On the influence of weather upon disease and mortality / by R.E. Scoresby-Jackson.

Dr. SCORESBY-JACKSON

ON

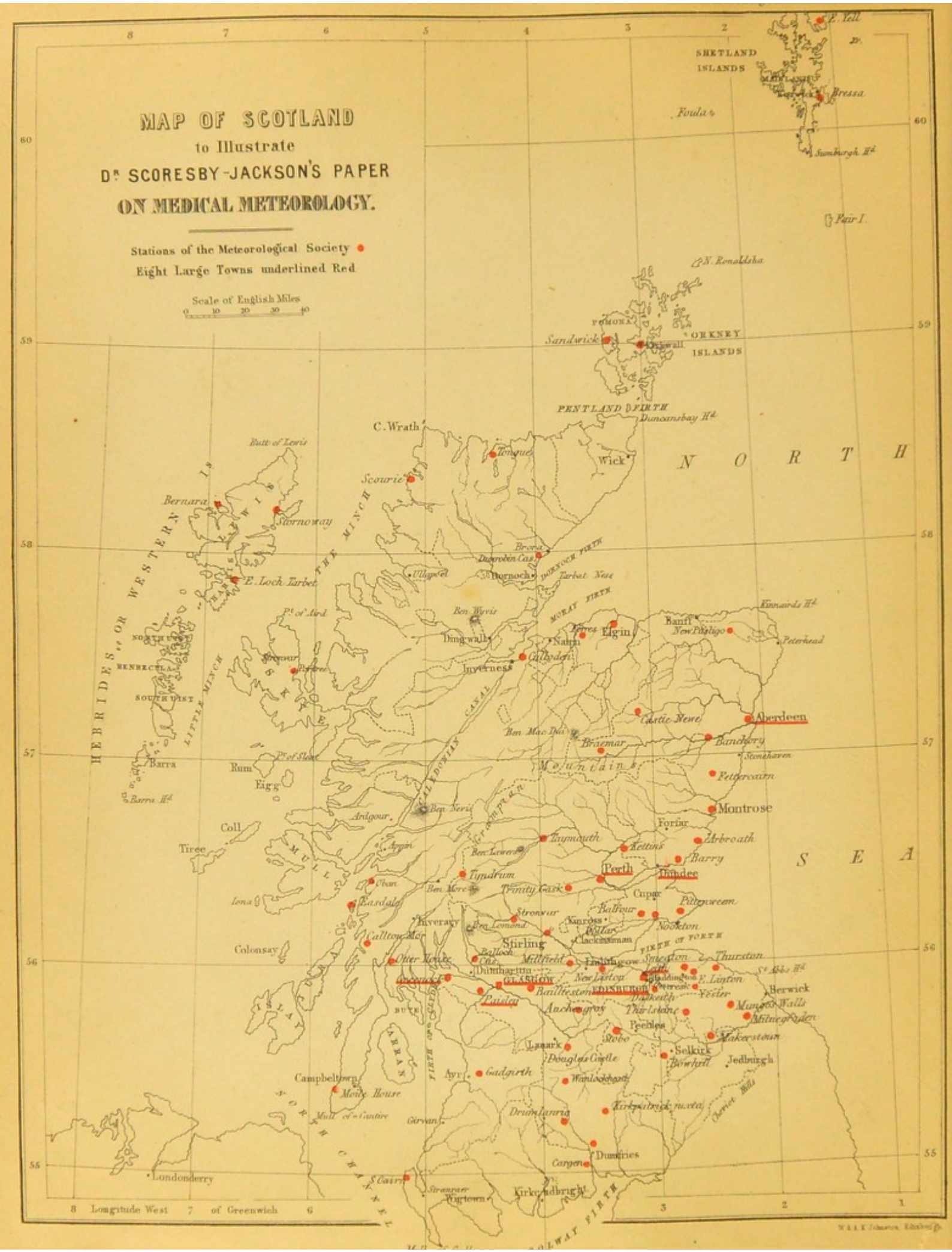
MEDICAL METEOROLOGY

Dr. Dowson

with kind regards from

The Author

21st July 1863.


MAP OF SCOTLAND
to Illustrate
Dr SCORESBY-JACKSON'S PAPER
ON MEDICAL METEOROLOGY.
Stations of the Meteorological Society ●
Eight Large Towns underlined Red
Scale of English Miles
0 10 20 30 40
SHETLAND ISLANDS
Foula
Sumburgh Hd
Fair I.
N. Ronaldsha
ORKNEY ISLANDS
Sandwick
Kirkwall
PENTLAND FIRTH
Duncansbay Hd
C. Wrath
Butt of Lewis
Tongue
Wick
Scourie
Bernara
Stornoway
LEWIS
HARRIS
THE MINCH
Loch Torbet
Ullapool
Dornoch
Tarbat Ness
Ben Wyvis
Dingwall
Nairn
Elgin
Banff
New Pitsligo
Peterhead
Kinnaird's Hd
Inverness
Fort George
Pt of Sleat
SOUTH UIST
BENBECULA
LITTLE MINCH
HEBRIDES, OR WESTERN ISLES
SKYE
CALEDONIAN CANAL
Ben Mac Dui
Braemar
Castle Neve
Aberdeen
Banchory
Stonehaven
Fettercairn
Barra
Rum
Eigg
Barra Hd
Mountains
Montrose
Forfar
Arbroath
Ardgour
Ben Nevis
Coll
Tiree
Taymouth
Kettins
Barry
Perth
Dundee
S E A
Oban
Ben More
Tyndrum
Trinity Gask
Cupar
Pittenweem
Lena
Easdale
Inveraray
Ben Lomond
Stronvar
Balfour
Kinross
Nookton
Callton Muir
Colonsay
Stirling
Clackmannan
FIRTH OF FORTH
Otter House
Ballock
Millfield
Smeaton
Thurston
Dalmahoy
Edinburgh
New Lanton
E. Linton
St Abbs Hd
GLASGOW
EDINBURGH
Berwick
Paisley
Auchengray
Yester
Mungo Walls
Milne Graden
Peebles
Robo
Makerstoun
Lanark
Douglas Castle
Selkirk
Jedburgh
Campbeltown
Ayr
Gadgirth
Wanlockhead
Moile House
Mull of Cantire
Girvan
Dumfries
Cargen
Londonderry
Strangaer
Wigtown
Kirkcudbright
Longitude West 7 of Greenwich 6
3 2 1

ON

THE INFLUENCE OF WEATHER

UPON

DISEASE AND MORTALITY.

BY

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ILLUSTRATIONS.

ON THE

INFLUENCE OF WEATHER UPON MORTALITY.

The subject to which I have to invite the attention of the Society this evening is one of no modern origin, the name of HIPPOCRATES, amongst others of the fathers of medicine, being commonly associated with it. There is, indeed, perhaps no branch of medical inquiry whose history dips more deeply into the obscure pages of antiquity. The influence of weather upon disease and mortality has been acknowledged as a potent external force in every age, from that eminently speculative and credulous period when physicians professed to receive their diagnostic as well as their therapeutic inspirations from the stars, down to our own day. And yet there is perhaps no question in the whole cycle of medical sciences which has made slower progress than the one we have now to consider. People believe that the weather affects them. They speak of its influence, sometimes commendingly, more frequently with censure, on the most trivial occasions; but beyond a few commonplace ideas, the result of careless observation, or perhaps acquired only traditionally, they seldom seek a closer acquaintance with the subject. Our language teems with medico-meteorological apophthegms, but they are notoriously vague. The words which are most commonly employed to signify the state of the weather at any given time, possess a value relative only to the sensations of the individual uttering them. The general and convertible terms—bitter, raw, cold, severe, bleak, inclement, or fine and bracing, convey no definite idea of the condition of the weather; nay, it is quite possible that we may hear these several expressions used by different persons with reference to the weather of one and the same place and point of time. In order, then, to render medico-meteorological researches more trustworthy, we must be careful to employ, in the expression of facts, such symbols only as have a corresponding value in every nation.

As a matter of purely medical inquiry, the influence of weather is also too frequently neglected. So true is this, that when we examine the literature—at least the modern literature—of the subject, we find it to be most meagre, and very few are the statistics which we meet with to guide us in a further research. When I say, that in a medical point of view the influence of weather has been disregarded, I speak relatively to the amount of labour bestowed upon other

branches of medical science; and I do not for a moment ignore the valuable contributions to this department which have been made from time to time by physicians of distinction. In France, Belgium, Germany, Italy, and America, as well as in the United Kingdom, there have been many physicians during the present century, who by their labours have enriched this peculiar branch of medicine; and if I do not frequently quote their writings, it is neither from a want of respect to them individually, nor from a desire to underrate what they have accomplished, but simply because my time is very limited; and, further, because I think it will tend far more to the progress of the inquiry to pursue my own researches independently of any other investigations. It is well known that the influence of external causes upon the constitutions of living creatures differs materially with locality. These causes are not only numerous of themselves, but they are moreover capable of producing an infinite variety of results, according to their several combinations. Their effects are as distinct in different countries, as are the features of men of different nations. Therefore, conclusions derived from investigations pursued here can have no dependence upon the knowledge acquired by physicians in other countries; nor can any discrepancy which may be observed between the results of such several investigations serve to impugn the accuracy of individual deductions. It is quite possible that the results evoked by Casper in Berlin, Quetelet in Brussels, Boudin in Paris, Emerson in Philadelphia, and Guy in London, as well as those by the Registrars-General of the United Kingdom, may differ widely in many essential points, and yet the inferences of each observer be correct in themselves. The same may be said of the researches of Sir James Clark, Cless, Edmonds, Emerson, Foissac, Francis, Fuchs, Haviland, Haller, Hirsch, Keith Johnston, Lombard, Mädler, Marc d'Espine, Martin, Meyer, Milne-Edwards, Mühry, Ransome, Rigden, Schübler, Tripe, Villermé, and of many other careful observers. My object is to examine the relations which exist between the weather and the health of a community as closely as I may find it practicable to do so; and in pursuing this inquiry, my desire is to divest myself of all foregone theory, and to make the facts which I have collated speak for themselves.

We have the strongest indication of the utility of such investigations in the fact, that, whether we do or do not possess a knowledge of the etiological and therapeutic influence of meteorological phenomena, we invariably act as if we were most intimate with the subject. Delicate persons crave for, and physicians often recommend, change of climate, which in many instances is a term convertible with change of weather, though it often means nothing more than change of scenery and of mental or physical occupation. If it be a good thing for a sick man to change his residence, it must be a proper thing for him to know what it is that he is avoiding, and what it is that he is to acquire in exchange for it in another place. This must remain an exceedingly difficult question to solve, until we have statistics from every health resort, showing the correlations of weather and disease in each.

We are not to assume that because certain conditions of weather, as indicated by meteorological instruments, in this country are opposed to recovery from certain diseases, that, *therefore*, patients so suffering are not to be sent into any country where meteorological instruments afford exactly or even nearly parallel readings. In other words, in estimating the value of a foreign climate, or the different climates of our own country, we are not to depend so much upon a comparison of the meteorological data of the several places as upon the relations subsisting between the meteorological data and the prevalent diseases and death-rate of one and the same locality. Each spot of ground aspiring to the reputation of a health resort must first have this problem solved for it, and then we may with greater safety institute a general comparison. All that we can do in our present investigation is to find out, if it be contained in our data, what is good and what is objectionable in the climate of certain localities in Scotland, as evidenced by the general death-rate, and by the mortality from several causes. This will not in any way affect the character of the climates of Torquay, Bournemouth, Algiers, or Rome, except in so far as there may have been a line of investigation pursued in any of these places parallel with that now under consideration, so that a comparison may be instituted between the two; for, to argue, that because a given condition of temperature, atmospheric pressure, and humidity in Scotland is accompanied by a certain ratio of mortality, therefore, meteorological data being equal, the same death-rate will be observable in Torquay or Madeira, would be most fallacious: *all other things* being equal, the death-rate would also coincide; but it requires much more than mere meteorological analogy to establish such a parallelism.

But the present inquiry may serve another, and perhaps still more important, purpose. By far the greater number of cases requiring medical treatment do not involve the consideration of change of residence; nevertheless, I venture to assert that in all of them the weather plays an important part; and it cannot be otherwise than right for the physician to know whether he has, in the atmosphere around his patient, a foe or an ally in the treatment of his malady. In medical prognosis, a knowledge of the influence of weather is of essential service; and as an agent operating upon the therapeutic action of drugs, weather forms a most important study. I do not pretend that this is by any means an exhaustive inquiry; nor have I strained my facts to meet any so-called natural laws. On the contrary, the facts speak for themselves, sometimes making positive, sometimes negative assertions, and often enough hovering between the two, leaving us as much in doubt as before, but with a stimulus to deeper research into the influence of those numerous external agencies which are under the immediate control of the Great First Cause of all.

An inquiry into the causal relations subsisting between weather and disease is beset with a multitude of difficulties. In the first place, we ought not to attribute to the weather any effect upon the mortality of a given population, until we

have abstracted all other causes which might have operated in a similar manner, and to which such effect might altogether or in part be due: a task which is not very readily accomplished. Again, we cannot, if we would attain a rigid accuracy, attribute fluctuations in the death-rate to vicissitudes of weather, until we obtain a uniform climate over the entire area of observation, and this we shall never acquire. It may perhaps be objected to the results of my investigations, that it is not fair to apply the average of the climate of all Scotland to the death-rate of the eight larger towns; that the towns have a climate distinct from that of the rural and insular districts, and that each town has one of its own. That is quite true; but it is an objection which may with equal propriety be urged against the application of the climate of any large town to the mortality of its several parishes, the particular climate of each of which may, and often does, differ from that of its neighbour. But I prefer to consider the town districts alone, because it is in them that we meet with the mass of disease and the multiplied mortality; and as to the applicability of the general climate to a local death-rate, we may regard it in this way, that the climate of the towns is a climate within a climate, and that, whatever difference there may be between the containing and the contained, any modification of the larger must in a corresponding manner affect, if not in degree, at least in kind, the smaller.

Another objection might suggest itself in the returns of the cause of death made to the Registrar-General. It may be said that many of these returns are, at least, inexact; as, for example, when it is stated that death was caused by dropsy, the accumulation of fluid being merely a symptom of the real disorder: or, where the certificate tells only half the truth, as when a person who is dying of one disease is accidentally cut off by an intercurrent attack of another kind which would not have proved fatal but for the moribund condition of the patient at the time when it took possession of him; in such a case one class of disease is robbed of a victim which another gains by an adventitious circumstance. These and many other objections might be raised against investigations into the influence of the weather if we would be satisfied with nothing short of logical exactness; but we may undoubtedly arrive at an approximate knowledge of its effects if we are careful to avoid error in the main features of the inquiry.

The influence of external causes upon the constitutions of living creatures varies with locality, the variety depending upon the character of the causes, whether individually or combined. In a general way, these causes may be classed into two leading groups, as in the following order:—

A. Universal Causes, affecting Nations, as,—

1. *Position of a Country relative to*—The Equator—water in motion (*e.g.*, the sea with its currents; rivers, springs, extensive lakes)—stagnant waters (*e.g.*, canals, shallow lakes, marshes)—mountains, forests, arid plains, fields of ice.
2. *Aspect of a Country.*—General elevation and configuration, geological structure, physical and chemical properties of its soil, state of cultivation.
3. *Atmospheric Phenomena.*—Temperature, barometric pressure, direction and force of winds, humidity, insolation.

B. Local Causes, affecting Districts and Individuals, as,—

1. *Meteorological Phenomena*—Abnormal heat or cold, abnormal drought or humidity, abnormal fluctuations of the barometer (*i.e.* of atmospheric pressure), pernicious winds, ozone, electricity, diurnal phenomena, seasonal changes.
2. *Habitation*—Situation (town or country, on the coast or inland), elevation, construction, drainage, ventilation, heating, lighting, overcrowding.
3. *Dietetics*—Price of food, quality of food, quality and quantity of potable water, and of water for all domestic purposes.
4. *Personal*—Dress, occupation, habits and pursuits.

Although it may not be advisable to consider these several modifying causes in detail, nevertheless it is necessary that a passing glance should be accorded to them, in so far as they relate to this country.

Scotland, in its mainland, extends between 54° 38′, and 58° 40′ 30″ of north latitude, and 1° 46′, and 6° 8′ 30″ of west longitude. Including the circumjacent islands its limits are wider. The length of the mainland between its extreme points is 276 miles. Its breadth varies so greatly that no general idea can be given of it in one sum; it ranges from about 30 to 175 miles. In its general outline and configuration, Scotland is very remarkable. On glancing at a map of the country, the attention is at once arrested by the peculiar indentations of the coast line. In several situations the land is almost bisected by the prolongation of the sea into its interior, forming what are called Firths and Lochs, which serve to increase very considerably the shore of the country. The coast line, followed in all its sinuosities, occupies probably more than 3000 miles; but taking only the larger inlets of the sea into consideration, the circumference is probably about 2500 miles, which gives one mile of seaboard to every eleven square miles of surface; the estimated area of Scotland, inclusive of the Islands, being 31,324 square miles, or 20,047,360 acres. The ratio of seaboard to area over the whole of Europe is about one to twenty-five; Greece and Denmark being the only countries which approach Scotland in respect of proportional extent of coast. The islands of Scotland constitute about one-ninth of the entire area. It is obvious from these facts, that the sea, as an external cause operating upon the constitutions of the inhabitants, must be in the highest degree potent. And it is fortunate for Scotland that the influence of the sea is benign—unlike its action on the ice-bound shores of Labrador. It owes its mitigating influence, so far as Scotland is concerned, to the prevalence of westerly winds across its waters, tempered by the Gulf-stream; whereas, on the opposite shores of the Atlantic, the cold counter (Arctic and Hudson Bay) currents have a directly opposite tendency.

Besides the firths and marine lochs adverted to, Scotland possesses also many inland lakes, which, although not of magnitude comparable with those of the New World, tend materially to increase the aqueous element of its physical geography. The larger river-basins add also to the bulk of water in and around the country; in short, there is perhaps no point in Scotland more than a few miles

from a large body of water, and probably none more than forty miles distant from the sea. The same may be said with respect to the proximity of mountains; for there is scarcely any point commanding an extensive general view, from which a range of mountains may not be seen. There are five principal mountain chains, all of which assume a direction from N.E. to S.W. Besides these there are many detached groups, all of which exert a peculiar influence upon the climate. Forests do not form a special characteristic of Scotland, nor is there any barren plain within or near the country to modify the condition of the atmosphere in its passage across the land. But the ice-fields of arctic regions, lying not very far northward of Scotland, do probably exert a modifying power.

The geology of Scotland is one of the most striking features of the country; and that the structure of the land, together with the physical and chemical characteristics of the soil upon its surface, exercises a powerful influence upon the distribution of disease, I do not for a moment doubt; so much, indeed, am I impressed with the belief of this, that I have been for some time collecting materials, with a view of showing, more distinctly than has hitherto been done, the relations which these circumstances bear to each other.

The following table will serve to indicate the condition of the inhabitants of Scotland, during the several years under investigation, with respect to other external causes which might possibly divide with the weather the responsibility of determining the death-rate from all causes, or from any particular disease.

TABLE SHOWING THE AMOUNT AND DETAILS OF THE POOR-LAW EXPENDITURE IN EACH OF THE YEARS FROM 1852 TO 1861 INCLUSIVE; ALSO THE STATE OF THE FIARS-PRICES OF THE COUNTY OF EDINBURGH FOR THE CROPS FROM 1855 TO 1861 INCLUSIVE:—

Year.	1852.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	Average.
Poor-Law.	£	£	£	£	£	£	£	£	£	£	£
Relief of Poor on the Roll,	401,954	411,135	428,708	461,243	486,689	492,118	496,297	512,751	518,546	531,233	474,067
Relief of Casual Poor, .	25,986	24,114	24,386	27,356	22,188	20,869	27,915	25,752	22,218	24,118	24,490
Medical Relief, . . .	21,436	21,737	27,874	27,166	24,008	24,205	24,948	25,691	26,738	26,908	25,071
Management, ...	51,644	52,352	56,068	58,767	61,462	63,142	66,307	67,166	67,048	67,717	61,167
Law Expenses, . . .	13,266	13,036	9,780	10,290	8,474	7,637	7,165	9,753	8,750	7,975	9,613
Poor-House Buildings, .	21,186	21,644	25,850	20,605	24,847	27,277	18,066	16,250	19,973	25,948	22,165
General Sanitary Measures,	393	532	6,259	6,355	1,677	1,122	...	...	...	...	1,634
Total Expenditure, .	535,865	544,550	578,925	611,782	629,345	636,370	640,698	657,363	663,273	683,899	618,210
Fiars-Prices.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Wheat, 1st, ...	...	...	...	70 9	40 0	38 4	40 1	44 8	47 8	56 4	48 3
,, 2d, ...	...	...	...	68 0	35 0	35 6	37 0	42 0	44 8	54 0	45 2
Barley, 1st, ...	...	...	...	40 6	36 4	27 3	31 7½	37 6	40 5	31 3	34 11¾
,, 2d, ...	...	...	...	38 0	32 0	25 0	29 0	35 0	38 0	29 0	32 3
,, 3d, ...	...	...	...	36 0	28 0	22 6	27 0	32 6	35 0	27 6	29 9
Oats, 1st, ...	...	...	...	29 6	23 0	22 6	23 0	25 10	29 3	25 4	25 5
,, 2d, ...	...	...	...	27 6	20 0	20 6	21 0	22 6	27 0	23 6	23 1
Pease and Beans, . .	...	...	...	45 0	37 6	37 3	39 10	43 8	40 7	42 6	40 10
Oatmeal, ...	...	...	...	21 3	19 2	16 5½	16 8¾	18 9	21 5½	18 9	18 11¼

There remains, then, only one more subject for preliminary consideration, and that is, the sources of the different data employed in the following pages. The meteorological data are taken from the collected returns from the stations of the Meteorological Society of Scotland, as reduced by the Astronomer-royal. The stations of the Society have a mean latitude of 50° 30′ N.; a mean longitude of 3° 4′ W.; and a mean elevation of 222 feet nearly. It will be observed that the meteorological data are deficient in two points, namely, concerning electricity and ozone. Unfortunately, I have no means of applying these subtile agencies to the mortality of the years under examination; with respect to electricity, indeed, I have no information whatever; and concerning ozone, I have nothing trust-worthy. It is true that the Meteorological Society's reports contain the results of observations made with the usual test-papers in different parts of the country; but I submit, with all deference, that until the chemistry of ozone is more fully understood, its physiological action cannot be accurately defined. So long as it is left to each observer to determine the amount of ozone present at his station by the varying depth of colour on a slip of paper, our knowledge of the true quantity present must depend upon very slender evidence, and consequently be of very questionable accuracy. It is quite possible that six different observers might, with exactly the same indication on the test-paper, refer the amount of ozone present to as many different shades on the reference paper. Whether the paper itself affords a true indication of the presence of ozone, and to what extent, in the atmosphere, is a disputable matter. At all events, under existing circumstances, I should hesitate in comparing the ozone returns with the death-rate.

With respect to the humidity or dryness of the atmosphere, I have employed only three columns, showing, respectively, the number of rainy days, the amount of rain in inches, and the degree of saturation, as deduced by Mr GLAISHER: full saturation = 100. I have therefore omitted the readings of the dry and wet bulb thermometers, the temperature of the dew-point, and the elastic force of vapour. I have also omitted from the tables, although plotted in the diagrams, the absolute highest and absolute lowest temperatures at any of the stations; these are exceptional records, and can have no general application to the subject of the present inquiry.

The mortality tables are constructed from the returns made by the Registrar-General. The period over which my investigations extend is six years, namely, from 1857 to 1862 inclusive. This, I conceive, is quite long enough to indicate the relationship existing between the weather and mortality in non-epidemic years. I would, however, have made the period seven years, by including 1856, but I found that the meteorological data for that year were not trust-worthy; a circumstance arising from the newness of the Society, the inexperience of the observers at many of the stations, and a want of proper correction for the errors of the instruments then employed.

The absolute facts concerning the meteorology and mortality of the seventy-

two months are derived as already described ; but for the arrangement and calculations in the several tables, and for the inferences therefrom, mentioned in the text, I am alone responsible. The inquiry is led into the influence of weather upon mortality from all causes, from all specified causes, from zymotic diseases, from typhus, from scarlatina, from diarrhœa, from tubercular diseases, from phthisis pulmonalis, from diseases of the respiratory organs, from bronchitis, and from pneumonia, at all ages; and from all causes at four different periods of life—namely, under five years of age, between five and twenty, between twenty and sixty, and from sixty upwards.

In order to simplify the comparison of the meteorological with the mortality tables, and to render the fluctuations of the death-rate more distinct, I have reduced the number of deaths in every case to the ratio *per* 100,000, living in the eight larger towns at the time when the deaths were recorded, taking the estimated population for each of the six years as the standard of reference. Whether I have obtained a strictly correct estimate of the population of the eight towns or not, I cannot positively say; that given in the reports of the Registrar-General required considerable correction after the taking of the census in 1861. In consequence of this alteration, I had to recalculate my tables. In their present form the tables are calculated upon the following basis:—

Year.	Population of the Eight Large Towns.	Deaths from all Causes in the Eight Large Towns.
1857, ...	843,902	23,361
1858, ...	853,830	23,420
1859, ...	863,761	22,345
1860, ...	873,686	26,028
1861, ...	883,748	23,130
1862, ...	893,850	24,965
Average,	868,796	Total, 143,249

In the mortality tables, each of the months of thirty-one days is reduced to the value of thirty days, and the death-rate of February of each year is raised to the same value, so as to have uniformity over the whole seventy-two months.

The red dots upon the map indicate the situations of the meteorological stations; the red lines, the positions of the eight large towns, namely, Glasgow, Edinburgh, Aberdeen, Dundee, Perth, Greenock, Paisley, and Leith.

The diagrams which I have constructed to illustrate the paper, are, I venture to believe, not without considerable value. They present to the eye at one glance, the whole scheme of the investigation, and will probably leave a more vivid impression upon the minds of those who care to examine them than would result from an unaided examination of the tables, or a perusal of the text.

Of the three larger tables, the first (A) is arranged to represent a gradually descending ratio of mortality, the several months of the six years being placed in the order of the death-rate,—that in which the greatest number of deaths occurred

being at the top, that in which the lowest mortality took place being at the foot of the table. Opposite the mortality column are placed the several meteorological readings and deductions of the corresponding months. The columns are then divided into four distinct sections, each comprising eighteen months, the means of which are offered for comparison with each other, and with the means of the seventy-two months which are given alone in every third column. To have carried this table out to the extent of showing, in a similar manner, the order of the death-rate from the several classes of disease and individual diseases, as in the other tables, would have demanded more space than could reasonably be accorded. The materials for such extension, however, are given, and the arrangement might easily be made.

