

# SYMONS'S

## MONTHLY

# METEOROLOGICAL MAGAZINE.

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CXLIV.]

JANUARY, 1878.

[PRICE FOURPENCE  
or 5s. per ann. post free.]

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### OUR PAST.

WE believe that the last number of the first twelve volumes of this Magazine could scarcely be more appropriately occupied than by a summary of the leading subjects treated of during the past twelve years. The 143 numbers contain about a thousand articles; it is therefore obvious that only a very small proportion of them can be noticed, and that great brevity must be maintained if anything like a fair notion of the contents of the volumes is to be given.

Vol. I. (1866) commences with an article on the *Storage of Water* for country villages, with plans for accomplishing it, and with a lithographic illustration of the variation in the *depth of water in wells* sunk in different geological formations, and the effect of the rainfall thereupon. Other articles treat of *Minimum Temperature on Grass*, enquiring as to the proper length, and quality of grass, the size of the plot, &c., points still far from being satisfactorily defined. Mr. Cunningham, then Secretary to the Board of Northern Lights, sent a list of *Remarkably Low Sea-level Pressures* on December 31st, 1865, at twenty Scottish stations: they were all at or below 28·50 in.; they averaged 28·14 in., and at three of them (in the Hebrides and Orkneys) the pressure was below 28 inches. Another note suggests the possible *Periodicity of a Shower of Soft Hail* on March 8th. Under the title, *Equivalent Expressions of Wind Force*, are given tables of Lind's anemometer, the land scale 0-6, Beaufort's scale 0-12, velocity in miles per hour, and pressure in pounds per square foot. A code of rules is given for determining the *Temperature and Depth of Wells*, illustrated by a table, for 1864, of the temperature of eight wells in Scotland, and the air temperatures at the same stations. After a somewhat severe critique upon a little book entitled *Black Rain*, we have the rather celebrated letter of "A Lazy Man," asking for some *Simple Rule for Measuring Heights barometrically*, followed by several replies, notably Mr. Strachan's rule of multiply by 9, of which the latest form is that adopted in Mr. Symons's *Pocket Altitude Tables*. Details are given of the wonderfully beautiful *Meteor Shower* of Nov. 13-14th, 1866, when nearly 4000 must have been visible in a single hour. The last number of this volume contains, under the title *Cold*

*Winters*, a very full list of minimum temperatures during the frosts of 1838 and 1860, and a short one for 1867. It also contains a table of the *Lowest Temperature* in London and its suburbs, from 1794 to 1867.

Vol. II. (1867) contains further details of the *Frosts of the Present Century*, articles upon the *Measurement of Snow* and other points indicative of the *Low Temperature* then prevailing. A table gives a summary of seventeen years' observations on the *Direction of the Wind* at Linton Park, Kent. A list of nearly a hundred summers is given by Mr. Brumham, and the frequent repetition of similar seasons after a lapse of twenty-nine years is pointed out. A series of articles describe *Lind's*, *Robinson's*, *Casella's*, *Osler's*, and *Cator's Anemometers*. *Sausure's Hygrometer* is also illustrated. There is a long notice, with map, of the *Excessive Rainfall* on July 26th, 1867, when nearly five inches fell near Sittingbourne, in Kent. A *Storm* of exceptional violence occurred in the West Indies on October 29th, 1867, and details are given from Tortola, St. Thomas's, and Sombrero; the barometer is reported to have fallen two inches in  $2\frac{1}{2}$  hours at St. Thomas's, and 1.85 in. in two hours at Sombrero. On November 1st a *Cyclone* occurred in Bengal, and returns are given from Calcutta and other stations in that Presidency. An article discusses the question—"Is the *Royal Charter Gale* (Oct. 25th) periodic?"

Vol. III. (1868) commences with a continuation of the last-mentioned discussion. In a short note on the *Frost of January on the Continent* we find records of great intensity, e.g., at Montpellier the temperature is reported as steady at  $18^{\circ}$  F., and the houses and roads covered with snow. Among other subjects may be mentioned the *Climate of Sidmouth*, *Rainfall* in Sierra Leone, in Norway, on St. Bernard, in South Australia, in Abyssinia, in the South of France, and in the Mauritius. The Abyssinian war occurred during the publication of this volume, and one of the officers sent regular reports of temperature, &c. We notice here one of the many suggestions thrown out in these pages, and adopted by "the powers that be," viz., that the Kew certificates should carry upon them a caution as to the rising of the mercury in thermometers which depends upon their age. Among instruments mentioned we find *Cassella's Bifurcated Minimum Thermometer* and *Pastorelli's Altameter*, also the suggestion that a *Minimum Thermometer for Grass* ought to have an enamelled tube, to be divided on the stem, and the stem alone (not the bulb), enclosed in an exhausted tube. Nine years later this apparent impossibility was accomplished by Messrs. Negretti and Zambra. The July number contains two papers of more than passing interest, the first entitled, *Thunderstorms and Tidal Disturbances*, not only starts a question still unanswered, but also contains the first [or second (?)] notice of the "Pocky Cloud," which has since become well known. The second article gives an epitome of several investigations respecting the *Moon's influence on the Weather*. Details are given of the *Heat in July*, 1868, showing, by verified thermometers, temperatures on Glaisher and Stevenson stands ranging from  $95^{\circ}$  to

99°·9. In this volume we also have the commencement of the long enquiries by Messrs. Kesteven, Stow, Nunes, and Symons upon *Solar Radiation Temperatures*, which have led to the previously uncomparable instruments being succeeded by others which agree within a few tenths of a degree. We have also a series of articles upon *Thermometer Stands* with reference to the comparisons of them then in progress at Strathfield Turgiss. Three articles on *The Temperature of the Earth at great depths* give, firstly, a summary of the broad, general features of earth temperature, and, secondly, an account of the arrangements made for determining the temperatures in a well at Kentish Town, upwards of 1,000 feet deep.

Vol. IV. (1869) is largely devoted to descriptions of *Thermometer Stands*, but we find notices of *Rainfall* at Malta, New Zealand, Cape of Good Hope, Norway, Devonshire and Northumberland, and a table of *Time Intervals and their Equivalent Distances*, that is to say of the distances travelled by sound in every number of seconds from 1 to 70. An excellent letter, entitled *Pre-instrumental Meteorology*, unfortunately produced no result. We regret this so much that, after the lapse of eight years, we bring the subject again forward in case it may now receive that support which we thought, and still think, it deserves. We do not see that the subject could be more succinctly stated than it was by our correspondent, and therefore we do not hesitate to reprint his letter.

“PRE-INSTRUMENTAL METEOROLOGY.

“*To the Editor of the Meteorological Magazine.*

“SIR,—Will you allow me to raise the above subject for discussion in your pages? I cannot help thinking that very much is to be learned from old chronicles; although some of them were doubtless guilty of exaggeration, yet ‘in the multitude of counsellors,’ &c., and so if anything like a comprehensive collection was made, these faults would soon be detected. You stated (*British Rainfall*, 1868, p. 58) that one of your deceased correspondents had been comparing farm registers some two centuries old with contemporary rain returns, and had found a close accordance. I wish to suggest a similar course on a large scale, believing that many most important results could thereby be deduced. I wish some one to volunteer (I have not time myself) as superintendent, and I wish all your readers, each so far as in him lies, to assist. Vague suggestions generally produce poor results; I would therefore venture to suggest details, and that will be best done by an example. I recently borrowed from a friend a pamphlet, entitled ‘*Annals of the Diocese of Lichfield, Past and Present, being a Supplement to the Lichfield Church Calendar, 1861*’; therein I find a series of extracts from the oldest register of Ashley Church, two of which will serve as types of the whole:—

‘1614, Feb. 28th.—Predicta hiemalis intemperies a vicesimâ die Januarii a decimam quartam Martii.’

(A winterly severity of weather, as predicted, from the twentieth day of January to the fourteenth day of March.)

