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ON THE

MORTALITY AT GLASGOW,

AND ON THE

INCREASING MORTALITY IN ENGLAND.

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I HAVE recently collected some highly-valuable materials relating to the mortality prevailing in one of the largest British towns,—*Glasgow*. These materials are far superior to any previously existing in Britain; the information is supplied in a perfect form, and the accuracy of detail is unimpeachable. The results deduced from these materials are deserving of the best attention of the medical public, as they will be found to affect the pecuniary as well as the scientific interests of the profession. The new information is applicable to a period ending with the year 1835, which is five years later than the termination of the observation for all England published last year. The Glasgow agrees with the English observation, in the indication of a progressive increase in the mortality. I believe it to be a fact sufficiently well established, that the quantity of sickness suffered by any population bears a fixed proportion to the mortality. If, as seems probable, the mortality in England is now increasing at the rate of ten per cent. every ten years, it may be presumed that the quantity of sickness is increasing at the same rate. The population of England being increasing at the rate of sixteen per cent every ten years, it follows, that the quantity of sickness in a given parish is increasing at the rate of twenty-six per cent every ten years. Nevertheless the attempt is now being made, to diminish the remuneration of medical men, whilst the amount of professional labour required is so rapidly increasing.

The existence of the present new materials appears to be hardly known to any portion of the British public, and the inhabitants of Glasgow themselves appear to be unconscious of the great superiority of their "observation" over every other made in Britain. The observation extends over the fifteen years 1821-35, and is complete in all the particulars requisite for the accurate determination of the absolute mortality at every age during any part of the observed period. There are two points in which the Glasgow materials excell all others. First, in supplying an authenticated list of all the deaths with their ages, whilst in England we have only the deaths entered in the parish registers, with little security against omissions through negligence. The other point of superiority consists in a second (voluntary) enumeration of the living and *their ages* made in the year 1831. In England we have only one such enumeration made in the year 1821.

The town council of Glasgow, being sensible of the high importance of an accurate return of deaths, have organized a system for the attainment of the desired object, by the foundation of a "Committee on Churchyards." The following extract, from a work of Dr. Cleland published in 1832, will show how great a degree of confidence may be reposed in these returns. "At the end of the year, the wardens of the various burying-grounds furnish me with an abstract from their books, and it is from a combination of these abstracts that I draw up the annual mortality bills. From my official situation, I am enabled to state, that the books of the churchyard wardens are kept with such perfect accuracy, that every reliance may be placed on the number of burials in the city and suburbs." The deaths and their ages during each of the fifteen years, have been obligingly communicated to me by Henry Paul, Esq., the successor of Dr. Cleland, and the present Convener of the Committee on Churchyards. I subjoin the whole of the materials from which my results have been deduced. The juxta-position of the materials and the results ought never to be omitted in inquiries of the present nature. It is to be hoped that the reader will not find the general rule applicable in the present instance, but I cannot help stating as the fruit of long experience, that the publication of the materials is most commonly fatal to the argument and the conclusions of the investigator.

TABLE, *showing the number of Deaths of each Sex, in Thirteen Intervals of Age, as they occurred in Glasgow during Three successive Quinquennial Periods, ending with* 1835.

Between Ages.	Males Dying in Five Years.			Females Dying in Five Years.		
	1821-25	1826-30	1831-35	1821-25	1826-30	1831-36
0— 1	2232	2326	3599	1989	2082	2951
1— 2	1478	1612	2277	1332	1528	1951
2— 5	1014	1225	2204	939	1123	1899
5—10	632	667	929	587	622	887
10—20	594	731	945	647	646	875
20—30	696	944	1232	735	854	1402
30—40	594	842	1412	672	847	1409
40—50	659	936	1448	662	908	1390
50—60	625	943	1210	692	962	1369
60—70	679	918	1215	710	986	1302
70—80	600	798	1011	656	833	1023
80—90	241	359	408	281	402	468
Above 90	50	63	56	62	59	78
All ages	10,094	12,394	17,946	9964	11,852	17,004
30—60	1878	2721	4070	2026	2717	4168
Above 60	1570	2138	2690	1709	2280	2871
Still-born.	834	1050	1596	679	957	1388

TABLE, *showing in each of Eleven Intervals of Age, the numbers of each Sex ascertained to be Living in Glasgow, according to two Enumerations made in the middle of the Years* 1821 *and* 1831.