The second table (B) is constructed to represent the meteorology, and the death-rate from all and several causes at all ages, and from all causes at several ages, in the consecutive order of the months in each year: the means and totals of each year are given in separate columns, and the last column shows the means of the six years. The third table (C) is arranged for the purpose of comparing the meteorology and mortality of the several corresponding months of the different years, the mean of each of the 420 shorter columns being calculated in order to show more distinctly the character of the various deviations. I may also mention that each table was calculated independently of the others; on this account the general averages occasionally differ to a very trifling extent.

I.—The Influence of Weather upon Mortality from all Causes.

In the following details, I shall endeavour to show, as succinctly as possible, the influence of weather upon mortality from all and several causes; but I cannot pretend to exhaust the information which the tables and diagrams contain. I shall content myself with pointing out the prominent features of the inquiry; the facts from which they are drawn being placed without reserve before the Society, the inferences which I deduce from them are open to criticism, and nothing can fulfil my own desires more fully than an exposure of error, whether of fact (*i.e.*, of calculation) or of reasoning.

Season.—The influence of season upon mortality is not very distinctly understood, especially with reference to certain individual causes of death, opinions differing widely as to the months which determine the maximum and minimum of mortality from such particular causes. Here I would draw attention to the difference between mortality and disease; we shall fall into error if we suppose that the season of highest mortality is always the season of greatest sickness. It not unfrequently happens that certain seasons which are characterised by a maximum of sickness are at the same time distinguished for their low rate of

mortality; and contrariwise, seasons which may be somewhat remarkable for the general health of the public, may, by their influence upon one or two classes present a high death-rate. It is a very difficult matter to obtain accurate statistics of the prevalence of disease over a large community. After collecting a mass of statistics of disease from several dispensaries and hospitals, with a view of comparing the rate of *morbility* with the rate of mortality as given in this paper, I was obliged, after much labour, to abandon the *morbility* statistics, as next to worthless. Therefore this paper points to disease only through mortality.

If we turn to Table A, and regard the position of the months in the several sections, we shall find that while certain of the months are widely distributed through the column, others are arranged more compactly; but in no instance are the six corresponding months of the different years encompassed by one section of the column. If we apply to the several sections (from above downwards) respectively, the names *maximum*, *major*, *minor*, and *minimum* of mortality, and arrange under each title the number of corresponding months found in the section, we shall at once see how many of the years approached to uniformity of mortality, and how many were exceptional.

Month.	Maximum Mortality.	Major Mortality.	Minor Mortality.	Minimum Mortality.
January,	4	1	1	...
February,	3	3	...	...
March,	4	1	1	...
April,	2	2	2	...
May,	...	3	2	1
June,	...	...	4	2
July,	...	1	2	3
August,	...	1	...	5
September,	...	...	1	5
October,	...	...	4	2
November,	1	5	...	...
December,	4	1	1	...
Total,	18	18	18	18

This table shows us the distribution of the months, but not their order as determined by an average of the six years; for this we must look to Table C, and taking from it the means of the several columns, showing the mortality from all causes during the six years, we shall find the order of the months to be as follows:—

	Month.	Death-rate.		Month.	Death-rate.
Maximum,	January,	265·3	Minor,	May,	219·5
	February,	257·4		June	208·6
	March,	249·8		July,	204·5
Major,	December,	247·9	Minimum,	October,	198·2
	April,	242·8		August,	189·4
	November,	237·1		September,	187·7

Mean 225·7

If we revert to the previous table, we find that January, March, and December, have a like distribution over the *maximum*, *major*, and *minor* sections, the determining years being in the *maximum*, and an exceptional year in each of the two following sections, and we might have expected that these months would all have preceded February, which only contributes three years to the maximum section; but in the latter table we find February in its true place, taking precedence of March and December. This arises from the exceptional years of the latter months having a much lower rate of mortality than any of the Februaries. Before proceeding to examine the meteorological data in detail, we have here an opportunity of testing the influence of weather in a general way. If the weather had anything to do with the placing of the exceptional years, we shall expect to find that in the months of January, March, and December, those years which contribute to the major and minor sections will be more temperate than those whose months enter into the maximum section. In the case of November, severity of weather ought to characterise the exceptional year, and there ought, moreover, to be some marked peculiarity in the meteorology of the exceptional August. It will be unnecessary to test the other months at this stage.

We begin with January, and instead of quoting figures, let us take the general remarks contained in the meteorological reports as our guide. The four Januaries of the maximum section are those of 1861, 1862, 1860, and 1857, in the descending order of their mortality; the exceptional January in the major section is that of 1859; that in the minor section, the January of 1858. The relations which the months of the different years bear to each other, will be still better understood in this form :—

Year.	Maximum. Mortality	Major. Mortality	Minor. Mortality	
1861,	304·1	...	...	
1862,	296·6	...	...	
1860,	280·8	...	...	Mean 265·3.
1857,	253·2	...	...	
1859,	...	243·4	...	
1858,	...	...	214·0	

January 1861.—(I quote from the Meteorological Reports) "From these returns we gather that the month of January was still, like so many of the preceding ones, below the average in temperature, though in a less degree; the barometrical pressure was unusually high; but otherwise there are no remarkable differences in the other meteorological elements." Dr STARK says of the same month,—"The intensely cold weather which set in about Christmas, and, after a partial intermission, recurred during the earlier part of January, exhibited the usual effect of low temperature in this country, in largely increasing the number of deaths."

January 1862.—Meteorological Report: "From these returns we gather that

in January 1862 the most remarkable features were the great depth of rain, the large number of rainy days, the large amount of cloud, and the small amount of sunshine,—each of these quantities being more extreme than ever before registered in a January month. The mean temperature was also high, though not to so great a degree." Registrar-General: "January was a comparatively mild month for the season, with a mean temperature rather above the average, an unusual amount of mild south-westerly breezes, a consequently greater fall of rain, and a greater degree of humidity of the atmosphere than is usual during that month. This mild weather was, however, often interrupted by the wind suddenly veering to the north and east, and blowing with a keenness all the more severely felt, and the more detrimental to the health of the people from the previous mildness."

January 1860.—Meteorological Report: "For the month of January we thus find that the mean temperature, though 1°·5 higher than that of the preceding months, is yet 1°·7 less than the average of former Januaries, constituting therefore a particularly severe month, as additionally manifested by the black-bulb temperature by day being 6°·2 less than the average, and by night 3°·3 less,—the hours of sunshine being less, and the amount of cloud rather greater. The mean humidity has also been greater, as well as the amount of rain, with an unusual preponderance of north-east wind." Registrar-General: "The past quarter, coming as it did after the wintry weather which prevailed during November and December, was one of the most severe which has been experienced in this country for at least thirty-four Januaries, if not for a much longer period."

Such are the reports of the weather of those months whose death-rate is above the average of the six Januaries; from this point the weather ought to improve.

January 1857.—Meteorological Report: "January. The weather was as nearly as possible an average in point of severity." Registrar-General: "During January the weather was generally open, though the month began and ended with a snowstorm." This month, although below the average mortality of the six Januaries, still contributes to the maximum section.

January 1859.—Registrar-General: "The weather during the quarter was mild for the season, but stormy and rainy to an extent scarcely remembered to have been equalled within the recollection of the oldest inhabitants. The winds, which, during almost all the quarter, were from the west and south-west, were unusually high, and brought much rain with them." The Meteorological Report is too extensive for quotation; in substance it is the same as the remarks of the Registrar-General. It should be mentioned, however, that whilst there was a remarkable increase of rain in the western counties, there was at the same time a remarkable deficit in the eastern counties.

January 1858—Meteorological Report: As showing the general mildness of the month, it may be mentioned that at Sandwick, wall-flower, stock, carnation, and borage were in flower, so as to yield a bouquet on the 1st of January, while the hepaticas were in flower on the 4th. At Aberdeen, the hazel and snowdrop were in flower on the 25th; and at Banchory House the *Rhododendron ponticum* was in flower on the 29th. The thrush was often heard singing during the month at Scourie, and the lark at Aberdeen." Registrar-General: "The weather during the first two months of the quarter was unusually mild and open; and though the mean temperature was gradually falling during January and February, it was not till the 1st of March that winter, with its frosts and snow, fairly set in over the country."

Thus far, then, whatever we may meet with in detail, we must be impressed with the fact that the general term of a "mild" or "open" January corresponds with a low rate of mortality, a "severe" January with a high rate of mortality.

We next proceed to consider the months of March, and, in order to avoid long quotations, if we find that the exceptional months were "mild," we may assume that the four months of the maximum section were more or less "severe."

Year.	Maximum Mortality.	Major Mortality.	Minor Mortality.	
1860, . . .	283·2	...	...	Mean 249·8.
1858, . . .	257·8	...	...	
1862, . . .	256·7	...	...	
1857, . . .	250·0	...	...	
1859, . . .	...	232·0	...	
1861, . . .	...	...	220·2	

March 1859.—Registrar-General: "This month has therefore been characterised, even more intensely than the last, by an unusual amount of west wind, a low barometer, and, on the western coast, abundant rain and equable temperature. On the eastern coast, the rains have been scanty, but the temperature high."

March 1861.—Registrar-General: "The months of February and March however, have both been above the average temperature; and as this increase of temperature has been attended with a greater fall of rain and a greater amount of humidity than usual, while there has been a diminution in the proportion of cold arid east winds, and a preponderance of high winds from the west and south-west, there has been a free circulation of air, and no such stagnation of the atmosphere as would allow the excessive moisture to become hurtful to the living inhabitants. Hence the mortality of February and March has been below the average of former years; and if the weather continues favourable, as it appears to be giving every indication of doing, the present year may prove, like the census year 1851, a year of low mortality, and of prosperity and heavy crops to the farmer." Here "mildness" characterises also the months of lower mortality.

We may test the months of December in a similar manner by ascertaining the character of the exceptional years.

Year.	Maximum Mortality.	Major Mortality.	Minor Mortality.	
1859, . . .	263·4	...	...	Mean 247·9.
1862, . . .	259·0	...	...	
1860, . . .	257·7	...	...	
1858, . . .	250·0	...	...	
1861, . . .	...	241·4	...	
1857, . . .	...	...	215·7	

December 1861.—Registrar-General: "From the returns it appears that the month of December, in the important feature of mean temperature, has been nearly normal, and thereby between three and four degrees warmer than the two last Decembers."

December 1857.—Registrar-General: "During the quarter the weather was unusually mild,—so much so, indeed, that even sprigs of hawthorn in full blow, and several spring flowers, were gathered at Christmas; and in the north, a second and abundant crop of cranberries was gathered the second week of December."

The months of November present only one exceptional year, and that alone contributes to the maximum section; it will be sufficient to ascertain whether it is remarkable for its "severity."

Year.	Maximum Mortality.	Major Mortality.	
1858, . . .	266·1	...	Mean 237·1.
1859, . . .	...	236·0	
1862, . . .	...	234·7	
1857, . . .	...	231·3	
1860, . . .	...	230·0	
1861, . . .	...	224·5	

November 1858.—Registrar-General: "During November, again, the mean temperature of the month was 2°.2 below the average, and severe, stormy weather, accompanied by keen frost and falls of snow, prevailed during the third week of the month."

We have, however, an anomaly in November 1861, in which, with the lowest death-rate of all the Novembers, we find the following description of the weather:—"Hence it appears that the month of November has been cold, wet, and windy, to an unprecedented degree. The barometer was lower, and more uniformly low than in any month of the last six years. The mean temperature was lower than in any November through the same time." It will be noticed, however, that there is not a great difference in the death-rate between the several years entering into the major section. And, lastly, concerning the months of August. One of these months only presents an exceptional death-rate; it is that of the year 1857. The months of September present also an exceptional month, likewise that of

1857, but not to so great an extent as is witnessed in the case of the aberrant August; and forasmuch as the cause in both instances is obviously identical, it will be sufficient to explain it in reference to August only.

Year.	Major Mortality.	Minor Mortality.	Minimum Mortality.	
1857, ...	224·1	...	...	
1858, ...	...	...	199·5	
1860, ...	...	...	192·4	
1859, ...	...	...	178·7	Mean 189·4
1861, ...	...	...	173·1	
1862, ...	...	...	168·4	

August 1857.—Registrar-General: "The mean temperature in August realised the very unusual height of 60°, and as July also, and the beginning of September, had mean temperatures higher than usual, bowel complaints (diarrhœa, dysentery, and cholera) became so prevalent and fatal, that instead of only 56 dying from these complaints in every hundred thousand persons, as in 1856, no fewer than 112 deaths occurred in a like population in 1857."

We proceed now to consider the influence of the several meteorological phenomena upon the mortality from all causes more in detail, and first we have to consider

The Influence of Temperature upon Deaths from all Causes.

Turning to Table A, we find that although the column of mean temperature does not increase in value so evenly as the column of mortality diminishes in value from above downwards, nevertheless over the whole of the two columns there is a distinctly inverse relationship; and if we compare the means of the four sections previously described, we find that the relationship existing between temperature and deaths from all causes is as follows:—

Mean of	Mortality.	Mean Temperature.
Maximum Section, ...	269·49	38·3
Major Section, ...	233·25	43·1
Minor Section, ...	214·26	49·5
Minimum Section, ...	185·85	54·3
Mean of the 72 Months,	225·71	46·3

To ascertain the difference of influence between a high and low mean temperature, I have constituted, out of the six, three factitious years; for the one, taking all the lowest temperatures of the six corresponding months; for another, the highest temperatures; and for the third, the mean of the six corresponding months. The death-rate of the three may be compared month by month. [Obviously, one disadvantage of such an arrangement is, that by associating the sequent months of different years we at once dissolve the continuity of effect which the weather exercises over mortality. It is important, in estimating the value of weather as an etio-

logical agent at any given time, that at least the character of the weather immediately preceding the period under examination should be ascertained, the influence of sustained heat or cold, for example, as will be shown hereafter, being remarkable. Nevertheless, when the period of comparison extends over an entire month, I think we may safely believe that the fluctuations in the death-rate—in so far as they are dependent upon weather at all—are dependent upon the weather of the particular month in which the deaths are recorded. This is not uniformly so Suppose, for example, that the fourth week of January were intensely cold, and the subsequent month of February comparatively mild, it is quite possible that a large number of deaths, caused by the cold of January, might fall to be registered in February; so that if either of the months were examined separately, an erroneous impression concerning the influence of temperature would result. If the periods of observation had been daily or weekly, I would on no account have separated them, because necessarily the ratio of deaths of one day, or even of one week, must often be, to a certain extent, modified by the weather of the previous days or week; but, I repeat, where each subject of comparison extends over a whole month, errors from such a cause as I have now explained must be very trifling. It is, however, to obviate such errors that I have constructed Table B, in which both the meteorological and necrological data are arranged appositely in the order of the sequence of the months of the several years. This explanation is also offered to objections which may be raised against the order of the months in Table A.] I need not mention the years from which the several months are taken; that will be seen on reference to the larger table:—

	January.		February.		March.		April.		May.		June.	
Months of Lowest Mean Temperature,	35°·5	280·8	34°·0	330·6	37°·8	256·7	41°·3	222·7	49°·1	225·4	52°·4	215·0
„ Highest, „	39·6	243·4	40·5	246·9	43·0	232·0	45·4	223·5	51·9	193·5	58·9	219·3
Mean of the Six Years, . . .	37·4	265·3	38·2	257·4	39·8	249·8	43·2	242·8	50·3	219·5	55·9	208·6

	July.		August.		September.		October.		November.		December.	
Months of Lowest Mean Temperature,	53°·8	192·3	54°·4	192·4	50°·2	182·5	44°·9	205·3	37°·1	234·7	34°·0	263·4
„ Highest, „	59·0	181·3	60·0	224·1	56·1	210·8	49·6	208·0	43·7	231·3	44·9	215·7
Mean of the Six Years, . . .	56·8	204·5	57·2	189·4	52·5	187·7	47·2	198·2	39·5	237·1	38·8	247·9

If this table speak truly, it leads to the conclusion, that for every diminution of mean temperature below 50° there is a corresponding increase of mortality; but that from mean temperatures above 50° a diminution is favourable to vitality, at least if the temperature have been for any length of time above 50°. In other words, mean temperature and mortality from all causes have an inverse relationship below 50°, a direct relationship above 50°. But it must be borne in

mind that the change is gradual: thus, in May, with a temperature of 51°·9 there is a mortality of 193·5, which is still below 225·4, the mortality corresponding with a mean temperature of only 49°·1. But if this be a rule, then the months of April and July are exceptional, the April with a lower mean temperature having also a slightly higher death-rate, the anomaly perhaps depending upon other meteorological elements. The April with the higher mean temperature and the lower death-rate had a mean barometric reading of 29·751, and a rain-fall of 3·20 inches; the other April had a mean barometric reading of 30·177, and a rain-fall of only 1·04 inches,—the one a low atmospheric pressure with a surplus humidity, the other a high rate of atmospheric pressure with a deficit of moisture. If I had selected the April of 1860, whose mean temperature is only 0·2° above the one in the table, namely 41·5°, the rule would have been sustained, the death-rate for that month being 290·2. The July with the lower temperature and lower death-rate had a mean barometric reading below the average of the six years with a rain-fall above it; the July with the higher mean temperature and death-rate had a barometric reading above the average of the six years with a rain-fall below the average. The July of 1857, with a mean temperature only one degree below that in the table, had a death-rate of 210·5.

Monthly Range of Temperature.—The relation of monthly range of temperature to the death-rate from all causes is also shown in Table A, the means of the four sections being as follows:—

Section.	Mortality.	Monthly Range of Temperature.
Maximum, ...	269·49	36·4
Major, ...	233·25	37·2
Minor, ...	214·26	39·6
Minimum, ...	185·85	33·9

If we adopt the same plan as with the mean temperature, constituting out of the six two excessive years, and comparing them with the mean, we have the following results:—

	January.		February.		March.		April.		May.		June.	
Months of greatest Monthly Range,	50°·1	253·2	56°·0	250·1	56°·0	257·8	61°·0	227·1	54°·7	210·4	66°·5	213·3
Months of least, „ „	21·7	296·6	29·0	246·9	27·0	283·2	32·2	290·2	31·2	228·4	27·3	215·0
Means of the Six Years, . . .	34·1	265·3	38·3	257·4	37·3	249·8	41·9	242·8	41·6	219·5	39·5	208·6

	July.		August.		September.		October.		November.		December.	
Months of greatest Monthly Range,	46°·5	210·5	53°·0	224·1	55°·0	194·6	47°·0	208·0	50°·0	231·3	40°·8	257·7
Months of least, „ „	26·2	192·3	25·1	173·1	27·7	165·0	29·6	210·4	26·5	230·0	22·7	259·0
Means of the Six Years, . . .	34·6	204·5	35·7	189·4	37·8	187·7	36·2	198·2	33·9	237·1	32·1	247·9

The two last tables, I think, point to this, that for three quarters of the year the relationship of monthly range of temperature and the death-rate from all causes is inverse—the greater the range the lower the mortality; but that during the months of July, August, and September, the relationship is direct—the greater the range the greater the mortality.

Mean Daily Range of Temperature.—The relationship as shown in Table A. is as follows:—

Section.	Mortality.	Mean of the Daily Ranges.
Maximum, ...	269·49	9·8
Major, ...	233·25	11·6
Minor, ...	214·26	13·0
Minimum, ...	185·85	13·8
Means, . . .	225·71	12·0

The result of constructing two excessive years out of the six is as follows:—

	January.		February.		March.		April.		May.		June.	
Months of greatest Mean Daily Range,	9°6	243·4	10°8	250·1	11°9	257·8	15°3	227·1	19°7	193·5	17°2	213·3
Months of least „ „	7·1	296·6	8·6	251·3	9·3	256·7	12·0	243·6	14·1	228·4	12·6	215·0
Means of the Six Years, . .	8·4	265·3	10·0	257·4	10·7	249·8	13·9	242·8	15·6	219·5	14·9	208·6

	July.		August.		September.		October.		November.		December.	
Months of greatest Mean Daily Range,	14°7	224·0	16°0	199·5	14°6	194·6	12°7	204·4	11°0	234·7	9°5	241·4
Months of least „ „	13·1	192·3	11·0	173·1	11·0	165·0	10·9	210·4	8·1	230·0	8·1	257·7
Means of the Six Years, . .	14·0	204·5	13·5	189·4	13·3	187·7	11·8	198·2	9·9	237·1	8·6	247·9

These tables indicate a similar relationship between mortality from all causes and the mean daily range of temperature as was noticed with respect to the monthly range of temperature, namely for three quarters of the years an inverse relationship, the greater the daily range the less the death-rate, but during the months of July, August, and September, a direct relationship, the greater the daily range of temperature the greater the mortality. It will be noticed in the latter table that March and November do not quite conform.

The Combined Influence of Temperature and Humidity.

It is difficult to obtain data for this inquiry, there being few months which, with equal mean temperatures, show at the same time a marked contrast in their hygrometric condition. I have, however, endeavoured in the following table to show the relative effect upon the death-rate of a dry and humid cold:—

Months.	Mean of the Six Years.				Dry Cold.				Humid Cold.			
	Mean Temp.	Rain-fall.	Humi-dity.	Mor-tality.	Mean. Temp.	Rain-fall.	Humi-dity.	Mor-tality.	Mean Temp.	Rain-fall.	Humi-dity.	Mor-tality.
January, . . .	37·4	3·82	88	265·3	35·7	2·77	87	253·2	35·5	4·56	89	280·8
					39·3	2·98	86	214·0	39·6	4·21	87	243·4
February, . . .	38·2	2·32	87	257·4	39·3	1·54	89	250·1	39·5	3·32	88	228·1
					40·1	1·88	89	251·3	40·5	3·38	88	246·9
March, ...	39·8	3·55	86	249·8	38·4	3·52	86	283·2	37·8	3·63	88	256·7
					39·5	1·95	85	257·8	39·2	2·94	86	250·0
April, ...	43·2	2·11	82	242·8	41·5	1·18	82	290·2	41·3	3·20	80	222·7
					43·8	1·86	78	227·1	44·6	2·99	83	250·0
Means, . .	39·7	2·95	86	253·8	39·7	2·21	85·2	253·4	39·7	3·53	86·1	247·3

In this table there is a tendency to support the general belief that a *dry* cold is more fatal than a *humid* cold; the four Januaries, it will be seen, oppose the idea of such a law, the greater death-rate being with the two humid months; two of the Aprils also conflict with the generally accepted law, the humid month, even with a rather higher mean temperature, having the greater mortality. In the months of March, and again in one of the comparisons of the months of April, it will be noticed, that whilst the order of the months is correct as to the amount of moisture indicated by the rain-fall in inches, nevertheless, if the humidity as deduced by Mr Glaisher's tables had been strictly taken as the test, the order ought to have been reversed. But it often happens that, as in the instances above referred to, whilst the amount of rain which may have fallen during a month may be higher than the mean of the six corresponding months, nevertheless, the amount of moisture in the atmosphere, as exhibited by a reference to Mr Glaisher's tables, may be below the average humidity of the six corresponding months. It behoves us, then, to compare both of these indices to the amount of moisture in the atmosphere with the temperatures below the means of the six corresponding months separately, and this is done in the following tables:—

Months in which both the Mean Temperature and the Rainfall are below the Mean of the Six corresponding Months.

		Mortality.
January	1857, ...	253·2
,,	1861, ...	304·1
February	1858, ...	237·7
March	1857, ...	250·0
,,	1858, ...	257·8
,,	1860, ...	283·2
April	1860, ...	290·2
	Mean, . .	268·0

Months in which the Mean Temperature is below, but the Rainfall above the Mean of the Six corresponding Months.

		Mortality.
January	1860, ...	280·8
February	1860, ...	330·6
March	1862, ...	256·7
April	1857, ...	243·6
April	1859, ...	222·7
...	...	...
...	...	...
	Mean, . .	266·9

Months in which both the Mean Temperature and Humidity are below the Mean of the Six corresponding Months.		Mortality.
January	1857,	253·2
February	1858,	237·7
,,	1860,	330·6
March	1858,	257·8
April	1859,	222·7
	Mean,	260·4

Months in which the Mean Temperature is below but the Humidity above the Mean of the Six corresponding Months.		Mortality.
January	1860,	280·8
,,	1861,	304·1
March	1862,	256·7
April	1857,	243·6
,,	1860,	290·2
	Mean,	275·1

Here, then, we have conflicting results. Following the rain-fall as our guide to the hygrometric condition of the atmosphere, we conclude that a dry atmosphere promotes mortality; if we refer the humidity present in the atmosphere to the standard calculated by Mr Glaisher, we are forced to an opposite opinion. Let these results be estimated only at their true value; the data are too few to render them of very great importance, but they may serve for comparison with other investigations. It must be remembered, however, that it is the temperature that binds me down to so few data. I shall have occasion hereafter to inquire into the value of the relative quantity of moisture in the atmosphere separately.

Before passing from the consideration of the influence of temperature upon mortality from all causes, there is one other important feature which ought to be mentioned,—namely, the aggravating influence of continued cold. The growing mortality consequent upon a continued low temperature is seen in the following table, where it is contrasted with the means of the mean temperature and mortality of the six corresponding months:—

	November.	December.	January.	February.	March.	
Year 1860,	39°·1	34°·1	35°·5	34°·0	38°·4	Mean Temp.
	230°·0	257°·7	280°·8	330°·6	283°·2	Mortality.
Average of the Six corresponding Months,	237°·1	247°·9	265°·3	257°·4	249°·8	Mortality.
	39°·5	38°·8	37°·4	38°·2	39°·8	Mean Temp.

In like manner the evil effects of a continued high temperature may be seen in the following table, in which the mean temperature and mortality of the warmer months of 1857 are contrasted with those of the averages of the six corresponding months of the years 1857-62 inclusive:—

	June.	July.	August.	September.	October.	
Year 1857,	57°·4	58°·0	60°·0	56°·1	49°·6	Mean Temp.
	213°·3	210°·5	224°·1	210°·8	208°·0	Mortality.
Average of the Six corresponding Months,	208°·6	204°·5	189°·4	187°·7	198°·2	Mortality.
	55°·9	56°·8	57°·3	52°·5	47°·2	Mean Temp.