'1634, June 23rd.—Circiter occasum solis mirandus tonitruui fulguris et grandinis increbuit horror una cum pluviae immensâ copiâ circa Shrawardine in comitatu Salopiæ perierunt segetes plurimæ grandine demissæ longique labor periit initus anni.'

(About sunset there prevailed a wonderful and terrible storm of thunder, lightning, and hail, together with an immense quantity of rain, around Shrawardine, in the county of Salop. A great deal of corn was destroyed, being cut down by the hail, and the undertaken labour of the long year was lost.)

My idea is, that each of your readers should, before copying any extracts, send a line to the superintendent, and ask if the book they propose to search has already been undertaken by anyone else; this would avoid waste of labour. The superintendent or secretary should have some cards printed after this style:—

DEAR SIR,

The work you mention has.....been searched.

Yours very truly,

It would take very little time to fill in the word 'not,' when required; and by keeping an alphabetical list of books searched, it would be easy to be sure whether the 'not' should be inserted or omitted. All persons making extracts should write on one side of the paper only, and they should be very careful to give correctly the title, date, volume, and page whence each separate extract is made. The duties of the secretary would simply consist in sending the above-mentioned cards, and in filing the extracts in the order of their date. It would obviously be inexpedient to think of printing them until the collection approached completion.

I hope that it will not be asking too much if I request that you will receive offers of assistance in this matter, and I trust that none of your readers will refrain from offering their aid through mistaken ideas of the greater capability of others. It is pre-eminently a work in which all can and all should help, so far as in them lies.

"I am, Sir, your obedient Servant,

"K. C. T."

If any one doubts the utility of this undertaking we trust that he will write and say so, and we would then give the reasons which induce us to support it; but our own impression is so strongly in its favour that we do not at present occupy further space on its behalf, except to say that, while we should much prefer that some one with a little leisure should undertake the secretarial office, we would do it ourselves rather than that the scheme should fall through. Another neglected suggestion is the utility of *Well-constructed Wheel Barometers*, not, of course, as standard instruments, but as friendly monitors to the regular observer, telling him of the least change in the mercurial column and also the extremes reached during his absence. A series of articles entitled *Indications of the Sky* urge greater attention to the appearance of the clouds, and the use of the *Cyanometer*. A brilliant meteor occurred on Nov. 6th, and led to several articles upon *True Time* and, we believe, to

much greater care being bestowed by observers upon their time-keepers than had previously been the case. A good cheap clock beating seconds is, however, still a desideratum.

Vol. V. (1870) commences with an article upon, and engravings of, some *Remarkable Solar Halos* seen in Aberdeenshire, in which a hint is given which might perhaps with advantage be developed by some good physicist, viz., the various supplementary rings are numbered and the entire system, of which only fragments were seen at any one station, is completed. Various *Rainfall* returns are given, a translation of Prof. Raulin's paper, *Sur le régime pluvial du bassin Occidental de la Méditerranée*, being especially worthy of notice; it is accompanied by a map showing the mean fall in English inches at about fifty stations on, and near, the shores of the Mediterranean. The average is apparently under 30 inches, but it varies from 17 or 18 inches in East Spain to 51 inches at Genoa. Considerable space is occupied by records of the *Heat, Drought, and Thunderstorms* of 1870, and also by an examination of the *Squall of October 19th, 1870*, which, though of small diameter, traversed a large portion of England at an average velocity of 50 miles per hour. Full details are also given of the *Christmas Frosts of 1870-71*.

Vol. VI. (1871) commences with a series of *Thermometric Observations during the Eclipse* of December 22nd, 1870, but discussions of the question *How ought Temperature and Rainfall to be entered?* and on the amendment of the *Rules for Rainfall Observers* occupy much space. A description of the *Anemometric Results* obtained at Kensington by Mr. R. H. Barnes, is finished by that gentleman stating that although his anemometer was above all surrounding objects, still it was influenced by them, and that "to give anything like true results as regards velocity, an anemometer should be in a tolerably open country, and well raised above the ground on a narrow building." With this we cordially agree; but how many anemometers now at work (and it is nearly seven years since this was written) fulfil these conditions? Can any one refer us even to two strictly comparable anemometric registers? On March 17th a rather sharp *Shock of Earthquake* was felt across England and in North Wales, and Dumfries-shire; unfortunately the reports as to time are not sufficiently accurate to afford positive proof, but they seem to indicate that the shock emanated from North Lancashire. We hope that when the next one occurs every observer will try to report the *true time*. Several fine *Auroræ* occurred about this period, and one of them led to the following remark by Mr. Backhouse, of Sunderland:—

"The heights of auroræ seem to be very imperfectly known. I do not see why it should be so; if a systematic series of observations were made in distant places, I have no doubt our knowledge on the subject would soon be greatly increased. I, for one, should be very willing to co-operate in such an undertaking."

This suggestion is certainly worthy of adoption. The next subject mentioned is the *Periodical Return of the Seasons*, and a natural history

calendar, suggested by the Rev. C. H. Griffith, and now being carried out for the Phrenological Committee of the Meteorological Society by the Rev. T. A. Preston. Under the heading *Weather Maps*, a short sketch of such publications in this and other countries was given, and enquiry made, Why have we not a daily Weather Map of the British Isles? Not many months elapsed before the present Daily Weather Charts were first published. The only other papers claiming special notice are a series on *Dew Point and other Hygrometers*.

Vol. VII. (1872). On January 24th a very deep *Barometric Depression* passed across England from Cornwall to the Wash, yielding minima below  $28\frac{1}{4}$  inches at sea level at many stations, and one reading of 28.135, at Upwey, near Weymouth; the returns received were so numerous that they were handed over to the Meteorological Society, and a series of *Isobaric Charts for each consecutive hour* were constructed by Mr. Marriott and published by the Society. Under the heading *Another Meteorological Conference* is given a history of the Brussels Conference of 1853, and an analysis of Dr. Ballot's *Suggestions on a Uniform System of Meteorological Observations*. The *Thunderstorms* in the summer of 1872 seem to have been exceptionally violent, and much space is occupied by reports upon them. A rather long discussion occurred under the title *Heat as measured by Natural v. Artificial means*, in which it was suggested that the state of the crops was as well worthy of being recorded as that of the thermometer, and it was urged that records of the crops could be obtained for many places and years where no thermometric register had been kept. It is needless to point out that this falls in with the remarks we have already made upon the subject of *Pre-instrumental Meteorology*.

Vol. VIII. (1873) opens with an account of a *Barometric Depression* on January 20th, almost as remarkable as that on nearly the same date in the previous year; and the next number contains accounts of an equally rare *High Barometer*, reaching 30.82 in. at several stations. The *Report of the Leipzig Conference* having been published by Government, but the information being classified rather according to the speakers, than the subjects, it was condensed as much as possible and reprinted arranged according to subjects; this reprint occupies much space, but gives a very terse summary of the views of the leading meteorologists on many disputed points. There is an interesting discussion between Dr. Burder and the Rev. W. Clement Ley upon the terms *Cyclone and Anti-Cyclone*. On November 30th an extremely *Violent Whirlwind* occurred near Banbury; its effects were carefully examined and mapped by Mr. T. Beesley and Mr. Symons; full details of the phenomenon, as well as plans, are given. In a review of the Report of the Director of the New York Meteorological Observatory for 1872 we have the first notice of the scheme now adopted by the *New York Herald*, of sending *Storm Warnings for England from America*. After dealing with the project, the review finishes in the following words:—"It would be still better if the Atlantic Telegraph Company would grant the same privilege to meteorologists as

they have to astronomers, and allow Mr. Draper to send, free of cost, four words about three times in each month. All that would be required would be 'Storm due Feb. 8.' Six months' trial would be worth years of post-facto compilations." This suggestion has been carried out, and we should like to see an official report upon the result.