Between Ages.	Males living in		Females living in	
	1821	1831	1821	1831
0— 5	10,905	15,422	10,345	14,855
5—10	8901	13,127	8613	12,580
10—20	15,305	18,980	17,305	22,976
20—30	10,509	15,177	15,403	23,008
30—40	8082	12,179	10,134	14,240
40—50	6925	8685	7719	9329
50—60	4147	5549	4945	6099
60—70	2198	3228	2898	3692
70—80	912	1090	1196	1502
80—90	219	260	325	385
Above 90	16	27	41	36
All ages	68,119	93,724	78,924	108,702
30—60	19,154	26,413	22,798	29,668
Above 60	3345	4605	4460	5615

In order to deduce the mortality at each age during each of the three quinquennial periods, it was necessary to calculate the numbers living at each interval of age, in the middles of the years 1823, 28, and 33, from the numbers ascertained to be living in the middles of the years 1821 and 1831. The principle which I have adopted is not new, although it has never before been similarly applied from want of the requisite materials. If the number living *at all ages* at the beginning and at the end of a period of ten years is known, the number living at any specified intermediate epoch

may be calculated. I have merely extended this universally-acknowledged principle, and assumed, that if the number living at *any interval* of age be ascertained by two enumerations in 1821 and 1831, then the number of living at this interval of age at any intermediate time is also known. I have not thought it necessary to give the calculated numbers living, because the reader may easily deduce them for himself, and because he may very easily satisfy himself as to the general correctness of the results. In order to obtain the average annual mortality for the ten years 1821-30, he has only to divide the deaths at each age during the ten years, by half the sum of the living at the same age according to the two enumerations. And in order to deduce the average annual mortality during the ten years 1826-35, he has only to divide the deaths during those ten years by the numbers at corresponding ages ascertained to be living in 1831.

The most remarkable feature presented by the present Glasgow observation, is the rapid and uniform increase in the mortality of adults. Between the ages of thirty and

TABLE, *showing for each of the above three quinquennial periods, the average Annual Deaths which occurred in each interval of Age, out of* 100 *living at the same interval; also showing the Annual Mortality for the Four last Years, exclusive of the Year of Cholera.*

Between Ages.	Males.			Females.			Third Period exclusive of Year of Cholera.	
	1821-25	1826-30	1831-35	1821-25	1826-30	1831-35	Males.	Females.
0— 5	8.08	7.47	9.78	7.66	7.10	8.52	9.51	8.29
5 - 10	1.31	1.14	1.31	1.26	1.11	1.31	1.26	1.24
10—20	.74	.82	.95	.71	.61	.72	.93	.67
20—30	1.23	1.39	1.51	.88	.84	1.12	1.46	.92
30 - 40	1.35	1.56	2.14	1.24	1.32	1.85	1.77	1.48
40—50	1.82	2.31	3.19	1.65	2.06	2.87	2.60	2.21
50—60	2.84	3.71	4.11	2.68	3.36	4.30	3.29	3.51
60—70	5.72	6.38	6.97	4.67	5.74	6.72	6.00	5.50
70—80	12.70	15.45	17.90	10.48	11.88	13.02	15.54	11.02
80 - 90	21.27	29.07	30.33	16.72	21.97	23.50	28.34	22.72
Above 90	56.29	54.60	37.36	31.04	31.52	44.48	36.69	42.76
All Ages.	2.78	2.91	3.59	2.37	2.40	2.93	3.31	2.62
30—60	1.84	2.27	2.89	1.69	1.98	2.66	2.35	2.12
Above 60	8.81	10.23	10.95	7.32	8.70	9.77	9.60	8.37

sixty, the mortality of each sex increased twenty per cent every five years. This is the case after deducting ten per cent from the actual average of the five years 1831-35, as the effect of the cholera visitation in 1832. The mortality in 1832, between the ages of thirty and sixty, really raised the average twenty per cent, but it may be judged probable that the half of this excess consisted of weak lives, who would have been carried off by other diseases during the succeeding three years. A comparison of the mortality suffered in the first two quinquennial periods will serve to show how little knowledge can be obtained as to the real state of a population, when the *ages* of the living and dying are not distinguished. During the five years 1826-30, the mortality at all ages was nearly equal to the mortality which had prevailed during the preceding five years, and yet the mortality between the ages of thirty and sixty had increased nearly twenty per cent during the latter period. The increased mortality of adults had been masked by a diminished mortality among children.