The Influence of Vicissitudes of Atmospheric Pressure.

When we notice that the average monthly range of the barometer for the six years under examination is not more than 1·262 inches, it behoves us to remember how much is implied in the oscillation of the barometer even to the extent only

of a single line. It indicates either a vast increase or diminution of pressure upon every point of surface of the body,—a pressure which normally is equal to that of fifteen pounds of dead weight to the square inch, and yet, a pressure so wonderfully adapted to our necessities that we are unconscious of its presence. So that, although in dealing with this part of the inquiry we are confined, with very few exceptions, to movements within the thirtieth inch of the barometric scale, we are not to suppose that such limited movements are of trifling, but that they are of all-important value.

Mean Height of Barometer reduced to Sea-level and 32° F.

A comparison of the means of the four sections in Table C, between the mean height of the barometer and the mortality from all causes, leaves us in uncertainty as to the relations which these circumstances bear to each other. It is indicated in the following table:—

Section.	Mortality from all Causes.	Mean Height of Barometer.
Maximum Section, ...	269·49	29·800
Major Section, ...	233·25	29·868
Minor Section, ...	214·26	29·862
Minimum Section, ...	185·85	29·842
Mean, ...	225·71	29·843

The mean height of the barometer for the whole of each of the six years, as compared with the mortality for the corresponding periods, is shown as follows:—

Year.	Average Monthly Mortality from all Causes.	Mean Height of Barometer.
1860, ...	244·2	29·785
1862, ...	229·2	29·812
1857, ...	227·5	29·893
1858, ...	225·5	29·916
1861, ...	214·9	29·838
1859, ...	212·7	29·817
Means, . . .	225·7	29·843

In both of these tables the lowest reading of the barometer corresponds with the highest death-rate. In both, the two lowest readings of the barometer correspond respectively with the highest and lowest death rates, with a minute fractional difference in the latter table, the second lowest reading being that of the mean of 1862. In the latter table the highest barometric reading corresponds with the mean of the mortality; in the former, the highest barometric reading stands opposite a much higher death-rate. The only point of resemblance between the two being that first mentioned, indicating a maximum of deaths with a minimum of atmospheric pressure. But we must not remain satisfied with the value of this indication alone.

In the next table we have three factitious years constituted,—the first, by those of the several corresponding months which possess the highest barometric readings; the second, by those which exhibit the lowest barometric readings; and the third, by the means of the six corresponding months:—

Months.	Highest Barometer.	Lowest Barometer.	Mean Barometer.	Mortality with Highest.	Mortality with Lowest.	Mean Mortality.
January, ...	30·065	29·529	29·813	214·0	280·8	265·3
February, ...	30·052	29·681	29·869	251·3	228·1	257·4
March, ...	29·852	29·507	29·701	257·8	220·2	249·8
April, ...	30·177	29·751	29·916	223·5	222·7	242·8
May, ...	30·070	29·810	29·923	225·4	228·4	219·5
June, ...	30·032	29·674	29·892	219·3	219·1	208·6
July, ...	30·050	29·735	29·851	181·3	192·3	204·5
August, ...	30·014	29·575	29·840	224·1	192·4	189·4
September, . . .	29·979	29·722	29·845	195·9	177·7	187·7
October, ...	29·936	29·620	29·784	173·1	204·4	198·2
November, . . .	30·115	29·855	29·881	231·3	236·0	237·1
December, ...	30·020	29·651	29·806	241·4	263·4	247·9
Means, ...	30·030	29·676	29·843	219·9	222·1	225·7

In this table there is evidently a good deal of conflict; but upon the whole year it corroborates the indications of the preceding tables, inasmuch as the average mortality with a low barometer is higher than that with a high barometer. But it is curious to observe that the average barometric reading of the whole term of seventy-two months corresponds with a higher necrological reading than either the absolute highest or the absolute lowest readings of the barometer, as is more distinctly seen thus:—

Mean of the Absolute Highest Barometric Readings,	30·030	Mortality,	219·9
,, Lowest ,,	29·676	,,	222·1
Mean of the whole Term of 72 Months, ...	29·843	,,	225·7

This, then, would indicate that high and low barometric readings are both more conducive to vitality than a medium reading; and, moreover, it serves to deepen the impression that a low barometer is more fatal than a high reading; because, although 29·843 is the exact mean of the whole term of seventy-two months, nevertheless it approximates nearer to the mean of the absolute lowest than to the mean of the absolute highest, for $30{\cdot}030 + 29{\cdot}676 \div 2 = 29{\cdot}853$.

In order to ascertain whether any month or season would give a stronger indication of the influence of atmospheric pressure upon the death-rate than is shown by the mere absolute highest and lowest barometric readings, and also whether season has any modifying power over such influence, I have classified as many of the corresponding months into separate groups as would in any way contrast, touching the circumstance of atmospheric pressure:—

Year.		Barometer above Mean of Six corresponding Months.	Mortality.	Year.	Barometer below Mean of Six corresponding Months.	Mortality.
January,	1858	30·065	214·0	1857	29·698	253·2
	1859	29·864	243·4	1860	29·529	280·8
	1861	30·038	304·1	1862	29·686	296·6
	Average mortality,		253·8			276·9
February,	1858	29·998	237·7	1857	29·840	250·1
	1860	29·932	330·6	1859	29·709	246·9
	1862	30·052	251·3	1861	29·681	228·1
	Average mortality,		273·2			241·7
March,	1857	29·804	250·0	1860	29·639	283·2
	1858	29·852	257·8	1861	29·507	220·2
	1859	29·707	232·0	1862	29·698	256·7
	Average mortality,		246·6			253·3
April,	1858	29·942	227·1	1857	29·767	243·6
	1860	29·978	290·2	1859	29·751	222·7
	1861	30·177	223·5	1862	29·881	250·0
	Average mortality,		246·9			238·8
May,	1857	29·959	219·3	1858	29·823	210·4
	1859	30·046	193·5	1860	29·831	240·0
	1861	30·070	225·4	1862	29·810	228·4
	Average mortality,		212·7			226·3
June,	1357	30·020	213·3	1860	29·674	219·1
	1858	30·032	219·3	1862	29·733	215·0
	1859	29·934	188·6	...	...	...
	1861	29·961	196·4	...	...	...
	Average mortality,		204·4			217·0
July,	1858	29·887	224·0	1857	29·832	210·5
	1859	30·050	181·3	1861	29·619	204·4
	1860	29·988	214·8	1862	29·735	192·3
	Average mortality,		206·7			202·4
August,	1857	30·014	224·1	1860	29·575	192·4
	1858	29·943	199·5	1861	29·774	173·1
	1859	29·850	178·7	...	...	...
	1862	29·885	168·4	...	...	...
	Average mortality,		192·7			182·7
September,	1857	29·882	210·8	1859	29·722	177·7
	1858	29·898	194·6	1861	29·723	165·0
	1860	29·868	182·5	...	...	...
	1862	29·979	195·9	...	...	...
	Average mortality,		195·9			171·3

Year.		Barometer above Mean of Six corresponding Months.	Mortality.	Year.	Barometer below Mean of Six corresponding Months.	Mortality.
October,	1857	29·803	208·0	1859	29·667	188·0
	1858	29·892	205·3	1860	29·784	210·4
	1861	29·936	173·1	1862	29·620	204·4
	Average mortality,		195·5			200·9
November,	1857	30·115	231·3	1859	29·855	236·0
	1858	29·956	266·1	1861	29·544	224·5
	1860	29·919	230·0	...	...	...
	1862	29·897	234·7	...	...	...
	Average mortality,		240·5			230·2
December,	1857	29·989	215·7	1858	29·703	250·0
	1861	30·020	241·4	1859	29·651	263·4
	...	...	...	1860	29·709	257·7
	...	...	...	1862	29·767	259·0
	Average mortality,		228·5			257 5

Therefore, of the averages of the twelve months, six give a higher death-rate with a barometric reading above the average of the several years for those months, and on the other hand, six present a higher death-rate with the barometer below the average. It is more distinctly seen thus:—

Months which give a High Death-rate with a High Barometer.		Months which give a High Death-rate with a Low Barometer.	
February,	273·2	January,	276·9
April,	246·9	March,	253·3
July,	206·7	May,	226·3
August,	192·7	June,	217·0
September,	195·9	October,	200·9
November,	240·5	December,	257·5
Mean of Mortality,	225·99	Mean of Mortality,	238·65

Here again, then, it is plain that the accumulated mortality of those months in which there is a high death-rate with a low state of the barometer, is greater than the accumulated mortality of those months in which the death-rate and barometric reading are both above the average. It is noticeable that the average death-rate of those months in which there is a direct relationship between the barometer and the mortality, corresponds exactly with the mean death-rate of the whole term of six years, whilst the average death-rate of the months in which the relationship between the barometric reading and the mortality is inverse, is much higher.

Now, if I take the mean of the averages of all the months with a barometric reading above the mean of the six corresponding months, and the mean of the averages of all the months with a barometric reading below the mean of the six corresponding months, the result is the same, though not, of course, so distinctly shown:—

	Jan.	Feb.	March.	April.	May.	June.	Means.
Average mortality of the months with a mean height of barometer above the mean of the six corresponding months, ...	253·8	273·2	246·6	246·9	212·7	204·4	
Average mortality of the months with a mean height of barometer below the mean of the six corresponding months, ...	276·9	241·7	253·3	238·8	226·3	217·0	

	July.	August.	Sept.	Oct.	Nov.	Dec.	
Average mortality of the months with a mean height of barometer above the mean of the six corresponding months, ...	206·7	192·7	195·9	195·5	240·5	228·5	224·8
Average mortality of the months with a mean height of barometer below the mean of the six corresponding months, ...	202·4	182·7	171·3	200·9	230·2	257·5	225·0

Again: the mean height of the barometer for the whole period of six years is 29·843. Now, if I take this reading as a standard of reference, I find that of the seventy-two months thirty-eight afford a higher, and thirty-four a lower mean reading, and the result, in regard to the ratio of mortality from all causes, is the same as was observable when I employed the means of the corresponding months as standards of reference; namely, that the mortality is greatest with a low reading of the barometer: or more clearly thus:—

Average mortality of thirty-four months, in which the mean height of the barometer for each month was *below* 29·843, ...	228·14
Average mortality of thirty-eight months, in which the mean height of the barometer for each month was *above* 29·843, ...	223·52
Excess of mortality with a low barometer,	4·62

Again: if I arrange the months in seasons, representing winter by the months December, January, and February, and the other seasons accordingly, I find that of the eighteen winter months, the mean height of the barometer in *ten* was below, and in *eight* above 29·843: of the eighteen spring months the mean height of the barometer in *ten* was below, and in *eight* above 29·843: of the eighteen

summer months, the mean height of the barometer in *seven* was below, and in *eleven* above 29·843; and of the eighteen autumn months, the mean height of the barometer in *seven* was below, and in *eleven* above 29·843. The average mortality of these several groups of months is seen thus:—

WINTER.

Average mortality of ten winter months, each with a mean height of barometer				*below* 29·843,	258·6
,,	,,	eight	,,	,, *above* ...	254·8
				Excess of mortality with low barometer,	3·8

SPRING.

,,	,,	ten spring months, each with a mean height of barometer		*below* 29·843,	238·7
,,	,,	eight	,,	,, *above* ...	235·8
				Excess of mortality with low barometer,	2·9

SUMMER.

,,	,,	seven summer months, each with a mean height of bar.		*below* 29·843,	200·97
,,	,,	eleven	,,	,, *above* ...	200·76
				Excess of mortality with low barometer,	0·21

AUTUMN.

,,	,,	eleven autumn months, each with a mean height of bar.		*above* 29·843,	214·5
,,	,,	seven	,,	,, *below* ...	197·0
				Excess of mortality with *high* barometer,	17·5

It would seem, then, that over the whole year, and in the seasons of winter, spring, and summer, the relationship between the mean monthly height of the barometer and the death-rate is *inverse;* but that in autumn it is *direct.* And I think that, although it is not a law without exceptions, there is an indication of a law, if the data be sufficient to determine it, of an increased mortality with a *low* barometer. But I must speak guardedly on this point, because the result of the inquiry differs from those obtained by many acute investigators; and I think it right to mention particularly that it is opposed to the opinion of talented investigators who have made similar observations in Berlin, Dresden, and Paris. And I may mention, moreover, that the results which are shown with reference to the influence of drought and humidity upon the death-rate from all causes are also opposed to those obtained by some of the same observers. At the close of the paper I shall present the principal data in a different form, in order to test still more rigidly the accuracy of these inductions.

The Range of the Barometer.—Intimately associated with the previous inquiry concerning the influence of the monthly mean height of the barometer upon the mortality, is that of the influence of the monthly range of the barometer. Referring to Table C, we find the following relations exhibited between the two in the several sections:—

Section.	Mortality.	Monthly Range of Barometer.
Maximum Section, ...	269·49	1·564
Major Section, ...	233·25	1·363
Minor Section, ...	214·26	1·163
Minimum Section, ...	185·85	0·961
Means, .	225·71	1·262

The following table is composed of three factitious years, constituted severally of months in which the monthly range of the barometer was greater than in any of the corresponding months, of months in which the range was less than in any other of the corresponding months, and of the mean monthly range of the six corresponding months of the different years.

Months.	Greatest Barometric Range.	Least Barometric Range.	Mean Barometric Range.	Mortality with High Range.	Mortality with Low Range.	Mean Mortality of the Six corresponding Months.
January, . . .	1·855	1·026	1·486	243·4	304·1	265·3
February, . . .	2·079	1·289	1·540	330·6	250·1	257·4
March, ...	2·021	1·270	1·593	250·0	232·0	249·8
April, ...	1·860	0·734	1·277	290·2	223·5	242·8
May, ...	1·339	0·498	0·956	210·4	193·5	219·5
June, ...	1·102	0·652	0·877	219·1	188·6	208·6
July, ...	1·083	0·745	0·865	181·3	214·8	204·5
August, . . .	1·167	0·661	0·942	178·7	224·1	189·4
September, . . .	1·172	0·993	1·082	165·0	195·9	187·7
October, . . .	1·872	1·201	1·417	204·4	173·1	198·2
November, . .	2·129	1·295	1·695	236·0	224·5	237·1
December, . . .	1·853	1·204	1·429	263·4	259·0	247·9
Means, . . .	1·627	0·964	1·263	231·04	223·60	225·68

Both of these tables direct us to the conclusion that the mortality from all causes bears a direct relation to the range of the barometer: the greater the range of the barometer the greater the death-rate, and *vice versa*. And this is another item in favour of the supposition that the mortality from all causes is greater with a low than with a high barometer, because the greatest range of the barometer is exhibited when the mean reading of the instrument is low. In the latter table four months oppose what has now been stated respecting the influence of the barometric range; they are January, July, August, and September;

and this they do whether the results of the highest and lowest ranges only be compared, or a comparison of all the six corresponding months in each case be instituted.

The Influence of Drought and Humidity.

We have already seen that, with reference to mean temperature, the relative amount of humidity in the atmosphere is important. We are now briefly to examine into the influence which the various hygrometric conditions of the atmosphere exert upon mortality from all causes independent of other meteorological elements. It should always be remembered, however, that the amount of moisture necessary to the saturation of a given quantity of air varies with temperature,—the warmer the atmosphere the greater the quantity of moisture requisite to saturate it, and *vice versa*. We may test the influence of the relative amount of moisture upon mortality from three points: *first*, with reference to the number of rainy days; *second*, with reference to the quantity of the rainfall in inches; and, *third*, with respect to the relative saturation of the atmosphere with moisture, as ascertained by means of Mr Glaisher's hygrometric Tables.

Number of Rainy Days.—A rainy day, it may be premised, does not necessarily mean one on which rain continued to fall throughout, nor even during many hours; a shower of rain is sufficient to constitute a rainy day. Nor has the term any reference to the amount of rain deposited in a given time; very little or very much rain may fall on a rainy day. Hence, we often find, that with ten rainy days in one month, there is a greater rainfall than in fifteen rainy days of another month.

In the several sections of Table C, the relative number of rainy days to the mortality from all causes is as follows:—

Section.	Mortality.	Number of Rainy Days.
Maximum Section, ...	269·49	15·1
Major Section, ...	233·25	13·7
Minor Section, ...	214·26	15·4
Minimum Section, ...	185·85	15·3
Means, ...	225·71	14·9

A Table consisting of three factitious years, constituted of months with the greatest number of, and months with the fewest rainy days, together with the means of all the corresponding months, shows the following result. Where two months are alike in the number of rainy days, the one in which most or least rain fell is taken:—

ERRATUM.

I regret that, owing to the circumstances under which the last of the Meteorological data were obtained, an error has crept into one of the tables, and from the table, somewhat into the text also. The Meteorological data for the quarter ending December 1862 were obtained from the Observatory, on slips of paper, from time to time, as they were reduced. I was obliged in this way to anticipate their publication, as the time for reading my paper was fixed for the 2d of February. Unfortunately, in constructing Table B, the slip of paper with the figures representing *the number of rainy days*, *the rainfall in inches*, and *the direction and force of the winds* for November 1862, was employed in the October column, the figures which ought to have been there finding their way into the November column. This error in Table B still exists.

The errors in the smaller tables of the text, arising from this transposition, are not of serious import; and indeed, if they had not occurred, the inferences drawn from the tables would generally have been only more apparent. The errors do not exist in Tables A and C, nor in the Diagrams; and in order to correct the errors of the smaller tables, it is only necessary to test the accuracy of the figures, by reference to one of the latter tables, in the few instances in which the rainfall and winds of October and November 1862 are quoted as illustrations.

	January.		February.		March.		April.		May.		June.	
Months with Most Rainy Days, . .	21	296·6	17	246·9	22	220·2	16	243·6	16	228·4	20	215·0
Months with Fewest Rainy Days, .	14	214·0	6	237·7	11	232·0	9	223·5	13	219·3	11	188·6
Means of the Six Corresponding Months,	16·6	265·3	12·1	257·4	16·1	249·8	12·2	242·8	13·0	219·5	13·8	208·6

	July.		August.		September.		October.		November.		December.	
Months with Most Rainy Days, . .	22	192·3	22	173·1	19	165·0	22	210·4	19	224·5	21	259·0
Months with Fewest Rainy Days, .	11	214·8	10	224·1	13	195·9	10	204·4	10	266·1	13	241·4
Means of the Six Corresponding Months,	16·5	204·5	16·0	189·4	15·3	187·7	15·7	198·2	15·2	237·1	16·2	247·9

In this Table the general indication is, that the mortality is greatest in those months which have the greatest number of rainy days. There are certain exceptions. March is the first month in which the general order is reversed, and in which, therefore, there is the highest mortality with the fewest rainy days. But if, instead of comparing only the months of the absolute highest and absolute lowest number of rainy days, we compare the four months which are below the mean of the six with the two that are above the mean, we find that the general rule holds good,—those months with the highest number of rainy days giving the average mortality 251·7, whilst those months with the fewest rainy days give an average mortality of only 249·1. The same may be said of July, where the average mortality of the three months with the greater number of rainy days is 206·9, whilst the average death-rate of the months with the fewest rainy days is only 202·2. The months of August, September, and November, which, in the above Table, oppose the general indication, continue so to do even when all the months are compared. Thus, the average mortality of the Augusts with most rainy days is only 177·9, whilst the average of those with the fewest rainy days is 200·7. Of September, in the same order, the proportion is 171·3 (most) to 195·9 (fewest). Of November, 229·7 (most) to 244·4 (fewest).

Quantity of Rain in Inches.

Table C. shows the following results:—

Section.	Mortality.	Rain in Inches.
Maximum Section, ...	269·49	3·18
Major Section, ...	233·25	3·06
Minor Section, ...	214·26	3·27
Minimum Section, ...	185·85	3·18
Means, ...	225·71	3·17

With the factitious years constituted as in the previous case, we have the following results:—

Months.	Most Rain.	Least Rain.	Mean Rainfall of the Six Corresponding Months.	Mortality with Most Rain.	Mortality with Least Rain.	Mean Mortality of the Six Months.
January, . .	5·32	2·77	3·82	296·6	253·2	265·3
February, . .	3·38	1·13	2·32	246·9	237·7	257·4
March, . . .	5·10	1·95	3·55	220·2	257·8	249·8
April, . . .	3·20	1·04	2·11	222·7	223·5	242·8
May, . . .	3·89	0·29	2·07	228·4	193·5	219·5
June, . . .	4·34	2·04	2·98	219·1	188·6	208·6
July, . . .	4·31	1·82	3·14	224·0	214·8	204·5
August, . .	6·44	2·27	3·39	173·1	178·7	189·4
September, . .	5·27	1·92	3·24	165·0	182·5	187·7
October, . .	5·14	2·36	4·41	210·4	208·0	198·2
November, .	6·63	2·38	3·37	224·5	266·1	237·1
December, . .	5·20	2·98	3·85	259·0	241·4	247·9
Means, .	5·82	1·91	3·18	224·16	220·49	225·7

In the latter Table we see the same indication of a tendency to increase of mortality with increase of rainfall, the exceptional months being, as in the case of the number of rainy days, March, July, August, September, and November, but in this case April also slightly opposes the general indication. It is observable that, in both instances, whether with an excess or deficit of the rainfall, the mortality is below that of the average of the six corresponding months taken over the whole year. Now, if instead of being content with the indications as given by a comparison of the month of absolute highest with the month of absolute lowest rainfall, we compare all the months which have a rainfall above the average rainfall of each group of corresponding months, with all the months which have a rainfall below the mean of the six corresponding months, we obtain the following result:—

	Average Mortality of those Months which have a Rainfall greater than the Mean of the Six corresponding Months.	Average Mortality of those Months which have a Rainfall less than the Mean of the Six corresponding Months.
January, ...	273·60	257·10
February, ...	268·53	246·36
March, ...	236·30	263·66 +
April, ...	238·76	246·93 +
May, ...	226·26	212·73
June, ...	217·05	204·40
July, ...	206·90	202·20
August, ...	184·75	198·60 +
September, ...	184·50	191·00 +
October, ...	201·23	195·16
November, ...	231·72	242·46 +
December, ...	255·56	240·16
Means, .	227·09	225·06

This Table still leads us to the same opinion,—namely, that the relationship existing between the amount of rainfall and the mortality from all causes is direct over the whole year, although it may be inverse as regards those months which in the latter Table are distinguished by the sign +.

Humidity.—It remains to be seen what may be the character of the relationship between the death-rate from all causes and the amount of moisture in the atmosphere, as indicated by the *humidity* column. The sections of Table C give us, with respect to humidity, the following results:—

Sections.	Mortality.	Humidity (Sat. = 100).
Maximum Section,	269·49	87
Major Section,	233·25	86
Minor Section,	214·26	84
Minimum Section,	185·85	84
Means,	225·71	85

In the foregoing Table we have an indication of a direct relationship between its two elements,—the greater the humidity the greater the mortality, although in the minor and minimum sections the figures representing the average amount of moisture are identical. In the following Table I have taken the average mortality of those of the six corresponding months whose humidity is above the mean of the six, and the average mortality of those months whose humidity is below the mean of the six. The results are seen thus:—

Average Mortality of those Months which have a Humidity above the Means of the Six corresponding Months.		Average Mortality of those Months which have a Humidity below the Means of the Six corresponding Months.		
January, (Aver. Mean Temp. 36°·73)	236·86	January, (Aver. Mean Temp. 38°·20)	293·86	+
February, („ „ 39°·85)	244·10	February, („ „ 34°·90)	284·15	+
March,	+ 253·36	March,	246·60	
April,	+ 251·82	April,	224·90	
May,	+ 224·70	May,	193·50	
June,	+ 210·16	June,	207·06	
July,	+ 208·87	July,	195·90	
August,	+ 189·50	August,	189·10	
September,	+ 188·55	September,	186·15	
October, (Aver. Mean Temp. 48°·30)	189·70	October, (Aver. Mean Temp. 46°·00)	206·70	+
November, „ „ 39°·97)	232·00	November, („ „ 39°·10)	242·20	+
December,	+ 249·70	December,	246·03	
Mean,	223·28	Mean,	226·346	

Here, for the first time, we meet with an indication of a dry air, irrespective of temperature, being more fatal than a humid atmosphere. Nevertheless, eight of the months tend to a conclusion in conformity with that which the former Tables have suggested, four of the months only conducing to an opposite opinion. If we seek an explanation in the mean temperature of the several months which determine the result of the latter table, we find that, with the exception of

January, the average mean temperature of those months which show an increased mortality with deficient moisture is below the average mean temperature of the corresponding months whose humidity was greater. If this be worth anything, it tends to corroborate a previous suggestion that *dry cold* is more fatal than humid cold.

On the Influence of certain Winds.

We have no winds in this country which bear comparison, in point of intensity, with such as are the bane of other lands. Of Siroccos, Harmattans, Simooms, Samiels, Khamsins, or Solanos, we have none. But we have an east wind; and although it is by no means the prevalent wind of the country, nevertheless, from its harshness, and from its evil influence upon certain classes of disease, it has acquired a just notoriety.

Table C. furnishes us with the following comparisons. The figures represent the average number of days on which the different winds blew.

Section.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm or Variable.	Mortality.
Maximum, .	2·91	2·22	3·00	3·36	3·09	5·67	5·13	3·22	1·90	269·49
Major, . . .	2·15	2·00	3·17	3·14	2·80	5·97	5·44	2·86	2·58	233·25
Minor, . . .	1·90	2·02	3·03	2·62	2·86	6·72	6·22	3·08	2·12	214·26
Minimum, .	1·58	1·72	3·00	2·88	3·28	6·57	6·33	2·64	2·58	185·85
Means, . .	2·13	1·99	3·05	3·00	3·01	6·23	5·78	2·95	2·29	225·71

In the foregoing Table we have a general indication of a direct relationship between mortality from all causes and winds from a point between N. and E., and of an inverse relationship between mortality from all causes and winds from a point between S. and W. The due E. wind shows little or no predominance in any one section more than another. The S.E. wind shows a tendency to blow directly as the mortality, but not uniformly through all the four sections. The due S. wind, with the exception of the first section, blows inversely as the mortality. The N.W. wind affords no determinate relationship. With respect to the number of calm days, or days on which the wind was so light and changeable as to afford no fixed direction, all that can be said is, that there are fewest of such days in the maximum section.

