

# MANCHESTER, SHEFFIELD AND LINCOLNSHIRE RAILWAY,

RAIN GAUGE RETURNS, 1865.

[Totals Received February 19th, 1866.]

## DIVISION VII.

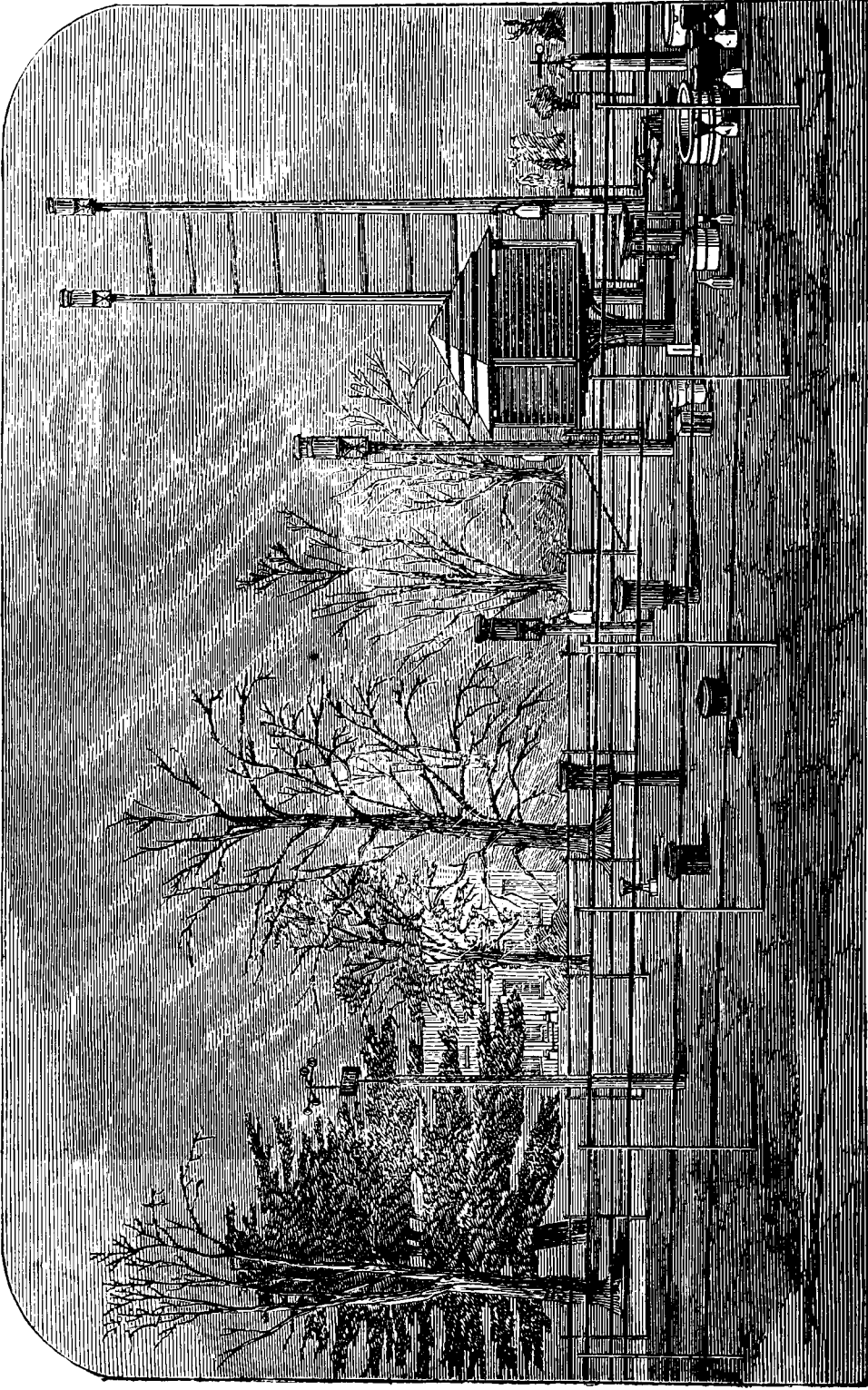
	inches.	days.		inches.	days.
Lincoln .....	20·82	80	Worksop .....	21·93	135
Gate Burton .....	23·84	144	Retford .....	21·86	105
Market Rasen .....	23·32	117	Chesterfield .....	27·09	93
Gainsborough .....	21·49	97	Norwood .....	24·41	146
Stockwith .....	21·06	101	Combs Moss .....	42·03	...
Brigg .....	25·17	123	„ Reservoir .....	42·82	152
Grimsby .....	21·84	112	Chapel-en-le- Frith .....	34·03	152
Barnetby .....	20·73	128	Woodhead .....	36·79	154
New Holland.....	22·76	164			

## DIVISIONS VIII & IX.

	inches.	days.		inches.	days.
Bosley Minns .....	25·79	98	Newton .....	24·56	161
„ Reservoir .....	26·43	130	Manchester, Piccadilly ..	27·27	147
Macclesfield .....	27·19	112	Fairfield .....	33·63	160
Bollington .....	29·65	...	Waterhouses .....	27·53	141
Whaley .....	35·81	163	Sheffield Station .....	26·81	160
Marple Aqueduct .....	28·07	160	„ Edge .....	29·91	171
„ Top Lock .....	30·10	152	Dunford Bridge .....	41·44	165
Mottram, Hill End .....	31·91	171	Carlcoates .....	51·96	142
„ Station .....	29·10	134	Penistone .....	26·73	107







EXPERIMENTAL GAUGES AT CASTLE HOUSE, CALNE.

[See p. 16.]

BRITISH RAINFALL, 1865.

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ON

THE DISTRIBUTION OF RAIN

OVER THE

BRITISH ISLES,

DURING THE YEAR

1865,

AS OBSERVED AT ABOVE 1000 STATIONS IN GREAT BRITAIN

AND IRELAND,

WITH REMARKS ON VARIOUS EXPERIMENTS,

AND ILLUSTRATIONS.

COMPILED BY

G. J. SYMONS,

*Member of the British and Scottish Meteorological Societies.*

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L O N D O N :

EDWARD STANFORD, CHARING CROSS. S.W.

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SIMPKIN, MARSHALL & CO., STATIONERS' HALL COURT,

1866.

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## BRITISH RAINFALL.

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In issuing this Sixth Annual Statement of the fall of rain in the British Isles, I have little to say by way of preface, except this, that I feel I ought somewhere (and perhaps nowhere more appropriately than in the forefront of the work) to tender my thanks to the very many who now supply the information on which it is based. By public bodies and private individuals, from the highest to the lowest, there is an ever-present readiness to help, which is gratifying in the extreme.

This, too, may be the place to pay the last tribute of respect to those removed by death from the list of contributors to "British Rainfall," 1865, among whom the familiar names of Admiral FitzRoy, W. C. Burder, Esq., of Clifton, and Dr. Barker, of Bedford, and others, hard workers, but not so generally known, will no more be found. But though the deaths have been unusually numerous, so many new stations have started, that the number now at work is greater than at any previous time.

G. J. SYMONS.

136, Camden Road, London, N.W.

February 5th, 1866.

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NOTE.—*February 17th.*—The returns from the Manchester, Sheffield and Lincolnshire Railway Company have not yet been received, although applied for over and over again. I do not know the cause of this great delay, but can only express my regret that I have waited for them, and promise to insert them in the number of the *Meteorological Magazine* issued next after their arrival.

# REPORT.

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IN reviewing, as has been my wont, the labours of the past year, I think it will be best to record the various matters pretty much in the order of their occurrence.

## DATE OF ENTRY OF RAINFALL, AND CLOSE OF RAIN MONTH.

The following paragraph appeared in "British Rainfall," 1864, page 12 :—

"A very knotty point is the date on which a fall is to be entered. For example, on January 17th, it began to rain in the afternoon, ceasing at 11 p.m.; this would of course be measured at 9 a.m. on the 18th; should it be entered against the 18th, or 17th? The British Meteorological Society, and Mr. Glaisher, say the 18th, the Scottish Meteorological Society say 17th. Believing that it is a matter on which uniformity is of more consequence than strict accuracy, I side with the former, and believe that in so doing I join a large majority of my observers; but as it is only supposition, it will perhaps be well to suspend any alteration by those who do otherwise, until the votes of the whole constituency can be taken."

This was objected to in the "Proceedings of the British Meteorological Society," vol. II., page 401, as follows :—

"There is, however, in this part one error which we are astonished so regular an observer as Mr. Symons should make. In order to make the matter clear, we quote the whole sentence, and add our own comments." [Here follows the above paragraph.]

"A rainfall ceasing at 11 p.m. on the 17th, is a rainfall belonging to the 17th, and *not* to the 18th, and should never be so considered, never has been at the Royal Observatory, and never by the British Meteorological Society. The practice of an observer reading only at 9 a.m. may throw doubts, and does create a doubt, as to whether the rain has fallen on the morning alone, or on the day before alone—that is before midnight, or on both days—this is usually cleared up by his notes. At Greenwich, every gauge is read daily at 9 a.m. and 9 p.m., and occasionally at midnight, and always at the end of the month; but this practice cannot be followed out generally. Some of the differences of monthly falls of rain when a heavy fall occurs on the last day of the month, are probably attributable to the practice of closing the



rain register at 9 p.m. on the last day, and allowing all that falls afterwards till 12 o'clock, to be credited to next month."

In reply to this I forwarded the following letter, which was published in the next number of the "Proceedings," page 423.

"DATE OF RAINFALL AND CLOSE OF RAIN MONTH.

*To the Editor of the Proceedings of the British Meteorological Society.*

"DEAR SIR,—Your astonishment at my error on this point is equalled by my own at being in error. If the practice of the observers of the British Meteorological Society is identical with that of their Scottish brethren, a material advance towards uniformity exists; and, as I said in the pamphlet, 'uniformity is of more consequence than strict accuracy,' so I will immediately adopt and recommend whichever is really the practice of the majority.

"You will doubtless allow me to explain why I said that the British Meteorological Society would enter a fall ending at 11 p.m. on January 17th, on the 18th. The head-lines of the Society's observation-forms run thus:—'At — a.m., local time, rain fallen in previous twenty-four hours;' that is to say, enter each morning how much has fallen since the previous morning. How can this instruct us to, or how can my fellow-observers, enter a fall between the afternoon and 11 p.m. on the 17th, on the 17th? Clearly it fell in the twenty-four hours previous to — a.m. on the 18th, not on the 17th. If the a.m. were absent, there might be doubt; but, as it is, I can come to no conclusion but that a fall occurring on the evening of the one day would be in the twenty-four hours previous to — a.m. on the next. This view is confirmed by the note, as to maximum and minimum temperatures on the back of the same form.

"It is important that no hasty decision be come to upon this matter, since it involves also the far more important point of the date of closing the monthly and annual rain record. Theoretically this should be midnight; but you truthfully remark, 'this cannot be followed out generally.' We must take things as we find them, and be guided by the general practice. Steps will shortly be taken to ascertain the hour at which each observer closes his or her return, and when the whole (about 1,100) have been classified, I will communicate the result to you.

"I wish this note to be as short as possible, but would just remark, that the practice of entering a fall on the date of measurement, is adopted both by Admiral FitzRoy in his daily 'Meteorological Reports' (where he gives 'Rainfall since last report'), and by Col. Sir H. James, R.E., in his 'Instructions for taking Meteorological Observations' Tables, page 34,—'Total quantity of rain on ground for the twenty-four hours previous to 9.30 a.m.'

"Leaving for the moment the British Meteorological Society out of the question, we have on one side, the Scottish Meteorological Society, on the other, Admiral FitzRoy and Col. Sir H. James.

"Yours very truly,

"G. J. SYMONS."

The following circulars were therefore sent to all observers on my list at the time of issue, May, 1865 :—

“SIR,—In ‘British Rainfall,’ 1864, on page 12, will be found the following paragraph—(*see above*).

“In pursuance of this suggestion, I have to request that you will be kind enough to fill and return the annexed form. It is obvious that the present want of uniformity—one observer closing his rain month at 9 a.m. on the last day, another at midnight, and others at 9 or 10 a.m. on the first day of the succeeding month—ought to be put an end to ; and I rely on the observers (by whose votes it is proposed that the question be settled) supporting their own decision when arrived at, so that in future our monthly totals may be more comparable than they have hitherto been.

“CLOSE OF RAIN MONTH.

“At what hour or hours do you measure the amount of rain ?

“Do you enter it against the day on which you measure it, or the preceding day ?

“What is the last hour of which the rainfall is included in each month’s total ?

“(Signed)”

These forms when returned were forwarded to G. Pigott, Esq., F.R.A.S., of Abington Pigotts, who kindly undertook to classify and report the result of the ballot, if I may so term this appeal to the votes of the observers.

The result may be very briefly told. More than half the observers observe at 9 a.m., and four-fifths observe between 8 and 10 a.m.; only 29 observe at midnight, and 17 at 9 p.m. It is therefore obvious that the minority of 18 per cent. (who moreover do not agree among themselves) should bow to the majority of 82 per cent., and make 9 a.m. their hour of observation. So much for the hour. The next question is, to which day is the fall to be entered ; to that on which it falls, or that on which it is measured. Two reasons appeared so strongly in favour of the latter course, that I was very glad to find the majority of the 82 per cent. did so record their fall. (1) The true end of the month being midnight on the last day, it is obvious that 9 a.m. on the last day is 15 hours too soon, and 9 a.m. on the first day only 9 hours too late, and that therefore, 9 a.m. on the first day is more accurate than 9 a.m. of the last, as 15 is to 9, or 5 to 3. (2) By the adoption of 9 a.m. on the first as the concluding observation of the previous month, and consequently entering the amount measured each morning to the previous day, the date of a rainfall will generally accord with the popular notion, that is to say, if it rains from 9 a.m. to 6 p.m., on say, the 8th, it will be measured on the 9th, but recorded to the 8th, the day it fell.

Having communicated the result of this investigation to Mr. Glaisher,

I received a reply from him agreeing to recommend *that 9 a.m. be adopted, and that the fall then measured be placed against the day preceding that on which it was measured*, but stipulating that when rain is known to fall between midnight of the last and 9 a.m. of the first of any month, a note to that effect should be added in the register. It is satisfactory to add, that I believe this suggestion will be generally adopted, and when fresh forms have been supplied by the Meteorological Society, it is hoped there will be few departures from uniformity of practice.

#### OLD RAINFALL OBSERVATIONS.

Postage and stationery being heavy items in conducting such a correspondence as mine, and being moreover anxious to avoid troubling my observers oftener than is absolutely necessary, I took the opportunity of enclosing with the above circulars an appeal for old observations, and the following form of queries :—

##### “ RAINFALL OBSERVATIONS.

“ I possess returns from *Beech Hill, Bury St. Edmund's*, for the years 1861 to 1864,

“ Can you supply me with any more—even odd months ?

“ Can you tell me of any person or place where observations are, or have been made, but which place is not entered in my annual tables ?

“ G. J. SYMONS.”

The proper filling-up of these circulars necessarily involved much trouble, and it was only through having the benefit of a regular and most careful assistant (paid by the Royal Society), that I was able to get everything into sufficient order to do so. Several hundred replies were received to these queries, and many most valuable old records obtained—these having been duly entered and classified—I undertook the compilation of a complete list of all places at which rainfall observations are ever known to have been made. This list formed, (with a concise history of rainfall investigations during the last two centuries) the main portion of my report presented to the British Association, at the Birmingham Meeting, in September, 1865. At that meeting a grant of £50 was made in aid of rainfall expenses, to a committee then appointed.

#### CIRCULARS TO THE NEWSPAPER PRESS.

At a meeting of that committee, it was resolved to send a copy of the following circular to every newspaper in the United Kingdom, with that portion of the above-mentioned list which referred to the county in which each paper was published ; hence of course there had to be different portions of the list for the papers of each county, and I

need hardly say, that as the daily and weekly newspapers now number over 1,400, the preparation and issue of these circulars was a long and most tedious process, every one passing separately through my own hands before issue. The following is a

*(Specimen.)*

*To the Editor of the Bedford Times.*

SIR,—I have to ask your readers' attention for a few moments to a request on the above subject, the importance of which in relation to engineering and drainage questions is well known. It is now some years since I began collecting returns of the fall of rain—with what success I will mention presently, but my main difficulty has been to find out the persons who keep such records, and one of the most obvious sources of assistance is the Public Press ; I now, therefore, ask from each and every journal in the British Isles their all-powerful aid. When the collection was first organized in 1860, scarcely 200 persons were known to observe and record the rainfall ; by steady perseverance, and the aid of a portion of the press, the number has been raised until there are now more than 1200 places whence returns are regularly received. Still I know there are many more, probably hundreds, who have either never heard of the establishment of a central dépôt to which copies of all rain records should be sent, or they have been too diffident to send them. It is of paramount importance to gather these, and make the tables yet more complete. I therefore beg leave through your columns to ask every reader to think for a moment if he or she knows of any one who keeps, or has kept, a rain-gauge ; or who has any tables of rainfall (or old weather journals) in their possession. And if they do know of such persons, I ask them on behalf of science, of my fellow-observers, and on my own behalf, to use every effort to secure their assistance, and to favour me with their names and addresses. We want old records, we want records for the present year, and from many parts of the country we want returns for the future, if a few persons will notify to me their willingness to assist, and to pay 10/6 for the very cheap and simple gauge now supplied.

To prevent needless correspondence I annex a list of the places in Bedfordshire, whence returns have been already collected for the years mentioned in the last column, and shall be very glad of any additions or corrections. Other counties, or the complete list for the whole country shall be sent to any one willing to make good use of it. I may add that an influential committee of the British Association has been appointed to superintend and assist in my investigations, and that they cordially support my present application.

I am, Sir,

Your obedient Servant,

G. J. SYMONS.

· 136, Camden Road, London, N.W.

The committee consists of J. GLAISHER, Esq., F.R.S., Lord WROTESLY, F.R.S., Prof. PHILLIPS, F.R.S., Prof. TYNDALL, F.R.S., Dr. LEE, F.R.S., J. F. BATEMAN, Esq., F.R.S., R. W. MYLNE, Esq., F.R.S., and myself.

## BEDFORDSHIRE.

Station.	Elevation.	Observer.	Period.
Ampthill .....	...	W. S. Slinn, Esq...	C 1865-
Bedford (Britannia Farm) .....	...	Mr. T. Bowick.....	C 1865-
+ „ (Harper Street) .....	112	Dr. Barker .....	C 1851-
„ (Observatory).....	...	Admiral Smyth ...	1831, 1833-38.
„ (Cardington Staff gauge) .....	100	Mr. M'Laren .....	C 1846-
„ (Obs. gauge) .....	100	„	C 1848-
„ (36 ft. + ground).....	136	„	C 1848-
„ (Sharnbrook).....	...	R. S. Stedman, Esq.	
Potton (Sutton Park) .....	...	Sir J. M. Burgoyne	C 1864-
Stotfold [Baldock] .....	220	W. Denne, Esq. ...	1864-
Woburn (Apsley).....	460	Rev. G. W. Mahon	C 1856-

I have much pleasure in stating that these communications were very generally published, so that the subject was fully brought before the notice of the inhabitants of the British Isles ; upwards of a million copies having been printed and circulated. Backed as it was in many cases by kind notices from the editors, and in some instances by leaders dwelling on the practical importance of rainfall investigations, the results of this extensive appeal were awaited with much interest. They were negative rather than positive—that is to say, although many hundred letters were received, only a small proportion of them contained that which was *most* wanted—namely, old observations not previously collected. Perhaps 200 notified that they had recently procured a gauge, and would be happy to supply the results in future ; and the residue either referred to observers already communicating, or to old observations already collected. The inferences which I draw are—

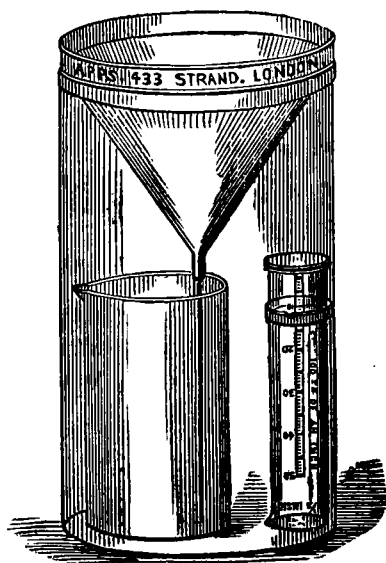
- (1.) Nearly all known observers are now working together ;
- (2) There are few old observations to be obtained except by really diligent search in published works and among private MSS. ;
- (3) That a large proportion of the “missing years” shown in the British Association report above referred to, and which will shortly be in the hands of every observer, are irretrievably lost ;
- (4) That therefore every stray observation should be treasured, at least until it is ascertained that it has been duly recorded in the general tables, of which the above report is virtually an index.

## INSTRUMENTS AND EXPERIMENTS.

Attention having mainly been directed to completing the records of the past, not very much has actually been accomplished in the way of instruments, although it is believed this will hardly be printed before several most important ones will be not only made, but at work. Proceeding again chronologically. The first new instrument made in

the year was a very simple one, home-made by myself, to show at a distance of 80 feet the amount of fall minute by minute. It is not intended for use alone, but only to supplement the ordinary gauge, and give full information as to a heavy rainfall without the personal discomfort of frequent measurement; the only objection to it, of which I am at present aware, is that being glass it should not be left full in frosty weather. I explained my own to Messrs. Negretti and Zambra, and hope before long that they will have them ready for sale. I should think they will not be expensive, perhaps £1 1s. or £1 10s., but this only *my* estimate.

The next instrument to be noticed is another 5-inch modification of the Glaisher pattern gauge similar to Casella's (see *British Rainfall*, 1864, page 10, fig. 4,) in external appearance, but differing from it in two points, as shown in the annexed wood-cut (1), that a can is substituted for the bottle (2), that the measuring-glass, instead of lying about on the grass, or having to be daily carried to and from the gauge, is provided with a holder inside the gauge—this seems a decided improvement. One of these gauges having been shown at the British Association Meeting at Birmingham, and seen there by some of the wholesale opticians, I find it has been copied by them for general use, so that with three London firms, Negretti & Zambra, Casella, and Apps, all supplying this type of gauge at 10s. 6d., and many of the country opticians selling similar ones, there can be no difficulty in the way of persons providing themselves with a proper and trustworthy instrument at the very small price of half-a-guinea. I do hope, therefore, that home-made gauges will be given up, or at any rate that they will only be used along with one made by some regular maker. No doubt amateurs may make perfectly good gauges, but my constant experience is, that they do not get them right once in twenty times.



**THERMO-RAIN GAUGE.**—I mentioned last year that my friend, Rev. J. Chadwick Bates, had undertaken to experiment on the temperature of falling rain. The following is his report for 1865 :—

I enclose readings of my Thermo-Rain Gauge, although they are too few and too imperfect to enable me to form any satisfactory opinion as to the real temperature of falling rain. In the first observation, May 15th, I had only one

thermometer *fixed* in the gauge; the other (the dry one) was then suspended at the side of the box, and exposed to the outer air; this arrangement, though not quite satisfactory (as I could not depend upon the thermometer) was nevertheless sufficient for a rough observation, and as I took the readings every five minutes for two hours, I consider it interesting, both for showing the declining temperature of the air during the time of rainfall, as well as for indicating the temperature of the falling rain, which appears to be very nearly that of the air cooled down by the rain. This, however, does not appear to have been the case in the next observation, May 29th, when though the temperatures of the falling rain and the outer air were nearly identical, yet instead of declining were gradually increased by  $0^{\circ}\cdot 1$  in the former, and  $0^{\circ}\cdot 2$  in the latter, except just when the rain ceased, when the former had increased to  $0^{\circ}\cdot 4$ , and the latter to  $0^{\circ}\cdot 7$ .

The most interesting observation was on July 7th, when the thermometer indicated a difference of  $4^{\circ}$  in the second reading, which was suddenly increased to  $15^{\circ}$  in the third reading, five minutes afterwards; this occurred during a heavy thunderstorm, in a sudden shift of the wind, accompanied by torrents of rain and hail. The remaining observations seem to point to the same result—viz., that the temperature of falling rain is much the same as that of the atmosphere after it has fallen, but in the absence of sufficient data it would be unsafe to draw any conclusions. I hope, however, to prosecute the inquiry during the present year, and have now arranged my gauge with every care, to ensure the greatest accuracy. The former gauge consisted of an open cubic box, made of copper, the sides of the cube being 10 inches; the receiver is made of ebonite instead of metal, which might disguise the temperature of the falling rain, and all its sides incline to one common centre, where a tube is placed, at the end of which there is a syphon, also made of ebonite, to retain a portion of the rain water, into which dips the thermometer; this is held by an india-rubber strap extending across the gauge, and to prevent vibration the thermometer is secured by an inclined brass strap, which holds it in a vertical position; and an ordinary thermometer was placed at the side, for comparing the outer with the inner air. This gauge, however, required modification, for I soon found that through its absorption of the sun's rays, the temperature of the outer and inner thermometer differed so much that I could not depend on the readings; besides, there was another difficulty to contend with, arising from the water collected inside the gauge, which if it were not emptied after an observation, might cool the temperature of the box too much, and so vitiate the readings of the syphon thermometer. I therefore discarded the copper box, and had a tin one made of the same size, but with the bottom and sides punctured with holes, had a new thermometer made to stand in a vertical position close to the side of the box but with the bulb inside, the box carefully screened from the draught by a gutta percha hood, and the whole gauge securely fastened against a pillar. The thermometers are extremely sensitive, and have been compared, so that the instrumental errors are known, and the gauge is read from my dining-room by an excellent telescope. I have, therefore, reason to hope that in future the readings will be perfectly reliable and trustworthy, and shall be happy to assist you in your investigations on the subject.

## OBSERVATIONS OF THERMO-RAIN GAUGE.

May 15th.

Time, p.m.	Thermo- Gauge.	Dry Bulb.	Time, p.m.	Thermo- Gauge.	Dry Bulb.	Time, p.m.	Thermo- Gauge.	Dry Bulb.
2. 5 ...	47.5 ...	48.2	2.50 ...	43.9 ...	44.8	3.35 ...	42.0 ...	42.8
2.10 ...	45.2 ...	47.2	2.55 ...	43.2 ...	44.2	3.40 ...	41.7 ...	42.7†
2.15 ...	45.0 ...	46.5	3.00 ...	43.1 ...	44.0	3.45 ...	41.5 ...	42.4
2.20 ...	45.0 ...	46.1	3. 5 ...	42.6 ...	43.7	3.50 ...	41.8 ...	42.3
2.25 ...	44.0 ...	45.9	3.10 ...	42.0 ...	43.2	3.55 ...	42.2 ...	42.6
2.30 ...	44.2 ...	45.2	3.15 ...	42.0 ...	43.0	4.00 ...	42.7 ...	43.0
2.35 ...	44.1 ...	45.0	3.20 ...	41.8 ...	42.8	4. 5 ...	43.3 ...	43.9
2.40 ...	44.1 ...	45.0	3.25 ...	42.0 ...	42.8*	4.10 ...	44.0 ...	44.5
2.45 ...	44.0 ...	44.8	3.30 ...	42.0 ...	42.8			

*Remarks.*—Commenced raining at 1.35. Masses of dark nimbus, moderate wind (mean 9.5 miles per hour) from W., veering to N.W. and back.

\* Min. in Ther. stand,  $42^{\circ}\cdot 0$ .† Min. in Ther. stand,  $41^{\circ}\cdot 0$ .

*May 29th.*

Time, p.m.	Thermo- Gauge.	Dry Bulb.	Time, p.m.	Thermo- Gauge.	Dry Bulb.	Time, p.m.	Thermo- Gauge.	Dry Bulb.
12.30 ...	57.0 ..	57.3	12.55 ...	57.1 ...	57.5	1.10 ..	57.9 ...	58.5
12.35 ...	57.0 ...	57.3	1. 0 ...	57.2 ...	57.5	1.15 ...	58.9 ...	59.3
12.40 ...	57.0 ...	57.3	1. 5 ...	57.4 ...	58.0	1.20 ...	58.8 ...	59.3
12.50 ...	57.1 ...	57.5						

*Remarks.*—Ceased raining at 1.10. Average velocity of wind, 26.4 miles per hour.

*June 23rd.*

7. 0 p.m.	64.0 ...	64.9	8.30 ...	57.8 ...	58.0	9. 0 ...	57.5 ...	57.5
8. 0 ...	58.0 ...	59.8						

*Remarks.*—Heavy shower. Wind S.W.; average velocity 8.6 miles per hour.

*July 7th.*

2. 0 p.m.	59.0 ...	59.8	2.30 ...	50.0 ...	54.5	2.35 ...	35.0 ...	50.0
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*Remarks.*—Heavy thunderstorm from 2 p.m. to 3.30; .108 inch of rain fell between 2.15 and 2.30, and .193 between 2.15 and 3.0 p.m. A violent gale blew away the gauge, and broke the dry thermometer. On resetting the gauge, I found the syphon thermometer reading so low that I thought it was broken. I am not certain it was quite so low as recorded, but sure that it was far below 40.0; the dry bulb reading 50. Velocity of wind, 10.5 miles.

**SELF-REGISTERING GAUGE.**—The desirability of having a record not merely of the total fall in any given period, but of the rainfall minute by minute automatically recorded, has often been mentioned. It has been effected partially by Mr. Osler's Anemometer, to which a rain-gauge is usually attached; but, inasmuch as these gauges are always elevated on buildings, the records are not of much practical use; and the very great cost of the instrument has prevented there being more than a dozen in the whole kingdom. A self-registering gauge, probably costing only from £5 to £10, is now, however, being made, from which it is believed perfectly accurate records may be obtained, with no trouble save that of winding-up a clock, and putting on a sheet of paper daily when there has been any rain: the design has not only my own approval but also that of several of the highest authorities; but it is not desirable to say more about it until it has been at work.

**INCLINED AND TIPPING-FUNNELLED GAUGES.**—At the last meeting of the British Association, it was suggested to me that I should try the effect of a gauge, whose mouth, instead of being horizontal, should be inclined, and kept face to wind by a vane. Knowing the heavy expenses that Colonel Ward and Mr. Bates have incurred in rainfall matters, and knowing also that the instruments they already have are so numerous as to take a long time daily in observing and recording, I felt it wrong even to mention to them this suggestion, which I had neither funds nor opportunity to carry out. A few weeks since, however, I had the good fortune to find both combined in Mr. Chrimes, of Rotherham. Mr. Apps, of the Strand, has completed the instruments, which Mr. Chrimes has had erected on a site granted by the local authorities.



Having been down to Rotherham to examine it before their erection, I may say I think it as suitable a position as could be desired.

The instruments are—

1. A gauge similar, I believe, to one employed many years ago by Professor Phillips, having one horizontal and four vertical funnels, facing E., W., N. and S. Of course if the rain is absolutely vertical it will only enter the horizontal funnel; if coming absolutely horizontal, and from say, due east, it will only enter the funnel facing east; if at any intermediate angle, it will partly fall into two or three funnels, each being provided with separate pipes and taps; the quantity caught by each is known, and the angle and point whence the rain fell can be easily calculated.

2. A gauge revolving by a vane, and having its funnel tilted towards the wind at an angle of  $45^{\circ}$ .

3. A gauge similar to No. 2, except that the tilt of the gauge is *not* fixed, but varies with the pressure of the wind. In a dead calm the funnel is horizontal, and in a gale it will, I hope, be tilted to an angle of  $70^{\circ}$  or  $80^{\circ}$ . It should thus be always at right angles to the wind, and catch more than any other gauge in windy weather.

4. A Robinson's anemometer, to give the horizontal motion of the air.

To these which were originally proposed, Mr. Chrimes has added—

5. A set of gauges at different elevations—10 feet, 15 feet, 20 feet, and 25 feet above the ground; two at each height, one for daily and one for monthly measurements. These, and also the above-mentioned gauges, are all 5 inches in diameter.

**EBONITE GAUGE.**—This instrument, constructed by Mr. S. W. Silver, continues unchanged in form or surface after two years' use. I hope during the present year to try other materials (such as glass and earthenware), and to come to some conclusion as to the material best suited for a collecting funnel, and whether the difference is such as to render it worth while to make any change from the present metallic funnels.

**TURF GAUGES.**—These have been used by Colonel Ward and myself, the result in each case being that the amount *caught* is nearly the same as that caught in an ordinary funnel, and that all percolates through the turf and cinders when they are saturated to begin with; but that in all other cases a very large proportion is evaporated, and that in the summer months there is seldom any water collected at the end of the month. These gauges have not been at work the whole year, or the results should be published.

**ISOLATED SUNK GAUGE.**—The rain caught at Calne, in 1864, in a gauge whose mouth was level with the surface of the earth was about 5 per cent. greater than in that whose mouth was 1 foot above it; it

was suggested that it might arise from insplashing, in support of which the frequency with which earth and small gravel are found in gauges so sunk was mentioned. In order to ascertain if this was the whole or partial cause, Colonel Ward has had a gauge sunk in a small pit so that it is level with the ground, but the earth being removed for some distance all round it, no insplashing can occur. This has only been at work nine months, the result during that period has been

	Total in.	Excess above fall at 1 foot.
Gauge at 1 foot above ground	23·08	0·00
„ 6 inches „	23·24	+ 0·16
„ 2 „ „	23·61	+ 0·53
„ level with the „	23·91	+ 0·83
„ (Isolated) „ „	23·60	+ 0·52

INFLUENCE OF RIVER MISTS ON THE AMOUNT OF RAIN COLLECTED.—This has often been questioned, especially by those who living on elevations can look down on the mist hanging over the windings of a river so marked and well-defined that its course can be traced for miles; is it to these mists or to the percolation of the water through the river banks that the luxuriance of their vegetation is to be ascribed? if to the mists we ought to find the rainfall observed in places usually covered by these mists somewhat in excess of adjacent localities. In order to test this, and, if it exists, to ascertain to what distance its influence extends on either bank, a few gauges have been erected; one set are placed at Shepperton Lock and Weir, the gauges *there* having been supplied by the Thames Conservancy Commissioners, and being observed by their servants. They are as follows:—No. 1 on a pile driven into the bed of the Thames just above the weir, and about 150 feet from the nearest land; No. 2 in the lock-keeper's garden (this is not yet placed); No. 3 (half-a-mile from No. 1 and 2) is in Weybridge village, having been placed and observed by Mr. W. F. Harrison, whose gauge at Weybridge Heath is No. 4, and completes the series, it being one and a half miles from No. 1 and 2. It is fortunate that Mr. Harrison is on the spot, and still more so that he has taken much interest in the matter since the site was first selected by Mr. Cuming, to whom we are mainly indebted for the establishment of this set of instruments.\* Another gauge has been erected on board the Nore Light Ship by consent of the Elder Brethren of the Trinity House, and is observed by the principal officer on board. Comparison will in this case be made with the land stations at Sheerness and Rochford.

SEA SPRAY MINGLED WITH THE RAIN.—It was cursorily mentioned last year that this had not been overlooked, but nothing has been done in the matter until after part of this report was in type, when I men-

\* The height of the lip of No. 1 above Mean Sea Level is about 44 ft. No. 3 is 53 ft., and No. 4, 150 ft.

tioned it to my friend, Dr. E. J. Mills, of University College, who will give his attention to it ; so that there is no doubt before long the test will be obtainable of the opticians. There can hardly be necessity for pointing out the *interest* that will attend the detection of sea-water 10, 20, 30, or perhaps more miles inland, but it may be well to add just a word as to its *utility*, not to say necessity, in some cases ; for instance, at Cape Wrath the gauge is 355 feet above the sea, yet, when a heavy south-west gale is blowing, the yard in which the gauge stands is reported to be flooded with sea-spray, lifted up there by the wind ; and the inference is drawn that much of what the gauge collects is such spray. At present there is no ready means of settling the point, save, perhaps, in such an extreme case as this the ordinary hydrometer should show it ; but in less marked cases it would not be sufficiently sensitive. It may be well to mention that neither Cape Wrath nor other exposed sea-side stations ever report such large falls of rain as stations in mountain gulleys ; hence the heavy falls do not arise from the addition of salt-water.

#### FINANCIAL.

Those who take an interest in the progress of the various branches of rainfall investigations to which I am now wholly devoted, are aware that the grand and yearly increasing difficulty has been to find the ways and means of paying the necessarily heavy expenses of such printing as these tables, and the still heavier items of miscellaneous printing, postage, stationery, and the inevitable sundries. They are also aware that up to the end of 1864, I was several hundred pounds out of pocket, and they will doubtless join with me in rejoicing that at last there seems a prospect of not only meeting the actual outlay, but leaving a small balance.

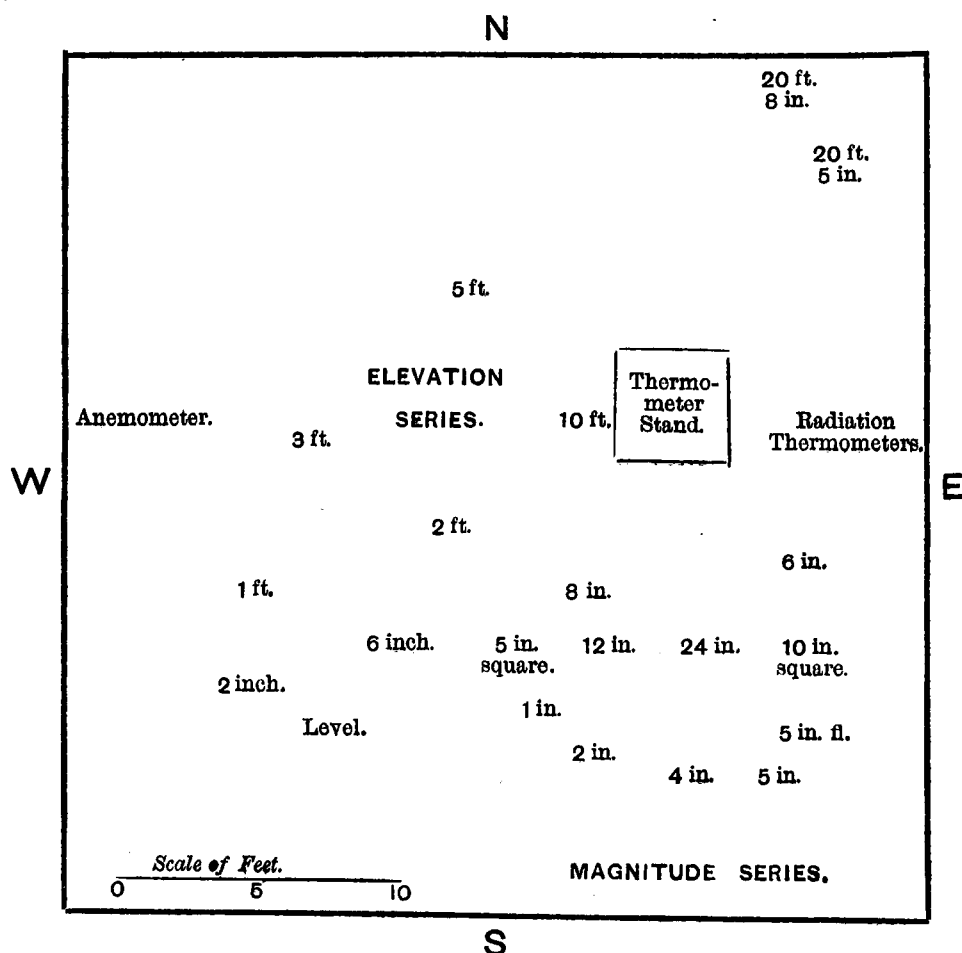
The following is a very rough estimate ; as the receipts will, it is hoped, be augmented by the subscriptions of many who read these lines, and many who have promised to help, and will doubtless do so ; the names of those who have already paid £1 and upwards are given on the pages immediately following the general tables (so that the latest receipts may be inserted.)

RECEIPTS.	£	s.	d.	ESTIMATED EXPENSES.	£	s.	d.
Paid for copies of " British Rainfall," 1865 .....	67	8	0	Engraving, Printing, and Binding, during 1866 ...	150	0	0
Paid for copies of " Monthly Meteorological Magazine," 1866 .....	54	15	0	Postages (in 1865, £45)...	55	0	0
Subscriptions to meet the general expenses of the undertaking .....	103	18	3	Stationery .....	10	0	0

I do not cast this up, because I *hope* the receipts will be largely augmented, and I *fear* the expenses will (as they always have done) exceed the estimate.

## EXPERIMENTAL GAUGES AT CALNE.

These instruments, the first, and in many respects the most important set of which any results have been published, have now been at work more than two years, and are watched with the greatest interest by many. I have therefore thought it not inappropriate to place before my readers an engraving (*see frontispiece*), from a photograph, and in all respects as accurate and faithful as possible. It is taken looking to north-east, because by so doing the arrangement of the gauges is best shown, but it has one drawback, namely, that it shows *all* the trees, and may lead some to fancy them too near; they are, however, at a considerable distance, and to E., N., and to N.W., while to the rainy points of W., S.W., S., and S.E., there are none at all—one or more having been cut down for fear they might even be *thought* to affect the results.



In order to supplement the view, and so far as is practicable, to make every reader realize the arrangement, almost as if they had absolutely seen the gauges, I have given the above ground plan (printed with ordinary type,) of that portion of his lawn which Colonel Ward has appropriated to them.

The precise form of the instruments whose results are quoted over-leaf, are—Elevation series—all Glaisher's gauges (fig. 2, "British Rainfall," 1864, but with a broader rim than there shown), even the 5 inch at 20 ft. being exactly the same pattern; the gauge at 5 ft. is emptied by a tap at its base, those at 10 ft. and 20 ft. have respectively 6 ft. and 16 ft. of composition gas tubing to bring the water down to the taps. This tubing is let into the posts exactly like the lead in an ordinary cedar pencil, *i.e.*, the post was sliced down, a groove cut in its centre, and the pipe being laid in, the side was replaced, and the tube protected as far as possible from frost; this is also guarded against by having bottles under the taps, into which the water can be run when there is fear of frost.

The Magnitude Series are not absolutely uniform, although it is firmly believed that the difference of *form* among them has not the slightest effect on their indications. It will, on consideration, be seen that with a gauge one or two inches diameter, the water would be all lost in a Glaisher-pattern gauge, and that the best chance of getting it all measured was to make these gauges on the "Howard's Bottle" plan; but it is equally evident that no bottle would hold an 8, 12, or 24 inch funnel in a gale of wind; these larger gauges, therefore, are made with cans instead of bottles.

The enclosed area is about 900 square feet, and is turf, kept closely cut.

# RAINFALL AT CASTLE HOUSE, CALNE, WILTS.

Lat. 51° 27' N. Long. 1° 59' W. 250 ft. above Mean Sea Level.

FOR THE YEAR 1865.

## ELEVATION SERIES. Diameter of Gauges, 8 inches.

<i>Height above ground .....</i>	Level.	2 in.	6 in.	1 ft.	2 ft.	3 ft.	5 ft.	10 ft.	20 ft.	5 in. 20 ft.
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
January.....	3·893	3·863	3·581	3·517	3·163	3·225	3·203	3·062	3·159	3·134
February ...	3·482	3·528	3·019	2·933	2·849	2·826	2·806	2·634	2·679	2·546
March .....	1·007	·973	·912	·897	·868	·873	·851	·830	·842	·808
April .....	·782	·763	·736	·729	·720	·723	·706	·706	·693	·658
May .....	2·387	2·325	2·272	2·277	2·275	2·271	2·222	2·187	2·178	2·095
June .....	1·577	1·569	1·563	1·563	1·565	1·560	1·540	1·538	1·519	1·458
July .....	2·993	2·977	2·921	2·897	2·901	2·904	2·879	2·827?	2·722	2·780
August .....	4·280	4·240	4·211	4·203	4·203	4·223	4·176	4·147	4·082	3·974
September...	·128	·128	·120	·128	·138	·152	·143	·151	·144	·106
October.....	5·601	5·577	5·536	5·525	5·503	5·495	5·420	5·425	5·416	5·249
November...	3·454	3·402	3·327	3·279	3·207	3·221	3·139	3·097	3·094	3·026
December ...	2·705	2·626	2·557	2·478	2·413	2·404	2·364	2·301	2·351	2·257
Totals .....	32·289	31·971	30·755	30·426	29·805	29·877	29·449	28·905?	28·879	28·091

## MAGNITUDE SERIES. Gauges 1 foot above the ground.

<i>Dia- meter.</i>	1 in.	2 in.	4 in.	5 in.	5 in. flange.	6 in.	8 in.	12 in.	24 in.	5 in. square.	10 in. square.
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Jan.	3·113	3·257	3·435	3·614	3·591	3·481	3·558	3·416	3·400	3·462	3·397
Feb.	2·715	2·768	2·729	2·738	2·907	2·833	2·901	2·839	2·860	2·863	2·825
March	·741	·816	·891	·857	·893	·903	·936	·870	·862	·873	·857
April	·632	·688	·719	·735	·738	·740	·738	·714	·706	·700	·705
May	2·079	2·164	2·285	2·284	2·317	2·315	2·320	2·226	2·200	2·223	2·205
June	1·400	1·530	1·568	1·532	1·543	1·568	1·565	1·543	1·526	1·564	1·559
July	2·622	2·751	2·857	2·871	2·909	2·965	2·946	2·823	2·842	2·817	2·796
Aug.	3·948	3·997	4·124	4·173	4·185	4·229	4·239	4·112	4·115	4·080	4·069
Sept.	·055	·106	·122	·130	·125	·141	·153	·120	·115	·118	·113
Oct.	5·331	5·360	5·456	5·258	5·427	5·375	5·479	5·443	5·414	5·452	5·443
Nov.	3·073	3·087	3·165	3·209	3·174	3·316	3·134	3·213	3·195	3·153	3·186
Dec.	2·298	2·353	2·352	2·365	2·358	2·520	2·443	2·435	2·455	2·405	2·456
Totals	28·007	28·877	29·703	29·766	30·167	30·386	30·412	29·754	29·690	29·710	29·611

REMARKS.—*January*.—Intense frost on 29th; min. 6°. Burst all the elevation gauges from “2 ft.” upwards; they were all frozen up from 24th to 29th, and melted on the latter day. The “level” and “2 in.” were buried in the snow. *February 17th*.—Impossible to measure the three lowest gauges accurately, they being buried in the snow. *July 7th and 8th*.—Conducting pipe of 10 ft. gauge leaked; the total measured was 2·577 in., and it is calculated that the loss was ·140 and ·110, which has been added to prevent a break in the series. *October*.—“Level” and “2 inches” very troublesome with leaves.—MICHAEL FOSTER WARD.

# RAINFALL AT ST. MARTIN'S PARSONAGE, CASTLETON MOOR, MANCHESTER.

Lat. 53° 35' 20" N. Long. 2° 10' 31" W. 475 ft. above Mean Sea Level.  
FOR THE YEAR 1865.

<i>Height above ground</i>	1 foot.		5 feet.		20 feet.	
<i>Diameter</i> .....	5 in.	8 in.	5 in.	8 in.	5 in.	8 in.
	in.	in.	in.	in.	in.	in.
January.....	3·874	4·050	3·492	3·631	3·177	3·292
February .....	2·934	3·033	2·493	2·775	2·344	2·572
March .....	1·357	1·396	1·161	1·246	1·055	1·111
April .....	1·444	1·474	1·377	1·410	1·337	1·377
May .....	2·863	2·784	2·622	2·647	2·297	2·278
June .....	·659	·669	·668	·666	·656	·670
July .....	3·546	3·412	3·407	3·347	3·224	3·260
August .....	5·099	4·941	4·892	4·862	4·650	4·733
September.....	·657	·652	·614	·628	·568	·580
October .....	6·251	6·230	6·010	6·030	5·777	5·858
November .....	3·829	3·774	3·508	3·608	3·303	3·384
December .....	1·315	1·299	1·234	1·207	1·092	1·158
Totals .....	33·828	33·714	31·478	32·057	29·480	30·273

J. CHADWICK BATES.

# RAINFALL AT THE ROYAL OBSERVATORY, GREENWICH.

FOR THE YEAR 1865.