In Glasgow, the mortality under the age of five years had been progressively diminishing until the year 1830, since which time it has rapidly increased. This fact is supported by the observation on London, published in THE LANCET of Jan. 30, wherein I have shown that the mortality, under the age of five years, had been uniformly diminishing during a period of 100 years ending with 1829. The increasing mortality of adults in Glasgow is supported by the population returns for all England, at least between the ages of fifteen and twenty-five years. If it be assumed, which is highly probable, that the number of females living at this interval bore the same proportion to the total English population throughout the eighteen years 1813-30, the mortality between the ages of fifteen and twenty-five has been increasing at the rate of twelve and a half per cent every ten years. The relative mortality at this inter-

val of age, during the three continuous periods, 1813-17, 1818-25, and 1826-30, was represented by the numbers 100, 109, and 116, respectively.

The increase on the aggregate mortality of the English population has been considerably less than that just stated, as may be seen from the following table. From the year 1780 to the year 1815 the number of deaths had been stationary, although the population had been increasing; consequently, the mortality at all ages had been diminishing at the same rate as the population had been increasing. From the year 1800 to the year 1815 the mortality was diminishing at the rate of fourteen per cent every ten years. From 1815 to 1830 the mortality at all ages of the English population increased at the rate of eight per cent every ten years. The present increasing mortality of the English population appears to be the natural consequence of the previously diminishing rate, because there is no ground for supposing the existence of any circumstances favourable to the permanent increase of the vitality of the population. A diminished mortality may coexist with a diminished vitality; an inferior class of lives well supplied with food may suffer a lower rate of mortality, than a class of the soundest lives deficiently supplied with food. In one important respect at least, the circumstances of the English population are decidedly more unfavourable to vitality than the circumstances of any other existing population. The proportion of town population is much greater in England than in any other country, and the fact of towns being extremely unfavourable to vitality has always been acknowledged. The agricultural portion of any population invariably suffers the lowest mortality; in England this portion constitutes only one-third of the total population, in most other countries this favoured class amounts to two-thirds of the total population. Notwithstanding appearances, the English population returns do not supply the slightest evidence of any increased longevity in any class of the population, from birth progressively to the end of life. The present appearances result from a low mortality of young lives combined with a low mortality among old lives, but we have no ground for supposing such a state of things to be applicable to the *same* lives. In the following table is indicated the progressive variation in the mortality of the total population of England and Wales, during six quinquennial periods, commencing with the year 1801, the time when the first enumeration of the living was made. The relative numbers result immediately from the ascertained fact, that the population increased at the rate of fourteen per cent from 1801 to 1811, and at the rate of fifteen and a half per cent for each o the two succeeding periods of ten years The relative numbers will represent the absolute annual mortality of both sexes, when multiplied by 2.04, which is the minimum annual mortality, or that experienced during the five years 1816-20.

TABLE, *showing for all England and Wales, the progressive Variation on the Mortality at all Ages, during Six continuous Quinquennial Periods ending with* 1830.

Periods of Five Years.	Total Registered Burials of both Sexes.	Relative Mortality.
1801— 5	970,468	114
1806—10	979,721	108
1811—15	969,233	100
1816—20	1,040,765	100
1821—25	1,169,245	104
1826—30	1,293,662	108
Thirty years	6,423,094	—

SUPPLEMENTAL TABLE,

Showing the Mortality of each Sex at all Ages, experienced at Glasgow during each of the Fifteen Years 1821-35.

