined Scotch offices. The new Actuaries' and Combined Experience tables are based on a longer period of observation, the latter going back to the seventeenth century.* But it may be doubted whether any thing is gained by this extension of the experience, as there is reason to believe that human vitality has somewhat improved in the present century, and our history has been sufficiently protracted to give a fair average for years of high and low mortality. When it is added that the observations of this Company are principally on American lives, and the others on a population in a different country, the value of the present contribution to the vital statistics of the United States must be apparent.

METHOD OF TREATMENT.

The essential particulars of each policy were written on separate cards, all of the same size. These were then alphabetically arranged, so as to bring together two or more cards referring to the same person. As the repetition of a policy on the same life had been regularly noted on the registers and transferred to the cards, there were two methods of detecting duplicate or triplicate policies. The two were compared, and every discrepancy noted and corrected.

* See "Annuities," by Jenkins Jones, page iv.

These repetitions were scrutinized to learn if the risk had been continuous, and if so, all such were counted as one risk. If any interval was found between any of the insurances, during which there had been no risk, the several distinct periods of exposure were regarded separately. In this way the 152,149 policies were reduced to 101,967 persons, and the observations reduced so as to be on lives and not on policies. The old Actuaries' Table has been disparaged because it was founded on policies and not on lives.* This objection has been wisely obviated in the recent treatment of the combined experiences of the English and Scotch offices. For some purposes, the use of policies will often give a very close approximation to the true hazard on lives, but when subdivisions of the risks are made to find the mortality for different years of insurance, or for other limited classes of lives, the results may vary largely from the truth. When the number of cards had been thus reduced, they were all rearranged, so as to bring together all those relating to entrants at the same age, which was taken at the nearest birthday. In the subsequent work the method adopted by the British Actuaries was carefully pursued. All the facts which were needed to find the number of years of exposure and the deaths for each age and each year of insurance were thus secured, and the results are to be found in **Table I.**, at the end of this report.

The figures near the top of the page in this table, under the heading "NUMBER OF ENTRANTS," represent the number of persons who were insured at the ages under them. The table can be read in three different ways, and in each it tells different facts.

If read horizontally, or across the page, it tells the total number of years which were lived by a different set of persons at different ages, in the same year of insurance. If read vertically, or down the page, it tells the total years lived by different persons in different years, but of the same age. If read diagonally, beginning at the left and passing to the

* See Massachusetts Insurance Department Reports for 1859 to 1865, page 89.

right and downwards, it tells the years lived at different ages in different years by the same persons.

From the number of entrants given in **Table I.**, the average age of the insured was found to be 34.95. In the twenty English offices it was 34.96, and in the ten Scotch offices it was 35.59. The number of entrants of the Mutual Life was greatest at the age of thirty, then decreased, slowly at first and more rapidly afterwards, but always steadily with increasing age. The office age in the twenty English companies had also its maximum of entrants at thirty, and thenceforward decreased with great regularity. These facts in the history of the age of insurants in different countries is a striking illustration of the law of human intentions, of which Quetelet has furnished so many instances.

TABLE OF MORTALITY.

By adding the vertical columns of the exposures and deaths in **Table I.**, and finding the ratios, the rates of mortality for every age of life from ten to ninety-two were obtained, and will be found in **Table IV.** In this table are also given the ratios between the actual deaths and the numbers predicted by the American and New Actuaries' Tables.

In obtaining the deaths for the New Actuaries' Table, the H^{MF} table, or the one for healthy male and female lives, was used; and this table was used subsequently for the experience of the twenty English offices wherever the deaths of the two experiences are compared. As the risks of this Company are chiefly males, the comparison with the H^M table would perhaps have been the fairest, but the difference is too small to affect any of the inferences drawn. When the observations of the two experiences are compared for successive years of insurance, the H^M table, or the experience for healthy male lives, was used.

By examining this table, it will be seen that the mortality of the Company at every age, where the observations were sufficient to inspire

confidence, has been lower than that of the other tables, and that the total mortality for all ages is twenty per cent below the American, and twenty-four per cent below the New Actuaries' Table.

This comparison presents satisfactory results, because the American is the table by which the Company's premiums have been computed.

The facts in this table indicate that the risks of this Company have been carefully selected, and that the mortality of American lives, such as have been here insured, is lower than that in the English offices.

As vital statistics of a reliable character have been very limited in this country, some doubt has hitherto existed on this question. And it may be objected that this doubt is not completely set at rest by the large percentage here shown in our favor. A large proportion of the Company's risks have been of recent origin. When the duration of the risks shall equal that of the English companies, the rate of mortality may be quite as great. And thus the question arises, How far may the past history of this Company be relied upon as a guide for the future?

The favorable influence of selection has been very great on our risks. So also has it been on the English. If it has been greater on ours, its effect will be seen at that period of life wherein the entrants are most numerous and the rate of mortality, which constitutes our experience for those ages, is most affected by new and recent insurances.

If **Table IV.** be examined for the purpose of discovering this difference, it will be seen that the irregularities at the several ages are so considerable that no satisfactory conclusion on this subject can be formed. To meet this difficulty, **Table V.** is presented, which is formed by a combination of the facts as presented in **Table IV.** for each five consecutive ages.

By examining this table, it will be found that the average ratio of actual to predicted mortality at all ages is under eighty per cent. whether the American or New Actuaries' Table be used in the comparison. Also that at the five-year combinations under age 45, this is true in five out of seven of the cases for the American, and four out of

seven for the New Actuaries'. After age 45, seven out of ten are above eighty per cent by the American, and five out of ten by the New Actuaries'. The largest number of entrants in this Company at any particular age is found at age 30. The majority entered at ages under 45. The table therefore establishes the fact that the mortality has been below that of the English or American Tables, by a larger percentage at the younger than at the older periods of life, taking forty-five as the dividing age.

But many irregularities are still apparent. The standards of comparison were graduated tables, and to make the comparison under similar circumstances, our experience was also graduated, and will be found in **Table VI**. This is derived from **Table IV**, in the following manner:

The radix was assumed to be 100,000 persons living at the age of ten, and their successive survivors were obtained according to the rates of mortality in **Table IV**. The numbers thus found were adjusted by the method of Mr. Woolhouse, which was used by the English actuaries for the experience of the twenty English offices. Our observations being few under eighteen and over eighty-three, the numbers below and above these two limits were not considered, and therefore the table begins at age twenty-five and ends at seventy-six. To this adjusted table we have annexed the rates of mortality, and are thus enabled to compare it with the New Actuaries' Table.

It will be seen that between the ages of 27 and 63 not a single one of our rates is above eighty per cent of the English; but above 63, all show a higher ratio to the English experience. It is therefore inferred that selection had a greater influence in reducing the average mortality than it had in the English offices. In order to obtain more satisfactory evidence of this, a new element of comparison, the expectation of life, was then introduced. This accumulates all the annual differences for a long series of years, and thus brings to view what might otherwise escape attention because of its minuteness or irregularity. Before, however,

obtaining these expectations, a more accurate adjustment was made of the experience by means of a mathematical formula which has been found to represent the different mortality tables so well, that it is generally received among actuaries as a close approximation to the true law of human mortality. This adjustment is to be found in **Table VII.**

The formula used in its construction was

$$l_x = ka^{-x}g^{q^x}$$

in which x denotes the age and l_x the number of living at that age; the quantities k , a , g and q being constants to be found from experience in the special community where the law is applied.

In applying this formula, the ages for the determination of the constants were so selected as to embrace the greatest range of the Company's active business, and, at the same time, make the corresponding Life Table the best approximation to the actual experience.

After many trials, the ages 25, 42, 59 and 76, giving intervals of seventeen years were adopted, with the following results for the constants, viz.:

$$\begin{aligned} \text{Log } q &= .0489315 \\ \text{Log } g &= -.000067515 \\ \text{Log } a &= .0026012 \\ \text{Log } k &= 5.0262203 \end{aligned}$$

The column $\frac{v^x}{l_x}$, in **Table VII.**, was not obtained from the numbers of the living and the dying in the two preceding columns, but from the general formula, which gave the results due to a larger radix than 100,000 for the number of the living at age ten.

The expectations for the New Actuaries' Table, here given, are for male lives. These expectations tell the history of the living from their several ages to the end of life, and afford the means of comparison between this new Mortality Table and the American and New Actuaries' for the

after lifetime of each separate age, and disclose the relative influence of selection as it affects the different tables.

For the younger ages, the expectations deduced from the experience of this Company are considerably greater than those of either of the tables. At twenty the excess is nearly three years. As age increases, the difference decreases, until at age 75 they become about equal. After that age the expectation by the English Table is a little higher than for this Company.

The result of these comparisons leaves but little doubt that the experience of this Company has been more affected by selection than that of the English. The low rates of mortality in the early years of insurance have reduced the general average to an extent greater than the Company ought to expect hereafter, because it is improbable that recently selected risks shall so greatly outnumber those of older date as in the past. A still closer comparison of the influence exerted by selection in this Company and the English, can be made by comparing the experience of the two in those parts of their history when the circumstances were identical. If new risks be compared with new risks, recent with recent and old with old, the comparison will be made under like circumstances.

For this purpose, **Table VIII.** was prepared as follows :

The exposures and deaths were found by summing up the observations of the H^M table of the twenty English offices for each year of insurance. From these the rate of mortality was found and inserted in the fourth column.

Precisely the same collection was made of the exposures and deaths of the observations of the Mutual Life, (see **Table XIII.**,) and the rate of mortality inserted in the fifth column.

The last column gives the ratios between the rates of mortality in this Company and in the twenty English offices, all ages combined. It will be observed that in the first year of insurance the difference is quite small, and in favor of the English experience. But in the succeeding

thirty years of insurance the rates for this Company are all below the English. Three only of the ratios exceed eighty per cent, and thirteen only exceed seventy. What was the probable cause of so great a difference in favor of American assured lives?

First. Since there is no material difference in the first year of insurance, it may be assumed that it is not to be found in any superiority of American over English vitality in the whole population.

Second. Nor can it be imputed to adverse selection, since the withdrawals from the Mutual Life exceeded those from the English companies (see **Table III.**).

Third. Nor can it be traced to any material difference in the average ages at entry, since, as already shown, they were almost identical.

The only explanation which suggests itself is, that the care here exercised in the selection of risks has been greater than in the English offices, and that its effects were not manifested in the first year of insurance, when the deaths were mainly due to accidents, and to the sudden and irresistible attacks of disease; but subsequently they became more and more apparent, when the strong constitutions, correct habits of life, and a favorable family history, presented a higher vitality to resist the several forces which destroy human life.

The comparisons may be further extended by resolving the whole of life into four periods, denominated young, middle-aged, elderly, and old; the average age of the first being 29, that of the second 40, of the third 49, and of the fourth 59. For this purpose, **Tables IX., X., XI., and XII.** were prepared. These tables were formed as follows, namely:

Begin with the middle-aged and **Table IX.**, which is made by collecting the exposures and deaths of the males in the twenty English offices, from the age 37 to the age 43 inclusive, for each successive year of insurance. This table gives the history of the same set of persons who entered at an average age of forty, which age begins the first column, and are forty-one years old in the second year of insurance,

forty-two in the third, and seventy in the last year of the observations. The rates in the fourth column are obtained by dividing the exposures of each year of life into the deaths. These rates being irregular, were adjusted by the method of Mr. Woolhouse. The first and last seven, which are not given by his general formula, were obtained by the ordinary method of differences.

The first year's rate for the Mutual Life was obtained by a careful adjustment of the first year's observations, and is to be found in **Table XVII.** This first year's rate was used for that of the twenty offices, as the average of the two was almost exactly the same, and no appreciable error is introduced by making them equal.

Tables X., XI., and XII. were constructed in a manner similar to **Table IX.,** but refer to different ages.

Table X. includes the entrants at all ages under 37, the average age being 29. This introduction of all the observations under 37 produced no material change in the rates, and it was concluded to make these comparisons embrace the total experience of the twenty English offices and of the Mutual Life for these ages.

Table XI. includes entrants between the ages 44 and 54, the average being 49.

Table XII. includes the entrants between ages 55 and 75. As the observations above age 65 were so few that they would not make a separate class, and as they could not produce much effect on the general averages, they were only included to make the comparisons complete. The average age of this class was 59.

The sixth column in each table was obtained by dividing the adjusted rates of the twenty offices into the adjusted rates of the Mutual Life, and the ratios afford a fair comparison of the rates of the two experiences, from which all the differences in the history, progress, and duration of the two are entirely eliminated.

From these four tables is deduced the following synopsis:

AVERAGE AGES AT ENTRY.

YEAR OF INSURANCE.	29	40	49	59
1st year	1.00	1.00	1.00	1.00
2d "	.93	.86	.82	.80
3d "	.90	.81	.73	.71
4th "	.89	.77	.69	.67
5th "	.87	.75	.69	.66
10th "	.82	.82	.77	.73
15th "	.72	.73	.64	.71
20th "	.68	.77	.91	.69
25th "	.92	.79	.87	.85
30th "	.49	.66	.19	.63

These percentages exhibit the ratios of the mortality in this Company to that of the twenty English offices, at the different ages at entry in the four periods of life, for the different years of insurance, and show, that while the American mortality equals that of the English in the first year, it rapidly declines through the next four insurance years, and after that remains, on an average, about twenty-four per cent lower through each succeeding year.

Another comparison between the risks of the English offices and those of the Mutual Life is afforded by **Table XIII.**, wherein the deaths predicted by the New Actuaries' and the American Tables are given for the new and old risks of the Mutual Life, embracing every year of insurance from the first to the thirty-first. By comparing these, it will be seen that the first year's actual deaths are only half the number expected by these two tables. In the second year they are less than two thirds; in the third, less than three fourths, and in the fourth, less than four fifths. In the fifth and subsequent years, they continue below the English for every year, except two, when they are one or two per cent higher; but if periods of three successive years be combined, the Company's experience is always below the English, showing that its worst risks are better for every continuous period of three years than the average of the twenty English offices. If compared with the Ameri-

can, its worst risks give a higher rate for four of the thirty-one years of insurance than that table; but the average of all the rates after the fifth, tenth, or any year of insurance, is below it.

In the later years, the deaths and exposures are not indeed very numerous; but in the last five, the number of deaths is only sixty-four against ninety, and in the last ten, three hundred and thirty-five against three hundred and sixty-three.

This table furnishes a striking proof of the great value of selection in the early years of insurance, and of its steady decrease with the age of the policy.

In further elucidation of this subject, **Tables XV.** and **XVI.** are given, in which the experience is divided into groups of five consecutive ages.

The first of these contains the ratios of the actual to the expected mortality by the American Table for entrants during each successive five years of life following the year of entrance, while the second, by means of like ratios, exhibits the increase in the force of mortality among persons of the same age who have been insured for different periods of time. For example, the first contains the ratios for each quinquennium of insurance for the entrants from forty to forty-four, and the second for those who have died between forty and forty-four. In examining these tables, it is found that for all the ages of life taken together, there was a steady advance in the ratios for each quinquennium of insurance excepting the last, where the observations were so few that the anomaly did not seem important; the ratio of the actual deaths to the expected being .71 in the first five years, .88 in the second, .89 in the third, .93 in the fourth, .95 in the fifth, and falling to .75 in the sixth. For some of the classes this advance was maintained for several of the quinquenniums, though not for all; and in some the ratio rose above unity, so that for these, the actual deaths exceeded the number predicted by the American table. This result shows that the inference drawn before from **Table XIII.**, that the Company's worst risks did not

show a higher rate of mortality than the American and the New Actuaries' tables, except in three or four years of insurance, was only true for all the ages of life taken together, and was not correct for every separate quinquennium of life.

VALUE OF SELECTION.

When a company is young, or has had a constant accession of new vitality, sufficiently large to keep the average mortality lower than the limit which it is probably destined to reach, it would be unsafe to regulate its business by its own experience without proper qualifications. Obligations contracted without such qualifications would embarrass and endanger a Company, when the yearly infusion of new vitality should diminish or cease. The influence of selection deserves, therefore, the most careful attention.

This influence is evidently at its maximum in the first year of insurance. Before the policy is issued, the closest examination is made of the health, constitution, and habits of life of every insurant. But after the contract is completed, this scrutiny can seldom be repeated, and therefore the health and habits of many, out of the whole number insured, will become more or less impaired, and this natural and inevitable deterioration will be increased by the adverse selection of those who withdraw. The vitality of the insured and the advantages of selection will diminish with the duration of the policy. If the selection had been made carefully, a larger or smaller part of the advantage which it gives would probably remain to the end of life. But if it had been made carelessly, or if the adverse selection made by those who withdrew had been accelerated by evil reports against the company, or other causes, it might happen that all the advantages of the favorable selection at entrance might be neutralized, and the mortality rise above that of the whole population.

To measure the advantages of selection in any class of insured lives, it is necessary to compare its mortality with that of the whole population; for if compared with any other rates that have been made up from

an experience among insured persons, in which the exact amount of advantage due to selection is unknown, it will be impossible to discover it. The mortality in this Company has been lower than that in the twenty English offices for the whole, and, as a rule, for each separate class, as to age and duration of insurance, into which they may be divided, and it is generally below the table on which the Company's premiums have been computed, but neither comparison measures the absolute advantages of selection.

Table XVII. gives the exposures, deaths, and rates of mortality in the first year of insurance. These rates were first adjusted, and the results properly tested.

If, now, the mortality rates for the whole American population were known, the absolute effect of selection could easily be ascertained. But these rates are not known, and resort was had to Farr's English Table, No. 3, Males, for the population of England and Wales. This gives a low rate of mortality for that population, but whether the rate for the United States is below or above this, there are no means to determine.

Comparing the Company's rate for the first year of insurance with this standard, it is found that under the age of forty, the former is only forty per cent of Dr. Farr's; from ages forty to sixty this percentage advances slowly, and at the latter age reaches fifty. A similar table was constructed for the experience of the twenty English offices, and showed, when compared with the same table, nearly the same result for the younger ages, but a lower percentage than forty for the higher.

As the observations were few at the older ages, it would seem probable that the rate at all ages of life will ultimately be brought down to forty per cent of the English table of Dr. Farr, and that this may be considered the measure of careful selection in the first year of insurance.

EFFECTS OF SELECTION IN YOUNG, MIDDLE, ELDERLY, AND OLD AGES.

To examine the waning effect of selection in the subsequent years of insurance, resume the four classes, designated as the young under

thirty-seven, middle-aged from thirty-seven to forty-three, elderly from forty-three to fifty-four, and the oldest from fifty-five to seventy-five. The exposures, deaths, and rates of mortality for these several periods of life are in **Tables XVIII., XIX., XX., and XXI.** In each of them will be found, also, the rates of mortality for the first year of insurance, when selection is at its maximum, and the ratios between these and the adjusted rates for every age for the successive years of insurance in each of these four periods of life.

From these it will be seen that among the younger insurants, whose average age is twenty-nine, this ratio, beginning at unity in the first year, advances to 1.40 in the second, to 1.69 in the third, and 1.90 in the fourth year, showing that the rate has nearly doubled, and instead of being forty per cent of the standard English, has already become nearly eighty per cent of that table.