Vol. IX. (1874) commences with articles on the *Direction of the Wind in violent Storms*, and on the amount of incurvation of the wind in cyclones by Messrs. Meldrum, Birt, Clement Ley and others. The relation between estimated and actual *Wind Force* is quoted from a paper by Mr. Scott, published by the Meteorological Society. This is followed by a note *Concerning Anemometers and the real Force of the Wind*, in which the present system of perching anemometers "among and slightly above the chimney pots on a building of any shape, and any height above the ground," is vigorously condemned. Under the title of *Indian Meteorology in Parliament*, a report is given of Mr. Egerton Hubbard's speech upon the subject, which was speedily followed by the appointment of Mr. Blanford as meteorologist to the Government of India. The July number contains a long article on the *Water Supply of North Western Europe* during 1874, with tables of the rainfall in France, Belgium, Holland, and the British Isles. The same number contains the suggestion of holding a British Association Meteorological Breakfast, but it seems doubtful whether it should be continued or not, because though many seem to approve of it, scarcely any one exerts himself to extend, maintain or improve it. Description, with engraving, is given of the plan of correcting the *Barometric Error in Clocks* adopted by Messrs. E. Dent & Co. In a review of the report of the Meteorological Committee there is a strong protest against the interruption of the storm-warning system on Sundays, and, as most of our readers know, the service has since been continued daily without interruption.

Vol. X. (1875) begins with a long notice of Governor Rawson's work on *The Rainfall and the Sugar Crop of Barbados*, showing how closely the latter can be computed from the former. Much space is occupied by reviews, and among them is scattered a variety of information, *e.g.*, a complete meteorological summary for Archangel, an epitome of anemometric results for Modena, others of the climate of Senegal, of Fécamp, Trieste, and Bodenbach, Bohemia. *Redier's Barograph* is engraved and fully described; we regret that this cheap and effective instrument is not more used in this country; many are working well in France. An article with the title *Conferences and Congresses* calls attention to the various published reports of the proceedings at Vienna and Leipzig, and complains that the greater part of the time of the conferences had been spent upon observational questions, and little upon the really difficult problems of meteorology, and that much time had been spent upon points which a good optician could have settled in half a minute. At the end of June heavy snow fell on the north of the Pyrenees, and rain in the lower country

between there and Bordeaux, resulting in great *Floods in the South of France*, of which details are given, and attention is called to the desirability of establishing a system of warning respecting inundations similar to that in operation at Lyons. A full description is also given (with engravings) of a *Whirlwind at Baldock*. In July a *very heavy rainfall* passed over England and Wales, which is treated at length. Upwards of *five inches fell at several stations in twenty-four hours*. Under the title, *Extraordinary or Water Reflection Rainbow*, is given a summary of the descriptions of that phenomenon from the time of Descartes to the present day. In a review of a Canadian publication there is an appreciative note respecting the practice of the English meteorological office in printing on every publication a list of all the works it has issued; a bibliography of the publications connected with Toronto observatory is given, and the hope is expressed that others will follow the example of our meteorological office. We regret that the suggestion has not been adopted, in fact *Bibliographical Meteorology* seems to have no followers at all.

Vol. XI. (1876) has for its first article *Sunlight*, a review of M. Marchand's work upon that subject; then Mr. Ley follows with some notes on *Cirrus Observations*. *Barometrical Depression* on March 12th (London min. 28.447 in.), *Underground Thermometers*, and *Ocean Rainfall* are among the early articles; a very careful letter by Mr. Ley classifies, and specifies the conditions of, English *Thunderstorms*. The principal feature in the volume is the classified and illustrated description of the meteorological apparatus exhibited at the *Loan Collection of Scientific Apparatus at South Kensington*, which included barometer tubes reported to have belonged to Torricelli, the Magdeburg hemispheres, aneroids of nearly all sizes from 6 ft. diameter to half-an-inch, thermometers in endless variety (one reported to have been used by Galileo), rain gauges, hygrometers, anemometers, &c., showing, in fact, how terribly far we are from uniformity in meteorological researches. In the middle of August *Great Heat* prevailed, of which details are given showing maxima above 90° at several stations. A very violent whirlwind crossed the Isle of Wight on September 28th, which is reported under the heading *The Cowes Storm*. *Hail Storms—an Explanation needed*—calls attention to the fact that all hail insurance companies charge double rates for insuring crops growing within 12 miles of Somersham station, Huntingdonshire, and asks *Why?* To this no answer has yet been given. Is there any foundation for this surcharge? A *Low Barometer* on December 4th (London min. 28.364 in.) is reported, and attention called to the desirability of determining the cause and real amount of "barometric pumping" during gales. The floods of January, 1877, are chronicled under the heading *Floods, and a plea for Flood Marks*—a plea which has not met with so hearty a response as we desire.

Vol. XII. (1877). A long note *On Keeping a Meteorological Journal* points out the uses of so doing, and also the duties which those who do so ought to discharge, and sources of inaccuracy which require to



# HIGHEST TEMPERATURE AT THE ROYAL OBSERVATORY, GREENWICH.

In each Month of the 37 Years, 1841-1877.