<i>Above Mean Sea Level.</i>	155ft. 3 in.		156ft. 6in	164ft.10in	177ft.2in.	193ft.2in.	205 ft. 6 in.	
<i>Above Ground.</i>	0ft. 5in.	0ft. 5in.	1ft. 8in.	10ft. 0in.	22ft. 4in.	38ft. 4in.	50ft. 8in.	50ft. 8in.
<i>Description of Gauge.</i>	Glaisher's 8 in. diam. read monthly.	Glaisher's 8 in. diam.	Crossley's	Glaisher's 8 in. diam.	Troughton 6 in. diam.	Glaisher's 8 in. diam.	Receiving surface, 10in by 20in	12 in. self-registering
	in.	in.	in.	in.	in.	in.	in.	in.
January ...	3·34	3·29	2·76	3·28	2·61	2·25	1·69	1·71
February ...	1·90	1·75	1·61	1·56	1·32	1·02	0·78	0·82
March .....	0·88	0·85	0·86	0·79	0·57	0·52	0·23	0·26
April .....	0·38	0·40	0·41	0·37	0·33	0·32	0·27	0·24
May .....	4·20	4·37	3·90	4·32	4·10	3·86	3·50	3·47
June.....	2·20	2·45	2·35	2·38	2·27	2·19	1·97	1·96
July .....	2·18	2·27	2·13	2·25	2·10	1·95	1·78	1·79
August.....	3·96	3·97	3·48	3·80	3·58	3·40	3·15	3·06
September..	0·16	0·16	0·18	0·16	0·17	0·10	0·09	0·09
October ...	6·00	5·90	5·00	5·79	5·30	4·77	4·14	4·02
November .	2·45	2·39	2·23	2·18	1·41	1·45	1·29	1·23
December..	0·90	0·87	0·81	0·81	0·42	0·37	0·39	0·35
Totals ...	28·55	28·67	25·72	27·69	24·18	22·20	19·28	19·00

JAMES GLAISHER.

# REMARKS ON THE RAINFALL AMONG THE CUMBERLAND MOUNTAINS, FOR THE YEAR 1865.

By ISAAC FLETCHER, Esq., F.R.S.

On the 1st of January, 1864, I planted seven gauges among the Cumberland mountains; their positions are shown with sufficient accuracy on the map accompanying "British Rainfall" for that year. The same map also shows the positions of five additional gauges which were brought into use on the 1st of January, 1865. These gauges (with the exception of the old one at Seathwaite, which has been read daily for 21 years) are all exactly alike. The aperture is four inches diameter, and capacity equal to 50 inches of rain. They are read off and registered on the last day of each month.

The heights above the sea level have been accurately determined by reference to neighbouring marks of the Ordnance survey, and in most cases they may be assumed to be correct within two or three feet.

Of course, where a rain gauge is only observed once a month, the loss by evaporation is very considerable, and in order to have a key to its amount I placed at the beginning of 1865 a 4-inch gauge, to be read monthly, alongside the old one at Seathwaite, having previously ascertained that both gave perfectly correct results under similar circumstances. Here are the results:—

1865.	SEATHWAITE.			THE STYE.
	Daily Gauge.	Monthly Gauge.	Loss by Evaporation, or other causes	Monthly Gauge.
	Inches.	Inches.	Inches.	Inches.
January .....	13·84	12·44	1·40	Frozen. }
February.....	10·94	10·19	·75	26·30 }
March .....	6·44	6·33	·11	11·35
April .....	4·31	3·35	·96	4·40
May .....	16·72	15·33	1·39	22·31
June .....	1·25	1·10	·15	1·52
July.....	7·08	6·64	·44	11·39
August .....	13·06	11·96	1·10	14·88
September .....	7·19	6·97	·22	11·06
October .....	11·78	9·48	2·30	12·59
November .....	13·83	12·49	1·34	17·79
December .....	11·05	10·33	·72	15·48
Totals .....	117·49	106·61	10·88	149·07



I confess I am surprised at the large amount of evaporation\* shown by this experiment, and no doubt a large additive correction is necessary in all cases where gauges are read at distant intervals; but at great altitudes it has been found that the evaporative force is much diminished.

On the summit of Great Gable there is a small triangular cavity which almost always contains water, even in the driest weather; and the hygrometrical observations of the late Dr. Miller, taken with great care many years ago, show conclusively that at heights of 1000 to 3000 feet the atmosphere has but small absorptive power.

During the first three months of the year a considerable amount of rain was lost to the gauges on Esk Hause, Great End, and Scawfell Pike, by reason of snow. On the 29th of February, my assistant found the Scawfell gauge covered by 10 or 12 feet of snow, frozen as hard as ice. There seems no remedy for this cause of error.

It will be seen that the Styre gauge beats Seathwaite hollow. This remarkable station was first pointed out to Dr. Miller by Mr. John Dixon, of Seathwaite, who had frequently noticed from his own house that heavy rain was falling on the Styre when it was fair lower down the valley. So far as has yet been ascertained, the Styre is the wettest spot in the British Isles.

As the Seathwaite gauge has now been in uninterrupted operation for 21 years, it will be interesting to the reader to have a synopsis of the results. The gauge is on Luke Howard's construction, and is 5 inches diameter.

It will be observed that the said period of 21 years embraces two cycles of wet years and only one of dry years; the mean of the whole, therefore, is by no means a correct average, but a careful consideration of

\* It has been suggested to me by Mr. Symons that a considerable portion of what at first sight looks like evaporation may be due to the different apertures of the two gauges (4-inch and 5-inch). In this instance, the smaller gauge has received the *smaller* amount, but in the elaborate series of experiments undertaken by Colonel Ward, at Calne, in the year 1864, the 4-inch gauge received 20·014 inches, and the 5-inch 19·954 inches, both being 1 foot above the ground. However, in order to settle the question, I have concluded to alter the aperture of the Seathwaite monthly gauge to the same as the old one. The pipe at the bottom of the funnel is larger than usual, being nearly three-eighths of an inch, in order to lessen the liability to stop up by hailstones, and to prevent overflow during the tremendous downfalls which occasionally occur; and the prevailing wind from the south-west being directed *downwards* from the mountains at the head of the valley into the gauge at an angle of 45°, a small whirlwind is perpetually going on in the receiver; so that I am convinced there is a considerable evaporation in this particular instance. It is well known that wind is a most powerful incentive to evaporation.

[I am sure my friend will forgive my adding a last word. In the case above-mentioned it is obvious, that by making the gauges of the same aperture, my suggestion will be fully tested, and very possibly the small whirlwind is, after all, not only at the bottom of the difference, but its sole cause. At any rate, the diameter cannot account for all, since, though at Calne, in 1865, the smaller gauge has received least, yet taking the two years, 1864 and 1865, the total caught in a 4-inch gauge has been 49·717, and in a 5-inch one 49·720—that is to say, *they* are identical; though if we go larger or smaller we get very discordant results, *e.g.*, 1 inch 46·490, and 8 inch 51·166.]

the conditions of the case leads me to assign 134 inches as the probable average yearly rainfall at Seathwaite.

*Results of 21 years' observations on the Rainfall at Seathwaite, viz., from 1845·0 to 1866·0.*

	Inches.
Mean of 1st seven years .....	143·80
„ 2nd „ .....	119·85
„ 3rd „ .....	152·56
„ First fourteen years.....	131·83
„ Last „ .....	136·20
Mean of the whole twenty-one years .....	138·74
Maximum, 1861 .....	182·47
Minimum, 1855 .....	88·31
Maximum in one month, January, 1851.....	28·63
„ in 72 hours—Dec. 3rd, 4th, and 5th, 1864 .....	15·53
„ in 48 hours—December 4th and 5th, 1864 .....	12·42
„ in 24 hours—	
{ November, 1846 .....	6·62
{ December, 1864 .....	6·47
{ May 30th, 1865 .....	6·41
{ September 10th, 1865 .....	6·00
Total fall in 21 years, 242·79 feet.	

An inspection of this table gives no indication of a fact which has been observed in other localities—that the average fall is diminishing.

Thus, Mr. Samuel Marshall, one of the oldest and most accurate meteorologists of the present day, found that at Kendal the average for 40 years—viz., from 1822·0 to 1862·0—was 52·271 inches. He also deduced the following results:—

Average of 1st twenty years .....	55·717
„ 2nd twenty years.....	41·825
„ 1st ten years.....	57·+
„ 2nd ten years .....	54·+
„ 3rd ten years .....	50·+
„ 4th ten years .....	47·+

In agricultural districts, such as the neighbourhood of Kendal, drainage and improved cultivation of the soil have no doubt been the chief causes of the diminution of rain, but these having been comparatively inoperative in the district about Seathwaite, no such diminution seems to have taken place.

Tarnbank, Cumberland, Jan. 4th, 1866.

## ON THE GENERAL WEATHER AND HEAVY RAINFALLS IN 1865.

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### JANUARY.

Much snow at the beginning of the month; in the North it was generally about 6 inches deep, and it extended even to Cornwall, where the ground was covered for some hours. On 14th a violent gale swept over the whole country, doing much damage. As an indication that even the heavy snow-fall at the beginning of the month had not fully made up for the drought of 1864, the following may be quoted from the *Stamford Mercury* of January 20th:—

Although the rain which has fallen during the past and present month has contributed to the replenishment of the dykes, the effects of the drought of last year are still experienced in the springs. A portion of the town of Stamford is supplied with water from a reservoir at Wothorpe, which receives the outpouring of a generally copious spring, but the contents of the reservoir have been so limited, that for the last fortnight the allowance to the inhabitants has been curtailed, and the supply limited to two hours on each of three days in the week.

On 25th snow began to fall, and it fell heavily over the greater part of the country, the average depth being about 9 inches; the drifts were very deep, 10, 12, and 15 feet not being at all rare. In South Wales the fall is said to have been unequalled for forty years. The total fall of rain and snow was near the average, perhaps rather above it.

### FEBRUARY.

With the exception of the north-western counties of England, most parts appear to have had about, or above, their average supply of water, though much of it fell as snow. The heavy snow of the end of January had hardly disappeared when most of England, and especially the northern counties and Perthshire were again coated about 8 inches thick. Several persons were lost in the drifts, the Perthshire, Aberdeen, and Inverness Railways were frequently blocked, in spite of snow ploughs and all other efforts to keep them open; and much cattle and game perished from want of food.

#### FLOODING OF THE RIVERS IN THE NORTH.

The melting of the snow which has covered the country for the last few weeks in the North of Scotland, has caused many of the rivers to become flooded, and in some places considerable damage to property has been the result. On the Deveron the ice was at one part from eight to twelve inches thick, and the breaking up was accompanied with a tremendous crashing noise. There being a large quantity of snow on the river, there were frequent huge wreaths above the ice. Carcasses of dead hares, rabbits, deer, and other game, were observed floating down among the masses of ice, several of the deer having beautiful heads, one especially with a royal head. The game have suffered severely by the late storm, more so than in any winter since 1838. The river carried off the wooden bridge for foot passengers at Lesmurdie. In the Dee the breaking-up of the ice is said to have been a grand

spectacle, but no material damage has been done along the banks of the river. In Glencluny, however, the waters of the Cluny made considerable havoc, the broken ice sweeping away several bridges. The damage on the Nairn has been serious. A correspondent of the *Banffshire Journal* gives the following particulars of the flood on that river:—"On Thursday, owing to the sudden melting of the snow on the neighbouring hills, the burns and rivulets running into the river Nairn became much swollen, and consequently the river rose to an unusual height. After passing Firhall House, the river acquires increased velocity by gradation, and after bending eastward it changes its course and widens its bed. Above this curve little or no damage was done; but further down, we are sorry to add, its effects were of a most serious character. During the night the river, as it swept this curve, recoiled across, and, striking the other side, carried away the bank and a large slice of a field belonging to Millfield, and then, pouring its volumes with fearful force on the intake immediately above the flour mills, rushed over and under the embankment, carrying away the massive structure and completely destroying the intake. Then, sweeping the other side, it carried away large portions of the bank, the Prince of Wales's Walk, and a piece of a field belonging to House Hill. In many parts the bed of the river is entirely changed."—*Edinburgh Courant*.

The almost unparalleled storm of last week has been succeeded by a complete fresh, which has swollen all our rivers to a most alarming extent. The Isla has overswept its banks, and begun doing great damage in the meadow land, covering whole fields of turnips, &c.; also threatening the railway works. Men have been sent to watch the bridges on the Banffshire and Inverness and Aberdeen Junction Railways. In the valley below Keith, and up at Mulben, the country is almost one sheet of water. The Spey is in full flood, and is a most magnificent sight. The Bogie and Deveron have also overswept their banks and flooded neighbouring fields, particularly the former river, which at one place has made a new course for itself altogether. The Shirach burn at Insh, which, like the dangerous Rothes burn, rises rapidly, was sweeping down on the fields below on Thursday, and must be worse now (Friday morning), as the wind is blowing very strong.—*Edinburgh Courant*.

### MARCH.

Temperature and rainfall rather below the average. A good deal of snow again this month, which was, in fact, simply a prolonged, cold, blustering, snowy winter month.

### APRIL.

Rainfall very small, mostly falling in the middle of the month, and hardly any after the 20th. Spring, or one might almost say summer, set in on the 9th, with a temperature of 80° in many places, which recurred towards the end of the month; in fact, in England the heat of April stands unequalled.

### MAY.

Rainfall above the average almost everywhere; most of it falling in thunderstorms, especially on the 22nd, as evidenced by the following paragraphs:—

The greatest amount of damage sustained in Preston appears to have been caused by the extraordinarily heavy rain and hail which fell on Monday afternoon. One tradesman in Friar-gate had £100 worth of goods (stored in his cellar) destroyed by the water which overflowed from the street. Another person had £50 worth destroyed in a similar way. The furniture in some of the houses in the lower portion of one of the streets in the centre of the town was floating about, and a few of the houses were so completely inundated, that the inmates were glad to

make their escape and get shelter elsewhere. A portion of the embankment of the Preston and Longridge Railway, near the Preston workhouse, was washed down, and towards Maudlands station the line was blocked up with sand, old railway sleepers, &c. The generality of the houses in Preston were injured more or less through the rain. A good deal of glass was broken in both Preston and the country districts about by the rain which fell. In some places hailstones fully an inch in diameter were picked up. Plenty as large as marbles could be found in the streets. They were very hard, and more like icicles than ordinary hailstones. On Monday evening, after the storm, the weather cleared up, and was very fine.

It appears that as the four o'clock express train from Edinburgh to Glasgow was nearing Croy station, and speeding along the line which at this point is carried through a deep cutting, the engine-driver was signalled when passing the 4.15 p.m. express train from Glasgow to proceed cautiously. Shortly after the warning had been given, a fearful noise was heard; flashes of lightning gleamed through the hazy air, followed by quick crashes of thunder; the carriages of the train were at the same time assailed, by what seemed to the affrighted passengers within, a terrific shower of hail, and in an instant a perfect deluge of water came sweeping down from the shelving rocks on either side of the cutting. A waterspout had evidently burst in the vicinity of the line, and before the speed of the train could be diminished to any considerable extent, it shot right into the centre of the suddenly released waters, which, foaming and seething, rushed into the cutting in solid sheets. The water gradually rose outside the carriages, reaching in a short time the footboard, and afterwards floating into the first-class compartments, while the hissing noise which was produced through contact with the works of the engine, tended to increase the feeling of consternation and alarm which already prevailed amongst the passengers. The difficulties of the situation were still further complicated by the sudden descent of a quantity of stonework from the heights above, arising probably from the giving way of a dry-stone dyke, which, spreading across the rails, destroyed any hope that might have been entertained of a passage being effected down the line after the water had cleared away. Meanwhile the train, its momentum imperfectly arrested, had been quietly gliding into the accumulated waters, and as the line here takes a slight decline, every inch of progress led into deeper danger, until it was finally brought to a stand. All this was the work of a few minutes. The passengers had been suddenly placed in a most critical position, and the safety with which they were enabled to tide it over—no personal injuries having been sustained—was probably owing to the presence of mind of the engine-driver, who, when he saw the turn which affairs were taking, at once fixed his damper over the furnace, thus preventing the ingress of the water, and avoiding the explosion which might otherwise have followed. The train was by and by backed out of the water, and while it was evident that the journey to Glasgow must be for some time delayed, all positive danger was at an end. Some of the passengers quitted the carriages, and climbing up to the top of the cutting, walked down as far as Croy station. The waterspout had evidently been limited to a comparatively narrow area, within which, however, it had operated with terrible force, for on reaching Croy it was found that here the elemental strife had been even more alarming while it lasted. The water was flowing into the station, and a number of waggons which were shunted into a kind of lye had been floated right out into an adjoining field.

**May 22.**—A waterspout is believed to have burst about 5 a.m. on the high ground near the well-known Knockholt beeches, but rather to the west of them. Its channel, some 40 feet wide, was easily traced for more than two miles down to Brasted Park (between Sevenoaks and Westerham, in Kent) the residence of Mr. Tipping, which was flooded to the depth of 7 feet.

The above storms were very local; on the contrary a heavy fall occurred on the 29th and 30th which was more general, and was noteworthy in this respect, that it gave over 5 per cent. of the total annual fall at several of the stations in Cumberland and Westmoreland, whereas usually the greatest fall in those parts is but 3 or 4 per cent. of the yearly total. The details of

heavy falls show that it was heaviest in the border counties of England and Scotland, and principally in their western portions. The swollen state of the Teviot, which was in greater flood than for many years, attested the heaviness of the fall in its upper districts almost as well as do the ample rain records of Cumberland. The greatest recorded fall was 6·41 at Seathwaite, and the greatest per centage (8) at Silloth.

#### JUNE.

Very fine, hot, and dry month; no rain falling between the 12th and 22nd, and scarcely any between the 5th and 29th.

#### JULY.

Another hot month, but generally wet; frequent violent thunderstorms with very heavy rain. Rain fell daily except on the 2nd and 3rd.

#### AUGUST.

A wet month, interrupting the harvest. The heaviest fall occurred on the 23rd, beginning about 7 a.m. and lasting till midnight at most places in the midland and eastern counties of England. The heaviest fall, as also the largest per centage, was at Fleckney, where an eighth of the entire yearly fall was poured down in less than 24 hours; the amount (as will be seen from the details on page 35) was 4·40, being 13 per cent. of the entire yearly fall of 33·29.

#### BURSTING OF A CANAL IN LEICESTERSHIRE.

The neighbourhood of Kibworth, Smeeton, and Fleckney, near Market Harborough, was visited on Wednesday with a storm of rain of almost unparalleled severity. For 20 hours the rain poured down in a steady torrent. Houses in the low-lying districts were flooded with water, and roads were impassable. At the Kibworth Railway Station there is a sharp incline; here the water rushed down with such force, that the ballast covering the sleepers was washed away, and the line very much weakened. Gangs of men were immediately set to work to repair the disaster as far as possible, and the trains ordered to proceed at slackened speed. The gas works at Kibworth also suffered, and a great deal of corn has been laid under water. The most serious damage, however, occurred to the canal near to Smeeton. Some short distance from Smeeton is a large sheet of water, of some 60 acres, known as the Saddington reservoir for the Leicestershire and Northamptonshire Union Canal. A feeder joins the canal near to the aqueduct at Smeeton, and here, owing to the great pressure from the heavy rains, the water began to overflow the towing-path. A shepherd, who was passing the spot at about 7 o'clock in the morning, observed a crack in the bank, which at first he describes as "not much larger than a gallon bottle." He at once gave information, but the fissure speedily got larger and larger, until at last it became of immense size, and the water came through with a roar, tearing away the embankment. From lock to lock, between which the accident occurred, was a space of ten miles, and a great deal of this water poured through the opening into the valley below, carrying corn, trees, and rubbish with it. The labourers of the district were soon collected and set to work, under the direction of Mr. Foxton, the company's engineer. Close to the point where the bank gave way is an aqueduct, and here some piles were driven in, and with planks and puddled clay the water was nearly stopped, and a similar proceeding was equally effectual at a bridge some few hundred yards on the Harborough side. The feeder of the canal from the reservoir was also stopped, and a cut being made in its bank, the water flowed in a miniature cataract down a steep embankment, and flooded a meadow, where it found its way to a culvert, and thence to a brook, communicating about six miles off with the river Welland. The fissure has a very formidable appearance,

being about 60 feet wide at the top, while the embankment is about 30 feet thick at the base, and 60 feet high, and the bottom of the canal has been torn out for 20 feet.—*The Times*.

## SEPTEMBER.

A remarkably fine, dry month, the rainfall being generally very small; in England only three slight showers, viz., on 1st in north-east Yorkshire, on the 9th in the south of England, and on the 21st generally (that is where any rain at all fell); the total was, however, very small, in most parts of England and Wales unprecedentedly so.

The following table shows the number of stations in each county at which the fall was less than one-tenth of an inch, and of those where none at all fell.

NUMBER OF STATIONS HAVING SMALL FALLS IN SEPTEMBER.

Div.	County.	Below ·10 in.	No Rain	Div.	County.	Below ·10 in.	No Rain
II.	Hampshire ...	3	1	V.	Devon .....	25	15
„	Kent .....	8	2	„	Cornwall .....	4	0
„	Sussex .....	14	3	„	Somerset .....	14	7
III.	Herts .....	1	0	VI.	Gloucester ...	11	2
„	Northampton..	2	2	„	Hereford .....	7	1
IV.	Essex .....	3	0	„	Stafford .....	1	0
„	Suffolk .....	8	2	„	Worcester .....	1	0
„	Norfolk .....	10	6	XI.	Monmouth ...	2	1
V.	Wilts .....	5	2	„	Denbigh .....	2	1
„	Dorset .....	8	3				

From this table we find that at 129 stations the fall of rain in September was less than ·10 inch, and that at 48 (of which 15 were in Devonshire) no rain at all fell.

## OCTOBER.

Generally fine until the 7th, when a wet period set in over almost the whole country, the rain being nearly incessant, and at times very heavy; the monthly totals were very large even for October, and in some of the eastern counties of England unprecedentedly so; so marked a contrast as this month presented to its predecessor is not known to be on record. Another noteworthy fact is that October, 1864, was just as remarkable for the fall in the south-east of Scotland as October, 1865, has been in the south-east of England; the fall in each case being three to four times the average due to October.\*

The following table explains itself, and requires only to be supplemented by mention of the fact that though the area of excessive fall seems from it to have been very limited, such was not the case, 20 to

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\* This is believed to be about 11 per cent. of the yearly total, but a careful determination of the proportions due to the various months, seasons, and localities is contemplated, and will be published in the "Meteorological Magazine," as soon as completed.

30 per cent. having been about the general rule, which was only exceeded in the undermentioned parts of Sussex and Northumberland.

STATIONS AT WHICH THE RAINFALL IN OCTOBER AMOUNTED TO 30 PER CENT. (OR MORE) OF THE ENTIRE YEARLY FALL.

Div.	Stations.	Fall in		Oct. per cent. of Total.	Div.	Stations.	Fall in		Oct. per cent. of Total.
		Oct.	Year.				Oct.	Year.	
	SUSSEX.	in.	in.			NORTHUMB.	in.	in.	
II.	Battle .....	11·88	39·60	30	X.	Allenheads..	14·26	47·58	30
„	Forest Lodge	11·51	37·84	30	„	Wylam .....	9·51	29·67	32
„	Newick .....	10·78	35·71	30	„	Brenckburn.	10·11	32·45	31
„	Hastings ...	10·88	30·88	35	„	Glantn Pyke	10·27	34·26	30
„	H. Wickham	9·35	28·65	33	„	Roddam ...	10·43	31·72	32

The fall on the 9th and 10th was very heavy, especially in Suffolk, Leicester, Lincoln, Notts, Derby, and Lancashire; from 2 to 2½ inches fell in many places, even at many where the entire yearly fall was under 30 inches, so that 7, 8, and even 9 per cent. of the yearly total fell in most of those counties. It need hardly be said that this heavy fall was very acceptable to the various water companies in Lancashire, which, during the earlier months of the year, had had rather less than their average supply to meet an increased demand.

### NOVEMBER.

Rainfall near the average; the greatest falls being during the heavy gales, for which the latter part of the month was noticeable: the north of Ireland had especially heavy rains during the last week, and serious floods and damage resulted.

### DECEMBER.

Mild, and generally fine, nearly all the rain having fallen in the first and last weeks; the total below the average. Violent gale from 29th to 31st.

### THE YEAR.

On the whole, the fall in

January,	} was above the average.	in June, the November,	} equal to the average.	and in March,	} below the average.
February,				April,	
May,				Sept.,	
July,				Dec.,	
August,					
October,					

and the total fall over the whole country was about 7 per cent. above the average of the ten years 1850-59, which are assumed (see British Association Report, 1862, page 296,) to be 5 per cent. below the average of the last 50 years, it results that 1865 had a rainfall very near the true average fall in this country.

England, taken as a whole, has had an average fall; Scotland less than its assumed average, and Ireland has had more.

The Midland Counties of England have had about their average, the



South-Eastern a large excess (nearly 30 per cent.), and the North-Western a deficiency of 15 per cent. ; but as these counties did not suffer from any deficiency until 1864, and in 1864 and 1865 together have only been about a fourth of a year's supply short, I cannot at present see that the failure of water supply in South Lancashire should be charged to deficient rainfall. Take two stations, one in Lancashire and one in Norfolk, say Bolton-le-Moors and Burnham.

	MEAN.		DIFFERENCE FROM 1850-9.		
	1850-9.	1860-5.	1863.	1864.	1865.
Bolton .....	44·01	48·33	+ 9·74	— 1·27	— 6·50
Burnham .....	26·86	25·98	— 3·90	— 9·18	+ 2·27

Hence we see that at Bolton the average of the last six years is 10 per cent. above that of the previous ten, that 1863 was nearly 10 inches *above* the 10 year average, and that the total deficiency in 1864-5 is less than the said excess. On the contrary, at Burnham the fall in the last six years has been less than in the preceding ten, the deficiency in 1863-4 amounted to half-a-year's supply, and 1865 has only given an excess of two inches towards replacing the deficiency.

The state of the case will be still further elucidated by the following table.

#### RAINFALL 1860-5 IN LANCASHIRE AND NORFOLK

CALCULATED MEAN ANNUAL FALL AT	BOLTON.		BURNHAM.	
	Depth. 46·21	Mean =100	Depth. 28·21	Mean =100
1860.....	+11·45	125	+ 6·44	123
1861.....	— 1·30	97	— 3·43	88
1862.....	+ 7·22	115	— 1·50	95
1863.....	+ 7·54	116	— 5·25	81
1864.....	— 3·47	92	—10·53	63
1865.....	— 8·70	81	+ ·92	102

From this we see that while 1862-3 were wet at Bolton, they were dry at Burnham ; and that the deficiency following the two wet years was less than that following the two dry ones.

Lastly it may be mentioned that the mean of 1844-5 was 41·37.

„ „ 1853-4-5 was 39·51.

„ „ 1864-5 was 40·12.

Comparison of the Mean Rainfall in the ten years 1850-59, with that of the six years 1860-65, and also of the fall in 1864 and 1865, with the ten years 1850-59.

## ENGLAND.

Div.	Station.	County.	Mean.		Increase.	Difference from Mean, 1850-9.	
			1850-9	1860-5		1864	1865
I.	Chiswell Street ...	Middlesex ...	21·67	23·34	+ 1·67	- 5·89	+ 5·53
II.	Cobham.....	Surrey .....	22·41	24·34	+ 1·93	- 4·63	+ 6·76
	Chichester .....	Sussex .....	26·67	29·01	+ 2·34	- 3·42	+ 9·01
	„ (Shopwyke) .....	„	26·25	28·41	+ 2·16	- 4·70	+ 10·45
	„ (West Dean) .....	„	35·30	37·02	+ 1·72	- 7·82	+ 9·37
	Ventnor .....	Hampshire ...	28·46	29·26	+ ·80	- 6·59	+ 4·27
III.	Hemel Hempstead	Herts.....	26·43	25·47	- ·96	- 9·47	+ 3·82
	Hitchin.....	„	24·72	23·25	- 1·47	- 7·56	+ 5·54
	Oxford .....	Oxford .....	22·24	21·26	- ·98	- 7·39	+ 1·66
	Banbury .....	„	24·73	24·75	+ ·02	- 4·51	+ 3·56
	Althorp.....	Northampton	20·34	21·77	+ 1·43	- 3·13	+ 5·16
	Cardington .....	Bedford.....	21·60	21·87	+ ·27	- 3·19	+ 5·58
IV.	Epping .....	Essex.....	23·18	26·05	+ 2·87	- 8·38	+ 3·76
	Witham .....	„	20·55	20·73	+ ·18	- 5·15	+ 4·44
	Norwich .....	Norfolk.....	26·08	24·37	- 1·71	- 8·29	+ ·43
	Honingham .....	„	25·99	23·28	- 2·71	- 11·37	- ·44
	Burnham .....	„	26·86	25·98	- ·88	- 9·18	+ 2·27
	Holkham .....	„	26·13	23·10	- 3·03	- 11·63	+ ·55
V.	Baverstock .....	Wiltshire .....	28·69	29·57	+ ·88	- 7·29	+ 2·41
	Goodamoor .....	Devonshire ...	54·13	57·32	+ 3·19	- 15·84	+ 3·87
	Exeter Institution	„	26·91	30·17	+ 3·26	- 4·29	+ 8·56
	Clyst Hydon .....	„	30·70	31·70	+ 1·00	- 7·56	+ 6·35
	Bradninch .....	„	34·71	37·22	+ 2·51	- 6·81	+ 7·09
	Broadhembury.....	„	32·75	34·28	+ 1·53	- 7·38	+ 4·40
	Helston.....	Cornwall .....	36·22	38·05	+ 1·83	- 7·66	+ 8·52
	Bodmin .....	„	43·48	46·12	+ 2·64	- 6·35	+ 5·50
	Swanswick .....	Somerset .....	25·20	24·15	- 1·05	- 8·32	+ ·75
VI.	Cirencester .....	Glo'stershire...	29·60	30·87	+ 1·27	- 4·92	+ 6·22
	Burford .....	Shropshire ...	25·52	26·25	+ ·73	- 6·22	- 1·07
	Haughton Hall ...	„	24·02	23·74	- ·28	- 6·79	- ·77
	Orleton .....	Worcester.....	28·82	30·06	+ 1·24	- 7·03	+ 1·06
VII.	Wigston .....	Leicester .....	26·39	26·49	+ ·10	- 8·79	+ ·41
	Welbeck .....	Notts .....	23·29	24·02	+ ·73	- ·69	+ 1·22
	Derby .....	Derby .....	23·98	25·14	+ 1·16	- 2·24	+ ·48
VIII.	Bolton-le-moors ...	Lancashire ...	44·01	48·33	+ 4·32	- 1·27	+ 6·50
	Belmont .....	„	51·19	55·70	+ 4·51	- 2·99	+ 8·59
	Rufford .....	„	33·24	34·81	+ 1·57	- 4·10	+ 5·39
	Preston (Howick)...	„	34·28	38·09	+ 3·81	+ ·13	- 2·73
	„ (Fishwick) .....	„	29·10	33·57	+ 4·47	- 1·43	- 1·94
	„ (Ho. of Cor.) .....	„	33·60	36·80	+ 3·20	- 1·30	- 2·76
	Stonyhurst .....	„	45·37	49·08	+ 3·71	- 3·57	- 4·78
	Holker .....	„	39·17	44·98	+ 5·81	+ 4·39	- ·82
	Coniston .....	„	71·40	86·00	+ 14·60	+ ·50	+ ·70
	Wray Castle.....	„	60·81	68·23	+ 7·42	+ ·25	+ 5·90
IX.	Redmires .....	York .....	37·86	37·89	+ ·03	- 5·98	+ 5·39
	Standedge .....	„	49·57	52·17	+ 2·60	+ 2·18	- 8·57
	Ackworth .....	„	22·84	22·26	- ·58	- 3·09	+ ·37
	Halifax (Well Head)	„	30·71	31·09	+ ·38	- 7·07	- 2·75
	Leeds (Marshall & Co.)	„	20·91	21·99	+ 1·08	- 4·26	- ·26
	„ (Eccup) .....	„	24·98	24·69	- ·29	- 6·03	- 2·32
	„ (Manor Road) .....	„	23·31	22·63	- ·68	- 6·27	+ 2·47
	Settle.....	„	35·55	39·77	+ 4·22	- 2·95	- ·17

Div.	Station.	County.	Mean.		Increase.	Difference from Mean, 1850-9.	
			1850-9	1860-5		1864	1865
IX.	York .....	York .....	22·02	23·38	+ 1·36	— ·89	+ 1·17
X.	Bishopwearmouth .....	Durham .....	16·91	21·16	+ 4·25	+ 2·61	+ 3·82
„	Seathwaite .....	Cumberland ..	126·98	153·47	+ 26·49	+ 7·69	— 9·49
„	Keswick .....	„	55·01	60·56	+ 5·55	— 2·33	— 5·83
„	Kendal .....	Westmoreland	44·92	52·88	+ 7·96	+ 2·65	— 2·25
„	Troutbeck .....	„	72·13	89·65	+ 17·52	+ 3·61	— 8·08
XI.	Guernsey .....	Channel Isles	34·46	37·09	+ 2·63	— 1·80	+ 8·89
SCOTLAND.							
XIII.	Haddington .....	Haddington ...	24·34	26·93	+ 2·59	+ 4·76	+ 3·16
„	Thurston Dunbar...	„	26·96	29·62	+ 2·66	+ 9·04	— 1·36
„	Glencorse .....	Edinburgh ...	36·96	36·77	— ·19	— 1·16	— 2·36
XIV.	Bothwell Castle ..	Lanark .....	27·76	28·33	+ ·57	— 2·20	— 4·06
„	Largs Mansfield ...	Ayr .....	43·06	48·63	+ 5·57	— ·26	— 3·26
„	Brisbane .....	„	46·85	53·24	+ 6·39	+ 2·05	— 2·05
XV.	Castle Toward .....	„	47·88	53·80	+ 5·92	— 1·03	— 3·99
„	Lismore .....	„	38·44	46·95	+ 8·51	+ 13·68	+ 1·61
„	Ardnamurchan .....	„	38·50	47·94	+ 9·44	+ 7·67	+ 2·28
„	Hynish .....	„	73·90	84·77	+ 10·87	+ 4·52	+ 2·80
XVI.	Isle of May .....	Fife .....	15·21	21·08	+ 5·87	+ 7·55	+ ·60
„	Deanston .....	Perth .....	39·21	42·35	+ 3·14	+ 2·69	— 5·46
„	Stanley ... ..	„	29·05	30·60	+ 1·55	— ·45	— 1·59
„	Craigton .....	Forfar .....	31·87	35·64	+ 3·77	+ 8·95	+ 1·55
„	Hill Head .....	„	31·06	35·59	+ 4·53	+ 8·78	+ 2·90
„	Seichen .....	„	32·07	36·87	+ 4·80	+ 11·01	+ 1·75
XVII.	Girdleness .....	Kincardine ...	19·71	22·13	+ 2·42	+ 2·93	— ·09
„	Castle Newe .....	Aberdeen .....	32·98	34·60	+ 1·62	+ 3·50	+ ·37
„	Buchanness .....	„	23·40	22·51	— ·89	— ·97	— 2·88
„	Kinnaird Head ...	„	22·04	23·32	+ 1·28	+ 5·18	— ·21
XVIII.	Cromarty .....	E. Ross .....	23·66	27·80	+ 4·14	— ·34	— 4·15
„	Barrahead .....	W. Inverness	32·67	32·62	— ·05	+ 4·10	+ 2·77
„	Island Glass .....	„	31·92	23·86	— 8·02	— 14·41	— 13·99
XIX.	Cape Wrath .....	Sutherland ...	36·94	39·59	+ 2·65	+ 1·25	— 4·14
„	Noss Head .. ..	Caithness .....	25·57	23·57	— 2·00	+ 1·66	— 10·48
„	Dunnet Head .....	„	22·09	25·93	+ 3·84	+ 6·36	— ·24
„	Pentland Skerries	„	24·12	28·92	+ 4·80	+ 7·82	+ 1·93
„	Sandwick .....	Orkney .....	36·14	36·79	+ ·65	— 2·86	— 1·93
„	Start Point .....	Shetland .....	23·77	28·92	+ 5·15	— ·15	— 4·94
„	Sumburghhead .....	„	25·22	25·52	+ ·30	— 1·32	— 4·75
„	Bressay Manse .....	„	36·22	40·40	+ 4·18	+ 6·78	— 4·12
IRELAND.							
XX.	Portlaw .....	Waterford .....	39·49	45·90	+ 6·41	+ ·78	+ 7·76
„	Killaloe .....	„	38·33	46·70	+ 8·37	— 2·69	+ 7·71
XXI.	Black Rock .....	Dublin .....	21·78	25·83	+ 4·05	+ 3·95	+ 8·02
XXIII.	Belfast L. H. ....	Antrim .....	30·01	37·12	+ 7·11	— ·07	+ 5·77
MEANS.							
	England .....		33·97	36·52	+ 2·55	— 4·44	+ 1·18
	Scotladd .....		32·24	35·34	+ 3·10	+ 3·08	+ 1·75
	Ireland .....		32·40	38·89	+ 6·49	+ ·49	+ 7·32

NOTE.—In somewhat similar tables to the preceding (see pp. 8 and 9, 1862, and pp. 16 and 17, 1863), I have calculated the means, as above, of *all* stations, and also of the English ones, omitting Seathwaite and Coniston. I have not done so this year, because it is hard to know where to draw the line. Certainly it is not fair, in considering the fluctuations of rainfall, to let 10 per cent. at Seathwaite (13 inches) annihilate 60 per cent. at another place, which is the inevitable result of taking the absolute falls instead of the ratios. For instance, from the above it will be seen that in England the mean fall in the six years 1860-65, is 2·52 in. more than the mean of the preceding ten years. If we look into the cause of this excess, we find that 58·61 in. of the whole is due to the three stations—Coniston, Seathwaite, and The Howe—whereas, if their excess was *at the same rate*, but on a lower average fall, the excess would be perhaps 15 inches, and the excess in 1860-65 would fall from +2·52 in. to about +1·50 in.—say nearly half. I hope before very long to be able to determine the probable averages for many of the stations, and will then try how this ratio scheme will answer.

## HEAVIEST FALLS OF RAIN IN 24 HOURS DURING 1865.

This table differs from that given last year in only one respect, that it contains none but the absolute yearly maximum at each station; this alteration, which has been necessitated if the table was to be kept within reasonable limits, is, in some respects, an advantage, in one respect the reverse, as one cannot quite so well trace the boundaries of each heavy fall; on the other hand, we are now able further to test the rule which I suggested last year, viz., that "though in point of quantity the Western stations maintain their excess as well in individual falls as in the yearly totals, the heaviest falls there are relatively hardly half as large as in the Eastern stations." This may be verified from any column of the tables as well as from the following abstract. It is somewhat remarkable that in 1864 the mean of the heaviest falls was 3·47, in 1865, 3·61, the corresponding per centages being 6·3 and 6·4; and that the mean of the largest per centages was 9·0 against 9·9, the corresponding falls being 2·48 and 2·62.

LARGEST FALLS.				LARGEST PERCENTAGES.			
Div.	Station.	Inches.	Per Cent.	Div.	Station.	Per Cent.	Inches.
X.	Seathwaite .....	6·41	5	VII.*	Fleckney.....	13	4·40
VII.	Fleckney.....	4·40	13	IX.	Goole .....	10	2·50
X.	Ambleside .....	3·90	6	XI.	Llandudno .....	10	2·77
VIII.	Monk Coniston ..	3·90	6	IV.	Gisleham.....	10	3·29
X.	Lesketh How.....	3·90	6	XVIII	Beaufort Castle ...	10	2·64
XI.	R. V. H. Llanberis	3·40	4	VIII.	Howick .....	9	3·00
XXIII	Bann Reservoir ...	3·33	7	IV.	Bexwell .....	9	2·48
VIII.	Wray Castle .....	3·31	6	IV.	Culford .....	9	2·48
IV.	Gisleham.....	3·29	10	VII.	Derby .....	9	2·12
X.	Loughrigg .....	3·26	5	IV.	Colchester .....	9	2·90
XI.	Llanberis, D Quar.	3·23	5	„	Bury St. Edmunds	9	2·46
„	Rhiw Bryfdir.....	3·20	4	XVIII	Fearn .....	9	2·02
X.	The How.....	3·15	5	II.	Dunsfold.....	8	2·50
XI.	Beddgelert .....	3·06	4	VII.	Wainfleet .....	8	2·06
II.	Ryde .....	3·03	7	XVII.	Tillydesk... ..	8	2·05
VIII.	Preston Howick...	3·00	9	IV.	Aldham .....	8	2·32
	Mean .....	3·67	6·4		Mean .....	9·9	2·62

\* It is worthy of note that in 1864 the maximum per centage was at West Retford, and was also 13 per cent.—the two stations being on the same meridian, and only about 50 miles apart, the mean rainfall of the two stations is more-over very similar.

Date.	Div.	Station.	Depth.	Per cent of Annual Fall.	Date.	Div.	Station.	Depth.	Per cent of Annual Fall.
		<b>JANUARY.</b>	in.						
1	XIV.	Douglas Castle .....	1.50	4	29	VIII.	Holker .....	1.77	5
"	XVIII.	Applecross .....	1.58	3	"	"	Ulverstone .....	1.97	4
8	XVIII.	Inverinate House...	2.00	4	"	X.	Wray Castle .....	3.31	6
9	VIII.	Cartmel .....	1.95	5	"	"	Belford .....	2.05	7
11	XI.	Beddgelert .....	3.06	4	"	"	Bootle .....	1.97	5
"	XVIII.	Clunes .....	1.60	3	"	"	Whitbeck .....	1.72	4
14	VI.	Ross .....	1.26	4	"	"	Whinfell Hall .....	2.94	6
"	IX.	Bradford .....	1.19	5	"	"	Mirehouse .....	1.61	4
15	XI.	Aberdaron .....	1.06	3	"	"	Cockermouth .....	1.59	4
18	"	Rhydwen .....	1.32	3	"	"	Wigton .....	1.76	7
26	I.	Spring Gardens ..	1.19	4	"	"	Carlisle .....	1.52	6
"	V.	Exeter Institute ..	1.48	4	"	"	Silloth .....	2.22	8
"	"	Penzance .....	1.05	2	"	"	Ambleside .....	3.90	6
27	I.	Camden Town .....	1.12	4	"	"	Appleby .....	1.29	4
"	II.	Earl Sutton Park...	1.96	6	"	XII.	Cargen .....	2.10	5
"	"	Hastings High W.	1.48	5	"	"	Dalbeattie .....	1.78	5
"	V.	Dinder .....	1.29	4	"	"	Dumfries .....	1.70	6
29	"	Bodmin .....	1.60	3	"	"	Hawick .....	2.05	7
30	"	(Liddell) ..	1.50	3	"	XX.	Waterford .....	1.23	3
"	VI.	Pailton House .....	1.62	6	"	"	Rathculliheen .....	2.00	5
"	XII.	Dumfries .....	1.75	5	"	XXI.	Birr Castle .....	1.40	4
"	XXI.	Fassaroe .....	1.73	4	30	X.	Parkend .....	1.65	5
		<b>FEBRUARY.</b>			"	"	Seathwaite .....	6.41	5
1	VI.	Hereford (Barton)..	1.20	5	"	"	Kirkby Stephen ..	1.25	4
"	"	(Broomy Hill)	1.20	5	"	"	Tarnbank .....	2.56	7
"	XI.	Festiniog .....	1.70	3	"	"	Kendal .....	2.36	6
2	XIV.	Blair .....	2.67	6	"	"	Great Strickland ..	1.78	5
3	XVI.	Muthill .....	1.06	3	"	"	Lesketh How .....	3.90	6
4	V.	Bovey Tracey .....	1.43	3	"	"	The Howe .....	3.15	5
5	XXI.	Wexford .....	1.45	4	"	"	Loughrigg .....	3.26	5
6	V.	Tavistock .....	1.30	3	"	XI.	Penrhyn .....	2.06	4
7	"	Ridgeway .....	1.34	3	"	"	Llanberis D. Quar.	3.23	5
23	XV.	Ardaroch .....	2.40	4	"	XII.	Waterside, Kells ..	1.54	3
		<b>MARCH.</b>			"	"	N. Balfern .....	1.24	3
5	XIV.	Ferguslie House ..	1.20	2	"	XIV.	Hillend House .....	1.21	5
25	VI.	Leek .....	2.48	6	"	XX.	Limerick .....	1.47	3
		<b>APRIL.</b>			"	"	Killaloe .....	1.77	4
5	XI.	Portmadoc .....	1.40	4	"	XXI.	Tullamore .....	1.08	4
13	IX.	York (Coney Street)	1.12	4	"	"	Cangort Park .....	1.28	4
17	VIII.	Penketh ..	1.26	5	"	XXIII.	Armagh .....	1.74	4
18	"	Weston Point .....	1.02	5	"	"	Belfast Linen H. ...	1.24	3
		<b>MAY.</b>					<b>JUNE.</b>		
5	VII.	Louth .....	2.02	6	1	I.	Spring Grove .....	1.05	4
"	VIII.	Stonyhurst .....	1.14	3	"	II.	Englefield .....	1.35	5
8	X.	Whitley .....	1.08	4	"	III.	Hemel Hempstead ..	1.44	5
9	V.	Upwey .....	1.60	4	"	"	Berkhampstead ..	1.30	4
10	X.	Sunderland .....	1.10	4	"	"	Eton .....	1.49	5
12	XIII.	E. Linton .....	1.55	7	"	"	Potterspurty .....	1.46	5
13	X.	Wallsend .....	1.11	4	"	"	Oxford .....	1.44	5
15	X.	Darlington .....	2.10	8	"	V.	Torquay La Morna ..	2.13	5
22	II.	Sidcup (in 1 hour)	2.00	6	"	"	High Wick .....	1.66	4
"	VIII.	Howick .....	3.00	9	"	"	Bishops Teignton ..	1.82	4
"	XII.	Jedburgh .....	1.07	5	"	"	Helston .....	1.44	3
29	VIII.	Poaka Beck .....	1.45	4	"	"	St. Austell .....	2.05	4
"	"	Monk Coniston ..	3.90	6	"	"	Treharrock House ..	1.20	3
"	"				"	"	Altarnum .....	1.40	2

Date.	Div.	Station.	Depth.	Per cent. of Annual Fall.	Date.	Div.	Station.	Depth.	Per cent. of Annual Fall.
2	I.	Harefield Park.....	1.52	5	9	VII.	W. Retford .....	1.47	6
"	"	Pinner Hill .....	1.25	4	12	XI.	Ystalyfera.....	1.78	3
"	III.	Henley-on-Thames .....	1.55	6	"	"	Brynkinalt .....	1.24	3
"	V.	Pencarrow .....	1.14	3	13	V.	Bratton Fleming... ..	1.60	3
"	"	Roscarrock .....	1.22	3	17	IV.	B. St. Edmunds A. St. ..	2.46	9
"	IX.	Goole.....	2.50	10	"	"	" (Bot. Gardens) .....	2.36	7
3	VI.	Haughton Hall ...	1.80	8	"	"	" (Beech Hill) .....	1.59	5
24	XI.	Cilgwyn Quarry ...	1.16	3	"	"	* " (Barton Hall) .....	.97	4
28	XX.	Cordaggan Manor... ..	1.59	4	"	"	* " (Culford) .....	1.18	4
29	III.	Sutton Park .....	1.90	6	"	"	* Mattishall.....	1.50	5
"	V.	Wiveliscombe .....	1.30	4	"	"	* Rochford .....	.93	4
"	XI.	Blaina .....	1.70	4	22	IV.	Acle .....	1.42	5
"	"	Swansea .....	1.37	4	"	"	Diss .....	1.62	6
30	I.	Bryanston Square... ..	1.16	4	23	I.	Mill Hill .....	1.83	6
"	II.	Clapham .....	1.65	6	"	II.	Cranbrook.....	2.59	6
"	V.	Foxdown .....	1.38	3	"	"	Hunton Court .....	1.61	5
"	"	S. Petherton.....	1.11	3	"	IV.	Egmere .....	1.82	7
		JULY.			31	XI.	Denbigh .....	1.25	4
1	II.	Brixton Hill.....	1.46	5			AUGUST.		
5	III.	Weedon Beck .....	1.91	7	2	V.	Castle Hill .....	1.52	3
"	V.	Sidmouth (Belgrave) ..	1.38	4	"	IX.	Middlesbro' .....	1.38	6
"	"	" (Salcombe) .....	1.39	4	"	"	" (Marton Hall) .....	1.80	8
"	"	Weston .....	1.42	4	3	VII.	Wainfleet .....	2.06	8
"	VI.	Gloucester Spa.....	1.08	5	"	IX.	Manywells .....	1.56	6
"	"	Great Malvern .....	1.19	4	"	"	Hull (Bev. Road)... ..	1.00	4
6	III.	Woodfield.....	1.94	6	4	"	" (Man. H. St.) .....	1.03	4
"	"	Althorp.....	1.90	7	6	V.	Badminton .....	2.40	7
"	"	Wistow .....	1.09	5	9	XXI.	Black Rock .....	1.73	6
"	V	Sidmouth .....	1.38	4	10	I.	Winchmore Hill ...	1.23	4
"	VI.	Cirencester .....	2.20	6	"	XXI.	Dublin O. S. O. ...	1.35	5
"	"	Rocklands.....	1.12	3	"	"	Monkstown .....	1.13	3
"	"	Worcester Gas W. ..	1.33	5	11	II.	Kew .....	1.01	4
"	"	" (Lark Hill) .....	1.59	6	"	V.	Goodamoor .....	1.25	2
"	"	West Malvern .....	1.25	5	"	XXI.	Glasnevin.....	1.42	6
"	"	Walsgrave.....	1.46	6	12	V.	Long Sutton.....	1.03	3
"	"	Radford.....	1.46	5	"	XXIII	Waringstown .....	1.35	5
"	"	Rugby .....	2.03	8	15	XI.	Bettws y Coed .....	1.84	3
"	VII.	Wigston .....	1.61	6	"	"	Plas Brereton .....	1.00	3
7	III.	Banbury H. St. ...	1.30	5	"	XXI.	Inisnag .....	1.15	4
"	"	Stretham .....	1.02	4	16	XIV.	Baillieston .....	1.62	4
"	"	Wisbech N. Brink. ..	1.39	5	20	VIII.	Caton.....	1.01	3
"	"	" (Obs.) ...	1.65	6	"	"	Hornby Castle .....	1.15	3
"	"	" (St. Mary's) ..	1.35	5	22	II.	Petersfield.....	1.87	5
"	IV.	Swaffham .....	2.00	6	23	I.	Pimlico .....	1.03	4
"	VII.	Little Dalby.....	1.55	6	"	II.	Dunsfold .....	2.50	8
"	XI.	Cowbridge.....	1.24	3	"	"	Bagshot (Duke's H.) ..	2.02	7
"	XVI.	Montrose H. St. ...	1.46	6	"	"	Croydon .....	1.60	5
"	XVII.	Castle Newe .....	1.92	6	"	"	Maidstone.....	1.62	6
"	"	Tillydesk .....	2.05	8	"	"	Bepton Hill .....	2.30	5
"	"	New Pitsligo .....	1.95	5	"	"	Liss .....	1.94	5
"	XVIII	Dingwall .....	1.24	5	"	"	Strathfield Turgiss ..	1.18	4
"	"	Fearn.....	2.02	9	"	"	Cumberland Lodge ..	1.55	5
8	VI.	Moseley.....	1.93	6	"	"	Sandhurst.....	1.57	.7
"	XIII.	Cobbinshaw .....	1.60	5	"	"	Streatley .....	1.04	4
"	XVII.	Aberdeen (A. Pl.)... ..	1.58	5	"	III.	Bayfordbury .....	1.22	4
"	XVIII	Beaufort Castle ...	2.64	10	"	"	Waresley .....	1.24	5

\* These are *not* maxima, but are added to show how very local this heavy fall was.