In the fifth year this advance is still greater, and in the sixth the maximum impairment is reached, and the greater part of the advantages of selection disappear. When the ratios for middle life are examined, the progressive decline of selection is found to be slower. In the second year, the ratio is 1.15; in the third, 1.29; in the fourth, 1.36, and in the fifth, 1.42, and at no age does it exceed 1.65; and it is inferred from this that a considerable portion of the influence of selection has remained among this class of lives through every subsequent year of insurance. If the experience at the older and the oldest ages be examined, this progressive advance in the rate of mortality with the year of insurance is still slower, and the ratios between the rates experienced and those for the first year of insurance are smaller than at the earlier ages of life, showing that the decrease of the influence of selection is less rapid than in early life, and that a much larger portion of it remains through the succeeding years of insurance.

The conclusions therefore are: *first*, that the advantage of selection diminishes at all ages with the duration of the policy; *second*, that it decreases very rapidly among those who insure at the younger periods of life;

and, *third*, that it decreases more slowly at middle life and among older insurants, and probably never entirely disappears. This will be found to be confirmed on an examination of the observations of the twenty English offices, and also in the experience of the ten Scotch offices in these four periods of life. So that it would seem to be fully established that these three propositions are true laws of the mortality of insured lives. Their bearing on some of the practical questions of insurance is of importance.

In determining the proper charges to be made for insurance, they indicate that the premium may be lower than is required by the average table deduced from the whole experience, because the receipts will be larger and the discount on future payment for losses by death greater, than if these peculiarities of insured lives were not considered. Their effect on the distributive share of profits which belongs to the several members of a Mutual Company deserves a further examination, as it seems to change more or less all the elements on which the contributions to surplus are founded. This is important, as this Company is dividing millions every year of its history, and the just distribution of these savings is demanded by the interests of its policy-holders, and desired by its officers.

Turn now to the history of entrants between ages twenty and twenty-four. In **Table XV.** these show great peculiarities, and to exhibit them in all their force, **Tables XXII.** and **XXIII.** were prepared from the observations of this Company, and of the twenty English offices. They comprise a large number of exposures, especially in the earlier years of insurance, so that the experience is large enough to present results worthy of confidence.

By examining the ratios of the Company's mortality to that of the English, which are to be found in the last column of **Table XXII.**, it will be seen that the former is always below the latter, after the first year of insurance, and that the percentage decreases very slowly at first, and rapidly afterwards, so as to average seventy-two per cent of the

English after the fifth year of insurance; which result accords very closely with what had been found to be true for all the younger lives under the age of thirty-seven.

By referring in **Table XXIII.** to the rates of mortality for the Company's experience for ages twenty to twenty-four in the second, third, and subsequent years of insurance, it will be seen that the advance is extremely rapid: fifty per cent in the second year, ninety in the third, one hundred and twenty in the fourth, and in the twelfth year the rate becomes more than three times that of the first. The increase in the English experience is still more rapid, rising to more than four times the first year's rate in the fifteenth year of insurance.

The advance in the rate of mortality in our experience for this class of entrants carries the rate higher than the American table at the sixth year of insurance, and thenceforward, with one or two exceptions, it continues above, to the twenty-sixth year, after which our exposures were too few to warrant an inference entitled to any confidence.

The benefits of selection for these entrance ages decrease also very rapidly, measuring them by the standard of Dr. Farr's table. In the first year they are sixty per cent; in the third, thirty; in the fifth, fifteen; in the thirteenth and fourteenth only five, but this is the minimum; so that some of the benefits of selection always remain among the young entrants. In the English experience, the mortality of this same class advances so rapidly that it rises above the rate of the whole population, and so continues from the twelfth to the twentieth year of insurance.

SURRENDER CHARGES.

The facts, as regards insured lives at entrance ages under twenty-five, require further comment. The impairment is so large that some other cause is operating besides the natural and normal forces which are at work on the general population. Such a cause is known to exist; for it is at this period of life that the withdrawals are at their maximum, as

shown in **Table II.**, and the selection against the Company most powerful and efficient.

The ratios in this table are found by dividing the number of retirants by the number of years of exposure in each five years of life, and each five years of insurance. These retirants include those who have terminated their policies by lapse, surrender, or expiration, but are mainly of the first two classes, as for many years no term risks have been taken, except for endowments, and the terminations of the last had been very few at the close of 1873. From this it appears that the number of withdrawals is at its maximum in the first five years of insurance, and decreases with the age of the policy, and that this disposition to retire is greatest with the young, and lessens continually with advancing years.

Of the 9866 entrants at ages 20 to 24 inclusive, 3045 retired within the first five years, or more than thirty per cent of the whole number, and this percentage is much greater than at the older ages.

Among these retirants the larger number were, doubtless, sound lives, and, if so, their departure reduced the vitality of those who remained below the limit to which it would otherwise have fallen. The very great number of withdrawals at these early ages makes the increase of mortality more marked than at other periods of life; and although it would be impossible to give its exact measure, it is probably a considerable part of the whole cause at these younger ages.

It is an evident consequence of these facts, that those who retire should not be permitted to take with them their contributions to the tabular reserve. This reserve was computed upon the assumption of a continuous average vitality for all, not less than that predicted in the Mortality Table from which it was derived. Its function is to eke out the deficiencies in premiums which will occur in the later years of insurance. If by the withdrawals of good and the forced retention of impaired lives, these deficiencies are aggravated, those who cause the mischief must repair it. It is, therefore, proper that a surrender charge be made against

those who, being in sound health and having the promise of long life, voluntarily withdraw from the Company, to enable it to make a readjustment of the reserve fund. The amount of this charge should vary with the age at entrance and duration of the policy. But the large depreciation of vitality which has been found among those who have been a long time insured, and the expenditures which have been incurred in procuring and examining the entrants, and charged to the whole body of insurers, make it evident that this charge should often be no insignificant part of the tabular reserve. The rule which has been adopted by the Company for this purpose is founded on these principles, and the facts which have been developed in this investigation, in reference to the impairment of insured lives, have furnished new evidence of its propriety and justice.

Certain it is, that the impairment of insured life which has been observed in the experience of this Company and of all others, is a proof that some charge ought to be made, and that the theory that all the computed reserve is the individual property of the insured, to be demanded and received at will, is unsound and unsafe.

Such a theory seems to make no account of the distinction, so well known to mathematicians, between what are called mathematical and moral values. Wherever there are business risks there must be corresponding cautionary measures, and the relation between these must determine the moral value of business capital. A manufacturer of gunpowder who should put all his materials and operatives in a single building might be ruined by a single explosion, whereas if they were distributed in detached parcels, so as to be independent of one another, a single accident of this kind might do him but little harm. In the former case the moral value of his capital would be small, in the latter comparatively large, while the mathematical value, in both cases, might remain unchanged. And so it is with life insurance. It is a common remark, and as true as common, that nothing is more uncertain than human life in the individual, and nothing more certain in a large community, and a

company having but few insured lives might have a greater ratio, mathematically, of assets to liabilities than another having more numerous risks; but the moral values in the latter case might more than offset any difference in their mathematical values. While the assets of a company might not justify a risk upon a single or a few lives, they might be more than ample to insure a large number of the same vital force, but sufficiently numerous to secure the benefit of a general average vitality. Moral solvency, in this case, would result from the multiplication of risks.

Other things being equal, an increase in the number of assured lives increases the mathematical and moral values of a company's assets, but the latter more rapidly than the former; and, conversely, a decrease of the number of assured lives diminishes both of these values, but the moral more than the mathematical.

Retiring members, therefore, not only impair a company's vitality by what is called adverse selection, but they also inflict an injury upon its assets; and while the company can not control the wills of its policyholders, but must let them go when they please, it may and must take care that the harm from these sources be compensated by a money equivalent.

The moral value of the assets will then be kept in proper relation to the altered condition of the company, and the requisite means secured to satisfy the future claims as they mature. Those who retire should leave the company no worse off than if they remained. The conditions of the problem are these: The company can not compel the policyholder to continue the payments of his premium. The contract gives him no prescriptive right to a cash surrender value. But the company ought to give him paid-up insurance, and can base it upon his contributions to the reserve fund, because so long as he remains a member, he is entitled to consideration as a risk no better and no worse than the average. This being done, the policyholder has received the full value of his payments, in the commodity in which the company deals.

But if he choose to retire altogether, another question arises: Will the company purchase one of its own obligations not yet matured? In this it must be governed by the equities due to persistent members. If it decide to purchase, the new paid-up policy should be the basis for the determination of a price, and the member who proposes to retire must be considered a risk quite as good as any in the company.

1. What is the company's interest in this policy? Obviously, the present value of the sums which it would contribute, from year to year, if it remained, towards the payment of death-claims on other policies.

2. What is the interest of the assured, or his heirs, in this policy? It is the present value of the sum which they would receive at the death of the assured, and this is the present reserve.

The difference between the two present values is the sum which the retiring member may claim, and which can be paid without injury to the interests of those who remain.

ANOTHER TABLE OF MORTALITY.

The very low rates of mortality in the early years of insurance in this Company, have suggested a table of mortality in which the experience of these years is omitted.

It has been repeatedly noticed, in the past discussions, that the rate of mortality increases rapidly during the first five years of insurance and slowly afterwards. The observations of these five years have, therefore, been excluded, and the result is **Table XXIV.**, which was adjusted by the method of Mr. Woolhouse, and by the same mathematical formula which was used in the general table, thus forming **Tables XXVI.** and **XXVII.**

Although **Table XXVII.** is based upon the limited experience which remains after rejecting that of the first five years, and upon a law of mortality which is, perhaps, not wholly free from doubt, and will, therefore, need confirmation by future observations, it is, nevertheless, believed

to be a nearer approximation to the true law of vitality of assured male lives in the United States than any hitherto constructed from purely American experience.

PRICES OF INSURANCE.

The material facts of the Company's vital statistics having been made apparent, it only remains to show the modifying influences these facts would have had upon the prices of insurance, had the latter been regulated by them. Taking the graduated **Table VII.**, constructed from the whole experience, and six and a half per cent interest for money, which is a trifle under the general average realized, the corresponding net annual premiums for ten thousand dollars of insurance, payable at death, have been computed and placed in column (2) of **Table XXVIII.** The Company's present net premiums, or premiums without loadings, for this insurance, are placed in column (3), and the difference of these two sets of premiums, taken at the respective ages, in column (4).

Had the Company charged only its present net rates—that is, rates without loading—the numbers in column (4) would have been the annual amounts available for incidental expenses, and for bringing the new reserves up to the present basis. These, according to the past history of the Company, would have been more than sufficient for the purpose. The same would have been true for other forms of insurance.

So that the Company had, during the period usually allotted to a human generation, not only secured and safely invested its ample reserves, computed upon a basis of four per cent interest for money and the American table, but also paid all its death claims and business expenses from its present net premiums. In other words, it had returned to its policy-holders, as over-payments, more than all the marginal loadings charged for current expenses of business. This is a most striking proof of the economy and prudence with which the Company has been managed, and of the safety and wisdom of the recent recommendation

to the Board of Trustees to reduce its premium rates, action on which was suspended for extraneous reasons.

At my request and by your sanction, this report was submitted to the scrutiny and judgment of Prof. C. F. McCay, LL.D., of Baltimore, a gentleman distinguished for his familiarity with vital statistics. He kindly undertook and performed the requisite labor to form an intelligent opinion, and to him the Company is indebted for many valuable suggestions, which were adopted and are a part of this letter.

In closing this report, it becomes my duty, as it is my pleasure, to say to you, that much is due to the assistants in the Actuarial Department, for the zealous and intelligent aid they have given in its preparation, and for which I tender to them my hearty acknowledgments.

Respectfully submitted,

W. H. C. BARTLETT,

Actuary.

TABLE I.—Continued.

NUMBER OF ENTRANTS.

Years of Insur- ance.	4394		4353		4387		4344		4236	
	AGES AT EXPOSURE.									
	31		32		33		34		35	
	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.
1	2142	11	2121	4	2135.5	6	2122.5	15	2069	9
2	4029	19	3707.5	25	3766.5	26	3767.5	14	3754.5	22
3	3103	16	3473	29	3190	14	3242.5	20	3277.5	21
4	2688.5	16	2740.5	15	3102.5	20	2839.5	19	2871.5	12
5	2126	20	2368.5	17	2418.5	12	2732.5	15	2509.5	21
6	1657.5	12	1784.5	15	2024.5	16	2056.5	24	2320.5	21
7	1216.5	12	1325	12	1385.5	10	1623	12	1663	18
8	692	7	896	3	983.5	16	1002.5	11	1209	11
9	395	6	487.5	1	640	7	681	5	714	5
10	220.5	1	308.5	3	367	3	494	6	548	4
11	108.5	0	184	1	261.5	2	307.5	2	407.5	4
12	39.5	0	99.5	0	159	1	224	5	253.5	1
13	25.5	0	33	0	89	3	139	1	200	3
14	14	0	23	2	31	0	81.5	1	129.5	2
15	12	0	14	0	16	0	30	0	67.5	0
16	6	0	11	0	9	0	14	0	26	0
17	7	0	5.5	0	9	0	7	0	11	0
18	2	0	6	0	4	0	9	0	6	0
19	0	0	2	0	5	0	3	0	9	0
20	1	0	0	0	2	0	4	0	2	0
21	0	0	0	0	..	..	2	0	4	0
22	1	0	0	0	..	..	..	..	2	0
23	..	..	1	0	..	..	..	..	..	..

TABLE I.—Continued.

NUMBER OF ENTRANTS.

Years of Insur- ance.	4110		3754		3555		3302		3480	
	AGES AT EXPOSURE.									
	36		37		38		39		40	
	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.
1	2003	11	1830	8	1746	7	1622	11	1705	5
2	3692.5	21	3534.5	23	3220.5	19	3096	23	2890.5	16
3	3287.5	21	3221.5	10	3064	19	2815.5	19	2705.5	22
4	2892.5	26	2917.5	23	2900	25	2731.5	25	2496	29
5	2565.5	28	2542.5	30	2590.5	21	2577.5	28	2423	14
6	2150.5	20	2161.5	16	2150	21	2249.5	21	2196	21
7	1854.5	20	1714.5	12	1741	23	1743	15	1795.5	15
8	1231.5	7	1382	16	1272	9	1314.5	13	1287	14
9	895.5	3	887.5	10	1025.5	4	942	6	961.5	7
10	544	4	707.5	8	686.5	6	812.5	10	747.5	5
11	460	2	459	3	581	3	568.5	2	671.5	8
12	349.5	3	394.5	0	392	7	511	5	478	6
13	227	4	318	3	353	3	345	6	457	2
14	179.5	2	202	3	290	1	322	0	319.5	3
15	113.5	0	152	1	176.5	3	246	4	290.5	3
16	59	1	96.5	1	125.5	0	156	2	212	3
17	20.5	0	50.5	0	78.5	1	111	0	130.5	1
18	10	0	18	0	41.5	0	65	2	92.5	6
19	5	0	8	0	12.5	0	31	0	49	1
20	9	0	5	0	7	0	12	0	22	0
21	2	0	7	0	3	0	4	0	9	0
22	4	0	1	0	5	0	3	0	4	0
23	2	0	3	0	1	0	4	0	3	0
24	..	..	2	0	3	0	1	0	4	0
25	..	..	..	..	1	0	1	0	1	0

TABLE I.—Continued.

NUMBER OF ENTRANTS.

Years of Insurance.	2885		2704		2429		2232		2105	
	AGES AT EXPOSURE.									
	41		42		43		44		45	
	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.
1	1414	3	1330	5	1198.5	8	1095	8	1027	8
2	3030	20	2507.5	15	2365.5	20	2131	13	1950	10
3	2559	17	2666.5	15	2223	12	2082.5	17	1870	17
4	2400.5	13	2271	17	2406	21	1995	18	1874.5	17
5	2215	11	2137	13	2005	18	2129.5	19	1784.5	13
6	2075	12	1925.5	22	1856	10	1730	17	1843.5	17
7	1786.5	23	1678	10	1561.5	14	1515.5	18	1382	13
8	1315.5	9	1321	9	1268.5	11	1153	9	1133	5
9	919.5	3	900.5	8	935	5	847	8	836	9
10	746.5	5	735.5	3	705.5	7	744	6	657.5	4
11	626.5	6	615.5	4	597	4	596.5	12	638	6
12	573.5	6	532	8	533	3	516	8	520.5	4
13	420	2	501.5	3	477	2	482	5	440	2
14	419	1	390.5	0	460.5	4	436.5	8	436	3
15	277	3	370.5	3	349.5	5	405.5	4	383.5	5
16	239	0	246	3	326.5	3	306.5	4	362.5	6
17	179	3	202	5	222	3	283	1	262.5	4
18	109.5	0	149	1	170.5	0	197.5	2	252	1
19	72.5	1	90.5	0	119.5	2	139.5	0	166.5	2
20	35	0	60	0	76.5	1	102.5	0	119	0
21	16	0	28.5	0	53	1	62	1	85	0
22	9	0	15	0	25	0	42	0	55	1
23	3	0	7	0	14	1	23	0	38	2
24	2	0	1	0	7	0	12	1	21.5	0
25	2	0	2	0	0	0	3	0	9	0
26	..	..	1	0	2	0	0	0	3	0
27	..	..	..	..	1	0	2	0	0	0
28	..	..	..	..	..	..	.5	0	1	0

TABLE I.—Continued.

NUMBER OF ENTRANTS.

Years of Insurance.	1864		1562		1513		1321		1296	
	AGES AT EXPOSURE.									
	46		47		48		49		50	
	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.
1	913.5	5	764.5	9	745	6	647.5	6	635	5
2	1827.5	10	1608.5	14	1366	7	1327	15	1144	9
3	1746	22	1612.5	13	1394	11	1227	16	1177.5	8
4	1676	23	1569	13	1462	20	1243	9	1092.5	6
5	1692	20	1492	19	1397.5	18	1289.5	6	1090.5	13
6	1549	18	1459.5	15	1274.5	17	1202	11	1106.5	9
7	1472.5	9	1213.5	18	1175.5	13	1003.5	7	958.5	15
8	1023	10	1041.5	13	855.5	14	863.5	4	738.5	10
9	788.5	10	707	8	714	6	574.5	7	585.5	10
10	632	7	593.5	11	552.5	6	559	9	422	3
11	534.5	4	531.5	3	493	4	452	6	453	8
12	543.5	4	467.5	9	460.5	5	423	8	385	8
13	469	9	478	7	409.5	4	417	9	381.5	9
14	402	7	414	2	426	5	376	5	367.5	4
15	392.5	5	359	1	371.5	0	354.5	1	324	2
16	325.5	3	350.5	2	314.5	7	341	3	312	4
17	319	3	289.5	3	312.5	2	277	2	295.5	0
18	229.5	1	276	4	249.5	5	274.5	7	248	2
19	209	2	193.5	2	234	4	201.5	2	228	3
20	136	0	164	3	163	1	205.5	0	170	3
21	98.5	0	120	0	134	1	138.5	2	179.5	1
22	75	0	87	1	103	0	119	0	121.5	2
23	51	0	69	1	77	3	92	0	109.5	1
24	33	0	46	1	62	1	65.5	3	80.5	1
25	14	0	26	0	43	1	53.5	1	53.5	0
26	4	0	7	0	13	0	31	1	44	0
27	2	0	2	0	5	0	10	0	19	0
28	0	0	1	0	1	0	3	0	8	0
29	1	0	..	..	1	0	1	0	3	0
30	..	..	..	..	..	..	1	0	.5	0

TABLE I.—Continued.