Year.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.		Year.
	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	
1841	53.0	27	54.6	20	66.9	26	76.5	27	82.8	27	78.5	18	76.6	3	79.6	27	79.6	12	64.6	1	58.3	29	53.9	10	1841
1842	46.8	31	53.2	15	60.5	28	73.7	24	74.7	29	87.4	12	78.8	18	90.5	10	75.8	2	60.9	8	55.9	12	58.2	13	1842
1843	57.0	28	51.9	21	63.7	18	70.8	20	69.5	12	77.3	27	89.8	5	82.8	19	79.9	17	70.4	1	57.5	7	54.7	23	1843
1844	53.7	5	50.4	23	60.2	29	74.9	26	77.4	14	87.6	24	87.4	25	75.4	20	78.0	1	67.4	3	58.1	16	49.3	29	1844
1845	51.3	6	48.5	26	59.4	27	70.3	24	68.2	27	86.0	13	83.3	7	77.8	31	73.5	9	67.6	3	59.6	6	55.5	30	1845
1846	55.3	25	62.3	28	58.0	31	63.0	12	84.3	31	91.1	20	93.3	5	92.0	1	86.4	6	67.7	4	61.5	4	49.9	21	1846
1847	52.7	24	55.0	17, 18	64.2	17	63.8	12	86.2	28	80.4	2	89.4	12	87.7	1	72.5	11	74.4	12	67.3	8	59.5	7	1847
1848	50.4	3	55.0	24	71.5	31	74.6	3	83.0	15	79.0	15	84.5	14	74.7	3	80.5	22	73.6	6	57.3	21	62.4	10	1848
1849	56.4	14	58.0	22	60.7	17	64.3	30	75.0	5	80.7	5	84.1	8	82.5	9	79.0	6	69.7	19	61.7	11	56.3	15	1849
1850	53.1	25	58.2	15	58.0	31	66.9	7	76.5	31	85.1	23	87.0	16	81.0	5	70.5	2	64.5	7	61.3	2	56.5	15	1850
1851	56.5	1	57.1	18	58.4	20	64.1	17	74.2	29	87.0	27	84.4	2	82.0	12	76.6	1	70.1	10	53.4	1	54.8	10	1851
1852	55.5	16	57.4	2, 17	68.4	23	74.7	14	73.4	16	72.7	25	90.3	5	81.5	1	77.5	4	64.0	2	63.8	5	57.1	11	1852
1853	55.5	20	45.0	28	60.5	13	62.0	4	78.8	27	81.0	11	81.7	7	77.5	19	73.0	17	67.0	26	60.8	1	50.8	1	1853
1854	54.8	30	57.0	6	64.8	27	77.5	20	70.5	17	80.0	25	88.7	25	85.2	28	81.2	4	72.8	2, 5	61.6	1	55.0	14, 25	1854
1855	52.4	2	48.4	25	57.8	20	72.8	16	81.5	26	83.5	6	79.3	10	79.0	28	78.2	23	66.8	1	58.0	6	52.4	28	1855
1856	54.0	24	58.0	9	58.0	31	73.0	25	72.0	11	83.1	27	87.3	31	89.8	2	72.5	10	66.2	22	58.0	23	58.9	7	1856
1857	52.7	2	56.9	28	66.2	18	69.0	19	80.2	16	92.7	28	89.7	15	88.0	3	80.7	17	69.0	1	64.3	3	57.0	17	1857
1858	51.9	9	52.8	5	68.7	24	76.0	16	81.2	31	94.5	16	88.2	15	86.9	12	83.8	12	69.5	3	58.3	26	53.5	21	1858
1859	53.0	18	59.0	16	63.5	5	79.0	6	77.0	30	81.3	26	93.0	18	91.3	25	76.0	24	81.0	4	60.4	6	56.5	31	1859
1860	55.5	3	53.5	28	59.5	28	65.0	30	76.5	23	74.0	24	75.0	17	70.8	4, 16	69.7	7, 8	68.5	28	55.3	1	54.0	6	1860
1861	55.0	27, 29	56.0	17	61.8	24	63.5	12	80.2	23	81.8	19	76.3	1, 8	89.3	12	81.1	1	75.6	8	57.8	26	54.0	9	1861
1862	55.0	31	56.3	20	63.6	24	75.0	25	81.5	6	73.5	2	79.0	26	79.9	1	73.8	15	71.7	3	57.0	3, 4	57.1	7	1862
1863	55.2	29	55.7	28	64.0	3	69.3	20	79.7	29	84.0	3	86.0	15	84.9	9	71.8	19	66.5	4	60.8	4	54.2	3	1863
1864	54.0	27	53.8	13	58.0	4	73.8	20	81.0	18	78.4	7	85.6	20	88.6	5	75.5	8	67.2	19	54.4	28	53.7	5	1864
1865	50.2	10	52.7	28	58.7	31	81.5	27	78.5	21	87.6	23	85.0	15, 27	78.0	27	86.0	8	71.7	2	56.4	24	52.7	7	1865
1866	54.3	22	57.0	1	64.0	30	79.0	27	73.1	28	86.5	27	87.2	13	78.5	26	71.0	28	68.1	3	59.6	5	56.3	6	1866
1867	55.0	27	57.1	16	59.1	24	64.8	19, 23	83.6	7	82.1	12	81.5	5	89.0	14	79.9	1	64.8	14	64.0	1	55.2	1	1867
1868	51.9	14, 17	61.7	25	58.5	27	68.9	30	87.0	19	88.0	20, 27	96.6	22	90.5	5	92.1	7	66.6	12	57.1	1	57.8	6	1868
1869	55.9	31	61.6	5	53.6	5	79.1	14	70.5	26	87.5	7	90.9	22	89.0	28	80.0	5	73.9	9	58.8	15	55.8	16, 18	1869
1870	50.9	8, 14	55.6	28	61.1	2	78.7	20	85.4	21	90.2	22	89.7	8	81.0	1, 6	72.6	1	68.6	3	58.9	24	57.4	14	1870
1871	46.7	16	57.0	27	70.9	24	66.5	12	79.5	25	77.2	15	82.6	17	89.2	13	82.0	1	68.4	18	51.0	3, 15	48.8	19	1871
1872	52.7	31	57.9	9	60.8	7	69.9	12	73.2	28	86.0	17	90.9	25	81.7	17	81.4	3	66.6	2	61.8	5	55.4	22	1872
1873	53.8	10	50.1	26	64.6	29	76.8	15	70.9	26	81.2	27	88.7	22	87.3	8	72.5	27	75.1	3	55.2	3	56.3	16	1873
1874	55.0	20	55.9	28	65.4	23	79.7	23	77.6	22	83.7	2	83.0	9	81.2	19	78.1	25	69.6	1	62.6	6	53.3	6	1874
1875	53.7	20	51.3	15	57.4	8	71.5	30	81.9	15	83.3	4	77.5	29	85.4	16	81.0	18	68.8	5	58.5	4	54.5	22	1875
1876	56.1	31	59.0	18	64.7	31	70.2	8	73.6	21, 30	83.9	21	94.0	17	93.8	14	72.5	21	72.2	6	63.3	14	56.2	3	1876
1877	56.1	19	59.1	7	59.4	29	66.0	4	67.6	26	85.5	29	88.2	31	83.3	20	73.4	11	68.8	14	58.7	8	55.0	6	1877
Mean..	53.6	18	55.4	18	62.0	21	71.5	18	77.5	22	83.3	17	86.0	15	84.0	13	77.6	11	69.2	8	59.1	10	55.1	14	Mean..
Highest	57.0	1843	62.3	1846	71.5	1848	81.5	1865	87.0	1868	94.5	1858	96.6	1868	93.8	1876	92.1	1868	81.0	1859	67.3	1847	62.4	1848	Highest
Lowest	46.7	1871	45.0	1853	53.6	1869	62.0	1853	67.6	1877	72.7	1852	75.0	1860	70.8	1860	69.7	1860	60.9	1842	51.0	1871	48.8	1871	Lowest
Range.	10.3	...	17.3	...	17.9	...	19.5	...	19.4	...	21.8	...	21.6	...	23.0	...	22.4	...	20.1	...	16.3	...	13.6	...	Range..



# LOWEST TEMPERATURE AT THE ROYAL OBSERVATORY, GREENWICH,

In each Month of the 37 Years, 1841-1877.