Date.	Div.	Station.	Depth.	Per cent. of Annual Fall.	Date.	Div.	Station.	Depth.	Per cent. of Annual Fall.
23	III.	Fulbourn .....	1.03	4	9	VIII.	Old Trafford (G.V.V.)	2.26	8
"	IV.	Gisleham .....	3.29	10	"	"	" (J. C.)	1.39	5
"	"	Colchester .....	2.90	9	"	"	" (J.C. 9th & 10th)	2.47	9
"	V.	Devizes .....	1.70	5	"	"	Eccles .....	2.21	8
"	"	Exeter, Albert Ter.	1.26	4	"	"	Outwood .....	2.10	7
"	"	Strath Culm House	1.53	4	"	"	Royton .....	1.84	5
"	VII.	Fleckney .....	4.40	13	"	"	Wigan W. W. ....	2.30	8
"	XVI.	Arbroath .....	1.15	4	"	"	Standish .....	2.07	6
24	I.	Guildhall .....	1.36	5	"	"	Rufford .....	1.35	5
"	"	Chiswell Street....	1.14	4	"	IX.	Barnsley .....	1.28	6
"	"	Offord Road .....	1.12	4	"	"	Tickhill .....	1.30	5
"	II.	Tong .....	1.70	5	"	"	Doncaster ..	1.43	6
"	"	Bromley Common...	1.02	3	"	"	Ackworth .....	1.55	7
"	III.	Yardley Hastings...	1.34	4	"	"	Wakefield .....	1.58	7
"	"	Kettering .....	1.70	6	"	"	Rastrick .....	1.55	6
"	"	Cardington .....	1.80	7	"	"	Ganton .....	1.87	7
"	"	Abington Pigotts...	1.34	5	"	XVI.	Nookton .....	1.20	5
"	IV.	Billericay .....	1.36	5	"	"	Trinity Gask .....	1.00	3
"	"	Aldham .....	2.32	8	"	"	Scone Palace.....	1.82	6
"	V.	Highworth .....	1.24	5	10	IV.	Mattishall .....	1.81	6
"	"	Meshaw .....	1.60	4	"	"	Burnham .....	1.37	5
"	VII.	Leicester .....	1.62	6	"	VII.	Heydour .....	1.53	7
"	XX.	Cork, Queen's Coll.	1.55	4	"	"	Brampton .....	1.96	6
"	"	Mallow .....	1.33	3	"	"	St. Thomas .....	2.10	7
25	V.	Newquay .....	1.20	3	"	"	Belton .....	1.44	6
27	XV.	Callton Mor .....	1.50	3	"	"	Loughborough .....	1.98	7
"	"	Castle Toward .....	2.48	5	"	"	Waltham .....	1.57	6
28	"	Stuckgown .....	2.45	3	"	"	Belvoir .....	1.27	5
"	"	Oban .....	2.00	4	"	"	Southwell ..	1.47	7
"	"	Otter House .....	1.75	4	"	"	Sawley .....	1.85	7
29	XVI.	Dollar .....	1.73	5	"	"	Derby .....	2.12	9
SEPTEMBER.					"	VIII.	Garstang .....	1.05	3
6	XVIII.	Portree .....	2.52	3	"	"	Macclesfield .....	1.75	6
10	XI.	Rhiw bryfdir .....	3.20	4	"	"	Oldham .....	1.37	5
16	X.	Workington .....	1.50	5	"	"	Strines Dale .....	1.68	6
OCTOBER.					"	"	Brushes Clough ..	1.50	4
7	VII.	Waltham .....	1.57	6	"	"	Heaton .....	2.00	6
8	II.	Frant .....	1.62	4	"	"	Belmont .....	1.60	4
"	V.	Ham .....	1.32	3	"	IX.	Broomhall Park ..	1.51	5
9	IV.	Sheering .....	1.32	5	"	"	Harewood .....	1.13	5
"	"	Grundisburgh .....	1.70	6	"	"	Queensbury .....	1.55	5
"	"	Barton .....	1.48	6	"	"	Port Mulgrave .....	1.03	5
"	"	Culford .....	2.48	9	"	X.	Seaham .....	1.03	4
"	"	Thurston .....	2.13	7	"	"	Brenckburn .....	1.65	5
"	"	Bexwell .....	2.48	9	"	XIII.	Thirlestane .....	1.70	6
"	"	Honingham .....	1.11	4	"	XVI.	Balfour .....	1.80	7
"	"	Hunstanton .....	1.03	5	"	"	Logierait .....	1.74	5
"	VII.	Rearsby .....	2.15	8	11	V.	Fullands School ..	1.55	5
"	"	W. Hallam .....	2.36	8	"	"	Broadhembury .....	1.67	5
"	"	Rothley .....	2.20	8	"	"	Penarth .....	1.17	3
"	"	Grantham .....	1.39	6	"	"	Taunton .....	1.45	4
"	"	Sleaford .....	1.44	6	"	"	Batheaston .....	1.44	5
"	"	Stubton .....	1.20	5	"	VII.	Welbeck Abbey ..	1.53	6
"	"	Beeston Meadow ...	1.72	7	"	"	Doveridge .....	2.12	8
"	"				"	VIII.	Willaston .....	2.00	8
"	"				"	IX.	Longwood .....	1.19	5

Date.	Div.	Station.	Depth.	Per cent. of Annual Fall.	Date.	Div.	Station.	Depth.	Per cent. of Annual Fall.
11	IX.	High Harrogate ...	2·16	8	22	V.	Weston-super-Mare	2·04	7
"	XI.	Llandudno .....	2·77	10	23	I.	Pinner Hill .....	1·25	4
12	I.	Twickenham .....	1·44	6	"	II.	Bagshot .....	1·16	3
"	VI.	Woolstaston .....	1·75	6	24	IV.	Dunmow .....	1·83	7
"	"	Leominster .....	1·10	4	"	"	Fincham .....	1·60	6
"	"	Ellastone .....	1·50	5	25	XIX.	Kirkwall .....	1·07	4
"	"	Orleton .....	1·29	4	26	II.	Osborne .....	1·15	3
"	"	Leamington .....	1·56	6	"	XI.	Chepstow .....	1·47	4
"	VII.	Owston .....	1·71	5	"	"	Carmarthen .....	1·37	3
"	X.	Ushaw .....	1·17	4	"	"	Plas Cwrt Hyr .....	1·53	3
"	"	Gateshead .....	1·46	5	"	XV.	Hafton .....	1·30	2
"	XI.	Presteign .....	1·01	3	"	XIX.	Helmsdale .....	1·58	6
"	XXIII	Red Hills House ...	2·25	6	27	IX.	Arnelcliffe .....	1·57	3
"	"	Milltown .....	2·26	8	"	XI.	Dolgelly .....	1·88	4
16	III.	Hitchin .....	1·68	6	"	XVIII	Ardross Castle .....	2·14	7
"	V.	Marlborough .....	1·64	5	28	V.	Hingston .....	1·64	3
"	VII.	Appleby (Lin.) .....	1·75	8	"	X.	Long Newton .....	1·20	5
17	II.	Wantage .....	1·60	6	"	XI.	Merthyr Tydfil .....	2·40	5
"	"	Wallingford .....	1·33	5	29	II.	Canterbury .....	1·78	5
"	III.	Kensworth .....	1·32	4	"	XI.	Glyn Padarn .....	1·57	2
"	IV.	Cossey .....	1·25	5	"	XII.	Carsphairn .....	1·77	4
"	V.	Calne .....	1·30	4	"	XV.	Cardross .....	1·60	4
"	IX.	Holme-on-S.-Moor	1·24	5	"	XXI.	Woodstock .....	1·22	3
"	X.	Otterburn .....	1·92	6	"	XXIII	Bann Reservoir ...	3·33	7
"	"	Bywell .....	1·75	6	30	II.	Hythe .....	1·52	4
"	"	Wylam .....	2·30	8	"	"	Pevensey .....	1·13	4
"	"	Howick .....	1·20	4	"	"	Glynde Place .....	1·64	4
"	"	Roddam .....	2·10	7	"	XVII.	Coldstone .....	2·10	7
"	XIII.	Mungo's Walls .....	1·50	5	31	II.	Acol .....	1·74	6
"	"	Sineaton .....	1·19	5	"	"	Hastings .....	1·98	6
18	II.	Maresfield Rectory	2·74	7	"	V.	Kingsbridge .....	1·80	4
"	"	Uckfield .....	2·40	6	NOVEMBER.				
"	"	Ventnor .....	2·49	8	19	II.	Buxted Park .....	1·80	4
"	"	Ryde .....	3·03	7	"	V.	Dartmoor .....	2·10	3
"	"	Eling House .....	1·50	4	20	"	Dorchester .....	1·80	4
"	IV.	Thorpe .....	1·05	4	"	"	Portland .....	1·12	5
19	I.	Mile End .....	1·77	6	"	"	Little Bridy .....	1·50	3
"	II.	East Peckham .....	1·61	5	"	"	Bridport .....	1·17	3
"	"	Ketches .....	1·92	5	"	"	Penzance .....	1·05	2
"	"	Shirley Warren .....	1·08	3	24	"	Abergavenny .....	1·37	4
"	"	Tunbridge .....	1·63	5	"	XI.	Ardglass .....	1·20	4
"	"	N. Falconhurst ...	1·72	5	25	XXIII	Trawsfynedd .....	1·35	3
"	"	Linton Park .....	1·27	4	26	XI.	Bethesda .....	1·32	2
"	"	Seven Oaks .....	1·45	5	"	"	Glyn Padarn .....	1·57	2
"	"	W. Wickham .....	2·60	8	"	"	Glenarm .....	1·69	4
"	"	Dale Park .....	2·90	7	27	XX.	Portlaw .....	2·24	5
"	"	Balconbe Place ...	1·98	6	28	"	Owendoon .....	1·74	5
"	"	Maresfield Forest L.	1·86	5	"	XXIII	Moneydig .....	1·38	4
"	"	Leigh Park .....	2·23	6	"	"	Londonderry .....	1·30	4
"	IV.	Rochford .....	1·35	6	"	"	Leckpatrick .....	1·95	5
"	"	Bocking .....	1·61	6	29	XX.	Valencia .....	1·32	2
"	XI.	Guernsey .....	2·87	7	DECEMBER.				
20	II.	Horton Park .....	1·86	6	6	V.	Liskeard .....	1·00	2
"	VI.	Berkeley .....	1·26	4	"	XII.	Wanlockhead .....	2·11	4
22	I.	Colney Hatch .....	1·00	4	10	XI.	Llanberis R. V. H.	3·40	4
"	III.	Gorhambury .....	1·22	4	30	XVIII	Lochbroom .....	1·12	3
"	V.	Holbrook .....	1·52	5	31	XI.	Millbrook .....	1·50	4
"	"	Northam .....	1·24	3					



## OBSERVERS' NOTES.

## ENGLAND.

## DIVISION I.—MIDDLESEX.

*Bryanston Square.* A wet year if estimated by the total amount of rain measured ; a dry one if estimated by the number of days on which rain fell, having long periods of drought, very rainy periods, and many heavy daily falls.—*Winchmore Hill.* The rainfall in October was the heaviest we have had here since I began to register in 1858. Winter so mild that in November the raspberry canes bore moderately ripe fruit, and to the end of December the monthly roses were blooming, and we had a nosegay of wallflowers, primroses, and periwinkles from the open garden at Christmas.

## DIVISION II.—SOUTH-EASTERN COUNTIES.

*Pevensey.* On the last day of the year there must have been a much heavier fall than I register, as I have not had so large a flood on the marshes but once before during the year.—*Shirley Warren.* Less rain in September (·01) than for many years. More rain in October (7·71) than for 21 years. February 17th, after a heavy fall of snow, curious rhomboidal balls of snow of various sizes covered the ground, for which no one seems able to account. June, long drought ; roses blighted and grass scorched. 18th September, a case of Asiatic cholera in Southampton. 8th October, much electrical disturbance. December 3rd, beautiful lunar rainbow. December 15th, barometer (reduced) at 10 p.m. 30·690, highest recorded by me for some years.—*River Hill.* No rain from 24th August to 9th of October.—*Liss, Hampshire.* No rain from 6th to 28th of June.—*Wallingford.* 24th December, an unusually dense fog.—*Sandhurst.* A remarkable year for heat, at the same time there has been a bountiful supply of rain. Summer commenced on the 1st of April, and lasted till the middle of October. Only ·27 rain in September, but an unusual quantity fell in October.—*Leigh Park, Havant.* From 29th August to 8th of October (40 days) no rain ; from October 8th to 31st (24 days) 10·21 fell.—*Ventnor, Isle of Wight.* October, 8·84, the heaviest fall in any one month since the register has been kept (27 years). On 18th of October, 2·49, the heaviest fall in 24 hours in same period.—*Ryde.* Unusual height of barometer on the 15th of December, being 30·81 (reduced) at 11 p.m.—*Forest Lodge, Maresfield.* The rainfall here in October, 11·51, was utterly unprecedented. September was remarkable for the drought which prevailed ; only ·06 was measured. August and September were distinguished by the clearness of the sky, but during the remaining months the amount of clouds was quite abnormal.—*Chilgrove.* More rain (9·95) fell in October than in any month for the last 30 years, the heaviest pre-

vious fall being in November, 1852, when 8·62 was registered. September was the hottest month, and almost as dry as September, 1851, when *no* rain fell here.—*Linton Park*. January wet and changeable. February cold, with full average downfall, and the same may be said of March, but April was dry and fine throughout, and remarkable for containing only one frosty morning, while we had three such in May, which nevertheless, was, on the whole, a fine month, warm, with copious showers. June was very dry, no rain falling from 3rd to 29th. July and August, up to 24th of latter, were showery, but the rains being mostly of a thundery character, with periods of fine warm sunny weather between, alike favoured the growth and ripening of the various crops, and dry hot weather setting in on 25th of August, continued throughout September, and up to 9th of October, during which time only ·08 rain fell, while the first 20 days in September were the hottest in the year. October however was remarkably wet, 6·47 falling on the last 14 days, and 8·14 in the whole month, being upwards of two inches more than in any previous month the last 11 years. November not remarkable, and December dull and mild. The hottest day being 21st June, and the coldest night, that preceding 15th February. The highest range of barometer, December 10th, 30·37, and the lowest, January 14th, 28·14, the longest period without rain being from 3rd to 29th June. The direction of the wind at noon each day was — E. 28 days, S.E. 45, S. 59, S.W. 74, W. 36, N.W. 29, N. 35, N.E. 55, and not ascertained 4 days—total 365. Thunder, except in the distance, has not been prevalent, and fewer high winds than usual in the autumn.—*Dunsfold*. The rain on the 23rd of August produced the highest flood known in the parish for 23 years.

#### DIVISION III.—SOUTH-MIDLAND COUNTIES.

*Woodfield, near Stevenage*. July and August remarkable for storms and heavy rains. September and October, especially September, remarkable for heavy dews.—*Hitchin*. The wettest year, 30·26, since 1860, when we had 30·28. 1·68 fell on 16th, the greatest fall in 24 hours since October, 1857, when 3·09 fell. *Berkhampstead*. The excess of rainfall over 1864 was 11·88. There was a heavy hailstorm on 3rd of December, between 4 and 5 p.m.; ·24 inches was collected. This does not appear to have been general.—*Yardly, Hastings*. June 2nd, a fall of 1·15 was measured, which had fallen in 10 hours.—*Cardington*. The average (20 years) yearly number of days on which 0·01 or more rain fell is 155 days; in 1865 the number was 130, being 25 below the average.—*Northampton*. February and March—exceedingly heavy falls of snow in these months. April, very heavy fall of rain on the 18th. May, heavy thunderstorm about 6 p.m. on 23rd.—*Cambridge Observatory*. January, barometer 28·40 on 14th; heavy gale and rain from W. Heavy fall of snow on 16th. February, first week misty; heavy fall of rain on 16th, and high wind on 19th. March, frequent storms of snow and hail. May, violent thunderstorm on 9th, from 4 to 5 a.m.; another on 22nd. June 3rd, heavy thunderstorm at 6 p.m. July, scarcely one day that was really warm and cheerful, raining repeatedly, and thus delaying the harvest. September fine and warm throughout. The wettest October in Cambridge since 1843, when the fall was 5·923. November, a very

heavy gale on the 22nd from S.W., the barometer falling rapidly, being at 9 a.m. 28·813, at 10 a.m. 28·740, at noon 28·684, when it began to rise, being at 3 p.m. 28·806. Great damage done to trees, many being blown down. Barometer began to fall rapidly, going down an inch between 3 p.m. on 27th Dec., and 3 p.m. on 29th; it rose four-tenths of an inch in the next 24 hours; soon after fell again during the raging of the gale of the night of the 30th.—*Wisbech*. The heavy fall on the 10th of October, 1·56 all fell after 10 p.m. The wetness of July is remarkable, but such a wet month as October has not occurred here for many years.—*Abington Pigotts*. The year may be considered, for the district, a wet one, 1860 being the last like it. Highest barometer 30·688, December 15th. Lowest 28·452, January 14th.

#### DIVISION IV.—EASTERN COUNTIES.

*Swaffham*. July 7th and August 25th, violent thunderstorms accompanied by heavy rain.—*Westly*. September was the driest month since 1857, and October the wettest. The crops are all bad in this part of Suffolk, except mangold.—*Grundisburgh*. It has been a remarkable year for extremes; a wet cold month of March, dry and warm April, May more of an average, June more rain than usual (2·05), but all fell on the 1st & 2nd, and 29th & 30th days, 26 consecutive days without any rain. July wet and warm; 22nd, 4 a.m. to 8 p.m., 1·59. August wet and cool. September hot and dry; one thunder shower between 4 and 5 a.m. on the 9th, 0·05; no more till the night of the 8th of October. From the 28th of August till the 8th of October, 41 days, with only this shower. On the night of October the 9th, we had the heaviest rain, for the time, I think I ever recollect; I never heard rain make such a noise; 1·70 fell in a very short time, not more than five or six hours, if so long. October was a very wet month, although no rain fell the first week. From 8th to 11th inclusive, I registered 2·31, 16th to 19th inclusive, 2·61, from 21st to 27th inclusive, 1·57. November must be considered upon the whole a fine month; no heavy rains, but December still finer; no heavy rain till the last night of the month. Up to the present the thermometer has been below freezing only five times, which shows the mildness of the season.—*Mattishall*. July 17th, ·842 fell in less than an hour, and on 25th August, ·814 fell in about the same time.—*Cossey*. Not a drop of rain in September, but on two mornings the dew was so copious, that I collected ·02 and ·01.—*Beech Hill*. July 17th, thunderstorm commenced soon after noon, and in one hour, from 2 to 3 p.m., 1·407 fell. On 19th of October, the whole fall of the 24 hours, 1·062, took place between 8 a.m. and 4 p.m., but the main part of the storm fell a mile or two E. of this place, and was very heavy there.

#### DIVISION V.—SOUTH-WESTERN COUNTIES.

*The Knowle, Kingsbridge*. January, great gales on 1st, 6th, 9th, 14th, and 29th; in the gale on 9th trees blown down, and houses much damaged. From the 31st of August to the 8th of October no rain fell, but there were copious dews, refreshing to vegetation, but trying to invalids. The thermometer high, but wind easterly. November 21st and

22nd tremendous gale, doing much damage. I hear remarks that the rainfall has been heavier than usual, though on fewer days, which has made the people say what a very dry year it has been, whereas it is really the reverse.—*Lamorna, Torquay*. No rain from 24th August to 6th October, except on 9th of September, when it amounted only to .005.—*Broadhembury*. Rainfall for 1865 rather above the average of 20 years, 1837 to 1856, which is 34.78.—*Meshaw Rectory*. On 24th of August there was a very remarkable storm in this immediate locality, approaching a waterspout in its effect; the rain, 1.60, fell in about five hours.—*Holbrook Farm*. July 6th, a remarkable rain at 5 p.m.; 1.25 fell in 20 minutes. I never witnessed such rain in my life.—*Bratton Fleming*. Heavy dew but no rain in September. No snow fell up to the 31st of December.—*Bodmin (Liddell)*. The average of 16 years is 44.54, so that notwithstanding the drought of the summer, the heavy rains of January, February, August, October, and November, brought the rainfall 4.44 above the average.—*Helstone*. April 9th, swallow; 20th, apple in bloom; 22nd, chesnut in bloom; 28th, lilac in bloom; May 2nd, hawthorn in bloom; 3rd, laburnum in bloom; 4th, honeysuckle in bloom; June 10th, wheat in ear; 19th, barley and oats in ear; strawberries on 2nd, raspberries on 12th, and cherries on 19th. July 7th, thunder and lightning; 10th, oats cut; 24th, barley cut; 28th, wheat cut; 30th, peaches ripe; October 2nd, woodcock; November 4th, horse chesnut, 18th, poplar and hawthorn, leafless. November 25th, hurricane from the S.; much damage done. December 29th, heavy gales.—*Taunton*. No rain from 26th of August to the 8th of October.—*Strathculm House*. Heavy hailstorm on 11th of August.—*Marlborough*. January and February, gauge frozen at times.

#### DIVISION VI.—WEST MIDLAND COUNTIES.

*Birmingham (T. L. Plant)*. This is the wettest year (1860 excepted) that I have ever recorded. Our average fall is about 28 inches, so that the depth in 1865 is 20 per cent. above the average. January, February, May, July, August, October, and November in excess: April and September very dry; March, June, and December little deviation.—*West Lodge, Leominster*. The year has been remarkable for violent winds.—*Broomy Hill, Hereford*. There was a fall of .40 in 15 minutes on the 9th of July. There also fell in two showers, between 10 a.m. and 4 p.m. on the 23rd of August, .84.—*Saul Lodge, Stonehouse*. The lowest barometer (28.76) was on the 22nd of November, during a fearful gale, which raised the waters of the Severn 8 feet above the ordinary tide level for the day. The highest reading (30.86) was on the 15th of December, a calm, clear, beautiful day; this is the highest I have ever recorded.—*The Boyce Court, Gloucester*. No rain from 25th of August to 6th of October, inclusive, except .02 on 21st September.—*Haughton Hall, Shifnal*. The drought here not so great as last year, but the turnips suffered greatly. Crops good up to September, when mildew attacked them to such a degree, that the leaves shrivelled up as if they had been roasted in the fire, and the stench was abominable and perceptible for some distance. On the return of rain in October they revived beyond all expectation, but were little in the bulb, all the growth being from the top,

which caused them only to neck, the bulb being hard and stunted. Scarce a wasp seen since the spring, when queens were numerous; their destruction has been traced by some, in other parts, to the abundance of earwigs, which destroyed the larvæ in the comb, but as we had no earwigs, some other cause must have existed. The humming-bird sphinx numerous beyond precedent for many seasons; death's-head hawk-moth also frequently met with.—*Ross, Herefordshire*. The last three months the wettest since (June, July, and August,) 1860. The fall of snow in January and February, about 12 inches on level, without drifting, estimated at 1·25.—*Whitchurch, Salop*. The rain in August seemed entirely what farmers call thunder-rain; it came down in a succession of heavy showers, followed by one, two, or three days of warm murky weather. We have had no thunderstorms of any consequence here; it may be the flatness of the district has tended to this.

#### DIVISION VII.—NORTH MIDLAND COUNTIES.

*Wigston*. The total fall of rain during the year 1865 (26·80) is about the annual average during the last 28 years, but the number of days on which it fell is less than I have ever recorded.—*West Retford*. The most remarkable meteorological feature in the past year was the drought, which extended from the 29th of August to the 9th of October, during which time only ·16 fell. The rainfall is 1·08 above the average of the last 6 years, and is ·04 above the fall of last year.—*Chatsworth*. Sharp frosts with snow in January, February, and March; very dry and hot in April, May, and June; warm rains in July and August; a very dry hot September; wet mild October; very mild November and December; in the latter month some very heavy gales from S. and S.W.—*Welbeck*. The total rainfall near the average 25·0, 12 inches of which fell in the three months of May, August, and October, equal to the fall of the other nine. The mean temperature of April, May, June, and September, was above the average. July and December equal to average, and the other months below it. The temperature for the year was 59°, being 1½ degrees above the average (47°·0). September was a very hot month, and all the corn cut or uncut in the beginning of it, was secured in excellent condition in the northern parts of the kingdom. Some tropical plants ripened in the open air, and the Jerusalem (or ground) artichoke flowered profusely here, a circumstance which I never observed before in the Midland counties.—*Fleckney*. The year 1865 has been remarkable for heavy rains and droughts; the most extraordinary rain that has ever been known in these parts came on the 23rd of August, when it fell heavily for 20 hours without intermission, in which time 4·40 of rain fell; the canal burst its banks near the Saddington reservoir, deluging the country and doing much damage.—*Rearsby, near Leicester*. October 9th, 2·15, the largest fall in 24 hours I have measured in 20 years.—*Rugby*. October 18th, heavy thunderstorm at mid-day; furnace chimney at the Cement Works struck, and damaged from top to bottom.

#### DIVISION VIII.—NORTH-WESTERN COUNTIES.

*Holker Gardens, Newton-in-Cartmel*. Highest temperature 85° on 21st of June; lowest 14° on 15th of February.—*Standish, Wigan*. Year

remarkable for bright sunny weather, yet sufficient rain fell to keep the pastures green and beautiful, though rather too dry for the hay and turnip crop. Probably the finest summer since 1826. Great scarcity of water in many parts. Very hot in September.—*Caton, Lancashire*. Rainfall 4·66 below the average (16 years).—*Woodville Terrace, Fishwick*. 22nd of May, strong wind from the E.; a severe storm of thunder, lightning, hail, and rain. As the ordinary channels, spouts and watercourses, could not carry off the water, much damage done.—*Rufford*. The rainfall in 1865 was 6·89 below the average of last 19 years.—*Downham Hall*. This year's fall about  $4\frac{1}{2}$  inches below average.—*Royton*. September, mean temperature 7·1 above the average (30 years).

#### DIVISION IX.—YORKSHIRE.

*Old Malton*. Greatest fall during the year 1·10 on 18th of April, in 12 hours.—*Hull* (Baker Street). More fleas noticed than usual, presumably from the dry weather of the preceding September.—*Moorgate Grove, Rotherham*. 24th May, ·93 fell in four hours during a thunderstorm.—*Beverley Road, Hull*. September was a remarkable month here, the average maximum and minimum being 7° above the mean of the previous eight years. During the eight Septembers, 1857 to 1864, the temperature only exceeded 70° on 14 days; in September, 1865, that temperature was reached on 21 days, and on one day reached 82°·5, the previous max. being 74°·5. The rainfall was 0·47, the average for eight years being 2·67. October 27th, a most remarkable phenomenon occurred during the afternoon; a thunderstorm passed over the town, and for half an hour the darkness was that of midnight; all had to light-up fully. Rain total, ·68 above average.—*Middlesborough*. November 22nd, barometer fell to 28·00

#### DIVISION X.—NORTHERN COUNTIES.

*Otterbourne*. May 23rd, no rain at Otterbourne, but a waterspout on Carter Fell, 14 miles off; the flood came down like a wall of water. I crossed some stepping-stones, and in three minutes there was six feet of water over them. The flood came on at the rate of three miles an hour. October 19th, Northern lights very brilliant.—*Brenckbourne*. April remarkably fine and warm. September and part of October very hot, and during the intermediate months continued fine summer weather.—*West Hendon*. More rain fell in October than in any other month since 1859, when I began to register.—*Burghfield Grange*. 17th of October, 1·18 fell.—*Whitley*. Snow was registered for the first time on 27th of October: there has been, as usual, but very little snow.—*The Hall, Sunderland*. Average fall for 11 years, 1855 to 1865, 23·73. From 3rd of June to 4th of July no rain fell.—*Ambleside*. Rainfall 18·35 below the average of the last five years.—*Brougham Hall*. The average rainfall is 26 inches; the last two years have been about two inches below that, but in 1861, 1862, and 1863, it was about 10 inches above. *Great Strickland*. We have reason to think that high wind affects the quantity of rain which enters the gauge, there being a great deal more flood on a windy day, on which we registered a less quantity, than there was on a calm day, on which we registered a greater quantity—does it

blow over the gauge? It has been by far the driest year here for a long time, places being dried up which have never been so before in the memory of the oldest inhabitant, yet we have had 36 inches of rain, but it was concentrated in a few months.

#### DIVISION XI.—MONMOUTH, WALES, AND THE ISLANDS.

*Carmarthen, The Gaol.* 21st of October (when most rain fell) was exceeding windy, principally S., by which the sea-water was driven into the Towy river, causing the tide to rise much higher than for many years past, thus flooding the lands on either sides of it to a great depth, and making serious breaks in the South Wales Railway. Much damage was also done by the wind to trees, houses, &c.—*Blaina.* A remarkably fine season for this district. No rain from September 10th to October 7th. Severe gale on 22nd of November from S.S.W.—*Abergavenny.* 9th of October, .94 fell in half an hour.—*Chepstow.* No rain from 23rd of August to 7th October, except .06 on 9th of September; 16th, .846; 22nd, 1.024; and 26th, 1.476. The average of the mean of two daily temperature readings were, June, 62°·2; July, 62°·7; August, 60°·4; September, 64°·1. Rainfall less than average of four previous years. Wet days 12 fewer than average.—*Merthyr Tydvil.* May 3rd, vegetation three weeks in advance. From 1st of June to 26th, very hot, ground cracked and grass burnt up. No hay crop to speak of.—*Brithdin, Dolgelly.* From noon on 27th to noon on 28th October, barometer rose from 28.50 to 29.42, and fell on 29th to 28.58; on 22nd November it fell to 27.90.—*Bangor, Carnarvon.* 12th of October, .95 fell in 12 hours. In June the maximum and minimum temperature in shade varied from 41° to 81°.—*Guernsey.* The rainfall is 8.354 above the average of 22 years; the number of days is 10 below the same average. The fall in October was the greatest during the past 23 years.

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### SCOTLAND.

#### DIVISION XIV.—SOUTH-WESTERN COUNTIES.

*Beechgrove, Mauchline.* Driest year for a long time. A spring which had not failed for 27 years, was nearly dry in September.—*Kilbarchan.* The past year has been drier, and the harvest earlier and more fruitful, than any of the immediately preceding years. I believe the same remark will be applicable to other localities having the like character of a dripping climate. Abundant rains, or rather I should say, super-abundant rains, deteriorate a climate and soil productions, not so much by the mere super-saturation of the soil and plant, as by robbing the air and soil of heat in the process of evaporation. Irrigated meadows gave a good return of natural grasses. There was, contrary to rule, a good deal of disease among potatoes in light dry soils, and scarcely a trace of taint among those grown on heavy clay soils, which farmers have not reputed good potato soils. The long autumn, after the carrying of the crops, has allowed the farmers to commit wheat to a large breadth of ground. There were nine mornings during November on which the temperature was below the

freezing point of water. December, on the contrary, has been unusually mild, showing a mean temperature of fully 40°, and only two mornings with the temperature below 32° Fahrenheit. The rainfall, 48·40 (in 1865), is the result of 139 days. 1864 was 54 inches, and the mean of 1860, 1861, 1862, and 1863 was no less than 70 inches.—*Bothwell Castle*. The rainfall of 1864 is five inches below the average; it must, however, be considered a favourable season for the district, as crops in general have been good, and the hay crop and general pasturage extra fine.

#### DIVISION XV.—WEST MIDLAND COUNTIES.

*Stuckgown*. Seven months of this year seem to have naturally divided themselves into two parts—a dry half and a wet half—in this locality. Almost the entire fall of rain in January, March, April, and September, occurred before the 16th of the month, and February, October, and November, occurred after the 16th. There occurred from 22nd of September, 17 consecutive days, from 7th of June, 16 consecutive days, and from 19th of April, 13 consecutive days, without any register of rain at all.—*Arblarrock*. 26th of October, barometer 28·60; high wind; 29th October, sleet and wind, with barometer 28·52. 10th December, barometer 30·60, with frost; 29th, 28·50; high winds and rain.—*Hafton*. The driest year since 1856. Such a warm sunny summer has not occurred here for a long time; the winter has been particularly mild. *Callton Moor*. The finest season in this part for many years, there having been ·66 less rain, and over 200 hours more of sunshine than in 1864.—*Otter House*. December warmer than November; fields green and trees budding. An unusual succession of gales, with rain, from the 19th; thunder and lightning on the 25th and 31st; hills covered with snow on the 30th, the frost checking premature vegetation.

#### DIVISION XVI.—EAST MIDLAND COUNTIES.

*Leny*. A remarkably fine summer and autumn, August being the only exception to a brilliant summer.—*Stronvar*. Total fall 15 per cent. less than in 1864.

#### DIVISION XVII.—NORTH-EASTERN COUNTIES.

*Coldstone*. I am satisfied from experiments I have made, that a large gauge should not be placed near the surface of the ground. February was notable for a great snow-storm; the average depth on 20th was 2 ft. 9 in., but drifted so, that in many places it was 10 ft. deep; the roads were blocked up for seven days. June and September were almost without a shower. October and the early part of November were characterized by very heavy rainfall. I observed three beautiful Auroral belts during the season, one on the 16th of February, one on the 2nd of March, and one surpassing the other two in extent and duration, on the 20th of March; this attracted general attention, and was described in most of the provincial newspapers.—*Castle Newe*. Number of rainy days five under the average of nine years; depth of rain 0·36 below the average of 32 years.—*Tillydeskh*. The months of April, May, and June, were remarkably dry, and crops of all kinds suffered greatly in June from want of



moisture. From the 1st to 7th of July inclusive, 2·91 of rain fell, nearly the same amount (2·96) which had fallen during the three months immediately preceding.

#### DIVISION XVIII.—NORTH-WESTERN COUNTIES.

*Andross Castle.* The greatest degree of heat was 77° on July 6th; the greatest depth of snow, 9½ inches, on 20th of February. January and October were the wettest months. The summer was dry and warm; by far the finest we have had for years. Rainfall 5·66 less than last year. —*Fearn School.* February 15th, we had a snow-storm which continued several days, and was equivalent to a rainfall of 1·32. The two heaviest falls of rain were on the 7th of July and 26th of October. In the former instance there was a depth of 2·02 in less than 12 hours, and in the latter 1·24 in about 16 hours. June and September were both characterized by a high temperature and a great scarcity of rain. In June the total quantity registered amounted to ·58, and the largest on any day was (with the exception of ·25 on the 6th) only ·09, and in September matters were much the same. The temperature of September, however, was higher than that of June by 1°·3, the maximum being 75° in June, and 76°·3 in September; the humidity as well as rainfall were likewise greater. Some idea of the dryness of June may be had from the fact, that the hygrometer on the 19th showed a difference of 15·5 between the wet and dry thermometers.

#### DIVISION XIX.—NORTHERN COUNTIES.

*Kirkwall.* Rainfall 8·465 below the mean of the preceding three years. A warm genial summer and autumn. In the vicinity of Kirkwall crops excellent and reaped in good time.—*Melsetter.* The month of September the driest I ever remember in Orkney, also the first week in October, but on the 6th a complex halo was seen round the sun, three semicircles touching the central ring, one at its top and one on each side, and very wet and stormy weather followed.

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### IRELAND.

#### DIVISION XX.—MUNSTER.

*Woodfoot.* January, February, and March had many wet days, without any very heavy falls in the 24 hours. April and May were months of average temperature, the last seven days of May being very wet. June remarkably dry up to the 29th, when there was a break and it rained almost continuously to the 24th of July. Rain commenced again early in August, ·67 falling in three hours on the 23rd. September was remarkably dry, as was also the early part of October, but a great deal of rain fell from the 9th to the end of the month. November dry and fine to 13th, but rain fell on every day from that date to the 7th of December, and from 16th to the end of the year.

#### DIVISION XXI.—LEINSTER.

*Inisnag.* The absence of high winds and thunderstorms was remarkable, all through the year there were but two thunderstorms, viz., on 7th and 18th of July. The lightning struck a large spruce about half a

mile distant from this place, shattering it completely on the latter day. All springs and streams were very low until the heavy rain in November and December; the latter halves of these two months were very wet and stormy. Temperature of November and December very high. Tender plants still in flower.

#### DIVISION XXII.—CONNAUGHT.

*Cregg Park.* This year, like 1864, was a very fine one; an unusually long summer, and very fine crops. Snow on 1st, 12th, and 13th of January; 13th, 15th, and 17th of February, and 6th of March. A hard frost from 20th to 28th of February, which ended in a S.W. gale.

#### DIVISION XXIII.—ULSTER.

*Moneydig.* 22nd of August, 1·25 fell in about an hour and a half; one shower came from the S.E.; it cleared up, and soon came on again from the N.E., with about an hour between the storms.—*Londonderry.* Though the rain this year is slightly in excess of last year, the temperature has been higher, and more damp without rain.—*Letterkenny.* Mean temperature at 9 a.m. in

January .....	37·0	May .....	57·1	September .....	63·6
February .....	40·3	June .....	66·2	October .....	50·5
March .....	43·3	July .....	66·5	November .....	42·6
April .....	55·9	August .....	62·5	December .....	45·5

Mean of the year (at 9 a.m.) 52°·6.

# ENGLAND AND WALES.

[The divisions are the same as those adopted by the Registrars-General of England and Scotland. The Stations in each county are arranged in the order of their latitude from South to North. An alteration has been made with respect to printing the names of stations, in order to facilitate finding the fall in any part of the country: the first name is now almost always that of a place given in *Bradshaw* or the *British Postal Guide*; the second name is added occasionally, to fix accurately the site of Observation. In a very few instances, this second name is in [ ] instead of ( ); it shows the nearest town, which is then in an adjoining county. An asterisk \* denotes that the gauge was tested before erection, and a † that it has been visited and examined since. A note of interrogation (?) implies doubt, not necessarily error. It will be seen that, according to promise, a column has been devoted to the number of days on which rain fell—not counting days with less than 0·01 inch, because many gauges will not show less, and it is often uncertain whether less amounts are due to rain, dew, or fog.]

## DIVISION I.—MIDDLESEX.

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which ·01 or more fell.
		Above Ground.	Above Sea Level.	1865	
		ft.	in.	feet.	inches.
MIDDLESEX.					
Twickenham Observatory.....	A. Wiss, Esq.....	0	9	34	25·10 121
Chiswick .....	R. Thompson, Esq. ....	2	9	14	26·92 148
Hammersmith, S.W. ....	F. J. Burge, Esq. ....	1	0	12	25·90 156
Ealing (Spring Grove) .....	T. E. Wyatt, Esq.....	1	0	65	27·64 160
Pimlico (Pulford St.) .....	F. Gaster, Esq. ....	8	0	21	30·22 168
„ (Bloomfield Terrace).....	C. Harding, Esq. ....	2	0	16	27·42 162
Westminster(SpringGrdns),S.W.	J. W. Bazalgette, Esq.	6	8	36	26·58 140
London (Guildhall), E.C. ....	W. Haywood, Esq. ....	4	0	50	28·55 163
„ „ „ „ .....	51 0 98				27·13 163
† „ (Bryanstone Square), W.	C. O. F. Cator, Esq. ....	4	6	93	28·48 152
„ (Chiswell Street), E.C....	W. Fletcher, Esq. ....	50	0	...	27·20 121
„ (Mile End), E. ....	F. Charrington, Esq....	12	0	...	29·65 93
† „ (Camden Road), N.W....	G. J. Symons, Esq. ....	0	4	100	29·44 163
„ (Offord Road), N.....	R. Strachan, Esq. ....	2	0	80	29·49 165
Hackney, N.E. ....	Dr. Tripe .....	0	6	40	29·24 ...
Hampstead, N.W. ....	Rogers Field, Esq.....	1	0	360	31·39 145
† Highgate Nurseries .....	J. Cutbush, Esq. ....	1	0	394	30·49 147
Harrow .....	Dr. Hewlett .....	1	2	354	29·00 156
Uxbridge (Harefield Park) .....	W. F. Vernon, Esq. ....	0	8	290	30·10 121
† Colney Hatch Asylum .....	Mr. R. G. Rose .....	40	0	...	25·46 132
Pinner Hill .....	W. A. Tooke, Esq. ....	3	6	410	33·33 126
Mill Hill, N.W. ....	E. G. Fawcett, Esq. ....	1	0	365	32·24 ...
Lower Edmonton .....	Mr. J. Brown .....	0	9	...	26·71 139
Enfield (Nag's Head Lane) .....	W. Mylne, Esq.....	3	0	89	32·55 184
„ (Winchmore Hill).....	Miss Feltham.....	4	6	...	31·97 145

## DIVISION II.—SOUTH-EASTERN COUNTIES.

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which -01 or more fell.	
		Above Ground.	Above Sea Level	1865		
SURREY.						
Godalming (Dunsfold) .....	W. L. Woods, Esq. ...	0	6	...	30·32	...
Reigate (Ham) .....	J. G. Marriage, Esq....	3	0	...	29·54	...
Dorking (Deepdene) .....	Mr. J. B. Whiting ...	2	9	...	34·30	...
„ (West Street) .....	W. A. Marsh, Esq. ...	35	0	...	36·82	152
Betchworth (Brockham) .....	W. Bennett, Esq. ....	0	6	130	31·89	149
Dorking (Box Hill) .....	E. Boorman, Esq. ....	4	0	500	36·95	...
† Cobham Lodge .....	Miss Molesworth .....	0	6	100	29·17	139
† Weybridge Heath .....	W. F. Harrison, Esq..	0	6	150	26·99	...
Bagshot .....	Dr. Blount .....	4	0	200 ?	31·37	127
„ (Park) .....	Sir J. Clark, Bt., F.R.S.	1	1	230	33·17	...
„ (Windlesham) .....	G. Dines, Esq. ....	2	0	205	29·09	...
Croydon .....	Dr. Westall .....	1	8	152	31·41	109
Wimbledon .....	T. Devas, Esq. ....	3	0	...	26·64	...
* Brixton Hill.....	Miss Sweeting .....	1	0	127	28·62	148
Wandsworth (South Fields).....	R. Coleman, Esq. ....	1	0	...	29·23	...
„ (St. Ann's Hill).....	G. Dines, Esq. ....	...	...	...	29·49	...
„ (West Hill) .....	J. E. Richard, Esq. ...	0	7	86	28·81	83
Clapham .....	H. Doxat, Esq. ....	0	11	80	28·15	137
† Kew Observatory .....	B. Stewart, Esq., F.R.S.	1	3	19	26·44	146
Battersea College .....	J. P. Faunthorpe, Esq.	0	0	13	27·04	137
KENT.						
Tenterden (Rolvenden) .....	R. Appach, Esq. ....	...	...	...	36·20	160
Hythe .....	H. B. Mackeson, Esq..	0	8	12	35·76	168
† Dover (Castle Street).....	H. J. Poulter, Esq. ...	2	2	16	38·03	160
† „ (Castle Keep) .....	„ „ „	99	0	512	14·57	...
Hythe (Horton Park) .....	J. Kirkpatrick, Esq....	1	6	350	39·99	171
Cranbrook (Tillsden) .....	Mr. T. Pile .....	0	3	...	44·38	...
Tunbridge .....	Dr. Fielding .....	1	0	125	34·75	170
Edenbridge (New Falconhurst)...	J. G. Talbot, Esq. ....	1	0	400	35·49	138
Staplehurst (E. Sutton Park) ...	Mr. Skinner .....	1	0	...	35·68	163
„ (Linton Park) .....	Mr. J. Robson .....	0	6	200 ?	35·18	172
„ (Hunton Court).....	Mr. P. Goddard .....	0	6	...	32·31	136
East Peckham.....	Mr. S. T. Harris .....	2	0	76	31·52	107
Canterbury (Chartham).....	C. T. Drew, Esq. ....	2	6	...	34·38	165
Maidstone .....	F. Dobell, Esq. ....	...	...	...	34·56	...
„ (Fant Road) .....	J. H. Baverstock, Esq	1	3	60	29·13	136
† Seven Oaks (River Hill) .....	J. T. Rogers, Esq.....	9	0	520	29·69	111
† Westerham (Chartwell).....	J. C. Colquhoun, Esq.	1	0	400	37·15	...
Sittingbourne (Tong) .....	G. Eley, Esq.....	2	0	2	33·98	125
„ (Hartlip).....	W. Bland, Esq. ....	2	0	159	37·93	...
† Ramsgate (Cannon Brewery) ...	R. Cramp, Esq. ....	7	6	78	28·73	136
* † Margate (Acol).....	E. S. Lendon, Esq. ...	1	0	60	29·80	108
† „ (R. Sea-B. Infirmary) ..	W. K. Treves, Esq.....	1	0	25	27·90	166
West Wickham .....	Rev. J. T. Austen .....	1	0	330	34·29	...
„ „ .....	Miss Steuart .....	3	0	500 ?	33·93	92
Bromley Common, S.E. ....	Rev. A. Rawson .....	1	0	280	31·12	...