NUMBER OF ENTRANTS.

Years of Insurance.	973		923		763		680		529	
	AGES AT EXPOSURE.									
	51		52		53		54		55	
	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.
1	473	5	455	5	375	2	335	2	258	3
2	1120	11	828	8	821	12	643.5	5	580	8
3	1009	10	1007	14	722	7	721	8	558	11
4	1067	13	918	10	909	10	640	12	629	5
5	975	9	949	13	817.5	8	804	8	557	12
6	944.5	10	836	4	816.5	11	710.5	13	685	10
7	903	11	747	10	670	5	655	6	545	15
8	668.5	8	634	14	530	8	478	4	469.5	4
9	480.5	2	464.5	8	423.5	5	354	7	320	5
10	441	8	378	6	349.5	7	314.5	6	251	4
11	350.5	3	339	3	311.5	5	282	8	258	9
12	375	6	292	5	294	4	259	6	236.5	5
13	346.5	5	328	3	259.5	3	261.5	5	225	6
14	341.5	2	312	7	296	2	235	2	237	5
15	326	11	300	4	277.5	3	263.5	6	207.5	3
16	294	2	283.5	3	261.5	4	242.5	4	226	2
17	273	3	254.5	4	252.5	2	237.5	4	219.5	5
18	256	4	237.5	2	223	4	213.5	3	204.5	3
19	213.5	2	215.5	1	212.5	0	192.5	5	182.5	2
20	201	0	168.5	2	182	8	186	5	165.5	3
21	148	2	170.5	2	142.5	1	158	2	161	5
22	165	1	124.5	2	158	1	130.5	2	146	2
23	110.5	1	152	2	110	3	140.5	5	114	2
24	95.5	4	101	5	139.5	1	94.5	2	125.5	2
25	71.5	0	79	1	83.5	4	112.5	2	76	1
26	38	1	55	0	58.5	2	63	0	80	2
27	32	0	29	0	43	2	49	1	44.5	0
28	13	0	18	0	22.5	1	29	2	37	1
29	4	0	9	0	13	0	14	0	19	1
30	2	0	1	0	8	0	4	0	7	0
31	..	..	1	0	..	..	6	0	3	0

TABLE I.—Continued.

NUMBER OF ENTRANTS.

Years of Insurance.	464		391		357		235		202	
	AGES AT EXPOSURE.									
	56		57		58		59		60	
	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.
1	225.5	1	189.5	2	175	2	114	1	99.5	4
2	457	4	391.5	4	332	4	302	3	199.5	3
3	516	8	393	3	352.5	7	293.5	5	272	2
4	487	9	452	9	348.5	6	310	6	252.5	6
5	554	5	420	3	393.5	13	301.5	5	274	10
6	457	6	463	6	363	4	338	10	257.5	5
7	515.5	8	345.5	4	361.5	6	291.5	6	254	2
8	371	6	359	7	247.5	6	265	6	189.5	3
9	317	8	239.5	4	225	6	142.5	2	177	2
10	220.5	3	216	2	170	3	157.5	2	113	3
11	193	4	169.5	2	147	2	144	4	130	4
12	216	4	162	1	135	1	130	2	123.5	4
13	206.5	3	189	4	140.5	4	121	2	112	1
14	203	1	183.5	0	168	2	125.5	2	103	0
15	203.5	0	174.5	6	162.5	2	146.5	2	110	4
16	177	1	180	2	146.5	6	144.5	5	132.5	3
17	197	8	157.5	1	161.5	3	126.5	3	123	6
18	186	1	162.5	3	134.5	1	136.5	2	114.5	2
19	173.5	4	160.5	3	134	3	118	5	111	3
20	161	2	146	5	135.5	3	111.5	2	100.5	4
21	142.5	2	143	1	122	1	113	1	100.5	2
22	146	1	130	5	123	3	108.5	1	102.5	5
23	130.5	0	131	5	113.5	0	114	4	96.5	2
24	101.5	4	114.5	4	118.5	1	103.5	2	101.5	5
25	112	1	85	0	96	0	100	3	92	4
26	58.5	0	88	1	65	1	71	1	78	1
27	59	1	43	1	65.5	2	46	0	54.5	3
28	36	0	39.5	1	27	1	42.5	0	28.5	0
29	25	1	21	0	25	0	20	0	30	0
30	10	0	12	0	14.5	0	12	0	10	0
31	3	0	4	1	3	0	3	0	4	0

TABLE I.—Continued.

NUMBER OF ENTRANTS.

Years of Insurance.	147		123		80		61		41	
	AGES AT EXPOSURE.									
	61		62		63		64		65	
	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.
1	73	2	61	1	39.5	2	30	1	20	1
2	159	6	129	0	98	1	65	2	51	2
3	172.5	3	134	2	120	2	85.5	2	60	6
4	239.5	6	149	5	117	3	108	4	79	4
5	214.5	4	209.5	4	122.5	2	100	3	93	4
6	227.5	3	185	6	176.5	4	103	5	80.5	3
7	207	5	167.5	3	135	2	126.5	3	73.5	4
8	194	9	140.5	3	114.5	3	96	6	89	1
9	129	0	122.5	2	85.5	3	79	3	60	3
10	120	3	83	2	76.5	2	62.5	2	53	3
11	90	5	97	3	63	2	62	3	44.5	1
12	109.5	4	74	3	80	5	55	0	53.5	1
13	109	1	99	4	67.5	2	65.5	0	52	1
14	101	3	99	1	84.5	1	60	1	60.5	0
15	91.5	1	84.5	0	89	1	72.5	2	51.5	0
16	94.5	1	86	2	72	2	79.5	4	59.5	3
17	115	2	82.5	0	74.5	2	57	5	67	6
18	107.5	4	102	3	72.5	3	66	5	49	3
19	95	3	94	2	85.5	2	54	5	56	3
20	91	2	79	4	80	1	69	0	46	1
21	85	3	77	0	69.5	1	68	1	64.5	1
22	86	3	72	2	71.5	3	65	4	61	3
23	88.5	2	73	2	64	2	63.5	1	55	2
24	87	2	82	0	62.5	0	55	1	58	2
25	88	3	77	3	72	2	54	2	46.5	1
26	73	6	69	1	57	3	58.5	1	44	1
27	60	1	51.5	3	57	1	44	2	45	2
28	38	1	36	1	37.5	2	42	1	32	0
29	24	2	28	1	23	1	25	0	29	1
30	20	0	7	0	14	0	11.5	0	18	0
31	3	0	15	0	3	0	6	0	2	0

TABLE I.—Continued.

NUMBER OF ENTRANTS.

Years of Insur- ance.	14		20		11		10		6	
	AGES AT EXPOSURE.									
	66		67		68		69		70	
	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.
2	6.5	0	9.5	0	5.5	0	5	0	3	0
3	36.5	0	12	0	18.5	0	11	0	9.5	0
4	47.5	2	35.5	1	12	1	18	0	10.5	0
5	48.5	1	41	0	32	1	11	1	17.5	0
6	68.5	4	45	3	39	3	30	1	10	2
7	73.5	4	51.5	3	35	1	31	0	28	0
8	63.5	2	53.5	1	41.5	0	28.5	1	25	2
9	47	3	41	4	33.5	1	24.5	0	19	0
10	65	2	28	1	24	1	21	0	13	0
11	36	2	43	1	16	0	18.5	0	14	1
12	36	3	26.5	1	31	3	14	1	16	0
13	37	0	28.5	2	23.5	0	22	0	12	1
14	48	1	33	0	23.5	3	21	2	20	0
15	47	1	44.5	0	29	2	19	1	19	2
16	53	0	42	1	39	1	24	0	16	1
17	44	2	49.5	2	39.5	1	35	0	23	2
18	50	2	36.5	2	40.5	3	32	1	31	1
19	51	4	43.5	2	29.5	0	31.5	2	27	1
20	40.5	3	43.5	1	37	3	23	3	25	2
21	43.5	2	30.5	4	35	2	28.5	0	16	1
22	45	2	38	1	22.5	1	30	1	24	3
23	59	2	40.5	1	35	2	21	1	27	1
24	49	2	52	1	36	3	30	2	20	0
25	46.5	2	44	5	46.5	3	28.5	2	27	1
26	53	5	34	2	31	1	39	4	24.5	0
27	35	0	34	2	25	1	20	1	30	3
28	31.5	1	27.5	1	23	1	22	0	13	0
29	27	0	22	0	22	0	16	1	18	1
30	22	2	22.5	1	16	1	16	0	10	0
31	17	1	11.5	0	14	2	7	0	8	1
32	6	0	9	1	5	0	8	0	2	0

TABLE I.—Continued.

NUMBER OF ENTRANTS.

Years of Insur- ance.	AGES AT EXPOSURE.									
	5		1		2		1		1	
	7 ¹		7 ²		7 ³		7 ⁴		7 ⁵	
	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.
1	2.5	0	.5	0	1	0	.5	0	.5	0
2	6	0	5	0	1	1	2	0	1	0
3	9	0	6	1	5	0	0	0	1.5	0
4	9.5	0	9	0	5	2	5	1	0	0
5	16	0	8.5	0	9	0	3	0	4	1
6	8	2	14	1	8	1	8.5	0	3	1
7	20.5	0	5	0	12	1	4	0	7	1
8	15.5	1	13	0	3	0	5	1	3	1
9	14	0	12	2	8	1	0	0	4	0
10	9	0	8	0	4	1	4	1	0	0
11	11	1	7	0	8	1	0	0	2	0
12	10.5	3	9	1	7	2	4.5	0	0	0
13	10	0	6	0	7.5	0	4	0	4	1
14	18	1	10	1	4	0	7	0	4	0
15	16	1	14	0	8	0	3.5	1	6	1
16	12	0	12	0	12	0	6	0	2	0
17	20.5	3	11	1	9.5	1	11	0	5	0
18	28	3	14	3	9	0	6	0	10	0
19	24	1	22	0	9	0	7	0	6	1
20	22	2	20	2	21	0	9	1	7	0
21	14	0	18	2	14.5	1	16.5	2	7.5	2
22	15.5	1	14	1	14.5	1	11	1	13	1
23	25.5	2	14	2	13	1	11	2	10	1
24	18	0	20	1	12	1	9	3	8	0
25	24	1	15	6	17	1	10	1	5	0
26	19	0	18.5	0	6	0	13	1	8	0
27	20	0	12	1	16	1	4	0	10	1
28	10	0	18	0	8	1	10	1	3	0
29	13	1	6	0	12.5	0	3	0	5	0
30	3	0	6.5	0	2	0	4	0	2	0
31	5	0	0	0	4	0	1	0	2	0

TABLE I.—Continued.

NUMBER OF ENTRANTS.

Years of Insurance.	AGES AT EXPOSURE.									
	76		77		78		79		80	
	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.
	o	o	o	o	o	o	o	o	o	o
1	..	..	..	..	..	..	..	..	..	..
2	1	0	..	..	..	..	..	..	..	..
3	1	0	1	0	..	..	..	..	..	..
4	1	0	1	0	1	0	..	..	..	..
5	0	0	1	0	1	0	1	0	..	..
6	3	0	0	0	1	0	0	0	1	1
7	1	0	3	0	0	0	1	0	0	0
8	2	0	0	0	3	0	0	0	1	1
9	1	1	0	0	0	0	0	0	0	0
10	3	0	0	0	0	0	0	0	0	0
11	0	0	2	0	0	0	0	0	0	0
12	2	0	0	0	2	1	0	0	0	0
13	0	0	2	0	0	0	1	0	0	0
14	1	0	0	0	2	0	0	0	1	0
15	4	1	1	0	0	0	2	0	0	0
16	5	0	3	1	1	0	0	0	2	1
17	1	0	5	1	2	0	1	0	0	0
18	5	2	1	0	3.5	1	2	0	1	0
19	9	1	3	0	1	0	2	0	2	0
20	4	0	7	2	3	0	1	0	2	0
21	6	0	4	1	5	0	3	0	1	0
22	3	0	5	1	2	0	5	1	3	0
23	11	2	3	0	4	1	1.5	0	4	1
24	9	1	8	1	3	0	3	0	1	0
25	6	0	7	3	5	0	3	1	3	0
26	5	1	3.5	2	3	0	3.5	0	2	0
27	6	1	2	0	1	0	3	1	1.5	1
28	6	0	5	0	2	0	1	0	2	0
29	2	0	5	0	3	0	2	0	1	0
30	4	1	1	0	3	0	2	0	0	0
31	1	0	2	0	1	0	1.5	0	2	0

TABLE I.—Continued.
NUMBER OF ENTRANTS.

Years of Insurance.	AGES AT EXPOSURE.											
	81		82		83		84		85		86	
	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.
15	I	0	..	..	..	..	..	..	..	..	..	..
16	0	0	I	0	..	..	..	..	..	..	..	..
17	I	0	0	0	I	0	..	..	..	..	..	..
18	0	0	I	0	0	0	I	0	..	..	..	..
19	I	0	0	0	I	0	0	0	I	0	..	..
20	2	0	.5	0	0	0	I	0	0	0	I	0
21	2	0	2	0	0	0	0	0	I	I	0	..
22	I	0	2	0	2	0	0	0	0	0	0	..
23	2	I	I	0	2	0	I	0	0	0	0	..
24	3	0	I	0	I	0	2	0	0	0	0	..
25	I	I	3	I	I	I	0	0	2	0	0	..
26	I	0	0	0	I	0	0	0	0	0	I	0
27	2	0	I	I	0	0	I	0	0	0	0	..
28	0	0	I	0	0	0	0	0	I	0	0	..
29	0	0	0	0	0	0	0	0	0	0	I	..
30	I	0	0	0	0	0	0	0	0	0	0	..
31	0	0	I	0	0	0	0	0	0	0	0	..

NUMBER OF ENTRANTS.

Years of Insurance.	AGES AT EXPOSURE.											
	87		88		89		90		91		92	
	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.	Exposed to Risk.	Died.
21	I	0	..	..	..	..	..	..	..	..	..	..
22	0	.	I	0	..	..	..	..	..	..	..	..
23	0	..	0	..	I	0	..	..	..	..	..	..
24	0	..	0	..	0	..	I	0	..	..	..	..
25	0	..	0	..	0	..	0	..	I	0	..	..
26	0	..	0	..	0	..	0	..	0	..	I	I
27	I	0	0	..	0	..	0	..	0	..	0	..
28	0	..	I	0	0	..	0	..	0	..	0	..
29	0	..	0	..	I	0	0	..	0	..	0	..
30	I	0	0	..	..	..	I	I	0	..	0	..

TABLE II.

Comparison between the rates of retiring in different years of Insurance.

Age at Entrance.	RATIO OF WITHDRAWALS TO EXPOSURES DURING THE					
	1st Five Years.	2d Five Years.	3d Five Years.	4th Five Years.	5th Five Years.	6th Five Years.
20 to 24	.103	.038	.018	.015	.009	.006
25 to 29	.078	.032	.017	.014	.011	.005
30 to 34	.062	.030	.018	.014	.012	.008
35 to 39	.058	.028	.021	.014	.013	.006
40 to 44	.053	.028	.021	.014	.014	.006
45 to 49	.050	.025	.021	.010	.011	.012
50 to 54	.047	.023	.018	.016	.014	.051
55 to 59	.047	.014	.016	.009	.025	..
60 to 64	.033	.033	.032	..	..	..

TABLE III.

Rate of retiring in successive years of Insurance. All ages combined.

Years of Insurance.	MUTUAL LIFE.			TWENTY ENGLISH OFFICES.		
	Exposures.	Retirants.	Ratio.	Exposures.	Retirants.	Ratio.
1	49647.5	2672	.054	64247	1750	.027
2	86929.5	8697	.100	117679.5	8495	.072
3	74939	5066	.068	104313	5297	.051
4	66224.5	3189	.048	93668	3958	.042
5	58277	2212	.038	84416.5	2831	.034
6	49609	1618	.033	76689.5	2207	.029
7	39409	1042	.026	70086.5	1751	.025
8	28636	1094	.038	63722.5	2397	.038
9	19968.5	395	.020	57685	1086	.019
10	15289.5	341	.022	52343.5	829	.016
11	12542.5	223	.018	47207.5	713	.015
12	10710.5	209	.020	42265	660	.016
13	9485.5	181	.019	37994.5	545	.014
14	8574.5	161	.019	34055.5	399	.012
15	7519.5	155	.021	30549	370	.012
16	6580.5	89	.014	27147.5	299	.011
17	5736	89	.016	24343.5	255	.010
18	4944.5	69	.014	21604.5	195	.009
19	4137	54	.013	19329.5	167	.009
20	3473	34	.010	16996.5	133	.008
21	2967	36	.012	15150	118	.008
22	2635.5	33	.013	13537.5	101	.007
23	2345	32	.014	12006	92	.008
24	2072	28	.014	10634.5	69	.006
25	1738.5	11	.006	9294	56	.006
26	1291	6	.005	7995	58	.007
27	961.5	9	.009	6945.5	41	.006
28	666	6	.009	6032	24	.004
29	456	2	.004	5214.5	27	.005
30	240.5	5	.021	4483	18	.004
31	106.5	1	.009	3872.5	13	.003

TABLE IV.

Mortality Experience of the Mutual Life, from 1843 to 1873, inclusive.

Age.	Years of Life Exposed.	Actual Deaths.	RATIO OF ACTUAL DEATHS TO			Age.
			Exposed.	Probable Deaths. American.	Probable Deaths. New Actuaries'	
0 to 10	648	2	.....	.....	.....	0 to 10
11	59.5	0	.....	.....	.....	11
12	56	0	.....	.....	.....	12
13	53.5	0	.....	.....	.....	13
14	58.5	0	.....	.....	.....	14
15	79.5	0	.....	.....	.....	15
16	116	0	.....	.....	.....	16
17	167	0	.....	.....	.....	17
18	273	1	.003663	.474	.675	18
19	523	5	.009560	1.231	1.583	19
20	1011.5	9	.008898	1.140	1.370	20
21	1876.5	15	.007994	1.018	1.177	21
22	3091.5	14	.004529	.573	.654	22
23	4605	30	.006515	.819	.938	23
24	6337.5	41	.006469	.808	.930	24
25	8319	58	.006972	.865	.996	25
26	10353.5	53	.005119	.630	.722	26
27	12182.5	80	.006567	.801	.896	27
28	13970	85	.006084	.736	.802	28
29	15556	93	.005978	.716	.763	29
30	17144	112	.006533	.775	.810	30
31	18486.5	120	.006491	.763	.790	31
32	19591	127	.006483	.753	.775	32
33	20599	136	.006602	.757	.772	33
34	21382.5	150	.007015	.794	.801	34
35	22054.5	154	.006983	.781	.776	35
36	22558	173	.007669	.844	.822	36
37	22615.5	167	.007384	.800	.763	37
38	22466.5	172	.007656	.814	.766	38
39	22284.5	192	.008616	.899	.839	39
40	21951	181	.008246	.842	.785	40
41	21444.5	138	.006435	.643	.602	41
42	20684.5	144	.006962	.679	.638	42
43	19958.5	155	.007766	.738	.689	43
44	19032.5	179	.009405	.869	.802	44
45	18151	149	.008209	.735	.666	45
46	17159	172	.010024	.867	.770	46
47	15943	172	.010788	.899	.786	47
48	14809.5	161	.010871	.860	.754	48
49	13773	140	.010165	.776	.673	49
50	12734	136	.010680	.775	.677	50

TABLE IV.—Continued.