Year.	Males.	Females.
1821	2.54	2.16
1822	2.46	2.06
1823	3.09	2.43
1824	2.90	2.51
1825	2.86	2.63
1826	2.72	2.21
1827	3.01	2.41
1828	3.22	2.82
1829	2.89	2.41
1830	2.70	2.15
1831	3.23	2.72
1832	4.87	4.32
1833	3.23	2.43
1834	3.16	2.43
1835	3.50	2.81
1821—25	2.78	2.37
1826—30	2.91	2.40
1831—35	3.59	2.93

It is not to be supposed possible that the past extraordinary increase in the mortality of adults at Glasgow can be of any long continuance. If the circumstances of Glasgow (and of Britain in general) had been of an ordinary nature, it might be properly concluded that the mortality between thirty and sixty years of age had passed from a minimum to a maximum (differing fifty per cent) in the short space of ten years. But it is now impossible to form any safe conclusion as to the probable future maximum. In Glasgow, and in all England, the mor-

tality under the age of five years is nearly one half less than that indicated by all previous observations, and it appears in the highest degree probable that the part of the population which has suffered so low a mortality in infancy, will suffer a correspondingly high mortality when arrived at mature years. About the year 1760 there died in London, under the age of five years, sixty out of every 100 born; in 1820 there died only thirty out of the same number. In the same period, the deaths at this age in *all* England were reduced from forty to twenty out of every 100 born. I make this statement respecting the mortality in 1760 on the authority of Dr. Price, the soundest of all writers upon this subject. It might be alleged by those who have an imperfect knowledge of the subject, that Dr. Price's opinions were founded upon defective materials, because the ages of the living in England had never been distinguished before the year 1821. This objection is of no weight when applied to the ascertaining of the mortality under the age of five years, provided that (as was the case with Dr. Price) the number of births be known. In THE LANCET of Jan. 30, I have shown that the deaths in all parts of England under the age of five years, when compared with the births, or when compared with the living in 1821 under the age of five years, yield results in all respects identical.

The results of the present complete and excellent observation on Glasgow, will serve to indicate the nature of the national loss which has been sustained by the neglect of the government to demand a return of the *ages* of the English population in 1831, similar to the return of 1821. The adviser of this measure has committed irreparable mischief, and his ignorance has seriously obstructed the advancement of the science of "population statistics." Mr. Rickman appears to have taken upon himself the responsibility of the omission, as he ventured to declare, in 1832, that such a distinction of ages would have been "unnecessary and inconclusive." At Glasgow, during the three quinquennial periods, the progressive variations in the mortality at given intervals of age, exhibit a considerable degree of uniformity. If, however, similar materials had existed for the total English population, we should probably have obtained an extremely uniform progressive variation at given ages, which might have revealed some important secrets in the laws of vitality. Combining the imperfect observation on England with the perfect observation at Glasgow, it may be considered as extremely probable, that the increasing mortality at Glasgow represents in an exaggerated degree, and forms part of, a general increase in the mortality throughout the whole of Great Britain.

In THE LANCET of December 5th, I gave a table representing the law of mortality prevailing in six large English towns, the numbers being founded on the assumption, that the registered deaths at every age were deficient by one-sixth part of the true number of deaths. The results there given, and the present accurate results for Glasgow, agree very nearly with each other, and with the results of my theoretical table of "city mortality." In the two following tables is presented a comparative view of these results. I have also added for comparison, results for London, for all England, for Sweden, and for Carlisle, and the results of two other theoretical tables. In the case of the six English towns, I have now introduced a correction in the mortality of the male sex, which I previously indicated as necessary, on account of the omission in the enumeration of the living of all the military and maritime population attached to those towns.

TABLE *of the Annual Mortality of each Sex at every Age in Glasgow, during the Fifteen Years* 1821-35, *compared with the Mortality prevailing during Eighteen Years,* 1813-30, *in six large English Towns, in London, and in all England and Wales.*

Between Ages.	Six English Towns, 18 Years, 1813-30.		Glasgow, 15 Years, 1821-35.		London, 18 Years, 1813-30.		England and Wales, 18 Years, 1813 30.	
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
0— 5	9.21	8.06	8.44	7.76	8.83	7.71	5.35	4.60
5—10	1.09	.97	1.25	1.23	1.14	1.02	.72	.67
10—20	.82	.63	.84	.68	.63	.56	.61	.64
20—30	1.61	1.18	1.38	.95	1.22	.92	1.01	1.04
30—40	1.67	1.45	1.68	1.47	1.69	1.35	1.14	1.24
40—50	2.08	1.84	2.44	2.19	2.54	2.04	1.49	1.49
50—60	3.23	2.76	3.55	3.45	4.04	3.19	2.34	2.16
60—70	6.48	5.17	6.36	5.71	8.12	6.56	4.53	4.12
70—80	13.28	10.92	15.35	11.79	15.97	14.50	10.12	9.69
80—90	25.40	23.84	26.89	20.73	30.91	28.90	22.71	21.46
Above 90	42.57	42.88	49.42	35.68	33.84	33.26	37.01	37.19
All ages	3.21	2.68	3.09	2.57	3.11	2.58	2.17	2.07