As it would require too much space to compare the relative frequency of the different winds with the death-rate month by month, it must suffice to do so year by year. This is done in the following Table, in which the average mortality of the years with the greatest number of days of each wind is compared with the average mortality of the years with the fewest days of each wind :—

	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	C. or V.
Average Mortality of the Years in which the number of days of each Wind was above the Mean of the Six, ...	229·5	235·8	235·8	233·0	222·0	220·1	218·9	227·4	221·9
Average Mortality of the Years in which the number of days of each Wind was below the Mean of the Six, ...	223·7	220·6	220·6	218·3	227·4	236·7	232·4	223·8	229·4

If this be a true guide to the relationship existing between the prevalence of certain winds and mortality from all causes, then it is manifest that all winds between N.W. and S.E. (north about) are directly related to the death-rate, whilst those winds blowing from points between S.E. and W. (south about) have an inverse relationship. It would seem, moreover, that calms, or light shifting winds, are less frequent when the mortality is high than when it is low.

Force of Winds.—There is nothing in Table A. to lead us to a decision as to the influence of the relative force of wind upon mortality from all causes. The force is there given in lbs., and, according to the several sections, stands related to the death-rate in the following manner :—

Section.	Mortality.	Force of Wind in lbs.
Maximum, ...	269·49	1·654
Major, ...	233·25	1·630
Minor, ...	214·26	1·737
Minimum, ...	185·85	1·346
Means, ...	225·71	1·592

Two factitious years, constituted of the months which show the greatest wind force of the six, and those which show the least, respectively, afford the following comparison :—

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Mortality of each Month of the Greatest Wind Force, ...	243·4	330·6	232·0	222·7	219·3	215·0	192·3	173·1	177·7	210·4	224·5	215·7
Do. do. Least do.	253·2	251·3	256·7	223·5	193·5	196·4	214·8	168·4	195·9	204·4	230·0	241·4

From this table it is evident, that our data do not furnish us with determinate information regarding the influence of the pressure of the wind upon mortality. There can be no doubt, however, and perhaps, if the data prove anything at all, they prove this, that whatever be the exact pressure of the wind, it acts in a two-fold manner upon the death-rate, each separate influence compensating the other. If we have high winds, and stormy weather on that account, the death-rate will be increased not only by the fatal exhaustion caused to debilitated persons, but also by the casualties which invariably occur both afloat and on shore during gales of wind. On the other hand, when the pressure of wind is low, the atmosphere is stagnant, becomes loaded in many localities with pestilent effluvia, and sickness, usually of the zymotic class, prevails. A breeze of wind on land sweeps

out the hotbeds of disease, clearing them of the products of animal and vegetable putrefaction, and rendering them wholesome habitations for the human family; just as in another sphere of usefulness it turns up the surface of the wide ocean, preserving its waters from corruption, and imparting the very essence of life to its creatures.

Recapitulation.

Such is a brief sketch of the first part of the subject which at the outset I proposed to lay before the Society. I have before said, that this is by no means intended to be an exhaustive treatise, and I repeat that I have not even exhausted all the information which the tables and diagrams are capable of affording. In both there is still abundance of materials for further research, even concerning the influence of weather upon mortality from all causes of which alone I am now speaking, which may be thrown into a variety of shapes for the purpose of elucidating peculiar theories. I have done nothing more than examine the leading characteristics of the subject; and that without endeavouring either to propound or substantiate any theory whatever. I am neither disappointed that my results do not always coincide with those obtained by other investigators of cognate subjects, nor am I gratified with the idea of raising opposite views. In some points, the results of my inquiries harmonise with those of several observers in other countries, while in some they are diametrically opposed; but this does not at all imply a want of accuracy, either on their part or mine; it is quite competent for the results to differ, and yet each be right regarding the particular locality to which he refers. I have endeavoured to treat the investigation in the simplest manner, by merely putting questions to the collected facts, and leaving them to supply the answers; and in the present recapitulation I would have it distinctly understood, that I do not assert that these statements inviolably express the influence of weather upon mortality in the towns of Scotland; but I think it very probable that they do so generally. It will be a matter of no small interest to learn from the circumstances of the next six years whether the present suggestions are tenable or not. There does not appear to me to have been during the six years from which the facts are gathered any fluctuation of other external agencies worthy of particular attention. Sanitary improvements are occurring from time to time, and when they are such as to affect a large community, a diminution in the death-rate should, to a certain extent, be ascribed to them; the other matters of importance, as the price of food and the like, have already been given in a tabular form. It is probable, then, that in Scotland the death-rate from all causes is influenced by

A. *Temperature.*

1. Below 50° Fahr., the relationship existing between mean temperature and the death-rate from all causes is *inverse*—the lower the temperature the higher

the mortality; but above 50° the relationship becomes *direct*, the death-rate increasing with the temperature. The months during which the latter condition is observable, are probably July and August; but in Scotland the mean temperature does not often rise so high as to render it a cause of alarm.

2. Over the whole year the relationship between the monthly range of temperature and the death-rate is inverse; but during the months of July, August, and September, it is direct. A similar relationship exists between the mean daily range of temperature and the death-rate.

3. It is probable that *dry* cold is more fatal than *humid* cold.

4. Extremes of temperature are always fatal, but eminently so when long sustained.

B. *Atmospheric Pressure.*

1. The results afforded by comparison of the relative height of the barometer with the death-rate from all causes are conflicting, but there is probably a preponderance in favour of the supposition that the relationship between the two is inverse in the colder, and direct in the warmer months.

2. The relationship between the monthly range of the barometer and the death-rate is direct.

C. *Drought and Humidity.*

The relationship existing between humidity (irrespective of temperature) and mortality appears to be direct in the colder, and inverse in the warmer months.

D. *Winds.*

Winds blowing from a point between N.W. and S.E. (north about) attend a high death-rate. Winds blowing from a point between S.E. and W. (south about) occur more frequently during months in which the mortality from all causes is low.

If in the foregoing tables the difference between the mortality with this and with that kind of weather be often apparently trifling, it must be remembered that one or two deaths, more or less, per 100,000 living, is a matter for serious consideration. It must be remembered also, that in the mortality from all causes, there are many compensating influences at work which tend to reduce and soften what would otherwise appear as remarkably prominent features in the inquiry. As a single example of this, it is plain that if deaths from diarrhœa were excluded, the death-rate from all causes would be relatively higher in cold weather than it now appears to be, for deaths from diarrhœa being low in cold and high in warm weather, tend to equalise the surface over the whole rate of mortality.

II.—The Influence of Weather upon Mortality from Special Causes.

It must be quite obvious that to have repeated the foregoing inquiries with each class of disease, or still more so with each individual disease, would have carried me far beyond the limits of a single paper. The tables and diagrams together, however, are sufficient to enable any one desirous of information concerning the influence of weather upon mortality from any of the diseases there given, to comprehend readily enough the relationship which the several meteorological data bear to the death-rates. All that I can venture to do with the remainder of the collected facts will be to trace out the more apparent bonds of union between the weather and the several diseases; and I may mention, in passing, that the reason why I have added to the titles and diagrams a representation of the deaths from all *specified* causes, is simply to afford an opportunity of determining the proportion which the death-rate from any individual disease bears to the entire mortality; this could not have been ascertained by a reference to the death-rate from all causes, since that comprises many deaths from causes which are not stated, and which might therefore be attributable to any of the diseases in the Registrar-General's Schedule. Following the order in which the diseases are arranged in the tables, I shall confine my remarks either to the class of diseases or to one of the representative diseases, as seems to promise most interest.

A. *The Influence of Weather upon Mortality from Zymotic Diseases.*

This class of diseases may be dismissed with very few remarks; not because the inquiry is either uninteresting or unimportant, but because it is very complex, and would require more time than can at present be afforded to treat it as it deserves. I shall speak of zymotic diseases only as a class.

The influence of season in determining the death-rate from these disorders may be inferred from the following order of months, the ratio of deaths being that afforded by the averages of the six corresponding months as in Table C.

Month.	Mortality.	Month.	Mortality.
January,	67·0	September,	54·7
November,	65·8	July,	50·7
December,	64·7	April,	50·3
February,	60·3	August,	47·5
October,	59·0	May,	45·0
March,	55·3	June,	44·7
	Mean,		55·42.

Perhaps the questions of greatest interest with respect to zymotic diseases are those which refer to the mean temperature, mean height of the barometer, direction and force of wind, and the rainfall.

The relationship existing between the mean temperature of the month and its death-rate from zymotic diseases is seen in the following table, in which, out of the seventy-two months, those with the highest and those with the lowest death-rate from such causes are selected :—

	Jan.	Feb.	March.	April.	May.	June.	Average.
Mean temperature of the months in which the highest death-rate occurred, .	39·6	39·3	39·2	42·7	49·8	58·9	
Mean temperature of the months in which the lowest death-rate occurred, . .	39·3	35·8	39·5	45·4	49·5	57·2	
	July.	August.	Sept.	Oct.	Nov.	Dec.	
Mean temperature of the months in which the highest death-rate occurred, .	56·0	60·0	56·1	46·0	39·4	39·9	47·24
Mean temperature of the months in which the lowest death-rate occurred, . .	59·0	56·0	53·7	49·5	38·5	44·9	47·36

Hence it appears that the influence of temperature upon the death-rate caused by zymotic diseases as a class is variable, and that the above data afford no indication of any general law.

The following table is constructed upon the same principle as the former, and refers to the mean height of the barometer :—

	Jan.	Feb.	March.	April.	May.	June.	Average.
Mean height of the barometer for the months in which the highest death-rate occurred, ...	29·864	29·840	29·804	29·767	29·959	30·032	
Mean height of the barometer for the months in which the lowest death-rate occurred, ...	30·065	29·998	29·852	30·177	29·823	29·961	
	July.	August.	Sept.	Oct.	Nov.	Dec.	
Mean height of the barometer for the months in which the highest death-rate occurred, ...	29·887	30·014	29·882	29·784	29·956	29·703	29·874
Mean height of the barometer for the months in which the lowest death-rate occurred, ...	30·050	29·885	29·723	29·936	29·544	29·989	29·917

The preceding table scarcely points to any general law, unless it be this, that during the colder months of the year the relationship existing between the height of the barometer and the death-rate from zymotic diseases is inverse, whilst during the warmer months it is direct. The months July and November do not conform to such a law; it may be remarked, however, that the July with the high death-rate was much cooler than the other, whilst the November with the high death-rate was rather warmer than its associate.

The following table is arranged in the manner of the two previous tables, and refers to the amount of the rainfall in inches :—

	Jan.	Feb.	March.	April.	May.	June.	Average.
Rainfall of the months in which the highest death-rate occurred, . . .	4·21	1·54	2·94	2·38	1·66	2·36	
Rainfall of the months in which the lowest death-rate occurred, . . .	2·98	1·13	1·95	1·04	2·81	2·35	
	July.	August.	Sept.	Oct.	Nov.	Dec.	
Rainfall of the months in which the highest death-rate occurred, . . .	4·31	1·87	3·82	5·14	2·38	4·00	3·05
Rainfall of the months in which the lowest death-rate occurred, . . .	2·76	3·35	5·27	3·34	6·63	3·37	3·08

Eight of the months show a higher death-rate with a greater rain-fall, whilst the remaining four present a higher death-rate with a smaller rain-fall; nevertheless the average quantity of rain of both the years so constituted is almost identical.

As it would be tedious to reproduce in the text the relative prevalence of all the winds given in the tables, it may suffice to select one of them, and to infer from the fluctuations in that the relative frequency of others. The wind which blows on the greatest number of days in the year is that from the south-west; it will therefore be the one most suitable to our present purpose.

	Jan.	Feb.	March.	April.	May.	June.	Average.
Days of south-westerly wind in the months with the highest death-rate,	11·0	10·5	5·0	3·5	4·5	7·0	
Days of south-westerly wind in the months with the lowest death-rate,	10·0	3·5	6·5	3·0	6·5	6·0	
	July.	August.	Sept.	Oct.	Nov.	Dec.	
Days of south-westerly wind in the months with the highest death-rate,	6·0	5·5	6·0	8·0	3·1	8·9	6·6
Days of south-westerly wind in the months with the lowest death-rate,	7·0	7·0	6·0	8·0	7·0	15·0	7·12

In this table there appears no indication of a law of the wind affecting the death-rate; the averages of both the factitious years are somewhat above the average frequency of south-westerly winds over the six years. I find, on arranging the due east winds in the same manner, that the average of the twelve months with the highest death-rate is 3·46, whilst the average of the months with the lowest death-rate is 2·88; and that both of these averages are somewhat below the average frequency of due east winds over the six years, which is 3·5.

It will be interesting, in the last place, to ascertain whether the relative force

of the winds exerts any influence upon the death-rate from zymotic diseases. The following table is constructed like the former, the figures representing the force of the winds in pounds weight:—

	Jan.	Feb.	March.	April.	May.	June.	Average.
Pressure of the winds during the months with the greatest death-rate, . .	2·95	1·77	1·88	1·18	1·79	1·36	
Pressure of the winds during the months with the least death-rate, . . .	2·36	1·80	1·89	1·45	1·34	1·67	
	July.	August.	Sept.	Oct.	Nov.	Dec.	
Pressure of the winds during the months with the greatest death-rate, . .	1·11	1·04	1·38	2·34	1·09	1·80	1·64
Pressure of the winds during the months with the least death-rate, . . .	1·44	0·82	1·38	1·28	2·36	2·32	1·68

The average force of the winds over the six years is 1·59, and therefore in both of the extreme years of the above table the averages are rather high. It might have been supposed, that when the death-rate from zymotic diseases was higher, the relative pressure of the wind would have been low, indicating *calm* rather than *breezy* weather; but if the above table proves anything, it is the very opposite of that.

That the weather has to do with fluctuations in the death-rate from zymotic diseases no one will doubt, but the manner of its operation it is difficult to explain. In countries where marshes form an ample source of some of these diseases, the effects of temperature and humidity are obvious enough; but in this country, in which the germs of such diseases spring from unrecognised sources, the influence of the weather in bringing them hither, developing, and propagating them, is not so plain. I make no comments upon the foregoing facts; it was not to be expected that any very striking results would be deducible from a mere comparison of the meteorological data with the death-rate from a class of diseases comprehending so great a variety. In the tables I have given the death-rates from three diseases of the zymotic class—viz., Typhus, Scarlatina, and Diarrhœa—and it would have been interesting to have shown the effects of meteorological phenomena upon each of these, but that must be left to another opportunity.

B. *The Influence of Weather upon Mortality from Phthisis Pulmonalis.*

Instead of examining the influence of weather upon the tubercular class of diseases as a whole, it will perhaps be more profitable to confine my remarks to one, and that the most fatal, of such diseases.

The order of the months according to the death-rate from phthisis, from the highest to the lowest, following the means of the six corresponding months as in Table C, is as follows:—

April,	35·9	July,	30·3
March,	35·1	December,	28·1
May,	33·6	November,	26·7
June,	33·5	August,	26·0
February,	32·3	September,	23·1
January,	30·6	October,	22·9

The average monthly ratio of deaths from phthisis pulmonalis, per 100,000 living at all ages, in the eight larger towns of Scotland, during the six years 1857–62 inclusive, is exhibited in the following table, together with some of the meteorological characteristics of the corresponding periods :—

Year.	Mortality.	Mean Temp.	Mean of the Monthly Ranges of Temperature.	Mean of the Daily Ranges of Temperature.	Mean Height of Barometer.	Mean of the Monthly Ranges of Barometer.	Total Rainfall in Inches.	Total of Days of N., N.E., and E. Winds.
1860	32·4	44·5	31·3	11·8	29·785	1·444	37·88	105·0
1862	30·1	46·1	30·0	11·5	29·812	1·218	45·29	74·0
1858	29·5	46·6	45·8	12·8	29·916	1·294	33·91	74·0
1857	29·4	48·0	49·8	11·8	29·893	1·236	30·56	98·8
1861	29·1	46·9	30·9	11·6	29·838	1·099	45·07	83·0
1859	28·7	46·7	33·6	12·7	29·817	1·289	37·17	76·0
Average,	29·7	46·5	36·9	12·0	29·843	1·263	38·31	85·1

The following table is constructed upon the plan of those previously given with other subjects of investigation ; the months are not those of the same years, but those of any year in which the highest or lowest death-rate from phthisis occurred.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Average.
Mean temperature with highest mortality,	36·3	34·0	38·4	41·5	50·2	53·0	58·0	54·4	53·4	46·0	39·4	34·0	44·9
Mean temperature with lowest mortality,	39·6	39·3	43·0	41·3	49·5	57·2	53·8	56·0	53·7	45·8	37·1	41·8	46·5
Monthly range of temperature with highest mortality,	37·4	35·0	27·0	32·2	35·5	27·5	46·5	27·1	32·9	29·6	33·3	35·5	33·3
Monthly range of temperature with lowest mortality,	27·1	56·0	33·2	39·0	54·7	32·3	26·2	26·4	27·7	43·8	33·3	22·7	35·2
Daily range of temperature with highest mortality,	8·2	10·7	11·5	14·9	15·0	13·3	14·1	12·8	14·1	10·9	9·7	8·7	12·0
Daily range of temperature with lowest mortality,	9·6	10·8	10·9	13·5	14·8	13·6	13·1	12·6	11·0	12·0	11·0	8·7	11·8
Mean height of barometer with highest mortality,	30·038	29·932	29·639	29·978	29·831	29·674	29·832	29·575	29·979	29·784	29·956	29·651	29·822
Mean height of barometer with lowest mortality,	29·864	29·840	29·707	29·751	29·823	29·961	29·735	29·885	29·723	29·667	29·897	29·767	29·802
Range of barometer with highest mortality,	1·026	2·079	1·931	1·860	1·228	1·102	0·850	1·080	0·993	1·261	1·872	1·853	1·428
Range of barometer with lowest mortality,	1·855	1·289	1·270	1·289	1·339	0·694	0·790	0·944	1·172	1·236	1·513	1·204	1·216
Rain in inches with highest mortality,	3·09	2·69	3·52	1·18	2·18	4·34	2·17	3·79	2·44	5·14	2·38	3·66	3·05
Rain in inches with lowest mortality,	4·21	1·54	4·18	3·20	2·81	2·35	3·87	3·35	5·27	4·60	6·32	5·20	3·91
Days of N., N.E., and E. winds with highest mortality,	6·0	8·0	6·0	13·0	8·0	11·0	3·0	6·0	6·0	4·0	10·0	8·0	7·42
Days of N., N.E., and E. winds with lowest mortality,	1·0	1·5	4·0	12·0	8·5	14·0	4·0	7·0	3·0	10·0	2·0	2·0	5·75

From the foregoing tables it would seem :—

1. That a low mean temperature of the winter months gives rise to an increase in the death-rate from phthisis, and that this relationship is the more clearly observable if the low temperature be sustained for some time without intermission, as in the case of the months from November 1859 to February 1860 inclusive. A high summer temperature does not seem to increase the fatality of phthsis. It is only when the temperature of winter is remarkably low that the increased death-rate from phthisis is distinctly traceable to that cause.

2. That the relationship between the monthly range of temperature and the death-rate from phthisis is uncertain, and that the latter is not under the control of the former.

3. That the daily range of temperature exerts no constant influence upon the death-rate from phthisis.

4. That there is no constant relationship observable between the mean monthly height of the barometer and the death-rate from phthisis.

5. That if there be any indication of a constant relationship between the monthly range of the barometer and the death-rate from phthisis, it is that the death-rate increases with the range.

6. That the rainfall bears no constant relationship to the death-rate from phthisis. It is possible, however, that it may be inverse in the colder and direct in the warmer months.

7. That possibly an increase in the number of days during which north, north-east, and east winds prevail, may give rise to an increase in the death-rate from phthisis.

C. *The Influence of Weather upon Mortality from Bronchitis.*

The influence of the weather upon diseases of the respiratory organs differs greatly from its influence upon phthisis pulmonalis. In the former, the atmosphere comes immediately into contact with the seat of the malady; in the latter, it merely touches a local manifestation of the disease. It is the oversight of this difference that leads to so much disappointment in the employment of change of climate as a remedial agent. In selecting a locality for the residence of a patient afflicted with a disease of the respiratory system,—as bronchitis, asthma, or the laryngeal affections,—too much care cannot be observed in matters meteorological; but, in choosing a winter resort for a phthisical patient, there are many circumstances of more weighty importance than the weather, to the consideration of which meteorology ought to be subordinated. Change of climate as a remedial agent in the treatment of consumption is exceedingly valuable when properly employed, but equally mischievous when used without a due regard to all the

circumstances of the case. To treat consumption by change of climate on meteorological grounds alone, is simply to endeavour to combat a symptom without reference to the pathology of the disease, and it would be quite as reasonable to expect a cure from the mere use of a poultice or a cough mixture. To dispatch a consumptive patient to a foreign country only for meteorological reasons, if he be unable to enjoy the change, in spite of the anxiety, fatigue, and discomforts which must attend the sacrifice of his ordinary pursuits, the separation from his friends and a sojourn amongst strangers, is not useless only, but *cruel*. But this is a digression from which, perhaps, it would be better that I should refrain.

The order of the months according to the death-rate from bronchitis, from the highest to the lowest, following the means of the six corresponding months as in Table C, is as follows :—

January,	30·4	May,	16·9
February,	30·0	June,	13·9
December,	26·9	October,	12·4
March,	25·2	July,	10·5
April,	22·8	September,	9·5
November,	22·7	August,	8·7
	Mean,	19·16	

The average monthly ratio of deaths from bronchitis, per 100,000 living at all ages, in the eight larger towns of Scotland during the six years 1857–62 inclusive, is exhibited in the following table, together with some of the meteorological characteristics of the corresponding periods:—

Year.	Mortality.	Mean Temp.	Mean of the Monthly Ranges of Temperature.	Mean of the Daily Ranges of Temperature.	Mean Height of Barometer.	Mean of the Monthly Ranges of Barometer.	Total Rainfall in Inches.	Total of Days on which N., N.E., and E. Winds blew.
1860	26·6	44·5	31·3	11·8	29·785	1·444	37·88	105·0
1862	25·6	46·1	30·0	11·5	29·812	1·218	45·29	74·0
1861	22·9	46·9	30·9	11·6	29·838	1·099	45·07	83·0
1858	15·6	46·6	45·8	12·8	29·916	1·294	33·91	74·0
1857	12·4	48·0	49·8	11·8	29·893	1·236	30·56	98·8
1859	11·9	46·7	33·6	12·7	29·817	1·289	37·17	76·0

As in the case of bronchitis there is a very remarkable difference between the death-rate in 1860 and that in 1859, instead of constituting factitious years for comparison, I may in this instance contrast the year of the highest with the year of the lowest death-rate. This is done in the following table:—

	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Year.
Mortality from bronchitis in 1860,	36·0	62·0	41·2	43·9	26·8	17·2	14·2	9·3	8·9	11·7	21·7	26·0	26·6
Mortality from bronchitis in 1859,	17·6	19·8	14·8	13·3	10·0	6·8	6·0	5·9	6·8	6·0	6·8	28·8	11·9
Mean temperature in 1860, . .	35·5	34·0	38·4	41·5	50·2	53·0	57·3	54·4	50·2	46·0	39·1	34·1	44·5
Mean temperature in 1859, . .	39·6	40·5	43·0	41·3	51·9	56·6	59·0	57·8	52·3	45·8	39·4	34·0	46·7
Monthly range of temperature in 1860, ...	28·5	35·0	27·0	32·2	35·5	27·5	30·9	27·1	35·0	29·6	26·5	40·8	31·3
Monthly range of temperature in 1859, ...	27·1	29·0	33·2	39·0	42·4	35·3	32·4	30·7	28·2	43·8	26·9	35·5	33·6
Mean of the daily ranges of temperature in 1860, ...	8·1	10·7	11·5	14·9	15·0	13·3	14·5	12·8	13·8	10·9	8·1	8·1	11·8
Mean of the daily ranges of temperature of 1859, ...	9·6	9·8	10·9	13·5	19·7	16·1	14·3	14·7	13·6	12·0	10·4	8·7	12·7
Mean height of the barometer in 1860, ...	29·529	29·932	29·639	29·978	29·831	29·674	29·988	29·575	29·868	29·784	29·919	29·709	29·785
Mean height of the barometer in 1859, ...	29·864	29·709	29·707	29·751	30·046	29·934	30·050	29·850	29·722	29·667	29·855	29·651	29·817
Monthly range of the barometer in 1860, ...	1·810	2·079	1·931	1·860	1·228	1·102	0·745	1·080	1·165	1·261	1·641	1·426	1·444
Monthly range of the barometer in 1859, ...	1·855	1·375	1·270	1·289	0·498	0·653	1·083	1·167	1·063	1·236	2·129	1·853	1·289
Amount of rain in inches in 1860,	4·56	2·69	3·52	1·18	2·18	4·34	1·82	3·79	1·92	5·14	2·83	3·91	37·88
Amount of rain in inches in 1859,	4·21	3·38	4·18	3·20	0·29	2·04	2·76	2·27	3·21	4·60	3·37	3·66	37·17
No. of days on which N., N.E., and E. winds blew in 1860,	9·0	8·0	6·0	13·0	8·0	11·0	9·0	6·0	7·0	4·0	13·0	11·0	105·0
No. of days on which N., N.E., and E. winds blew in 1859,	1·0	2·0	4·0	12·0	11·0	11·0	7·0	1·0	3·0	10·0	6·0	8·0	76·0

If the foregoing tables are to be trusted, it would seem—

1. That there is an inverse relationship between temperature and the death-rate from bronchitis in all seasons, but that this is more remarkable in the winter months, and especially when the cold is severe and protracted.

2. That possibly there may be an inverse relationship between the monthly range of temperature and the death-rate from bronchitis over the whole year, but the relationship varies with the season.

3. That the relationship between the daily range of temperature and the death-rate from bronchitis also varies with the season; but there is no indication of any constant correspondence.

4. That possibly the relationship between the mean height of the barometer and the death-rate from bronchitis may be inverse in summer and direct during the remainder of the year. And that there is no constant relationship between the death-rate from bronchitis and the monthly range of the barometer.

5. That the rainfall does not influence the death-rate from bronchitis. To the last two suggestions it may be added, that although the tables do not indicate any constant correspondence between them, nevertheless it is highly probable that the state of the barometer, and the hygrometric condition of the atmosphere, do exert a powerful influence upon the mortality from bronchitis, and that the reason why such influence is not more distinctly visible is this, that whilst a dry atmosphere with a high barometer is prejudicial to one class of bronchitic patients it favours another, and *vice versa;* so that, the one class balancing the other, the influence is not discoverable upon the whole death-rate.