Age.	Years of Life Exposed.	Actual Deaths.	RATIO OF ACTUAL DEATHS TO			Age.
			Exposed.	Probable Deaths. American.	Probable Deaths. New Actuaries'	
51	11738	134	.011416	.785	.691	51
52	10687	138	.012913	.839	.746	52
53	9782.5	125	.012778	.782	.698	53
54	8829.5	135	.015290	.879	.786	54
55	7827.5	136	.017375	.936	.841	55
56	6861	96	.013992	.704	.637	56
57	5965	90	.015088	.707	.646	57
58	5206.5	93	.017862	.779	.718	58
59	4553	87	.019108	.773	.716	59
60	3946.5	93	.023565	.883	.820	60
61	3392.5	90	.026529	.919	.855	61
62	2865.5	63	.021986	.703	.653	62
63	2384.5	60	.025163	.741	.690	63
64	1988.5	69	.034700	.941	.881	64
65	1653.5	63	.038101	.950	.900	65
66	1333.5	55	.041245	.944	.908	66
67	1073	44	.041007	.861	.843	67
68	860.5	41	.047647	.916	.916	68
69	686	25	.036443	.642	.651	69
70	558	26	.046595	.752	.764	70
71	449	23	.051225	.757	.766	71
72	348	25	.071839	.974	.975	72
73	270.5	18	.066543	.830	.816	73
74	182.5	16	.087671	1.007	.974	74
75	143.5	12	.083624	.886	.853	75
76	103	11	.106796	1.044	1.009	76
77	75.5	12	.158940	1.431	1.404	77
78	52.5	3	.057143	.473	.472	78
79	39.5	3	.075949	.577	.587	79
80	30.5	5	.163934	1.135	1.182	80
81	18	2	.111111	.701	.745	81
82	14.5	2	.137931	.791	.858	82
83	9	1	.111111	.580	.638	83
84	6	0	....	....	....	84
85	5	1	.200000	.849	.987	85
86	3	0	....	....	....	86
87	3	0	....	....	....	87
88	2	0	....	....	....	88
89	2	0	....	....	....	89
90	2	1	.500000	1.100	1.800	90
91	1	0	....	....	....	91
92	1	1	1.000000	1.587	3.333	92
Totals,	578112.5	5515	.009540	.799	.759	

TABLE V.

Synopsis of Table IV., in groups of five ages.

Age.	Years of Life exposed.	Actual Deaths.	PROBABLE DEATHS.		RATIO OF ACTUAL TO PROBABLE.	
			American.	New Actuaries'.	American.	New Actuaries'.
0 to 14	875.5	2	6.57	4.18	.304	.478
15 to 19	1158.5	6	8.95	6.28	.670	.955
20 to 24	16922	109	134.49	116.78	.810	.933
25 to 29	60381	369	496.38	448.87	.743	.822
30 to 34	97203	645	838.83	817.53	.769	.789
35 to 39	111979	858	1036.18	1081.19	.828	.794
40 to 44	103071	797	1057.69	1133.72	.754	.703
45 to 49	79835.5	794	958.10	1087.66	.829	.730
50 to 54	53771	668	824.01	930.73	.811	.718
55 to 59	30413	502	641.03	702.82	.783	.714
60 to 64	14577.5	375	447.25	480.40	.838	.781
65 to 69	5606.5	228	259.45	265.99	.879	.857
70 to 74	1808	108	128.20	128.16	.842	.843
75 to 79	414	41	44.01	44.98	.932	.912
80 to 84	78	10	12.78	11.94	.782	.838
85 to 89	15	1	4.37	3.37	.229	.297
90 to 92	4	2	2.07	1.16	.966	1.724
Totals,.....	578112.5	5515	6900.36	7265.76	.799	.759

TABLE VI.

Mutual Life Experience. Adjusted by Interpolation.

Age.	l_x	d_x	Rate.	New Actuaries' Rate.	Ratio of Mutual Life to New Actuaries'.
25	95313	596	.006253	.007002	.89
26	94717	574	.006060	.007095	.85
27	94143	571	.006065	.007333	.83
28	93572	571	.006102	.007586	.80
29	93001	584	.006280	.007833	.80
30	92417	580	.006276	.008064	.78
31	91837	588	.006403	.008220	.78
32	91249	599	.006564	.008368	.78
33	90650	610	.006729	.008554	.78
34	90040	627	.006964	.008755	.80
35	89413	644	.007203	.008996	.80
36	88769	658	.007412	.009326	.79
37	88111	669	.007593	.009677	.78
38	87442	679	.007765	.010000	.78
39	86763	663	.007642	.010271	.76
40	86100	652	.007573	.010501	.75
41	85448	648	.007584	.010687	.71
42	84800	657	.007748	.010915	.71
43	84143	666	.007915	.011277	.70
44	83477	707	.008469	.011727	.72
45	82770	751	.009073	.012321	.73
46	82019	790	.009632	.013014	.74
47	81229	810	.009972	.013719	.73
48	80419	836	.010396	.014424	.72
49	79583	859	.010794	.015115	.71
50	78724	888	.011280	.015778	.71

TABLE VI.—Continued.

Age.	l_x	d_x	Rate.	New Actuaries' Rate.	Ratio of Mutual Life to New Actuaries'.
51	77836	917	.011781	.016512	.71
52	76919	971	.012624	.017322	.73
53	75948	1025	.013496	.018315	.74
54	74923	1058	.014121	.019448	.73
55	73865	1099	.014878	.020655	.72
56	72766	1158	.015914	.021960	.72
57	71608	1199	.016744	.023358	.72
58	70409	1258	.017867	.024892	.72
59	69151	1364	.019725	.026695	.74
60	67787	1453	.021435	.028729	.75
61	66334	1547	.023321	.031043	.75
62	64787	1710	.026394	.033657	.78
63	63077	1858	.029456	.036468	.81
64	61219	1985	.032424	.039374	.82
65	59234	2101	.035469	.042331	.84
66	57133	2223	.038909	.045434	.85
67	54910	2219	.040412	.048665	.83
68	52691	2254	.042778	.052044	.82
69	50437	2289	.045383	.055988	.81
70	48148	2376	.049348	.060956	.81
71	45772	2519	.055033	.066862	.82
72	43253	2779	.064250	.073682	.87
73	40474	2921	.072170	.081540	.88
74	37553	3101	.082577	.090042	.92
75	34452	3243	.094131	.097988	.96
76	31209	3127	.100195	.105812	.95

TABLE VII.

Mortality Table deduced from the whole experience of the Company.

Age.	Log l_x	l_x	d_x	$\frac{d_x}{l_x}$	EXPECTATION.			Age.
					Mutual Life.	American.	New Actuaries'.	
10	5.0000000	100000	603	.006029	52.03	48.72	50.29	10
11	4.9973739	99397	600	.006035	51.35	48.08	49.54	11
12	4.9947449	98797	597	.006043	50.65	47.45	48.73	12
13	4.9921126	98200	594	.006051	49.96	46.80	47.89	13
14	4.9894766	97606	592	.006061	49.26	46.16	47.03	14
15	4.9868364	97014	589	.006072	48.56	45.50	46.16	15
16	4.9841914	96425	586	.006083	47.85	44.85	45.29	16
17	4.9815415	95839	584	.006097	47.14	44.19	44.44	17
18	4.9788856	95255	583	.006111	46.43	43.53	43.61	18
19	4.9762233	94672	580	.006128	45.71	42.87	42.82	19
20	4.9735536	94092	578	.006147	44.99	42.20	42.06	20
21	4.9708757	93514	577	.006168	44.26	41.53	41.33	21
22	4.9681887	92937	575	.006191	43.53	40.85	40.60	22
23	4.9654915	92362	575	.006218	42.80	40.17	39.88	23
24	4.9627828	91787	573	.006247	42.07	39.49	39.15	24
25	4.9600613	91214	573	.006280	41.33	38.81	38.41	25
26	4.9573255	90641	572	.006316	40.59	38.12	37.66	26
27	4.9545736	90069	573	.006358	39.84	37.43	36.91	27
28	4.9518037	89496	573	.006404	39.09	36.73	36.16	28
29	4.9490137	88923	574	.006455	38.34	36.03	35.42	29
30	4.9462012	88349	575	.006513	37.59	35.33	34.68	30
31	4.9433635	87774	578	.006577	36.83	34.63	33.95	31
32	4.9404976	87196	580	.006650	36.07	33.92	33.21	32
33	4.9376001	86616	583	.006730	35.31	33.21	32.48	33
34	4.9346673	86033	586	.006821	34.55	32.50	31.75	34
35	4.9316949	85447	592	.006922	33.78	31.78	31.02	35
36	4.9286783	84855	597	.007035	33.01	31.07	30.29	36
37	4.9256121	84258	603	.007162	32.24	30.35	29.56	37
38	4.9224904	83655	611	.007304	31.47	29.62	28.84	38

TABLE VII.—Continued.

Age.	Log l_x	l_x	d_x	$\frac{d_x}{l_x}$	EXPECTATION.			Age.
					Mutual Life.	American.	New Actuaries'.	
39	4.9193067	83044	620	.007462	30.70	28.90	28.12	39
40	4.9160536	82424	630	.007641	29.93	28.18	27.40	40
41	4.9127226	81794	641	.007839	29.15	27.45	26.68	41
42	4.9093047	81153	654	.008062	28.38	26.72	25.96	42
43	4.9057893	80499	669	.008311	27.61	26.00	25.23	43
44	4.9021649	79830	686	.008589	26.83	25.27	24.51	44
45	4.8984185	79144	704	.008901	26.06	24.54	23.79	45
46	4.8945355	78440	726	.009250	25.29	23.81	23.08	46
47	4.8904997	77714	749	.009640	24.52	23.08	22.38	47
48	4.8862927	76965	776	.010077	23.76	22.36	21.68	48
49	4.8818942	76189	805	.010565	22.99	21.63	20.99	49
50	4.8772814	75384	837	.011112	22.23	20.91	20.31	50
51	4.8724287	74547	874	.011723	21.48	20.20	19.63	51
52	4.8673074	73673	914	.012406	20.73	19.49	18.95	52
53	4.8618857	72759	958	.013171	19.98	18.79	18.28	53
54	4.8561275	71801	1008	.014026	19.24	18.09	17.62	54
55	4.8499928	70793	1060	.014982	18.51	17.40	16.96	55
56	4.8434367	69733	1120	.016052	17.78	16.72	16.32	56
57	4.8364090	68613	1183	.017247	17.06	16.05	15.68	57
58	4.8288533	67430	1253	.018583	16.35	15.39	15.05	58
59	4.8207068	66177	1329	.020077	15.65	14.74	14.44	59
60	4.8118989	64848	1410	.021745	14.96	14.10	13.83	60
61	4.8023508	63438	1498	.023610	14.28	13.47	13.24	61
62	4.7919742	61940	1591	.025692	13.62	12.86	12.66	62
63	4.7806703	60349	1691	.028018	12.96	12.26	12.10	63
64	4.7683285	58658	1796	.030615	12.32	11.67	11.55	64
65	4.7548250	56862	1905	.033512	11.70	11.10	11.01	65
66	4.7400213	54957	2020	.036745	11.08	10.54	10.49	66
67	4.7237624	52937	2136	.040352	10.49	10.00	9.98	67
68	4.7058745	50801	2254	.044372	9.91	9.47	9.48	68
69	4.6861636	48547	2371	.048851	9.35	8.97	8.98	69
70	4.6644122	46176	2487	.053840	8.80	8.48	8.50	70

TABLE VII.—Continued.

Age.	Log l_x	l_x	d_x	$\frac{d_x}{l_x}$	EXPECTATION.			Age.
					Mutual Life.	American.	New Actuaries'.	
71	4.6403768	43689	2594	.059393	8.27	8.00	8.03	71
72	4.6137852	41095	2695	.065569	7.76	7.55	7.58	72
73	4.5843325	38400	2781	.072434	7.27	7.11	7.15	73
74	4.5516774	35619	2852	.080057	6.80	6.68	6.75	74
75	4.5154381	32767	2900	.088516	6.35	6.27	6.38	75
76	4.4751870	29867	2924	.097892	5.92	5.88	6.02	76
77	4.4304457	26943	2917	.108271	5.51	5.49	5.67	77
78	4.3806788	24026	2877	.119746	5.11	5.11	5.34	78
79	4.3252869	21149	2801	.132415	4.74	4.74	5.03	79
80	4.2635989	18348	2685	.146378	4.39	4.39	4.72	80
81	4.1948644	15663	2534	.161741	4.06	4.05	4.43	81
82	4.1182425	13129	2345	.178608	3.74	3.71	4.17	82
83	4.0327930	10784	2125	.197085	3.45	3.39	3.93	83
84	3.9374627	8659	1881	.217272	3.17	3.08	3.71	84
85	3.8310736	6778	1622	.239266	2.91	2.77	3.51	85
86	3.7123065	5156	1357	.263151	2.67	2.47	3.31	86
87	3.5796853	3799	1098	.288995	2.45	2.18	3.10	87
88	3.4315578	2701	856	.316849	2.24	1.91	2.88	88
89	3.2660748	1845	640	.346733	2.05	1.66	2.63	89
90	3.0811658	1205	456	.378631	1.87	1.42	2.36	90
91	2.8745151	749	309	.412492	1.71	1.19	2.08	91
92	2.6435287	440	197	.448207	1.56	.98	1.80	92
93	2.3853049	243	118	.485612	1.43	.80	1.50	93
94	2.0965957	125	66	.524480	1.30	.64	1.20	94
95	1.7737642	59	33	.564510	1.19	.50	.93	95
96	1.4127423	26	16	.605332	1.08	..	.68	96
97	1.0089737	10	6	.646501	.98	..	.50	97
98	0.5573619	4	3	.687508	.87	..	..	98
99	0.0522004	1	1	.727790	.70	..	..	99

TABLE VIII.

Experience of New Actuaries', males, and of Mutual Life for each year of Insurance.

Years of Insurance.	NEW ACTUARIES'.			Mutual Life Rate.	Ratio of Mutual Life to New Actuaries'.
	Exposures.	Deaths.	Rate.		
1	64247	295	.00459	.00498	1.08
2	117679.5	897	.00762	.00649	.85
3	104313	1032	.00989	.00761	.77
4	93668	1077	.01150	.00855	.74
5	84416.5	1111	.01316	.00928	.71
6	76689.5	1003	.01308	.01008	.77
7	70086.5	999	.01425	.01035	.73
8	63722.5	949	.01489	.01107	.74
9	57685	885	.01534	.01002	.65
10	52343.5	853	.01630	.01151	.71
11	47207.5	850	.01801	.01220	.68
12	42265	756	.01789	.01419	.79
13	37994.5	757	.01992	.01360	.68
14	34055.5	726	.02132	.01050	.49
15	30549	697	.02282	.01223	.54
16	27147.5	662	.02439	.01444	.59
17	24343.5	621	.02551	.01691	.66
18	21604.5	518	.02398	.01861	.78
19	19329.5	550	.02845	.01861	.65
20	16996.5	483	.02842	.01900	.67
21	15150	449	.02964	.01618	.55
22	13537.5	449	.03317	.02125	.64
23	12006	412	.03432	.02644	.77
24	10634.5	359	.03376	.02992	.89
25	9294	345	.03712	.03278	.88
26	7995	312	.03902	.02634	.68
27	6945.5	323	.04650	.03016	.65
28	6032	244	.04045	.02252	.56
29	5214.5	236	.04526	.02632	.58
30	4483	231	.05153	.02495	.48
31	3872.5	183	.04726	.01878	.40

TABLE IX.

Experience of New Actuaries', males, from ages 37 to 43—Average age at entrance, 40.

Age.	Exposures.	Deaths.	Rate.	Adjusted Rate.	Ratio of Mutual Life to New Actuaries'.
40	12217.5	46	.0038	.0052	1.00
41	22660	168	.0074	.0072	.86
42	20361.5	195	.0096	.0089	.81
43	18451	196	.0106	.0104	.77
44	16856	217	.0128	.0117	.75
45	15478	178	.0115	.0126	.76
46	14273.5	196	.0137	.0134	.76
47	13085	179	.0137	.0138	.78
48	11946.5	169	.0141	.0147	.78
49	10934.5	175	.0160	.0153	.82
50	9940	164	.0165	.0163	.85
51	8971	148	.0165	.0173	.83
52	8111.5	144	.0178	.0191	.78
53	7331.5	137	.0187	.0207	.76
54	6632	175	.0264	.0221	.73
55	5858	150	.0256	.0234	.68
56	5205	118	.0224	.0252	.70
57	4724	110	.0233	.0259	.80
58	4267.5	131	.0307	.0270	.72
59	3748.5	102	.0272	.0283	.77
60	3367	104	.0309	.0298	.83
61	3035	95	.0313	.0316	.81
62	2719.5	86	.0316	.0340	.80
63	2417	89	.0368	.0370	.80
64	2123.5	88	.0414	.0402	.79
65	1811.5	76	.0420	.0436	.78
66	1585	85	.0536	.0472	.75
67	1363	68	.0499	.0510	.73
68	1187	60	.0505	.0550	.69
69	1032.5	73	.0707	.0593	.66
70	886.5	46	.0519	.0637	.63

TABLE X.

Experience of New Actuaries, males, from ages 0 to 36. Average age at entrance, 29.

Age.	Exposures.	Deaths.	Rate.	Adjusted Rate.	Ratio of Mutual Life to New Actuaries'.
29	39273	146	.0037	.0037	1.00
30	71282.5	412	.0058	.0057	.93
31	62626.5	474	.0076	.0073	.90
32	55778.5	467	.0084	.0085	.89
33	49834.5	493	.0099	.0095	.87
34	44971.5	433	.0096	.0101	.85
35	40933	415	.0101	.0103	.83
36	37137.5	367	.0099	.0102	.83
37	33562.5	338	.0101	.0105	.81
38	30360.5	314	.0103	.0106	.82
39	27323	329	.0120	.0111	.80
40	24392	259	.0106	.0117	.78
41	21906.5	272	.0124	.0122	.75
42	19637	272	.0139	.0129	.74
43	17609.5	214	.0122	.0137	.72
44	15711.5	229	.0146	.0143	.71
45	14121.5	227	.0161	.0148	.68
46	12515	193	.0154	.0156	.68
47	11206	176	.0157	.0163	.67
48	9885.5	166	.0168	.0169	.68
49	8856	148	.0167	.0179	.70
50	7957	157	.0197	.0186	.78
51	7100	154	.0217	.0193	.86
52	6345.5	119	.0188	.0201	.91
53	5575.5	113	.0203	.0211	.92
54	4853.5	97	.0200	.0223	.88
55	4268	121	.0284	.0237	.82
56	3762.5	87	.0231	.0253	.73
57	3273.5	85	.0260	.0272	.61
58	2847.5	89	.0312	.0292	.49
59	2498	78	.0312	.0314	.36

TABLE XI.