TABLE *of the Mortality of both Sexes, deduced from the preceding Table, together with the Mortality at Carlisle, and in all Sweden, compared with the Results of three published Theoretical Tables.*

Between Ages.	Six Towns of England.	Glasgow.	London.	Theoretical Tables.			Sweden, 21 years, 1755-75.	England and Wales.	Carlisle, 9 Years, 1779-87.
				City Mortality.	Mean Mortality.	Village Mortality.			
0— 5	8.63	8.10	8.27	8.46	6.73	7.48	9.01	4.98	8.23
5—10	1.03	1.24	1.08	1.24	.99	1.02	1.42	.70	1.02
10—20	.73	.76	.60	.88	.70	.58	.71	.63	.59
20—30	1.39	1.17	1.07	1.17	.93	.78	.92	1.02	.75
30—40	1.56	1.57	1.52	1.57	1.25	1.05	1.22	1.19	1.06
40—50	1.96	2.31	2.29	2.10	1.68	1.40	1.74	1.49	1.43
50—60	3.00	3.50	3.61	2.99	2.40	2.01	2.64	2.25	1.83
60—70	5.83	6.04	7.34	5.99	4.83	4.05	4.81	4.33	4.12
70—80	12.10	13.57	15 23	12.36	10.04	8.46	10.23	9.90	8.30
80—90	24.62	23.81	29.91	24.53	20.18	17.16	20.78	22.08	17.56
Above 90	42.72	42.55	33.55	47.20	39.85	33.45	39.41	37.10	28.44
All ages	2.95	2.83	2.84	—	—	—	2.89	2.12	2.50

In the year 1832 I published a system of "Life Tables," founded upon the discovery of three constants, which I believed to be the universal regulators of the duration of every variety of human life. I have applied these three constants (in the same manner) to three different bases, and thus produced three theoretical tables, under the designation of "village," "mean," and "city mortality," with the expectation of thereby representing every class of facts usually occurring in human mortality. As the base of the village table, I assumed the minimum mortality (at the age of ten years) to be five deaths in a year out of 1000, or one out of every 200 living. The minima in the three tables, and the mortality at every age, are in the exact proportion of the numbers 5, 6, and 7.5 respectively. The results of the village table agree closely with the results of the observation made at Carlisle in 1787 by Dr. Heysham, which represents the lowest mortality ever recorded under any circumstances. The results of the "Mean" table agree closely at every age with the observation for all Sweden during the twenty-one years 1755-75, except below the age of eight years. At this period I designedly departed from the facts, by putting back the limit of "infancy" one year, in order to represent what I expected to be the fact now in England among children. This table represents more nearly than any other published table, the mortality of the total English population. The third table, that of "city" mortality, represents more nearly than any other table the law of mortality recently observed in Glasgow and in other British towns. The observations for Sweden are beyond comparison superior to any others in existence, which are all isolated and partial. Assuming the theory to be true, I can hardly conceive the possibility of a nearer approach than that presented by the long series of Swedish observations. There exist some occasional small deviations; but the same discrepancy never occurs in two consecutive observations.