6. That the north, north-east, and east winds decidedly tend to increase the death-rate from bronchitis.

D. *The Influence of Weather upon Mortality from all Causes at different Ages.*

There are two periods in a lifetime at which the influence of the weather, equally with that of other external causes, is felt most keenly,—infancy and old age. In childhood, functional activity is bestowed upon the construction and development of the body; in old age, it is required to combat a natural tendency to decay; at both of these periods, the powers of resistance are feeble. Whatever causes interfere with the due performance of the vital functions, are more potent for mischief at these than at other periods of life. The adult can bear an amount of fatigue, both mental and physical, deprivations of food and sleep, and vicissitudes of weather, with far less danger to vitality than others can do at the extremes of life. A glance at the diagram in which the curves of mortality from all causes, at different ages are laid down, will show this distinctly. The curve representing the death-rate from 0–5 years fluctuates more than the rest; next to that in point of angularity is the death-rate of the aged. The curve of mortality in youth deviates but slightly, and that representing the death-rate in adult life would be much less prominent in its deviations, if it were seen in periods of twenty years each, as in the curves of youth and old age, supposing the latter to extend to eighty.

The order of the months, according to the death-rate from all causes at different periods of life, from the month with the highest to the month with the lowest death-rate, following the means of the six corresponding months, is as follows:—

0–5 Years.		5–20 Years.		20–60 Years.		60 Years and Upwards.	
January,	122·7	April,	25·1	January,	72·8	January,	45·9
February,	121·9	March,	24·3	March,	70·2	February,	44·0
December,	113·9	February,	24·1	December,	67·8	December,	43·5
March,	113·9	January,	23·9	February,	67·0	April,	42·1
November,	111·5	May,	23·8	April,	67·9	March,	41·5
April,	107·5	June,	23·3	May,	63·2	November,	41·3
May,	97·2	December,	22·7	November,	61·9	May,	35·2
October,	96·2	July,	22 5	June,	59·2	June,	34·9
July,	96·1	November,	22·4	July,	54·7	July,	31 2
September,	92·2	October,	21·5	August,	51·7	October,	28·8
June,	91·3	September,	20·3	October,	51·0	August,	28·7
August,	89·1	August,	19·7	September,	48·6	September,	26·7
Means,	104·5		22·7		61·3		36·9

It is noticeable, that the order of the months, according to the death-rate in infancy and old age, is very nearly the same as that according to the death-rate from bronchitis; whilst the order of the months, according to the death-rate be-

tween five and twenty years, is more like that observed with phthisis, the order of the months, according to the death-rate between twenty and sixty years, appearing to hover between the two.

The range of the death-rate between the month with the highest and the month with the lowest mortality varies with the period of life. As already adverted to, it is 33·6 in infancy, 19·2 in old age, and only 5·4 in youth. In adult life, over a period of forty years, the range is 24·2.

I shall not extend my paper by pursuing the same investigations with this as with the previous subjects of inquiry. There is only one more question I will ask of the facts now before me. It is this,—What is the effect of protracted cold in winter, and of sustained heat in summer, upon the death-rates at different periods of life? The question is answered in the following table. The periods selected for the inquiry are from November 1859 to April 1860, and from May to October 1857:—

	Nov.	Dec.	Jan.	Feb.	March.	April.
Mean Temperature in 1859–60	39·4	34·0	35·5	34·0	38·4	41·5
Average of the Six corresponding Months	39·5	38·8	37·4	38·2	39·8	43·2
Death-rate 0–5 years, 1859–60	107·8	114·4	131·2	155·2	131·2	130·4
Average, &c.	111·5	113·9	122·7	121·9	113·9	107·5
Death-rate 5–20 years, 1859–60	23·6	23·2	27·4	28·3	26·9	26·8
Average, &c.	22·4	22·7	23·9	24·1	24·3	25·1
Death-rate 20–60 years, 1859–60	63·4	77·3	79·1	86·1	76·2	77·5
Average, &c.	61·9	67·8	72·8	67·0	70·2	67·9
Death-rate 60 &c. years, 1859–60	41·5	49·0	42·8	60·7	48·4	55·2
Average, &c.	41·3	43·5	45·9	44·0	41·5	42·1

	May.	June.	July.	Aug.	Sept.	Oct.
Mean Temperature in 1857	49·8	57·4	58·0	60·0	56·1	49·6
Average, &c.	50·3	55·9	56·8	57·2	52·5	47·2
Death-rate 0–5 years, 1857	100·2	90·7	100·3	114·5	111·0	93·6
Average, &c.	97·2	91·3	96·1	89·1	92·2	96·2
Death-rate 5–20 years, 1857	22·6	25·1	20·9	19·4	19·1	22·9
Average, &c.	23·8	23·3	22·5	19·7	20·3	21·5
Death-rate 20–60 years, 1857	61·0	63·4	56·6	59·3	51·3	57·4
Average, &c.	63·2	59·2	54·7	51·7	48·6	51·0
Death-rate 60 &c. years, 1857	35·3	34·1	32·8	31·0	30·0	34·0
Average, &c.	35·2	34·9	31·2	28·7	26·7	28·8

From the foregoing table it would seem:—

1. That a protracted low temperature in winter largely increases the death-rate amongst children under five years of age; and that the death-rate rises almost immediately upon the fall of the thermometer, and falls again so soon as the temperature begins to rise.

2. That a continued low temperature perceptibly increases the death-rate amongst those between five and twenty years of age, though to a much less extent than in infancy; and the mortality curve does not rise so suddenly upon the fall in the curve of temperature.

3. That continued cold also raises the death-rate amongst adults, more perceptibly than in youth, but less than in infancy.

4. That in old age continued cold is prejudicial, but the death-rate does not rise so suddenly as either in infancy or in adult life.

5. It would appear from the foregoing remarks, that severe winter weather induces acute inflammatory diseases in infancy and adult life, rapidly cutting off its victims; that it increases the death-rate of the aged by aggravating chronic diseases; and that it probably cuts off only those in youth who are previously debilitated by some exhausting disease, as phthisis.

6. That a high temperature in summer, especially if long sustained, increases infantile mortality.

7. That such high summer temperature scarcely affects the death-rate in youth.

8. That it slightly increases the mortality in adult life.

9. And that it also slightly increases the death-rate of the aged.

10. That care ought to be taken to avoid exposure to the direct influence of the weather when the mean temperature sinks below 39° in winter, or rises above 57° in summer.

III.—General Resumé.

In the foregoing investigations I have employed as the standards of reference either the means of the six corresponding months, or the means afforded by the six years. In many instances I have drawn my conclusions from the comparison of two extreme years, factitiously constructed out of the whole term of seventy-two months. I have been urged to such modes of investigation for the sake of conciseness, having had to treat of a comprehensive subject within too narrow limits. In conclusion let me place the data before the Society in one other form, which will serve both as a check upon the previous inductions, and also as a *resumé* of the entire subject.

I shall employ as the standards of reference, in this instance, the means of the six corresponding *seasons*, and compare with them the *major* and *minor* readings, respectively, of the eighteen months comprised in the several periods from which the means are derived. It is unnecessary, or, at least, would occupy too much space, to repeat the minor meteorological details; I shall therefore restrict the present inquiry to the influence of mean temperature, the mean height of the barometer, and the humidity as represented by the rainfall in inches.

Resumé: On the Influence of Mean Temperature.

Average monthly mean temperature of the six winters (Dec., Jan., Feb.),	.	38°·1
,, ,, ,, springs (March, April, May),		44°·4
,, ,, ,, summers (June, July, Aug.),		56°·6
,, ,, ,, autumns (Sept., Oct., Nov.),		46°·4

In the following table the upper lines represent the average mortality of the months whose mean thermometric readings are severally *above* the standard of reference, whilst the lower lines represent the average mortality of the months with thermometric readings *below* the standard :—

	At all Ages from				From all Causes at			
	All Causes.	Zymotic Diseases.	Phthisis.	Bronchitis.	0–5 Years.	5–20 Years.	20–60 Years.	60, &c. Years.
Average mortality of *ten* winter months, with a mean temperature *above* 38°·1, ...	245·51	63·90	29·25	25·49	116·60	23·23	64·71	41·10
Average mortality of *eight* winter months, with a mean temperature *below* 38°·1, ...	271·11	64·12	31·74	33 69	123·17	24·04	74·64	48·76
Average mortality of *eight* spring months, with a mean temperature *above* 44°·4, ...	223·81	45·41	34·17	19·09	99·48	24·25	63·41	36·72
Average mortality of *ten* spring months, with a mean temperature *below* 44°·4, ...	248·35	54·44	35·46	23·74	111·58	24 53	70·02	42·01
Average mortality of *eleven* summer months, with a mean temperature *above* 56°·6, . .	201·40	49·09	29·43	9·70	94·73	20·96	54·57	31·13
Average mortality of *seven* summer months, with a mean temperature *below* 56°·6, . .	199·97	45·29	30·77	13·19	88·36	23·19	56·20	32·37
Average mortality of *nine* autumn months, with a mean temperature *above* 46°·4, ...	190·22	54·56	23·10	11·32	92·28	20·06	49·60	28·12
Average mortality of *nine* autumn months, with a mean temperature *below* 46°·4, ...	225·14	65·11	25·47	18·47	107·61	22·77	58·11	36·40

The foregoing table—

1. Corroborates the suggestion previously made, that the relationship between mortality from all causes and mean temperature is *inverse* when the mean temperature is below 50°, and *direct* when the temperature is higher. Probably the bad effects of a high mean temperature are not perceptible until it has been maintained for some time at or above 56°·6. In general terms, the relationship between mean temperature and mortality from all causes is inverse in winter, spring, and autumn, but direct in summer.

2. Seems to indicate a relationship between mean temperature and mortality from zymotic diseases similar to that between mean temperature and death from all causes; namely, *inverse* in winter, spring, and autumn, but *direct* in summer. The previous suggestion was, that the relationship was variable and uncertain.

3. Corroborates the suggestions previously made concerning the influence of mean temperature upon the death-rate from Phthisis Pulmonalis; namely, that a low winter temperature increases the mortality from phthisis, but only to a remarkable extent when the mean temperature is very low, and continuously so; and that a high summer temperature does not increase the fatality of phthisis.

It may be stated, generally, that the relationship between mean temperature and the death-rate from phthisis is *slightly inverse* all the year round.

4. Substantiates the previous statement that the relationship between mean temperature and the death-rate from bronchitis is *inverse* all the year round, and that such relationship is most distinct in winter.

5. Supports the previous statement, that the relationship between mean temperature and mortality from all causes is *inverse at all ages* in winter, spring, and autumn; and that such relationship is most distinct in infancy, and least so in youth. It also corroborates the statement that a high mean summer temperature increases infantile mortality; but it is opposed to the suggestion that a high mean summer temperature also increases the death-rate from all causes at other periods of life.

Resumé: On the Influence of the Mean Barometric Pressure.

Average monthly mean height of barometer of the six winters,	.	.	29·829
,, ,, ,, springs,	.	.	29·847
,, ,, ,, summers,	.	.	29·861
,, ,, ,, autumns,	.	.	29·837

In the following table, the upper lines represent the average mortality of the months whose mean barometric readings are severally *above* the standards of reference, whilst the lower lines represent the average mortality of the months with barometric readings *below* the standard :—

	At all Ages from				From all Causes at			
	All Causes.	Zymotic Diseases.	Phthisis.	Bronchitis.	0-5 Years.	5-20 Years.	20-60 Years.	60, &c. Years.
Average mortality of *nine* winter months, with mean height of barometer *above* 29·829, .	254·26	58·00	31·69	29·51	116·91	22·68	68·92	45·67
Average mortality of *nine* winter months, with mean height of barometer *below* 29·829, .	259·52	70·00	29·02	28·76	122·15	24·50	69·55	43·35
Average mortality of *eight* spring months, with mean height of barometer *above* 29·847, .	235·85	47·12	34·68	22·24	104·30	24·64	67·06	39·89
Average mortality of *ten* spring months, with mean height of barometer *below* 29·847, .	238·72	53·00	35·06	21·22	107·72	24·22	67·10	39·46
Average mortality of *ten* summer months, with mean height of barometer *above* 29·861, .	202·97	49·44	29·30	10·30	95·50	21·30	54·76	31·39
Average mortality of *eight* summer months, with mean height of barometer *below* 29·861, .	198·19	45·41	32·01	11·99	88·06	22·50	55·76	31·90
Average mortality of *eleven* autumn months, with mean height of barometer *above* 29·837, .	214·57	61·64	24·97	15·93	105·06	21·65	55·08	32·70
Average mortality of *seven* autumn months, with mean height of barometer *below* 29·837, .	196·86	57·00	23·20	13·27	91·90	21·04	51·91	31·57

The foregoing table—

1. Corroborates the previous suggestions, that over the whole year the relationship between the mean height of the barometer and the death-rate from all causes is *inverse*; that the relationship is *inverse* in winter and spring, and that it is *direct* in autumn; but it opposes the suggestion of an inverse relationship in summer.

2. Substantiates the suggestion, that the relationship between the mean height of the barometer and the death-rate from zymotic diseases is *inverse* in the colder, but *direct* in the warmer seasons.

3. Confirms the statement, that there is no constant relationship observable between the mean monthly height of the barometer and the death-rate from phthisis, the results both of the two colder and of the two warmer seasons being opposed to one another.

4. Suggests a *direct* relationship between the mean height of the barometer and the death-rate from bronchitis in winter, spring, and autumn; but an *inverse* relationship in summer,—a suggestion which, although not without conflict, is supported by the results previously obtained.

5. Shows that the influence of barometric pressure upon the death-rate from all causes varies with age. In infancy the relationship between the mean height of the barometer and the death-rate from all causes is probably inverse in winter and spring, but direct in summer and autumn: in youth the relationship is inconstant; in adult life it is also uncertain; in old age it is possibly nearly the opposite of that which obtains in infancy.

Resumé: On the Influence of Drought and Humidity.

Average monthly rainfall of the six winters,	. . . . .	3·33	inches.
,, ,, ,,	springs,	. . . . .	2·58	,,
,, ,, ,,	summers,	. . . . .	3·17	,,
,, ,, ,,	autumns,	. . . . .	3·67	,,

In the following table the upper lines represent the average mortality of the months whose mean rainfall is severally *above* the standard of reference, whilst the lower lines represent the average mortality of the months with a rainfall below the standard :—

	At all Ages from				From all Causes at			
	All Causes.	Zymotic Diseases.	Phthisis.	Bronchitis.	0-5 Years.	5-20 Years.	20-60 Years.	60, &c. Years.
Average mortality of *nine* winter months, with a rainfall *above* 3·33 inches,	257·06	69·44	29·20	27·48	120·37	24·12	69·21	43·66
Average mortality of *nine* winter months, with a rainfall *below* 3·33 inches,	256·72	58·55	31·52	30·80	118·68	23·06	69·26	45·36
Average mortality of *nine* spring months, with a rainfall *above* 2·58 inches,	239·29	52·80	34·33	22·24	108·97	24·42	66·18	39·42
Average mortality of *nine* spring months, with a rainfall *below* 2·58 inches,	235·60	48·00	35·44	21·10	103·43	24·40	67·99	39·88
Average mortality of *eight* summer months, with a rainfall *above* 3·17 inches,	198·60	45·12	30·24	13·42	88·55	22·84	55·61	31·51
Average mortality of *ten* summer months, with a rainfall *below* 3·17 inches,	202·65	49·60	29·72	9·15	95·11	21·02	54·88	31·69
Average mortality of *seven* autumn months, with a rainfall *above* 3·67 inches,	205·53	60·30	23·36	15·27	100·13	20·77	52·90	31·47
Average mortality of *eleven* autumn months, with a rainfall *below* 3·67 inches,	209·05	59·55	24·88	14·66	99·83	21·82	54·45	32·76

The foregoing table—

1. Suggests a direct relationship between the rainfall and the death-rate from all causes in winter and spring; but an inverse relationship in summer and autumn,—a suggestion which the previous results tend to support.

2. Suggests a direct relationship between the rainfall and the death-rate from zymotic diseases in winter, spring, and autumn; but an inverse relationship in summer. This suggestion also is nearly supported by the previous results.

3. Shows that there is a slight indication of an inverse relationship between the rainfall and mortality from phthisis in winter, spring, and autumn; but of a direct relationship in summer. These indications, however, are not very distinct, and are not well substantiated by the previous results.

4. Indicates a direct relationship between the death-rate from bronchitis and the rainfall in spring, summer, and autumn; but an inverse relationship in winter. This is not distinctly observable in the previous results; and probably the note appended to the fifth suggestion, under bronchitis, is the true explanation of the inconstancy of the relationship.

5. Shows that the influence of the rainfall upon the death-rate from all causes varies with the periods of life. In infancy the relationship appears to be direct in winter and spring, doubtful in autumn, and inverse in summer. At other periods of life the relationship is scarcely perceptible.

Here I must close my paper. I offer it as a slight contribution to medical climatology, and I trust there will be found in it something worthy of the consideration of those who take an interest in that still very obscure science. The interpretations that I have given of the facts at my disposal are such as I think they will bear without straining; but I place both facts and comments before the Society, so that any one who is interested in the matter may judge for himself.

TABLE A. In which the Months, with their Meteorological Readings and Deductions, are Arranged in the order of the Ratio of Mortality from all Causes, the highest Ratio being at the top and the lowest at the foot of the Table; each Column is divided into Four Sections of Eighteen Months, corresponding to a Maximum, Major, Minor, and Minimum Ratio of Mortality; the Means of each section are given in the second, and the Means of the whole in the third columns.

Year.	Month.	Ratio per 100,000 living of Deaths from all causes.	Mean of each Section.	Mean of the whole.	Mean Temperature.	Mean of each Section.	Mean of the whole.	Mean of the highest Temperatures.	Mean of each Section.	Mean of the whole.	Mean of the lowest Temperatures.	Mean of each Section.	Mean of the whole.
1860	Feb.	330·6			34·0			39·2			28·6		
1861	Jan.	304·1			36·5			40·4			32·9		
1862	Jan.	296·6			38·4			42·0			34·8		
1860	April	290·2			41·5			48·9			34·0		
1860	March	283·2			39·4			44·0			32·5		
1860	Jan.	280·8			35·5			39·6			31·4		
1858	Nov.	266·1			39·4			44·4			34·4		
1859	Dec.	263·4			34·0			38·3			29·7		
1862	Dec.	259·0			41·8			46·2			37·8		
1858	March	257·8	263·49		39·5	38·5		45·5	43·1		33·6	33·4	
1860	Dec.	257·7			34·1			37·9			30·0		
1862	March	256·7			37·8			42·5			33·2		
1857	Jan.	253·2			35·7			39·8			31·6		
1862	Feb.	251·3			39·1			44·4			33·8		
1857	Feb.	250·1			39·5			44·3			34·3		
1862	April	250·0			44·6			51·3			37·8		
1857	March	250·0			39·2			44·0			34·5		
1858	Dec.	250·0			39·9			44·0			35·7		
1859	Feb.	246·9			40·5			45·4			35·5		
1857	April	243·6			42·7			48·7			36·7		
1859	Jan.	243·4			39·6			44·4			34·8		
1861	Dec.	241·4			38·0			42·8			33·3		
1860	May	240·0			50·2			57·7			42·6		
1858	Feb.	237·7			35·8			41·0			30·5		
1859	Nov.	236·0			39·4			44·5			34·2		
1862	Nov.	234·7			37·1			42·6			31·6		
1859	March	232·0	233·25		43·0	43·1		48·3	50·0		37·6	38·2	
1857	Nov.	231·3			43·7			48·1			39·2		
1860	Nov.	230·0			39·1			51·4			40·5		
1862	May	228·4			51·1			58·1			44·0		
1861	Feb.	228·1			39·5			44·1			34·9		
1858	April	227·1			43·8			51·4			36·1		
1861	May	225·4			49·1			56·2			41·3		
1861	Nov.	224·5			38·5			43·0			33·0		
1857	Aug.	224·1			60·6			67·1			53·0		
1858	July	224·0			56·0			63·4			48·7		
				223·73			46·3			52·6			40·5
1863	April	223·5			45·4			52·4			38·3		
1859	April	222·7			41·3			48·7			35·2		
1863	March	220·2			41·1			46·9			35·5		
1857	May	220·2			49·8			57·0			42·6		
1858	June	219·3			58·9			67·1			50·7		
1860	June	219·1			53·0			59·7			46·5		
1857	Dec.	215·7			44·9			49·2			40·7		
1862	June	215·0			52·4			58·7			46·0		
1860	July	214·8			57·3			64·5			50·1		
1858	Jan.	214·0	214·26		39·5	49·5		44·0	56·3		34·6	43·1	
1857	June	213·3			57·4			66·0			48·8		
1857	Sept.	210·8			56·1			62·5			49·7		
1857	July	210·5			58·0			65·1			51·0		
1858	May	210·4			49·5			56·9			42·1		
1860	Oct.	210·4			46·0			51·4			40·5		
1857	Oct.	209·0			49·6			55·3			43·9		
1858	Oct.	205·5			44·9			51·0			39·2		
1862	Oct.	204·4			47·1			53·4			40·7		
1861	July	204·4			56·8			63·6			50·0		
1858	Aug.	199·5			57·9			65·9			49·9		
1861	June	196·4			57·2			64·0			50·4		
1862	Sept.	195·9			53·4			60·3			46·4		
1858	Sept.	194·6			54·5			61·8			47·2		
1859	May	193·5			51·9			61·7			42·1		
1860	Aug.	192·4			54·4			60·8			48·0		
1862	July	192·3			55·5			60·4			47·3		
1859	June	188·6			56·6			64·7			48·6		
1859	Oct.	188·0	185·85		45·6	54·3		51·8	61·2		39·8	47·4	
1860	Sept.	182·5			50·2			57·1			43·3		
1859	July	181·3			59·0			66·2			51·9		
1859	Aug.	178·7			57·8			65·2			50·4		
1859	Sept.	177·7			52·5			59·2			45·5		
1861	Aug.	173·1			57·4			62·8			51·9		
1861	Oct.	173·1			49·5			55·4			43·7		
1862	Aug.	168·4			56·0			62·3			49·7		
1861	Sept.	165·0			53·7			59·2			48·2		

Year.	Month.	Monthly Range of Temperature.	Mean of each Section.	Mean of the whole.	Mean of the Daily Range of Temperature.	Mean of each Section.	Mean of the whole.	Mean Height of Barometer at Sea level and 32°.	Mean of each Section.	Mean of the whole.	Monthly Range of Barometer.	Mean of each Section.	Mean of the whole.
1860	Feb.	33·0			10·7			29·502			2·079		
1861	Jan.	37·4			8·2			30·038			1·036		
1862	Jan.	23·7			7·1			29·486			2·451		
1860	April	32·2			14·9			29·978			1·861		
1860	March	27·0			11·5			29·639			2·031		
1860	Jan.	28·3			8·1			29·529			1·810		
1858	Nov.	33·3			9·7			29·956			1·872		
1859	Dec.	35·5			8·7			29·651			1·835		
1862	Dec.	22·7			8·7			29·767			1·294		
1858	March	36·0	30·4		11·9	9·8		29·832	29·690		1·597	1·564	
1860	Dec.	40·8			8·1			29·709			1·416		
1862	March	34·8			9·3			29·698			1·322		
1857	Jan.	50·1			8·2			29·698			1·534		
1862	Feb.	33·2			8·6			30·032			1·402		
1857	Feb.	36·0			10·8			29·840			1·289		
1862	April	39·7			13·7			29·881			1·204		
1857	March	49·5			9·5			29·804			2·021		
1858	Dec.	25·2			8·3			29·700			1·297		
1859	Feb.	29·0			9·8			29·703			1·375		
1857	April	46·0			12·0			29·709			1·142		
1859	Jan.	37·1			9·6			29·864			1·835		
1861	Dec.	30·6			9·5			30·020			1·439		
1860	May	35·5			15·0			29·831			1·228		
1858	Feb.	49·0			10·7			29·866			1·697		
1859	Nov.	26·9			10·4			29·855			2·139		
1862	Nov.	33·3			11·0			29·886			1·511		
1859	March	33·2	37·2		10·9	11·6		29·707	29·868		1·270	1·168	
1857	Nov.	30·0			9·1			30·115			1·719		
1860	Nov.	26·5			8·1			29·929			1·641		
1862	May	31·2			14·1			29·850			0·845		
1861	Feb.	29·7			9·3			29·681			1·670		
1858	April	61·0			15·3			29·942			1·434		
1861	May	39·0			15·6			30·070			0·937		
1861	Nov.	33·4			10·9			29·544			1·395		
1857	Aug.	53·0			14·1			30·014			0·661		
1858	July	46·0			14·7			29·857			0·945		
				36·8			12·0			29·843			1·262
1863	April	34·0			14·1			30·177			0·734		
1859	April	39·0			13·5			29·731			1·289		
1863	March	28·2			11·4			29·307			1·430		
1857	May	47·0			14·4			29·959			0·890		
1858	June	47·0			16·4			30·032			0·702		
1860	June	27·5			13·3			29·674			1·102		
1857	Dec.	38·0			8·5			29·989			1·338		
1862	June	27·3			12·6			29·735			1·024		
1860	July	30·9			14·4			29·945			0·745		
1858	Jan.	40·0	39·6		9·4	13·0		30·065	29·861		1·241	1·163	
1857	June	64·5			17·2			30·020			1·030		
1857	Sept.	47·9			12·8			29·853			1·104		
1857	July	40·5			14·1			29·832			0·850		
1858	May	36·7			14·8			29·823			1·139		
1860	Oct.	29·6			10·9			29·764			1·261		
1857	Oct.	47·0			11·4			29·865			1·246		
1858	Oct.	32·9			12·4			29·891			1·647		
1862	Oct.	32·8			12·7			29·630			1·672		
1861	July	27·6			13·6			29·619			0·777		
1858	Aug.	32·0			16·0			29·943			1·003		
1861	June	32·3			13·6			29·921			0·698		
1862	Sept.	32·9			14·1			29·979			0·991		
1858	Sept.	35·0			14·6			29·896			0·997		
1859	May	42·4			19·7			30·046			0·498		
1860	Aug.	27·1			12·8			29·575			1·080		
1862	July	26·2			13·1			29·750			0·790		
1859	June	35·3			16·1			29·904			0·652		
1859	Oct.	43·8	35·9		12·0	13·8		29·687	29·842		1·126	0·961	
1860	Sept.	35·0			13·8			29·868			1·165		
1859	July	32·4			14·3			30·050			1·083		
1859	Aug.	30·7			14·7			29·850			1·147		
1859	Sept.	28·2			13·6			29·722			1·063		
1861	Aug.	25·1			13·0			29·774			0·737		
1861	Oct.	30·9			11·6			29·936			1·201		
1862	Aug.	26·4			12·6			29·885			0·944		
1861	Sept.	27·7			11·0			29·723			1·172		

Year.	Month.	No. of Rainy Days.	Mean of each Section.	Mean of the whole.	Quantity of Rain in inches.	Mean of each Section.	Mean of the whole.	Humidity Sat. = 100.	Mean of each Section.	Mean of the whole.
1860	Feb.	13			2·69			85		
1861	Jan.	14			3·09			90		
1862	Jan.	21			5·52			90		
1860	April	10			1·18			82		
1860	March	19			3·52			86		
1860	Jan.	18			4·26			89		
1858	Nov.	10			2·38			89		
1859	Dec.	15			3·66			88		
1862	Dec.	21			5·20			89		
1858	March	11	15·1		1·05	3·18		85	87	
1860	Dec.	17			3·91			90		
1862	March	16			3·03			88		
1857	Jan.	16			2·77			87		
1862	Feb.	11			1·88			89		
1857	Feb.	11			1·54			89		
1862	April	14			2·59			83		
1857	March	16			2·94			86		
1858	Dec.	17			4·00			90		
1859	Feb.	17			3·38			88		
1857	April	16			2·38			84		
1859	Jan.	17			4·21			87		
1861	Dec.	13			2·95			90		
1860	May	15			2·18			81		
1858	Feb.	6			1·13			83		
1859	Nov.	14			2·37			89		
1862	Nov.	10			2·10			90		
1859	March	11	13·7		4·18	3·06		85	86	
1857	Nov.	12			3·89			90		
1860	Nov.	17			2·83			90		
1862	May	16			3·89			84		
1861	Feb.	15			3·32			88		
1858	April	9			1·86			78		
1861	May	14			1·57			80		
1861	Nov.	18			4·63			87		
1857	Aug.	10			1·87			85		
1858	July	17			4·31			83		
				14·9			3·17			85
1863	April	9			1·04			83		
1859	April	15			3·20			80		
1863	March	22			5·10			86		
1857	May	15			1·68			80		
1858	June	12			2·26			78		
1860	June	18			4·24			85		
1857	Dec.	14			2·37			88		
1862	June	20			3·99			83		
1860	July	11			1·52			83		
1858	Jan.	14	15·4		2·98	3·27		86	84	
1857	June	9			2·79			81		
1857	Sept.	15			3·82			87		
1857	July	13			2·17			80		
1858	May	16			2·81			81		
1860	Oct.	22			3·14			87		
1857	Oct.	16			2·56			90		
1858	Oct.	18			4·72			87		
1862	Oct.	19			6·32			88		
1861	July	20			3·94			84		
1858	Aug.	15			2·61			81		
1861	June	13			2·35			84		
1862	Sept.	13			2·44			88		
1858	Sept.	14			2·80			84		
1859	May	4			0·29			73		
1860	Aug.	19			3·79			85		
1862	July	22			3·87			83		
1859	June	11			2·04			78		
1859	Oct.	14	15·3		4·60	3·18		89	84	
1860	Sept.	14			1·92			87		
1859	July	14			2·76			81		
1859	Aug.	14			2·27			89		
1859	Sept.	17			5·23			82		
1861	Aug.	22			6·44			86		
1861	Oct.	14			3·34			90		
1862	Aug.	16			3·35			87		
1861	Sept.	19			5·27			88		

WINDS.