## DIVISION II.—SOUTH-EASTERN COUNTIES—(continued).

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain. 1865	Days on which 1 or more fall
		Above Ground.	Above Sea Level.		
		ft. in.	feet.	inches.	
KENT ( <i>con.</i> ).					
Foot's Cray (Sidcup) .....	Miss Berens .....	...	...	32.45	...
Deptford (Pumping Station).....	J. Grant, Esq.....	3 8	18	32.17	155
† Bexley Heath (Welling) .....	H.S.H. Wollaston, Esq. ....	6 0	150	30.13	...
Greenwich Observatory.....	J. Glaisher, Esq., F.R.S. ....	0 5	155	29.00	...
Crossness [Barking Reach] .....	J. Grant, Esq. ....	6 3	12	27.61	108
WEST SUSSEX.					
Bognor (Aldwick) .....	H. Upton, Esq. ....	0 6	8	29.97	...
Emsworth (West Thorney) .....	W. L. Woods, Esq. ....	0 10	10	31.51	...
Chichester (Infirmary = Museum) .....	W. Hills, Esq. ....	0 6	20	35.68	...
„ (Westgate) .....	Dr. Tyacke .....	0 6	12	35.41	...
„ (Shopwyke) .....	Rev. G. H. Woods ....	1 3	61	36.70	...
Arundel (Dale Park) .....	J. C. Fletcher, Esq. ....	4 0	316	42.26	105
Chichester (West Dean) .....	H. Paxton, Esq. ....	1 4	250	44.67	153
„ (Chilgrove) .....	W. Leyland Woods, Esq. ....	0 6	284	38.45	82
„ (Bepton Hill) .....	„ „ „ .....	0 6	554	43.88	...
Petworth .....	Rev. C. Holland .....	2 0	...	38.83	...
EAST SUSSEX.					
Pevensay .....	M. Vidler, Esq. ....	4 0	10	29.26	...
Brighton .....	Dr. Kebbell .....	3 6	40	35.13	101
Hastings (High Wickham) .....	E. Field, Esq. ....	1 4	212	28.65	124
† „ (Bleak House) .....	Mr. J. Banks .....	3 0	80	30.88	97
Lewes (Glynde) .....	Mr. J. McLeod .....	3 0	45 ?	39.69	135
Battle .....	F. Webster, Esq. ....	1 3	...	39.60	...
Hurstpierpoint (St. John's Coll.) .....	Rev. J. Gorham.....	0 8	110 ?	36.36	153
Uckfield .....	C. L. Prince, Esq. ....	6 0	206	38.97	120
„ (Moulsey Gore) .....	F. Brodie, Esq. ....	0 6	...	39.35	...
Newick (Ketches) .....	Miss Shiffner.....	0 5	150 ?	35.71	138
Buxted Park .....	W. T. Huggett, Esq. ....	7 0	200	41.29	127
Maresfield (Rectory) .....	Rev. E. Turner .....	1 2	250	42.21	150
„ (Forest Lodge).....	Captain W. Noble.....	1 2	301	37.84	151
Salehurst (Church House) .....	Mr. S. Boorman, jun. ....	4 2	...	38.39	152
Cuckfield (Balcombe Place) .....	J. A. Hankey, Esq. ....	1 3	340	35.81	150
Frant [Tunbridge Wells] .....	Dr. Allnatt .....	1 3	595	40.00	...
Crawley (The Hyde) .....	E. S. Bigg, Esq. ....	2 0	300	43.00	...
HAMPSHIRE.					
Ventnor, Isle of Wight.....	Dr. Martin.....	3 0	150	32.73	156
Ryde .....	Mr. R. Taylor.....	7 0	15	39.20	143
Osborne .....	J. R. Mann, Esq. ....	3 0	172	34.96	119
Southampton (Cadland).....	A. H. Hogg, Esq. ....	4 6	100	38.62	..
Fareham .....	H. Sharland, Esq. ....	0 0	26	39.11	...
Havant (Leigh Park) .....	W. H. Stone, Esq. ....	0 4	40 ?	37.10	125
Southampton, Ordnance Survey } Office .....	Col. Sir H. James, R.E. }	0 10	74	33.46	...
	F.R.S. ....	1 3	75	42.71	...
		18 6	92	33.09	...
Southampton (Eling House).....	W. C. Spooner, Esq. ....	0 8	20	34.98	...
„ (Shirley Warren).....	R. C. Hankinson, Esq. ....	4 0	100	34.16	151
Winchester (Otterbourne).....	J. B. Yonge, Esq. ....	1 3	112	35.54	148
Petersfield (Heath Lodge).....	Rev. H. Haigh .....	0 10	70	41.12	125

## DIVISION II.—SOUTH-EASTERN COUNTIES—(continued.)

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which .01 or more fell.	
		Above Ground.	Above Sea Level	1865		
HAMPSHIRE—(con.)						
Petersfield (Liss) .....	G. E. Coryton, Esq. ...	0	6	...	42·81	...
New Alresford (Arle Bury) .....	F. Marx, Esq. ....	1	3	308	34·25	...
Selborne (The Wakes) .....	T. Bell, Esq. ....	4	0	500 ?	38·18	137
Aldershott .....	Mr. J. Arnold .....	3	0	325	29·62	143
" .....	" .....	25	0	350	24·45	143
" (Bourley—2 miles W.) .....	Corporal Dagnall, R.E. ..	1	0	370	33·10	141
Strathfield Turgiss.....	Rev. C. H. Griffith ...	4	0	169	32·15	156
BERKS.						
Sandhurst Royal M. College.....	Dr. Collins .....	5	0	246	24·37	157
Windsor (Cumberland Lodge) ...	Hon. Maj.-Gen. Hood ..	1	0	200	29·55	139
" (Parkside) .....	W. Menzies, Esq. ....	6	0	...	25·65	...
Reading (Englefield) .....	E. Robinson, Esq. ....	0	6	...	28·19	139
Hungerford (Welford Park).....	Mr. C. Ross .....	...	...	...	29·69	...
Maidenhead (White Waltham)...	J. Silver, Esq. ....	1	6	...	27·25	...
Streatley .....	Rev. J. Slatter .....	0	4	100	27·26	125
*Wantage .....	E. C. Davey, Esq. ....	12	8	...	27·46	145
Wallingford (The Castle) .....	J. Kirby Hedges, Esq. ..	0	9	175	26·32	126
Long Wittenham .....	Rev. J. C. Clutterbuck ..	1	0	170	30·35	...

### DIVISION III.—SOUTH MIDLAND COUNTIES.

HERTS.					
Watford (Watford House) .....	R. Clutterbuck, Esq.....	1	6	190	29.59 111
" (Eastbury) .....	D. Carnegie, Esq. ....	0	4	377	31.96 ...
Hoddesdon (Field's Weir).....	N. Beardmore, Esq. C.E.	2	0	82	28.79 ...
Hertford (Parkgate) .....	Rev. R. P. Davies ...	2	9	...	28.12 153
Bayfordbury (8-in. gauge) .....	W. C. Baker, Esq.....	0	4	250	29.81 151
" (5-in. gauge).....	" " " "	1	2	250	29.59 151
St. Albans (Gorhambury) .....	Mr. G. "Bogue" .....	2	9	...	32.02 138
Hemel Hempstead .....	J. Evans, Esq., F.R.S.	3	0	250	30.25 145
Berkhampstead .....	W. Squire, Esq. ....	1	6	370	31.70 146
Kensworth [Dunstable].....	T. Jones, Esq. ....	1	4	90 ?	32.52 140
Stevenage (Woodfield) .....	J. Bailey Denton, Esq.	1	6	300	29.99 185
Hitchin.....	W. Lucas, Esq. ....	2	0	240	30.26 131
Royston .....	H. Wortham, Esq. ...	0	6	266	29.33 ...
BUCKINGHAMSHIRE.					
Eton .....	Rev. Herbert Snow ...	1	0	120 ?	28.53 ...
High Wycomb.....	R. Wheeler Esq.....	...	...	...	25.03 ...
Missenden Abbey .....	J. Begbie, Esq. ....	1	0	...	33.01 ...
Newport Pagnell .....	R. Littleboy, Esq. ....	30	0	...	22.61 ...
OXFORD.					
Henley-on-Thames .....	T. F. A. Byles, Esq....	4	0	83	27.22 ...
Oxford (Radcliffe Observatory)	Rev. R. Main, F.R.S....	0	8	210	28.53 144
" " .....	" " " "	24	0	234	23.90 ...
*Bicester (Stratton Audley Park)	G. Glen, Esq.....	3	0	300 ?	27.26 ...
Banbury (High Street) .....	T. Beesley, Esq.....	7	0	345	28.29 161
" .....	W. Johnson, Esq. ....	4	0	...	29.28 141

## DIVISION III.—SOUTH MIDLAND COUNTIES.—(continued.)

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which "01 or more fell.
		Above Ground.	Above Sea Level	1865	
		ft.	in.	feet.	inches.
NORTHAMPTON.					
*Potterspury [Stoney Stratford]...	Rev. R. E. Crawley ...	0	4	...	28·40 171
Yardley-Hastings .....	Rev. R. W. Prichard	1	2	180 ?	28·72 ...
Weedon Beck .....	Rev. J. S. Winter .....	1	0	...	26·74 ...
*Northampton (Wellington Pl.)...	Mr. G. Ellick .....	7	6	...	32 01 ...
" (Althorp House)...	Mr. W. F. Jakeman ...	3	4	310	25·50 110
Wellingborough .....	E. Sharman, Esq. ....	0	2	...	30·66 144
Kettering .....	John Wallis, Esq. ....	1	6	...	28·96 134
HUNTS.					
St. Neot's (Waresley).....	Rev. W. M. H. Elwyn	1	0	200	26·48 133
Kimbolton (Hamerton) .....	Rev. A. F. Stopford ...	5	4	170	26·03 ...
*Huntingdon (Wistow) .....	Rev. T. Woodruff .....	0	3	...	22·71 ...
Conington Castle .....	J. M. Heathcote, Esq..	1	0	...	24·30 ...
" Rectory.....	Rev. G. Heathcote ...	5	0	...	23·32 ...
Standground Sluice, [Peterboro']	R. Lunn, Esq. ....	...	...	...	23·36 143
BEDFORD.					
Stotfold [Baldock].....	W. Denne, Esq. ....	0	9	220	28·78 121
Potton (Sutton Park).....	Sir J. M. Burgoyne, Bt.	1	1	...	29·51 130
Cardington (8 in. gauge) .....	Mr. J. B. McLaren ...	0	0	100	27·25 130
" (Staff gauge) .....	" " "	3	6	104	26·18 130
" (8 in. gauge) .....	" " "	36	0	136	22·23 130
Bedford .....	G. P. Goldsmith, Esq.	3	6	100	24·78 148
CAMBRIDGE.					
Abington Pigotts [Royston].....	G. Pigott, Esq. ....	0	6	130	28·18 143
Fulbourne .....	Rev. J. H. Usill.....	0	4	...	23·72 131
Cambridge (Beech House).....	J. Nutter, Esq. ....	4	0	46	24·97 161
*" (Observatory) .....	Professor Adams, F.R.S.	0	9	88	24·96 144
Ely (Stretham) .....	Edwin Stanley, Esq.	4	6	...	23·03 121
Wisbech (North Brink).....	A. Peckover, Esq. ....	0	8	11	26·54 150
" (Observatory) .....	Mr. S. H. Miller .....	0	6	10	27·44 142
" " "	" " "	8	0	18	26·52 ...
" " "	" " "	35	0	45	22·92 ...
Wisbech, St Mary's .....	Herbert J. Little, Esq.	0	6	10	25·80 142

## DIVISION IV.—EASTERN COUNTIES.

ESSEX.					
Rochford (Clement's Hall).....	A. Holt White, Esq....	4	0	25 ?	24·86 ...
*Billericay.....	F. Carter, Esq. ....	1	0	...	30·71 179
Epping.....	H. Doubleday, Esq. ...	6	0	360	26·94 155
Harlow (Sheering) .....	Rev. Edward Hill ...	1	0	100 ?	27·37 134
Witham (Dorward's Hall).....	H. Dixon, Esq. ....	1	6	20 ?	24·99 ...
Dunmow .....	H. E. Cockayne, Esq...	0	3	234	27·01 150
Braintree (Bocking) .....	S. Tabor, Esq. ....	3	0	200	27·04 117
*Colchester (Broom Hill House)...	Captain Walker .....	1	3	85 ?	33·60 153
Halstead (Hedingham Castle) ...	Lewis A. Majendie, Esq.	0	6	...	27·91 159
Saffron Waldon (Wimbish) .....	D. K. Emson, Esq. ...	...	...	...	28·74 ...
" " (Ashdon) .....	Rev. J. T. Walker.....	1	0	300	25·40 ...

## DIVISION IV.—EASTERN COUNTIES—(continued).

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which .01 or more fell.
		Above Ground.	Above Sea Level	1865	
		ft.	in.	feet.	inches.
SUFFOLK.					
Hadleigh (Aldham).....	J. H. Lloyd, Esq. ....	3	0	...	29·48 145
Grundisburgh .....	P. Harris, Esq. ....	4	1	...	28·85 161
Saxmundham (Carlton Hall) ...	Mr. Clark .....	5	0	...	32·43 ...
† Bury St. Edmunds (Abbeygate St.)	E. Skepper, Esq. ....	45	0	...	28·23 104
† " " (Beech Hill) .....	H. Turner, Esq. ....	0	9	...	30·92 76
† " " (Botanic Gardens) .....	E. Skepper, Esq. ....	1	0	...	32·85 104
† " " (Westley) .....	R. Burrell, Esq. ....	1	6	...	26·06 ..
† " " (Thurston Lodge) .....	Rev. W. Steggall .....	3	2	...	28·64 122
† " " (Barton Hall) ...	Mr. W. Allan.....	1	0	...	25·68 139
† " " (Culford) .....	Mr. P. Grieve .....	1	2	...	28·31 128
Mendlesham (Thwaite) .....	Mr. Whistlecraft .....	3	6	150	32·81 ...
Lowestoft (Gisleham).....	Rev. H. Jodrell.....	1	2	...	31·99 ...
" (Carlton Colville).....	G. Edwards, Esq. ....	1	0	6	29·07 ...
" (Somerleyton).....	Sir Francis Crossley...	3	6	...	25·91 134
" (Hopton Hall) .....	C. Cory, Esq. ....	0	0	70	27·68 128
NORFOLK.					
Diss .....	Dr. Stewart .....	0	6	110	28·44 144
* Watton.....	Mr. Martin.....	1	0	...	29·53 162
* Downham Market (Bexwell) ...	Rev. E. J. Howman ...	0	11	...	29·03 97
" " (Outwell Sluice) .....	R. Lunn, Esq. ....	4	0	16	27·12 70
" (Fincham).....	Rev. W. Blyth .....	6	0	...	27·75 ...
Norwich .....	W. Brooke, Esq. ....	0	3	50	26·51 148
" .....	C. Evans, Esq. ....	2	3	...	24·41 125
" (Thorpe) .....	W. Birkbeck, Esq. ....	0	10	100	26·64 139
Acle .....	Rev. R. W. Kerrison...	0	8	37	27·18 155
Norwich (Cossey) .....	H. Culley, Esq. ....	1	0	...	26·32 132
" (Honingham) .....	Lady Bayning .....	0	6	110 ?	25·55 141
Dereham (Mattishall) .....	Rev. J. M. Du Port ...	1	2	165	30·57 154
East Dereham.....	G. H. Cooper, Esq. ....	2	0	...	30·13 ...
* Swaffham.....	C. J. Drury, Esq. ....	1	6	239	32·59 149
* Reepham .....	T. Alderton, Esq. ....	...	...	...	26·48 149
Fakenham (Egmere) .....	R. Overman, Esq. ....	4	8	150	26·29 126
Burnham .....	H. E. Blyth, Esq. ....	4	6	102	29·13 152
Holkham .....	John Davidson, Esq. ...	0	0	39	26·68 130
" " " .....	" " " .....	4	0	43	26·07 130
Hunstanton .....	Mr. J. Rippingale .....	3	8	60	21·81 ...

## DIVISION V.—SOUTH-WESTERN COUNTIES.

## WILTS.

Salisbury (Woodford) .....	H. Hinxman, Esq. ....	1 0	...	29·71	...
" (Baverstock) .....	Archdeacon Hony .....	3 0	300	31·10	...
Heytesbury (Chiltern) .....	R. Hayward, jun., Esq. ...	4 2	380	29·75	148
Devizes (Lavington) .....	F. Stratton, Esq. ....	2 6	350 ?	33·33	...
Trowbridge (Holbrook Farm) ...	J. A. Fryer, Esq. ....	1 6	...	30·65	...
Marlborough .....	W. C. Merriman, Esq. ...	4 0	500 ?	32·80	...
" College .....	Rev. T. A. Preston ...	0 0	456	34·23	167



## DIVISION V.—SOUTH-WESTERN COUNTIES—(continued.)

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which .01 or more fell.
		Above Ground.	Above Sea Level.	1865	
		ft.	in.	feet.	inches
WILTS—(con.)					
† Calne (Castle House) .....	Lieut.-Col. Ward .....	0	11	251	29.92 146
Chippenham (Badminton).....	Mr. J. Trotter .....	0	10	...	35.12 147
Swindon (Penhill) .....	Mr. T. Arkell.....	0	10	...	30.19 ...
„ (Highworth) .....	E. E. Dymond, Esq....	1	1	435	26.35 101
DORSET.					
Portland .....	J. Barnes, Esq. ....	2	0	52	24.28 110
Wareham (Encombe).....	O. W. Farrer, Esq. ...	0	6	150	37.40 ...
Upwey .....	J. Miller, Esq. ....	1	0	70	38.77 162
Little Bridy.....	H. S. Eaton, Esq.....	0	4	348	45.12 162
*Dorchester .....	J. Jowett, Esq. ....	0	6	250	44.70 150
Bridport .....	A. Stephens, Esq. ....	0	11	85	40.31 148
Cerne Abbas (Melbury).....	Mr. G. C. Elliot.....	2	9	...	46.00 ...
*Wimborne Minster (Chalbury)...	Rev. G. H. Billington.	2	0	400 ?	? 32.86 141
Blandford.....	W. Shipp, Esq. ....	1	0	...	40.13 ...
Gillingham .....	T. Thompson, Esq. ..	1	5	110 ?	31.04 141
DEVON.					
Kingsbridge (The Knowle) .....	Mrs. Harris .....	0	6	143	43.40 156
Plymouth (Old Town Street) ...	A. P. Balkwell, Esq....	30	0	150	41.32 ...
† „ (Saltram Gardens) ...	Mr. J. Snow .....	0	3	96	45.49 ...
† „ (Ham) .....	Rev. C. Trelawny .....	3	0	94	45.98 145
† Ivybridge (Torrhill) .....	J. Widdicombe, Esq....	0	4	240	49.51 181
† Plympton St. Mary (Ridgeway)	Miss B. T. Philipps ...	0	6	116	52.26 193
† „ (Goodamoor) .....	H. H. Treby, Esq.....	0	2	580	58.00 184
† Dartmoor (Lee Moor).....	„ „ „ .....	0	2	900	69.43 ...
*Torquay (Lamorna) .....	W. Pengelly, Esq. ...	0	9	205	45.87 180
Buckfastleigh (Hawson) .....	Mr. H. Scott .....	0	6	...	67.21 ...
† Newton Bushel (Highwick) .....	Dr. Barham .....	1	6	250 ?	46.68 146
† Dartmoor (Prison Reservoir) ...	Mr. H. Watts .....	0	2	1400	77.43 148
† Teignmouth (Westbrook) .....	Miss Clark .....	0	3	50	42.03 ...
„ (Bishopsteignton)...	Rev. S. M. Scroggs ...	6	6	100	45.11 176
† Tavistock (Public Library) .....	Mr. W. Merrifield.....	20	0	273	46.53 137
* „ (Mount Tavy) .....	H. Clark, Esq. ....	0	6	...	46.76 ...
† Milton Abbot (Endsleigh).....	Mr. Cornelius.....	0	6	...	45.20 ...
† Dawlish (Charlton Villa) .....	P. J. Margary, Esq. ...	0	8	62	38.84 ...
† Bovey Tracey .....	J. Divett, Esq. ....	0	6	94	50.59 185
Chagford .....	R. L. Berry, Esq. ....	0	5	660	57.41 ...
Sidmouth (Black Moor).....	W. Strahan, Esq. ....	1	0	30	36.98 153
„ (Belgrave) .....	Dr. Mackenzie .....	0	6	26	37.88 170
* „ (Salcombe Hill House)	Alfred North, Esq. ...	1	0	74	38.68 175
† Exeter (Albert Ter.) .....	R. Dymond, Esq. ....	0	0	141	35.77 167
† „ (High Street) .....	W. H. Ellis, Esq. ....	44	3	180	34.90 164
* „ „ „ .....	„ „ „ .....	47	11	184	35.50 ...
† „ (Devon & Exeter Institution)	Mr. E. Parfitt .....	13	7	155	35.47 ...
† „ (Hooper House) .....	G. Kennaway, Esq. ...	0	7	293	35.41 ...
„ (Brampford Speke) .....	W. H. Gamlen, Esq....	0	3	140	35.55 ...
Cullompton (Clysthydon) .....	Rev. J. Huyshe.....	0	6	200	37.05 ...
„ (Bradinch) .....	Mr. H. Matthews .....	1	6	194	41.80 ...
* „ (Strath Culm House)	C. R. Collins, Esq. ...	0	6	200	36.16 131

## DIVISION V.—SOUTH-WESTERN COUNTIES—(continued.)

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which .01 or more fell.
		Above Ground.	Above Sea Level.	1865	
		ft. in.	feet.	inches.	
DEVON—(con.)					
† Honiton (Broadhembury) .....	Rev. W. Heberden .....	2 4	600	37·15	174
Tiverton (Cove) .....	W. N. Row, Esq. ....	0 10	450	44·50	...
„ (Springfield) .....	H. Stokes, Esq. ....	...	400	41·85	193
Great Torrington .....	Rev. S. Buckland .....	3 10	450 ?	40·36	175
S. Molton (Meshaw) .....	Rev. W. H. Karslake ..	0 6	472	44·09	172
* Bideford (Buckish) .....	Rev. J. H. Kirwan .....	1 1	550	44·87	222
* „ (Northam) .....	Rev. I. H. Gosset .....	1 0	140	39·11	185
S. Molton (Castle Hill) .....	Mr. A. Saul .....	3 0	150	46·49	186
Barnstaple .....	T. Mackrell, Esq. ....	0 6	31	39·36	161
* „ (Bratton Fleming) ..	Rev. H. S. Pinder .....	1 0	600 ?	50·65	210
CORNWALL.					
Helstone .....	M. P. Moyle, Esq. ....	5 0	115	44·74	183
Penzance .....	W. H. Richards, Esq. ...	3 0	94	47·58	139
Redruth (Tehidy Park) .....	Mr. H. Beddard .....	0 0	100	38·97	...
Truro (Royal Institution) .....	Dr. Barham .....	40 0	56	48·26	190
„ (Penarth) .....	Nicholas Whitley, Esq. ...	1 0	190	47·27	190
St. Agnes .....	Dr. Barham .....	1 4	300	42·69	161
* St. Austell (Trevarna) .....	W. Coode, Esq. ....	0 5	300	52·09	187
Newquay .....	Mr. W. H. Tregidgo ..	1 9	90	37·17	165
Liskcard .....	S. W. Jenkin, Esq. ....	2 6	400	51·42	199
Callington (Pentillie Castle) .....	Mr. C. Edwards .....	1 5	...	54·23	...
„ (Hingston Down) ..	Captain Richards .....	1 0	850 ?	60·17	189
Bodmin .....	A. Hambly, Esq. ....	2 6	340	49·14	202
„ .....	Capt. Liddell, R.N. ....	2 6	325	48·98	205
„ (Warleggan) .....	Rev. D. Clements .....	3 0	800	52·99	...
„ (Pencarrow) .....	Mr. H. Jones .....	3 0	230	43·77	196
Wadebridge (Tregarrock House) ..	F. B. Hambly, Esq. ....	3 6	303	41·53	212
Port Isaac (Roscarrock) .....	Mark Guy, Esq. ....	3 0	210	38·22	200
Launceston (Altarnum) .....	C. U. Tripp, Esq. ....	0 7	570	59·07	201
Camelford (Lanteglos) .....	Rev. J. I. Wilkinson ..	3 0	460	50·51	182
SOMERSET.					
Chard (Tudbeer) .....	Mr. A. Hull .....	4 0	...	29·50	153
Ilminster (South Petherton) .....	W. Blake, Esq. ....	1 4	...	31·93	153
Ilchester .....	J. W. Bourne, Esq. ....	1 0	30 ?	31·07	134
* Wellington (Foxdown) .....	W. Elworthy, Esq. ....	1 0	...	42·90	...
Taunton (Paul's House) .....	Dr. Gillett .....	1 6	38	33·62	172
* „ (Fullands School) .....	W. Reed, Esq. ....	1 4	...	32·62	145
* Wiveliscombe .....	B. Boucher, Esq. ....	1 2	...	36·97	182
Langport (Long Sutton) .....	R. Palmer, Esq. ....	0 7	...	31·57	153
Glastonbury (Street) .....	J. Clark, Jun., Esq. ....	1 6	100	35·18	126
Wells (Dinder) .....	Rev. T. J. Bumpsted ..	4 0	140 ?	37·48	170
Frome (Mells Rectory) .....	Rev. J. H. Horner. ....	1 6	450 ?	37·88	187
Radstock (Downside College) ...	Rev. T. B. Snow .....	0 6	607	43·09	177
E. Harptree (Sherborne Reservoir) ..	Bristol Water Works ..	5 0	360	41·96	...
* Weston-super-Mare .....	Mr. J. Boycott .....	0 3	8	30·46	...
Chew Magna [Bristol] .....	Bristol Water Works ...	1 0	130	34·87	...
Bath (Paragon) .....	C. S. Barter, Esq. ....	17 0	107	28·15	...
„ (Weston) .....	.....	10 0	190	31·83	177

DIVISION V.—SOUTH-WESTERN COUNTIES—(*continued*).

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which .01 or more fell.
		Above Ground.	Above Sea Level	1865	
		ft. in.	feet.	inches	
SOMERSET—( <i>con</i> ).					
Bath (Batheaston) .....	A. Mitchell, Esq. ....	2 0	226	29·96	...
" (Swanswick) .....	Rev. F. Lockey .....	32 0	...	25·95	...
Barrow Gurney Reservoir.....	Bristol Water Works	5 0	310	39·30	...
Brislington [Bristol] .....	G. Thomas, Esq.....	5 0	100	36·13	...

## DIVISION VI.—WEST MIDLAND COUNTIES.

## GLOUCESTER.

Bristol (Park Row) .....	Bristol Water Works	6 0	140	33·82	...
" (Small St.) .....		25 0	40	34·16	...
Clifton .....	Dr. " G. F. Burder .....	0 6	192	36·50	159
Berkeley .....	Rev. C. T. Pratt .....	1 6	60	29·37	153
" (Lydney) .....	W. H. Bathurst .....			34·80	...
Cirencester .....	T. C. Brown, Esq.....	1 2	446	35·82	...
Stroud (Castle Villas).....	Mr. Bateman .....	1 0	240	30·10	162
Frampton-on-Severn(Saul Lodge)	W. B. Clegram, Esq. C.E.	3 6	42	25·00	136
Gloucester (Witcomb Court).....	Anthony Bubb, Esq....	2 0	...	29·68	...
" (Quedgeley) .....	J. C. Hayward, Esq....	0 10	100 ?	27·52	...
" (Barnwood House)...	Dr. Alfred Wood .....	1 3	...	24·92	...
" (The Spa)— <i>monthly</i> ...	A. Price, Esq. ....	3 6	50	21·81	148
" " <i>daily</i> .....	" " " .....	34 0	84	21·85	...
Charlton Kings (Whithorne Ho.)	Dr. Williams .....	1 0	...	29·37	...
Newent (Boyce Court) .....	General Drummond ...	0 4	...	24·31	120

## HEREFORD.

Ross (Rocklands) .....	J. M. Herbert, Esq. ...	1 10	100 ?	32·44	146
Ross .....	H. Southall, Esq. ....	1 4	150 ?	28·57	147
Hereford (Broomy Hill) .....	T. Curley, Esq., C.E.	0 11	158	26·08	136
" (Barton Cottage) .....	J. Trusted, Esq.....	0 11	150	25·25	115
" (Hampton Park) .....	W. Cooke, Esq. ....	7 0	204	25·01	173
" (Stretton) .....	Rev. H. C. Key .....	1 0	170	27·38	...
Leominster (West Lodge) .....	E. P. Southall, Esq. ...	1 6	229	27·10	165
" (Leysters) .....	Rev. T. S. Hewitt.....	0 6	700 ?	25·47	...

## SHROPSHIRE.

Burford [Tenbury].....	Lord Northwick .....	0 10	180 ?	24·45	...
Ludlow (Knowbury) .....	Rev. J. B. James .....	0 4	1000 ?	26·81	...
Church Stretton (Woolstaston)...	Rev. D. Carr .....	1 0	790	31·44	185
Shiffnal (Evelith Manor) .....	Miss Elwell .....	4 8	430	18·17	...
" (Haughton Hall) .....	Rev. J. Brooke .....	4 6	450 ?	23·25	127
Wellington .....	Rev. H. Banning .....	1 0	400 ?	24·57	150
Shrewsbury (Highfield) .....	T. Howells, Esq. ....	5 6	200	24·23	...
" .....	Marshall & Co. ....	4 4	192	19·16	...
Ellesmere (Cockshutt) .....	Mr. R. King .....	0 9	...	27·67	167
Oswestry (Hengoed) .....	Rev. A. R. Lloyd .....	6 0	471	38·34	...
Whitchurch .....	Rev. J. E. Yeadon ...	0 10	...	25·24	...

## DIVISION VI.—WEST MIDLAND COUNTIES—(continued).

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which .01 or more fell.
		Above Ground.	Above Sea Level	1865	
STAFFORD.					
Wolverhampton .....	H. Ward, Esq. ....	0 10	520	31·85	155
„ (Goldthorn Hill) .....	W. H. Ford, Esq. ....	0 6	521	24·69	138
„ (Pattingham) ...	Rev. B. S. Malden ...	1 0	450 ?	23·97	115
„ (Patshull) .....	„ „ „	2 0	400 ?	24·06	139
„ (Wrottesley) ...	Lord Wrottesley, F.R.S.	0 6	531	22·37	143
„ „ „	„ „ „	22 0	553	18·78	143
Weston-under-Lyziard [Shiffnal] .....	Rev. J. R. O. Bridgeman	0 10	...	25·05	...
Oakmoor (Ellaston) .....	Rev. Sir C. R. Lighton, Bt.	3 0	350	32·90	166
Stoke-upon-Trent (Sudbury) .....	Mr. A. Dick .....	1 9	175	30·86	...
„ (Stanley Reservoir) .....	J. Forbes, Esq., C.E.	3 0	550	23·18	...
„ (Etruria) .....	„ „ „	3 0	440	28·73	...
Leek (Rudyard) .....	J. Forbes, Esq., C.E.	10 0	500	27·16	...
Knypersley [Congleton] .....	„ „ „	3 0	500	24·05	...
Wincle [Macclesfield] .....	„ „ „	3 0	500	29·04	...
WORCESTER.					
Northwick Park .....	Lord Northwick .....	1 6	...	30·35	...
Great Malvern .....	Dr. Williams .....	4 0	450	26·81	121
West Malvern .....	A. H. Hartland, Esq.	1 3	900	27·82	152
Worcester (Lark Hill) .....	W. Burgess, Esq. ....	1 0	157	28·04	154
„ (Gas Works) .....	F. N. Gosling, Esq. ...	5 3	...	24·66	152
Tenbury (Orleton) .....	T. H. Davis, Esq. ....	0 9	200	29·88	172
Bromsgrove .....	G. Dipple, Esq. ....	4 4	425	25·91	157
Moseley [Birmingham] .....	T. L. Plant, Esq. ....	4 0	481	33·78	175
Henley-in-Arden .....	G. R. Dartnell, Esq. ...	2 0	300 ?	24·02	127
WARWICK.					
Leamington .....	S. U. Jones, Esq. ....	0 8	195	26·48	149
Rugby .....	F. Fuller, Esq. ....	2 4	384	25·94	144
Coventry (Radford) .....	A. F. Atkins, Esq. ....	0 9	305 ?	27·81	128
„ (Walsgrave-on-Sowe) ...	Rev. H. H. Pinniger ...	1 0	257	25·34	136
Pailton House [Lutterworth] ..	Capt. Constable Curtis	1 0	...	27·97	118
† Edgbaston .....	W. Southall, Esq. ....	1 6	510	31·56	178
† Birmingham (Bloomsbury Street) ..	D. Smith, Esq. ....	0 10	340	29·87	166

## DIVISION VII.—NORTH MIDLAND COUNTIES.

**LEICESTER.**

† Market Harborough (Fleckney) .....	Mr. J. B. Putt .....	0 8	...	33·29	...
† Wigston .....	T. Burgess, Esq. ....	0 6	220	26·80	134
† Leicester .....	H. Billson, Esq. ....	1 0	220 ?	26·23	151
† Thornton Reservoir .....	Mr. J. Bevins .....	2 8	420 ?	25·82	...
Appleby .....	Rev. F. B. Falkener ...	0 9	340	27·70	...
† Owston [Oakham] .....	Miss Gilford .....	1 0	600 ?	31·90	175
Loughborough (Rothley) .....	Rev. R. Burton .....	0 4	210	26·30	141
Melton Mowbray (Dalby Hall) .....	Mr. G. Jones .....	1 6	408 ?	26·01	158
Rearsby .....	Mr. G. Kilby .....	1 6	220	26·63	145
Loughborough (Emmanuel Rec.) .....	Rev. R. J. Bunch .....	0 5	210 ?	28·72	131
„ (Belton) .....	Rev. R. Dalby .....	4 0	250	23·34	152
Waltham Rectory .....	Rev. G. E. Gillett .....	4 0	540 ?	25·53	141
† Belvoir Castle .....	W. Ingram, Esq. ....	1 0	287	25·22	140

## DIVISION VII.—NORTH MIDLAND COUNTIES.—(continued.)

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which $\geq 0.1$ or more fell.
		Above Ground.	Above Sea Level	1865	
		ft.	in.	feet.	inches.
<b>LINCOLN.</b>					
† Stamford (Greatford Hall).....	Captain Peacock .....	0	9	...	22.75 ...
* Bourne (Wytham-on-the-Hill) ...	A. C. Johnson, Esq. ....	1	3	...	21.69 ...
† Grantham .....	J. W. Jeans, Esq. ....	0	6	179	23.28 152
Sleaford (Heydour).....	Rev. Gordon F. Deedes .....	3	0	...	21.91 116
Boston .....	Dr. Mercer Adam .....	6	0	10	25.79 153
Sleaford .....	Mr. B. Heald .....	0	0	52	24.95 121
Stubton [Newark] .....	G. Nevile, Esq. ....	5	0	...	25.81 136
Wainfleet .....	Rev. D. S. Matthew ...	0	10	15 ?	27.77 137
Horncastle .....	Rev. W. H. Milner ...	8	0	100	25.29 79
Spilsby (Welton-le-Marsh) .....	Rev. A. Wright .....	3	6	80 ?	26.30 154
Lincoln .....	† M. S. & L. R. Co. ...	3	6	26	...
Gate Burton .....	" " "	3	6	96	...
Louth .....	T. W. Wallis, Esq. ...	6	0	80	30.66 ...
Market Rasen .....	M. S. & L. R. Co. ....	3	6	100	...
Gainsborough .....	" " "	3	6	76	...
" (Spring Gardens) .....	T. Dyson, Esq. ....	8	0	38	23.06 ...
Stockwith .....	M. S. & L. R. Co. ....	3	6	21	...
Brigg .....	" " "	3	6	16	...
Grimsby .....	" " "	15	0	42	...
Barnetby .....	" " "	3	6	51	...
Brigg (Appleby).....	Rev. J. E. Cross .....	0	9	50	24.13 ...
" (Ferriby Sluice) .....	" " "	0	9	20	21.30 ...
New Holland .....	M. S. & L. R. Co. ....	3	6	18	...
<b>NOTTS.</b>					
Beeston Meadow .....	Mr. W. Barker .....	1	1	100	24.47 ...
Southwell (Oxton) .....	H. Sherbrooke, Esq. ....	2	0	...	23.99 ...
" .....	W. W. P. Clay, Esq. ...	1	0	200	20.25 ...
Welbeck Abbey .....	Mr. W. Tillery .....	3	10	...	24.51 92
Worksop .....	M. S. & L. R. Co. ....	3	6	127	...
Retford .....	" " "	3	6	52	...
" East .....	J. S. Piercy, Esq. ....	2	0	50	23.74 ...
" West .....	Rev. C. D. Butterfield .....	0	6	50	23.52 149
<b>DERBY.</b>					
Sawley .....	Mr. J. Windle .....	0	9	100	25.72 144
Doveridge [Uttoxeter] .....	Hon. & Rev. O. Forester .....	7	0	270	28.26 157
Derby (Spondon) .....	T. C. Cade, Esq. ....	1	6	200 ?	26.12 ...
" .....	J. Davis, Esq. ....	5	0	180	24.46 149
" (West Hallam) .....	Rev. C. J. Newdigate .....	3	2	354	29.07 136
" (Morley) .....	Rev. S. Fox .....	3	0	406	27.69 ...
Chesterfield .....	M. S. & L. R. Co. ....	3	6	248	...
" (Brampton).....	J. M. Hewitt, Esq. ...	6	8	510	31.39 164
" (St. Thomas') .....	Rev. J. M. Mello .....	6	6	326	31.21 163
Norwood .....	M. S. & L. R. Co. ....	3	6	238	...
Comb's Moss .....	" " "	3	6	1669	...
" Reservoir .....	" " "	3	6	710	...
Chapel-en-le-Frith .....	" " "	3	6	965	...
Woodhead .....	" " "	3	6	878	...

† See note on page 3.

## DIVISION VIII.—NORTH-WESTERN COUNTIES.

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which $\frac{1}{10}$ or more fell.
		Above Ground.	Above Sea Level		
		ft. in.	feet.	inches.	
CHESHIRE.					
Wrenbury .....	F. Hardacre, Esq. ....	1 6	...	22·32	166
Bosley Minns .....	† M. S. & L. R. Co. ...	3 6	1210		...
Bosley Reservoir .....	" " "	3 6	590		...
Macclesfield .....	" " "	3 6	539		...
" " "	W. Jeffrey, Esq. ....	2 0	500	29·43	145
Northwich .....	E. L. Williams, Esq. ...	4 8	42	P 19·42	90
Frodsham (Kingsley) .....	Rev. R. Tyas .....	0 8	193	25·14	148
Hooton (Willaston) .....	T. Waring, Esq. ....	4 0	...	23·76	103
Runcorn (Weston Point) .....	E. L. Williams, Esq. ...	3 10	15	P 18·95	89
Bollington (Spond's Hill) .....	M. S. & L. R. Co. ....	3 6	1279		...
Whaley .....	" " "	3 6	602		...
Handforth (Quarry Bank) .....	J. Henshall, Esq. ....	0 8	295	26·93	...
Marple Aqueduct .....	M. S. & L. R. Co. ....	3 6	321		...
" Top Lock .....	" " "	3 6	543		...
Mottram Hill End .....	M. S. & L. R. Co. ....	3 6	680		...
" Matley's Field .....	" " "	3 6	399		...
Newton .....	" " "	3 6	396		...
LANCASHIRE.					
Warrington (Penketh) ..	L. W. Reynolds, Esq. ...	1 0	39	26·79	162
West Derby (Sandfield Park) ..	Mr. W. Briggs .....	...	...	24·43	...
Liverpool (Observatory) .....	J. Hartnup, Esq. ....	30 0	52	21·82	154
† Manchester (Old Trafford) .....	G. V. Vernon, Esq. ...	2 7	106	28·39	153
† " " .....	J. Curtis, Esq. ....	2 3	104	29·43	172
" (Eccles) .....	T. Mackereth, Esq. ...	3 0	118	27·81	177
" " .....	" " "	31 9	147	26·23	...
Fairfield .....	M. S. & L. R. Co. ....	6 0	312		...
Gorton Reservoir .....	J. F. Bateman, Esq. FRS	...	263	28·17	...
Denton " .....	" " "	...	324	28·28	...
Godley " .....	" " "	...	500	26·49	...
Arnfield " .....	" " "	...	575	29·37	...
Rhodes Wood " .....	" " "	...	520	37·25	...
Woodhead " .....	" " "	...	680	40·35	...
Torrside " .....	" " "	...	600	35·08	...
Stoneclough (Outwood) .....	W. Horrocks, Esq. ...	1 0	295	31·70	152
Oldham .....	J. Taylor, Esq. ....	6 0	600	29·68	167
" (Waterhouses) .....	M. S. & L. R. Co. ....	3 6	345		...
" (Strines Dale) .....	J. Taylor, Esq. ....	6 0	800	29·33	179
" (Brushes Clough) .....	" " "	6 0	930	35·37	197
† Heywood (Castleton Moor) .....	Rev. J. C. Bates .....	1 0	475	33·83	137
* Oldham (Royton) .....	J. Heap, Esq. ....	1 0	484	34·57	155
Radcliffe (Mount Sion) .....	H. Eaton, Esq. ....	1 3	250	33·50	...
Bolton-le-Moors (The Folds) .....	H. H. Watson, Esq. ...	3 6	286	37·51	...
" (Vale Bank) .....	J. Watkins, Esq. ....	3 0	300	37·67	...
Wigan (Water Works Reservoir) ..	J. L. Hunter, Esq., C.E.	1 3	225	29·42	145
" (Standish) .....	" " "	0 6	300	33·48	141
Bolton (Heaton) .....	H. Baylis, Esq. ....	0 0	500	35·50	124
" (Belmont) .....	" " "	0 0	800	42·60	130
Rochdale (Nagden Dane) .....	C. E. Cawley, Esq. C.E.	1 6	900	30·21	...

† See note on page 3.

## DIVISION VIII.—NORTH-WESTERN COUNTIES—(continued).

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which .01 or more fell.
		Above Ground.	Above Sea Level	1865	
		ft. in.	feet.	inches.	
LANCASHIRE—(con.)					
Rochdale .....	† M. S. & L. R. Co. ....	...	...	...	...
Ormskirk (Rufford) .....	J. Porter, Esq. ....	0 8	38	27·85	151
Blackburn (W. Works Office) ...	J. F. Bateman, Esq. FRS	...	400	32·68	...
„ (Pickup Reservoir) ...	„ „ „	...	720	35·60	...
„ (Guide Reservoir) ...	„ „ „	...	650	33·10	...
Bacup .....	G. C. Harrison, Esq. ...	...	...	38·60	...
Preston (Howick House) .....	T. Norris, Esq. ....	0 6	72	31·55	...
„ (Fishwick) .....	T. Oddie, Esq. ....	24 0	154	27·16	...
„ (House of Correction) ...	Mr. J. Hesketh .....	1 1	140	30·84	...
„ „ „	„ „ „	53 6	187	26·64	...
„ (Holme Slack) .....	J. Newton, Esq., C E. ....	1 2	143	32·44	...
Blackpool (South Shore) .....	G. Sharples, Esq. ....	1 8	29	26·55	...
Stonyhurst College .....	Rev. W. Sidgreaves ...	1 3	381	40·59	170
Clitheroe (Knowlmer) .....	J. Peel, Esq. ....	...	432	49·03	...
„ (Downham Hall) .....	R. Assheton, Esq. ....	1 6	464	35·30	...
Garstang (Vale House) .....	J. Jackson, Esq., junr..	4 3	455	33·97	156
Lancaster (South Road) ..	W. Roper, Esq. ....	1 0	114	34·60	...
† „ (Caton) .....	Rev. A. Christopherson	1 9	120	34·36	127
Hest Bank .....	T. Ransome, Esq. ....	2 2	58	31·24	...
„ (Hornby Castle) .....	C. H. Lethbridge, Esq.	3 2	103	39·10	105
† Cartmel (Allithwaite) .....	Mr. W. R. Nash .....	1 0	88	34·65	151
† „ (Holker) .....	Mr. Wilson .....	4 8	155	38·35	164
„ (Grange) .....	Amos Beardsley, Esq.	3 0	25	41·93	135
„ (Aynsome) .....	H. Remington, Esq. ...	0 7	60	42·30	...
*Ulverston .....	J. H. Matthews, Esq. ....	5 6	98	45·51	177
„ (Poaka Beck Reservoir) ..	A. Strongitharm, Esq.	3 6	500	34·69	148
† Coniston .....	H. C. Marshall, Esq. ...	4 11	150	72·10	...
Monk Coniston .....	R. J. Bywater, Esq. ...	1 0	287	66·19	164
† Windermere (Wray Castle) .....	Dr. Dawson .....	4 9	250	54·91	149

## DIVISION IX.—YORKSHIRE.

W. RIDING.					
Sheffield (Station) .....	M. S. & L. R. Co. ....	3 6	188	...	...
„ (Edge) .....	„ „ „	3 6	336	...	...
„ (Broomhall Park) .....	D. Doncaster, Jun. Esq. ...	2 0	337	28·69	165
„ (Doncaster Street) .....	„ „ „	18 0	170	21·53	...
„ (Crookesmoorside) .....	„ „ „	0 6	600	28·02	...
Redmires .....	J. Gunson, Esq. ....	4 0	1100	32·47	...
Tickhill .....	Dr. Dixon .....	2 0	61	25·26	143
Rotherham (Moorgate Grove) ...	R. Chrimes, Esq. ....	6 3	265	21·03	141
Wath-upon-Deerne .....	W. M. Burman, Esq. ....	4 0	186	19·22	128
Rotherham (West Melton) .....	Rev. J. Boyd .....	0 10	172	20·04	125
Doncaster (Magdalens) .....	Mr. J. Howorth .....	4 0	46	23·23	99
Dunford Bridge .....	M. S. & L. R. Co. ....	3 6	954	...	...
Carlcotes .....	„ „ „	3 6	1075	...	...
Penistone .....	„ „ „	3 6	717	...	...

† See note on page 5.