Year.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.		Year.
	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	deg.	date.	
1841	4.0	8	12.4	3	29.5	1	31.8	10	41.2	13	40.3	15	44.3	12	45.5	12	36.6	5	32.2	21	22.6	16	24.3	18	1841
1842	23.2	23	26.4	18	29.9	23	28.0	5	36.4	9	44.7	2	45.5	6	47.5	30	41.1	21	28.3	20	31.1	5	30.8	27	1842
1843	24.0	2	20.3	14	26.5	4	27.2	11	35.4	6	42.9	4	44.6	23	47.2	10	34.0	28	28.5	18	27.4	12	25.6	12	1843
1844	18.8	2	20.0	13	24.1	5	33.4	7	33.9	17	43.4	2	47.1	16	42.8	27	34.8	29	30.8	22	27.4	26	21.1	6	1844
1845	24.4	31	7.7	11	13.1	13	29.5	6	34.4	10	43.8	28	44.6	29	43.2	1	33.4	23	31.4	25	26.6	3	28.0	12	1845
1846	29.4	4	26.9	10	26.5	20	33.3	20	38.3	15	49.4	1	49.1	25	47.5	13	39.2	29	35.0	28	23.4	29	18.0	30	1846
1847	24.0	10	11.2	11	16.9	10	23.0	16	36.1	2	41.4	8	45.4	23	42.3	3	33.1	27	33.0	25	24.5	19	25.0	21	1847
1848	16.8	28	30.2	18	28.0	4	30.3	27	34.5	1	39.7	3	42.7	1	43.1	9	33.2	13	33.1	31	25.9	5	22.4	23	1848
1849	19.9	3	23.5	13	27.7	25	26.8	18	36.4	12	38.6	14	39.5	1	42.4	5	42.7	18	31.5	10	23.5	28	18.8	29	1849
1850	22.0	8	30.0	14	20.0	26	34.0	29	31.7	3	36.2	16	43.5	10	40.0	22	39.0	7	31.5	27	27.9	15	24.2	21	1850
1851	26.6	24	23.7	17	29.8	9	28.6	6	33.5	5	38.5	1	38.9	5	42.2	31	37.6	10	34.7	17	24.3	19	24.9	27	1851
1852	28.1	5	24.9	21	21.3	5	26.7	10	29.3	3	41.0	1	49.2	23	49.9	4	37.9	17	31.0	17	32.6	25	31.7	1	1852
1853	30.8	19	20.5	19	20.8	25	32.3	25	32.6	11	39.9	4	48.3	1	45.8	18	37.5	27	31.7	3	25.8	23	18.0	29	1853
1854	13.5	3	23.5	14	24.6	3	28.3	25	34.8	19	41.4	1	44.0	29	43.0	18	37.9	29	31.3	27	25.9	27	26.5	11	1854
1855	16.2	19	11.1	19	24.5	10, 11	25.9	2	28.3	5	39.3	3	43.7	5	47.3	14, 30	34.1	27	35.0	28	25.7	16	16.9	22	1855
1856	24.3	15	27.5	1	24.7	30, 31	30.6	21	29.8	5	41.1	6	44.0	10, 3	45.0	23	40.0	20, 21	31.4	29	19.4	30	18.5	28	1856
1857	20.0	30	20.0	1	27.7	22	28.2	24	31.5	4	38.8	14	45.7	8	48.8	28	41.5	21	37.8	31	30.0	12	30.8	31	1857
1858	20.9	6	23.5	26	23.6	11	27.2	2	32.1	7	45.3	28	43.8	29	43.3	29	41.5	25	33.0	30	20.5	24	30.3	7	1858
1859	28.5	9	30.5	5	28.9	31	25.3	1	32.1	6	43.5	25	46.5	25	46.5	31	41.5	12, 20	26.5	24	25.5	14	14.0	19	1859
1860	27.5	28	23.2	11	23.5	10	28.2	11	32.5	7	43.5	6	41.6	5	45.5	7	35.7	12	32.4	12	28.5	3	8.0	25	1860
1861	16.0	8	24.4	12	29.1	14	26.8	21	33.4	9	42.9	10	48.4	11	46.2	31	37.7	27	39.6	29	23.2	19	23.5	28, 30	1861
1862	20.4	19	24.4	8	22.5	4	26.7	13	37.8	3	43.4	10	44.6	22	44.7	24	39.2	23	28.5	30	24.8	23	33.4	22	1862
1863	27.7	12	27.2	18	28.1	18	28.3	1	31.4	1	42.1	1	38.7	19	46.0	21	35.0	30	34.0	24	28.1	10	26.5	23	1863
1864	14.3	7	20.1	10	26.9	24	33.4	13	33.4	30	42.3	2	45.8	8, 15	38.1	27	40.9	12	37.5	6	25.9	10	17.3	18	1864
1865	19.6	22	15.5	15	23.7	21	31.9	2	31.4	1	41.2	12	47.0	12	43.2	3	40.2	23	33.5	20	31.0	5	29.2	24	1865
1866	23.7	13	24.2	18	22.5	1	34.2	5, 30	32.6	4	42.2	17	46.0	31	45.0	19	41.3	25	31.0	27	26.5	21	27.7	31	1866
1867	6.6	5	32.9	3	24.5	16	30.5	1	31.9	24	40.5	29	43.3	30	40.9	3	35.5	25	30.8	5	27.5	28	21.2	9	1867
1868	22.8	3	26.7	9	28.1	30	28.9	12	33.9	7	44.7	1	43.2	5	47.8	26	43.6	11	29.3	20	26.1	6	31.5	31	1868
1869	26.3	24	31.7	13	27.3	8	29.3	2	33.3	2	35.6	1	49.1	5	42.1	31	41.2	1	27.9	28	26.8	21	21.3	28	1869
1870	19.6	28	19.4	11	23.1	14	26.0	4	29.8	9	41.4	6	44.8	2	41.0	31	37.4	25	32.4	11	24.3	19	9.8	25	1870
1871	18.3	13	25.0	11	28.9	15	29.1	7	34.0	12	38.7	5	46.8	31	46.1	28	39.0	23	31.2	13	20.3	19	18.6	8	1871
1872	28.3	15	32.4	28	26.1	26	29.6	20	32.6	20	40.6	7	47.0	18	45.0	28	34.5	23	29.1	14	32.3	18	27.1	12	1872
1873	26.0	25	25.0	24, 25	27.2	14	28.7	26	34.0	20	42.0	7	46.4	19	47.9	29	38.2	22	26.7	29	25.8	13	22.1	10, 29	1873
1874	28.1	25	21.0	11	22.6	11	30.5	30	31.1	10	37.5	13	46.2	18	44.0	24	43.4	19	36.0	23	25.0	27	18.5	31	1874
1875	18.2	1	23.3	24	25.5	5	27.8	25	36.6	31	41.0	1	42.5	13	43.6	2	44.6	1	33.5	13, 17	28.3	30	23.3	5	1875
1876	17.4	8	21.8	13	25.5	19	29.2	12	31.5	3, 5	40.1	11	44.7	12	41.1	26	41.6	13, 18	34.5	31	25.5	10	28.3	23	1876
1877	27.7	21	24.7	28	23.5	1	32.1	20	28.1	4	44.2	7, 25	42.6	8	40.5	24	33.3	25	28.2	18	31.9	17, 26	28.7	28	1877
Mean..	21.7	14	23.2	14	25.0	15	29.2	14	33.3	9	41.4	9	45.0	15	44.4	19	38.3	20	32.0	21	26.3	18	23.3	21	Mean..
Highst	30.8	1853	32.9	1867	29.9	1842	34.0	1850	41.2	1841	49.4	1846	49.2	1852	49.9	1852	44.6	1875	39.6	1861	32.6	1852	33.4	1862	Highst
Lowest	4.0	1841	7.7	1845	13.1	1845	23.0	1847	28.1	1877	35.6	1869	38.7	1863	38.1	1864	33.1	1847	26.5	1859	19.4	1856	8.0	1860	Lowest
Range.	26.8	...	25.2	...	16.8	...	11.0	...	13.1	...	13.8	...	10.5	...	11.8	...	11.5	...	13.1	...	13.2	...	25.4	...	Range.



be avoided. Under the title *Governmental Meteorology*, the report of the Treasury Committee upon the administration of the meteorological office by the late Meteorological Committee is sharply criticized. Under the heading of *Easter at the Sorbonne* is given a report on the principal meteorological papers read at that meeting, and a notice of M. Alluard's observatory on the Puy-de-Dôme. A long paper on *The Climates of the various British Colonies* is printed in extenso. Among other subjects we may mention the *French Agricultural Storm Warning System, Sea Temperature and the Herring Fishery, Tornado of March, 1875, Sun Spots and Famines, the Climate of Brest, Anemometers, and Why are not Hygrometers as generally used as Thermometers?* A series of tables of *Greenwich Extreme Temperatures* extracted by Mr. Brumham for Mr. Mawley are given during the year, and some errors having been detected, they are reprinted in a compact form in the present number.

SUPPLEMENTARY TABLE OF RAINFALL IN DEC., 1877.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see Met. Mag., Vol. XI., p. 28., but the list is under revision.]