Year.	Month.	N.	Mean of each Sect.	Mean of the whole.	NE.	Mean of each Sect.	Mean of the whole.	E.	Mean of each Sect.	Mean of the whole.	SE.	Mean of each Sect.	Mean of the whole.	S.	Mean of each Sect.	Mean of the whole.
1860	Feb.	2·0			2·0			1·0			1·0			2·0		
1861	Jan.	2·0			1·0			3·0			3·0			4·0		
1862	Jan.	2·0			1·0			2·0			5·0			3·0		
1860	April	4·0			4·0			3·0			3·0			2·0		
1860	March	3·0			2·0			1·0			2·0			3·0		
1860	Jan.	2·0			3·0			3·0			4·0			4·0		
1858	Nov.	3·1			2·6			4·3			3·9			2·4		
1859	Dec.	4·0			2·0			2·0			3·0			3·0		
1862	Dec.	1·0			0·0			1·0			3·0			5·0		
1858	March	2·0	2·91		2·5	2·25		1·5	3·00		0·5	3·36		0·5	3·09	
1860	Dec.	4·0			3·0			4·0			7·0			3·0		
1862	March	2·0			4·0			9·0			4·0			2·0		
1857	Jan.	3·5			1·5			2·0			1·5			2·0		
1862	Feb.	2·0			2·0			4·0			6·0			3·0		
1857	Feb.	2·0			0·0			1·0			2·5			3·0		
1862	April	2·0			2·0			2·0			3·0			4·0		
1857	March	1·0			1·0			7·0			4·0			3·0		
1858	Dec.	0·8			0·4			3·2			4·1			4·8		
1859	Feb.	1·0			0·0			1·0			2·0			3·0		
1857	April	2·0			3·0			7·0			4·0			2·0		
1859	Jan.	1·0			0·0			0·0			1·0			3·0		
1861	Dec.	3·0			2·0			1·0			2·0			3·0		
1860	May	1·0			2·0			5·0			4·0			4·0		
1858	Feb.	2·0			2·5			4·5			6·5			2·5		
1859	Nov.	3·0			1·0			2·0			3·0			3·0		
1862	Nov.	2·0			1·0			2·0			4·0			4·0		
1859	March	2·0	2·15		1·0	2·00		1·0	3·17		1·0	3·14		2·0	2·80	
1857	Nov.	2·5			3·5			4·5			3·5			2·0		
1860	Nov.	2·0			3·0			8·0			6·0			2·0		
1862	May	1·0			2·0			3·0			4·0			5·0		
1861	Feb.	2·0			2·0			2·0			4·0			4·0		
1858	April	2·0			2·0			3·0			4·0			2·0		
1861	May	4·0			3·0			3·0			1·0			1·0		
1861	Nov.	4·0			3·0			2·0			1·0			2·0		
1857	Aug.	2·3			3·0			3·5			3·5			3·0		
1858	July	2·0			2·0			2·5			2·0			2·0		
				2·13			1·99			3·03			3·00			3·01
1863	April	3·0			3·0			3·0			3·0			2·0		
1859	April	4·0			3·0			5·0			2·0			1·0		
1863	March	1·0			1·0			1·0			2·0			3·0		
1857	May	1·5			4·0			8·5			4·5			3·0		
1858	June	0·5			1·0			2·0			3·0			4·0		
1860	June	2·0			3·0			4·0			5·0			4·0		
1857	Dec.	0·5			0·0			0·0			1·0			3·0		
1862	June	3·0			1·0			2·0			2·0			3·0		
1860	July	3·0			2·0			4·0			3·0			3·0		
1858	Jan.	1·3	1·93		0·5	2·02		0·5	3·03		2·5	2·61		3·0	2·86	
1857	June	2·0			4·0			6·0			4·0			3·0		
1857	Sept.	1·5			3·3			3·5			2·0			3·5		
1857	July	1·5			1·0			0·5			0·5			2·0		
1858	May	2·5			3·0			3·0			3·0			2·5		
1860	Oct.	2·0			1·0			1·0			2·0			4·0		
1857	Oct.	1·5			3·0			3·3			3·0			3·0		
1858	Oct.	2·2			2·8			2·1			1·2			1·5		
1862	Oct.	1·0			0·0			1·0			3·0			3·0		
1861	July	1·0			2·0			3·0			3·0			4·0		
1858	Aug.	2·0			1·5			2·0			3·5			3·5		
1861	June	2·0			4·0			7·0			4·0			3·0		
1862	Sept.	1·0			2·0			3·0			4·0			3·0		
1858	Sept.	0·5			0·5			2·0			2·5			2·5		
1859	May	2·0			3·0			6·0			5·0			4·0		
1860	Aug.	3·0			1·0			3·0			3·0			2·0		
1862	July	1·0			1·0			2·0			2·0			3·0		
1859	June	2·0			4·0			3·0			3·0			2·0		
1859	Oct.	3·0	1·58		3·0	1·72		4·0	3·00		4·0	2·88		2·0	3·28	
1860	Sept.	3·0			2·0			2·0			1·0			3·0		
1859	July	1·0			2·0			4·0			2·0			2·0		
1859	Aug.	0·0			0·0			1·0			1·0			5·0		
1859	Sept.	0·0			1·0			2·0			3·0			4·0		
1861	Aug.	1·0			0·0			1·0			1·0			4·0		
1861	Oct.	1·0			1·0			2·0			4·0			6·0		
1862	Aug.	2·0			2·0			3·0			3·0			3·0		
1861	Sept.	3·0			1·0			2·0			3·0			4·0		

Year.	Month.	SW.	Mean of each Sect.	Mean of the whole.	W.	Mean of each Sect.	Mean of the whole.	NW.	Mean of each Sect.	Mean of the whole.	Calm or Variable.	Mean of each Sect.	Mean of the whole.	Force of Wind in lbs.	Mean of each Sect.	Mean of the whole.
1860	Feb.	4·0			6·0			6·0			1·0			2·13		
1861	Jan.	8·0			5·0			2·0			3·0			1·33		
1862	Jan.	6·0			5·0			3·0			1·0			1·64		
1860	April	3·0			5·0			3·0			2·0			1·53		
1860	March	6·0			8·0			3·0			1·0			1·93		
1860	Jan.	5·0			4·0			3·0			2·0			1·78		
1858	Nov.	3·1			4·0			2·6			3·5			1·09		
1859	Dec.	6·0			4·0			4·0			3·0			1·67		
1862	Dec.	9·0			9·0			4·0			1·0			2·15		
1858	March	4·5	5·67		7·5	5·15		7·5	3·27		1·5	1·90		1·89	1·654	
1860	Dec.	2·0			2·0			3·0			3·0			1·37		
1862	March	3·0			2·0			1·0			1·0			1·36		
1857	Jan.	6·0			7·0			4·0			2·0			1·23		
1862	Feb.	3·0			4·0			2·0			2·0			1·36		
1857	Feb.	10·5			5·5			1·0			2·0			1·77		
1862	April	7·0			5·0			3·0			1·0			1·57		
1857	March	5·0			5·0			2·0			1·0			1·88		
1858	Dec.	8·9			6·4			1·9			2·2			1·80		
1859	Feb.	8·0			8·0			3·0			2·0			2·67		
1857	April	3·5			3·5			2·0			2·0			1·18		
1859	Jan.	11·0			10·0			4·0			2·0			2·95		
1861	Dec.	7·0			6·0			3·0			4·0			1·20		
1860	May	3·0			6·0			2·0			2·0			1·42		
1858	Feb.	3·5			1·5			2·0			3·0			2·80		
1859	Nov.	6·0			6·0			3·0			3·0			2·31		
1862	Nov.	6·0			4·0			3·0			4·0			0·90		
1859	March	8·0	5·97		10·0	5·44		3·0	2·86		1·0	2·58		3·19	1·630	
1857	Nov.	5·0			3·0			2·5			1·5			1·10		
1860	Nov.	2·0			2·0			2·0			3·0			2·09		
1862	May	6·0			6·0			2·0			2·0			1·27		
1861	Feb.	7·0			4·0			2·0			1·0			2·22		
1858	April	5·0			4·5			2·5			3·0			1·45		
1861	May	6·0			7·0			6·0			2·0			1·18		
1861	Nov.	7·0			6·0			2·0			2·0			2·36		
1857	Aug.	5·5			4·5			2·0			4·0			1·04		
1858	July	6·0			0·0			4·5			4·0			1·11		
				6·23			5·78			2·93			2·29			1·592
1863	April	3·0			4·0			4·0			3·0			1·13		
1859	April	3·0			4·0			5·0			3·0			2·33		
1863	March	8·0			9·0			3·0			1·0			2·64		
1857	May	4·5			2·5			0·5			2·0			1·79		
1858	June	7·0			7·0			3·0			2·5			1·36		
1860	June	4·0			3·0			2·0			1·0			1·28		
1857	Dec.	15·0			8·0			5·0			1·5			2·32		
1862	June	6·0			7·0			5·0			1·0			1·67		
1860	July	3·0			6·0			4·0			3·0			0·87		
1858	Jan.	10·0	6·72		8·0	6·22		4·0	3·08		1·0	2·12		2·06	1·737	
1857	June	4·0			2·5			1·5			3·0			1·63		
1857	Sept.	6·0			5·5			1·5			3·0			1·58		
1857	July	9·5			10·5			3·5			2·0			1·55		
1858	May	6·5			5·0			3·0			2·5			1·34		
1860	Oct.	8·0			8·0			3·0			2·0			2·34		
1857	Oct.	7·0			6·0			1·5			2·0			1·29		
1858	Oct.	7·5			7·0			4·0			2·7			1·90		
1862	Oct.	9·0			9·0			3·0			2·0			2·07		
1861	July	7·0			7·0			2·0			2·0			1·41		
1858	Aug.	6·5			5·0			3·0			4·0			0·99		
1861	June	3·0			3·0			2·0			2·0			0·88		
1862	Sept.	6·0			5·0			2·0			4·0			0·92		
1858	Sept.	10·0			7·0			2·5			2·5			1·01		
1859	May	4·0			2·0			1·0			4·0			0·84		
1860	Aug.	5·0			8·0			4·0			3·0			1·15		
1862	July	7·0			9·0			5·0			1·0			1·76		
1859	June	4·0			5·0			3·0			2·0			1·66		
1859	Oct.	4·0	6·57		4·0	6·53		4·0	2·64		3·0	2·58		1·63	1·346	
1860	Sept.	6·0			8·0			4·0			2·0			1·09		
1859	July	7·0			5·0			2·0			3·0			1·44		
1859	Aug.	10·0			9·0			2·0			2·0			1·38		
1859	Sept.	8·0			8·0			2·0			2·0			1·80		
1861	Aug.	10·0			10·0			3·0			1·0			1·92		
1861	Oct.	8·0			5·0			1·0			3·0			1·28		
1862	Aug.	7·0			5·0			2·0			4·0			0·82		
1861	Sept.	6·0			6·0			3·0			2·0			1·38		

TABLE **B.** Representing the Meteorology and the Death-rate (from all and several Causes at all Ages, and from all Causes at several Ages), in the consecutive order of the Months in each Year.

1857

Rate of Deaths per 100,000 living at all Ages.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Mean temperature,	33·7	39·5	39·2	42·7	49·8	57·4	59·0	60·9	56·1	49·6	43·7	44·9
Mean of the highest temperatures,	39·6	44·3	44·9	48·7	57·0	66·0	65·1	67·1	62·5	55·5	48·3	49·2
Mean of the lowest temperatures,	31·6	34·3	34·3	36·7	42·6	49·8	53·0	53·0	49·7	43·8	39·2	40·7
Monthly range of temperature,	7·9	5·0	10·6	12·0	14·4	16·2	12·1	14·1	12·8	11·7	9·1	8·3
Mean daily range of temperature,	8·0	10·8	9·5	12·0	14·4	17·2	14·1	14·1	12·8	11·4	9·1	8·3
Mean bt. of barom.: sea-level & 32°	29·936	29·840	29·936	29·707	29·920	30·026	29·852	29·664	29·982	29·960	30·115	29·989
Monthly range of barometer,	1·034	1·220	2·021	1·182	0·950	1·023	0·930	0·661	1·216	1·266	1·719	1·338
Number of rainy days,	16	11	16	16	15	9	15	10	15	16	12	14
Rain in inches,	1·77	1·24	2·94	2·35	1·66	2·79	2·17	1·87	3·82	2·16	2·89	3·47
Humidity (Sat. = 100),	87	89	86	84	80	81	80	85	87	90	90	88
Rain (Wind's Dir.)	3·5	0·5	1·0	3·0	1·5	2·0	1·5	2·0	2·5	2·5	2·5	2·5
	3·5	0·5	1·0	3·0	1·5	4·0	1·5	2·0	3·5	3·5	2·5	2·5
	2·0	1·0	7·0	7·0	8·5	6·0	0·5	3·5	3·5	3·5	4·5	6·0
	1·5	2·5	4·0	4·0	4·5	4·0	0·5	2·5	2·0	3·5	2·5	1·0
	2·0	5·0	3·0	3·0	3·0	3·0	3·0	3·0	3·5	3·0	3·0	3·0
	6·0	10·5	5·0	3·5	4·5	4·0	9·5	5·5	6·0	7·0	5·0	15·0
	7·0	5·5	5·0	3·5	2·5	2·5	10·5	4·5	3·5	6·0	5·0	8·0
	4·0	1·0	2·0	2·0	0·5	1·5	3·5	2·0	1·5	2·5	2·0	2·0
	2·0	2·0	1·0	2·0	2·0	3·0	2·0	4·0	3·0	2·0	3·5	1·5
	1·23	1·67	1·88	1·18	1·79	1·65	1·28	1·04	1·38	1·19	1·10	2·32
Deaths from all causes (all ages),	2332·2	2350·1	2350·0	2825·6	2199·3	2513·3	2705·2	2284·1	2100·6	2080·0	2383·3	2125·7
Do. from all specified causes,	243	289	240	234	210	203	202	214	204	198	220	205
Do. from zymotic diseases,	73	79	66	61	48	44	36	45	72	52	55	61
Do. from typhus,	10·1	11·0	11·8	13·8	9·0	8·2	8·8	2·7	8·9	15·0	13·8	12·0
Do. from scarlatina,	21·6	18·0	12·0	7·3	6·5	3·7	3·7	7·0	6·6	8·2	6·9	4·4
Do. from diarrhœa,	5·1	4·7	4·5	4·9	5·0	5·0	12·5	17·9	13·9	5·0	4·0	3·0
Do. from tubercular diseases,	4·0	4·0	6·6	5·1	4·3	4·6	4·2	4·3	3·7	4·5	4·0	4·0
Do. from phthisis pulmonalis,	27·0	26·2	33·5	37·2	31·4	33·0	32·4	27·9	23·5	24·0	27·0	29·4
Do. from diseases of resp. organs,	36	37	34	29	27	25	26	14	13	15	34	35
Do. from hydrocephalus,	16·1	19·4	14·6	12·4	11·7	12·0	8·8	5·6	5·4	8·6	18·2	16·4
Do. from premature birth,	19·6	9·0	16·5	8·7	10·1	8·3	8·7	6·6	7·5	10·2	9·4	15·3
Do. at 0–5 years of age,	124·6	122·0	116·3	109·0	100·2	90·7	100·8	114·3	111·0	93·6	101·4	94·0
Do. at 5–20 do.	21·0	22·5	23·8	24·4	23·1	20·9	19·6	19·1	22·9	19·1	19·4	19·4
Do. at 20–60 do.	48·3	62·7	67·7	79·6	61·0	61·4	54·6	59·3	51·3	57·4	61·9	59·6
Do. at 60, &c. do.	41·6	41·5	39·8	41·4	35·3	34·1	32·8	31·9	30·9	34·0	47·7	41·0

Rain (in inches) per 100,000 living at all Ages.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Mean temperature,	39·5	43·8	49·5	43·9	49·5	58·9	58·0	57·9	54·5	44·9	39·4	42·3
Mean of the highest temperatures,	44·0	49·1	55·5	51·6	58·4	67·1	65·8	64·5	61·4	51·9	44·4	44·0
Mean of the lowest temperatures,	34·6	39·5	43·6	36·1	42·1	50·7	48·7	49·9	47·2	38·4	34·7	40·7
Monthly range of temperature,	9·4	9·6	11·9	15·5	16·3	16·4	17·1	14·6	14·2	13·5	9·7	3·3
Mean daily range of temperature,	9·4	9·6	11·9	15·5	16·3	16·4	14·7	14·0	14·6	12·4	9·7	3·3
Mean bt. of barom.: sea-level & 32°	29·905	29·938	29·852	29·942	29·823	30·052	29·887	29·961	29·888	29·932	29·936	29·760
Monthly range of barometer,	1·241	1·427	1·087	1·434	1·033	0·702	0·941	1·003	0·997	1·497	1·872	1·297
Number of rainy days,	14	6	13	9	10	12	17	15	14	18	10	17
Amount of rain in inches,	2·08	1·13	1·93	1·16	3·91	2·56	4·38	2·63	2·10	4·72	2·38	4·60
Humidity (Sat. = 100),	86	83	85	78	81	78	83	81	84	87	89	90
Rain (Wind's Dir.)	1·5	2·0	3·0	2·0	2·5	0·5	2·0	2·0	0·5	2·2	3·1	0·8
	0·5	2·5	2·5	2·0	3·0	1·0	2·0	2·5	0·3	2·8	2·0	0·4
	0·5	4·5	1·5	5·0	3·0	2·0	2·5	2·0	2·0	2·1	4·5	1·2
	2·5	6·5	0·5	4·0	3·0	3·0	2·0	3·5	2·5	1·2	3·9	4·1
	3·0	2·5	0·5	2·0	2·5	4·0	2·0	5·5	2·5	1·5	2·4	4·8
	12·0	3·0	6·5	6·0	7·8	0·0	6·5	10·0	3·5	2·1	4·0	8·1
	8·0	1·5	7·5	4·5	5·0	7·0	6·0	5·0	7·0	7·0	4·0	6·4
	4·0	2·0	7·5	2·5	3·0	3·0	4·5	3·0	2·5	4·0	2·4	1·0
	1·0	3·0	1·5	3·0	2·5	2·0	1·5	4·0	4·5	2·7	3·5	2·2
Force of wind in lbs.,	3·36	1·00	1·39	1·45	1·34	1·26	1·11	0·99	1·08	1·20	1·09	1·80
Deaths from all causes (all ages),	2147	2227	2378	2272	2104	2193	2249	1993	1946	2033	2061	2300
Do. from all specified causes,	205	224	263	234	193	206	214	190	186	193	203	218
Do. from zymotic diseases,	82	83	96	45	43	36	62	56	41	39	76	77
Do. from typhus,	11·9	10·0	11·5	9·0	8·1	5·7	8·2	7·0	7·8	7·7	8·9	7·9
Do. from scarlatina,	3·5	3·6	3·7	3·9	2·5	3·4	3·7	4·9	11·3	17·5	29·6	36·6
Do. from diarrhœa,	4·6	4·2	3·5	3·0	3·7	7·2	11·1	9·4	11·8	5·2	4·8	7·8
Do. from tubercular diseases,	4·6	4·1	5·0	3·6	4·1	4·3	4·5	4·0	3·5	4·0	4·0	4·0
Do. from phthisis pulmonalis,	32·5	34·1	35·2	34·3	28·6	32·8	30·1	32·5	22·5	29·2	28·4	29·3
Do. from diseases of resp. organs,	35	36	47	32	26	29	25	18	21	29	32	39
Do. from hydrocephalus,	18·6	18·7	22·8	15·5	11·4	9·2	9·7	7·8	10·1	12·1	19·2	21·4
Do. from premature birth,	19·2	12·7	14·1	10·6	9·1	7·9	9·6	6·6	8·8	12·9	14·3	11·5
Do. at 0–5 years of age,	99·3	106·2	109·5	96·5	93·8	104·8	113·7	105·6	109·4	112·1	134·3	122·3
Do. at 5–20 do.	18·7	21·2	22·8	23·1	22·3	20·7	24·3	19·8	19·7	19·7	27·8	27·9
Do. at 20–60 do.	60·7	63·8	78·5	69·1	58·0	59·2	57·5	47·0	46·6	47·9	60·8	69·4
Do. at 60, &c. do.	34·9	43·7	46·9	36·1	33·9	37·4	36·1	30·2	32·4	36·0	36·8	44·9

Rate of Deaths per 100,000 living at all Ages.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Mean temperature,	39·5	39·5	41·3	45·4	49·1	57·2	59·8	57·4	53·7	49·5	38·5	38·0
Mean of the highest temperatures,	46·4	44·1	46·9	52·4	56·9	64·0	63·6	62·8	59·2	55·4	44·9	42·8
Mean of the lowest temperatures,	32·9	34·9	35·8	38·3	41·3	50·4	56·0	51·9	48·2	43·7	33·0	33·1
Monthly range of temperature,	13·5	9·2	11·1	14·1	15·6	13·6	7·6	10·9	11·0	11·8	11·9	9·7
Mean daily range of temperature,	13·5	9·2	11·1	14·1	15·6	13·6	7·6	10·9	11·0	11·8	11·9	9·7
Mean bt. of barom.: sea-level & 32°	30·168	29·931	29·907	30·171	30·001	29·961	29·623	29·778	29·723	29·936	29·944	30·022
Monthly range of barometer,	1·168	1·870	1·430	0·734	0·902	0·694	0·777	0·797	1·122	1·291	1·293	1·459
Number of rainy days,	14	15	22	9	14	13	20	12	19	14	19	13
Rain in inches,	2·49	3·32	3·03	1·04	1·37	2·35	3·94	6·44	5·27	2·54	4·63	2·88
Humidity (Sat. = 100),	86	85	86	83	80	84	84	86	88	90	87	90
Rain (Wind's Dir.)	2·0	4·0	2·0	0·0	2·0	2·0	1·0	0·0	0·0	2·0	2·0	4·0
	1·0	2·0	1·0	3·0	3·0	4·0	1·0	2·0	1·0	3·0	1·0	2·0
	3·0	2·0	1·0	3·0	3·0	7·0	3·0	1·0	2·0	2·0	2·0	1·0
	2·0	4·0	2·0	2·0	4·0	2·0	1·0	2·0	4·0	2·0	4·0	1·0
	4·0	4·0	3·0	1·0	1·0	3·0	4·0	1·0	2·0	4·0	1·0	2·0
	4·0	4·0	3·0	3·0	3·0	7·0	3·0	1·0	2·0	2·0	2·0	1·0
	3·0	4·0	2·0	3·0	4·0	3·0	2·0	1·0	2·0	3·0	2·0	1·0
	4·0	4·0	3·0	3·0	3·0	7·0	3·0	1·0	2·0	3·0	2·0	1·0
	4·0	4·0	3·0	3·0	3·0	7·0	3·0	1·0	2·0	3·0	2·0	1·0
	1·68	1·36	1·34	1·87	1·47	1·67	1·76	0·82	0·92	0·80	2·07	2·15
Deaths from all causes (all ages),	2296·6	2312·0	2367·2	2200·0	2284·6	2150·0	1932·5	1858·4	1953·8	2004·8	2247·2	2309·0
Do. from all specified causes,	239·6	248·0	252·9	243·6	251·7	271·6	249·3	238·4	195·2	209·2	231·2	255·2
Do. from zymotic diseases,	69·0	60·8	58·5	55·6	46·3	51·0	36·4	47·9	39·0	45·5	56·4	67·9
Do. from typhus,	11·1	9·6	10·1	5·7	5·1	5·1	2·8	3·4	3·2	4·7	9·3	9·3
Do. from scarlatina,	3·4	5·8	4·7	2·8	2·8	1·7	2·0	2·6	6·4	12·7	20·6	15·8
Do. from diarrhœa,	3·3	3·4	4·0	2·8	4·0	2·8	3·8	3·9	6·0	3·8	3·4	4·1
Do. from tubercular diseases,	4·5	4·2	4·8	3·9	3·8	3·4	3·7	3·9	3·4	3·8	4·0	4·2
Do. from phthisis pulmonalis,	31·3	30·6	34·4	35·1	35·5	36·9	27·9	23·4	16·5	19·2	24·3	24·7
Do. from diseases of resp. organs,	38	44	48	45	54	52	26	21	22	29	46	52
Do. from hydrocephalus,	17·3	31·0	31·8	25·2	19·8	20·1	15·7	13·5	15·0	19·8	31·0	34·0
Do. from premature birth,	9·8	6·9	9·0	10·1	8·9	7·3	7·5	7·2	7·0	5·1	7·8	10·1
Do. at 0–5 years of age,	130·6	116·9	115·5	113·6	96·5	103·8	83·1	74·5	91·7	103·2	104·3	124·0
Do. at 5–20 do.	20·0	22·7	24·7	23·0	26·9	32·6	23·6	19·9	18·4	17·7	21·1	23·5
Do. at 20–60 do.	84·5	89·0	92·1	85·3	82·6	92·4	82·4	85·4	67·0	80·8	82·4	87·2
Do. at 60, &c. do.	57·1	60·9	64·8	48·3	54·9	53·5	52·3	47·1	36·9	31·8	37·1	44·7

Rate of Deaths per 100,000 living at all Ages.