## DIVISION IX.—YORKSHIRE—(continued).

STATIONS.	AUTHORITIES,	Height of Rain Gauge.		Depth of Rain.	Days on which .01 or more fell.
		Above Ground.	Above Sea Level.	1865	
		ft. in.	feet.	inches.	
W. RIDING—(con.)					
Barnsley .....	Dr. Sadler .....	1 1	350	21·85	153
Holmfirth (Holme Styes Reservoir) .....	J. F. Bateman, Esq. FRS .....	...	850	34·00	...
„ (Boshaw Whams Reservoir) .....	„ „ „ .....	...	950	33·10	...
„ (Bilberry Reservoir) .....	„ „ „ .....	...	800	38·30	...
Saddleworth (Friesland) .....	Rev. G. Venables .....	3 6	650 ?	36·22	155
„ (Station) .....	E. Greenwood, Esq. ....	5 0	640	33·05	...
Standedge .....	„ „ „ .....	2 0	1150	41·00	...
Pontefract (Kirk Smeaton) .....	C. O. F. Cator, Esq. ....	0 9	...	23·64	180
Ackworth School .....	G. Satterthwaite, Esq. ....	0 3	135	23·21	118
† Wakefield .....	W. R. Milner, Esq. ....	4 0	115	21·71	138
Huddersfield (Longwood) .....	C. Hare, Esq. ....	4 6	600	26·08	165
„ (Dalton) .....	J. R. Robson, Esq. ....	...	350	39·00	...
Goole .....	T. Kendall, Esq. ....	3 4	...	23·73	146
Mirfield (Calder Farm) .....	Mr. J. Johnson .....	0 5	320	21·46	...
Stansfield Hall [Todmorden] .....	J. Fielden, Esq. ....	13 8	500 ?	31·49	...
* Huddersfield (Rastrick) .....	A. Clay, Esq. ....	1 3	410	27·99	151
† Halifax (Well Head) .....	J. Waterhouse, Esq. FRS .....	0 11	487	27·96	...
„ (Warley Moor) .....	G. W. Stevenson, Esq. ....	1 0	1425	37·70	...
„ (Midgeley „) .....	„ „ „ .....	1 0	1350	40·00	...
„ (Ovenden „) .....	„ „ „ .....	1 0	1375	35·00	...
Bradford (Mechanics' Institute) .....	C. Lund, Esq. ....	48 0	373	25·18	175
„ (Manywells) .....	C. Gott, Esq. ....	0 9	700	25·47	...
„ (Queensbury) .....	W. Forster, Esq. ....	5 4	1050	31·44	100
Leeds (Leventhorpe Hall) .....	J. T. Leather, Esq. ....	2 0	90	18·57	...
† „ (Holbeck) .....	Marshall and Co. ....	32 0	127	20·65	...
„ „ „ .....	„ „ „ .....	1 0	95	23·50	...
† „ „ „ .....	E. Filliter, Esq. ....	0 0	95	25·78	111
„ (Eccup) .....	„ „ „ .....	0 0	340	22·66	99
„ (Headingley) .....	H. C. Marshall, Esq. ....	1 0	400	24·37	...
Keighley (Braithwaite) .....	Mr. W. Shackleton .....	5 0	770	26·45	...
Otley (East Chevin) .....	W. Lawson, Esq., junr .....	4 7	764	25·03	135
Otley .....	H. Thorns, Esq. ....	0 7	206	24·81	94
Harewood Bridge .....	H. Roberson, Esq. ....	...	...	23·35	...
Boston Spa .....	F. R. Carroll, Esq. ....	0 11	74	26·54	...
Ilkley .....	Dr. Thomas Scott .....	0 6	500	36·30	...
† York (Bootham) .....	J. Ford, Esq. ....	0 6	50	23·19	150
„ (Coney Street) .....	Mr. Sigsworth .....	8 0	40	25·33	147
Thornton-in-Craven .....	T. Wilson, Esq. ....	5 4	456	30·59	173
† Harrogate .....	Dr. Bainbridge .....	0 6	420	27·70	144
Skipton .....	Rev. R. H. Sidgwick .....	0 6	450	42·28	165
„ .....	J. Heelis, Esq. ....	1 3	430	32·68	150
Settle .....	J. Tatham, Esq. ....	40 0	498	35·38	...
Arnccliffe .....	Rev. W. Boyd .....	3 0	750	47·26	127
Ripon .....	F. W. Stow, Esq. ....	0 3	105	23·91	141
„ .....	„ „ „ .....	0 6	120	23·43	...
E. RIDING.					
† Patrington .....	W. B. Pugh, Esq. ....	4 8	32	215·99	...
† Hull (Manor House Street) .....	W. Lawton, Esq. ....	0 10	14	22·87	152



## DIVISION IX.—YORKSHIRE—(continued).

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which .01 or more fell.
		Above Ground.	Above Sea Level	1865	
E. RIDING—(con.)					
† Hull (Beverley Road) .....	J. Smith, Jun., Esq. ...	3 10	11	23·80	165
„ (Baker Street).....	A. O. Atkinson, Esq. ...	2 0	10 ?	23·49	...
† Holme-on-Spalding-Moor .....	G. Dunn, Esq. ....	3 0	30	25·16	170
† Beverley (Middleton).....	Rev. H. D. Blanchard	1 6	150	27·05	...
N. RIDING.					
† Malton .....	H. Hurtley, Esq. ....	1 0	73	23·32	...
Scarborough (Ganton) .....	Sir D'Arcy Legard, Bt.	3 6	120	28·35	115
*Filey Reservoirs .....	D. Philliskirk, Esq. ...	9 0	183	23·44	173
Beadlam Grange .....	John H. Phillips, Esq.	0 6	192	28·55	...
*Northallerton .....	W. T. Jefferson, Esq. ...	1 0	...	19·91	...
Richmond (Aske) .....	Earl Zetland .....	2 8	550	31·40	...
*Whitby.....	M. Simpson, Esq. ....	2 0	184	22·63	154
* „ (Port Mulgrave) ...	A. S. Palmer, Esq. ...	0 6	356	20·32	156
Middlesborough (Marton Hall)...	H. Bolckhow, Esq. ...	1 3	120	22·16	...
Upleatham .....	Earl Zetland .....	0 4	330	23·85	...
Middlesborough .....	W. Fallows, Esq. ....	1 6	21	21·64	...

## DIVISION X.—NORTHERN COUNTIES.

DURHAM.					
* Darlington (Dinsdale) .....	Rev. J. W. Smith .....	1 6	135	22·50	138
Stockton (Long Newton) .....	F. H. Dyke, Esq. ....	2 3	147	? 25·01	156
Darlington .....	Mr. J. Richardson ...	4 0	40	27·05	125
Winston (Stubb House) .....	T. Dodgson, Esq. ....	0 9	458	26·73	...
Wolsingham (St. John's) .....	W. Backhouse, Esq. ...	2 8	908	28·91	99
Durham (S. Cuthbert's Col. Ushaw)	Rev. Dr. Gillow .....	0 10	600	29·73	168
Seaham .....	R. Draper, Esq. ....	1 0	100	26·07	113
„ (Vicarage) .....	Rev. A. Bethune .....	0 4	50	26·17	122
† Sunderland (Hendon Hill) .....	J. W. Mounsey, Esq.	0 6	120	25·33	168
„ (Bishopwearmouth) ...	Dr. Ogden .....	30 0	130	20·73	129
† „ (The Hall) .....	Rev. G. Iliff .....	1 6	85	26·06	145
Gateshead (Burghfield Grange) ...	G. Wailes, Esq. ....	0 6	68	29·08	170
NORTHUMBERLAND.					
Allenheads .....	T. J. Bewick, Esq., C.E.	0 5	1360	44·43	175
„ (12 in. gauge) .....	„ „ „	6 9	1367	47·58	177
Bywell .....	Mr. J. Dawson .....	0 6	87	29·82	184
Wylam .....	G. C. Atkinson, Esq. ...	0 4	96	29·67	156
Newcastle .....	W. Lyall, Esq. ....	75 0	180	21·24	124
† Harlow Hill (Whittle Dean R.)	D. D. Main, Esq. ....	0 6	380	23·09	...
Hallington .....	„ „ „	0 6	400	25·72	...
„ (Fawcett) .....	„ „ „	0 6	...	25·44	...
North Tyne (Green Crag) ...	„ „ „	0 6	...	27·05	...
„ (Valley) .....	„ „ „	0 6	...	24·40	...
Gunnerton Burn (Camphill) .....	„ „ „	0 6	...	26·54	...
Swinburn (Woodford) .....	„ „ „	0 6	...	26·02	...
North Shields (Wallsend) .....	R. R. Dees, Esq. ....	0 6	90	27·24	116
† „ (Rosella Place) .....	R. Spence, Esq. ....	1 0	124	26·90	138

## DIVISION X.—NORTHERN COUNTIES—(continued.)

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which .01 or more fell.
		Above Ground.	Above Sea Level	1865	
		ft. in.	feet.	inches.	
NORTHUMBERLAND—(con.)					
North Shields (Low Lights) .....	J. R. Procter, Esq. ...	3 1	20	25·56	142
"    (Tynemouth).....	P. J. Messent, Esq. ...	2 6	60	23·47	...
*    "    (Whitley).....	Rev. R. F. Wheeler ...	0 11	83	26·99	105
Stamfordham .....	Rev. J. F. Bigge .....	1 0	400	27·41	...
"    (Church Tower) .....	"    "    "    "    "    "    "	42 0	456	20·82	...
Hexham (Parkend).....	M. A. Ridley, Esq. ...	0 4	277	29·80	138
Bellingham (Otterburn) .....	Mr. T. Wearing.....	1 3	500	34·27	165
Morpeth (Brenckburn Priory) ...	C. H. Cadogan, Esq....	1 0	200 ?	32·45	133
Deadwater [on the borders] .....	Hawick Farmers' Club	...	...	39·60	...
Alnwick (Glanton Pyke) .....	F. W. Collingwood, Esq	0 8	534	34·26	...
Howick .....	Earl Grey .....	4 0	129	28·64	109
Roddam Hall .....	Mrs. Roddam .....	0 6	545	31·72	...
Lilburn Tower .....	E. J. Collingwood, Esq	6 0	290	30·39	...
Belford (Middleton Hall) .....	J. T. Leather, Esq ...	2 0	240	28·92	...
Bamburgh (North Sunderland)...	Rev. F. R. Simpson ...	...	...	32·47	...
* Wooler (Milfield) .....	G. A. Grey, Esq. ....	0 4	200	28·65	...
CUMBERLAND.					
Bootle (Whitbeck) .....	Rev. T. Ormandy .....	1 0	...	41·38	175
"    (Rectory) .....	Rev. A. Wilkin.....	1 0	87	44·44	168
Whitehaven (Braystones) .....	J. D. Watson, Esq ...	3 8	36	33·20	...
"    Scawfell Pike .....	(c) I. Fletcher, Esq., F.R.S.	0 6	3200	49·12	...
"    Esk Hause .....	(c) " " "	0 6	2550	61·53	...
"    Great End .....	(b) " " "	0 6	2982	59·52	...
"    Wasdale Head .....	(A) " " "	0 6	247	75·73	...
"    Brant Rigg.....	(B) " " "	0 6	695	68·27	...
"    Sprinkling Tarn.....	(E) " " "	0 6	1985	103·84	...
"    Mosedale .....	(a) " " "	0 6	624	51·11	...
"    Stye Head Tarn .....	(D) " " "	0 6	1472	99·85	...
"    The Stye .....	(e) " " "	0 6	1077	149·07	...
"    Seathwaite .....	(d) " " "	0 6	422	106·61	...
"    † Seathwaite (read daily)...	(F) " " "	1 0	422	117·49	181
"    Stonethwaite .....	(G) " " "	0 6	330	84·13	...
Penrith (Hallsteads) .....	Mr. Sinclair .....	4 0	430	49·00	...
Keswick (Crow Park) .....	H. C. Marshall, Esq...	4 0	260	43·00	...
Derwent Island .....	"    "    "    "    "    "    "	1 0	240	49·23	...
† Keswick .....	Mr. Crosthwaite .....	1 0	270	49·18	138
"    (Greta Bank) ...	J. J. Spedding, Esq....	0 6	...	47·77	118
† Bassenthwaite (Mirehouse) .....	T. S. Spedding, Esq....	0 7	310	42·63	125
Cockermouth (Whinfell Hall) ...	W. Robinson, Esq. ...	2 0	266	44·25	185
Workington.....	C. Litt, Esq. ....	1 0	101	32·12	134
Cockermouth .....	Dr. Dodgson .....	0 6	158	37·79	155
"    (on a post) .....	"    "    "    "    "    "    "	6 6	164	35·38	155
"    (on Church Tower) ...	"    "    "    "    "    "    "	100	260	24·80	...
"    (Tarnbank) .....	I. Fletcher, Esq., F.R.S.	0 6	225	40·46	165
"    "    "    "    "    "    "    "	"    "    "    "    "    "    "	5 0	230	39·26	166
"    (Higham) .....	Rev. T. A. Hoskins ...	0 6	488	37·37	137
"    (Bridekirk) .....	J. Carter, Esq. ....	0 6	350 ?	31·98	...
Penrith (Edenhall).....	Mr. T. Bowstead .....	...	...	28·99	...

Mountain Gauges, read monthly.  
(Letters refer to Map facing p. 64.)

## DIVISION X.—NORTHERN COUNTIES—(continued.)

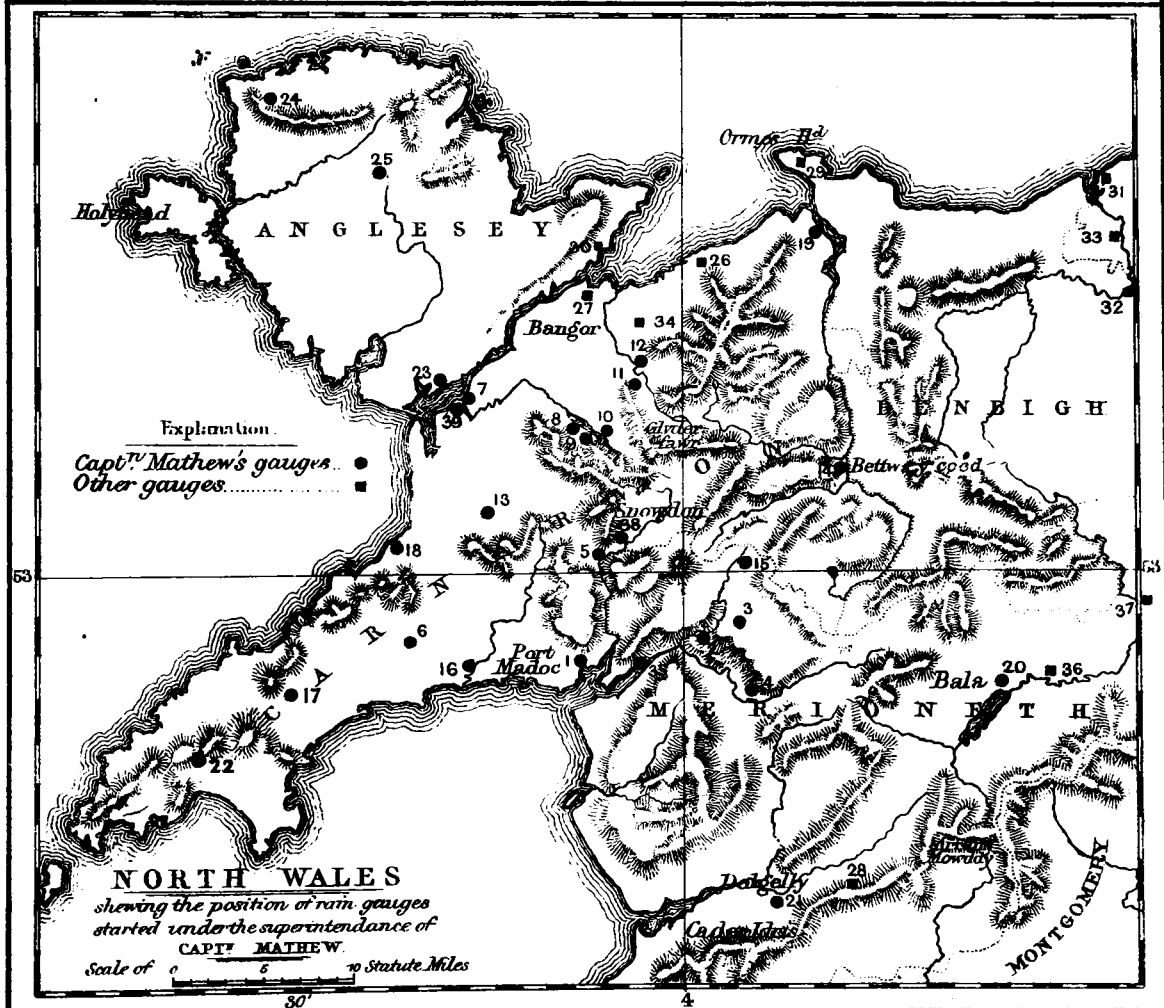
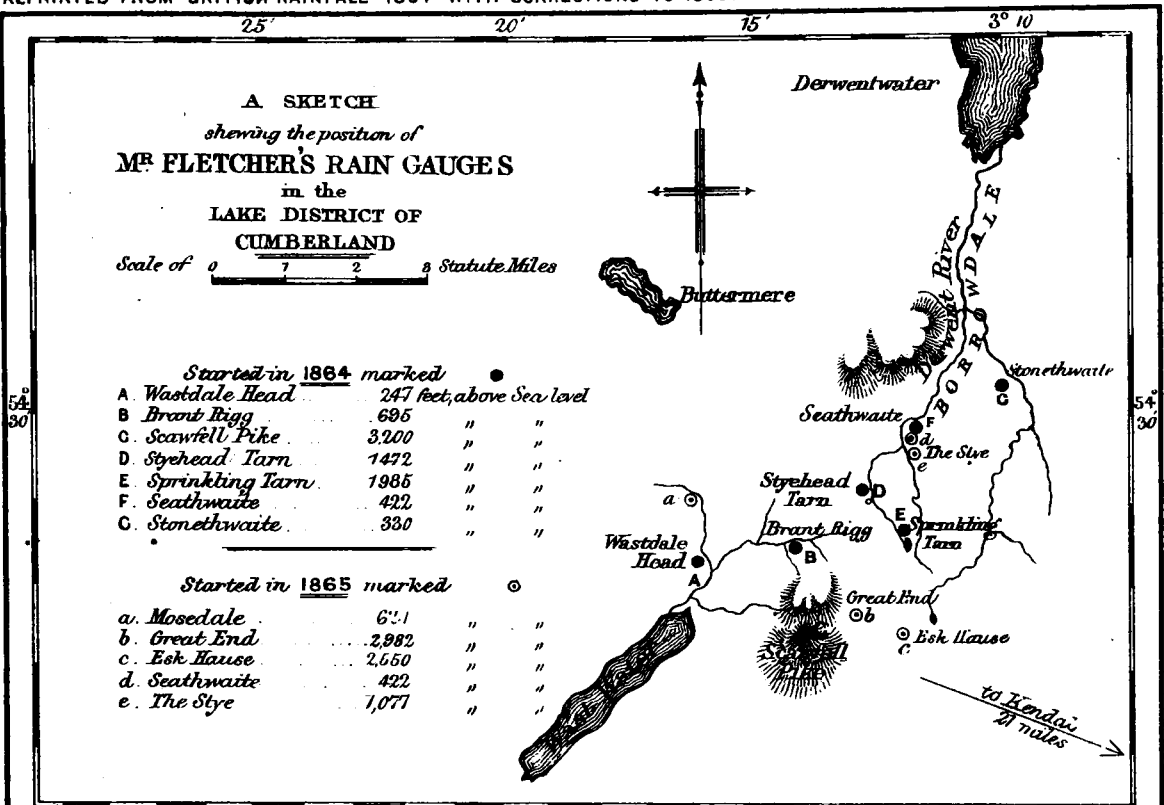
STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain. f	Days on which .01 or more fell.
		Above Ground.	Above Sea Level	1865	
		ft. in.	feet.	inches.	in.
CUMBERLAND—(con.)					
Penrith (Greystoke) .....		...	700	33·34	...
Wigtown (Brookfield) .....	R. M. Lidbetter, Esq.	6 0	130 ?	26·23	159
Silloth .....	Rev. F. Redford .....	3 0	28	28·74	142
Carlisle (Cemetery).....	Mr. J. Cameron, Jun.	0 0	114	24·72	127
" (Scaleby) .....	R. A. Allison, Esq.....	0 8	...	28·83	...
WESTMORELAND.					
Burton (Darton Hall) .....	E. G. S. Hornby, Esq.	1 0	...	37·37	...
Kirkby Lonsdale (Biggins House) .....	Mrs. Tomlinson .....	3 6	400 ?	40·39	...
" " (Rigmaden) ...	E. Wilson, Esq. ....	3 0	350	38·77	...
" " .....	W. Harrison, Esq. ...	1 2	209	38·01	...
" " (Vicarage) .....	Rev. H. Ware .....	1 1	210	38·27	...
† Kendal .....	S. Marshall, Esq. ....	4 6	149	42·67	146
Ambleside (Low Nook) .....	J. C. Wilson, Esq.....	1 2	150	65·78	193
† " (Lesketh How) .....	Dr. J. Davy, F.R.S....	3 0	200	65·80	...
Windermere (The Howe) .....	Admiral Wilson .....	1 2	470	64·05	130
Ambleside (Loughrigg) .....	E. B. W. Balme, Esq.	0 9	570	71·00	183
*Kirkby Stephen .....	T. Mason, Esq. ....	1 1	574	32·64	142
Patterdale Hall .....	Mr. Sinclair .....	2 0	500	61·99	...
Appleby .....	Dr. Armstrong .....	1 0	442 ?	30·26	151
Great Strickland [Penrith] .....	H. Plumer, Esq.....	1 6	650	35·87	129
Brougham Hall [Penrith].....	Mr. G. Campbell .....	4 6	...	24·88	...

## DIVISION XI.—MONMOUTH, WALES, AND THE ISLANDS.

MONMOUTH.					
*Newport (Isca Foundry) .....	J. Laybourne, Esq. ...	1 0	...	37·02	...
* " (Llanfrechfa Grange) ...	F. J. Mitchell, Esq. ...	1 0	360	41·57	116
Chepstow .....	J. G. Wood, Esq. ....	3 6	200	35·50	145
*Newport (Abercarn) .....	Rev. D. Charles.....	1 3	450	45·75	...
Tredegar (Blaina) .....	H. Soper, Esq. ....	0 9	1100	46·07	187
Abergavenny .....	Dr. McCullough .....	1 3	...	35·76	...
GLAMORGAN.					
*Cowbridge (The Ham) .....	G. W. Nicholl, Esq. ...	1 2	55	36·67	...
Swansea .....	J. W. James, Esq.....	16 0	30	33·05	143
Merthyr Tydfil .....	E. W. Scale, Esq. ....	4 6	500	50·37	...
Swansea (Ystalyfera).....	J. Rogers, Esq. ....	1 0	368	61·69	166
CARMARTHEN.					
*Llanelly .....	E. Bagot, Esq. ....	7 0	20	51·80	207
*Carmarthen—(Plas Cwrt Hyr)...	W. E. Gwynn, Esq....	0 9	300 ?	54·35	150
" (Gaol) .....	George Stephens, Esq.	0 5	78	50·47	201
Llandissilio (Rhydwen).....	H. S. Morgan, Esq. ...	1 0	150	43·33	133
PEMBROKE.					
*Tenby (Caldy Island).....	Mr. Fletcher .....	1 0	173	37·16	159
Pembroke Dock .....	E. Chevallier, Esq.....	4 0	30	42·64	140
*Haverfordwest .....	E. P. Phillips, Esq. ...	2 0	60	50·77	166

## DIVISION XI.—MONMOUTH, WALES, AND THE ISLANDS—(continued).

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which -01 or more fell	
		Above Ground.	Above Sea Level	1865		
		ft.	in.	feet.	inches.	
CARDIGAN.						
Cardigan (Kilgerran).....	Rev. D. Evans .....	1	2	80	42·96	112
Lampeter .....	Rev. J. Matthews .....	5	0	420	42·39	171
Aberystwith (Goginan Mine) ...	H. Thomas, Esq. ....	4	0	290	40·38	...
„ (Frongoch Mine) ...	„ „ .....	4	0	855	43·74	...
„ .....	T. Paul, Esq. ....	1	0	12	34·81	175
BRECKNOCK.						
Crickhowell .....	Sir J. Bailey .....	0	0	...	39·75	...
Brecknock (Treberfydd) .....	R. Raikes, Esq. ....	...	...	...	34·14	...
Hay (Pen-y-maes) .....	Captain Brown .....	1	0	400	30·99	...
RADNOR.						
*Presteign .....	Captain Hannam .....	1	0	550 ?	32·55	164
Rhayader (Cefnfaes) .....	Mrs. Jones .....	2	0	880	41·48	193
MONTGOMERY.						
Llanidloes (Broomcliff) .....	T. F. Roberts, Esq. ...	3	10	750	43·33	...
FLINT.						
† Hawarden [Chester] .....	Dr. Moffat .....	1	0	260	21·96	137
Holywell (Maes y dre) .....	J. Williams, Esq. ....	5	0	400	21·22	...
† Rhyl (Gas Office, Crossley's g.)...	Mr. E. Evans .....	3	3	30	19·48	...
*† „ ( „ Works, 5-inch g.) (3)	„ „ .....	4	2	20	26·66	...
DENBIGH.						
Chirk (Brynkinalt).....	Mr. Hall .....	0	9	...	36·60	107
Wrexham (Brymbo) .....	C. E. Darby, Esq. ....	6	3	550 ?	30·33	...
*Denbigh (Plas Clough) .....	J. Harrison, Esq. ....	0	9	...	29·04	151
† Llandudno (Warwick House) (29)	Dr. Nicol .....	0	6	99	28·11	149
MERIONETH.						
*Talgarth Hall [Machynlleth] ...	C. F. Thruston, Esq. ...	1	0	150 ?	43·32	...
Towyn .....	Dr. C. Rice Williams..	1	0	18	35·32	175
*Dolgelly .....	Captain Mathew .....	1	0	43	52·01	148
* „ (Brithdin) .....	J. Hill, Esq. ....	1	0	500	57·59	...
*Bala (Llandderfel) .....	Mr. Pamplin .....	1	0	540	42·97	165
*Trawsfynedd .....	Captain Mathew .....	0	7	700	48·18	102
Hendre .....	F. C. Ball, Esq. ....	1	6	80 ?	41·22	...
*Maentwrog .....	Captain Mathew .....	1	0	15	48·95	...
*Festiniog .....	„ „ .....	1	0	600	57·22	169
*Rhiw brifdir .....	„ „ .....	10	0	1140	74·49	197
Corwen (Rhug) .....	W. Wagstaff, Esq. ...	4	6	500 ?	36·07	...
CARNARVON.						
Aberdaron (Sarn).....	Mr. W. Jones .....	5	0	340	40·81	185
*Pwllheli (Bodfaen) .....	Captain Mathew .....	...	...	...	38·36	194
*Llanystumdwy (Talarvor) ...	„ „ .....	3	0	50	34·10	191
*Llangybi .....	„ „ .....	1	1	200	44·43	212
*Port Madoc .....	„ „ .....	15	0	20	38·38	159
† *Beddgelert (Sygun).....	„ „ .....	5	6	330	81·23	152
*Llanllyni (Cilgwyn).....	„ „ .....	1	0	500	35·45	165
*Bettws y Coed .....	„ „ .....	1	2	70	54·13	...
† *Llanberis (R. Vict. Hotel) ...	„ „ .....	1	0	370	75·51	133
* „ (Dinorwic Quarry) (10)	„ „ .....	1	10	850	62·19	...
* „ (Glyn Padarn) .....	„ „ .....	1	0	377	65·18	187



## SCOTLAND.

## DIVISION XII.—SOUTHERN COUNTIES.

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which -01 or more fell.
		Above Ground	Above Sea Level	1865	
		ft. in.	feet.	inches.	
WIGTOWN.					
Mull of Galloway .....	Bd. of Northern Lights	...	...	27·41	...
*Wigton (N. Balfern) .....	T. MacLelland, Esq....	1 0	50	38·75	190
Stranraer (South Cairn).....	Mr. J. Kennedy.....	0 4	209	41·30	157
Corsewall.....	Bd. of Northern Lights	3 4	22 ?	35·73	...
KIRKCUDBRIGHT.					
Little Ross .....	Bd. of Northern Lights	3 3	130 ?	25·24	...
*Dalbeattie .....	J. Grieve, Esq. ....	0 8	25 ?	39·48	149
Castle Douglas (Slogarie) .....	T. R. Bruce, Esq. ....	0 1	300	56·04	...
" " " .....	" " " .....	0 6	800	57·78	...
Cargen [Dumfries].....	P. Dudgeon, Esq. ....	0 3	80	41·19	120
*New Galloway (Waterside) .....	P. Dalziel, Esq. ....	0 5	215	49·61	136
" (Glenlee) .....	W. Maxwell, Esq. ....	1 6	217	37·90	...
*Carsphairn .....	J. Hannah, Esq. ....	3 11	600	47·64	130
DUMFRIES.					
Dumfries (Crichton Asylum).....	Dr. Gilchrist .....	0 3	182	35·91	166
" (March Hill Cott.).....	Mr. T. Hogg .....	0 5	70	27·75	145
Thornhill (Glencairn).....	Rev. R. Home .....	0 9	350	43·02	...
" (Wallace Hall).....	C. T. Ramage, Esq. ...	0 6	206 ?	34·80	...
" (Drumlanrig) .....	Mr. McIntosh .....	0 4	191	39·55	81
Wanlockhead .....	Mr. G. Dawson .....	0 4	1330	52·87	165
Langholme .....	J. Little, Esq. ....	0 6	270	44·35	...
Westerkirk .....	" " "	0 6	420	50·10	...
Eskdale. Ewes .....	" " "	0 6	407	41·80	...
Carlesgill.....	" " "	0 6	370	46·80	...
" Hill Top .....	" " "	0 6	1164	48·35	...
Eskdalemuir .....	" " "	0 6	612	49·50	...
Ettrick Pen Top.....	" " "	0 6	2268	69·00	...
Liddlesdale (Whithaugh) .....	" " "	0 6	400	46·30	...
" (Kirndean).....	" " "	...	...	39·10	...
ROXBURGH.					
Hawick (Falnash) .....	Hawick Farmers' Club	0 6 ?	800 ?	51·30	...
" (Borthwickbrae) .....	A. E. Lockhart, Esq....	0 2	800	38·10	...
" (Goldielands) .....	Dr. Elliott.....	0 9 ?	505	33·95	...
" (Lynnwood) .....	" " "	0 6 ?	387	29·90	...
* " (Silverbut Hall) .....	Mr. D. Elder .....	4 0	580	28·09	131
" (Langraw) .....	W. Oliver, Esq. ....	0 6	570	32·05	...
" (Kirkton) .....	Hawick Farmers' Club	0 6 ?	...	28·48	...
" (Menslaws) .....	Mr. T. Cockburn .....	0 6 ?	290	24·88	...
*Jedburgh (Sunnyside) .....	G. Hilson, Jun., Esq....	10 0	333	20·56	...
Yetholm (Mowhaugh) .....	Mr. R. Carter.....	0 4	612	32·50	...
Kelso (Springwood Park) .....	Sir G. Douglas, Bt ...	0 8	130	23·83	136

### DIVISION XIII.—SOUTH-EASTERN COUNTIES.

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which .01 or more, fell.	
		Above Ground.	Above Sea Level	1865		
		ft.	in.	feet.	inches.	
SELKIRK.						
Selkirk (Bowhill) .....	Mr. J. Mathison .....	4	0	537	28·69	...
Galashiels (Wooplaw) .....	Mr. J. Murray .....	0	3	890	29·86	161
PEEBLES.						
Penicuik (N, Esk Reservoir) ...	Mr. J. Garnock .....	0	6	1150	36·70	121
BERWICK.						
Milne Graden .....	A. Buchan, Esq. ....	...		103	25·10	...
Lauder (Thirlestane Castle) .....	Mr. J. Whitton .....	0	3	558	28·80	118
Dunse (Mungo's Walls) .....	Mr. J. Thompson .....	0	6	267	29·68	149
St. Abb's Head .....	Bd. of Northern Lights	0	4	211 ?	23·63	...
HADDINGTON.						
Yester .....	Mr. A. Shearer .....	1	0	420	36·10	...
Prestonkirk (Smeaton) .....	Mr. J. Black .....	8	0	100	22 05	126
Haddington (Millfield) .....	Mr. T. Dods .....	4	6	140	27·50	...
„ (East Linton).....	Mr. J. Storie .....	0	3	90	23·87	140
Dunbar (Thurston).....	Mr. R. Mossman .....	3	0	320	25·60	...
EDINBURGH.						
Cobbinshaw Loch .....	J. Deas, Esq., C.E. ....	0	7	863	29·70	123
Harlaw.....	A. Ramsay, Esq. ....	0	6	807	34·90	...
Glencorse .....	„ „ „	0	6	787	34·60	144
Swanston .....	„ „ „	0	6?	555	30·70	...
Clubbie Dean .....	„ „ „	0	6?	760	35·30	...
Colinton (Fernelaw) .....	J. Leslie, Esq. ....	0	6	500	31·80	...
Inveresk .....	Mr. McAuslane .....	2	0	60	27·78	...
Costorphine (Meadowfield) .....	A. Paterson, Esq. ....	9	0	155 ?	21·85	...
Edinburgh .....	Messrs. Adie and Sons	7	0	208	21·07	...
„ (Charlotte Square)...	J. Leslie, Esq. ....	0	6	230	23·65	...
„ „ „	„ „ „	63	0	300	17·05	...
„ (March Hall).....	A. K. Johnstone, Esq.	0	3	270	20·10	...
„ (Castle) .....	A. Buchan, Esq. ....	0	6	420 ?	20·80	...
Inchkeith.....	Bd. of Northern Lights	3	0	182 ?	25·70	...

## DIVISION XIV.—SOUTH-WESTERN COUNTIES.

LANARK.					
Douglas (Newmains) .....	Mr. J. Russell .....	0	2	783	36·42 152
Uddingston (Meadowbank) .....	J. Anderson, Esq. ....	13	0	125	23·25 ...
Hamilton (Murdostan Castle) ...	Mr. Armour .....	...	...	...	25·20 ...
„ (Auchinraith) .....	R. Ker, Esq. ....	4	2	150	24·28 ...
„ (Bothwell Castle) .....	Mr. A. Turnbull .....	18	0	147	23·70 141
Glasgow (St. George's Road).....	M. J. Bell, Esq. ....	1	0	...	28·22 ...
„ (Cessnock Park).....	R. Hart, Esq. ....	4	4	30	30·46 143
„ (Observatory) .....	A. Buchan, Esq. ....	0	3	200	35·37 ...
„ (Baillieston) .....	Mr. P. Jarvie .....	0	3	230	38·04 190
Shotts (Hillend House) .....	Mr. D. Thompson .....	7	0	620	24·18 162

## DIVISION XIV.—SOUTH-WESTERN COUNTIES—(continued.)

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain. 1865	Days on which -01 or more fell.
		Above Ground	Above Sea Level		
		ft.	in.	feet.	inches.
AYR.					
Girvan .....	Mr. P. Paterson .....	0	6	15	41·66 157
Ayr (Auchendrane House) .....	E. Cathcart, Esq. ....	2	3	94	31·06 175
Cambusdoon .....	J. Baird, Esq. ....	3	0	50	25·48 151
Mauchline (Beechgrove) .....	Major Adair .....	2	4	472	33·33 ...
Dalry (Blair) .....	Captain Blair, R.N. ...	0	0	150	44·06 201
Largs (Mansfield) .....	Dr. Campbell .....	0	6	30	39·80 ...
" (Brisbane House) .....	" " " .....	0	0	125	44·80 ...
Gorbals's District. Ryat Lynn .....	† Glasgow Water Works	0	5	310	35·80 ...
Waulk Glen .....	" " " .....	0	5	280	35·50 ...
Middleton .....	" " " .....	0	5	550	40·03 ...
Black Loch .....	" " " .....	0	5	700	38·75 ...
RENFREW.					
Eaglesham (Revoch) .....	Mr. J. Scott .....	0	3	700	46·50 ...
" (Crosskeys) .....	J. Arneil, Esq. ....	0	7	520	49·75 ...
Mearns (Newton) .....	P. R. Murdoch, Esq. ....	...	...	360	34·10 ...
" (Nither Place) .....	W. Mather, Esq. ....	0	5	350	38·38 ...
Paisley (Ferguslie House) .....	Mr. J. Stewart .....	0	3	88	34·88 113
" (Stanely Reservoir) .....	W. R. Copland, Esq. ...	...	...	100	36·63 ...
" (Back Thornly Muir) ...	" " " .....	0	3	646	38·54 ...
" (Kilbarchan) .....	D. Robie, Esq. ....	1	0	350	48·40 139
Shaw's Water Works. No. 1. On Embankment ...	P. Morison, Esq. ....	0	8	600	48·20 ...
" 2. Hillside Park .....	" " " .....	0	8	560	55·70 ...
" 3. Top of Shiel Hill ...	" " " .....	0	8	800	51·10 ...
" 4. Spunge Hill .....	" " " .....	0	8	540	45·30 ...
Greenock (Everton Cottage)	" " " .....	0	8	472	56·20 152
" (Hamilton Street) ..	J. Gardner, Esq. ....	0	6	50	49·43 210
" (Gowrock) .....	W. Melvin, Esq. ....	...	...	...	48·23 ...

## DIVISION XV.—WEST MIDLAND COUNTIES.

DUMBARTON.					
Dumbarton (Cardross) .....	J. W. Burns, Esq. ....	0	0	50	45·40 141
" (Balloch Castle) .....	A. J. D. Brown, Esq. ...	0	4	91	45·20 183
Loch Lomond (Luss) .....	A. McDougall, Esq. ...	0	3	70	61·75 ...
" " (Stuckgown) .....	Captain Ainsworth ...	2	4	100 ?	76·95 200
" " (Ardlui) .....	A. McDougall, Esq. ...	0	6	50 ?	92·60 ...
Long Long (Arddaroch) .....	J. White, Esq. ....	1	0	80	60·79 157
" " (Arrochar) .....	A. McDougall, Esq. ...	0	3	20 ?	76·40 ...
STIRLING.					
Mugdock Reservoir .....	Glasgow Water Works	0	6	320	34·90 ...
Stirling (Polmaise Gardens) .....	Mr. Gorrie .....	0	1	12	32·60 ...
" (Blairhoyle) .....	Mr. W. Munro .....	1	6	...	36·15 ...
Ben Lomond .....	Glasgow Water Works	0	6	1800	67·20 ...
BUTE.					
Pladda .....	Bd. of Northern Lights	3	3	55 ?	26·95 ...
Isle of Cumbræe .....	J. Miller, Esq. ....	4	6	50	32·30 ...

† Information supplied by J. M. Gale, Esq., Engineer.



DIVISION XV.—WEST MIDLAND COUNTIES—(*continued.*)

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain. 1865	Days on which ·01 or more fell.
		Above Ground.	Above Sea Level		
		ft. in.	feet.	inches.	
ARGYLL.					
Mull of Cantire .....	Bd. of Northern Lights	...	219 ?	52·86	...
Campbeltown (Devaar) .....	" " "	3 4	75 ?	40·61	...
Rhinns of Islay .....	" " "	3 0	74 ?	34·35	...
Islay (Mc Arthurshead) .....	" " "	0 4	106 ?	54·40	...
Tarbert (Stonefield) .....	Colin G. Campbell, Esq.	1 3	90	55·79	...
Castle Toward .....	Mr. W. Milne .....	4 0	80 ?	43·89	192
Dunoon (Hafton) .....	Mr. D. Doig .....	4 0	40	56·42	171
Otter House .....	Dr. Rankin .....	0 6	130	47·84	177
Lochgilphead (Kilmory) .....	Sir J. P. Orde, Bart....	0 4	100 ?	55·20	200
" (Callton Môr) .....	Mr. J. Russell .....	4 6	65	45·07	201
Kilmartin (Largie) .....		4 4	64	44·00	...
Jura Sound (Fladda) .....	Bd. of Northern Lights	0 6	20 ?	68·20	...
Lochgailhead (Upper Glencroe)	A. McDougall, Esq. ...	0 6	400 ?	104·70	...
Inverary Castle .....	Mr. J. Caie .....	0 0	30	40·10	...
Dalmally (Bridge of Orchy) .....	A. E. McDougall, Esq.	0 6	600 ?	89·25	...
Oban .....	Captain Bedford, R.N.	0 4	10	54·25	181
Lismore .....	Bd. of Northern Lights	3 4	37 ?	40·11	...
Isle of Tiree (Hynish) .....	" " "	...	...	76·70	...
Loch Eil (Corran) .....	" " "	0 4	14 ?	67·90	...
Sound of Mull .....	" " "	0 6	12 ?	55·90	...
Ardnamurchan .....	" " "	3 6	82 ?	40·78	...
" (Camusinas) .....	A. Buchan, Esq. ....	...	...	81·66	...

## DIVISION XVI.—EAST MIDLAND COUNTIES.

## CLACKMANNAN.

Dollar .....	Mr. J. Westwood .....	0 4	170	36·20	107
KINROSS.					
Loch Leven Sluice .....	Mr. P. Farnie .....	0 10	...	34·10	...
FIFE.					
Burntisland .....	Mr. Macbean .....	0 6	80	25·42	159
Dunfermline .....	W. Chisholm, Esq. ...	0 10	458	28·40	...
Balfour .....	Mr. J. Dewar .....	0 6	129	27·10	135
Leven (Nookton) .....	W. McG. Miller, Esq.	0 6	80	25·77	155
Isle of May .....	Bd. of Northern Lights	2 2	182 ?	15·81	...
Cupar (Birkhill) .....	Mrs. Wedderburn .....	1 0 ?	...	31·80	...
PERTH.					
Menteith (Cardross House) .....	Mr. Wyber .....	1 0	120	43·00	...
Aberfoyle .....	Glasgow Water Works	0 6	60	46·30	...
Ledard .....	" " "	0 6	1500	81·20	...
Dunblane (Kippenross) .....	J. Stirling, Esq. ....	0 4	100	32·35	...
Deanston .....	J. Finlay, Esq. ....	0 0	130	33·75	171
Loch Dhu .....	Glasgow Water Works	0 6	325	64·90	...
" Drunkie .....	" " "	0 6	420	46·80	...
" Vennachar .....	" " "	0 6	275	46·20	...
Bridge of Turk .....	" " "	0 6	270	45·00	...
Lanrick Castle .....	A. Glover, Esq. ....	0 0	150 ?	36·70	134

## DIVISION XVI.—EAST MIDLAND COUNTIES—(continued).

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which .01 or more fell.
		Above Ground.	Above Sea Level	1865	
		ft. in.	feet.	inches.	
PERTH—(con.)					
Loch Katrine (Tunnel Hill Top)	Glasgow Water Works	0 6	830	61·70	...
Callander (Leny) .....	J. B. Hamilton, Esq....	0 4	345	46·90	...
Between Glen Finlas & Ben Ledi	Glasgow Water Works	0 6	1800	57·70	...
Glen Gyle .....	" " "	0 3	380	72·20	...
Auchterarder House .....	Lieut.-Colonel Hunter	2 3	162	32·70	...
Loch Earn Head (Stronvar).....	D. Carnegie, Esq. ....	0 5	463	62·11	...
Crieff (Muthill) .....	Rev. A. J. T. Morris...	1 0	247	39·46	177
Auchterarder (Colquhalzie House)	J. S. Hepburn, Esq. ...	0 6	100	31·67	...
" (Trinity Gask).....	Mr. R. Wylie.....	0 1	133	30·55	120
Perth Academy .....	Dr. Miller, F.R.S.E....	64 5	79	24·43	...
" (Balthaycock) .....	Mr. Wedderspoon .....	3 0?	...	33·10	...
" (Inchbank) .....	Dr. Miller, F.R.S.E....	1 6	20	42·43	...
" (Early Bank).....	A. Buchan, Esq. ....	0 3	64	39·34	...
Scone Palace .....	Mr. J. Halliday.....	2 6	80 ?	28·79	122
Stanley.....	Rev. W. Mather .....	1 0	200	27·46	...
Blairgowrie (Rosemount) .....	Mr. J. Gibb .....	6 1	300 ?	26·31	...
Meikle (Belmont Castle) .....	" " "	2 0	220 ?	29·00	...
Aberfeldy (Taymouth) .....	Mr. P. Murray .....	4 0	370	35·40	...
" (Blackhill) .....	J. S. Hepburn, Esq. ...	0 3	823	37·84	...
" (Bolfracks) .....	J. F. Wyllie, Esq.....	...	...	40·10	...
*Logierait (Strath-tay) .....	Rev. G. D. R. Munro..	1 0	250	31·71	136
FORFAR.					
Dundee (Constitution Road).....	† Dundee Water Works	0 0	116	29·90	...
" (Somerville Place) .....	John Kerr, Esq. ....	0 3	240	30·59	...
Barry Village .....	Mr. J. Proctor .....	0 3	35	26·65	178
Craigton .....	Dundee Water Works	0 0	440	33·42	...
Kettins.....	Mr. J. Gibb .....	1 0	218	30·82	119
Hill Head .....	Dundee Water Works	0 0	500	33·96	...
Seichen.....	" " "	0 0	550	33·82	...
Arbroath .....	A. Brown, Esq.....	2 0	65	27·88	122
Montrose (Bridge Street) .....	D. Scott, Esq. ....	0 3	25	25·50	142
" (High Street).....	Mr. W. Leighton .....	6 0	21	23·26	112
" (Museum) .....	Mr. J. Campbell .....	29 0	37	23·38	123
" (Royal Asylum) .....	Dr. Howden .....	2 0	200	34·26	108

## DIVISION XVII.—NORTH EASTERN COUNTIES.

## KINCARDINE.

Brechin (The Burn) .....	Lieut.-Col. McInroy ...	0 6	237	34·70	...
Fettercairn .....	Mr. A. C. Cameron ...	0 3	221	32·40	166
" (Bogmuir) .....	R. Vallentine, Esq. ...	0 3	200	30·20	...
Laurencekirk (Johnstone Lodge)	A. Buchan, Esq. ....	...	...	45·60	...
† Banchory House [Aberdeen] ...	A. Thompson, Esq. ...	0 4	99	32·40	199
Girdleness [Aberdeen] .....	Bd. of Northern Lights	4 7	86	19·62	...

† Information supplied by J. Duncan, Esq.

## DIVISION XVII.—NORTH EASTERN COUNTIES—(continued).

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which ".01 or more fell.	
		Above Ground.	Above Sea Level	1865		
ABERDEEN.		ft.	in.	feet.	inches.	
Braemar .....	Mr. J. Aitken .....	0	9	1110	29.72	210
Ballater .....	J. W. Paterson, Esq... ..	0	9	656	37.91	162
Cromar (Coldstone) .....	Rev. J. G. Michie .....	4	0	680	33.33	...
*Aberdeen (Cuparstone) .....	Rev. A. Beverley .....	1	2	112	30.89	189
"      "						

## DIVISION XVIII.—NORTH-WESTERN COUNTIES.

WEST ROSS.					
*Loch Alsh (Inverinate House) ...	Mrs. Matheson .....	3 0	150	56.73	...
*Applecross .....	Dr. Haynes .....	1 0	50	55.41	169
*Lochbroom .....	Mr. M. Macleary .....	0 8	47	38.30	221
Isle of Lewis (Stornaway) .....	Bd. of Northern Lights .....	3 4	31?	21.41	...
" (Lewis Castle) .....	Mr. J. Pullinger .....	0 3	60	30.38	...
" (Butt of Lewis) .....	" .....	3 6	...	38.74	...
EAST ROSS.					
*Dingwall .....	J. Boyd, Esq. ....	0 11	20?	21.70	180
Cromarty .....	Bd. of Northern Lights .....	3 4	28?	19.51	...
*Invergordon Castle .....	B. B. Æ. McLure, Esq. ..	3 0	20	20.67	143
Alness (Ardross Castle) .....	Mrs. Matheson .....	1 0	450	29.68	171
*Tain (Fearn) .....	Mr. M. McLean .....	1 3	48	21.64	161
Tarbetness .....	Bd. of Northern Lights .....	3 4	61?	17.46	...
WEST INVERNESS.					
*Loch Lochy (Clunes) .....	A. C. MacIntyre, Esq.. ..	0 10	...	52.42	185
Isle of Skye (Oronsay) .....	Bd. of Northern Lights .....	0 6	15?	46.98	...
" (Kyle Akin) .....	" .....	0 2	3?	79.18	...
" (Raasay) .....	Mr. T. Bunning .....	3 0	80	57.25	162

DIVISION XVIII.—NORTH-EASTERN COUNTIES—(*continued*).

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which .01 or more fell.	
		Above Ground.	Above Sea Level.	1865		
		ft.	in.	feet.	inches.	
WEST INVERNESS—(con.)						
Isle of Skye (Portree) .....	Mr. J. Grant .....	0	4	60	78·75	211
„ .....	„ „ „ .....	0	4	60	65·82	211
„ (Rona) .....	Bd. of Northern Lights	0	6	196 ?	45·30	...
Barrahead .....	„ „ „ .....	3	0	640 ?	35·44	...
S. Uist (Ushenish) .....	„ „ „ .....	0	4	157 ?	39·66	...
N. Uist (Monach) .....	„ „ „ .....	...	...	...	44·10	...
„ (Loch Maddy) .....	C. Shaw, Esq.....	2	8	30 ?	26·05	...
Harris (Island Glass).....	Bd. of Northern Lights	3	4	50 ?	17·93	...
EAST INVERNESS.						
*Laggan .....	Mr. A. McIntosh .....	0	9	1000 ?	26·35	...
Urquhart (Corrimony) .....	T. Oglivy, Esq. ....	0	4	320 ?	35·80	178
*Beauley (Beaufort Castle) .....	Mr. W. Anderson ...	1	6	65	26·09	116
Inverness (High School) .....	J. Robertson, Esq. ...	1	3	15	23·49	...
„ (Culloden House) .....	A. Forbes, Esq. ....	3	0	104	23·81	149

## DIVISION XIX.—NORTHERN COUNTIES.

SUTHERLAND.						
Golspie (Dunrobin Castle) .....	Mr. J. Mitchell .....	0	6	6	21·06	138
*Helmsdale .....	Mr. J. Campbell .....	1	0	34 ?	26·64	177
Scourie .....	J. Simpson, Esq. ....	5	0	26	34·60	130
House of Tongue .....	J. Crawford, Esq. ....	0	1	33	28·90	267
Cape Wrath .....	Bd. of Northern Lights	3	6	355 ?	32·80	...
CAITHNESS.						
Nosshead .....	Bd. of Northern Lights	3	4	127 ?	15·09	...
Thurso (Holburnhead) .....	„ „ „ .....	0	4	60 ?	24·91	...
Dunnethead .....	„ „ „ .....	3	6	300 ?	21·85	...
Pentland Skerries .....	„ „ „ .....	3	3	72 ?	26·05	...
ORKNEY.						
Hoy (Melsetter) .....	J.G. Heddle, Esq. ....	0	4	55	32·83	...
Hoy Sound, East .....	Bd. of Northern Lights	3	4	27 ?	31·28	...
„ (West) .....	„ „ „ .....	...	...	37 ?	26·32	...
† Kirkwall .....	Mr. J. G. Iverach .....	0	4	8	24·94	194
Balfour Castle .....	D. Balfour, Esq. ....	0	3	50	25·45	...
† Sandwich (Lawn) .....	Rev. C. Clouston .....	2	0	78	34·21	215
Start Point, Sanda .....	Bd. of Northern Lights	0	6	29 ?	18·83	...
North Ronaldsay .....	„ „ „ .....	3	4	21 ?	25·98	...
SHETLAND.						
Sumburghhead .....	Bd. of Northern Lights	3	4	265 ?	20·47	...
Bressay .....	„ „ „ .....	0	4	72 ?	35·84	...
„ (Manse) .....	Rev. Z. M. Hamilton ..	0	9	12	32·10	...
East Yell .....	Mr. A. D. Mathewson	3	0	...	38·09	...