Experience of New Actuaries', males, from ages 44 to 54. Average age at entrance, 49.

Age.	Exposures.	Deaths.	Rate.	Adjusted Rate.	Ratio of Mutual Life to New Actuaries'.
49	9585.5	63	.0067	.0080	1.00
50	17806.5	170	.0095	.0105	.82
51	16076	218	.0136	.0129	.73
52	14664.5	233	.0159	.0150	.69
53	13405	221	.0165	.0169	.69
54	12318	235	.0191	.0187	.70
55	11317	237	.0209	.0202	.73
56	10301.5	216	.0210	.0216	.76
57	9364	212	.0226	.0233	.79
58	8559.5	207	.0242	.0250	.77
59	7749.5	216	.0279	.0275	.70
60	6970	200	.0287	.0300	.62
61	6298	215	.0341	.0325	.58
62	5620.5	200	.0356	.0352	.59
63	5022	187	.0372	.0380	.64
64	4478.5	184	.0411	.0400	.73
65	4018.5	178	.0443	.0426	.82
66	3562	147	.0413	.0456	.85
67	3162.5	159	.0503	.0482	.89
68	2790.5	150	.0537	.0515	.91
69	2449	131	.0535	.0567	.92
70	2164.5	130	.0601	.0616	.96
71	1895.5	130	.0686	.0668	.99
72	1638	119	.0727	.0743	.94
73	1401	106	.0757	.0812	.87
74	1189.5	115	.0967	.0876	.77
75	989	97	.0981	.0934	.65
76	830.5	73	.0879	.0986	.51
77	697	72	.1033	.1033	.36
78	568	64	.1127	.1074	.19
79	463	50	.1080	.1109	0

TABLE XII.

Experience of New Actuaries', males, from ages 55 to 75. Average age at entrance, 59.

Age.	Exposures.	Deaths.	Rate.	Adjusted Rate.	Ratio of Mutual Life to New Actuaries'.
59	3151.5	39	.0124	.0154	1.00
60	5896	146	.0248	.0213	.80
61	5221.5	143	.0274	.0270	.71
62	4752	180	.0379	.0324	.67
63	4302	176	.0409	.0377	.66
64	3908	155	.0397	.0429	.66
65	3551	147	.0414	.0478	.67
66	3191	186	.0583	.0525	.70
67	2806	164	.0585	.0573	.72
68	2485	157	.0632	.0630	.73
69	2191	140	.0639	.0678	.71
70	1929	148	.0767	.0722	.73
71	1676.5	126	.0752	.0777	.72
72	1464.5	116	.0792	.0821	.69
73	1284.5	121	.0942	.0860	.71
74	1098.5	98	.0892	.0903	.76
75	938.5	98	.1044	.0982	.75
76	803.5	68	.0846	.1038	.72
77	693.5	84	.1211	.1133	.74
78	572	65	.1136	.1252	.69
79	478	66	.1381	.1358	.73
80	381	67	.1759	.1403	.76
81	291	42	.1443	.1559	.77
82	234	32	.1368	.1625	.83
83	194	38	.1959	.1725	.85
84	140.5	24	.1708	.1858	.84
85	103.5	20	.1932	.2026	.81
86	76	16	.2105	.2227	.76
87	57	19	.3333	.2463	.70
88	35	5	.1429	.2732	.63
89	25	9	.3600	.3035	.57

TABLE XIII.

Comparison of the actual mortality, all ages combined, with that predicted by the American and New Actuaries' Tables, for different years of Insurance.

Years of Insurance.	Years of Life Exposed.	Actual Deaths.	PROBABLE DEATHS.		RATIO OF ACTUAL TO PROBABLE.	
			American.	New Actuaries'.	American.	New Actuaries'.
1	49647.5	247	485.79	491.19	.508	.503
2	86929.5	564	872.79	891.76	.646	.632
3	74939	570	776.86	801.30	.734	.711
4	66224.5	566	708.26	738.51	.799	.766
5	58277	541	643.84	676.90	.840	.799
6	49609	500	567.21	600.83	.882	.832
7	39409	408	465.42	496.07	.877	.822
8	28636	317	348.45	373.32	.910	.849
9	19968.5	200	248.97	267.96	.803	.746
10	15289.5	176	194.74	210.36	.904	.837
11	12542.5	153	165.10	178.93	.927	.855
12	10710.5	152	146.83	159.59	1.035	.952
13	9485.5	129	136.01	148.11	.948	.871
14	8574.5	90	128.84	140.43	.699	.641
15	7519.5	92	118.97	128.73	.773	.715
16	6580.5	95	110.18	120.06	.862	.791
17	5736	97	101.53	110.52	.955	.878
18	4944.5	92	92.53	100.64	.994	.914
19	4137	77	82.57	90.67	.933	.849
20	3473	66	74.03	80.95	.892	.815
21	2967	48	67.91	73.10	.707	.657
22	2635.5	56	64.07	68.76	.874	.814
23	2345	62	60.72	64.80	1.021	.957
24	2072	62	56.87	60.47	1.090	1.025
25	1738.5	57	51.45	56.00	1.108	1.018
26	1291	34	40.54	42.48	.839	.800
27	961.5	29	32.00	33.64	.906	.862
28	666	15	24.32	25.31	.617	.593
29	456	12	17.93	18.52	.669	.648
30	240.5	6	10.53	10.63	.570	.564
31	106.5	2	5.10	5.22	.392	.383
Totals,	578112.5	5515	6900.36	7265.76	.799	.759

TABLE XIV.

Showing the number of entrants at the different ages, the number of deaths out of the same in after years, and the ratio of the actual deaths to the deaths expected by the American Table.

Age at Entrance.	Number of Entrants.	Deaths.	Ratio of Actual to Probable Deaths.	Age at Entrance.	Number of Entrants.	Deaths.	Ratio of Actual to Probable Deaths.
20	805	24	.850	48	1513	119	.795
21	1425	49	.947	49	1321	120	.828
22	2003	62	.812	50	1296	115	.805
23	2588	101	.965	51	973	90	.849
24	3045	106	.828	52	923	84	.720
25	3855	128	.770	53	763	64	.653
26	3828	156	.887	54	680	82	.832
27	4128	170	.888	55	529	54	.708
28	4342	174	.784	56	464	57	.823
29	4341	168	.746	57	391	50	.833
30	4717	213	.814	58	357	38	.573
31	4394	199	.820	59	235	34	.846
32	4353	202	.785	60	202	32	.957
33	4387	202	.793	61	147	25	.686
34	4344	219	.820	62	123	19	.716
35	4236	213	.782	63	80	18	.956
36	4110	203	.774	64	61	14	.949
37	3754	213	.838	65	41	3	.538
38	3555	195	.785	66	14	6	1.554
39	3302	194	.809	67	20	5	.406
40	3480	189	.757	68	11	3	.716
41	2885	160	.744	69	10	1	.224
42	2704	173	.803	70	6	4	1.932
43	2429	178	.898	71	5	2	.725
44	2232	169	.878	72	1	1	.833
45	2105	147	.765	73	2	1	1.000
46	1864	126	.769	74	1	0	....
47	1562	98	.635	75	1	1	1.538

TABLE XV.

The ratios of actual mortality to that predicted by the American Table during each quinquennium following the date of Insurance.

Age at Entrance.	RATIOS DURING						Average for whole time.
	1st Five Years.	2d Five Years.	3d Five Years.	4th Five Years.	5th Five Years.	6th Five Years.	
20 to 24	.775	1.003	1.143	1.066	1.229	.450	.879
25 to 29	.714	.983	.787	.848	1.055	1.000	.812
30 to 34	.716	.911	.931	.917	.806	.731	.806
35 to 39	.694	.843	1.000	.860	.938	.969	.797
40 to 44	.723	.896	.880	.977	.936	.532	.811
45 to 49	.674	.801	.730	1.126	.916	.516	.758
50 to 54	.730	.753	.741	.870	1.264	.871	.774
55 to 59	.633	.833	.869	.902	1.189	.862	.747
60 to 75	.806	.781	1.105	.582	.172	.833	.789

TABLE XVI.

The influence of duration of Insurance on the ratios of actual to probable mortality, by the American Table.

Age at Death.	RATIOS OF ACTUAL TO PROBABLE MORTALITY AMONG PERSONS WHO HAD BEEN INSURED.					
	5 years or less.	6 to 10 years.	11 to 15 years.	16 to 20 years.	21 to 25 years.	26 to 31 years.
20 to 24	.810	.861	....	....	....	....
25 to 29	.690	1.135	.529	....	....	....
30 to 34	.689	.984	1.088	....	....	....
35 to 39	.754	.965	.907	.762	....	....
40 to 44	.662	.807	.930	1.005	1.098	....
45 to 49	.769	.867	.877	.917	.875	.935
50 to 54	.673	.837	1.017	.820	1.018	.957
55 to 59	.690	.817	.805	.911	.803	.708
60 to 64	.750	.757	.799	1.015	.911	.980
65 to 69	.926	.790	.599	1.127	1.045	.681
70 to 74	.651	.782	.921	.831	1.136	.519
75 to 79	.602	1.124	1.096	.954	1.067	.663
80 to 84	....	....	....	.347	.742	.763
Total Experience.	.713	.877	.885	.927	.947	.751

TABLE XVII.

First Year's Experience, Mutual Life.

Age.	Exposures.	Deaths.	Rate.	Adjusted Rate.	Computed Deaths.	SUM OF DEATHS.	
						Actual.	Computed.
20	383	1	.00261	.00317	1.2	1	1.2
21	681	4	.00587	.00321	2.2	5	3.4
22	947.5	3	.00317	.00325	3.1	8	6.5
23	1240.5	2	.00161	.00329	4.1	10	10.6
24	1470	5	.00340	.00334	4.9	15	15.5
25	1856	8	.00431	.00340	6.3	23	21.8
26	1847	7	.00379	.00346	6.4	30	28.2
27	1990	7	.00352	.00352	7.0	37	35.2
28	2114	12	.00568	.00359	7.6	49	42.8
29	2113.5	4	.00189	.00367	7.8	53	50.6
30	2291	6	.00262	.00375	8.6	59	59.2
31	2142	11	.00514	.00384	8.2	70	67.4
32	2121	4	.00189	.00394	8.4	74	75.8
33	2135.5	6	.00281	.00405	8.6	80	84.4
34	2122.5	15	.00707	.00417	8.9	95	93.3
35	2069	9	.00435	.00430	8.9	104	102.2
36	2003	11	.00549	.00444	8.9	115	111.1
37	1830	8	.00437	.00460	8.4	123	119.5
38	1746	7	.00401	.00477	8.3	130	127.8
39	1622	11	.00678	.00495	8.0	141	135.8
40	1705	5	.00293	.00515	8.8	146	144.6
41	1414	3	.00212	.00537	7.7	149	152.3
42	1330	5	.00376	.00562	7.5	154	159.8

TABLE XVII.—Continued.

Age.	Exposures.	Deaths.	Rate.	Adjusted Rate.	Computed Deaths.	SUM OF DEATHS.	
						Actual.	Computed.
43	1198.5	8	.00667	.00588	7.0	162	166.8
44	1095	8	.00731	.00617	6.8	170	173.6
45	1027	8	.00779	.00647	6.6	178	180.2
46	913.5	5	.00547	.00681	6.2	183	186.4
47	764.5	9	.01177	.00719	5.5	192	191.9
48	745	6	.00805	.00759	5.6	198	197.5
49	647.5	6	.00927	.00803	5.2	204	202.7
50	635	5	.00787	.00852	5.4	209	208.1
51	473	5	.01057	.00905	4.3	214	212.4
52	455	5	.01099	.00962	4.4	219	216.8
53	375	2	.00533	.01025	3.8	221	220.6
54	335	2	.00597	.01093	3.7	223	224.3
55	258	3	.01163	.01168	3.0	226	227.3
56	225.5	1	.00443	.01250	2.8	227	230.1
57	188.5	2	.01055	.01339	2.5	229	232.6
58	175	2	.01143	.01436	2.5	231	235.1
59	114	1	.00877	.01543	1.8	232	236.9
60	99.5	4	.04020	.01659	1.7	236	238.6
61	73	2	.02740	.01785	1.3	238	239.9
62	61	1	.01639	.01923	1.2	239	241.1
63	39.5	2	.05063	.02074	.8	241	241.9
64	30	1	.03333	.02238	.7	242	242.6
65	20	1	.05000	.02418	.5	243	243.1

TABLE XVIII.

Mutual Life Experience from ages 0 to 36. Average age at entrance, 29.

Age.	Exposures.	Deaths.	Rate.	Adjusted Rate.	1st Year's Rate.	Ratio.
29	30017	119	.0040	.0037	.0037	1.00
30	52185.5	299	.0057	.0053	.0038	1.40
31	44297	286	.0065	.0066	.0039	1.69
32	38852	266	.0068	.0076	.0040	1.90
33	34023.5	274	.0081	.0083	.0041	2.02
34	28753.5	250	.0087	.0086	.0042	2.05
35	22863.5	203	.0089	.0086	.0043	2.00
36	16771.5	152	.0091	.0085	.0044	1.93
37	11953.5	82	.0069	.0085	.0046	1.85
38	9369	78	.0083	.0087	.0048	1.80
39	7778.5	64	.0082	.0088	.0050	1.76
40	6689	70	.0105	.0091	.0052	1.75
41	5924.5	60	.0101	.0092	.0054	1.70
42	5392	49	.0091	.0096	.0056	1.71
43	4729.5	40	.0085	.0098	.0059	1.66
44	4148	44	.0106	.0101	.0062	1.63
45	3607	35	.0097	.0101	.0066	1.53
46	3131.5	41	.0131	.0106	.0068	1.56
47	2616	27	.0103	.0110	.0072	1.53
48	2199.5	26	.0118	.0115	.0076	1.51
49	1869.5	20	.0107	.0125	.0080	1.56
50	1671.5	18	.0108	.0145	.0085	1.71
51	1499.5	26	.0173	.0164	.0090	1.82
52	1334.5	32	.0240	.0182	.0096	1.90
53	1116.5	18	.0161	.0193	.0102	1.89
54	833	16	.0192	.0197	.0109	1.81
55	618	14	.0227	.0194	.0117	1.66
56	419	10	.0239	.0184	.0125	1.47
57	286	6	.0210	.0167	.0134	1.26
58	152.5	0	.0000	.0143	.0144	.99
59	62	1	.0161	.0112	.0154	.73

TABLE XIX.

Mutual Life Experience from ages 37 to 43. Average age at entrance, 40.

Age.	Exposures.	Deaths.	Rate.	Adjusted Rate.	1st Year's Rate.	Ratio.
40	10845.5	47	.0043	.0052	.0052	1.00
41	19241	126	.0065	.0062	.0054	1.15
42	16922	119	.0070	.0072	.0056	1.29
43	15119	138	.0091	.0080	.0059	1.36
44	13455	113	.0084	.0088	.0062	1.42
45	11638	116	.0100	.0096	.0066	1.45
46	9324	92	.0099	.0102	.0068	1.50
47	6808	65	.0095	.0108	.0072	1.50
48	4686	52	.0111	.0114	.0076	1.50
49	3578	50	.0140	.0125	.0080	1.56
50	2930.5	32	.0109	.0139	.0085	1.64
51	2488.5	42	.0169	.0143	.0090	1.59
52	2219	40	.0180	.0149	.0096	1.55
53	1992	23	.0115	.0158	.0102	1.55
54	1752.5	33	.0188	.0161	.0109	1.48
55	1517	22	.0145	.0160	.0117	1.37
56	1352	26	.0192	.0176	.0125	1.41
57	1152	15	.0130	.0186	.0134	1.39
58	974.5	23	.0236	.0194	.0144	1.35
59	824.5	22	.0267	.0218	.0154	1.42
60	710	9	.0127	.0247	.0166	1.49
61	628.5	21	.0334	.0255	.0179	1.43
62	554.5	15	.0271	.0273	.0192	1.42
63	492.5	12	.0244	.0297	.0207	1.43
64	424.5	18	.0424	.0319	.0224	1.42
65	322.5	9	.0279	.0338	.0242	1.40
66	250	8	.0320	.0355	.0261	1.36
67	179	3	.0167	.0370	.0283	1.31
68	128.5	6	.0467	.0382	.0307	1.24
69	67	4	.0597	.0393	.0332	1.18
70	33	1	.0303	.0400	.0359	1.11

TABLE XX.

Mutual Life Experience from ages 44 to 54. Average age at entrance, 49.

Age.	Exposures.	Deaths.	Rate.	Adjusted Rate.	1st Year's Rate.	Ratio.
49	7465.5	61	.0082	.0080	.0080	1.00
50	13215.5	109	.0083	.0086	.0085	1.01
51	11690	128	.0109	.0094	.0090	1.04
52	10468.5	116	.0111	.0104	.0096	1.08
53	9247.5	108	.0117	.0116	.0102	1.14
54	7922	94	.0119	.0130	.0109	1.19
55	6246.5	88	.0141	.0147	.0117	1.26
56	4406	75	.0170	.0165	.0125	1.32
57	2914.5	49	.0168	.0184	.0134	1.38
58	2071.5	37	.0179	.0192	.0144	1.33
59	1635.5	46	.0281	.0192	.0154	1.25
60	1375	30	.0218	.0186	.0166	1.12
61	1210	23	.0190	.0188	.0179	1.05
62	1076.5	11	.0102	.0206	.0192	1.07
63	942	14	.0149	.0243	.0207	1.17
64	836.5	25	.0299	.0292	.0224	1.30
65	709	30	.0423	.0348	.0242	1.46
66	607.5	30	.0494	.0388	.0261	1.50
67	504.5	25	.0496	.0431	.0284	1.52
68	411.5	15	.0365	.0468	.0307	1.53
69	355	15	.0423	.0523	.0332	1.58
70	311.5	15	.0482	.0591	.0360	1.64
71	271.5	18	.0663	.0659	.0390	1.69
72	230	18	.0783	.0698	.0423	1.65
73	183.5	17	.0927	.0702	.0459	1.53
74	129.5	8	.0618	.0671	.0499	1.34
75	88.5	6	.0678	.0606	.0542	1.12
76	65	2	.0308	.0506	....	....
77	39.5	0	.0000	.0371	....	....
78	19	1	.0526	.0201	....	....
79	11.5	0	.0000	.0000	....	....