	Means of the several Years.			Mean of all the Years.
	1857.	1858.	1859.	
Mean temperature,	48·0	46·7	46·9	46·5
Mean of the highest temperatures,	53·9	53·2	55·7	52·3
Mean of the lowest temperatures,	42·1	40·4	41·1	40·4
Monthly range of temperature,	11·8	12·7	14·6	11·9
Mean daily range of temperature,	11·8	12·7	11·6	12·0
Mean bt. of barom.: sea-level & 32°	29·930	29·917	29·926	29·943
Monthly range of barometer,	1·216	1·289	1·666	1·263
Number of rainy days (total),	163	163	194	179
Amount of rain in inches (total),	30·36	37·37	45·07	38·31
Humidity (Sat. = 100),	85·6	85·3	86·4	85·3
Rain (Wind's Dir.)	29·3	23·0	28·0	24·9
	31·3	26·9	23·0	23·9
	47·0	33·9	32·0	36·6
	34·5	39·0	31·0	34·0
	35·5	34·0	40·0	36·1
	81·5	79·0	80·0	74·8
	62·3	78·0	72·0	69·4
	24·9	28·0	34·0	33·4
Force of wind in lbs.,	1·32	1·92	1·27	1·09
Deaths from all causes (all ages),	227·3	2127	2149	2237
Do. from all specified causes,	217·8	205·6	210·2	218·2
Do. from zymotic diseases,	59·5	57·9	67·0	55·4
Do. from typhus,	10·7	7·3	8·0	8·5
Do. from scarlatina,	8·6	13·7	5·5	8·2
Do. from diarrhœa,	9·2	8·4	5·7	5·2
Do. from tubercular diseases,	4·3	3·7	4·0	4·1
Do. from phthisis pulmonalis,	29·4	28·7	29·1	28·7
Do. from diseases of resp. organs,	29·2	23·3	24·2	31·6
Do. from bronchitis,	12·4	11·9	12·9	13·1
Do. from pneumonia,	8·3	7·6	8·4	8·9
Do. at 0–5 years of age,	104·4	97·5	96·0	104·5
Do. at 5–20 do.	22·1	22·6	21·3	22·7
Do. at 20–60 do.	61·2	59·0	62·0	61·3
Do. at 60, &c. do.	37·8	34·7	36·7	36·9

Rain (in inches) per 100,000 living at all Ages.

	Means of the several Years.			Mean of all the Years.
	1857.	1858.	1860.	
Mean temperature,	46·0	44·5	46·2	
Mean of the highest temperatures,	53·0	50·3	51·8	
Mean of the lowest temperatures,	40·2	38·5	40·4	
Monthly range of temperature,	12·8	11·8	11·3	
Mean daily range of temperature,	12·8	11·8	11·3	
Mean bt. of barom.: sea-level & 32°	29·916	29·785	29·921	
Monthly range of barometer,	1·279	1·444	1·210	
Number of rainy days (total),	161	132	109	
Amount of rain in inches (total),	30·92	37·08	45·39	
Humidity (Sat. = 100),	82·8	80·0	80·8	
Rain (Wind's Dir.)	22·1	24·0	22·0	
	23·3	28·0	20·0	
	39·6	42·0	34·0	
	36·7	41·0	42·0	
	31·2	35·0	41·0	
	82·5	73·0	74·0	
	60·9	64·0	73·0	
	29·5	41·0	35·0	
Force of wind in lbs.,	1·54	1·52	1·45	
Deaths from all causes (all ages),	225·5	244·2	229·2	
Do. from all specified causes,	215·3	205·8	226·4	
Do. from zymotic diseases,	55·5	59·1	54·5	
Do. from typhus,	8·6	7·3	7·5	
Do. from scarlatina,	9·5	13·8	4·0	
Do. from diarrhœa,	6·1	5·9	4·0	
Do. from tubercular diseases,	4·2	4·03	4·7	
Do. from phthisis pulmonalis,	29·5	32·4	30·1	
Do. from diseases of resp. organs,	31·5	43·6	30·0	
Do. from bronchitis,	13·6	16·6	15·6	
Do. from pneumonia,	10·7	11·0	7·5	
Do. at 0–5 years of age,	108·2	112·8	105·2	
Do. at 5–20 do.	22·3	18·8	23·3	
Do. at 20–60 do.	59·2	60·7	62·7	
Do. at 60, &c. do.	35·4	39·6	38·0	

TABLE C. In which the corresponding Months of the several Years are arranged in Groups.

Month.	Year.	Mean Temperature.	Mean of the highest Temperatures.	Mean of the lowest Temperatures.	Monthly Range of Temperature.	Mean of the Daily Range of Temperature.	Mean Height of Barometer at Sea level, and 32°.	Monthly Range of Barometer.	Number of Rainy Days.	Rain in Inches.	Humidity, Sat. = 100.	Winds: N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm or Variable.	Force of Wind in lbs.
January	1857	35·7	39·8	31·6	50·1	8·2	29·698	1·534	16	2·77	87	3·5	3·5	2·0	1·5	2·0	6·0	7·0	4·0	2·0	1·25
	1858	39·3	44·0	34·6	40·0	9·4	30·065	1·241	14	2·98	86	1·5	0·5	0·5	2·5	3·0	10·0	8·0	4·0	1·0	2·36
	1859	39·6	44·4	34·8	27·1	9·6	29·864	1·855	17	4·21	87	1·0	0·0	0·0	1·0	3·0	11·0	10·0	4·0	1·0	2·95
	1860	35·5	39·6	31·4	28·5	8·1	29·529	1·810	18	4·56	89	3·0	3·0	3·0	4·0	4·0	5·0	4·0	3·0	2·0	1·78
	1861	36·3	40·4	32·9	37·4	8·2	30·038	1·026	14	3·09	90	2·0	1·0	3·0	3·0	4·0	8·0	5·0	2·0	3·0	1·33
	1862	38·4	42·0	34·8	21·7	7·1	29·686	1·451	21	5·32	90	2·0	1·0	2·0	5·0	5·0	6·0	5·0	3·0	2·0	1·68
	Means	37·4	41·7	33·4	34·1	8·4	29·813	1·486	16·6	3·82	88·1	1·5	1·5	1·7	2·8	3·5	7·6	6·5	3·3	1·8	1·89
February	1857	39·3	44·3	34·3	56·0	10·8	29·840	1·289	11	1·54	89	0·5	0·0	1·0	2·5	5·0	10·5	5·5	1·0	2·0	1·77
	1858	35·8	41·0	30·5	49·0	10·7	29·998	1·427	6	1·13	83	2·0	2·5	4·5	6·5	2·5	3·5	1·5	2·0	3·0	1·80
	1859	40·5	45·4	35·5	29·0	9·8	29·709	1·375	17	3·35	88	1·0	0·0	1·0	2·0	3·0	8·0	8·0	3·0	2·0	2·67
	1860	34·0	39·2	28·6	35·0	10·7	29·932	2·079	13	2·69	85	5·0	2·0	1·0	1·0	2·0	4·0	6·0	6·0	1·0	2·33
	1861	39·5	44·1	34·9	29·7	9·3	29·681	1·670	15	3·32	88	2·0	2·0	2·0	4·0	4·0	7·0	4·0	2·0	1·0	2·22
	1862	40·1	44·4	35·8	31·2	8·6	30·052	1·402	11	1·88	89	2·0	2·0	4·0	6·0	3·0	3·0	4·0	2·0	2·0	1·36
	Means	38·2	43·1	33·2	38·3	10·0	29·869	1·540	12·1	2·32	87·0	2·1	1·6	2·2	3·7	3·2	6·0	4·8	2·6	1·8	2·02
March	1857	39·2	44·0	34·5	49·5	9·5	29·804	2·021	16	2·94	86	1·0	3·0	7·0	4·0	3·0	5·0	5·0	2·0	1·0	1·88
	1858	39·5	45·5	33·6	56·0	11·9	29·852	1·587	13	1·95	85	3·0	2·5	1·5	0·5	0·5	6·5	7·5	7·5	1·5	1·89
	1859	43·0	48·5	37·6	33·2	10·9	29·707	1·270	11	4·18	85	2·0	1·0	1·0	1·0	2·0	8·0	10·0	5·0	1·0	3·19
	1860	38·4	44·0	32·5	27·0	11·5	29·639	1·931	19	3·32	86	3·0	2·0	1·0	2·0	3·0	6·0	8·0	5·0	1·0	1·95
	1861	41·1	46·9	35·5	24·2	11·4	29·507	1·430	22	5·10	86	1·0	1·0	1·0	2·0	3·0	8·0	9·0	5·0	1·0	2·64
	1862	37·8	42·5	33·2	34·8	9·3	29·698	1·322	16	3·63	88	3·0	6·0	9·0	4·0	2·0	3·0	2·0	1·0	1·0	1·06
	Means	39·8	45·2	34·5	37·3	10·7	29·701	1·593	16·1	3·55	86·0	2·2	2·6	3·6	2·2	2·2	6·1	6·9	4·2	1·1	2·15
April	1857	42·7	48·7	36·7	46·0	12·0	29·767	1·142	16	2·38	84	2·0	3·0	7·0	4·0	3·0	3·5	3·5	2·0	2·0	1·18
	1858	43·8	51·4	36·1	61·0	15·3	29·942	1·434	9	1·86	78	2·0	2·0	5·0	4·0	2·0	5·0	4·5	2·5	3·0	1·45
	1859	41·3	48·7	35·2	39·0	13·5	29·751	1·289	15	3·20	80	4·0	3·0	5·0	2·0	1·0	3·0	4·0	5·0	3·0	2·33
	1860	41·5	48·9	34·0	32·2	14·9	29·978	1·860	10	1·18	82	4·0	4·0	5·0	3·0	2·0	3·0	3·0	3·0	2·0	1·35
	1861	45·4	52·4	38·3	34·0	14·1	30·177	0·734	9	1·04	83	3·0	3·0	5·0	3·0	2·0	3·0	4·0	4·0	3·0	1·13
	1862	44·6	51·5	37·8	39·7	13·7	29·881	1·204	14	2·99	83	3·0	2·0	2·0	3·0	4·0	7·0	5·0	3·0	1·0	1·37
	Means	43·2	50·3	36·3	41·9	13·9	29·916	1·277	12·2	2·11	81·7	3·0	2·8	4·8	3·1	2·3	4·1	4·0	3·2	2·3	1·53
May	1857	49·8	57·0	42·6	47·0	14·4	29·959	0·890	13	1·66	80	1·5	4·0	8·5	4·5	3·0	4·5	2·5	0·5	2·0	1·79
	1858	49·5	56·9	42·1	54·7	14·8	29·823	1·339	16	2·81	81	2·5	3·0	3·0	3·0	2·5	6·5	5·0	3·0	2·5	1·34
	1859	51·9	61·7	42·1	42·4	19·7	30·046	0·498	4	0·29	73	2·0	3·0	6·0	5·0	4·0	4·0	2·0	1·0	4·0	0·84
	1860	50·2	57·7	42·6	35·5	15·0	29·831	1·228	15	2·18	81	1·0	2·0	5·0	4·0	4·0	5·0	6·0	2·0	2·0	1·42
	1861	49·1	56·9	41·3	39·0	15·6	30·070	0·937	14	1·37	80	4·0	3·0	3·0	1·0	1·0	6·0	7·0	4·0	2·0	1·18
	1862	51·1	58·1	44·0	31·2	14·1	29·810	0·845	16	3·89	84	1·0	2·0	3·0	4·0	5·0	6·0	6·0	2·0	2·0	1·27
	Means	50·3	58·0	42·4	41·6	15·6	29·923	0·956	13·0	2·07	79·8	2·0	2·8	4·7	3·6	3·2	5·3	4·7	2·1	2·4	1·31
June	1857	57·4	66·0	48·8	66·5	17·2	30·020	1·039	9	2·79	81	2·0	4·0	6·0	4·0	3·0	4·0	2·5	1·5	3·0	1·65
	1858	58·9	67·1	50·7	47·0	16·4	30·032	0·702	12	2·36	78	0·5	1·0	2·0	3·0	4·0	7·0	7·0	3·0	2·5	1·36
	1859	56·6	64·7	48·6	35·3	16·1	29·934	0·652	11	2·04	78	2·0	4·0	5·0	3·0	2·0	4·0	5·0	3·0	2·0	1·66
	1860	53·0	59·7	46·5	27·5	13·3	29·674	1·102	18	4·34	85	2·0	3·0	6·0	5·0	4·0	4·0	3·0	2·0	1·0	1·28
	1861	57·2	64·0	50·4	32·3	13·6	29·961	0·694	13	2·35	84	3·0	4·0	7·0	4·0	3·0	3·0	3·0	2·0	2·0	0·88
	1862	52·4	58·7	46·0	27·3	12·6	29·733	1·074	20	3·99	83	3·0	1·0	2·0	2·0	3·0	6·0	7·0	5·0	1·0	1·67
	Means	55·9	63·4	48·5	39·5	14·9	29·892	0·877	13·8	2·98	81·5	2·1	2·8	4·7	3·5	3·1	4·7	4·6	2·7	1·9	1·41
July	1857	58·0	65·1	51·0	46·5	14·1	29·832	0·850	15	2·17	80	1·5	1·0	0·5	0·5	2·0	9·5	10·5	3·5	2·0	1·55
	1858	56·0	63·4	48·7	44·0	14·7	29·887	0·945	17	4·31	83	2·0	2·0	2·5	2·0	2·0	6·0	6·0	4·5	4·0	1·11
	1859	59·0	66·2	51·9	32·4	14·3	30·050	1·083	14	2·76	81	1·0	2·0	4·0	2·0	2·0	7·0	8·0	2·0	3·0	1·44
	1860	57·3	64·5	50·1	30·9	14·5	29·988	0·745	11	1·82	83	3·0	2·0	4·0	3·0	3·0	3·0	6·0	4·0	3·0	0·87
	1861	56·8	63·6	50·0	27·6	13·6	29·619	0·777	20	3·94	84	1·0	2·0	3·0	3·0	4·0	7·0	7·0	2·0	2·0	1·41
	1862	53·8	60·4	47·3	26·2	13·1	29·735	0·790	22	3·87	83	1·0	1·0	2·0	2·0	3·0	7·0	9·0	5·0	1·0	1·76
	Means	56·8	63·8	49·8	34·6	14·0	29·851	0·865	16·5	3·14	82·3	1·6	1·7	2·7	2·1	2·7	6·6	7·7	3·5	2·5	1·36
August	1857	60·0	67·1	53·0	53·0	14·1	30·014	0·661	10	1·87	85	2·3	3·0	3·5	3·5	3·0	5·5	4·5	2·0	4·0	1·04
	1858	57·9	65·9	49·9	52·0	16·0	29·943	1·003	15	2·61	81	2·0	1·5	2·0	3·5	3·5	6·5	5·0	3·0	4·0	0·99
	1859	57·8	65·2	50·4	30·7	14·7	29·850	1·167	14	2·27	80	0·0	0·0	1·0	1·0	5·0	10·0	9·0	2·0	2·0	1·58
	1860	54·4	60·8	48·0	27·1	12·8	29·575	1·080	19	3·79	85	2·0	1·0	3·0	3·0	2·0	5·0	8·0	4·0	3·0	1·15
	1861	57·4	62·8	51·9	25·1	11·0	29·774	0·797	22	6·44	86	1·0	0·0	1·0	1·0	4·0	10·0	10·0	3·0	1·0	1·92
	1862	56·0	62·3	49·7	26·4	12·6	29·885	0·944	16	3·35	87	2·0	2·0	3·0	3·0	3·0	7·0	5·0	2·0	4·0	0·82
	Means	57·2	64·0	50·5	35·7	13·5	29·840	0·942	16·0	3·39	84·0	1·5	1·2	2·2	2·5	3·4	7·3	6·9	2·7	3·0	1·25
September	1857	56·1	62·5	49·7	47·9	12·8	29·882	1·101	15	3·82	87	1·5	3·5	3·5	2·0	3·5	6·0	5·5	1·5	3·0	1·38
	1858	54·5	61·8	47·2	55·0	14·6	29·898	0·997	14	2·80	84	0·5	0·5	2·0	2·5	2·5	10·0	7·0	2·5	2·5	1·68
	1859	52·3	59·2	45·5	28·2	13·6	29·722	1·063	17	3·21	82	0·0	1·0	2·0	3·0	4·0	8·0	8·0	2·0	2·0	1·80
	1860	50·2	57·1	43·3	35·0	13·8	29·868	1·165	14	1·92	87	3·0	2·0	2·0	1·0	2·0	6·0	8·0	4·0	2·0	1·09
	1861	53·7	59·2	48·2	27·7	11·0	29·723	1·172	19	5·27	88	3·0	1·0	2·0	3·0	4·0	6·0	6·0	3·0	2·0	1·38
	1862	53·4	60·3	46·4	32·9	14·1	29·979	0·993	13	2·44	88	1·0	2·0	3·0	4·0	3·0	6·0	5·0	2·0	4·0	0·92
	Means	52·5	60·0	46·7	37·8	13·3	29·845	1·082	15·3	3·24	86·0	1·5	1·7	2·4	2·6	3·1	7·0	6·6	2·5	2·6	1·37
October	1857	49·6	55·3	43·9	47·0	11·4	29·803	1·246	16	2·36	90	1·5	3·0	3·5	3·5	3·0	7·0	6·0	1·5	2·0	1·29
	1858	44·9	51·0	39·2	32·9	12·4	29·892	1·687	18	4·72	87	2·2	2·8	2·1	1·2	1·5	7·5	7·0	4·0	2·7	1·00
	1859	45·8	51·8	39·8	43·8	12·0	29·667	1·236	14	4·60	89	3·0	3·0	4·0	4·0	2·0	4·0	4·0	4·0	3·0	1·63
	1860	46·0	51·4	40·5	29·6	10·9	29·784	1·261	22	5·14	87	2·0	1·0	1·0	2·0	4·0	8·0	8·0	3·0	2·0	2·34
	1861	49·5	55·4	43·7	30·9	11·6	29·936	1·201	14	3·34	90	1·0	1·0	2·0	4·0	6·0	8·0	5·0	1·0	3·0	1·28
	1862	47·1	53·4	40·7	32·8	12·7	29·620	1·872	19	6·32	88	1·0	0·0	1·0	3·0	3·0	9·0	9·0	3·0	2·0	2·07
	Means	47·2	53·0	41·3	36·2	11·8	29·784	1·417	17·2	4·41	88·5	1·8	1·8	2·3	3·0	3·3	7·3	6·5	2·7	2·5	1·75
November	1857	43·7	48·3	39·2	50·0	9·1	30·115	1·719	12	2·89	90	2·5	3·5	4·5	3·5	2·0	5·0	3·0	2·5	3·5	1·10
	1858	39·4	44·4	34·4	33·3	9·7	29·956	1·872	10	2·38	89	3·1	2·6	4·3	3·9	2·4	3·1	4·0	2·6	3·5	1·09
	1859	39·4	44·5	34·2	26·9	10·4	29·855	2·129	14	3·37	89	3·0	1·0	2·0	3·0	3·0	6·0	6·0	3·0	3·0	1·31
	1860	39·1	43·1	35·1	26·5	8·1	29·919	1·641	17	2·83	90	2·0	3·0	8·0	6·0	2·0	2·0	2·0	2·0	3·0	1·09
	1861	38·5	43·9	33·0	33·4	10·9	29·544	1·295	19	6·63	87	4·0	3·0	2·0	1·0	2·0	7·0	6·0	3·0	2·0	2·36
	1862	37·1	42·6	31·6	33·3	11·0	29·897	1·513	10	2·41	90	2·0	1·0	2·0	4·0	4·0	6·0	4·0	3·0	4·0	0·80
	Means	39·5	44·4	34·6	33·9	9·9	29·881	1·695	13·7	3·42	89·2	2·8	2·3	3·8	3·6	2·6	4·9	4·2	2·6	3·2	1·29
December	1857	44·9	49·2	40·7	38·0	8·5	29·989	1·338	14	3·37	88	0·5	0·0	0·0	1·0	3·0	15·0	8·0	2·0	1·5	2·32
	1858	39·9	44·0	35·7	25·2	8·3	29·703	1·297	17	4·00	90	0·8	0·4	1·2	4·1	4·8	8·9	6·4	1·9	2·2	1·80
	1859	34·0	38·3	29·7	35·5	8·7	29·651	1·853	15	3·66	88	4·0	2·0	2·0	3·0	3·0	6·0	4·0	4·0	3·0	1·67
	1860	34·1	37·9	30·0	40·8	8·1	29·709	1·426	17	3·91	90	4·0	3·0	4·0	7·0	3·0	2·0	2·0	3·0	3·0	1·37
	1861	38·0	42·8	33·3	30·6	9·5	30·020	1·459	13	2·98	90	3·0	2·0	1·0	2·0	3·0	7·0	6·0	3·0	4·0	1·20
	1862	41·8	46·2	37·4	22·7	8·7	29·767	1·204	21	5·20	89	1·0	0·0	1·0	3·0	3·0	9·0	9·0	4·0	1·0	2·15
	Means	38·8	43·1	34·5	32·1	8·6	29·806	1·429	16·2	3·85	89·2	2·2	1·2	1·5	3·3	3·3	7·9	5·9	2·9	2·4	1·75

DEATHS IN 100,000 LIVING AT ALL AGES.