Div.	Station.	Total Rain.	Div.	Station.	Total Rain.
		in.			in.
II.	Acol .....	4.68	XI.	Llanfrechfa .....	4.45
	Hailsham .....	1.77		Solva .....	3.58
"	St. Lawrence, I. of W....	2.04	"	Castle Malgwyn .....	3.35
"	Andover.....	1.47	"	Carno .....	3.82
"	Strathfield Turgiss .....	1.57	"	Rhug, Corwen .....	3.13
III.	Addington Manor.....	2.06	"	Port Madoc .....	5.55
"	Oxford .....	1.76	XII.	Melrose .....	1.77
"	Northampton .....	1.67	XIV.	Cessnock, Glasgow .....	5.60
"	Cambridge.....	1.75	XV.	Gruinart .....	7.96
IV.	Sheering .....	1.85	XVII.	Keith .....	2.46
"	Ipswich .....	2.29	XVIII.	Dalwhinnie .....	5.01
"	Diss .....	2.13	"	Auchnasheen .....	...
"	Swaffham .....	2.03	"	Springfield, Tain .....	2.31
V.	Compton Bassett .....	2.06	XX.	Skibbereen .....	...
"	Dartmoor .....	4.99	"	Glennville, Fermoy .....	3.91
"	Teignmouth .....	1.63	"	Tralee.....	5.92
"	Langtree, Torrington ..	3.99	"	Newcastle W., Limerick	3.59
"	Cosgarne, St. Austell ...	4.08	"	Kilrush .....	4.55
"	Taunton .....	1.66	XXI.	Kilkenny .....	3.31
VI.	Bristol .....	2.02	"	Kilsallaghan .....	2.78
"	Sansaw .....	1.93	"	Twyford, Athlone .....	5.23
"	Cheadle .....	2.86	XXII.	Ballinasloe.....	4.39
VII.	Coston, Melton Mowbray	1.75	"	Kylemore .....	13.01
"	Bucknall .....	1.75	"	Carrick on Shannon....	4.20
V III.	Walton, Liverpool .....	3.79	XXIII.	Rockcorry .....	3.76
"	Broughton-in-Furness ..	7.15	"	Warrenpoint .....	5.11
IX.	Stanley, Wakefield .....	2.09	"	Carnlough, Larne. ....	...
X.	Gainford .....	1.55	"	Bushmills .....	4.14
"	Shap .....	5.43	"	Buncrana .....	4.78

## RAINFALL OF MUSWELL HILL &amp; LONDON COMPARED.

*To the Editor of the Meteorological Magazine.*

SIR,—The following comparison of the rainfall at Camden Square for the past year as given by you in the *Times* of the 3rd inst., with that here, may possibly be of interest to some of your readers. The distance between the two places is about three miles and a half, as the crow flies, and they are nearly North and South of each other; the summit of Highgate Hill very nearly intervenes. The excess of the rainfall here over that at Camden Square—3·91 inches, or about 14 per cent. on the total (28·17 in.) at the latter place—is no doubt chiefly owing to the greater elevation, Muswell Hill being about 200 feet higher than Camden Square—310 feet against 111 feet. The fact that this spot is considerably wooded may also partly account for the larger quantity of rain that falls. The second table, giving the totals of the six years 1872–1877 for the two places, shows that the difference ranges from 6 to 14 per cent., and averages 11 per cent. :—

	Total in Month.		Diff. from average Camden Square. 1860-5.	Diff. from average Muswell Hill. 1872-6.	No. of days Camden Square.	No. of days Muswell Hill.
	Camden Square.	Muswell Hill.				
January .....	4·74	5·01	+ 2·79	+ 2·49	25	25
February.....	1·78	1·80	+ ·56	+ ·24	17	20
March .....	2·38	2·69	+ ·30	+ ·81	20	21
April .....	2·59	2·94	+ 1·46	+ 1·56	16	18
May .....	1·91	2·41	— ·49	+ ·64	15	17
June .....	·42	·52	— 2·63	— 1·91	6	8
July.....	3·94	3·78	+ 2·15	+ 1·35	14	15
August .....	2·23	3·79	— ·41	+ 1·57	17	17
September .....	·83	1·07	— 1·43	— 1·85	10	11
October .....	1·97	2·08	— ·62	— 1·43	16	14
November .....	3·88	3·96	+ 1·47	+ ·91	22	23
December .....	1·50	2·03	·00	— 1·01	17	18
	28·17	32·08	+ 3·15	+ 3·37	195	207

The above shows that out of the twelve months the departure from the average has been alike in both places in nine months out of the twelve. In the three months where this is not so, May has a deficient total at Camden Square, whilst at Muswell Hill it was in excess. August is the same, the heavy rain at the latter place on the 25th of that month (1·14 in.) is alone sufficient to account for the difference, being more than double that of same date at Camden Square (·55 in.), that is to say that the same fall at the latter place would have brought the month's total above the average. December had just its average at Camden Square, whilst it was about an inch deficient at Muswell Hill. This discrepancy in these three months would not probably have occurred if it had been possible to compare the *same* years, but I

have not the returns of the *months* for 1872-6 at Camden Square at hand.

*Rainfall at Camden Square and Muswell Hill from 1872 to 1877.*

	Camden Square.		Muswell Hill.		Excess over Camden Square.		Per cent. (about).
1872.....	33·86	.....	37·91	.....	4·05	.....	12
1873. ... ..	22·67	.....	24·70	.. ..	2·03	.....	9
1874.....	18·82	.....	21·22	.. ..	2·40	.....	13
1875.....	28·44	.. ..	30·20	.....	1·76	.....	6
1876 .....	26·16	.....	29·55	.. ..	3·39	.....	13
1877.....	28·17	.....	32·08	.....	3·91	.....	14
Average ...	26·35		29·27		2·92		11

—I am, Sir, yours obediently,

J. W. SCOTT.

*Muswell Hill, Middlesex, January 5th, 1878.*

THE WEATHER AT CAMBRIDGE IN 1875, 1876 & 1877.

	1875.	1876.	1877.
Mean temperature.....	47°·7	48°·2	47°·4
Hottest by Day ....	August 16 80°	August 14 86°	June 18, July 31 77°
Coldest by Day .....	January 1 28°	January 8 28°	Dec. 25, 27 & 28 34°
Hottest by Night .....	Aug. 10, 16 & 17 60°	August 17 63°	August 20 64°
Coldest by Night ...	January 1 11°	January 11 18°	Feb 27 & 28 23°
Days on which the max. was at or under 32°.....	12	8	0
Nights on which the min. was at or under 32°.....	70	66	56
Mean of Barometer .....	29·85	29·87	29·98
Barometer highest.....	October 6 30·50	January 15 30·60	October 6 30·64
Barometer lowest .....	November 9 28·40	December 4 28·40	November 11 28·76
Rainfall .....	26·59 in.	24·63 in.	24·84 in.

J. NUTTER.

*Beech House, January, 1878.*

BROMLEY COMMON, KENT.

METEOROLOGICAL REPORT FOR YEAR 1877.

*Thermometer.* — Highest, 84° on the 31st July; Lowest, 21° on the 11th March.  
Mean maximum, 57°·7. Mean minimum, 41°·2.  
Mean of Year, 49°·5. No. of Frosts, 63.  
Greatest diurnal range 35° on May 8th.

*Barometer.* — Highest, 30·38 on the 19th Dec.; lowest, 28·50 on the 1st January.

*Rain*—Total fall, 34·28 in., being 6·22 in. above the mean yearly fall of 10 years.  
Most in 24 hours from 9 a.m. on the 11th to 9 a.m. on the 12th.  
November, 1·72.

No. of days on which more than ·01 fell, 188.

A. RAWSON.

## GREAT METEOR.

*To the Editor of the Meteorological Magazine.*

[Dr. Nicol, of Llandudno, favoured us with a notice of the violent explosion resulting from this meteor; it appeared to us better to forward the letter to Capt. Tupman, whom we knew to be investigating the subject. He has permitted us to print the following note.—Ed.]

SIR,—I am much obliged to you for communicating Dr. Nicol's observation of the great meteor of Nov. 23rd.

I have made out its path very satisfactorily from a great many fairly accordant observations. It began as an ordinary shooting star, 90 miles\* high, 5 m. N. of Derby, became wonderfully brilliant 50 m. over Liverpool, and burst at the height of 26 miles 15 m. N.N.W. of Great Orme's Head. From no less than 25 estimations of its duration, the velocity was between 18 and 19 miles per second. Assuming it to have been moving in the parabola deduced from the radiant point,  $63^{\circ} + 15^{\circ}$ , the actual velocity was 17 miles per second, a very satisfactory agreement, leaving no doubt that its orbit was sensibly parabolic.

The neighbourhood of Aldebaran has long been known to yield very large meteors about Nov. 21–23.

No comet has yet been discovered with elements similar to these. That of 1702 has similar elements except in the long. of the node, but from the very small inclination this discordance loses much of its significance. It is just possible these visitors may be stragglers from that comet.