TABLE XXI.

Mutual Life Experience from ages 55 to 75. Average age at entrance, 59.

Age.	Exposures.	Deaths.	Rate.	Adjusted Rate.	1st Year's Rate.	Ratio.
59	1319.5	20	.0152	.0154	.0154	1.00
60	2287.5	30	.0131	.0171	.0166	1.03
61	2030	37	.0182	.0192	.0178	1.08
62	1785	46	.0258	.0217	.0192	1.13
63	1551	46	.0297	.0248	.0207	1.20
64	1295.5	40	.0309	.0282	.0224	1.26
65	975	25	.0256	.0321	.0242	1.33
66	650.5	25	.0384	.0366	.0261	1.40
67	414.5	17	.0410	.0414	.0283	1.46
68	271	11	.0406	.0462	.0307	1.51
69	198	11	.0556	.0479	.0332	1.44
70	158	10	.0633	.0524	.0359	1.46
71	132	6	.0455	.0556	.0390	1.43
72	114	7	.0614	.0565	.0423	1.34
73	95.5	5	.0524	.0612	.0459	1.33
74	79	4	.0506	.0682	.0499	1.37
75	68	6	.0882	.0733	.0542	1.35
76	53.5	6	.1121	.0745	....	....
77	42	2	.0476	.0835	....	....
78	37.5	3	.0800	.0868	....	....
79	32.5	4	.1231	.0995	....	....
80	24	2	.0833	.1065	....	....
81	19.5	3	.1538	.1206	....	....
82	15	0	.0000	.1345	....	....
83	14	4	.2857	.1463	....	....
84	6	1	.1667	.1559	....	....
85	5	1	.2000	.1635	....	....
86	3	0	.0000	.1689	....	....
87	2	0	.0000	.1722	....	....
88	2	1	.5000	.1733	....	....
89	0	0	.0000	.1723	....	....

TABLE XXII.

Experience of the New Actuaries', males, from ages 20 to 24. Average age at entrance, 22.

Age.	Exposures.	Deaths.	Rate.	Adjusted Rate.	Ratio of Mutual Life to New Actuaries'.
22	7279	22	.0030	.0033	1.00
23	12857.5	76	.0059	.0051	.96
24	10845.5	79	.0073	.0065	.97
25	9366.5	53	.0057	.0077	.94
26	8116	69	.0085	.0085	.93
27	7152	68	.0095	.0091	.91
28	6363	62	.0097	.0094	.88
29	5641	56	.0099	.0094	.85
30	5011.5	41	.0082	.0097	.81
31	4472.5	45	.0101	.0097	.89
32	3959.5	44	.0111	.0104	.88
33	3504.5	29	.0083	.0110	.91
34	3095	43	.0139	.0120	.87
35	2717	32	.0118	.0129	.84
36	2415.5	36	.0149	.0140	.76
37	2148	28	.0130	.0141	.79
38	1923	36	.0187	.0146	.72
39	1693.5	20	.0118	.0144	.72
40	1486.5	25	.0168	.0137	.77
41	1293.5	14	.0108	.0136	.83
42	1166.5	8	.0069	.0142	.85
43	1053.5	22	.0209	.0137	.97
44	917.5	17	.0185	.0136	1.02
45	830.5	8	.0096	.0146	.96
46	734	8	.0109	.0153	.86
47	636	11	.0173	.0157	.74
48	549	9	.0164	.0157	.58
49	490	7	.0143	.0155	.37
50	433	5	.0115	.0149	.10
51	376	8	.0213	.0140	0
52	327	4	.0122	.0128	0

TABLE XXIII.

Mutual Life Experience from ages 20 to 24. Average age at entrance, 22.

Age.	Exposures.	Deaths.	Rate.	Adjusted Rate.	1st Year's Rate.	Ratio.
22	4722	15	.0032	.0033	.0033	1.00
23	8018.5	53	.0066	.0049	.0033	1.48
24	6524.5	56	.0086	.0063	.0033	1.91
25	5527.5	36	.0065	.0072	.0034	2.12
26	4697	24	.0051	.0079	.0035	2.26
27	3842	40	.0104	.0083	.0035	2.37
28	2941.5	17	.0058	.0083	.0036	2.31
29	2031	18	.0089	.0080	.0037	2.16
30	1425	11	.0077	.0079	.0038	2.08
31	1096.5	9	.0082	.0086	.0038	2.26
32	908	6	.0066	.0092	.0039	2.36
33	775.5	7	.0090	.0101	.0041	2.46
34	688	11	.0160	.0104	.0042	2.48
35	623.5	8	.0128	.0108	.0043	2.51
36	539.5	4	.0074	.0107	.0044	2.43
37	463	4	.0086	.0111	.0046	2.41
38	391	2	.0051	.0105	.0048	2.19
39	326.5	8	.0245	.0104	.0050	2.08
40	255.5	2	.0078	.0106	.0052	2.04
41	205.5	1	.0049	.0113	.0054	2.09
42	168.5	2	.0119	.0120	.0056	2.14
43	146	1	.0068	.0133	.0059	2.25
44	133	3	.0226	.0139	.0062	2.24
45	119.5	2	.0167	.0140	.0065	2.15
46	95	1	.0105	.0132	.0068	1.94
47	58	1	.0172	.0116	.0072	1.61
48	38	0	0	.0091	.0076	1.20
49	26	0	0	.0057	.0080	.71
50	18	0	0	.0015	.0085	.18
51	12.5	0	0	0	.0091	0
52	7	0	0	0	.0096	0

TABLE XXIV.

Mortality experience of the Mutual Life, excluding the first five years of Insurance.

Age.	Years of Life Exposed.	Actual Deaths.	RATIO OF ACTUAL DEATHS TO			Age.
			Exposed.	Probable Deaths, American.	Probable Deaths, New Actuaries'.	
0 to 10	131.5	1	.....	.....	.....	0 to 10
11	27	0	.....	.....	.....	11
12	26	0	.....	.....	.....	12
13	23	0	.....	.....	.....	13
14	20	0	.....	.....	.....	14
15	18	0	.....	.....	.....	15
16	17.5	0	.....	.....	.....	16
17	20	0	.....	.....	.....	17
18	16	0	.....	.....	.....	18
19	28.5	0	.....	.....	.....	19
20	52.5	1	.019048	2.441	2.933	20
21	75	0	.....	.....	.....	21
22	112.5	1	.008889	1.124	1.284	22
23	189.5	3	.015831	1.989	2.279	23
24	333.5	0	.....	.....	.....	24
25	537	7	.013035	1.616	1.862	25
26	878.5	10	.011383	1.400	1.604	26
27	1396	9	.006447	.787	.879	27
28	2050.5	18	.008778	1.062	1.157	28
29	2754.5	26	.009439	1.131	1.205	29
30	3641	21	.005768	.684	.715	30
31	4398	38	.008640	1.015	1.051	31
32	5180.5	37	.007142	.829	.854	32
33	5986	58	.009689	1.111	1.133	33
34	6678	67	.010033	1.136	1.146	34
35	7572.5	69	.009112	1.021	1.013	35
36	8117	66	.008131	.895	.872	36
37	8569.5	73	.008519	.923	.901	37
38	8945.5	81	.009055	.962	.906	38
39	9442	86	.009108	.950	.887	39
40	9731	95	.009763	.997	.930	40
41	9826	74	.007531	.753	.705	41
42	9772.5	79	.008084	.788	.741	42
43	9760.5	76	.007786	.740	.690	43
44	9599.5	104	.010834	1.000	.924	44
45	9645	84	.008709	.780	.707	45
46	9304	92	.009888	.855	.760	46
47	8896.5	104	.011690	.974	.852	47
48	8445	99	.011723	.937	.813	48
49	8039	88	.010947	.835	.724	49
50	7594.5	95	.012509	.908	.793	50

TABLE XXIV.—Continued.

Age.	Years of Life Exposed.	Actual Deaths.	RATIO OF ACTUAL DEATHS TO			Age.
			Exposed.	Probable Deaths, American.	Probable Deaths, New Actuaries.	
51	7094	86	.012123	.834	.734	51
52	6530	88	.013476	.876	.778	52
53	6138	86	.014011	.858	.765	53
54	5686	100	.017587	1.011	.904	54
55	5245.5	97	.018492	.996	.895	55
56	4621.5	69	.014930	.751	.680	56
57	4119	69	.016752	.785	.716	57
58	3605	61	.016921	.738	.680	58
59	3232	67	.020730	.839	.776	59
60	2849	68	.023868	.894	.831	60
61	2534	69	.027230	.943	.877	61
62	2183	51	.023362	.747	.694	62
63	1887.5	50	.026490	.780	.726	63
64	1600	57	.035625	.966	.905	64
65	1350.5	46	.034061	.849	.805	65
66	1126	48	.042629	.975	.938	66
67	930	40	.043011	.903	.884	67
68	753.5	36	.047777	.919	.918	68
69	611	23	.037643	.663	.672	69
70	507.5	24	.047291	.763	.776	70
71	406	23	.056650	.837	.847	71
72	319	24	.075235	1.020	1.021	72
73	249.5	15	.060120	.750	.737	73
74	172	15	.087209	1.002	.968	74
75	136.5	11	.080586	.854	.822	75
76	100	11	.110000	1.075	1.040	76
77	72.5	12	.165517	1.490	1.462	77
78	50.5	3	.059406	.492	.491	78
79	38.5	3	.077922	.592	.602	79
80	30.5	5	.163934	1.135	1.182	80
81	18	2	.111111	.701	.745	81
82	14.5	2	.137931	.791	.858	82
83	9	1	.111111	.580	.638	83
84	6	0	....	....	....	84
85	5	1	.200000	.849	.987	85
86	3	0	....	....	....	86
87	3	0	....	....	....	87
88	2	0	....	....	....	88
89	2	0	....	....	....	89
90	2	1	.500000	1.100	1.800	90
91	1	0	....	....	....	91
92	1	1	1.000000	1.587	3.333	92
Totals..	242095	3027	.012503	.887	.826	

TABLE XXV.

Synopsis of Table XXIV., in groups of five years.

Age.	Years of Life Exposed.	Actual Deaths.	PROBABLE DEATHS.		RATIO OF ACTUAL TO PROBABLE.	
			American.	New Actuaries'.	American.	New Actuaries'.
0 to 14	227.5	1	2.15	1.45	.465	.690
15 to 19	100	0	.76	.51	.000	.000
20 to 24	763	5	6.07	5.42	.824	.923
25 to 29	7616.5	70	62.85	57.61	1.114	1.215
30 to 34	25883.5	221	223.86	218.78	.987	1.010
35 to 39	42646.5	375	395.32	413.42	.949	.907
40 to 44	48689.5	428	500.43	536.75	.855	.797
45 to 49	44329.5	467	533	605.54	.876	.771
50 to 54	33042.5	455	507.46	573.33	.897	.794
55 to 59	20823	363	439.77	482.31	.825	.753
60 to 64	11053.5	295	340.61	366.06	.866	.806
65 to 69	4771	193	221.57	227.27	.871	.849
70 to 74	1654	101	117.42	117.66	.860	.858
75 to 79	398	40	42.33	43.52	.945	.919
80 to 84	78	10	12.78	11.94	.782	.838
85 to 89	15	1	4.37	3.37	.229	.297
90 to 92	4	2	2.07	1.16	.966	1.724
Totals,	242095	3027	3412.82	3666.10	.887	.826

TABLE XXVI.

Mutual Life Experience—excluding the first five years of Insurance. Adjusted by Interpolation.

Age.	l_x	d_x	$\frac{d_x}{l_x}$	Age.	l_x	d_x	$\frac{d_x}{l_x}$
25	95304	903	.009475	51	74922	965	.012880
26	94401	814	.008623	52	73957	1029	.013913
27	93587	842	.008997	53	72928	1077	.014768
28	92745	796	.008583	54	71851	1105	.015379
29	91949	735	.007994	55	70746	1144	.016170
30	91214	730	.008003	56	69602	1180	.016954
31	90484	750	.008289	57	68422	1207	.017641
32	89734	733	.008169	58	67215	1261	.018761
33	89001	771	.008663	59	65954	1352	.020499
34	88230	782	.008863	60	64602	1426	.022073
35	87448	789	.009023	61	63176	1523	.024107
36	86659	784	.009047	62	61653	1670	.027087
37	85875	767	.008932	63	59983	1784	.029742
38	85108	755	.008871	64	58199	1897	.032595
39	84353	738	.008749	65	56302	2008	.035665
40	83615	716	.008563	66	54294	2126	.039157
41	82899	701	.008456	67	52168	2132	.040868
42	82198	713	.008674	68	50036	2195	.043868
43	81485	710	.008713	69	47841	2243	.046884
44	80775	735	.009099	70	45598	2322	.050923
45	80040	773	.009658	71	43276	2426	.056059
46	79267	816	.010294	72	40850	2656	.065018
47	78451	830	.010580	73	38194	2763	.072341
48	77621	868	.011183	74	35431	2921	.082442
49	76753	901	.011739	75	32510	3063	.094217
50	75852	930	.012261	76	29447	2982	.101267

TABLE XXVII.

Mortality Table deduced from the experience of the Mutual Life, excluding the first five years of Insurance.

Age.	Log l_x	l_x	d_x	$1 - \frac{l_{x+1}}{l_x}$	Expectation.	Age.
10	5.0000000	100000	810	.008102	49.39	10
11	4.9964672	99190	804	.008105	48.79	11
12	4.9929327	98386	798	.008110	48.18	12
13	4.9893964	97588	792	.008115	47.57	13
14	4.9858578	96796	786	.008120	46.95	14
15	4.9823169	96010	780	.008127	46.34	15
16	4.9787732	95230	775	.008134	45.71	16
17	4.9752264	94455	769	.008142	45.08	17
18	4.9716761	93686	763	.008151	44.45	18
19	4.9681218	92923	759	.008161	43.81	19
20	4.9645630	92164	753	.008173	43.17	20
21	4.9609991	91411	748	.008186	42.52	21
22	4.9574295	90663	744	.008200	41.86	22
23	4.9538534	89919	739	.008217	41.21	23
24	4.9502699	89180	734	.008236	40.54	24
25	4.9466781	88446	730	.008258	39.88	25
26	4.9430769	87716	727	.008282	39.20	26
27	4.9394650	86989	723	.008310	38.53	27
28	4.9358411	86266	719	.008341	37.85	28
29	4.9322036	85547	717	.008376	37.16	29
30	4.9285507	84830	714	.008416	36.47	30
31	4.9248803	84116	711	.008560	35.77	31
32	4.9211903	83405	710	.008512	35.08	32
33	4.9174779	82695	709	.008569	34.37	33
34	4.9137404	81986	708	.008634	33.67	34
35	4.9099744	81278	708	.008708	32.95	35
36	4.9061761	80570	708	.008791	32.24	36
37	4.9023413	79862	709	.008885	31.52	37
38	4.8984652	79153	712	.008992	30.80	38

TABLE XXVII.—Continued.

Age.	Log l_x	l_x	d_x	$1 - \frac{l_{x+1}}{l_x}$	Expectation.	Age.
39	4.8945425	78441	715	.009112	30.07	39
40	4.8905671	77726	719	.009248	29.35	40
41	4.8865319	77007	724	.009402	28.61	41
42	4.8824292	76283	730	.009577	27.88	42
43	4.8782501	75553	739	.009773	27.15	43
44	4.8739847	74814	748	.009996	26.41	44
45	4.8696215	74066	759	.010248	25.67	45
46	4.8651478	73307	772	.010533	24.93	46
47	4.8605491	72535	787	.010855	24.19	47
48	4.8558091	71748	805	.011219	23.45	48
49	4.8509091	70943	825	.011631	22.71	49
50	4.8458283	70118	848	.012096	21.97	50
51	4.8405429	69270	875	.012622	21.24	51
52	4.8350261	68395	904	.013217	20.50	52
53	4.8292476	67491	937	.013890	19.77	53
54	4.8231731	66554	975	.014650	19.04	54
55	4.8167638	65579	1017	.015508	18.32	55
56	4.8099758	64562	1064	.016479	17.60	56
57	4.8027594	63498	1116	.017575	16.88	57
58	4.7950586	62382	1174	.018814	16.18	58
59	4.7868098	61208	1237	.020214	15.48	59
60	4.7779412	59971	1307	.021794	14.79	60
61	4.7683716	58664	1383	.023578	14.10	61
62	4.7580091	57281	1466	.025592	13.43	62
63	4.7467497	55815	1555	.027866	12.77	63
64	4.7344760	54260	1652	.030431	12.12	64
65	4.7210549	52608	1753	.033323	11.49	65
66	4.7063362	50855	1860	.036585	10.87	66
67	4.6901496	48995	1973	.040261	10.26	67
68	4.6723029	47022	2088	.044401	9.67	68

TABLE XXVII.—Continued.

Age.	Log l_x	l_x	d_x	$1 - \frac{l_{x+1}}{l_x}$	Expectation.	Age.
69	4.6525784	44934	2204	.049063	9.10	69
70	4.6307300	42730	2321	.054309	8.54	70
71	4.6064794	40409	2433	.060207	8.00	71
72	4.5795116	37976	2538	.066834	7.48	72
73	4.5494706	35438	2632	.074273	6.98	73
74	4.5159536	32806	2710	.082616	6.50	74
75	4.4785049	30096	2768	.091961	6.04	75
76	4.4366094	27328	2799	.102417	5.60	76
77	4.3896840	24529	2799	.114098	5.19	77
78	4.3370696	21730	2762	.127128	4.79	78
79	4.2780204	18968	2687	.141633	4.42	79
80	4.2116933	16281	2568	.157750	4.06	80
81	4.1371342	13713	2408	.175615	3.73	81
82	4.0532642	11305	2209	.195366	3.42	82
83	3.9588628	9096	1975	.217135	3.13	83
84	3.8525499	7121	1716	.241048	2.85	84
85	3.7327642	5405	1445	.267217	2.60	85
86	3.5977398	3960	1171	.295729	2.37	86
87	3.4454796	2789	911	.326644	2.15	87
88	3.2737243	1878	676	.359979	1.96	88
89	3.0799188	1202	476	.395697	1.77	89
90	2.8611732	726	315	.433702	1.61	90
91	2.6142183	411	195	.473814	1.46	91
92	2.3353572	216	111	.515771	1.32	92
93	2.0204079	105	59	.559209	1.20	93
94	1.6646401	46	28	.603664	1.08	94
95	1.2627040	18	12	.648565	.98	95
96	0.8085491	6	4	.693252	.88	96
97	0.2953304	2	2	.736988	.73	97

TABLE XXVIII.

Net Annual Premiums to insure \$10,000.