## I R E L A N D.

## DIVISION XX.—MUNSTER.

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which not or more fell.
		Above Ground.	Above Sea Level	1865	
<hr/>					
CORK.					
*Dunmanway .....	J. Donovan, Esq. ....	1	4	...	62·32 147
Cork (Queen's College) .....	Professor England ...	6	0	65	43·01 142
Mallow (Woodfoot) .....	G. S. Ware, Esq. ....	5	6	205	38·59 225
KERRY.					
Knightstown (Valentia).....	The Knight of Kerry	2	0	30	59·09 227
WATERFORD.					
Waterford (Newtown) .....	Mr. R. J. Greer .....	4	0	60	41·02 188
„ (Portlaw) .....	A. Free, Esq.....	20	0	50	47·25 ...
„ (Rathcullihen) .....	.....	2	0	140	39·62 ...
TIPPERARY.					
Clonmel (Glenarm) .....	L. Grubb .....	1	10	80	40·94 173
Tipperary (Cordangan Manor) ...	L. Cust, Esq. ....	12	0	300?	40·21 207
*Borrisoleigh (Ballinlonty).....	Mr. Kearns .....	1	0	...	34·58 ...
LIMERICK.					
*Limerick .....	S. Caswell, Esq.....	0	6	92	45·19 182
CLARE.					
Killaloe .....	Rev. C. Mayne .....	5	0	128	46·04 210
*Ennis .....	Rev. S. Leslie Brakey	2	6	35	32·11 ...

## DIVISION XXI.—LEINSTER.

WEXFORD.					
Wexford (Reclaimed Lands).....	C. W. Palliser, Esq. ...	0	2	1	36·63 ...
KILKENNY.					
*Stoneyford (Inisnag) .....	Rev. J. Graves .....	1	0	196?	29·31 173
Inistogue (Woodstock) .....	Right Hon. W. F. Tighe	4	0	316	43·62 122
Kilkenny (Model Farm) .....	J. Boyd, Esq. ....	0	6	200	30·43 160
QUEEN'S COUNTY.					
Portarlinton .....	M. Hanlon, Esq. ....	1	1	236	43·84 180
KING'S COUNTY.					
Roscrea (Cangort Park).....	H. B. Trench, Esq. ...	8	0	340	31·00 187
Parsonstown (Birr Castle) .....	Earl Rosse, F.R.S.....	0	3	200	31·90 ...
Tullamore .....	H. J. B. Kane, Esq. ...	3	0	235	26·92 173
WICKLOW.					
Bray (Fassaroe) .....	E. Barrington, Esq. ...	5	0	250	42·21 190
DUBLIN.					
Black Rock .....	T. Bewley, Esq.....	29	0	95	29·80 119
Monkstown .....	Arthur Pim, Esq. ....	0	6	100	32·14 180
„ „ „	„ „ „	40	0	145	26·66 177
„ „ „	„ „ „	90	0	200	22·09 ...
Dublin (Phoenix Park).....	Capt. Wilkinson, R.E.	3	0	162	28·34 178
„ „ „	„ „ „	10	0	169	28·23 178
„ (Trinity College) .....	Rev. Prof. Galbraith...	18	0	42	29·23 ...
„ (St. Anne Street) .....	J. W. Moore, Esq. ...	3	0	35	27·46 216
Glasnevin.....	D. Moore, Esq. ....	6	6	66	24·34 143

## DIVISION XXII.—CONNAUGHT.

STATIONS.	AUTHORITIES.	Height of Rain Gauge.		Depth of Rain.	Days on which 01 or more fell.	
		Above Ground	Above Sea Level	1865		
GALWAY.		ft.	in.	feet.	inches.	
Gort (Cregg Park) .....	R. J. Lattey, Esq.....	3	0	120	38·43	164
Galway (Queen's College) .....	Prof. Curtis, LL.D. ...	6	0	25	48·90	202
Ballinasloe .....	R. H. Smythe, Esq. ...	6	0	134	34·50	...
*Outerard (Inishambo) .....	J. D. Darcy, Esq. ....	1	0	35	43·69	190
ROSCOMMON.						
*Hollywell.....	H. Smyth, Esq. ....	2	6	...	32·98	145
SLIGO.						
*Buninnadden (Doo Castle) .....	Mr. D. O'Dowd.....	1	0	...	39·62	203
Sligo (Haslewood) .....	Rt. Hon. John Wynne	2	4	47	41·81	154

## DIVISION XXIII.—MUNSTER.

CAVAN.					
*Bawnboy (Owendoon) .....	G. H. L'Estrange, Esq.	1 3	218	41·35	222
*Belturbet (Red Hills) .....	Rev. E. Whyte Venables	0 9	...	36·92	197
FERMANAGH.					
Enniskillen (Florence Court) ...	Earl of Enniskillen ...	11 0	300	43·15	211
ARMAGH.					
Armagh Observatory .....	Rev. Dr. Robinson F.R.S.	30 0	238	37·93	164
DOWN.					
Milltown (Bann Res.) .....	J. Smith, Jun., Esq. ...	1 0	440	52·30	...
Banbridge (Milltown) .....	" " "	0 8	200	29·21	168
" " " .....	" " "	40 0	240	25·96	...
Ardglass Castle .....	A De Vere Beauclerk Esq.	1 0	50	31·46	...
Waringstown .....	F. Waring, Esq. ....	0 4	190	28·62	162
ANTRIM.					
Belfast (Harbour Office) .....	O'Connell Shaw, Esq.	47 0	61	26·06	141
† " (Queen's College) .....	Mr. J. Bell .....	9 3	58	32·02	162
† " (Linen Hall) .....	J. Stephens Esq. ....	4 0	12	35·78	169
*Antrim .....	Rev. J. H. Orr .....	1 0	150	29·41	161
LONDONDERRY.					
*Garvagh (Moneydig) .....	H. R. Morrison, Esq. ...	1 1	121	37·86	214
Londonderry .....	D. Watt, Esq. ....	0 6	80	39·24	...
" " " .....	Rev. F. Smith .....	8 0	...	36·41	...
" (Literary Institution) .....	Dr. Cuthbert .....	50 6	78	33·27	192
TYRONE.					
Strabane (Leekpatrick) .....	Rev. C. Maxwell .....	0 5	260	37·99	212
DONEGAL.					
*Letterkenny .....	Rev. Dr. Kingsmill ...	0 6	108	50·46	175
Milford .....	Rev. A. Delap .....	0 5	100 ?	50·05	226

G J. S.

Sums of £1 and upwards paid prior to Feb. 16th, for Rainfall Publications,  
and towards the general expenses of Rainfall Investigations in 1866.

Aire & Calder Navigation Comp. £1 19 3	Hopkins, T., Esq. £2 4 0
Alexander, J., Esq. 1 0 0	Horner, Rev. J. 1 6 3
Assheton, R., Esq. 1 0 0	Howard, W. D., Esq. 5 10 0
Backhouse, W., Esq. 1 6 3	Hull, Rev. J. 1 0 0
Balme, E. B. W., Esq. 1 1 0	Ingram, Rev. H. 1 10 0
Barrington, E., Esq. 1 0 0	Jenkins, S., Esq., C.E. 1 0 0
Baverstock, J. H., Esq. 1 0 0	Jones, Mrs. 1 0 0
Baylis, H., Esq. 1 0 0	Jowers, F., Esq., 1 6 6
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Beverley, Rev. A. 1 0 0	Kirkpatrick, J., Esq. 1 10 0
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Bridgeman, Rev. J. 1 10 0	Melville, A. S. L., Esq. 1 0 0
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Brown, T. C., Esq. 1 0 0	Moates, W., Esq. 1 10 6
Bampstead, Rev. T. J. 1 0 0	Morris, Rev. A. J. T. 1 0 0
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Charrington, F., Esq. 1 0 0	Oddie, F., Esq. 1 5 0
Chrimes, R., Esq. 5 0 0	Ogilvy, T., Esq. 1 1 0
Clegram, W. B., Esq. 1 1 0	Orde, Sir J. P., Bart. 1 10 6
Collins, C. R., Esq. 1 6 3	Pasley, Admiral Sir T. S. 2 0 0
Collins, Dr. 1 1 0	Peckover, A., Esq. 1 1 0
Colquhoun, J. C., Esq. 1 5 0	Phillips, E. P., Esq. 1 3 0
Coode, W., Esq. 1 0 0	Pigott, G., Esq. 1 0 0
Cooper, Col. M.P. 1 0 0	Preston, Rev. T. A. 1 12 0
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Dartnell, G. R., Esq. 1 1 0	Richardson, J., Esq. 1 6 0
Dipple, G., Esq. 1 0 0	Silver, S. W., Esq. 2 2 0
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Dudgeon, P., Esq. 1 5 0	Soper, H., Esq. 1 0 3
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Dyke, F. H., Esq. 1 0 9	Spedding, T. S., Esq. 1 5 0
Dymond, E. E., Esq. 1 0 0	Squire, W., Esq. 1 0 6
Ellis, W. H., Esq. 1 0 0	Stephens, A., Esq. 1 0 0
Estlin, J. P., Esq. 1 1 0	Stevenson, G. W., Esq. 1 11 0
Evans, F. G., Esq. 1 6 0	Stow, F. W., Esq. 1 0 0
Fawcett, E. G., Esq. 1 1 0	T. H. S. 1 0 0
Field, R., Esq. 1 11 0	Treby, H. H., Esq. 1 0 0
Filliter, E. Esq. 2 2 0	Trimleston, Lord 1 0 0
Finlay, J., Esq. 1 0 0	Tupman, G. L., Esq. 1 8 0
Fletcher, I., Esq., F.R.S. 1 11 0	Turner, T. Esq. 1 18 0
Fuller, F., Esq. 1 10 6	Wagstaff, J., Esq. 1 1 0
Gillett, Rev. G. E. 1 0 0	Wallis, J., Esq. 1 0 0
Gillett, Dr. W. E. 1 0 0	Ware, G. S., Esq. 1 0 3
Gosset, Rev. I. H. 1 10 0	Waring, T., Esq. 1 0 0
Gott, C., Esq. 1 1 0	Warren, G., Esq. 1 13 0
Hare, C., Esq. 1 0 0	Watkins, J., Esq. 1 14 0
Herbert, J. M., Esq. 1 0 0	White, J., Esq. 1 0 0
Hill, Rev. E. 1 6 0	Wilson, T., Esq. 1 0 0
Hill, H., Esq. 1 16 0	Winter, Rev. E. W. 1 0 0
Hill, J. H., Esq. 1 0 0	Woods, W. L., Esq. 1 0 6
Hony, The Ven. Archdeacon 1 0 0	Wortham, H., Esq. 1 5 0
Hood, Major-Gen. The Hon. A. 1 0 0	Yonge, J. B., Esq. 1 0 0

Subsequent receipts will be acknowledged in the *Meteorological Magazine*.





# MONTHLY RAIN CIRCULARS, 1865.

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NOTE. —A few trifling errors have been detected on comparing the monthly and annual returns of the observers, and have been corrected in the following reprint.

# SYMONS'S RAINFALL CIRCULAR.

JANUARY, 1865.

STATIONS.		HEIGHT OF GAUGE.		DEPTH OF RAIN.			Days on which Rain, Snow, or Hail measured 0·01	
		Above Ground	Above Sea Level.	Total in the Month.	Greatest Fall in 24 hours.			
					Depth.	Date.		
[The Roman numerals denote the division of the Annual Tables to which each station belongs.]		ft.	in.	feet.	inches.	inches.		
ENGLAND AND WALES.	I. London (Camden Town) .....	0	6	100	3·63	1·12	27	12
	II. Staplehurst (Linton Park) ...	0	6	200 ?	4·48	1·02	13	21
	II. Selborne .....	4	0	500 ?	3·87	·97	27	17
	III. Banbury .....	7	0	345	2·51	·73	27	17
	III. Wisbech .....	0	6	10	2·77	·80	27	12
	IV. Bury St. Edmunds (Culford)	1	2	...	2·77	·96	14	12
	V. Calne .....	0	11	250	3·65	·64	13	15
	V. Plymouth (Goodamoor) .....	0	2	580	7·58	1·04	29	23
	V. Taunton .....	1	6	38	3·72	·90	27	21
	VI. Tenbury (Orleton).....	0	9	200	2·58	·56	27	18
	VII. Leicester (Wigston) .....	0	6	220	2·33	...	...	13
	VII. West Retford .....	0	6	50	1·80	·59	27	14
	VII. Derby .....	5	0	180	2·00	·43	27	15
	VIII. Manchester.....	2	7	106	3·11	·66	14	18
	IX. York .....	0	6	50	1·07	...	...	15
	IX. Skipton (Arnccliffe) .....	3	0	750	6·00	1·25	10	13
	X. North Shields.....	1	0	124	1·76	·42	5	13
	X. Borrowdale (Seathwaite).....	1	0	422	13·84	3·68	10	19
	XI. Haverfordwest .....	2	0	60	4·50	·94	30	14
	XI. Rhayader (Cefnfaes).....	2	0	880	6·00	...	...	22
SCOTLAND.	XII. Dumfries.....	0	5	70	2·30	·55	31	14
	XIV. Ayr (Auchendrane House) ...	2	3	94	3·74	·38	10	17
	XV. Argyll (Otter House) .....	0	6	130	6·49	1·30	12	18
	XVI. Leven (Nookton) .....	0	6	80	1·33	·22	24	18
	XVI. Stirling (Deanston) .....	0	0	130	2·76	·35	4	18
	XVII. Aberdeen .....	4	8	115	2·64	·46	18	18
	XVIII. Inverness (Culloden).....	3	0	104	2·72	·58	18	17
	XVIII. Portree, Isle of Skye .....	0	4	60	11·32	1·85	2	21
	XIX. Scourie, Sutherland .....	0	3	26	4·70	1·50	16	? 20
	XX. Sandwick, Orkney .....	2	0	78	4·08	·38	6	25
IRELAND.	XX. Cork .....	5	0	50	4·22	1·25	30	13
	XX. Waterford .....	4	0	60	4·29	1·00	12&29	13
	XX. Killaloe, Clare .....	5	0	128	6·13	·86	11	18
	XXI. Portarlinton.....	9	0	236	4·51	·83	12	18
	XXI. Monkstown, Dublin .....	0	6	90	2·62	1·10	30	16
	XXII. Galway .....	6	0	25	9·01	1·02	11	18
	XXII. Sligo (Bunninnadden) .....	1	0	...	4·65	·63	29	17
	XXIII. Bawnboy (Owendoon) .....	1	3	218 ?	4·29	·66	10	19
	XXIII. Waringstown, Down .....	0	4	191	2·95	·55	30	15
	XXIII. Strabane (Leckpatrick) .....	0	5	260	4·98	·78	12	21

Difference of rainfall in January, 1865, from the mean of ten years 1850—1859.

Goodamoor	+ 1·10	Derby	+ ·05	Deanston	— 2·24
Orleton	+ ·12	York	— ·62	Sandwick	— ·27
Wigston	+ ·19	Seathwaite	— 3·43	Killaloe	+ 1·82

(+ Above the mean; — Below.)

## REMARKS.

## ENGLAND AND WALES.

*Linton Park.*—Snow-storms on the 27th and 28th, but no skating.

*Selborne.*—Max. 46° on 5th; min. 9° on 29th. Aurora on 25th. Snow 6 in. deep on 27th. *Banbury.*—Snow 9 in. deep by 27th, and many feet when drifted; intense frost on night of 28th, 4°.

*Wisbech.*—Min. on 29th 15°·7. Snow on 7 days, and frost on 17 days.

*Culford.*—Max. 52° on 10th; min. 18° on night of 21st. High wind with rain, on 13th. Snow on 2nd, 12th, 25th, 26th, 27th and 30th.

*Culne.*—Gales on 12th, 14th, and 15th; tremendous gale on 14th; anemometer recorded 72 miles an hour at 11 a.m.; several large trees blown down. Heavy snow on 27th.

*Goodamoor.*—Max. 50°; min. 16°. Our springs have never been known so high.

*Taunton.*—Max. 53° on 4th; min. 14° on 29th. 21 nights below freezing point.

*Orleton.*—Max. 52°·2 on 10th; min. 0° on 29th (on grass, —2·0, being the coldest for 30 years); snow 18 inches deep on level.

*Wigston.*—Three heavy falls of snow of about equal quantities, on the nights of the 25th, 26th, and 29th, making together more than I have recorded for 28 years, when melted yielded 1·10. Frost on 24 nights min. 13°.

*West Retford.*—Min. on 29th 13°. Frost on 19 nights. Gale on 14th.

*Derby.*—Heavy falls of snow on 27th and 30th, measuring 9 in. in sheltered situations.

*Manchester.*—Rain 0·65 above the average (71 years).

*N. Shields.*—Thunder on 24th, thunderstorm on 27th, hail on 23rd and 27th, fog on 25th and 29th; snow on 10 days; lunar halo on 11th, solar halo on 29th, aurora on 28th.

*Seathwaite.*—Rain above an inch on 6 days. Hard frost from 23rd to 29th; fine skating on the lakes. Heavy snow storm from 29th to 31st, 2 ft. deep; and 10 or 12 in railway cuttings.

*Haverfordwest.*—Mild and rainy to the 12th, when a severe storm of wind commenced, lasting till the morning of the 18th, when it shifted to N. and frost set in, increasing in severity till 24th, when snow began with a strong wind drifting it 5 or 6 feet deep. Min. 14°.

*Cefnfaes.*—Snow at the end of the month. Max. 48°, min. 11°.

## SCOTLAND.

*Dumfries.*—Snow on 7 days, and on 30th; the most severe for many years.

*Auchendrane.*—Of the total rainfall above stated, 2·74 was actual rain or sleet, which melted as it fell, and 1 inch is added for 10 inches of snow not measured by the gauge.

*Otter House.*—Rain about the average, most of it falling on the first 15 days; frost from 19th to 31st; snow fell to the unusual depth of 8 inches.

*Nookton.*—Snow on the 23rd, 24th, and 25th. Min. on 29th, 11° (on grass 3°.)

*Deanston.*—Max. 48° on 8th; min. 9° on 27th. Fine from 16th to 29th. Snow on the 25th and 28th, but never more than 1 inch deep.

*Aberdeen.*—Frequent high winds during the month; hurricane on 6th; snow or sleet on 17 days; aurora on 15 nights. Max. 49°; min. 14° (on grass 11°). Great depression of bar. 14th.

*Culloden.*—Great depression of the Bar. on 12th, 13th and 14th, the lowest reading 28·07 (corrected) occurring at 3 a.m. on the latter day, being the lowest since Dec. 27, 1852, when it fell to 27·87. Heavy gales on 5th and 6th.

*Portree.*—Hurricane from 10 p.m. on 6th to 8 a.m. on 7th; greatest force at 2 a.m., when it exceeded the great gale of October, 1860. Thunderstorms on the 4th, 5th and 10th. Frosts from 14th to 30th. Min. 12°·2, on 27th.

*Scourie.*—Hurricane on 5th, blowing off slates and chimney cans, overturning corn-stacks, and unroofing houses.

*Sandwick.*—Thunderstorm on 10th; aurora on 11 nights; gale on morning of the 6th, blowing 70 miles an hour. Slight snow on 21st, which continued till 31st.

## IRELAND.

*Killaloe.*—The greatest rainfall but one that I have recorded in January.

*Monkstown.*—Gales on 6 days; those on 11th and 14th, very severe; hard frost from 20th to 29th. Very bright aurora on 16th. Max. 52°·7; min. 19°·3 (on grass 13°·5).

*Bunninaddan.*—Very severe frost from 17th to 28th; penetrated 1 foot into the land.

*Owendoon.*—Severe frost from 19th to 29th with some fog, but generally clear and sharp.

*Waringstown.*—Hard frost from 18th to 29th.

*Leckpatrick.*—Very wet till 19th, when severe frost set in. Frost on grass on 26 nights. 30th and 31st very rainy.

G. J. SYMONS

136, Camden Road, February, 1865.

# RAINFALL, FEBRUARY, 1865.

STATIONS.		HEIGHT OF GAUGE.		DEPTH OF RAIN.			Days on which Rain, Snow, or Hail measured 0·01	
		Above Ground	Above Sea Level.	Total in the Month.	Greatest Fall in 24 hours.			
					Depth.	Date.		
[The Roman numerals denote the division of the Annual Tables to which each station belongs.]		ft.	in.	feet.	inches.	inches.		
ENGLAND AND WALES.	I. London (Camden Town) .....	0	6	100	2·27	·42	25	20
	II. Staplehurst (Linton Park) ...	0	6	200 ?	2·49	·35	24	23
	II. Selborne .....	4	0	500 ?	3·11	·39	24	12
	III. Banbury .....	7	0	345	2·35	·65	17	19
	III. Wisbech .....	0	6	10	1·99	·62	17	16
	IV. Bury St. Edmunds (Culford)	1	2	...	2·46	·71	25	16
	V. Calne .....	0	11	250	2·77	·73	17	16
	V. Plymouth (Goodamoor) .....	0	2	580	5·58	·86	6	23
	V. Taunton .....	1	6	38	2·48	·52	17	20
	VI. Tenbury (Orleton).....	0	9	200	2·66	·44	17	20
	VII. Leicester (Wigston) .....	0	6	220	2·43	·48	16	14
	VII. West Retford .....	0	6	50	1·76	·36	7	16
	VII. Derby .....	5	0	180	2·06	·42	1	18
	VIII. Manchester.....	2	7	106	2·36	·31	21	17
	IX. York .....	0	6	50	1·55	·49	22	12
	IX. Skipton (Arncliffe) .....	3	0	750	3·64	1·50	7	7
	X. North Shields.....	1	0	124	1·47	·69	6	12
	X. Borrowdale (Seathwaite).....	1	0	422	10·94	2·72	24	15
	XI. Haverfordwest .....	2	0	60	4·37	·80	6	17
	XI. Rhayader (Cefnfaes).....	2	0	880	2·50	...	...	17
SCOTLAND.	XII. Dumfries .....	0	5	70	2·40	·45	18	19
	XIV. Ayr (Auchendrane House) ...	2	3	94	2·73	·40	19	14
	XV. Argyll (Otter House) .....	0	6	130	4·54	1·15	19	17
	XVI. Leven (Nookton) .....	0	6	80	1·83	·32	18	16
	XVI. Stirling (Deanston) .....	0	0	130	2·95	·45	19	19
	XVII. Aberdeen .....	4	8	115	4·22	1·06	4	17
	XVIII. Inverness (Culloden).....	3	0	104	2·12	·18	4	14
	XVIII. Portree, Isle of Skye .....	0	4	60	5·68	1·25	24	16
	XIX. Scourie, Sutherland .....	0	3	26	3·90	1·60	23	8
	XIX. Sandwick, Orkney .....	2	0	78	3·40	·44	28	20
IRELAND.	XX. Cork .....	5	0	50	3·00	·55	8	12
	XX. Waterford .....	4	0	60	3·17	·53	6	17
	XX. Killaloe, Clare .....	5	0	128	5·16	·68	1	25
	XXI. Portarlington.....	9	0	236	5·41	·93	1	23
	XXI. Monkstown, Dublin .....	0	6	90	2·70	·77	5	19
	XXII. Galway .....	6	0	25	5·04	·72	6	21
	XXII. Bunninnadden (Doo Castle)...	1	0	...	2·86	·40	10&17	19
	XXIII. Bawnboy (Owendoon) .....	1	3	218 ?	5·10	·62	18	20
	XXIII. Waringstown, Down .....	0	4	191	2·75	·61	1	17
	XXIII. Strabane (Leckpatrick) .....	0	5	260	3·30	·62	11	20

Difference of rainfall in February, 1865, from the mean of ten years 1850—1859.

Goodamoor	+	2·16	Derby	+	·79	Deanston	—	·29
Orleton	+	1·30	York	+	·53	Sandwick	+	·35
Wigston	+	1·22	Seathwaite	—	1·24	Killaloe	+	2·30

(+ Above the mean; — Below.)

## REMARKS.

## ENGLAND AND WALES.

*Camden Town.*—Snow lying on the ground almost continuously. Lightning at 9.10 p.m. 28th. Min.  $15^{\circ}4$  (on grass  $10^{\circ}8$ ) on 15th. Frost on grass on 17 days.

*Linton Park.*—Snow on the ground almost all the month. Rainfall double the average.

*Selborne.*—Snow on 6 days. Min.  $15^{\circ}$  on 15th. Aurora on 20th and 21st.

*Banbury.*—Snow on 6 days. 9 inches fell on the 16th.

*Wisbech.*—Snow on 7 days. 6 inches deep on the 17th. Fine aurora 17th, 8 to 10 p.m. Gale on 19th (10 lbs.) and lightning at 11 p.m. Min.  $21^{\circ}3$  (on grass  $17^{\circ}7$ ) on 15th.

*Culford.*—Min.  $12^{\circ}$  on 14th—coldest this year. Snow on 7 days.

*Calne.*—The “greatest fall” on 17th was 9 inches of snow, melted. Frost on 14 days. Snow on 6. Hail on 24th. Min.  $17^{\circ}$  on 12th. Snowdrops in bloom 2nd. Crocuses on 18th.

*Goodamoor.*—A cold and very unpleasant month. Min.  $18^{\circ}$ .

*Tarnton.*—Frost 14 days. Min.  $23^{\circ}$  on 10th, 12th, and 13th. Snow on ground 10 days.

*Orleton.*—Ground covered with snow greater part of the month. Min.  $18^{\circ}6$  on 15th. Heavy gale on 19th.

*Wigston.*—Rainfall much above the average; temperature below it.

*W. Retford.*—Frost on 21 nights. Min.  $13^{\circ}$  on 15th.

*Manchester.*—Rainfall 0.02 in. below the average of 71 years.

*N. Shields.*—Snow on 11 days; hail on 4th, 8th, 19th, and 20th; fog on 1st, 2nd, and 3rd; aurora on 15th, 20th, and 26th; lunar halo on 9th. Month unusually cold and cloudy. Plants in flower: 5th yellow primrose, 6th polianthus, 8th blue hepatica, 10th pansy, 24th snowdrop, 28th single lilac primrose.

*Seathwaite.*—A month of most severe weather. Frost from 5th to 21st. Snow 12 inches deep. Min. (at Tarnbank)  $11^{\circ}3$  on 15th. Fine skating on the Lakes.

*Haverfordwest.*—A severe month. 1st week cold, gloomy, and wet; 2nd week hard frost and snow 10 in. deep. Min.  $18^{\circ}$  on 12th. Heavy gale on 18th and 19th.

## SCOTLAND.

*Dumfries.*—From the 3rd to about 24th very severe weather, with deeper snow than there has been since 1827; sheep on hill farms suffered severely. Min.  $9^{\circ}5$  on 15th. Snow on 11 days.

*Auchendrane.*—Snow on 7 days, total depth  $14\frac{1}{2}$  inches; ground covered nearly all the month. Strong N.E. wind (4 or 5 lbs.) on 19th, bar. 28.7, and next day 30.0 in. Min.  $12^{\circ}$  on 15th, on which night a fine luminous arch spanned the sky from N.E. to S.W. at 9.30 p.m.

*Otter House.*—Rainfall above the average. This month not only “filled the dyke,” but for nearly three weeks covered the fields and surrounding hills with snow. Min.  $23^{\circ}$ .

*Nookton.*—Rain 0.09 in. above 8 years’ average. Snow on 8 days.

*Deanston.*—Min.  $2^{\circ}5$  on 17th, also  $5^{\circ}5$  on 18th, and  $6^{\circ}$  on 15th, doing much damage. Snow on 11th 4 in., 16th 3 in., 20th 2 in., and it lay 9 in. deep until 24th. Snowdrops and winter aconite in flower last week.

*Aberdeen.*—A cold, wet month. Min.  $15^{\circ}7$  on 18th. Snow on 12 days, in all about 15 inches deep. Splendid aurora on 17th; also seen on 20th, 22nd, 23rd, and 26th.

*Culloden.*—Mean temp. below the average. Min.  $21^{\circ}4$  on 18th. Total depth of snow  $15\frac{1}{2}$  in.

*Portree.*—Cold and stormy. Hard frost from 2nd to 22nd. Much snow from 14th to 22nd. Lunar halo on 8th and 9th. Gale from W. on 23rd. Min.  $13^{\circ}4$  (on grass  $6^{\circ}8$ ) on 18th.

*Scourie.*—Clear and frosty weather from 2nd to 13th. Hail on 14th. Heavy snow from 16th to 20th. Gauge a foot below the snow for several days.

*Sandwick.*—Snow from 16th to 20th; snow rollers (description next month) on 18th. Aurora on 5 nights. Solar and lunar halos on 11th.

## IRELAND.

*Monkstown.*—Min.  $25^{\circ}5$  on 15th. Barometer rose nearly an inch on 19th, and it afterwards blew a very severe gale. Aurora on 15th and 17th.

*Doo Castle.*—On 13th rain gauge had collected snow which yielded 0.15 in.; inverted funnel in a spot free from drift, obtained 0.17. Repeated the experiment and found the same, so adopted 0.17 in.

*Owendoon.*—Very cold weather, frost from 13th to 18th; snow 16th to 21st, and a great fall (8 in. deep) on 17th.

*Waringstown.*—Frequent frosts and slight falls of snow, which, however, always thawed in 48 hours. Spring very backward. Snowdrops and crocuses later than I ever recollect them.

*Leckpatrick.*—Cold and stormy month. Vegetation, and also farm work, backward. Frost on grass on 23 nights. Min.  $17^{\circ}$  on 15th.

G. J. SYMONS,

136, Camden Road, March, 1865.

# SYMONS'S RAINFALL CIRCULAR.

HAVING a strong suspicion that these monthly circulars have hitherto been regarded by many as very "dry," I purpose during the present year enlarging them by one-half, and making this first page a general receptacle for rain and weather notes of various kinds—in fact, a corner for gossip, where *brief* notes will always be acceptable. Obviously it will entail additional expense, but I am determined to leave no stone unturned to bring my work to a successful issue both scientifically and financially; and it would be short-sighted policy to abandon a notion which may be good for the sake of a few pounds, which an increased circulation may restore.

G. J. S.

## ON THE WEIGHT AND BULK OF RAIN.

The depth of rain being now occasionally quoted in tons per acre, it may be handy to give a small table shewing the equivalents of rain in inches, its weight per acre, its bulk in gallons, and in cubic feet, also the cube root of this last, *i.e.*, the cubes whose contents equal the respective depths.

Inches .....	0·1	0·2	0·3	0·4	0·5	0·6	0·7	0·8	0·9	1 in.
Tons ..... per acre	10	20	30	40	50	61	71	81	91	101
Gallons       "	2262	4525	6787	9049	11312	13574	15836	18098	20361	22623
Cubic feet   "	363	726	1089	1452	1815	2178	2541	2904	3267	3630
A cube of     "	7·1ft.	9·0ft.	10·3ft.	11·3ft.	12·2ft.	13·0ft.	13·6ft.	14·3ft.	14·8ft.	15·4ft.

Of course all the above equivalents, except the last, are available for larger or smaller values by merely shifting the decimal point—*e.g.*, 60 in. = 6100 tons (nearly), and 0·06 in. = 6 tons per acre, &c.

One rather curious deduction may be drawn from this table. Assume a flower garden 22 yards square (a tenth of an acre), how many cans of water are required to equal half-an-inch of rain—a very moderate amount for a thunder shower? If the can holds four gallons (*i.e.*, 40 lbs.) of water, it will require to be filled 282 times, or, to put it in weight, five tons of water would have to be supplied. I see, however, no advantage in quoting either by weight or bulk, and strongly protest against a change which will only lead to confusion, and by which we should organize a useless departure from the practice of the whole civilized world.

## RAINFALL AT ST. OMER (FRANCE) AND OSTEND (BELGIUM.)

It is interesting to compare the records of these two stations on the Continental side of Dover Straits. They are about 50 miles from each other, St. Omer being 45 miles S.E. and Ostend 68 miles E. of Dover. The rain gauge at Ostend is 6 inches in diameter, 3 ft. above the ground, and 43 ft. above sea level; observer, M. Cavalier. I am not aware of the position of that at St. Omer, but presume it is also at some height above the ground. The Dover records being incomplete, I have selected Linton Park, Staplehurst, and Tunbridge as representing the English side of the Straits.

		St. Omer.	Ostend.	Staplehurst.	Tunbridge.
		in.	in.	in.	in.
1860		28·15	...	33·66	31·43
1861		18·90	...	24·01	23·11
1862		20·08	23·38	26·93	27·62
1863		18·31	19·38	22·75	23·28
1864		13·19	17·08	21·25	21·41
1864drier	1860by	14·96	...	12·41	10·02
than	1862by	6·89	6·30	5·68	6·21

BRITISH RAINFALL, 1864.—I hope all my correspondents received their copies in due course. Owing to the late period at which many returns were sent in, I was much hurried in getting it ready by the proper time; two errors consequently escaped notice. The diagram facing page 13 shows, of course, the rainfall in 1864, not 1865; and in some copies the figure 5 in the Kendal rainfall (47·57) has disappeared. Perhaps, however, considering the thousands of figures the pamphlet contains, I may congratulate myself on there being so few. I believe the nameless record on page 53 should have been "Londonderry, D. Watts, Esq."

# SYMONS'S RAINFALL CIRCULAR.

## SNOW ROLLERS.

In last month's circular a description of these singular formations was promised, and in fulfilment thereof, the following statement has been drawn up from several communications forwarded by the observer (Rev. C. Clouston), who first drew attention to them in 1847, by a note in the *Philosophical Magazine*. They have hitherto only been observed in the vicinity of Sandwick Manse, and even there only on four occasions, viz.—Feb. 11, 1847, March 5, 1862, Feb. 18, and (a few) March 26, 1865,—a combination of the following conditions being necessary: (1) a recent fall of loose snow-flakes in calm weather; (2) temperature near 32° to give adhesion to the snow without thawing it; (3) a good brisk wind rising after the fall. Under these conditions, the snow ripples up, as it were, and the ripples breaking into sections, the wind rolls each in its own path, until, just like a schoolboy's snow-ball, they rapidly increase in size, and have been found 3½ feet long, and 7 feet in circumference; while others are not as many inches. "On examination, they are all found to be cylindrical, like hollow-fluted rollers, or ladies' swandown muffs, of which the smaller ones much remind me, from their lightness and purity. The centre is not quite hollow, but in all there is a deep conical cavity at each end, and in many there is a small opening through which one can see." Their density seems to be about one-ninth that of water, as one 3 feet long, and 6½ feet in circumference weighed 64lbs. Their number is variable; in 1847, 133 were counted in one acre, and nearly 400 acres were covered with them. It may be well to add that the manse stands near the top of a very gentle slope, rising from the sea, whence it is distant about two miles; the coast which is generally fringed with cliffs of considerable height, drops to, and even below the level of the sea, west of the manse, and allows the sea to form an arm, running nearly up to the manse grounds. There is no high ground in the neighbourhood, but gentle undulations in all directions. I cannot help thinking that the briny breeze which thwarts all attempts at growth on the part of trees in the open country, produces these beautiful snow rollers, though the relative influence of the wind and the salt remains to be investigated.

## MEASUREMENT OF SNOW.

"Referring to *British Rainfall*, 1864, p. 5, you give as one of three methods of measuring snow: 'Measure the average depth of snow, and take a twelfth as the equivalent of water.' This differs so widely from the result of my own observation, that I should be very glad to see the results of any direct experiments, given on your first page. On a recent occasion, 2 in. of snow gave .37 in. of water—that is, about 1 to 5·4.

W. F. HARRISON, Bartropps, Weybridge Heath."

[My friend's note raises the point very clearly, and I willingly admit the rule to be bad, but as some observers will not take the trouble to melt the snow, the rule was added to secure uniformity and the nearest practicable approach to accuracy. Obviously the ratio depends entirely on the density; and the following experiments in different localities and winters, shew that any ratio from one-thirty-fifth to one-fifth may be obtained. I see nothing in the following table to induce me to recommend more than one-twelfth.]

Depth of Snow.	Yield in Water.	Depth of Snow to yield 1 in. of Water.	Observer.	Depth of Snow.	Yield in Water.	Depth of Snow to yield 1 in. of Water.	Observer.
in.	in.	in.		in.	in.	in.	
1·70	·048	35	G. J. S.	4·50	·366	12	E. J. L.
·75	·030	25	M. F. W.	·50	·042	12	G. J. S.
3·00	·140	21	E. J. L.	6·50	·527	12	E. J. L.
1·00	·048	21	G. J. S.	·10	·009	11	G. J. S.
1·00	·049	20	G. J. S.	2·12	·194	11	G. J. S.
1·00	·052	19	M. F. W.	3·00	·300	10	M. F. W.
18·00	·950	19	H. S. E.	6·00	·587	10	M. F. W.
2·00	·112	18	G. J. S.	12·00	1·270	9	H. S. E.
1·50	·088	17	M. F. W.	3·50	·391	9	E. J. L.
1·75	·120	15	M. F. W.	·50	·090	6	G. J. S.
1·00	·068	15	M. F. W.	2·00	·370	5	W. F. H.
·75	·050	15	G. J. S.	·50	·100	5	G. J. S.
·15	·012	13	G. J. S.	5·50	1·215	5	M. F. W.

Mean of the above 26 measurements:—14 inches of snow=1 inch of rain.

Observers.—H. S. Eaton, Little Bridy; W. F. Harrison, Weybridge Heath; E. J. Lowe, Nottingham; G. J. Symons, Camden Town; Col. M. F. Ward, Calne,

## RAINFALL, MARCH, 1865.

STATIONS.		HEIGHT OF GAUGE.		DEPTH OF RAIN.			Days on which Rain, Snow, or Hail measured 0·01		
		Above Ground	Above Sea Level.	Total in the Month.	Greatest Fall in 24 hours.				
					Depth.	Date.			
[The Roman numerals denote the division of the Annual Tables to which each station belongs.]									
		ft.	in.	feet.	inches.	inches.			
ENGLAND AND WALES.	I. London (Camden Town) .....	0	6	100	1·09	·24	26	15	
	II. Staplehurst (Linton Park) ...	0	6	200 ?	2·14	·57	6	21	
	II. Selborne .....	4	0	500 ?	1·18	·36	5	9	
	III. Banbury .....	7	0	345	1·02	·23	5	14	
	III. Wisbech .....	0	6	10	1·28	·36	26	17	
	IV. Bury St. Edmunds (Culford)	1	2	...	2·16	·50	26	13	
	V. Calne .....	0	11	250	·91	·40	5	9	
	V. Plymouth (Goodamoor) .....	0	2	580	3·91	·84	5	21	
	V. Taunton .....	1	6	38	1·40	·30	14	13	
	VI. Tenbury (Orleton).....	0	9	200	1·13	·29	5	12	
	VII. Leicester (Wigston) .....	0	6	220	1·01	·33	26	12	
	VII. West Retford .....	0	6	50	1·40	·35	26	20	
	VII. Derby .....	5	0	180	1·04	·28	26	11	
	VIII. Manchester.....	2	7	106	1·67	·52	25	12	
	IX. York .....	0	6	50	1·18	·23	25	19	
	IX. Skipton (Arnccliffe) .....	3	0	750	2·90	·98	5	7	
	X. North Shields.....	1	0	124	1·54	·22	26	17	
	X. Borrowdale (Seathwaite).....	1	0	422	6·44	2·44	5	13	
	SCOTLAND.	XI. Haverfordwest .....	2	0	60	3·14	·73	4	17
XI. Rhayader (Cefnfaes).....		2	0	880	1·47	...	...	16	
XII. Dumfries .....		0	5	70	1·30	·50	4	9	
XIV. Ayr (Auchendrane House) ...		2	3	94	2·21	·64	5	14	
XV. Argyll (Otter House) .....		0	6	130	2·62	·48	5	16	
XVI. Leven (Nookton) .....		0	6	80	·99	·29	4	13	
XVI. Stirling (Deanston) .....		0	0	130	1·91	·73	5	10	
XVII. Aberdeen .....		4	8	115	2·32	·48	5	23	
XVIII. Inverness (Culloden).....		3	0	104	1·45	·26	11	13	
XVIII. Portree, Isle of Skye .....		0	4	60	4·78	·61	4	22	
XIX. Scourie, Sutherland .....		0	3	26	2·80	·30	5	6	
XIX. Sandwick, Orkney .....		2	0	78	4·74	1·12	1	23	
XX. Cork .....		5	0	50	3·82	1·61	17	11	
XX. Waterford .....		4	0	60	1·70	·48	28	7	
XX. Killaloe, Clare .....		5	0	128	3·42	·58	27	21	
XXI. Portarlinton.....		9	0	236	3·43	·94	28	16	
XXI. Monkstown, Dublin .....		0	6	90	1·58	·31	8	15	
IRELAND.		XXII. Galway .....	6	0	25	2·54	·32	4	19
		XXII. Bunninnadden (Doo Castle)...	1	0	...	3·28	·80	27	22
	XXIII. Bawnboy (Owendoon) .....	1	3	218 ?	3·30	·36	1	22	
	XXIII. Waringstown, Down .....	0	4	191	2·25	·36	28	12	
	XXIII. Strabane (Leckpatrick) .....	0	5	260	3·40	·50	28	21	

Difference of rainfall in March, 1865, from the mean of ten years 1850—1859.

Goodamoor	+	·31	Derby	—	·24	Deanston	—	·45
Orleton	—	·45	York	+	·01	Sandwick	+	2·22
Wigston	—	·37	Seathwaite	—	1·02	Killaloe	+	·88

(+ Above the mean; — Below.)



## REMARKS.

## ENGLAND AND WALES.

*Camden Town.*—Frost on 24 nights. Min.  $23^{\circ} \cdot 2$  on 21st. Aurora on 20th. Hail on 8th and 26th. Lunar halo on 8th.

*Linton Park.*—Dull and cold. First 20 days mostly wet or snowy.

*Selborne.*—Snow more or less on 11 days. The latest season in field and garden for years.

*Banbury.*—Snow on 10 days.

*Wisbech.*—Snow on 7 days. Hail on 4th, 22nd, 24th, & 25th. Lunar halo on 5th. Aurora on 20th. Min.  $24^{\circ} \cdot 9$  (on grass,  $21^{\circ}$ ) on 21st. Gale (pressure 7lbs) on 26th.

*Culford.*—Very cold. Mean temp. scarcely higher than February. Min.  $19^{\circ}$  on 20th. Snow on 8 days; frost on 24. High winds, 18th and 20th.

*Calne.*—A dry, cold month. 28 frosty days. Min.  $22^{\circ}$  (on grass  $15^{\circ}$ ) on 24th. Snow on 11 days. Hail on 11th. Heavy gale from 10 p.m. 18th.  $\cdot 40$  in. fell in 5 hours on 4th.

*Goodamoor.*—Frost on 20 days. Min.  $16^{\circ}$ . A cold, wet, stormy month; and most unpropitious for getting in the spring corn. The cattle and sheep on very short allowance.

*Taunton.*—Frost on 21 days. Min.  $23^{\circ}$  on 10th and 21st. Cold, easterly winds prevalent.

*Orleton.*—A very cold month. Frost on 23 nights. Ground frequently covered with snow. Min.  $23^{\circ} \cdot 7$  on 13th.

*Wigston.*—Temp. & rainfall below the average. Frost on 26 nights. Vegetation backward.

*W. Retford.*—Very cold month. Vegetation backward. Frost on 24 nights. Min.  $23^{\circ}$ , 25th.

*Manchester.*—A very cold month; the mean temp. of the week ending on the 25th, being no less than  $8^{\circ} \cdot 6$  below the mean of 16 years.

*York.*—Snow on 10th, 21st, 22nd, 24th, 25th, 26th, 27th, & 29th.

*Arncliffe.*—Unusually cold and severe weather. Min.  $23^{\circ}$  on 28th.

*N. Shields.*—Unusually and severely cold. Continued snow storms from 18th to 27th. Snow on 13 days; hail on 8. Lightning on 26th, during a heavy fall of snow.

*Seathwaite.*—Very cold. Mountains covered with snow the whole month. (The gauge placed by the side of the old one, and read *monthly*—i.e., Seathwaite No. 2—gave  $6 \cdot 33$ .)

*Haverfordwest.*—Coldest March since 1853. Snow 6 inches deep on the level on 25th. Min.  $22^{\circ}$  on 20th. Rather tempestuous month, especially on 18th and 19th.

## SCOTLAND.

*Dumfries.*—Showery to 5th; after which three weeks of dry, cold, ungenial weather. Snow on 7 days. The hills have not been clear of snow since December. Vegetation backward.

*Auchendrane.*—Frost on 21 days. Very fine auroral arch on 20th, between 8 & 8:30 p.m.

*Otter House.*—Rain much below the average. Frost on 9 nights. Min.  $25^{\circ}$ . Aurora on 20th. Hail on 26th. Snow, hail, and rain on 27th.

*Nookton.*—Rain not half the average of previous 8 years. Hail on 19th. Snow on 3 days.

*Deanston.*—No rain from 14th to 25th. Slight snow on 5 days. Min.  $23^{\circ} \cdot 2$ .

*Aberdeen.*—Very ungenial month. Min.  $26^{\circ} \cdot 7$  on 26th. Snow or hail on 16 days. Aurora on 2nd, 5th, 13th, 21st, 23rd, 26th, 27th, & 29th.

*Culloden.*—Cold, wintry month, frequent snow. Min.  $29^{\circ} \cdot 5$ . Oat sowing commenced on 20th.

*Portree.*—Very bright lunar rainbow on 10th. A splendid aurora on 20th, lighting up the ground. Frost on almost every day. Frequent snow; heavy on the 26th. Min.  $20^{\circ} \cdot 8$  (on grass,  $14^{\circ} \cdot 8$ ) on 27th. Lunar halo on 3rd.

*Scourie.*—Very cold; with dry, N.E. winds. Hail and snow on 25th, and 26th, about 3 in. deep. Aurora on 17th.

*Sandwick.*—Wet and cold. Rainfall nearly double the average. Snow from 18th to 27th inclusive. Aurora on 9 nights. Lunar halo on 9th. A few snow rollers on 26th.

## IRELAND.

*Monkstown.*—A cold, dry month. Min.  $26^{\circ}$ , on grass  $23^{\circ}$ . Lightning on 26th, during a fall of snow. Vegetation very backward. On the evening of 20th, a bright, narrow, luminous band, of a pale green colour, was first seen at 8 p.m., stretching from N.E. to S.W. south of the zenith; it only lasted a short time.

*Galway.*—Aurora on 20th.

*Doo Castle.*—Extremely severe weather. Temp. at or below  $32^{\circ}$  on 15 days. Aurora on 20th.

*Owendoon.*—Fine from 21st to 25th. Slight frosts from 20th to 24th.

*Waringstown.*—A very cold month. Temp. much below the average. Strong N.E. winds from 17th to 30th.