Yours very truly,

G. L. TUPMAN.

1, Vanbrugh Park, Blackheath, Dec. 30th, 1877.

## WARM NIGHTS ON HILL-TOPS.

*To the Editor of the Meteorological Magazine.*

SIR,—The village in which I live is 700 feet above the sea level. It is supposed to be "Siberian" in its climate. To my surprise I find we have far less frost than our neighbours. As we rise on either side from the Valley of the Itchen, or the Wey, the amount of frost diminishes in a proportionately descending scale. When the geraniums in the gardens on the lower ground are entirely cut off, ours will remain often for many weeks untouched. Gilbert White tells us that he was "disturbed at this unexpected reverse of comparative local cold," when he found  $20^{\circ}$  less frost on the high ground at Newton Valence than at Selborne, which must be at least 200 feet lower. Such being an undoubted fact, may I ask at what elevation this would cease to hold good? Can you ascertain where about would be the limit of diminishing frost, supposing, I mean, our ground went on

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\* Nautical miles throughout, 6080 ft.



rising as on a mountain side? In other words, when does the height begin to produce *more* frost instead of *less*? And what do you consider to be the cause of this difference in the amount of frost on the higher and lower ground? Is it owing only to the difference in the amount of moisture in the atmosphere?—I am, Sir, yours faithfully,

A HAMPSHIRE HIGHLANDER.

January 4th, 1878.

### GREENWICH EXTREME TEMPERATURES.

The extreme Shade Temperatures of the month of December at the Royal Observatory, Greenwich, during the past 36 years.

Year.	Maximum.		Minimum.		Year.	Maximum.		Minimum.	
	deg.	date.	deg.	date.		deg.	date.	deg.	date.
1841	53·9	10	24·3	18	1859	56·5	31	14·0	19
1842	58·2	13	30·8	27	1860	54·0	6	8·0	25
1843	54·7	23	25·6	12	1861	54·0	9	23·5	28, 30
1844	49·3	29	21·1	6	1862	57·1	7	33·4	22
1845	55·5	30	28·0	12	1863	54·2	3	26·5	23
1846	45·9	21	18·0	30	1864	53·7	5	17·3	18
1847	59·5	7	25·0	21	1865	52·7	7	29·2	24
1848	62·4	10	22·4	23	1866	56·3	6	27·7	31
1849	56·3	15	18·8	29	1867	55·2	1	21·2	9
1850	56·5	15	24·2	21	1868	57·8	6	31·5	31
1851	54·8	10	24·9	27	1869	55·8	16, 18	21·3	28
1852	57·1	11	31·7	1	1870	57·4	14	9·8	25
1853	50·8	1	18·0	29	1871	48·8	19	18·6	8
1854	55·0	14, 25	26·5	11	1872	55·4	22	27·1	12
1855	52·4	28	16·9	22	1873	56·3	16	22·1	10, 29
1856	58·9	7	18·5	28	1874	53·3	6	18·5	31
1857	57·0	17	30·8	31	1875	54·5	22	23·3	5
1858	53·5	21	30·3	7	1876	56·2	3	28·3	23

Extremes in 1877, Max. : 55°·0 on 6th ; Min. : 28°·7 on 28th.

	Year.	Max.	Date.	Min.	Date.	Year.
Means of 36 years	...	55·1	14	23·3	21	...
Highest .....	1848	62·4	10	33·4	22	1862
Lowest .....	1871	48·8	19	8·0	25	1860
Range .....	...	13·6	...	25·4	...	...

Addiscombe.

EDWD. MAWLEY.

## DECEMBER, 1877.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.						Days on which ·01 or more fell.	TEMPERATURE.				No. of Nights below 32°	
		Total Fall.	Differ- ence from average 1860-5	Greatest Fall in 24 hours.		Deg.	Date.		Deg.	Date.	In shade	On grass		
				Dpth	Date.									
inches	inches.	in.												
I.	Camden Town .....	1·50	·00	·57	28	17	54·2	6	28·3	28	11	16		
II.	Maidstone (Hunton Court)...	2·29	+	·67	·70	28	13	...	...	...	...	...		
"	Selborne (The Wakes).....	2·62	—	·13	·71	28	16	52·0	6	28·2	25	8 12		
III.	Hitchen .....	2·02	+	·71	·59	28	20	49·0	29	25·0	var.	19...		
"	Banbury .....	2·13	+	·46	·62	28	19	51·0	6	24·0	26	15...		
IV.	Bury St. Edmunds (Culford)...	2·22	+	·73	·58	28	17	50·0	12	24·0	25	11 19		
"	Norwich (Sprowston) .....	2·07	...	...	·41	28	18	...	...	...	...	...		
V.	Bridport .....	1·69	—	1·68	·58	28	9	...	...	...	...	...		
"	Barnstaple.....	4·12	+	1·00	·80	28	28	54·0	30	32·0	15	...		
"	Bodmin .....	4·10	—	1·14	·68	5	23	56·0	6	31·0	28	2 4		
VI.	Cirencester .....	1·96	—	·33	·75	28	12	...	...	...	...	...		
"	Shifnal (Haughton Hall) ...	1·71	+	·03	·37	28	19	50·0	6, 22	24·0	25	16 22		
"	Tenbury (Orleton) .....	1·64	—	·82	·49	5, 28	17	54·0	29	23·8	25	13 16		
VII.	Leicester (Belmont Villas)...	1·73	...	...	·61	28	16	52·5	6	27·0	26	5...		
"	Boston .....	1·65	+	·16	·46	28	16	50·0	30	26·0	19	12...		
"	Grimsby (Killingholme) .....	1·92	...	...	·27	11	17	50·0	11	25·5	27	4...		
"	Mansfield .....	2·52	...	...	·57	5	25	50·5	6	24·0	26	11 19		
VIII.	Manchester .....	...	...	...	...	...	...	...	...	...	...	...		
IX.	York .....	...	...	...	...	...	...	...	...	...	...	...		
"	Skipton (Arncliffe) .....	6·59	+	2·04	1·12	30	23	48·0	6	19·0	26	10...		
X.	North Shields .....	2·15	—	·05	·63	30	17	55·3	22	25·0	25	9 13		
"	Borrowdale (Seathwaite).....	18·12	+	1·17	3·17	11	21	...	...	...	...	...		
XI.	Cardiff (Crockherbtown).....	...	...	...	...	...	...	...	...	...	...	...		
"	Haverfordwest .....	6·02	+	1·19	1·80	26	15	53·0	11	28·0	12*	11 15		
"	Aberdovey.....	4·42	...	...	1·24	28	23	52·0	6	33·0	2, 3†	0...		
"	Llandudno.....	3·88	+	1·68	1·03	30	23	55·5	12	34·4	26	0...		
XII.	Dumfries (Crichton Asylum)	4·10	+	·08	·85	28	19	50·8	7	24·0	27	10 17		
"	Hawick (Silverbut Hall).....	1·85	...	...	·35	11	21	...	...	...	...	...		
XIV.	Kilmarnock (Annanhill).....	5·45	...	...	·79	28	26	52·4	12	25·0	28	7 15		
XV.	Castle Toward .....	...	...	...	...	...	...	...	...	...	...	...		
XVI.	Mull (Quinish).....	7·78	...	1·61	12	23	...	...	...	...	...	...		
"	St. Andrews (Cambo Ho.) ...	2·30	...	...	...	...	...	...	...	...	...	...		
"	Grandtully.....	2·95	...	...	·70	11	12	...	...	...	...	...		
XVII.	Braemar .....	2·36	—	1·41	·37	5, 23	15	49·3	22	9·0	26	14 25		
"	Aberdeen .....	2·55	...	...	·39	6	19	52·2	22	19·9	26	7 26		
XVIII.	Gairloch .....	6·22	...	...	·68	9	26	...	...	...	...	...		
"	Portree .....	11·92	—	3·71	1·21	21	29	...	...	...	...	...		
"	Inverness (Culloden) .....	2·68	+	·75	·56	12	20	51·3	22	24·0	26	6 20		
XIX.	Helmsdale.....	3·20	...	...	...	...	...	...	...	...	...	...		
"	Sandwick .....	4·10	+	·13	·54	10	23	51·8	22	25·6	28	5 10		
XX.	Caherciveen Darrynane Abbey	7·03	...	...	·75	18	29	...	...	...	...	...		
"	Cork .....	4·02	...	...	·60	4	20	...	...	...	...	...		
"	Waterford .....	4·71	+	·29	1·05	5	16	53·0	6, 15	27·0	15‡	12...		
"	Killaloe .....	6·42	+	3·00	1·08	28	24	54·0	29	25·0	28	11...		
XXI.	Portarlington .....	3·12	—	·07	·41	28	30	53·5	10	27·0	2	14...		
"	Monkstown, Dublin .....	2·32	—	·30	·58	28	15	54·0	8	27·0	21	12...		
XXII.	Galway .....	...	...	...	...	...	...	...	...	...	...	...		
"	Ballyshannon .....	5·12	...	...	·51	7	25	...	...	...	...	...		
XXIII.	Waringstown .....	3·25	...	...	·65	28	24	57·0	22	26·0	26	15 23		
"	Edenfel (Omagh) .....	3·93	...	...	·56	28	27	50·0	17§	24·0	26	14...		