Age.	ACCORDING TO		Difference.	Age.	ACCORDING TO		Difference.
	Actual Experience.	American Table.			Actual Experience.	American Table.	
(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
25	92.28	142.11	49.83	46	205.13	282.73	77.60
26	94.79	145.70	50.91	47	215.63	294.99	79.36
27	97.49	149.48	51.99	48	226.89	308.09	81.20
28	100.37	153.46	53.09	49	238.98	322.07	83.09
29	103.44	157.67	54.23	50	251.95	336.97	85.02
30	106.74	162.11	55.37	51	265.88	352.87	86.99
31	110.26	166.80	56.54	52	280.84	369.84	89.00
32	114.02	171.76	57.74	53	296.92	387.94	91.02
33	118.05	177.00	58.95	54	314.21	407.28	93.07
34	122.36	182.55	60.19	55	332.80	427.92	95.12
35	126.97	188.42	61.45	56	352.81	449.97	97.16
36	131.91	194.64	62.73	57	374.35	473.53	99.18
37	137.19	201.24	64.05	58	397.55	498.72	101.17
38	142.84	208.24	65.40	59	422.55	525.68	103.13
39	148.89	215.66	66.77	60	449.50	554.52	105.02
40	155.36	223.54	68.18	61	478.59	585.39	106.80
41	162.29	231.92	69.63	62	509.98	618.44	108.46
42	169.72	240.84	71.12	63	543.88	653.85	109.97
43	177.68	250.33	72.65	64	580.52	691.80	111.28
44	186.20	260.44	74.24	65	620.14	732.48	112.34
45	195.33	271.22	75.89				

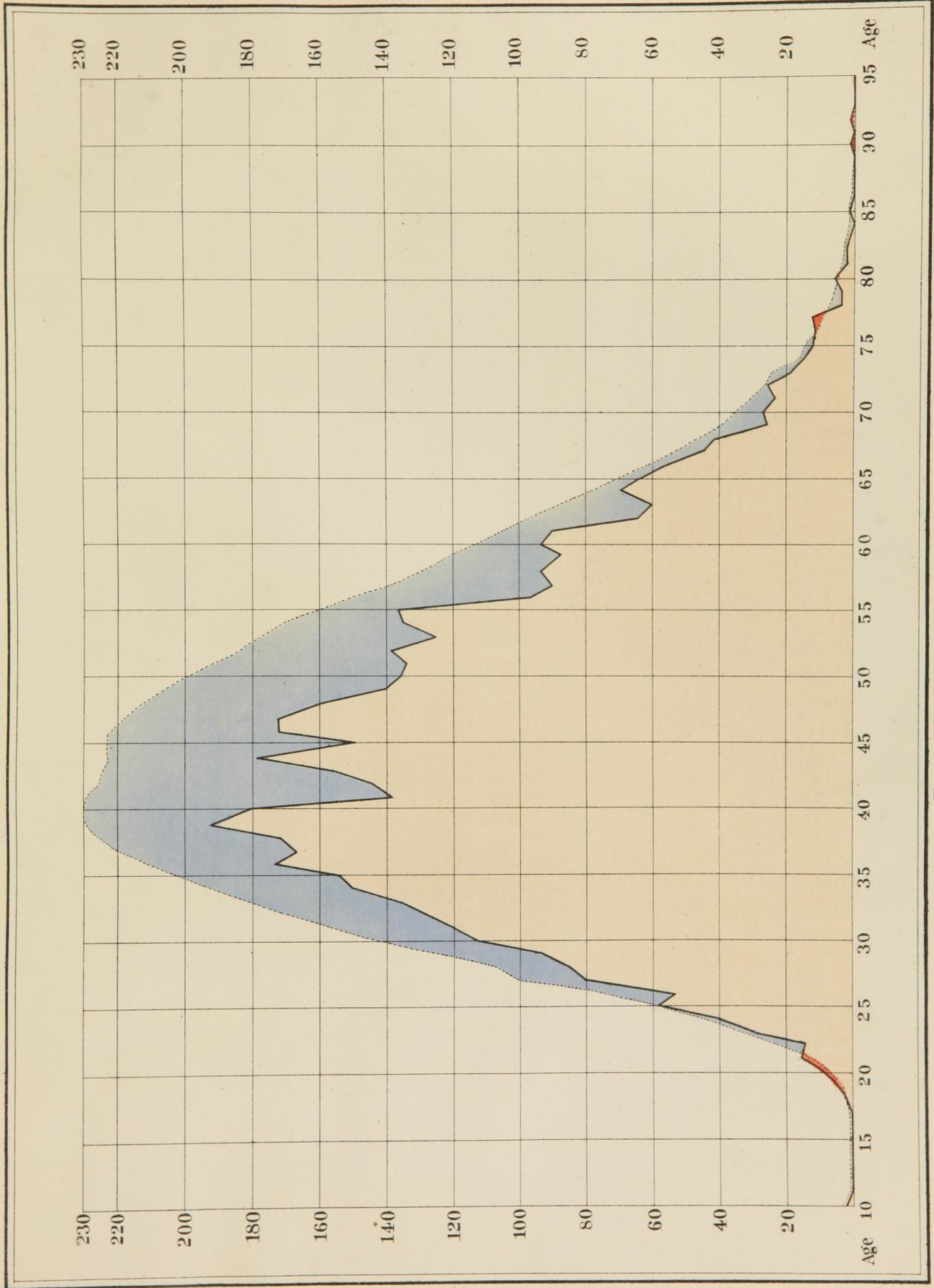
COMPARISON OF THE ACTUAL NUMBER OF DEATHS, AT EACH AGE, WITH THE COMPUTED NUMBER BY THE AMERICAN TABLE.



Favorable deviations colored blue.
Unfavorable " " red.

II.

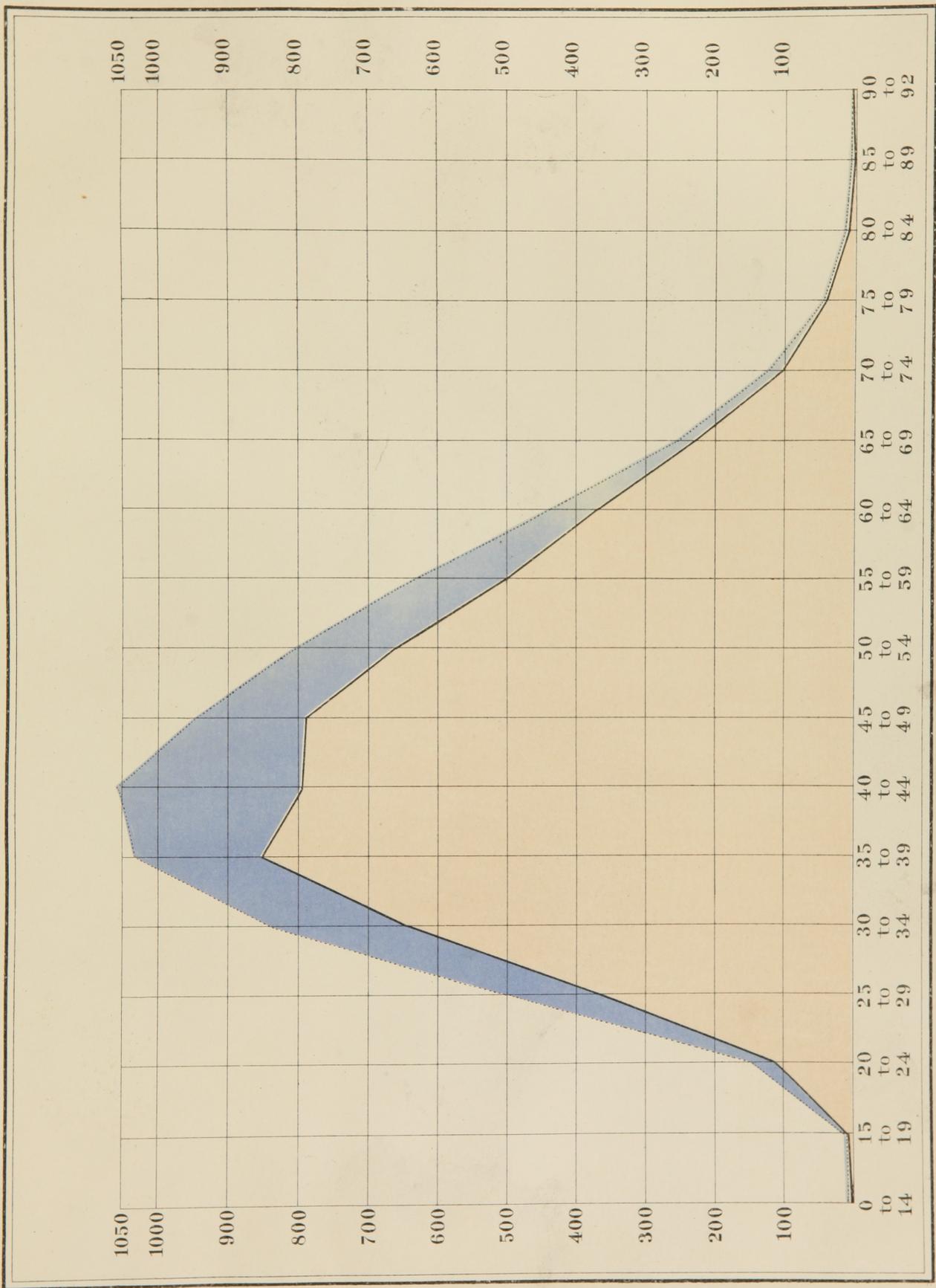
COMPARISON OF THE ACTUAL NUMBER OF DEATHS, AT EACH AGE, WITH THE COMPUTED NUMBER BY THE NEW ACTUARIES TABLE.



Favorable deviations colored blue.
Unfavorable " " red.

III.

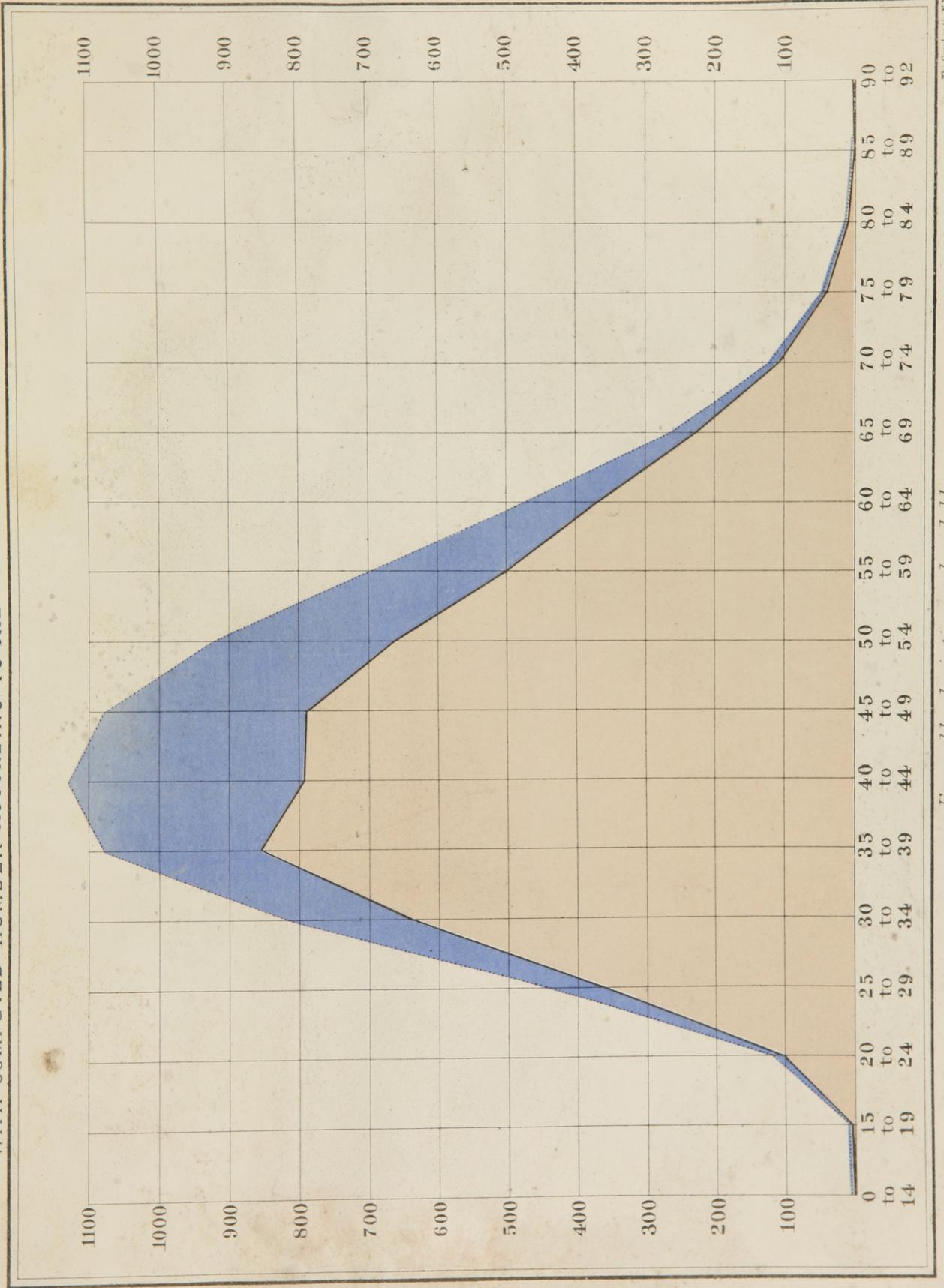
COMPARISON OF ACTUAL NUMBER OF DEATHS IN GROUPS OF FIVE AGES,
WITH COMPUTED NUMBER ACCORDING TO AMERICAN TABLE OF MORTALITY.



Favorable deviations colored blue.

IV.

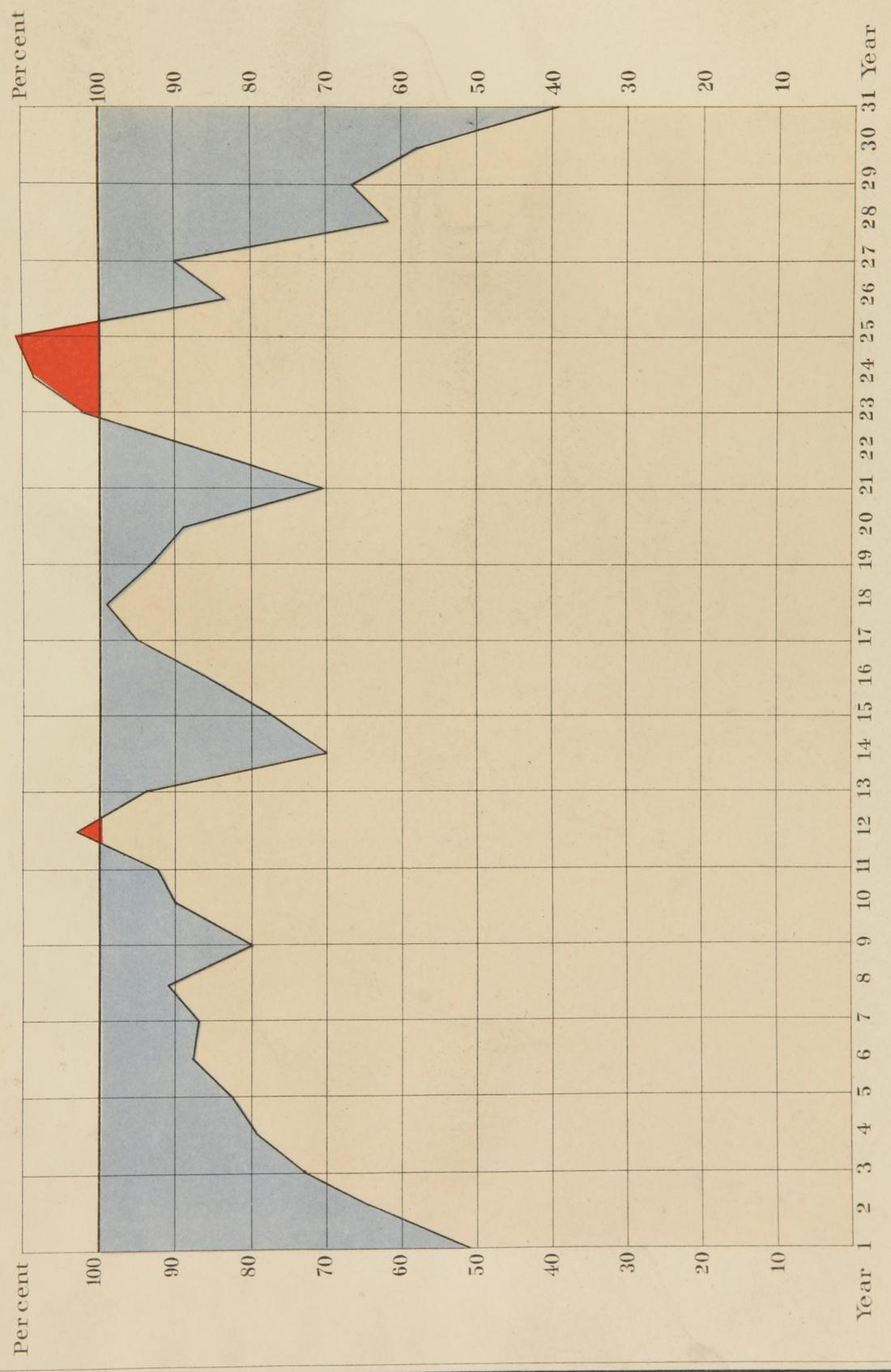
COMPARISON OF ACTUAL NUMBER OF DEATHS IN GROUPS OF FIVE AGES,
WITH COMPUTED NUMBER ACCORDING TO THE NEW ACTUARIES TABLE OF MORTALITY.



Favorable deviations colored blue.