*Leckpatrick.*—Very wet month. Unfavourable seed time. Frost on 19 nights. Min. (on grass)  $17^{\circ}$  on 21st. Mean temp.  $38^{\circ} \cdot 5$ . It was  $39^{\circ} \cdot 6$  in 1864, and  $43^{\circ} \cdot 3$  in 1863.

G. J. SYMONS.

# RAINFALL, APRIL, 1865.

STATIONS.		HEIGHT OF GAUGE.		DEPTH OF RAIN.			Days on which Rain, Snow, or Hail measured 0·01	
		Above Ground	Above Sea Level.	Total in the Month.	Greatest Fall in 24 hours.			
					Depth.	Date.		
[The Roman numerals denote the division of the Annual Tables to which each station belongs.]								
		ft.	in.	feet.	inches.	inches.		
ENGLAND AND WALES.	I. London (Camden Town) .....	0	6	100	·37	·11	17	6
	II. Staplehurst (Linton Park) ...	0	6	200 ?	·38	·11	14	7
	II. Selborne .....	4	0	500 ?	·89	·65	16	3
	III. Banbury .....	7	0	345	·78	·29	15	7
	III. Wisbech .....	0	6	10	·56	·15	1	6
	IV. Bury St. Edmunds (Culford)	1	2	...	·28	·22	6	2
	V. Calne .....	0	11	250	·73	·20	15	7
	V. Plymouth (Goodamoor) .....	0	2	580	·98	·26	19	7
	V. Taunton .....	1	6	38	·94	·30	19	9
	VI. Tenbury (Orleton).....	0	9	200	1·10	·62	18	6
	VII. Leicester (Wigston) .....	0	6	220	·40	·17	19	4
	VII. West Retford.....	0	6	50	1·06	·44	18	9
	VII. Derby .....	5	0	180	·97	·76	18	4
	VIII. Manchester.....	2	7	106	1·08	·46	17	8
	IX. York .....	0	6	50	1·51	·97	13	8
	IX. Skipton (Arncliffe) .....	3	0	750	1·50	·68	18	7
	X. North Shields.....	1	0	124	1·56	·84	13	6
	X. Borrowdale (Seathwaite).....	1	0	422	4·31	1·13	8	9
	XI. Haverfordwest .....	2	0	60	2·28	·82	5	10
	SCOTLAND.	XI. Rhayader (Cefnfaes).....	2	0	880	1·00	...	...
XII. Dumfries.....		0	5	70	·40	·25	18	6
XIV. Ayr (Auchendrane House) ...		2	3	94	·67	·20	13	10
XV. Argyll (Otter House) .....		0	6	130	1·59	·58	13	11
XVI. Leven (Nookton) .....		0	6	80	·62	·22	17	7
XVI. Stirling (Deanston) .....		0	0	130	·99	·37	14	9
XVII. Aberdeen .....		4	8	115	·67	·27	18	11
XVIII. Inverness (Culloden).....		3	0	104	1·08	·42	13	6
XVIII. Portree, Isle of Skye .....		0	4	60	2·94	·54	13	15
XIX. Scourie, Sutherland .....		0	3	26	1·60	·40	11	7
IRELAND.	X X. Sandwick, Orkney .....	2	0	78	1·47	·35	6	17
	XX. Cork .....	5	0	50	1·54	·62	19	8
	XX. Waterford .....	4	0	60	1·10	·60	18	8
	XX. Killaloe, Clare .....	5	0	128	·45	·06	5	17
	XXI. Portarlington.....	9	0	236	1·02	·31	19	11
	XXI. Monkstown, Dublin .....	0	6	90	1·75	·69	19	10
	XXII. Galway .....	6	0	25	·74	·36	12	6
	XXII. Bunninnadden (Doo Castle)...	1	0	...	1·40	·48	12	9
	XXIII. Bawnboy (Owendoon) .....	1	3	218 ?	1·65	·57	13	10
	XXIII. Waringstown, Down .....	0	4	191	·59	·27	18	6
XXIII. Strabane (Leekpatrick) .....	0	5	260	1·55	·45	18	12	

Difference of rainfall in April, 1865, from the mean of ten years 1850—1859.

Goodamoor — 3·73	Derby .....	— 0·74	Deanston — 1·08
Orleton ... — 1·27	York .....	+ 0·01	Sandwick — 0·36
Wigston ... — 1·43	Seathwaite — 3·85		Killaloe — 2·04

(+ Above the mean; — Below.)

## REMARKS. ENGLAND AND WALES.

*Camden Town.*—Quite a summer month. On the 1st there was hardly a tinge of green save on the grass; currants were fully formed on 12th; cherry in bloom on 21st, and everything in full leaf by the 30th. Max.  $81^{\circ}4$  on 27th.

*Linton Park.*—Remarkably dry, warm, and sunny; only one frosty night; and max. of  $84^{\circ}$  in shade on 27th. Cuckoo on 11th, earlier than ever known.

*Selborne.*—Aurora on 15th. Cuckoo on 17th. Max.  $71^{\circ}$  on 9th. Min.  $26^{\circ}$  on 2nd.

*Banbury.*—A very warm month, mean temp.  $51^{\circ}$ , or  $15^{\circ}$  above March. Hedges leafing on 8th; cuckoo on 17th.

*Wisbech.*—Max.  $74^{\circ}5$  on 27th. Min.  $31^{\circ}2$  on 2nd, on grass  $27^{\circ}$  on 29th. Swallow arriv on 17th. Lunar halo on 6th and 7th; solar halo, 26th.

*Culford.*—Very dry, and very warm month. Max.  $72^{\circ}$  17th, 22nd & 27th; min.  $28^{\circ}$ , 30th.

*Calne.*—Dry hot month; cloudless on 15 days. Max.  $77^{\circ}$  on 27th. Min.  $27^{\circ}7$  (on grass  $20^{\circ}8$ ) on 2nd. Sandmartens and chiffchaff arrived on 8th; swallow on 11th; marten, cuckoo, nightingale, and blackcap on 13th; swift on 30th.

*Goodamoor.*—Max. (in shade of trees)  $82^{\circ}$ , at 1.30 p.m. on 27th; min. (on grass)  $22^{\circ}$  on 2nd. Cuckoo on 13th; swallow on 16th. A very brilliant meteor in N. about 9 p.m. 12th.

*Taunton.*—Unusually dry and warm. Max.  $84^{\circ}$  on 27th; min.  $26^{\circ}$  on 4th. Swallow seen on 5th; cuckoo and nightingale heard early. Vegetation advancing rapidly, and asparagus cut from the open ground on 9th.

*Orleton.*—Very hot and brilliant month; the progress of vegetation singularly rapid. Max.  $74^{\circ}8$  on 27th; min.  $26^{\circ}7$  on 2nd.

*Wigston.*—Mean temperature ( $53^{\circ}$ ) higher, and rainfall less than in any April on record.

*W. Retford.*—Frost on four nights. Min.  $28^{\circ}$  on 2nd.

*Derby.*—In 21 years only 5 Aprils have been so dry.

*Manchester.*—Very warm, and a dry air, as three-fourths of the rain fell on two days.

*York.*—A heavy thunderstorm on 12th, with nearly an inch of rain in three hours.

*Arncliffe.*—A very dry month; much E. wind and sunshine.

*N. Shields.*—Fine dry month. Thunderstorm on 13th. Lunar halo on 7th; solar halo on 26th. Fog on 5 days. Pear in blossom on 29th.

*Scathwaite.*—A remarkably warm, dry, month; nevertheless (April 30th) snow still remains in patches on the mountains. At Tarnbank, max.  $75^{\circ}$  on 23rd.

*Haverfordwest.*—No record of so fine an April during my 17 years' observations. Max. above  $70^{\circ}$  on eight days, and on 28th,  $74^{\circ}5$ .

## SCOTLAND.

*Dumfries.*—Very dry; no rain after 19th. The close of the month very warm, though the mornings were frosty. Max. on 25th,  $78^{\circ}$ . Vegetation progressed rapidly, and the seed-time was most favourable. Swallow on 13th; cuckoo on 20th. Snow still (April 30th) on the Annandale hills.

*Auchendrane.*—Driest April for 9 years (excepting 1861= $\cdot61$  in.) A beautiful month.

*Otter House.*—A remarkably fine month. Crops and vegetation more forward than usual. Swallow and cuckoo a fortnight earlier than last year.

*Deanston.*—Max.  $67^{\circ}$  on 27th and 28th; min.  $26^{\circ}$  on 15th and 30th. A sunshiny month, with E. wind and some frost; on 30th ice  $\frac{1}{4}$ th of an inch thick. Beech, birch, plane, and horse chestnut show for leaf on 27th.

*Aberdeen.*—Driest April since 1842. Max.  $67^{\circ}5$  on 16th; min.  $29^{\circ}$  (on grass  $23^{\circ}$ ) on 30th. Aurora on 5 days. Fog on 9.

*Portree.*—Sunshiny month, with frosts at night. Solar halo on 13th. Cuckoo on 29th.

*Scourie.*—Fine month, with rainfall below the average. Vegetation far forward.

*Sandwick.*—A fine month, especially the latter part. Oats all sown; potatoes planting.

## IRELAND.

*Monkstown.*—Barometer very steady all the month. Of the whole rainfall  $1\cdot43$  in. fell in 4 days. Max.  $68^{\circ}$ ; min.  $36^{\circ}$ .

*Doo Castle.*—Thunderstorm with heavy rain on evening of 12th. Frost on 10th, 11th, 14th, and 15th. Month exceedingly fine.

*Owendoon.*—A very bright and favourable month.

*Waringstown.*—The driest April I ever remember, but grass grew well notwithstanding.

*Leekpatrick.*—Very fine month; no rain after 18th. Frost on grass on 9 nights. Min.  $24^{\circ}$ .

G. J. SYMONS.

136, Camden Road, May, 1865.

# SYMONS'S RAINFALL CIRCULAR.

## APRIL, 1865.

I TRUST both my observers and the contributors to my gossip corner, (who I am glad to say are increasing in number) will not disapprove of my postponing sundry notes on snow measurement, snow rollers, &c., until next month in order to insert the following statement, which, though only an abstract of the recent investigation, contains all the principal facts which have been deduced. I may add, that it is not my intention to make any further analysis until all the observations have been collected, when instead of reporting on the rainfall of 50 years, I hope to go safely back at least 150. Those, therefore, who want further information may expedite it by hunting up old observations and forwarding them to me.

### ON THE RAINFALL OF THE LAST HALF CENTURY.

As a rule I entertain a dislike to interim reports, based on partial information, not only because some attribute to *them* the status of finished deductions, but also because I think the writers liable to be inclined to make their final one harmonize with its precursor if possible. Hence I have hitherto confined myself to publishing details of the rainfall in each year, as it was completed, and been silent as to the fall previous to 1860, when the rainfall system was organized. So much interest is now taken, both in and out of Parliament, in questions of drainage, water supply, and the condition of our rivers, and I am so constantly urged to give some information on the point, that I feel rather as if I was acting the part of the dog in the manger, in gathering volume after volume of rainfall observations and yet deducing no results. My objection has been, that though much has been collected, as much (or more) remains to be done, and I have a great horror of incomplete work; but not having hitherto had the least assistance, and seeing no prospect of getting any except by paying clerks' salaries out of my own pocket, it will be some years before the inquiry can be completed. Under these circumstances, it seemed unreasonable to persist in my refusal of an interim investigation, and I have therefore drawn up the following statement.

My object has been to determine (1) whether the decreased annual fall of rain which has been observed at Greenwich, is a local variation, or whether it prevails generally throughout the country. Having ascertained that the present (temporary) investigation shows it to be general, (2) to ascertain in what districts the decrease is most marked.

Unfortunately, there are very few continuous records extending back more than about 30 years. A few, however, are available, and having carefully interpolated for one or two missing years, I have been able to form the following table from the mean of ten stations, one in each of the following counties:—Devon, Kent, Middlesex, Surrey, Essex, Lincoln, Lancashire, York, Edinburgh, and Argyll.

It may be well to add, that on carrying the examination back to 1800, the fall seems to have been *less* than it was about 1815, when the following more reliable table commences.

#### MEAN DEPTH OF RAIN AT TEN STATIONS, 1815—1864.

Year.	Depth.	Year.	Depth.	Year.	Depth.	Year.	Depth.	Year.	Depth.
1815	27·12	1825	26·57	1835	28·56	1845	27·87	1855	23·37
1816	29·26	1826	23·76	1836	33·49	1846	29·57	1856	25·89
1817	29·73	1827	29·53	1837	24·54	1847	25·80	1857	25·70
1818	30·34	1828	33·02	1838	27·11	1848	35·98	1858	22·79
1819	30·46	1829	28·70	1839	31·27	1849	28·51	1859	28·53
1820	24·53	1830	30·83	1840	24·67	1850	26·35	1860	33·34
1821	29·92	1831	32·28	1841	33·51	1851	26·70	1861	26·98
1822	26·63	1832	26·20	1842	25·53	1852	35·53	1862	30·37
1823	31·09	1833	29·71	1843	30·40	1853	27·38	1863	26·93
1824	30·91	1834	24·52	1844	23·72	1854	22·38	1864	22·11
Mean	28·999		28·512		28·280		28·607		26·601

From this table we find—that the annual fall in each ten years, from 1815 to 1854, was nearly equal, and always greater, than in the last ten years, 1855 to 1864—that out of the first 25 years no less than 16 were above the average, and in the second 25 years only 9 were above it. Moreover, we find that the ten years, 1845 to 1854, had a rainfall (28·61) nearly identical with the mean (28·60) of the preceding thirty years, 1815 to 1845. Hence it is evident that at any stations where observations have been made continuously from 1845 to 1864, we may take the ten years 1845 to 1854 as representing the forty years, 1815 to 1854,

and the difference between the first and last ten years as representing the decrease of rainfall at that place. The following table is formed in this manner; the stations follow each other in the order adopted in all my rainfall tables.

THE RAINFALL AT THE FOLLOWING STATIONS WAS LESS IN THE TEN YEARS 1855—1864 THAN IN THE TEN PRECEDING YEARS 1845—1854 BY THE UNDERMENTIONED QUANTITIES, GIVEN ALSO AS PER CENTAGES.

Div.	STATION.	Decrease.		Div.	STATION.	Decrease.	
		Amount.	Per cent.			Amount.	Per cent.
I.	Chiswick .....	1.30	6	IX.	Redmires .....	1.85	5
II.	Cobham .....	.35	2	„	Well Head .....	+ .33	+ 1
„	Greenwich .....	1.87	8	„	Leeds (Phil. Hall) ...	+ .16	+ 1
„	Chichester .....	1.22	5	„	„ (Eccup) .....	2.33	8
„	„ (W. Dean) .....	3.95	10	„	York .....	1.25	5
„	Ventnor .....	.65	2	„	Settle .....	4.13	10
III.	Althorp .....	1.72	8	„	Wheldrake .....	.81	3
IV.	Epping .....	4.00	16	X.	Seathwaite .....	+1.51	+ 1
„	Norwich .....	1.94	5	„	Keswick .....	3.73	6
„	Burnham .....	4.34	18	XIII.	Thurston .....	+ .66	+ 2
V.	Baverstock .....	2.55	8	„	Inveresk .....	+1.40	+ 5
„	Goodamoor .....	3.93	7	XIV.	Bothwell Castle .....	2.75	9
„	Exeter .....	1.85	7	„	Mansfield .....	1.71	4
„	Bradinch .....	3.34	9	„	Brisbane .....	1.24	2
„	Broadhembury .....	2.76	8	XV.	Castle Toward .....	2.50	5
„	Helstone .....	2.52	6	XVI.	Pittenweem .....	2.43	9
„	Truro .....	1.14	3	„	Deanston .....	.99	2
„	Swainswick .....	2.52	9	„	Stanley .....	3.57	11
VI.	Cirencester .....	2.46	8	„	Dundee (Hill Head) ..	2.36	7
„	Orleton .....	+ .06	0	XIX.	Sandwich .....	2.17	6
VII.	Wigston .....	2.82	10	XX.	Portlaw .....	.41	1
„	Boston .....	2.48	11	„	Killaloe .....	+ .41	+ 1
„	Derby .....	3.44	13	XXI.	Black Rock .....	.17	1
VIII.	Manchester .....	5.14	13	„	Dublin .....	1.38	5
„	Bolton .....	.53	1	„	Markree .....	3.19	8
„	„ (Belmont) ...	4.19	7				

I have not the slightest ambition to become an alarmist, and sincerely hope that the general decrease shown by this table is not a permanent alteration, but simply an oscillation or accidental phenomenon; and for the comfort of those who would suffer from a permanent decrease in our water supply, quote a few words from Professor Forbes' report to the British Association in 1832. He writes—"M. Arago has shown that the fall of rain at Paris has *not altered* for 130 years; and, in order to show that M. Flauguergue's idea of a gradual *increase* cannot be general, quotes the observations at Marseilles, where a *decrease* is shown in 50 years. At Milan an *increase* has been thought to be proved by 54 years' observations." It seems, from this, pretty evident that observations at any *one* spot even for half a century are not sufficient to determine the general law; but the present investigation being based on observations extending all over the British Isles, seem more reliable. At any rate, the following deductions naturally result from the foregoing tables, and for the present must be accepted as probably correct.

(1) That the fall of rain over the British Isles during the last ten years has been about a twentieth less than it had been previously. (2) That in the Eastern and East Midland Counties of England this decrease amounted to nearly one-fifth part, so that they have only had about 8 years' supply to meet 10 years' consumption. (3) That the deficiency seems to be increasing rather than otherwise.

I need not stop to point out the very important bearings of these facts on all questions of water supply, whether for the use of towns, canals, or mills but recommend them to the careful consideration of hydraulic engineers.

It is not my duty to suggest the cause of this decrease; perhaps some of our drainage engineers will be able to enlighten us. I confess I feel tantalized at being left to do all this work almost without support. Is it not too much to expect that I shall collect all the information and discuss it (*i. e.*, work eight hours a-day for two or three years), and finally enable others to make £ s. d. out of my materials.

# SYMONS'S RAINFALL CIRCULAR, MAY, 1865.

## OLD OBSERVATIONS OF RAINFALL, AND CLOSE OF RAIN MONTH.

DURING the past month circulars have been issued to all my observers, asking their aid in the collection of observations, however old or fragmentary, whenever and wherever (in the British Isles) made. Also, queries as to the date and hour of measurement, in order to settle the point raised in *British Rainfall*, 1864, p. 12. The discussion of these has been most kindly taken off my hands by Mr. Pigott, of Abington Pigotts, Royston, to whom I have handed over, and shall continue to forward, all the replies received from the observers. I felt from the first that *it* was an inquiry which might be well carried out by any observer who *could* spare the time, and *would* take the trouble incident to the classification of nearly a thousand replies. There seems every probability that Mr. Pigott will complete this investigation in ample time for all observers to know what is the practice of the majority, and to adopt it from and after January 1, 1866.

With respect to old observations, I cannot report so favourably as I expected—a very large number of the observers being unable to help at all, having no more observations than I previously possessed, and not being aware of any stations but those already in my annual pamphlets, while hardly anybody has referred me to printed tables. Some few persons have, however, taken much trouble, and been very successful in hunting up old records, among whom it is only fair to specially mention—Lady Bayning, Mr. Casartelli of Manchester, Mr. Davis of Derby, Mr. Herbert of Rocklands, Mr. Howard, of Tottenham, Mr. McLaren of Cardington, Rev. Professor Main of Oxford, Mr. Marshall of Leeds, Mr. S. Marshall of Kendal, Mr. Matthews of Ulverstone, Lord Northwick, Mr. Westwood of Dollar, and Mr. Wortham of Royston. In spite, however, of their efforts and my own, there are hundreds of years' observations still missing. For instance, Thurston, in Suffolk, was at work in 1834, for I have the fall (15'40); this gauge I saw in 1860, and the venerable owner said it had never been interrupted, and promised to send me a complete copy; illness has, however, I fear supervened, as I get no reply to my letters. Perhaps some of my Bury St. Edmunds observers will kindly look after the records. This, however, is only one instance; far oftener the observers have long since died, or moved to other parts of the country, and the returns are no one knows where—often in the columns of local newspapers, in the reports and libraries of provincial literary societies, but, unfortunately, too often destroyed. The largest collection is undoubtedly at the British Museum, and this monster library has already yielded some thousands of years; far more remains, but how long it will require to collect it depends not solely on myself and assistant, but also on the number of files of provincial papers searched by others, and on the search made by observers in the various libraries throughout the kingdom. Obviously, it would be waste of time to begin discussing the observations until they are reasonably complete, or until there seems little hope of rendering them more so, since few things would be more unsatisfactory than having it all to do over again in after years, because it had been hurried on before all the observations were gathered in.

## SNOW ROLLERS.

“Allow me to confirm the remarks of your Sandwich correspondent on all points, save one, and that is, the idea that the briny breeze has anything to do with them. I saw them here, 50 miles from the sea, on Feb. 19, and 20, 1865, but my lawn being dead level, the largest were perhaps the diameter of a cricket ball, and twice its length; in an adjacent sloping field, they were larger, but not more than half the size they are described at Sandwich. If schoolboys, in making a snow roller, go on too long in one direction, so as to elongate the roller, the inside will often fall out, without the roller falling to pieces; and I presume that the little hole in those at Sandwich was produced by the same mechanical action.”—Rev. ALBERT J. T. MORRIS, *Balwharrie House, Muthill, Crief.*

[The description was drawn up by myself, and I must bear the blame of the bit of false theory pointed out by Mr. Morris, if it be false. But although I find snow rollers have been noticed of a lesser size in two or three places, they certainly seem rare, and nowhere to attain the magnitude they do in the Orkneys.]

## MEASUREMENT OF SNOW.

I have had several notes on this subject, but unfortunately cannot print them all, so group the remarks. The prevailing impression seems to be that the equivalent should be about that which Mr. Harrison gave, namely, 1 to 5'4. If a sufficient number of really careful observations are sent in, to neutralize those published in the March circular, well and good;

I will raise the equivalent from that which I have hitherto recommended (*viz.*, 1 to 12) to anything *proved* to be more correct. Much care must, however, be taken in the experiments, which I hope many observers will make next winter. The Rev. J. Brooke, of Shiffnall, writes:—"Have all the observers melted their snow in a fair and proper way? for unless they have, grave errors may exist. I have been assured, (although I have never tried it,) that if you fill a saucepan with snow, and set it on the fire to melt, the bottom will be burnt out before the snow will melt into water, *i.e.*, all will evaporate; this of course is an extreme case, but evaporation must be entirely prevented." A second point is, to take the snow fairly *as it falls*, not to fill a vessel with the snow; obviously, by so doing, the snow is rendered more dense: the proper plan, I presume, is—previous to snow, lay down a piece of tin or board in an open place; after the fall, measure its vertical depth in two or three parts of the board; then invert the funnel of the rain-gauge on the board, taking care to hold it horizontal, press it firmly down till it touches the board, brush away the snow from the rest of the board, turn over funnel and board together, and, leaving the funnel covered by the board, place the funnel in its bottle, or other similar receptacle, and in a moderately warm room.

### CHARACTERISTICS OF 1864.

"I do not think your correspondents have noted two great characteristics which accompanied the drought of 1864. 1.—The absence of thunder and lightning in spite of the great heat. From May 1, to Sept. 1, I heard thunder (in the distance,) only three times,—May 15, and 20, and July 17. I did not observe a single flash of lightning during the entire four months. 2.—The absence of gales. In this district, only two gales occurred, *viz.*:—July 2, and August 23."—E. C. DAVEY, *Wantage*.

### WATER SUPPLY.

"As I find by your March Circular that you have a 'corner for gossip,' perhaps you will find the following formula useful. I have found it so, while attending a Committee of the House of Commons, on a question of water supply. If the drainage area is measured in square miles, (M) and the annual *available* rainfall be (*i*) inches, then the daily supply will be found by—

$$40,000 M i = \text{gallons in daily supply.}$$

(*This is in excess by only 8 per mille, which in practice is negligible.*)

EXAMPLE.—Drainage area ... = 21 square miles.

Available rainfall = 15 inches.

$$40,000 \times 21 \times 15 = 12,600,000 \text{ gallons } \text{per diem.}$$

If the area is given in acres (A), then—

$$\frac{1000 A i}{16} = \text{gallons in daily supply.}"$$

JOSEPH A. GALBRAITH.

### FLOODS ON THE TEVIOT.

"There has not been so great a flood in the Teviot for many years as on Monday night, the 29th of May, 1865."

#### RAINFALL DURING THE MONTH OF MAY.

Falnish.....	9·20	Lynnwood.....	5·80	Menslaws .....	6·30
Borthwick Brae .....	7·00	Kirkton.....	6·70	Linton Park Head .....	6·40
Goldielands .....	7·20	Langraw .....	6·28	Deadwater .....	7·00

ADAM ELLIOT, *Goldielands*.

### WHAT IS A RAINY DAY?

"This subject has been already somewhat fully discussed in your papers, and I have expressed my own opinion,—though it did not at the time appear to coincide with that of many of your correspondents,—that every day on which any appreciable quantity of rain falls, should be considered a rainy day. I considered the importance of that view to rest upon the ground that the climate of a locality was not to be judged of so much by the annual amount of rainfall as by the number of days on which it fell. On that ground I have also always thought it very desirable that the contents of the gauge should be registered, although it did not amount to ·01 of an inch, as such small returns show, more than anything else—or at any rate, next to the wet and dry bulb thermometer—the comparative dryness or dampness of the locality. The result of my observations last year shows this very forcibly, and how much drier that year really was than the mere rain returns showed. The average number of days for the preceding 9 years on which the gauge showed less than ·01 of an inch was 20, whereas last year it was only 3.—F. FULLER, *Rugby*.

G. J. S.

## RAINFALL, MAY, 1865.

STATIONS.		HEIGHT OF GAUGE.		DEPTH OF RAIN.			Days on which Rain, Snow, or Hail measured 0·01	
		Above Ground	Above Sea Level.	Total in the Month.	Greatest Fall in 24 hours.			
					Depth.	Date.		
[The Roman numerals denote the division of the Annual Tables to which each station belongs.]		ft.	in.	feet.	inches.	inches.		
ENGLAND AND WALES.	I. London (Camden Town) .....	0	6	100	3·40	·75	11	17
	II. Staplehurst (Linton Park) ...	0	6	200 ?	2·89	·65	10	11
	II. Selborne .....	4	0	500 ?	2·44	·50	8	14
	III. Banbury .....	7	0	345	1·50	·25	5	14
	III. Wisbech .....	0	6	10	1·63	·47	9	11
	IV. Bury St. Edmunds (Culford)	1	2	...	1·96	·83	11	9
	V. Calne .....	0	11	250	2·25	·49	9	16
	V. Plymouth (Goodamoor) .....	0	2	580	3·74	·68	9	16
	V. Taunton .....	1	6	38	3·24	·61	9	16
	VI. Tenbury (Orleton).....	0	9	200	3·57	·97	9	19
	VII. Leicester (Wigston) .....	0	6	220	3·00	1·05	23	14
	VII. West Retford.....	0	6	50	3·20	·48	13	16
	VII. Derby .....	5	0	180	2·63	·72	12	16
	VIII. Manchester.....	2	7	106	3·19	·61	11	19
	IX. York .....	0	6	50	1·91	·37	6	18
	IX. Skipton (Arncliffe) .....	3	0	750	5·72	1·20	4	15
	X. North Shields.....	1	0	124	4·11	·99	12	16
	X. Borrowdale (Seathwaite).....	1	0	422	16·72	6·41	30	19
	XI. Haverfordwest .....	2	0	60	5·75	1·64	4	18
	XI. Rhayader (Cefnfaes).....	2	0	880	5·29	...	...	23
	SCOTLAND.	XII. Dumfries.....	0	5	70	4·40	1·70	29
XIV. Ayr (Auchendrane House) ...		2	3	94	4·06	1·51	30	19
XV. Argyll (Otter House) .....		0	6	130	3·86	·73	30	8
XVI. Leven (Nookton) .....		0	6	80	2·99	1·15	29	20
XVI. Stirling (Deanston) .....		0	0	130	2·99	·59	30	17
XVII. Aberdeen .....		4	8	115	2·10	·71	30	16
XVIII. Inverness (Culloden).....		3	0	104	1·71	·44	30	11
XVIII. Portree, Isle of Skye .....		0	4	60	5·32	·90	19	14
XIX. Scourie, Sutherland .....		0	3	26	1·10	·20	28	10
XIX. Sandwick, Orkney .....		2	0	78	1·90	·69	28	13
IRELAND.	XX. Cork .....	5	0	50	4·36	·77	29	15
	XX. Waterford .....	4	0	60	4·54	1·23	30	15
	XX. Killaloe, Clare .....	5	0	128	5·52	1·77	29	15
	XXI. Portarlington.....	9	0	236	4·80	·96	29	17
	XXI. Monkstown, Dublin .....	0	6	90	3·77	·68	29	19
	XXII. Galway .....	6	0	25	4·19	·53	5	20
	XXII. Bunninnadden (Doo Castle)...	1	0	...	2·55	·72	5	18
	XXIII. Bawnboy (Owendoon) .....	1	3	218 ?	3·34	1·12	30	18
	XXIII. Waringstown, Down .....	0	4	191	3·80	1·30	30	21
	XXIII. Strabane (Leckpatrick) .....	0	5	260	2·91	·83	6	16

Difference of rainfall in May, 1865, from the mean of ten years 1850—1859.

Goodamoor	+	·09	Derby	+	1·06	Deanston	+	·76
Orleton	...	+ 1·52	York	.....	+ ·50	Sandwick	+	·57
Wigston	...	+ ·65	Seathwaite	+	10·50	Killaloe	+	2·92

(+ Above the mean; — Below.)



## REMARKS.

## ENGLAND AND WALES.

*Camden Town.*—Thunderstorms on 8th, 22nd, 23rd, and 24th. On the 23rd, 0·13 in. fell in five minutes, between 4.10 and 4.15 p.m. on 21st. Max. 81° on 21st.

*Linton Park.*—Fine month. Heavy rain 7th to 11th; which was very acceptable. Very hot on 21st and 23rd.

*Selborne.*—Thunderstorms on 5th, 9th, (severe about 3 a.m.), and 28th.

*Banbury.*—Thunder on 3 days.

*Wisbech.*—Thunderstorms on 9th—5 to 6 a.m.; 22nd, and 23rd, heavy, with vivid lightning, from 9 to 11 p.m. Gale on 30th; max. 11 lbs. Min. 31°·3 (on grass, 27°·2,) on 1st. Max. 82°·7 on 21st.

*Culford.*—Max. 79° on 21st and 23rd. Thunder on 8th and 23rd. Fine month.

*Calne.*—Violent thunderstorm on morning of 9th. Gale on night of 29th. Max. temp. 75°·3 on 21st and 22nd. Min. 34°·6 on 27th.

*Goodamoor.*—Max. 78°. Frost on grass on six mornings. At 1.30 a.m., on 9th, thunderstorm and high wind from S.E.

*Taunton.*—A fine growing month; warm showers, and no frost. Max. 78° on 22nd. thunderstorm on 9th.

*Orleton.*—Max. 75°·3 on 26th. Frost on grass on 4 nights. Heavy thunderstorms on 9th and 23rd; on the latter day, 0·50 in. fell in 15 minutes. Violent wind on 29th.

*Wigston.*—Heavy thunder on afternoon of 23rd; much damage by lightning and hail.

*York.*—Thunder on 5th, 22nd, and 28th. High wind on 30th.

*Arncliffe.*—Grass lands unusually luxuriant. Heavy thunderstorm on 22nd. Gale on morning of 30th.

*Shields.*—Fine month, with frequent heavy rains. Fog on 5th, 6th, and 24th. Thunder on 6th and 22nd. Lightning on 21st. Hail on 30th. Cuckoo heard, and sycamore in leaf on 8th. Swallow seen on 15th.

*Seathwaite.*—A wet month: the fall on the 30th has been only twice exceeded since the establishment of the gauge, viz.:—in November, 1846, when 6·62 in. was measured in 24 hours, and on Dec. 5, 1864, 6·47 in. At Tarnbank, the fall on the 30th was 2·50 in.

*Haverfordwest.*—Vegetation very rank, as the month has been colder than April, and the wettest May for 17 years.

*Cefnfaes.*—Violent thunderstorm, with rain, from midnight to 6 a.m. 23rd; sheep killed on the hills, and many trees blasted: direction, S.W. to N.E.

## SCOTLAND.

*Dumfries.*—Up to 19th, showery; warmer afterwards, with thunderstorms on 21st and 23rd. Max. 85° on 23rd. Excessive rain at the end of the month, especially on 29th.

*Auchendrane.*—Rainfall 1·26 in. above average of 9 years. None of the numerous thunderstorms have passed over here. Crops look well.

*Otter House.*—A fine month; rain about the average. No frost to injure the fruit trees.

*Deanston.*—Max 76° on 24th and 25th. Thunderstorm on 22nd. Snow on the hills on 10th.

*Aberdeen.*—Remarkably fine month. Max. 73°·3 on 25th. Distant thunderstorms on the 22nd and 23rd. Thunder on 28th. Aurora 14th.

*Culloden.*—Fine growing weather. Min. temp. 40°·5.

*Portree.*—Squally from 10th to 20th. Frost on 5 days. Max. 75° (in sun 121°) on 23rd. Grass growing rapidly, and looks well.

*Scourie.*—Fine month. Max. 76°. Snow and hail at 2 a.m. on 31st; the mountains white with snow, but it disappeared during the day.

*Sandwick.*—An uncommonly fine month. No aurora noted—the twilight being now too bright for it to be seen.

## IRELAND.

*Monkstown.*—Dense fog on 7th. Hail on 15th. Severe gale from N.N.W. on 30th.

*Doo Castle.*—Beginning of month very windy; afterwards sunshiny, with showers.

*Owendoon.*—Cold during greater part of the month, with high winds. Fine from 7th to 11th; and again from 21st to 25th. Thunderstorm on 30th.

*Waringstown.*—Variable weather, but favourable to vegetation; the crops progressing rapidly, and the grass crops the best for years. Remarkable fall of rain from 3 a.m. 29th, to 4 a.m. 30th, viz.:—1·55 in. Max. temp. 77°·5 on the 23rd.

*Leckpatrick.*—Rainfall very similar in May for consecutive 4 years, viz.:—in 1862=2·73; 1863,=2·84; 1864,=2·68; 1865,=2·91. Max. temp. 73° on 23rd.

G. J. SYMONS.

## RAINFALL, JUNE, 1865.

STATIONS.		HEIGHT OF GAUGE.		DEPTH OF RAIN.			Days on which Rain, Snow, or Hail measured 0·01	
		Above Ground	Above Sea Level.	Total in the Month.	Greatest Fall in 24 hours.			
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[The Roman numerals denote the division of the Annual Tables to which each station belongs.]								
		ft.	in.	feet.	inches.	inches.		
ENGLAND AND WALES.	I. London (Camden Town) .....	0	6	100	1·71	·65	2	4
	II. Staplehurst (Linton Park) ...	0	6	200 ?	1·17	·45	2	4
	II. Selborne .....	4	0	500 ?	2·35	1·37	1	4
	III. Banbury .....	7	0	345	3·69	1·18	2	6
	III. Wisbech .....	0	6	10	1·57	·94	2	5
	IV. Bury St. Edmunds (Culford)	1	2	...	1·20	·45	2	6
	V. Calne .....	0	11	250	1·51	·76	30	4
	V. Plymouth (Goodamoor) .....	0	2	580	1·26	·44	29	4
	V. Taunton .....	1	6	38	1·50	1·13	30	4
	VI. Tenbury (Orleton).....	0	9	200	2·05	·72	30	8
	VII. Leicester (Wigston) .....	0	6	220	2·29	1·15	2	5
	VII. West Retford.....	0	6	50	1·33	1·14	2	4
	VII. Derby .....	5	0	180	1·83	·96	2	4
	VIII. Manchester.....	2	7	106	·96	·30	1	4
	IX. York .....	0	6	50	1·09	·65	3	4
	IX. Skipton (Arncliffe) .....	3	0	750	·60	·45	2	4
	X. North Shields.....	1	0	124	·65	·59	2	3
	X. Borrowdale (Seathwaite).....	1	0	422	1·25	·40	24	6
	XI. Haverfordwest .....	2	0	60	1·33	·84	2	2
	XI. Rhayader (Cefnfaes).....	2	0	880	1·40	...	...	8
SCOTLAND.	XII. Dumfries .....	0	5	70	·60	·39	2	4
	XIV. Ayr (Auchendrane House) ...	2	3	94	1·28	·47	29	10
	XV. Argyll (Otter House) .....	0	6	130	1·54	·35	29	9
	XVI. Leven (Nookton) .....	0	6	80	·38	·29	2	4
	XVI. Stirling (Deanston) .....	0	0	130	·46	·22	6	4
	XVII. Aberdeen .....	4	8	115	1·08	·35	26	11
	XVIII. Inverness (Culloden).....	3	0	104	·08	·04	2	5
	XVIII. Portree, Isle of Skye .....	0	4	60	2·90	1·34	23	12
	XIX. Scourie, Sutherland .....	0	3	26	1·60	·20	13	...
	XIX. Sandwick, Orkney .....	2	0	78	1·42	·38	23	12
IRELAND.	XX. Cork .....	5	0	50	·66	·42	30	4
	XX. Waterford .....	4	0	60	·68	·47	29	4
	XX. Killaloe, Clare .....	5	0	128	2·19	1·25	28	5
	XXI. Portarlinton.....	9	0	236	1·06	·46	29	5
	XXI. Monkstown, Dublin .....	0	6	90	·56	·30	30	5
	XXII. Galway .....	6	0	25	1·26	·48	28	9
	XXII. Bunninnadden (Doo Castle)...	1	0	...	1·33	·84	28	7
	XXIII. Bawnboy (Owendoon) .....	1	3	218 ?	·69	·38	29	5
	XXIII. Waringstown, Down .....	0	4	191	·53	·21	29	6
	XXIII. Strabane (Leckpatrick) .....	0	5	260	·25	·09	24	6

Difference of rainfall in June, 1865, from the mean of ten years 1850—1859.

Goodamoor — 2·69	Derby .....	— ·68	Deanston — 2·70
Orleton ... — ·68	York .....	— 1·26	Sandwick — ·79
Wigston ... — ·29	Seathwaite — 6·63		Killaloe — 1·12

(+ Above the mean; — Below.)

## REMARKS.

## ENGLAND AND WALES.

*Camden Town.*—Fine month, with occasional heavy rains.

*Linton Park.*—Hot, dry month; no rain from 3rd to 29th, and very little thunder.

*Selborne.*—No rain from 3rd to 28th inclusive; 26 days without rain, longer than I ever knew before.

*Banbury.*—Max.  $82^{\circ}\cdot 8$ . Upwards of an inch of rain and hail fell in 25 minutes during a thunderstorm on the evening of the 15th.

*Wisbech.*—No rain from 3rd to 30th, except  $0\cdot 02$  on 24th. No thunderstorm. Max.  $85^{\circ}\cdot 9$  on 21st. Pastures very bare.

*Culford.*—Very dry month. Max.  $90^{\circ}$  on 23rd. Pastures all brown, and vegetation suffering much.

*Calne.*—Hot month. Max.  $86^{\circ}\cdot 6$  on 22nd. Distant thunderstorm on 15th.

*Goodamoor.*—Max.  $83^{\circ}$ . Ground much burnt up.

*Taunton.*—Remarkably dry month. Until 30th only  $0\cdot 37$  in. of rain falling in 3 days. Heat excessive; and on 22nd,  $94^{\circ}$  in shade.

*Orleton.*—A very hot, dry, and sunny month. Only  $0\cdot 03$  in. of rain fell between the 3rd and 28th. On 29th, heavy rain all day. No thunder or lightning. Max.  $86^{\circ}\cdot 8$  on 21st.

*Wigston.*—Nearly all the rain fell on the nights of 2nd and 29th. No rain at all from 3rd to 29th. Max.  $91^{\circ}$  on 21st.

*W. Retford.*—N.N.E. and E. winds very prevalent. No rain from 3rd to 24th.

*Derby.*—Excepting the trivial rainfall of  $0\cdot 02$  in. on the 24th, we had no rain between the 3rd and 30th.

*Manchester.*—Unusually dry, and accompanied by excessive heat. Max. in sun  $135^{\circ}$  on 22nd.

*Arncliffe.*—Unusually dry.

*N. Shields.*—Very fine and dry. Grass cut on 20th.

*Seathwaite.*—A month of extreme, and almost unparalleled dryness at this station.

*Haverfordwest.*—Very fine month and very dry; only two wet days—the 2nd and 30th. Heat very great; highest  $83^{\circ}\cdot 5$  on 21st. Owing to the drought, turnip crop in many places a complete failure. Grass crops very good; corn looking on the whole, well.

*Cefnfaes.*—Heavy rain on 2nd and 29th. Max. temp.  $82^{\circ}$ .

## SCOTLAND.

*Dumfries.*—Very dry and hot. Rainfall  $2\cdot 42$  in. under the average. Max.  $89^{\circ}\cdot 5$  (in sun,  $110^{\circ}$ ) on 15th.

*Auchendrane House.*—Dry month; rain  $2\cdot 68$  in. below the average of the last 9 years.

*Otter House.*—A splendid month; less rain than for many years, and none from 6th to 23rd. Crops all look well.

*Deanston.*—Max.  $84^{\circ}$  on 17th. Much sunshine, but no thunderstorm. Pastures much burnt up. Grain crops very short in straw, and oats likely to be deficient in yield.

*Aberdeen.*—A dry, warm month.  $82^{\circ}$  on 8th. Thunder and lightning at 1 a.m. on 6th.

*Culloden.*—The driest June for 26 years; with very hot sunshine. Pastures and crops much scorched.

*Portree.*—The finest month of June for 30 years; warm and sunshiny, with heavy dews. Frost on 1st and 4th. Max.  $75^{\circ}$  (in sun,  $121^{\circ}$ ) on 21st. Crops have a splendid appearance.

*Scourie.*—Very fine and warm throughout the month. Rain much below the average. Mist on 6th, 12th, and 26th. Crops making rapid progress.

*Sandwick.*—Max.  $65^{\circ}$ . Generally dry and fine until 23rd. Mean temperature slightly below the average.

## IRELAND.

*Killaloe.*—The driest June since 1847, in which the total rainfall was only  $1\cdot 28$  in.

*Monkstown.*—No rain from 3rd to 24th. Temp. very high. Max.  $82^{\circ}\cdot 3$  on 8th, and  $84^{\circ}$  on 22nd; the highest previous reading (since 1858) having been  $77^{\circ}\cdot 8$ . Max. in sun,  $116^{\circ}$  on 8th.

*Doo Castle.*—Very dry, hot month. Solar halo on 14th. Thunder on 29th. Crops have suffered much from long drought, 17 successive days having been without rain. Max. in sun,  $125^{\circ}$  on 19th.

*Waringstown.*—Very fine, dry, and intensely hot. Gardens suffering much from want of rain, but most farm crops looking well.

*Leckpatrick.*—Extraordinary drought; never was so dry a month since I have registered rainfall. Max.  $81^{\circ}$  on 21st.

G. J. SYMONS.

# SYMONS'S RAINFALL CIRCULAR,

## JUNE, 1865.

### OLD OBSERVATIONS OF RAINFALL, AND CLOSE OF RAIN MONTH.

I regret to find that many of my correspondents have neglected to reply to the circular on these subjects recently issued, and take this opportunity of calling upon them to do so without further delay, for three reasons; first, because until the replies are all received, Mr. Pigott cannot complete his self-imposed task; secondly, because I really must have the old observations gathered up; and lastly, I think the observers should recollect that inasmuch as I have considered the subject of the circular worth the trouble of issuing and directing, and the cost of printing and postage, (about £7,) it is not unreasonable to complain of their remaining unanswered, and the issue of second applications thereby necessitated.

### RAINFALL OF THE LAST HALF CENTURY.

"The table of rainfall for the last half century which you have compiled, is very interesting, and points the way to useful reflection and generalization as to the cause of the decreasing annual rainfall. I lean very strongly to the belief that the large extent of arterial drainage effected over England and Scotland by agriculturists within the last 30 years, forms a very material element in bringing about a drier atmosphere. I know many districts of country where the climate has been vastly improved by drainage operations executed on a large scale, and where special crops are now grown to perfection, which could not have existed on the undrained soil, owing to the cold and damp. Your statistics will direct men's minds to this subject, and sooner or later, force more attention to the means within our reach for improving our climate, and making it more healthy. A more extended system of arterial drainage would not only benefit the agriculturist, but it would form a really national source of prosperity. This is a fact proved in another way.—We have only to look at the benefits realized from the sanitary improvements of towns and villages to be at once satisfied that by the removal of every predisposing miasmatic element, we eradicate disease, or at all events greatly control it, and lessen mortality to a very considerable extent. What therefore is done for the citizen, can be done for vegetable and animal life; and in effecting this change for the lower physiology, we elevate and improve the higher—to wit, that of man in his rural capacity."—JOHN CRAWFORD, *House of Tongue, June 9th, 1865.*

### CLASSIFICATION OF DUMBARTONSHIRE STATIONS.

"A glance at any ordinary county map of Dumbartonshire will show you that the district naturally divides itself into Loch Lomond (N. S. and W.) and Loch Long (N. and E.) Thus your entries for 1864 would be given more accurately, and perhaps more intelligibly with reference to locality, and the difference between Loch Long (salt water,) and Loch Lomond (fresh water,) as follows:—

DUMBARTONSHIRE, Dumbarton, (Cardross.)  
 Loch Lomond, (Balloch Castle.)  
 „ (Stuckgown.)  
 „ (Ardovirlich.)  
 Loch Long, (Arrochar.)  
 „ (Arddaroch.)

The circumstance of Arroquhar being the *post* address for Stuckgown as well as for the whole district around, has naturally led to the present form of return, but I think that any person who knows the locality will agree with me that the above is a better classification, and I do not suppose that any of your observers and contributors in the district could have the slightest objection to the alteration."—D. AINSWORTH, *Stuckgown, Arroquhar.*

[I am much obliged to Captain Ainsworth for this suggestion, as the above arrangement brings out the relative position of the stations very clearly. I regret it is impossible to adopt it in my annual tables for the following reason:—(which applies equally, if not more strongly, to many other counties.)—In classifying any considerable number of facts, the classification must proceed on fixed, invariable rules; otherwise, as in the arrangement of these stations, difficulties of identification will arise. It is for this reason that I have always arranged the stations as strictly as possible in the order of their latitude, feeling that provided my arrangements proved the identity of the station, they might by others be grouped in accordance with the physical configuration of the country. I willingly acknowledge, as I have done before, that my plan is far from satisfactory, but at present do not see any alteration, which, invariably applied, will be an improvement.]

# SYMONS'S RAINFALL CIRCULAR,

## JULY, 1865.

### THUNDERSTORM IN HERTFORDSHIRE, JULY 6TH.

"I was travelling by the Great Northern train which left King's Cross for Shefford at 7 p.m. on the 6th of July, when I witnessed the violent thunderstorm about which I spoke to you. Storms had been coasting about Hitchin all day, and the heat both there and in London was intense. As we neared Hatfield Station at 7.30 p.m., I observed a dense thundercloud apparently resting on the ground, about half-a-mile to the left of the station; it was of that peculiar coppery colour one so often sees, and on its surface, light, fleecy clouds were whirling about in various directions. I asked a porter if there had been any thunder? He replied, 'No, only the darkness.' Just as we left the station, (7.32) a few large drops of rain fell, and the cloud seemed to follow us; when a mile or two out of the station, I saw, still on the left of the line, a large elm tree violently agitated, its leaves and branches whirled off in the air, which soon became full of leaves and small twigs. This whirlwind followed us, treating other trees in the same way, crossed the line behind the train, and passing over a piece of ornamental water in a gentleman's park, it took up a quantity of the water, and the clouds (always very low) descending, joined it, and formed a regular waterspout. We then shot into a tunnel, and on emerging, were in the thick of the storm; lightning incessant, and a deluge of rain. I distinctly saw the streams of lightning between me and the adjoining hedges; while in the intervals, the darkness was extreme, and the clouds whirling past the windows in every direction. On arriving at Hitchin the rails were under water. Just before reaching Shefford, one very vivid flash set a farm in flames in an instant. I was told that four others were fired at the same moment. You will have gathered from what I have said that the storm passed from S.W. to N.E. Further light is thrown on its path by a statement in the Bedford paper a few days afterwards that a waterspout had torn up the rails on the Bedford and Cambridge railway. This would lie in the track of the water-spout I and other passengers saw formed at Welwyn. The thunder and lightning continued all the evening in N.E.—M. F. WARD, *Castle House, Calne*."