\* And 27th; + And 16th; ‡ And 28th; § And 22nd.

+ Shows that the fall was above the average; — that it was below it.

# METEOROLOGICAL NOTES ON DECEMBER.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

## ENGLAND.

**SELBORNE.**—Dull and foggy throughout the month, especially on the 19th and 20th. Much white frost on the 14th; S on the 25th and 28th, that on the 28th very heavy, but it all melted next day.

**BANBURY.**—A very foggy month, with several showers of S, sleet, or H. High winds on 23rd and 30th.

**CULFORD.**—A very dark and sunless month, with much fog and damp weather. On the 25th winter appeared to set in; a considerable depression of temperature took place, and S fell slightly; S also on the 26th, and again on the 28th; but this soon changed to R, and the weather again became damp and mild. The last day of the month (and year) was remarkably fine. The mean temp. was 39°, and Polar winds prevailed during five days.

**SPROWSTON.**—There was very little S during the month, but there were several frosts, some of them rather sharp; but on the whole the month was dull and wet, especially at its close.

**HAUGHTON HALL.**—The rainy weather of last month continued with short intervals throughout this, varied by a fall of S on the 25th (producing .37 in. when melted), following a rapid fall of the bar. of 1.13 in., which commenced on the 20th, when it was unusually high. Although frosts occurred on 22 nights on the grass, they were very slight, except on the 25th, when a min. of 21° was registered. Fog and mist frequent; high wind on the night of the 10th; the year closed with the finest day of the month.

**ORLETON.**—Cloudy, damp and foggy in general, with frequent light falls of R, and very few fine days, nevertheless the rainfall was much below the average. Frequent strong gales of wind, especially on the 6th, 12th, 22nd, and 24th. A deep fall of S on the evening of the 28th, and a rapid thaw the next morning. There were frosts on many of the nights, but the mean temp. of the month was more than half a degree above the average.

**LEICESTER.**—About 2 inches of S fell on the 26th, but it all disappeared after a heavy R on the night of the 28th. Weather mild for the season, with very little frost during the month, the mean temp. being 39°·9; bar. high in the middle of the month.

**BOSTON.**—A damp month, with frequent rather than heavy R; S on two days.

**GRIMSBY.**—A fine month on the whole, and the days not so dark as is often the case; dense fog on the 20th; S on the 25th.

**ARNcliffe.**—S on two days only during the month. Very rapid rise of bar. on the 1st, 1.10 in. in 24 hours.

**NORTH SHIELDS.**—A fine month on the whole, though there was frequent but not heavy R; fog on four days; S on the 24th, 25th, and 28th.

## WALES.

**HAVERFORDWEST.**—More fine days in this month than in the two preceding months; some fine frosty days about the middle and at Christmas time, followed by heavy rainfall on the 26th and 27th; at present there does not appear to be any sign of change in this dismal damp climate.

**ABERDOVEY.**—A mild but damp month; no frost or S in these parts; max. temp. in shade has averaged from 40° to 49°. A heavy fall of R on the 28th. Chrysanthemums in full blossom throughout the month; furze also here and there in fine bloom.

**LLANDUDNO.**—Weather dull and damp throughout the month, but mild, the temp. being about 2°·5 above the average; there was very little S during the month, but R was very frequent, and though the amounts were not large, the total is 1.68 in. above the average.

## SCOTLAND.

**DUMFRIES.**—The year closes with another wet month, but much drier than November; the rainfall and mean temp. are both above the average. A sharp frost, accompanied by a considerable snowfall, occurred on the 24th, but only lasted a few days. Winds as a rule have been light, with an easterly direction at the beginning of the month, S.W. and W. in the middle, and N. and N.W. towards the close.

**SILVERBUT HALL.**—There were six days, from the 22nd to the 28th, which were very wintry, but the month otherwise was one of the mildest for December seen here for many years.

**ANNANHILL.**—Barometric pressure in excess of last month; mean temp.  $3^{\circ}7$  degrees lower. Winds principally Westerly and South-Westerly; gales took place on the 6th, 11th, 13th, 22nd, 23rd, 24th, and 29th. A good deal of frost was registered during the month; T and L on the 13th, S on 24th, 26th, and 28th. On the 3rd a butterfly was caught in the garden.

**BRAEMAR.**—An unusually fine month for December. Lunar halo on the 19th.

**ABERDEEN.**—A month of rather fine weather on the whole, but with frequent high winds; there was a good deal of hoar frost at the middle and towards the close of the month; S fell on the 23rd, 24th, 25th, and 26th, that on the 25th and 26th being specially heavy; fog on the 2nd, 3rd, and 21st.

**PORTREE.**—A cold stormy month. Gale on the 6th from S., and on the 26th and 27th from W. with snow drift, which continued for 48 hours, such as has not been seen in this island for many years, however all the S disappeared by the 29th. The last of the corn was secured in the second week of the month in very bad condition; provender for cattle is very scarce.

**CULLODEN.**—First part of the month fine, with fog on the 10th and again on the 16th; some heavy R in the middle of the month, and from the 23rd to the 27th inclusive there were frequent showers of sleet and S.

**SANDWICK.**—A mild winter month till the 23rd, when the ground was covered with S, which remained till the 29th, when a thaw set in, and next day all the S was cleared off the plains. There were gales of from 50 to 60 miles an hour on the 6th, 11th, and 24th.

## IRELAND.

**DARRYNANE ABBEY.**—Gale on 6th from N.W., on 11th from S.W., and on 24th and 26th from N.; hail on 6th, 12th, and 13th. Except 1872 this has been the wettest year of the last eight, both in total fall and number of days.

**WATERFORD.**—Stormy on the 5th, lunar halo on the 15th and 16th, fog on the 18th, 20th, and 21st.

**KILLALOE.**—Rainfall for the month nearly double the average; a good deal of thick mist and heavy fog; there were some squalls, but no continuous or heavy gales; temp. high on the last three days of the month, and still continues so.

**MONKSTOWN.**—A variable month, with more frosty nights than usual, the intensity being, however, much less, as shown by many plants such as mignonette, tea roses, &c., being still in flower; S fell on 26th and 28th, but not in any quantity.

**BALLYSHANNON.**—The year has closed with continued wet and cold weather; during the last week the mountains have been covered with S, which has, however, now disappeared. The lands are saturated with wet, and in many cases unable to absorb it.

**WARINGSTOWN.**—Mild month, temperature much above the average; many summer bedding plants still alive; S on the 25th and 26th.

**EDENFEL, OMAGH.**—Continuous R, and almost continuous storms, varied by three days of frost, snow, and sleet, during the last week.

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