The existence of the first of the three constants is indicated when under the age of about eight years, the deaths of any two consecutive years are in the proportion of three to two nearly. (The termination of this period coincides with the epoch at which the human brain attains its full development.) The existence of the second constant is indicated when the mortality (or the deaths out of a given number living) at any decennial interval of age between fifteen and fifty-five years, is *one-third* part greater than the mortality of the preceding decennial interval. The existence of the third constant is indicated when at ages greater than fifty-five, the mortality at any decennial interval is *double* that of the preceding decennial interval. The universal existence of the first and third constants I believe to be indisputable. The existence of the second constant is apparently opposed by the single isolated observation for all England. But the present Glasgow observation neutralizes this opposition. During the five years 1821-25, the mortality in Glasgow at successive decennial intervals of age between 20 and 50, differed *less* than it ought to have done according to the theory; the same was the case in all England during the eighteen years 1813-30. But in Glasgow, during the five years 1831-35, the difference was *greater* than that resulting from

the second constant. It may hence be concluded as extremely probable, that in all England, as in Glasgow, the deviation was temporary, and would have had no existence if the circumstances of the British population had not been so rapidly changing. It is, however, worthy of remark, that during the last five years, the mortality in Glasgow between the ages of 20 and 50, resembles that now existing in London, and once existing in Stockholm, in showing a decennial increase of one half, instead of one-third. This deviation from the theory is found to occur only in large towns, when the mortality is very great, and might be accounted for by supposing the vital powers of some classes of the inhabitants to be exhausted at a very early age. This premature decay would subject these classes to the dominion of the third constant, whilst other classes were subject to the second constant. The aggregate population between the ages of twenty and fifty, will then be under the regulation of an apparent constant, intermediate between the second and third real constants.

Under the age of two years, the present Glasgow observation confirms the theory in a remarkable degree, and opposes the observations made in England. According to the theory, the deaths under the age of one year, are to the deaths between one and two years in the proportion of three to two. This is exactly the case in Glasgow, for each sex during each of the three quinquennial periods. In England, the proportion of deaths under the age of one year is considerably greater. The correctness of the English returns at this age may consequently be suspected, when thus opposed to the accurate returns from Glasgow. In England we have no information given respecting the numbers "still-born;" and it is not impossible that they may have been included among the deaths under the age of one year, which error has been really committed by Dr. Cleland in the case of Glasgow. I do not, however, wish to conceal the fact, that the theory appears to be generally inapplicable below the age of two months. The proportion of still-born in Glasgow is unusually high; they amount to one in twelve of the total deaths, or to one in sixteen of the total births. During the fifteen years, the total still-born were 3480 males and 3024 females. In the same time the deaths under the age of two years were 13,554 males and 11,833 females. Consequently, the still-born males are to the still-born females in the proportion of 8 to 7, which is the same proportion as that existing between the deaths of males and females under the age of two years.

The mortality from cholera has been distinguished for each age and for each sex in the Glasgow returns. The increase in the mortality of females at all ages from cholera, was above twenty per cent greater than the increase in the mortality of the male sex. Between the ages of twenty and thirty, the difference was most remarkable. two females dying for one male; at other ages, six females died for every five males. The chief increase of the mortality from cholera occurred between the ages of twenty and seventy years. Under the age of twenty, the relative increase from cholera at Glasgow was apparently much less than that indicated by the general returns collected by the "Board of Health." From these latter returns it would seem, that the fatality of cholera is only one half as great among children as among adults. Having carefully inspected the Glasgow returns, I do not think that there is any sufficient evidence of a greater disproportion having existed in Glasgow than in England.

46, Regent-square, London,
June 4th, 1836.

RESEARCHES OF M. JUNOD INTO THE

PHYSIOLOGICAL AND THERAPEUTIC EFFECTS

OF THE

COMPRESSION AND RAREFACTION OF AIR ON THE HUMAN BODY.

To the Editor of THE LANCET.

SIR: Some months ago I received a letter from Professor Magendie of Paris, in which, amongst other things, he mentioned that he was appointed to report upon an apparatus invented by Dr. Junod, and desired some information from me relative to a similar apparatus invented by me, an account of which appeared in THE LANCET for March the 7th, 1835. It was not in my power to give this distinguished philosopher any information in addition to that which appeared as above mentioned. I may here state, that my time has not permitted me to follow up this very interesting subject.

It is curious that Sir James Murray, M.D., of Dublin, Theodore Junod, D.M.P., of Strasburg, and the present writer, were at the same time devising and carrying into effect similar apparatus, for the purpose of removing the pressure of the atmosphere from the surface of the body, without any hint on the subject having been previously published in any journal or other publication.

I am of opinion that a translation of the most interesting portions of Dr. Junod's "Researches upon the Physiological and Therapeutical Effects of Compression and Rarefication of the Air, whether upon the