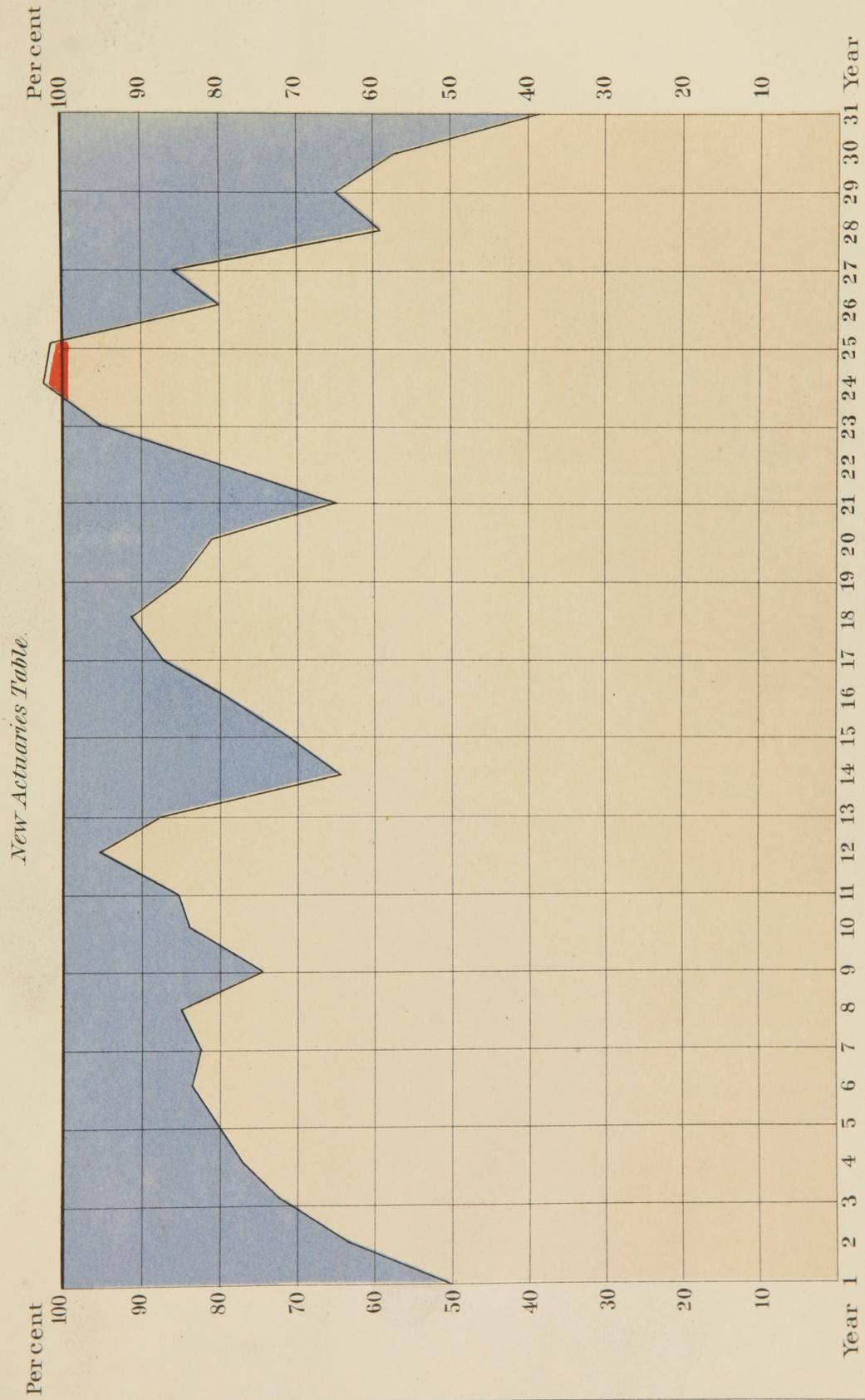
RATIO OF THE ACTUAL MORTALITY TO THAT PREDICTED BY THE AMERICAN TABLE FOR EACH YEAR OF INSURANCE.

American Table.



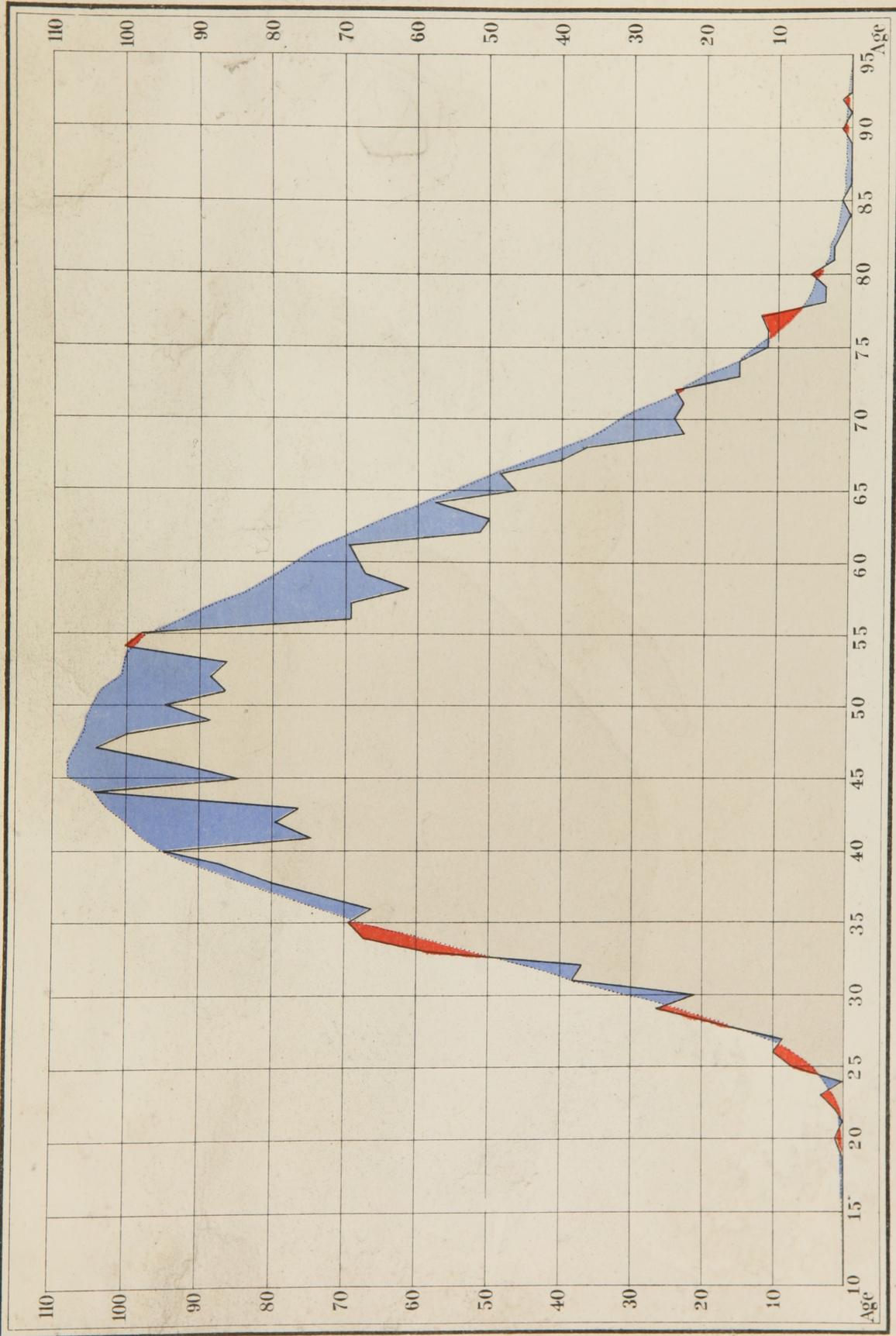
The broken line represents the actual mortality experienced.

RATIO OF THE ACTUAL MORTALITY TO THAT PREDICTED
BY THE NEW ACTUARIES TABLE FOR EACH YEAR OF INSURANCE.



The broken line represents the actual mortality experienced.

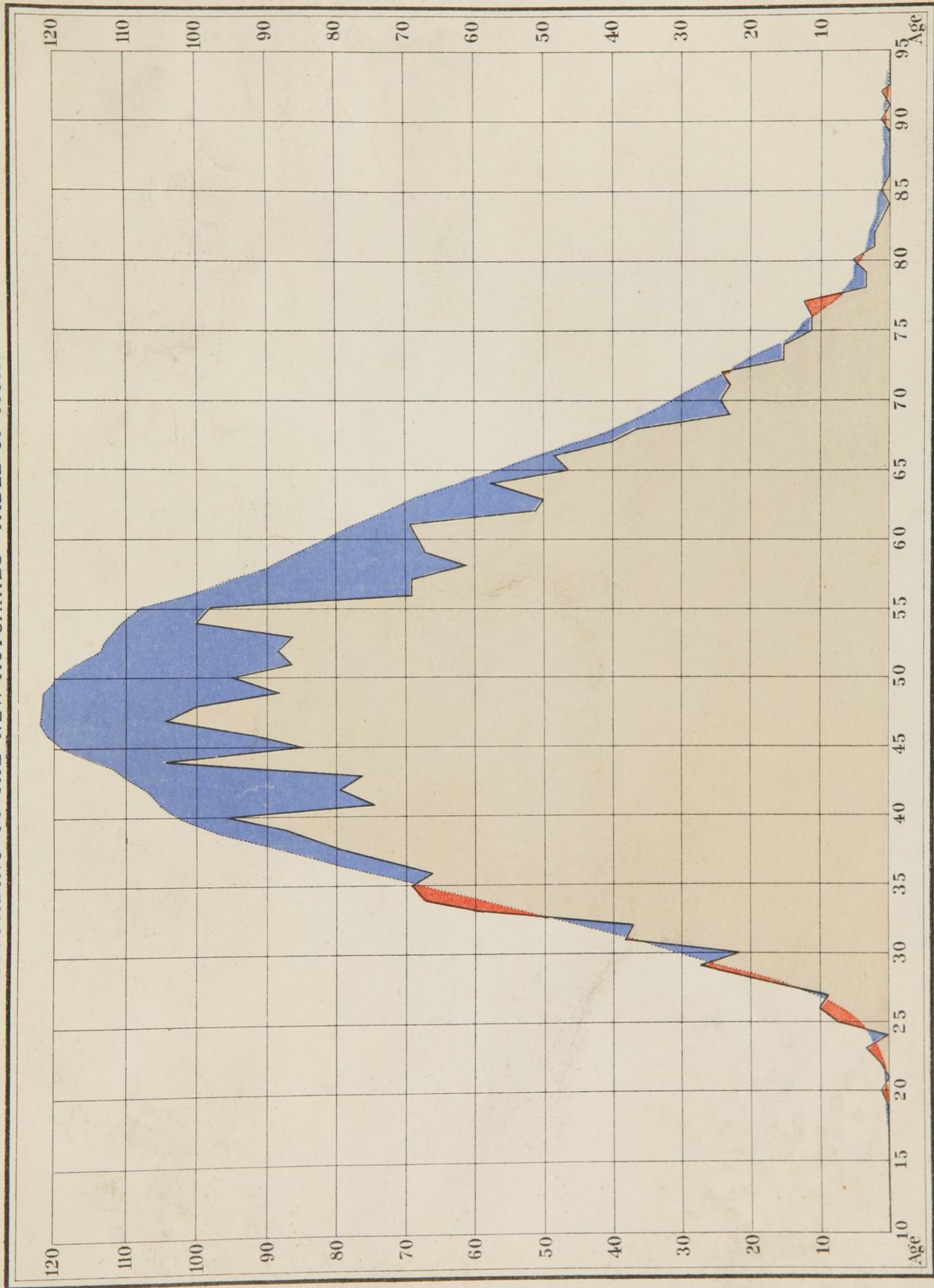
COMPARISON OF THE ACTUAL NUMBER OF DEATHS, AT EACH AGE, EXCLUDING THE FIRST FIVE YEARS OF INSURANCE, WITH THE COMPUTED NUMBER ACCORDING TO AMERICAN TABLE OF MORTALITY.



Favorable deviations colored blue.

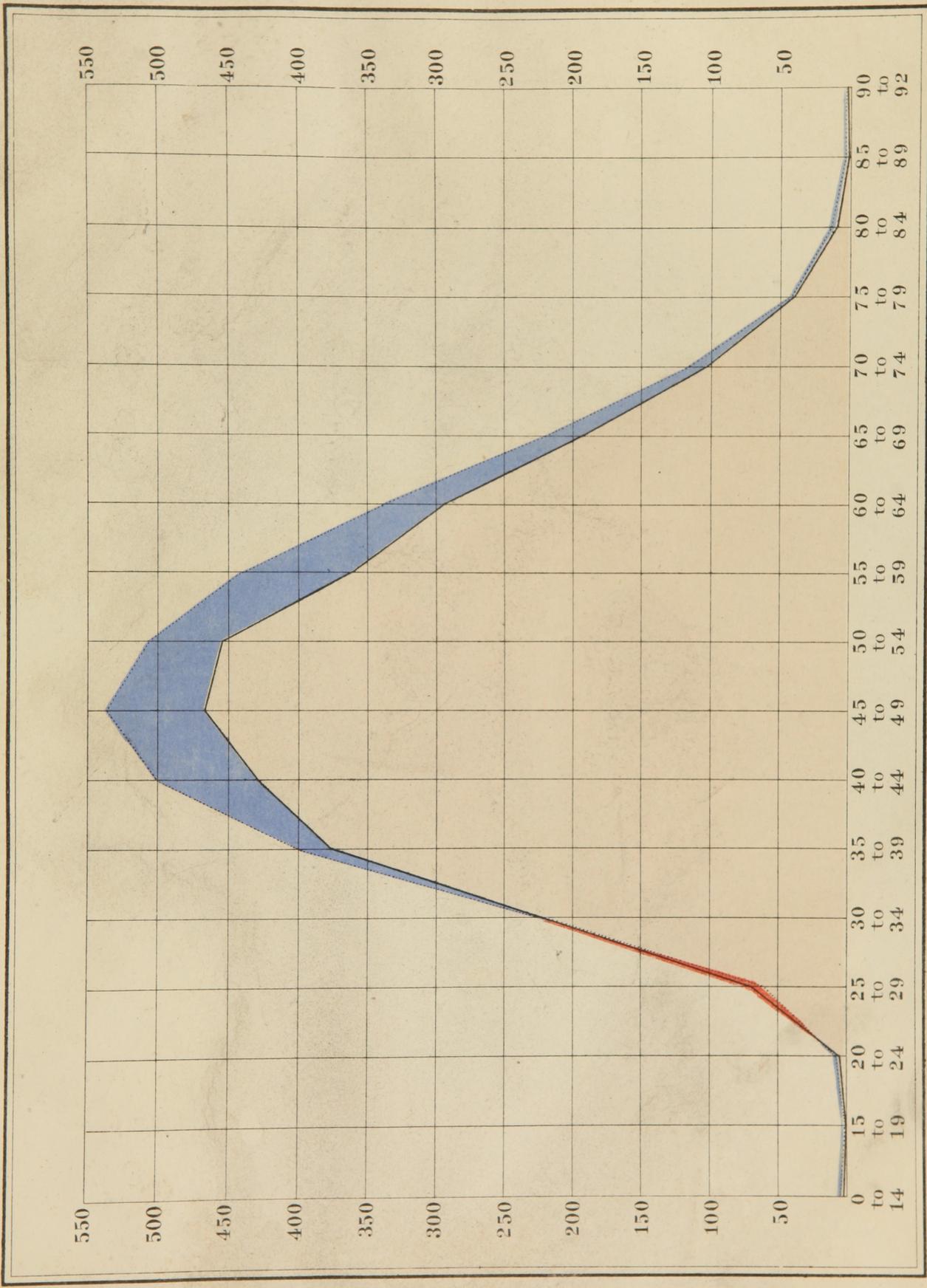
Unfavorable " " red.

COMPARISON OF THE ACTUAL NUMBER OF DEATHS, AT EACH AGE, REJECTING THE FIRST FIVE YEARS OF INSURANCE, WITH THE COMPUTED NUMBER ACCORDING TO THE NEW ACTUARIES TABLE OF MORTALITY.



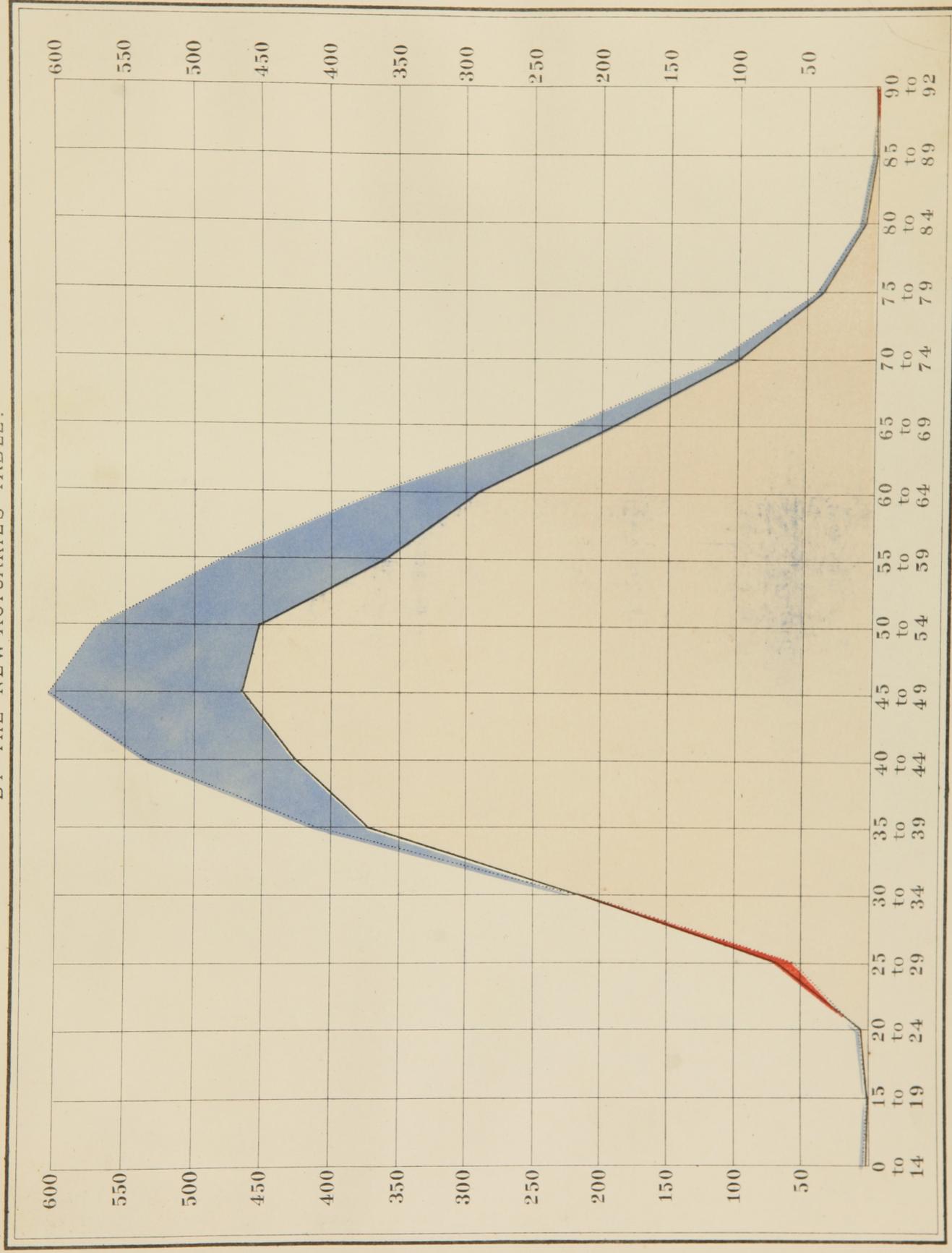
Favorable deviations colored blue.
Unfavorable " " red.

COMPARISON OF ACTUAL NUMBER OF DEATHS, IN GROUPS OF FIVE AGES,
AND EXCLUDING THE FIRST FIVE YEARS OF INSURANCE, WITH COMPUTED NUMBER
BY THE AMERICAN TABLE.



Favorable deviations colored blue.
Unfavorable " " red.

COMPARISON OF ACTUAL NUMBER OF DEATHS, IN GROUPS OF FIVE AGES,
AND EXCLUDING THE FIRST FIVE YEARS OF INSURANCE, WITH COMPUTED NUMBER
BY THE NEW ACTUARIES TABLE.



Favorable deviations colored blue.
Unfavorable " " red.

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