Month.	Year.	At all Ages from all and different Causes: From all Causes.	From all Specified Causes.	From Zymotic Diseases.	From Typhus.	From Scarlatina.	From Diarrhoea.	From Tubercular Diseases.	From Phthisis Pulmonalis.	From Diseases of Respiratory Organs.	From Bronchitis.	From Pneumonia.	All Causes at different Ages: 0-5.	5-20.	20-60.	60, &c.
January	1857	253·2	243	73	10·1	21·6	5·1	40	27·0	36	16·1	10·6	124·6	24·0	63·3	41·6
	1858	214·0	203	42	11·9	3·5	4·6	46	32·5	33	18·6	10·2	99·5	18·7	60·7	34·9
	1859	243·4	235	79	8·6	20·4	3·1	38	26·8	32	17·6	9·9	125·8	22·7	60·7	35·6
	1860	280·8	273	72	10·8	16·3	3·4	45	31·3	59	36·0	14·0	131·2	27·4	79·1	42·8
	1861	304·1	298	67	7·8	14·5	2·9	45	34·8	73	46·8	13·5	125·0	25·9	88·6	63·6
	1862	296·6	291	69	11·1	5·4	3·3	45	31·1	68	47·3	9·8	130·1	25·0	84·5	57·1
	Means	265·3	257·1	67·0	10·0	13·6	3·7	43·2	30·6	50·2	30·4	11·3	122·7	23·9	72·8	45·9
February	1857	250·1	240	70	11·0	15·0	4·7	40	26·2	37	19·4	9·0	122·0	22·5	63·2	41·5
	1858	237·7	225	43	10·0	3·3	4·2	47	34·1	38	18·7	12·7	106·2	21·2	63·8	45·7
	1859	246·9	238	69	8·3	15·0	3·8	42	30·2	38	19·8	11·4	120·2	25·4	61·2	40·3
	1860	330·6	323	66	10·4	10·5	3·6	55	40·4	96	62·0	21·6	155·2	28·3	86·1	60·7
	1861	228·1	223	54	7·7	7·0	2·7	40	26·7	45	29·4	10·2	111·2	21·5	59·8	35·2
	1862	251·3	248	60	9·0	5·8	3·4	50	36·6	44	31·0	6·0	116·9	25·7	68·0	40·9
	Means	257·4	249·5	60·3	9·4	9·4	3·7	45·7	32·3	49·7	30·0	11·8	121·9	24·1	67·0	44·0
March	1857	250·0	240	66	11·8	12·0	4·5	46	33·4	31	16·6	8·7	116·3	25·8	67·7	39·8
	1858	257·8	243	46	11·5	3·7	5·5	50	35·2	47	23·8	14·1	109·5	22·8	78·5	46·9
	1859	232·0	224	57	8·8	11·2	3·3	44	31·6	27	14·8	7·1	108·4	21·6	66·3	36·0
	1860	283·2	276	57	9·2	7·7	2·5	52	39·1	63	41·2	15·0	131·2	26·9	76·2	48·4
	1861	220·2	215	48	8·4	6·1	1·8	47	35·3	37	23·1	9·3	102·4	24·0	60·2	33·4
	1862	256·7	252	58	10·1	4·7	4·0	48	36·4	48	31·8	9·0	115·5	24·7	72·1	44·8
	Means	249·8	241·6	55·3	9·9	7·6	3·6	47·8	35·1	42·2	25·2	10·5	113·9	24·3	70·2	41·5
April	1857	243·6	234	60	13·8	7·3	4·9	51	37·2	29	13·4	10·7	108·6	24·1	70·6	41·4
	1858	227·1	214	45	9·0	3·9	3·0	46	34·5	32	15·5	10·6	96·5	25·1	69·1	36·1
	1859	222·7	213	50	7·5	7·0	2·5	47	33·8	26	13·3	8·4	97·0	23·5	62·0	38·0
	1860	290·2	284	57	8·4	5·0	3·7	51	38·1	66	43·9	13·3	130·4	26·8	77·5	55·2
	1861	223·5	219	40	7·4	4·4	2·5	53	36·6	37	22·7	9·7	96·9	26·3	62·8	37·9
	1862	250·0	246	50	8·7	2·8	2·8	50	35·1	45	28·2	10·1	115·6	25·0	65·5	44·5
	Means	242·8	235·0	50·3	9·1	5·1	3·2	49·7	35·9	39·2	22·8	10·4	107·5	25·1	67·9	42·1
May	1857	219·3	210	48	9·0	6·5	5·0	45	31·4	27	11·7	11·1	100·2	22·6	61·0	35·3
	1858	210·4	192	43	8·1	2·5	3·7	41	28·8	26	11·4	9·1	95·8	22·3	58·0	33·9
	1859	193·5	187	45	8·8	5·3	1·1	43	31·9	22	10·0	7·4	83·1	23·4	56·8	30·5
	1860	240·0	236	45	8·1	5·8	3·4	53	39·5	41	26·8	10·9	103·5	23·3	70·3	42·9
	1861	225·4	218	46	11·4	2·6	2·7	47	34·6	36	22·1	9·6	102·2	25·1	65·3	32·7
	1862	228·4	224	46	9·1	2·8	4·0	50	35·5	34	19·8	8·9	98·5	26·0	67·6	36·0
	Means	219·5	211·2	45·0	9·1	4·2	3·3	46·5	33·6	31·0	16·9	9·5	97·2	23·8	63·2	35·2
June	1857	213·3	203	44	8·2	3·7	5·0	46	33·6	25	12·0	8·7	90·7	25·1	63·4	34·1
	1858	219·3	208	56	8·7	3·4	7·2	45	32·8	20	9·2	7·9	104·8	20·7	58·2	35·4
	1859	188·6	184	41	6·7	5·2	4·0	43	31·0	18	6·8	7·6	76·9	21·8	56·0	34·3
	1860	219·1	214	48	6·0	6·3	2·4	49	37·1	30	17·2	8·9	91·1	25·0	63·3	39·5
	1861	196·4	191	40	8·2	2·4	3·3	41	29·8	28	18·2	7·0	90·5	21·4	51·9	32·7
	1862	215·0	212	39	8·4	1·7	2·8	52	36·9	32	20·1	7·1	93·8	25·6	62·4	33·5
	Means	208·6	202·0	44·7	7·7	3·8	4·1	46·0	33·5	25·5	13·9	7·8	91·3	23·3	59·2	34·9
July	1857	210·5	202	56	8·8	3·7	12·3	47	32·4	16	5·8	6·6	100·3	20·9	56·6	32·8
	1858	224·0	214	62	8·2	3·7	11·1	45	30·1	23	9·7	9·6	111·7	24·3	57·5	30·1
	1859	181·3	175	43	5·8	6·1	7·2	42	29·6	13	6·0	5·9	84·6	18·9	48·9	29·1
	1860	214·8	210	51	5·0	7·2	6·4	45	31·3	27	14·2	8·9	101·8	24·7	58·4	29·9
	1861	204·4	200	47	6·0	3·6	6·5	45	30·7	22	11·5	7·2	95·3	22·9	53·2	32·8
	1862	192·3	189	45	10·2	2·0	3·8	39	27·9	26	15·7	5·5	83·1	23·6	53·4	32·3
	Means	204·5	198·3	50·7	7·3	4·4	7·9	43·9	30·3	21·2	10·5	7·3	96·1	22·5	54·7	31·2
August	1857	224·1	214	65	7·7	7·0	17·9	43	27·9	14	5·6	5·3	114·5	19·4	59·3	31·0
	1858	199·5	190	56	7·0	4·9	9·6	39	23·5	18	7·8	6·6	105·0	16·8	47·0	30·2
	1859	178·7	171	44	5·8	7·8	8·3	38	25·3	13	5·9	5·6	82·0	20·5	49·1	27·4
	1860	192·4	190	46	4·9	9·5	6·1	41	29·0	18	9·3	6·0	86·4	22·1	53·8	29·8
	1861	173·1	170	38	6·6	2·8	5·6	39	26·8	17	10·4	3·6	72·5	19·3	54·3	27·0
	1862	168·4	165	36	6·8	2·6	3·9	35	23·4	21	13·5	5·2	74·5	19·9	47·0	27·1
	Means	189·4	183·3	47·5	6·5	5·8	8·5	39·2	26·0	16·9	8·7	5·4	89·1	19·7	51·7	28·7
September	1857	210·8	204	72	8·9	6·6	25·9	37	23·8	13	5·4	5·4	111·0	19·1	51·3	30·0
	1858	194·6	186	61	7·3	11·3	11·8	36	22·5	21	10·1	8·8	105·4	19·7	46·6	22·4
	1859	177·7	171	56	7·2	15·1	8·7	31	22·1	14	6·8	3·5	80·0	21·2	48·5	28·5
	1860	182·5	179	56	5·0	18·6	6·1	34	22·4	15	8·9	3·6	90·7	20·9	47·0	23·9
	1861	165·0	162	36	5·7	3·4	5·2	31	21·4	18	11·2	5·5	74·2	16·8	45·0	28·6
	1862	195·9	193	47	7·2	3·0	6·0	39	26·5	22	15·0	5·0	91·7	24·4	53·0	26·9
	Means	187·7	182·5	54·7	6·9	9·7	10·6	34·7	23·1	17·2	9·5	5·3	92·2	20·3	48·6	26·7
October	1857	208·0	198	62	13·0	8·2	14·0	35	24·0	18	8·6	5·6	93·6	22·9	57·4	34·0
	1858	205·3	193	59	7·2	17·5	5·2	33	22·2	29	12·1	12·9	111·1	19·7	47·9	26·0
	1859	188·0	181	62	6·2	27·4	5·4	30	22·0	17	6·0	5·8	87·4	25·4	48·6	26·7
	1860	210·4	205	70	7·2	30·4	4·8	35	24·4	23	11·7	8·5	101·2	25·6	54·9	27·3
	1861	173·1	170	42	6·9	6·2	5·0	31	22·0	24	16·1	5·2	78·7	17·8	48·7	27·5
	1862	204·4	200	59	8·7	4·0	5·8	34	23·2	29	19·8	5·1	105·2	17·7	48·8	31·3
	Means	198·2	191·2	59·0	8·2	15·6	6·7	33·0	22·9	23·3	12·4	7·2	96·2	21·5	51·0	28·8
November	1857	231·3	220	55	13·8	6·9	6·0	40	27·0	33	18·2	8·8	101·4	20·1	61·9	47·7
	1858	266·1	253	76	6·9	29·6	4·8	39	28·8	52	29·2	14·5	134·3	27·8	60·8	43·0
	1859	236·0	229	70	8·5	26·8	3·3	36	28·0	33	6·8	9·4	107·8	23·6	63·4	41·5
	1860	230·0	222	71	6·1	27·0	2·3	38	27·2	34	21·7	9·2	109·3	23·9	62·9	33·7
	1861	224·5	220	54	10·9	7·7	2·9	36	25·3	42	28·8	8·5	101·7	17·7	60·2	44·6
	1862	234·7	232	69	8·5	7·0	3·4	33	24·3	46	31·7	7·9	114·3	21·1	62·4	37·1
	Means	237·1	229·3	65·8	9·1	17·5	3·8	37·0	26·7	40·0	22·7	9·7	111·5	22·4	61·9	41·3
December	1857	215·7	205	43	12·0	4·4	5·0	40	28·4	35	16·4	11·3	94·0	19·4	59·4	44·0
	1858	250·0	238	77	7·9	26·6	2·8	40	29·3	39	21·4	11·5	122·3	27·9	62·4	36·8
	1859	263·4	259	69	8·5	18·1	2·6	42	31·7	51	28·8	12·1	114·4	23·2	77·3	49·0
	1860	257·7	250	71	7·9	20·0	2·4	40	29·2	49	26·0	12·8	121·3	22·6	71·1	42·6
	1861	241·4	237	52	9·2	5·8	2·9	35	25·4	56	35·1	11·4	107·5	19·7	69·8	44·1
	1862	259·0	255	76	9·5	5·8	4·1	37	24·7	52	34·0	10·5	124·0	23·5	67·2	44·7
	Means	247·9	240·7	64·7	9·2	13·4	3·3	39·0	28·1	47·0	26·9	11·6	113·9	22·7	67·8	43·5

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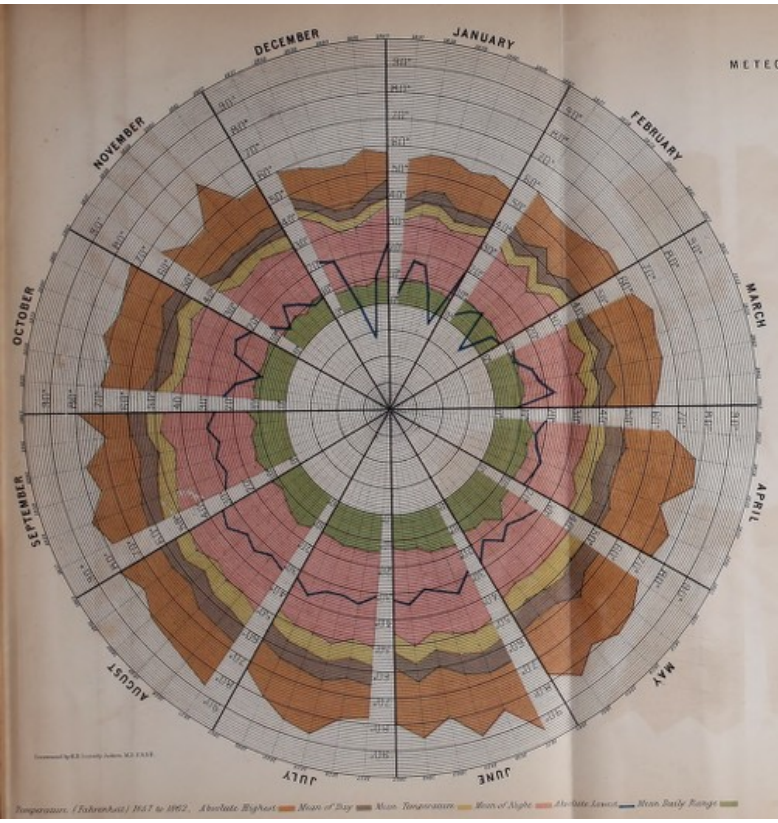
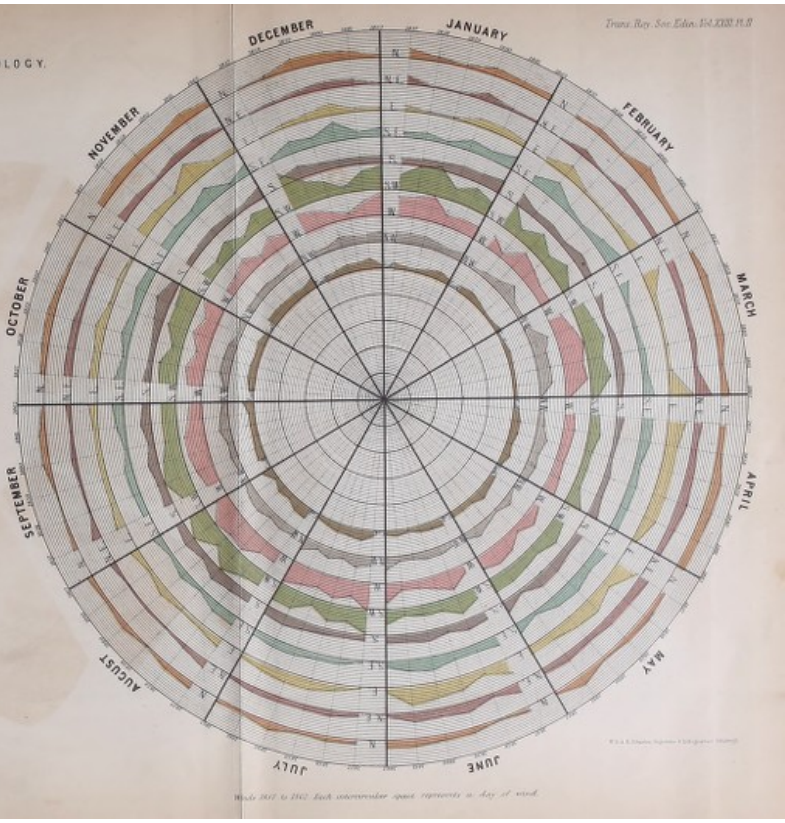
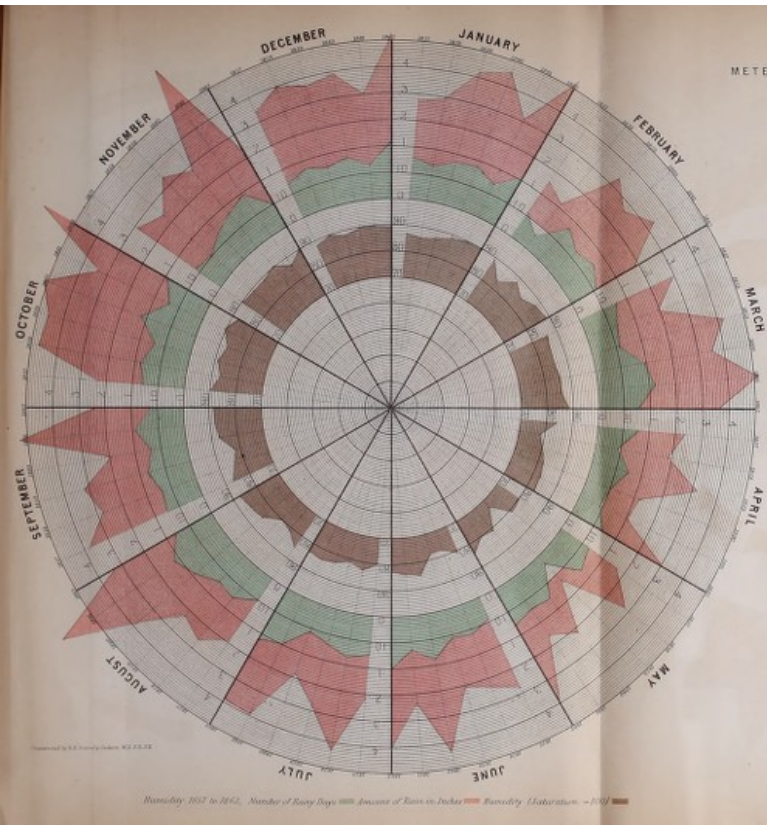


Temperature, (Fahrenheit) 1857 to 1862. Absolute Highest Mean of Day Mean Temperature Mean of Night Absolute Lowest Mean Daily Range

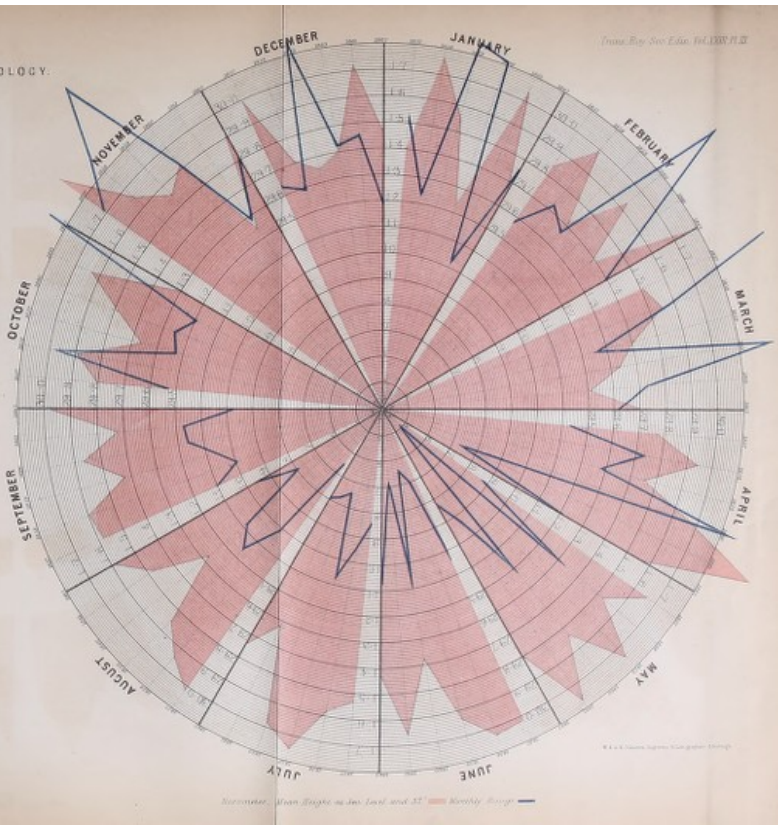


Winds 1857 to 1862. Each intermediate space represents an Amy of wind.

Trans. Roy. Soc. Edin. Vol. XXIV. Pl. XI.

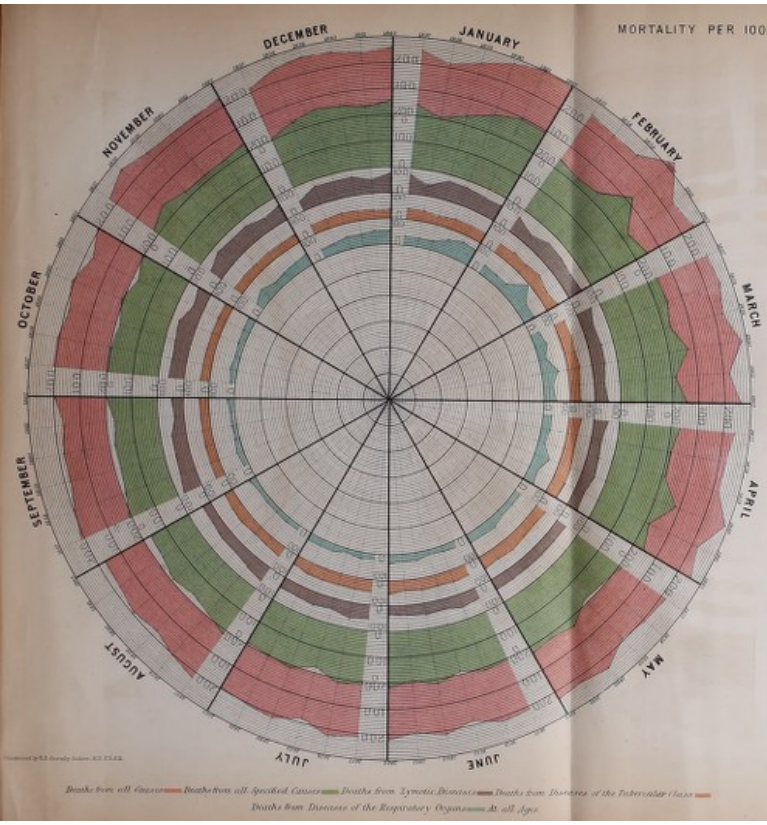


Humidity 1857 to 1862. Number of Rainy Days. Amount of Rain in Inches. Humidity (Saturation. = 100)



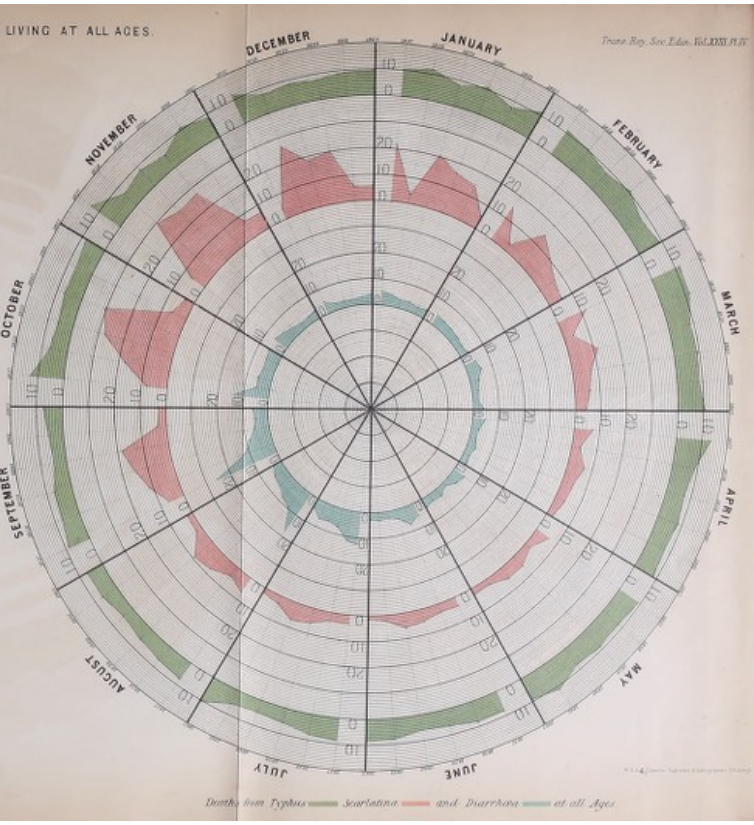
Barometer. Mean Heights in Inc. Lond. and 32° Monthly Range

MORTALITY PER 100,000 LIVING AT ALL AGES.

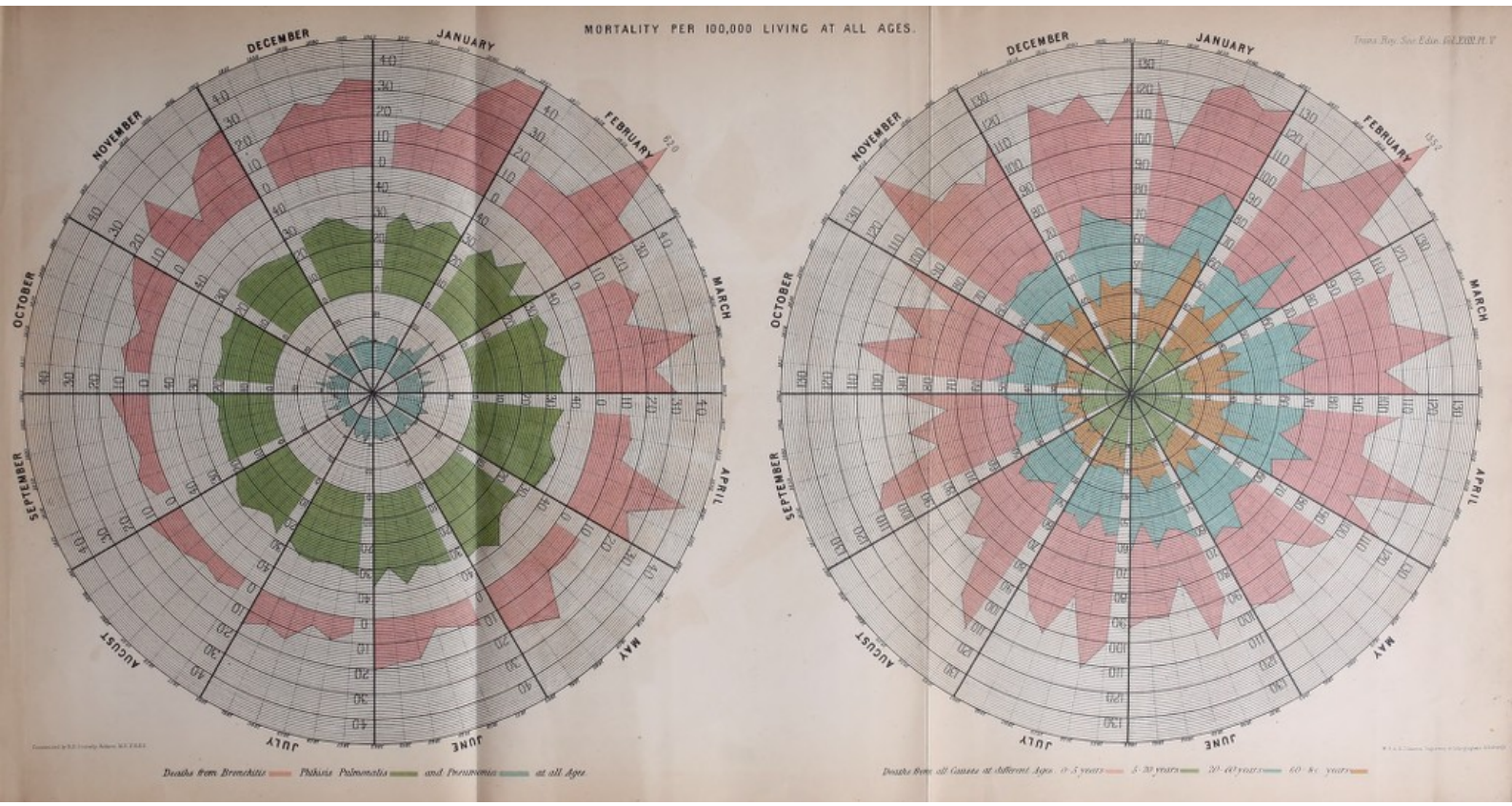


Deaths from all Causes — Deaths from all Specified Causes — Deaths from Zymotic Diseases — Deaths from Diseases of the Tubercular Class —
Deaths from Diseases of the Respiratory Organs — At all Ages.

Trans. Roy. Soc. Edin. Vol. XXII. Pl. IV.



Deaths from Typhus — Scarlatina — and Diarrhœa — at all Ages.


MORTALITY PER 100,000 LIVING AT ALL AGES.
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
Deaths from Bronchitis
Phthisis Pulmonalis
and Pneumonia
at all Ages
Deaths from all Causes at different Ages
0-5 years
5-20 years
20-40 years
40 &c years