Although thunderstorms of greater or less violence are reported on this day from many stations, it appears that the full fury was only felt in a very narrow track. The observers in the district report as follows:—

"The storm you refer to on July 6th was not felt much in this place—(*Little Berkhamstead*). As far as I could judge, it seemed to pass round by Hatfield and Welwyn. I think I heard of its being very severe at Buntingford. The amount of rain measured by me next morning, July 7th, at 9 a.m., was only 0.38 in.—R. P. DAVIES, *Park Gate, Hertford*."

"We had two storms on the 6th; the first, from 7 to 8 a.m., arising from the south, and passing in an easterly direction. The rainfall at 9 a.m. = 0.500 in. This fell entirely during the storm. The second storm was of longer duration, viz.:—from 6.30 to 8.30 p.m. It arose from N.W. and passed in a S.E. direction. Heavy rain followed; rainfall on morning of 7th being = 0.707 in. I was not at home during the storm in the evening, but I report from what our bailiff told me. The rainfall is from my own observation. Where I was—that is at a friend's house, about five miles distant, S.E.—a large elm was struck about 7.15 p.m., and at a distance of only 20 yards from the house—the storm then being so close that the report was almost simultaneous with the flash.—G. PIGOTT, *Abington Pigotts, Royston*."

"The thunderstorm of July 6th was singularly severe, but at the same time, remarkably free from rain; none falling until about the end of the storm, and then in by no means large quantities. There had been a slight thunderstorm in the morning, and all day the sky was charged with thunder-clouds; but about 8 p.m. the grand storm came on, and lasted nearly an hour, during which time, the lightning was most frequent, and the peals of thunder all but continuous—occurring and rolling in all directions—so that the reverberation of one peal had hardly ceased before a fresh clap became audible. The lightning, too, was of peculiar tints; sometimes bright rose-colour, sometimes violet, and sometimes of shades varying between those extremes; and on several occasions *two consecutive flashes appeared to travel over precisely the same path*, a phenomenon which I could only account for by assuming that in those cases it was the *edge of a very dense and rugged cloud, illuminated from behind* by two successive flashes, which was seen, and not the flashes themselves. The storm lasted nearly an hour, and several buildings and stacks on various sides of Royston were struck by the electric fluid, although no damage occurred at Royston itself. As I have said before, the rain was not excessive. At 10 a.m. on the 6th, I registered 0.798 in., and at the same hour on the 7th, .0737 in.; but of this latter quantity only a small part fell whilst the great storm raged on

## RAINFALL, JULY, 1865.

STATIONS.		HEIGHT OF GAUGE.		DEPTH OF RAIN.			Days on which Rain, Snow, or Hail measured 0·1	
		Above Ground	Above Sea Level.	Total in the Month.	Greatest Fall in 24 hours.			
					Depth.	Date		
[The Roman numerals denote the division of the Annual Tables to which each station belongs.]								
		ft.	in.	feet.	inches.	inches.		
ENGLAND AND WALES.	I. London (Camden Town) .....	0	6	100	1·91	·65	7	15
	II. Staplehurst (Linton Park) ...	0	6	200 ?	3·48	1·22	23	13
	II. Selborne .....	4	0	500 ?	2·77	·43	1&19	10
	III. Banbury .....	7	0	345	3·66	1·30	7	15
	III. Wisbech .....	0	6	10	4·44	1·65	7	14
	IV. Bury St. Edmunds (Culford)	1	2	...	4·10	1·18	18	10
	V. Calne .....	0	11	250	2·89	·59	7	12
	V. Plymouth (Goodamoor) .....	0	2	580	4·46	·85	13	16
	V. Taunton .....	1	6	38	2·34	·90	6	12
	VI. Tenbury (Orleton).....	0	9	200	2·68	·50	7	14
	VII. Leicester (Wigston) .....	0	6	220	3·25	1·61	6	15
	VII. West Retford .....	0	6	50	2·77	1·47	9	10
	VII. Derby .....	5	0	180	2·68	·97	7	14
	VIII. Manchester.....	2	7	106	3·00	·89	8	13
	IX. York .....	0	6	50	1·82	·55	20	16
	IX. Skipton (Arncliffe) .....	3	0	750	2·79	·51	19	16
	X. North Shields.....	1	0	124	1·93	·58	7	7
	X. Borrowdale (Seathwaite).....	1	0	422	7·08	1·06	13	21
	XI. Haverfordwest .....	2	0	60	3·80	1·00	14	14
	XI. Rhayader (Cefnfaes).....	2	0	880	4·00	...	...	20
SCOTLAND.	XII. Dumfries.....	0	5	70	2·05	·35	6	14
	XIV. Ayr (Auchendrane House) ...	2	3	94	1·92	·33	19	17
	XV. Argyll (Otter House) .....	0	6	130	3·74	·49	11	13
	XVI. Leven (Nookton) .....	0	6	80	4·04	·83	10	15
	XVI. Stirling (Deanston) .....	0	0	130	3·21	·93	8	16
	XVII. Aberdeen .....	4	8	115	2·76	1·58	8	16
	XVIII. Inverness (Culloden).....	3	0	104	5·03	2·93	8	20
	XVIII. Portree, Isle of Skye .....	0	4	60	6·13	1·54	16	14
	XIX. Scourie, Sutherland .....	0	3	26	2·10	·40	15	7
	XIX. Sandwick, Orkney .....	2	0	78	1·55	·38	30	14
IRELAND.	XX. Cork .....	5	0	50	3·35	1·27	5	14
	XX. Waterford .....	4	0	60	3·62	·70	19	14
	XX. Killaloe, Clare .....	5	0	128	3·54	·70	8	22
	XXI. Portarlinton.....	9	0	236	5·48	1·55	9	21
	XXI. Monkstown, Dublin .....	0	6	90	3·08	·58	31	17
	XXII. Galway .....	6	0	25	4·60	1·40	6	23
	XXII. Bunninnadden (Doo Castle)...	1	0	...	3·99	·44	3	22
	XXIII. Bawnboy (Owendoon) .....	1	3	218 ?	3·41	·66	19	25
	XXIII. Waringstown, Down .....	0	4	191	1·28	·23	31	14
	XXIII. Strabane (Leckpatrick) .....	0	5	260	1·75	·33	5	22

Difference of rainfall in June, 1865, from the mean of ten years 1850—1859.

Goodamoor	+	·90	Derby .....	—	·08	Deanston	—	·45
Orleton ...	—	·21	York .....	—	·85	Sandwick	—	1·16
Wigston ...	+	·37	Seathwaite	—	2·47	Killaloe	+	·14

(+ Above the mean; — Below.)

## REMARKS.

## ENGLAND AND WALES.

*Camden Town.*—Hottest July since 1859. Max.  $85^{\circ}3$  on 27th. Max. above 80 on 10 days.  
*Linton Park.*—Fine growing month, the rain being very acceptable; less hot than June, and very little thunder. Winds chiefly S.W. & S.  
*Selborne.*—Thunder on 6th and 12th. Much fog towards the end of the month.  
*Banbury.*—Thunderstorms on the 6th, 7th, 8th, and 9th. More than 2.25 in. of rain fell on the 6th, from 4 a.m. to 8 p.m..  
*Wisbech.*—Thunderstorms on 6th, 7th, 8th, 9th, 10th, 11th, and 17th. The greatest fall of rain during one month for several years past. Max.  $83^{\circ}8$  on 4th.  
*Culford.*—Thunderstorms on 6th, 7th, 8th, 9th, 10th, 11th, 17th, and 24th. A fine growing month. Max. temp.  $87^{\circ}0$  on 5th. Min.  $43^{\circ}$  on 1st.  
*Calne.*—Heavy thunderstorms on 6th, 7th, and 8th. Distant storms, with thunder and lightning frequently during the month. Max.  $81^{\circ}$  on 24th, and 25th. Min.  $43^{\circ}1$  on 2nd.  
*Orleton.*—Hot and dry from the 20th to the 31st. Remainder of month cool and showery. Distant thunder frequent. Heavy thundershowers on the 8th and 19th. Max.  $81^{\circ}5$  on 23rd.  
*Wigston.*—Max.  $89^{\circ}$  on 26th. Mean temp. much above the average. Barometer steady.  
*Manchester.*—On the 8th about six-tenths fell in 20 minutes.  
*Arncliffe.*—Unusually hot till the last three days.  
*N. Shields.*—Thunder on the 10th. Very fine and dry month.  
*Haverfordwest.*—Very fine month. The first 20 days showery, principally at night; at times very heavy falls. Heat steady, but at no time excessive; averaging  $70^{\circ}$  in the shade. Corn crops looking very well. Splendid meteor seen on night of 21st, at 9 p.m., passing from S.W. to N.E.

## SCOTLAND.

*Dumfries.*—The first half of month showery; the latter half very dry. Mean temp.  $61^{\circ}2$ . Harvest advanced rapidly after the middle of the month. Barley cutting commenced on the 20th; Oat cutting on 31st.  
*Auchendrane House.*—Rainfall .96 below the average of the last 9 years. The mean number of rainy days for July for the same period is 16. Evaporation active, but much moisture returned to the soil by heavy dews. Thunder from the south in the afternoon of 7th. Max.  $75^{\circ}$  on 3rd, 4th, 6th, and 22nd. Max. in sun,  $123^{\circ}$  on 26th.  
*Otter House.*—Rain about the average, but little after the 18th. Thunder on 4th and 7th, without lightning. This month colder than June. The crops betoken an early harvest.  
*Deanston.*—Fine seasonable weather during the month. Thunder and some lightning on 23th, and distant thunder on 20th. Max.  $76^{\circ}$  on 23rd and 24th. Min.  $37^{\circ}$  on 1st and 2nd.  
*Aberdeen.*—Of the total rainfall, 1.77 in. fell between 3 a.m. of 7th, and 3 a.m. of 8th; the remainder falling chiefly during the nights. Max.  $76^{\circ}$  on 5th. Thunder on 17th. Thunder and lightning on 13th. Aurora on 29th.  
*Culloden.*—Of the very heavy rainfall on the 8th. 2.16 in. fell between 8.10 a.m. and 8.14 p.m. on that day!; the wind being from the N.E. to E.N.E., and veering to E.S.E. There had been thunder on the previous day, followed by a thick fog at night.  
*Portree.*—Gales on the 14th, 15th, and 27th, from S.S.W. to W. Thunder and lightning on 6th and 15th. Above 1 in. of rain fell on 7th. The late rains have retarded the hay-making; the crop is abundant. All the crops look well. Frost on the 20th.  
*Scourie.*—Remarkably fine weather, with great heat throughout the month. Rain fell freely on the 7th, 13th, 14th, and 15th. Occasional showers afterwards, but total fall much below the average for many years. Crops look well, and promise good returns. Thunder on 6th and 20th, but no lightning.  
*Sandwick.*—The month warm and pleasant. Crops advancing well.

## IRELAND.

*Monkstown.*—7th to 23rd, rain almost every day. Gale on 15th. Max. temp.  $77^{\circ}$  on 2nd.  
*Doo Castle.*—This month converse of last—June being remarkable for continued drought—this month for continual rains till the 19th, after which, only .13 in. fell. Thunder on 5th and 1th. Hail on 10th.  
*Owendoon.*—Very favourable weather for farmers. Turnips recovering from effects of late drought. Other crops promise well.  
*Waringstown.*—July has been a remarkably fine and warm month; the rain falling principally during the night.  
*Leekpatrick.*—Fine month. Great want of rain. Oats very short, and turnip crop bad, owing to the drought. Max.  $75^{\circ}$  on 4th, and 23rd.

G. J. SYMONS.

the 6th, and then only at the *end* of the storm. On the whole, I never remember so violent a storm. My total rainfall for July is 3·539 in.—HALE WORTHAM, *Royston*."

"We had a fine, steady rain all night. Till 5 a.m. 0·50 fell only ( $\frac{1}{2}$  in.). The rain was pretty even all round here.—W. S. SLINN, *Amphill*."

"Violent thunderstorms from 4 a.m. to 8 a.m., and from 7 p.m. to 8 p.m. Wind E. by S. Rain in first storm ·57 in. ; in the second ·70 in.—W. DENNE, *Stotfold, Baldock*."

"We had the heaviest fall of rain I have ever recorded, on the 6th of July. The day's fall was 1·95 ; but 1·55 fell in about an-hour-and-a-half. The lightning was almost continuous, though the thunder was not so loud as I have before heard it.—J. BAILEY DENTON, *Stevenage*."

The reply from Hitchin has unfortunately not been received ; but the fact that two such experienced observers as Mr. Bailey Denton and Mr. Wortham class it as exceeding, the one in rainfall, and the other in electrical violence, any that they had previously observed, justifies me in devoting this space to its history. It will be seen from the July table that the fall on the 6th was also above an inch at both Banbury and Wisbech.

### HEAVY RAIN AT BALLATER, JULY 7TH.

"Since July came in, there has been a considerable rain ; up to this day (10th), 2·54 in., of which quantity 2·10 in. fell in the course of Friday, the 7th. It is the largest fall recorded since I commenced observations in 1861."—J. W. PATERSON, *Ballater, Aberdeen*.

### THUNDERSTORM AT BURY ST. EDMUNDS, JULY 17TH.

"We had such a fall of rain on July 17th, and so much more rain than at Culford—4 miles off—that I must send you word. The storm lasted from 2 to 4 p.m., and the rainfall measured next morning at the Botanic Gardens here was 2·36 in.

E. SKEPPER, *Bury St. Edmunds*."

### LIVERPOOL WATER SUPPLY.

"The Liverpool Corporation Reservoirs at Rivington having been at a seriously low ebb during the past few months, owing to the drought, the Town Council yesterday resolved to apply to Parliament for powers to purchase all the compensation water at present supplied from the various reservoirs, and to form a large new reservoir, at a total estimated cost of £130,000."—*Times*, Aug. 9th.

With reference to the above, it may be interesting to say, that the register at Bolton-le-Moors does not show any very great deficiency ; the mean (1850-9) fall from Jan. 1st to July 31st is 22·96 in., and the fall has been 18·67 in. I have not examined the case closely, but fancy it is increased consumption rather than decreased supply which involves this proposed expenditure.

### RAINFALL AT BOLTON-LE-MOORS.

	1864	Mean, 1850-9	Difference.
	inches.	inches.	
January .....	4·20	4·11	+ 0·09
February .....	4·18	3·64	+ ·54
March .....	1·74	2·61	— ·87
April .....	1·32	2·55	— 1·23
May .....	3·21	2·26	+ ·95
June .....	·63	3·78	— 3·15
July .....	3·39	4·01	— ·62
Total .....	18·67	22·96	— 4·29

### MONTHLY RAINFALL, 1862 AND 1863.

The British Association have kindly placed at my disposal, for distribution among the observers, 500 copies of my last report to the Association, to which is appended the monthly depth of rain at a large number of stations. I shall be happy to supply copies (*gratis*) on application, as soon as I receive them from the printers.



# SYMONS'S RAINFALL CIRCULAR,

## AUGUST, 1865.

### ADDITIONAL NOTES ON THE STORM OF JULY 6TH.

**HITCHIN.**—"Your letter of 8th August followed me on to the Continent, and not having access to my books, I could not reply to it, much to my regret. We certainly did have a storm on the 6th of July, such as the traditional 'oldest inhabitant' could not recollect. In about twenty minutes, or from that to half-an-hour, we registered 1'42 in. rain; it came up from the S.E., and was, no doubt, the supplement of a heavy storm early on the same day. The lightning was incessant, but although many trees, &c., were struck, no serious damage was done. An unfinished house close to mine, the only unfinished one in the street (curiously enough) was struck. On the following Sunday, another heavy thunderstorm took place, almost as severe as on the previous Thursday, in which 1'08 in. of rain fell. On both occasions, our little town was devastated by a flood which drove many of the poor people in the lower parts of the town on to their first floors. I am sorry to have been necessarily so behindhand with my information."—W. LUCAS.

**STROUD.**—"Between 5 a.m. on July 6th and 9 a.m. on July 7th (28 hours) just two inches of rain fell here, of which '50 in. fell in twenty minutes."—J. BATEMAN.

**DINGWALL, N.B.**—It may be worth mentioning, that on the 7th, there fell between about 10 a.m. and 10 p.m., 1'24 in. of rain, by far the heaviest fall this year. This has been a great relief to the district, as the season has hitherto been very dry—indeed, it is said to be the driest since 1826. The total rainfall for June was 0'26 in."—JOHN BOYD.

### HEAVY RAINFALL ON AUGUST 23RD.

Of course no rain storm can be fully traced until I receive the returns from all the observers at the end of the year; but that is no reason why the materials already received should not be collated, so I append them.

Middlesex.	Camden Town.....	1'01	from 9 a.m. to 9 p.m. '90; thence to midnight, '11.
"	Bryanstone Square...	1'11	
Surry .....	Dunsfold .....	2'50	{ rain fell from 6.30 a.m. to 5.30 p.m., 23rd, and amounted to 2'18 in.—H. J. B. HANCOCK.
"	Bagshot, Duke's Hill	2'02	
Kent .....	Linton Park .....	1'21	
Sussex ...	Chilgrove .....	2'30	? if some more did not run over.
"	Pevensay .....	'94	
Hants.....	Selborne .....	1'42	from 7.30 a.m. to 4 p.m. (8½ hours) 1'57 in. fell.
			{ 9 a.m. to noon, '31; noon to 4 p.m., '10; at 4, wind veered suddenly, and the opposing currents produced
Berks .....	Wantage .....	'92	{ such sheets of water as I never saw before. In five or six minutes, '45 in. fell; fall after to 5 p.m., '06 in. —E. C. DAVEY.
Oxford ...	Banbury .....	'58	{ rained from 10 a.m. 23rd continuously, and most of the night.
Herts .....	Berkhamstead .....	1'06	
Cambridge	Wisbech .....	'93	
Essex .....	Dunmow .....	1'10	
Suffolk ...	Culford .....	1'24	
Wilts .....	Calne .....	'78	
Somerset..	Taunton .....	'72	violent storm of rain between 11 a.m. and noon.
Worcester.	Orleton .....	'92	
Clare .....	Killaloe.....	'50	
Galway ...	Galway .....	1'32	

### CUMBERLAND AND NORTH WALES GAUGES.

It is satisfactory to know that both these sets of gauges are going on without mischance. The new gauge at the Styne has (like its predecessor some years ago) beaten Seathwaite hollow. The returns up to July 31st are—Seathwaite, 60'58 in.; Styne, 77'27 in. In July, the return from the Royal Victoria Hotel, Llanberis, Snowdon, also exceeded that from Seathwaite, but ordinarily the Welsh stations fall very far short of the Cumberland ones.

## RAINFALL, AUGUST, 1865.

STATIONS.		HEIGHT OF GAUGE.		DEPTH OF RAIN.			Days on which Rain, Snow, or Hail measured 0·01	
		Above Ground	Above Sea Level.	Total in the Month.	Greatest Fall in 24 hours.			
					Depth.	Date		
[The Roman numerals denote the division of the Annual Tables to which each station belongs.]								
		ft.	in.	feet.	inches.	inches.		
ENGLAND AND WALES.	I. London (Camden Town) .....	0	6	100	4·97	1·01	24	17
	II. Staplehurst (Linton Park) ...	0	6	200 ?	5·26	1·21	23	17
	II. Selborne .....	4	0	500 ?	5·01	1·42	24	17
	III. Banbury .....	7	0	345	3·79	·58	24	16
	III. Wisbech .....	0	6	10	4·25	·93	24	16
	IV. Bury St. Edmunds (Culford) ..	1	2	...	3·94	1·24	24	16
	V. Calne .....	0	11	250	4·17	·78	24	15
	V. Plymouth (Goodamoor) .....	0	2	580	7·36	1·25	11	16
	V. Taunton .....	1	6	38	4·77	·72	24	20
	VI. Tenbury (Orleton).....	0	9	200	4·80	·92	24	20
	VII. Leicester (Wigston) .....	0	6	220	3·54	1·47	24	17
	VII. West Retford .....	0	6	50	2·56	·46	1	15
	VII. Derby .....	5	0	180	3·25	·66	1	18
	VIII. Manchester.....	2	7	106	3·84	·71	17	16
	IX. York .....	0	6	50	5·28	·95	3	19
	IX. Skipton (Arncliffe) .....	3	0	750	6·87	1·14	18	16
	X. North Shields .....	1	0	124	2·82	·42	11	21
	X. Borrowdale (Seathwaite).....	1	0	422	13·06	1·50	11	21
	SCOTLAND.	XI. Haverfordwest .....	2	0	60	5·15	·90	13
XI. Rhayader (Cefnfaes).....		2	0	880	4·64	...	...	18
XII. Dumfries.....		0	5	70	3·80	·60	10	17
XIV. Ayr (Auchendrane House) ...		2	3	94	4·82	·99	18	22
XV. Argyll (Otter House) .....		0	6	130	5·96	1·75	28	22
XVI. Leven (Nookton) .....		0	6	80	...	...	...	...
XVI. Stirling (Deanston) .....		0	0	130	5·21	·85	28	24
XVII. Aberdeen .....		4	8	115	3·79	1·14	28	21
XVIII. Inverness (Culloden).....		3	0	104	3·37	·47	16	17
XVIII. Portree, Isle of Skye .....		0	4	60	6·35	1·80	27	18
IRELAND.	XIX. Scourie, Sutherland .....	0	3	26	3·40	·40	2	14
	XIX. Sandwick, Orkney .....	2	0	78	2·66	·54	12	14
	XX. Cork .....	5	0	50	4·39	1·55	24	19
	XX. Waterford .....	4	0	60	5·08	1·00	11	19
	XX. Killaloe, Clare .....	5	0	128	4·34	·50	23	25
	XXI. Portarlinton.....	9	0	236	5·09	·80	17	20
	XXI. Monkstown, Dublin .....	0	6	90	4·52	1·13	10	20
	XXII. Galway .....	6	0	25	4·91	1·32	23	21
	XXII. Bunninnadden (Doo Castle)...	1	0	...	3·85	·81	27	22
	XXIII. Bawnboy (Owendoon) .....	1	3	218 ?	5·13	·76	14	25
XXIII. Waringstown, Down .....	0	4	191	3·16	·55	21	17	
XXIII. Strabane (Leckpatrick) .....	0	5	260	5·37	1·29	28	21	

Difference of rainfall in August, 1865, from the mean of ten years 1850—1859.

Goodamoor	+ 3·46	Derby	+ ·27	Deanston	+ 1·45
Orleton	+ 1·83	York	+ 2·35	Sandwick	+ ·09
Wigston	+ ·90	Seathwaite	+ 2·13	Killaloe	+ ·90

(+ Above the mean; — Below.)

## REMARKS.

## ENGLAND AND WALES.

*Camden Town.*—Thunderstorms on 3rd, 10th, and 24th. Lightning on 12th.

*Linton.*—Frequent heavy rains; very little thunder; harvest secured without much damage.

*Selborne.*—Thunder on 2nd, 10th, 11th, 14th, and 24th. Aurora on 12th, 24th, 26th, and 28th, that on 24th, particularly bright, but not coruscating.

*Banbury.*—Thunderstorms on 16th. Harvest (except beans) mostly finished by 31st.

*Wisbech.*—Thunderstorm on 16th; thunder and heavy rain on 24th. Solar halo at 9 a.m. 20th; rain same day at 6 p.m. Harvest frequently interrupted. Root crops look well.

*Culford.*—A very rainy month, and unfavourable for harvest; much corn in bad condition. Thunder on 2nd, 3rd, 7th, and 10th.

*Calne.*—A good deal of thunder, with lightning in the evenings. During the rainfall of 23rd, there was distant thunder, and after the rain ceased, lightning all the evening.

*Goodamoor.*—A very unpropitious month for harvest; the corn round here carried in a very damp state.

*Taunton.*—Violent storm of wind and rain between 11 a.m. and noon on 23rd.

*Orleton.*—Temperature below the average; frequent heavy falls of rain; several thunderstorms, especially on 12th, 16th, and 24th.

*York.*—Thunder on 16th.

*N. Shields.*—Very wet and cloudy month; thunderstorms on 11th and 13th; lightning on 1st and 2nd; thunder on 6th, 17th, and 22nd; fog on 8th and 22nd.

*Seathwaite.*—Cloudy and unsettled weather throughout; rain above an inch on six days. Rainfall in July was 7·08 in., or 2·47 in. below the average; it fell on 21 days, the heaviest fall being 1·06 in. on 13th, the only day on which it exceeded 1 inch.

*Haverfordwest.*—Weather wet and variable. Grain good, but straw short. Thunderstorm on the 12th, the only one experienced here for the last two years.

*Cefnfaes.*—Max. in shade, 74°.

## SCOTLAND.

*Dumfries.*—First week fine; then nine wet days (rainfall, 3·55), afterwards dry, with occasional showers; during this period harvest proceeded rapidly, and by the close of the month a large extent was secured. Crops an average.

*Auchendrane House.*—Rainfall 1·03 in. above the average (9 years), the mean number for the same period being ·17. Frequent dews and some fog, southerly winds prevailing. Max. 75° on 7th.

*Otter House.*—Rain above the average, and crops partially damaged thereby; reaping, however, progresses rapidly when rain permits. Potatoo blight general; no rinderpest or cattle disease in this district. Thunderstorm on 11th; meteor on 17th.

*Deanston.*—Wet month, and only about 130 hours of sunshine. Distant thunder on 14th.

*Aberdeen.*—Dull, damp month, and unfavourable to the crops. The heavy rain which fell from 2 p.m. 27th, to 8 p.m. 28th, and gave a total of 1·75 in. (mean of two gauges), at Ashley Place, must either have been very local, or confined to the coast, since the Dee actually fell on the morning of 28th, though it had been raining heavily for 17 hours previously, and on 29th it only rose for a short time about 18 inches.

*Portree.*—Crops look well, but potatoes are blighted. Hay not yet secured. Continuous rain from 9 a.m. 27th, to 3 p.m. 28th.

*Scourie.*—Very fine during the month, with genial showers. Thunder on 14th, but no lightning. Fog on 7th, 18th, 19th, and 27th. Crops good; harvest very early.

*Sandwick.*—Thunder and lightning on 12th, and thunder on 19th. Aurora on 24th. Solar and lunar halos on 8th.

## IRELAND.

*Killaloe.*—In 1864, rain fell between Jan. 1st and Aug. 31st, on 121 days, and amounted to 17·06 inches; in 1865, the days are 147, and the amount 30·75.

*Monkstown.*—A wet month, though nearly half (2·09) of the rain fell on the 10th and 11th. Heavy hail shower at noon on 2nd. Aurora on 26th, remainder of sky being very dark.

*Galway.*—Erratum—Total rainfall in July should have been 4·60 in., not 4·42 in.

*Doo Castle.*—Fine month on the whole, in spite of a good deal of rain.

*Owendoon.*—Heavy shower of hail on 2nd, and a great thunderstorm on 23rd. In this week, the potatoe leaves were burnt up, and in some descriptions the disease has appeared.

*Waringstown.*—Variable; last 10 days fine and hot; water still very scarce and ground dry.

*Leckpatrick.*—Very wet month. Rain of great use to turnip crop and for flax steeping. More rain measured on 28th than on any day since June, 1863.

G. J. SYMONS.

136, Camden Road, N. W., September, 1865.

# SYMONS'S RAINFALL CIRCULAR,

## SEPTEMBER, 1865.

[The month has been remarkable in so many ways, and the notes of the regular contributors to this circular are so full and interesting, that I am sure my duty plainly is to put aside all other matters and give the observers' notes in full, instead of confining them to the usual limits.]

### REMARKS.

#### ENGLAND AND WALES.

*Camden Town.*—A hot, dry month; scarcely any rain except that measured on the 21st. The max. in shade rose to  $85^{\circ}$  on the 8th and 16th, and on ten days to, or above  $80^{\circ}$ ; while during September in the previous seven years it only reached  $80^{\circ}$  four times. It exceeded  $70^{\circ}$  every day but 5. The mean maximum was  $76^{\circ}\cdot4$ , or  $9^{\circ}$  above the previous seven years.

*Linton Park.*—A remarkably dry, hot month; only one slight shower, apparently the tail end of a thunderstorm: the other day registered was merely a collection of dew after a dense fog. It is somewhat remarkable that September, 1865, has not only been the driest month on record, but has also been one of the hottest. The first 20 days, taking day and night temperature together, present a greater amount of heat than any similar number of consecutive days for many years, excepting the last 20 days of July, 1857, which exhibit a slight excess.

*Selborne.*—Upon the whole the driest month I have ever recorded; only about a fifth of an inch of rain having fallen. Much fog in the mornings after the middle of the month. Max.  $76^{\circ}$  on 16th.

*Wisbech.*—A very fine, warm month. Max.  $84^{\circ}$  on 8th;—the hottest day of the summer. Solar halo on 16th.

*Culford.*—This has been the driest and hottest September ever remembered here. Max.  $80^{\circ}$  on 8th. Mean temp.  $60^{\circ}\cdot8$ , or  $2^{\circ}$  above the preceding month of August.

*Calne.*—Hot, dry month. Cloudless on 17 days. Mean amount of cloud  $2\cdot0$ . No thunder. Foggy on 10 mornings. Heavy dews. Mean ozone  $2\cdot0$ . Light winds from S.W. and W. till 14th; easterly after that date. Shooting stars in great numbers on 14th and 23rd. Laburnum tree in bloom on 23rd. Max.  $83^{\circ}\cdot5$  on 15th; max. in sun,  $117^{\circ}$  on 12th. Mean max.  $74^{\circ}\cdot6$ ; mean max. in sun,  $109^{\circ}$ . Mean temp.  $62^{\circ}\cdot4$ .

*Goodmoor.*—Max.  $82^{\circ}$ . The smallest amount of rain I have ever recorded for any month, though I have now kept a rain gauge for 31 years. Rain wanted for turnips, grass, rivers, and wells.

*Taunton.*—No rain has fallen since August 25th; consequently there is none to register for this month. The temperature has ranged very high, being  $85^{\circ}$  on the 27th. With the exception of the 8th and 9th, the barometer has been constantly above 30in. It has been an exceptional month for fine weather.

*Orleton.*—The hottest, driest, and most brilliant month ever remembered. Max.  $81^{\circ}\cdot3$  on 15th, and above  $70^{\circ}$  on 21 days. Barometer high and steady. Great wind on 10th.

*Wigston.*—Mean temp. of month  $62^{\circ}\cdot7$ ; mean max.  $76^{\circ}\cdot4$ ; which is far above any record I have for 30 years. The quantity of rain was less than in any month for 30 years, except March, 1840, when the fall was only  $\cdot19$ in.

*W. Retford.*—Remarkably dry month. Rainfall  $2\cdot48$ in. below the mean of 7 years. Average temp. very high. Max.  $86^{\circ}$  on 8th. Immense number of small flies and midges.

*Derby.*—Rainfall only one sixteenth of the average, and less than in any month for the 21 years during which continuous records have been kept in Derby; the only approach to it was February, 1858,  $=0\cdot20$ . The high temperature is equally remarkable. The mean (21 years) max. is  $63^{\circ}\cdot2$ , but 1865 gave  $72^{\circ}\cdot9$ . The highest point previously reached in September was  $76^{\circ}$ ; this year it has twice reached  $82^{\circ}$ .

*Manchester.*—Rainfall for August should be  $3\cdot84$ , not  $3\cdot41$  as sent to you. Average (71 years) rainfall for September,  $3\cdot24$ in. An extraordinarily fine month, with a temperature more like July than September.

*York.*—A remarkably fine, hot month. Mean temp.  $60^{\circ}\cdot1$ . Mean bar. ( $32^{\circ}$  and sea level)  $30\cdot141$ ; only 3 times observed below 30, and once as high as  $30\cdot58$ in.

*Arncliffe.*—The finest and driest September I have ever registered. Max.  $68^{\circ}$ .

*N Shields.*—Unusually warm and sunny month. Fog on 6 days. Solar halo on 17th.

## RAINFALL, SEPTEMBER, 1865.

STATIONS.		HEIGHT OF GAUGE.		DEPTH OF RAIN.			Days on which Rain, Snow, or Hail measured 0·01	
		Above Ground	Above Sea Level.	Total in the Month.	Greatest Fall in 24 hours.			
					Depth.	Date		
[The Roman numerals denote the division of the Annual Tables to which each station belongs.]								
		ft.	in.	feet.	inches.	inches.		
ENGLAND AND WALES.	I. London (Camden Town) .....	0	6	100	·56	·42	21	4
	II. Staplehurst (Linton Park) ...	0	6	200 ?	·08	·07	9	2
	II. Selborne .....	4	0	500 ?	·21	·16	21	2
	III. Banbury .....	7	0	345	·29	·23	21	3
	III. Wisbech .....	0	6	10	·37	·35	21	2
	IV. Bury St. Edmunds (Culford)	1	2	...	·04	·04	22	1
	V. Calne .....	0	11	250	·12	·07	12	2
	V. Plymouth (Goodamoor) .....	0	2	580	·08	·06	6	2
	V. Taunton .....	1	6	38	·00	·00	...	0
	VI. Tenbury (Orleton).....	0	9	200	·11	·08	21	2
	VII. Leicester (Wigston) .....	0	6	220	·22	·16	21	2
	VII. West Retford .....	0	6	50	·16	·11	21	2
	VII. Derby .....	5	0	180	·15	·09	21	3
	VIII. Manchester.....	2	7	106	·67	·43	9	2
	IX. York .....	0	6	50	·23	·12	21	3
	IX. Skipton (Arneliffe) .....	3	0	750	1·63	1·25	10	6
	X. North Shields.....	1	0	124	·56	·22	20	3
	X. Borrowdale (Seathwaite).....	1	0	422	7·19	6·00	10	8
	XI. Haverfordwest .....	2	0	60	·43	·35	9	4
	XI. Rhayader (Cefnfaes).....	2	0	880	·25	...	...	6
SCOTLAND.	XII. Dumfries.....	0	5	70	·65	·40	9	4
	XIV. Ayr (Auchendrane House) ...	2	3	94	1·16	·45	10	7
	XV. Otter House, Argyll.....	0	6	130	1·35	·35	10	8
	XVI. Leven (Nookton) .....	0	6	80	·64	·28	1	4
	XVI. Stirling (Deanston) .....	0	0	130	1·15	·55	10	6
	XVII. Aberdeen .....	4	8	115	·71	·23	10	8
	XVIII. Inverness (Culloden).....	3	0	104	·42	·20	2	7
	XVIII. Portree, Isle of Skye .....	0	4	60	8·77	2·52	6	17
	XIX. Scourie, Sutherland .....	0	3	26	3·20	·60	5	12
	XIX. Sandwick, Orkney .....	2	0	78	2·28	·47	10	13
IRELAND.	XX. Cork .....	5	0	50	...	...	...	...
	XX. Waterford .....	4	0	60	·55	·35	10	10
	XX. Killaloe, Clare .....	5	0	128	1·10	·60	9	8
	XXI. Portarlinton.....	9	0	236	·59	·19	10	7
	XXI. Monkstown, Dublin .....	0	6	90	·06	·02	10&12	4
	XXII. Galway .....	6	0	25	2·21	·84	9	10
	XXII. Bunninnadden (Doo Castle)...	1	0	...	·61	·20	9	9
	XXIII. Bawnboy (Owendoon) .....	1	3	218 ?	1·25	·69	10	15
	XXIII. Waringstown, Down .....	0	4	191	·38	·20	10	4
	XXIII. Strabane (Leekpatrick) .....	0	5	260	·73	·24	10	8

Difference of rainfall in September, 1865, from the mean of ten years 1850—1859.

Goodamoor	— 4·08	Derby	— 2·07	Deanston	— 1·34
Orleton	— 2·47	York	— 1·85	Sandwick	— ·58
Wigston	— 1·96	Seathwaite	— 2·17	Killaloe	— 1·76

(+ Above the mean; — Below.)

*Seathwaite*.—A month of most splendid weather. The tremendous rainfall on the 10th raised the lakes of Bassenthwaite and Derwent-water two feet. At Tarnbank, max.  $81^{\circ}3$ .

*Haverfordwest*.—Remarkable month for absence of rain and uniform high temperature. For the first 3 weeks temperature averaged  $70^{\circ}$  and upwards by day, and  $60^{\circ}$  the lowest at night. Second week close and foggy. The driest and finest September on my record.

*Cefnfaes*.—An extraordinarily hot and dry month. Max.  $82^{\circ}$ .

#### SCOTLAND.

*Dumfries*.—Weather remarkably fine. Rain only on 1st, 9th, 10th, and 20th. Mean temp.  $5^{\circ}9$  above the average (5 years), and rainfall 2.5in. below the average of the same period. Rainfall for 9 months of this year is only 17.9 inches or 7.33 below the average of previous 15 years. Glorious weather for the close of harvest.

*Auchendrane House*.—No September for the last 9 years has been so dry. Rainfall 3.05 below the monthly mean. None fell after 21st. The dew during 8 rainless nights amounted to 0.045. Rivers and springs very low. On 26th, 27th, and 28th, flies excessively numerous.

*Otter House*.—Rain below the average, and less than for many years past. Latter half of the month like a second summer. Corn all carried by 15th.

*Nookton*.—Windy till 10th; afterwards fine. Mean temp.  $57^{\circ}8$ , being unusually high.

*Deanston*.—Very fine and mild, with fogs on some mornings of the latter part of the month. Max.  $76^{\circ}8$  on 15th.

*Aberdeen*.—A month remarkable for heat and dryness. Mean temp. only  $0^{\circ}6$  below July (higher than that of any other month in the year), and  $5^{\circ}3$  above the mean for September in 9 previous years. Rainfall less by 1.99in. than the mean of the same period, and 1.66in. below the mean of 36 years. Aurora on 10th, 12th, 16th, 17th, 18th, 22nd, 23rd, 26th, 27th, & 28th.

*Culloden*.—Fine, hot, sunny weather throughout. Rainfall less than in any September since 1848.

*Portree*.—Very wet and stormy till 14th; fine afterwards. Most of the corn is carried in fine condition, and above the average, but half the potatoes are rotten. Gales on 4th, 5th, and 8th. Solar halo on 4th, at 5 p.m. Mean temp.  $58^{\circ}6$ .

*Scourie*.—Good harvest weather; oats and barley all secured. Potatoe disease making progress, but cattle healthy. Aurora on 15th. Fog on 5th, 10th, and 11th.

*Sandwick*.—Remarkably fine month. Rainfall below the average, and temp.  $3^{\circ}2$  above it. Gale on 10th, between 1 and 5 p.m., about 40 miles per hour. Solar halo on 4th. Aurora on 8 nights.

#### IRELAND.

*Waterford*.—I believe we really had rain only on 2 days; and that the entries of .01 or .02 on the other 8 days were the product of dew.

*Killaloe*.—No rain after the 20th. Very heavy dews in the beginning, and till near the end of the month.

*Monkstown*.—I have carefully examined the registry of rainfall kept at Phoenix Park Observatory (O.S.O.), about 9 miles hence, since 1837, and find the dryness of the present month without precedent. From August 24th to the present moment (October 4th), a period of 41 days, only 0.09in. has fallen. The nearest approaches to this drought (taken from the O. S. O. published registry,) are :

1840, Feb. 18 to March 26—36 days= $0.07$ in.

1842, April 2 to May 2—30 days= $0.08$ in.

1844, May 10 to June 4—25 days= $0.01$ in.

1848, April 24 to May 17—23 days= $0.03$ in.

The dews during the month were extremely heavy, mists and fogs prevalent, and the temperature was high, the max. being  $75^{\circ}8$ . Barometer high throughout.

*Doo Castle*.—Finest September ever remembered. My turnips have suffered much from the drought, and the crop I am sure will be fully one-fourth less from this cause.

*Owendoon*.—The month was remarkable for great heat and excessive dews. It is said there has not been such fine harvest weather since 1798.

*Waringstown*.—The hot and dry weather reported everywhere [save at Portree—G. J. S.] this month prevailed here throughout. Max.  $82^{\circ}$  on 15th, and  $80^{\circ}$  on 27th, on which day there was  $14^{\circ}$  difference between dry and wet bulb thermometer.

*Leckpatrick*.—Very dry month; no rain for a fortnight; the mouth of the rain gauge covered for that time with a cobweb, which remained undisturbed by one drop of rain. Max.  $77^{\circ}$ .

G. J. SYMONS.

136, Camden Road, N.W., October, 1865.

# SYMONS'S RAINFALL CIRCULAR,

## OCTOBER, 1865.

### RAINFALL IN OCTOBER AT ADDITIONAL STATIONS.

The rainfall of October having (locally) been as remarkably in excess as that of September was in defect, I append a short table, giving the total at some of the stations where the excess was most remarkable :—

DIV.	COUNTY.	STATIONS.	Total inches.	DIV.	COUNTY.	STATION.	Total inches.
II.	Sussex ...	Battle .....	11·88	II.	Kent .....	Canterbury .....	8·68
II.	„	Uckfield .....	11·23	II.	„	Linton Park .....	8·14
II.	Hants ...	Ryde .....	11·11	II.	„	Sevenoaks, River Hd.	8·04
II.	Sussex ...	Hurstpierpoint .....	10·59	II.	Hants ...	Selborne .....	7·95
II.	„	Frant .....	10·57	II.	„	Southampton .....	7·71
II.	„	Crawley .....	10·23	IV.	Suffolk ...	Culford .....	7·22
II.	„	Chilgrove .....	9·95	III.	Bedford...	Sutton Park .....	6·95
II.	Kent .....	Hythe, Horton Park	9·79	I.	Middlesex	Camden Town .....	6·20
V.	Dorset ...	Portland .....	9·60	VII.	Leicester..	Owston .....	6·00
II.	Kent .....	Hythe .....	9·42	I.	Middlesex	Bryanstone Square...	5·81
II.	Sussex ...	Hastings, High Wick	9·35	IV.	Norfolk...	Hillington .....	5·72
II.	„	Pevensey .....	9·34				

The fall on the 19th was excessive ; the maximum was recorded in the Isle of Wight, at Sandown, as 3·70, and Ryde as 3·03, while several stations had more than 2 inches, and most of the south-eastern ones seem to have had between 1 and 2 inches. It need hardly be added that this was nearly 5 times as much as they had in the whole of September.

The year, though still far from complete, seems now to be sufficiently so to form some idea of the probable relation it will hold to its precursors, and especially to 1864. I have, therefore, drawn up the following table comparing the fall up to October 31, 1865, with the fall of the whole year 1864 :—

DIV.	STATIONS.	10 Mths. 1865.	Year 1864.	DIV.	STATIONS.	10 Mths. 1865.	Year 1864.
I.	Camden Town ...	26·15	17·02	XI.	Haverfordwest ...	38·66	40·06
II.	Linton Park .....	30·51	21·25	XI.	Cefnfaes .....	32·65	37·02
II.	Selborne .....	29·76	23·71	XII.	Dumfries .....	22·25	30·64
III.	Banbury .....	24·15	20·22	XIV.	Auchendrane .....	25·71	36·81
III.	Wisbech .....	24·36	16·00	XV.	Otter House .....	37·60	56·14
IV.	Culford .....	25·44	16·44	XVI.	Deanston .....	25·84	41·90
V.	Calne .....	23·38	20·17	XVIII.	Culloden .....	20·26	24·76
V.	Goodamoor .....	45·41	38·29	XVIII.	Portree .....	59·14	89·54
V.	Taunton .....	26·80	21·00	XIX.	Sandwich .....	28·35	33·28
VI.	Orleton .....	25·50	21·79	XX.	Waterford .....	28·80	34·46
VII.	Wigston .....	23·35	17·60	XX.	Killaloe .....	36·87	35·64
VII.	W. Retford .....	20·80	23·48	XXI.	Portarlinton .....	37·23	42·45
VII.	Derby .....	21·81	21·74	XXI.	Monkstown .....	24·76	29·03
VIII.	Manchester .....	24·89	30·64	XXII.	Galway .....	40·23	58·07
IX.	York .....	20·07	21·13	XXII.	Doo Castle .....	30·17	31·89
IX.	Arncliffe .....	38·57	45·78	XXIII.	Owendoon .....	33·78	36·78
X.	N. Shields .....	23·01	26·77	XXIII.	Waringstown .....	22·60	25·44
X.	Seathwaite .....	92·61	134·67	XXIII.	Leckpatrick .....	29·54	34·99

From the above it is evident that at all stations S. of a line running from Swansea to Lincoln, the rainfall in ten months of 1865 exceeds the fall in the whole of 1864, and (with the solitary exception of Killaloe, on the west of Ireland,) at all stations N. of that line, the reverse has been the case.

## RAINFALL, OCTOBER, 1865.

STATIONS.		HEIGHT OF GAUGE.		DEPTH OF RAIN.			Days on which Rain, Snow, or Hail measured 0·01	
		Above Ground	Above Sea Level.	Total in the Month.	Greatest Fall in 24 hours.			
					Depth.	Date		
[The Roman numerals denote the division of the Annual Tables to which each station belongs.]								
		ft.	in.	feet.	inches.	inches.		
ENGLAND AND WALES.	I. London (Camden Town) .....	0	6	100	6·20	1·05	23	21
	II. Staplehurst (Linton Park) ...	0	6	200 ?	8·14	1·27	19	19
	II. Selborne .....	4	0	500 ?	7·95	1·45	19	20
	III. Banbury .....	7	0	345	4·56	·87	23	21
	III. Wisbech .....	0	6	10	5·50	1·37	10	19
	IV. Bury St. Edmunds (Culford)	1	2	...	7·22	2·48	10	19
	V. Calne .....	0	11	250	5·37	1·30	17	18
	V. Plymouth (Goodamoor) .....	0	2	580	10·36	1·10	29	18
	V. Taunton .....	1	6	38	6·41	1·45	11	21
	VI. Tenbury (Orleton).....	0	9	200	4·84	1·29	12	21
	VII. Leicester (Wigston) .....	0	6	220	4·88	1·13	12	17
	VII. West Retford.....	0	6	50	4·76	1·31	10	17
	VII. Derby .....	5	0	180	5·20	2·12	10	18
	VIII. Manchester.....	2	7	106	5·01	2·26	9	20
	IX. York .....	0	6	50	4·43	·89	11	16
	IX. Skipton (Arneliffe) .....	3	0	750	6·92	1·57	27	15
	X. North Shields.....	1	0	124	6·61	·96	9	17
	X. Borrowdale (Seathwaite).....	1	0	422	11·78	2·10	25	17
	XI. Haverfordwest .....	2	0	60	7·91	2·00	26	22
	XI. Rhayader (Cefnfaes).....	2	0	880	7·00	...	...	22
SCOTLAND.	XII. Dumfries.....	0	5	70	4·35	·90	16	13
	XIV. Ayr (Auchendrane House) ...	2	3	94	3·10	·72	30	11
	XV. Otter House, Argyll.....	0	6	130	5·91	1·40	27	14
	XVI. Leven (Nookton) .....	0	6	80	5·12	1·20	9	15
	XVI. Stirling (Deanston) .....	0	0	130	4·23	·97	27	14
	XVII. Aberdeen .....	4	8	115	3·15	·91	27	17
	XVIII. Inverness (Culloden).....	3	0	104	2·28	·54	30	14
	XVIII. Portree, Isle of Skye .....	0	4	60	5·97	1·14	27	16
	XIX. Scourie, Sutherland .....	0	3	26	3·90	1·00	24	9
	XIX. Sandwick, Orkney .....	2	0	78	4·85	1·27	30	20
IRELAND.	XX. Cork .....	5	0	50	3·29	·74	30	11
	XX. Waterford .....	4	0	60	4·07	1·10	29	17
	XX. Killaloe, Clare .....	5	0	128	5·05	1·68	28	18
	XXI. Portarlington.....	9	0	236	5·83	·71	26	16
	XXI. Monkstown, Dublin .....	0	6	90	4·12	·96	13	21
	XXII. Galway .....	6	0	25	5·91	1·04	29	19
	XXII. Bunninnadden (Doo Castle)...	1	0	...	5·61	1·00	28	22
	XXIII. Bawnboy (Owendoon) .....	1	3	218 ?	5·63	1·53	12	19
	XXIII. Waringstown, Down .....	0	4	191	4·91	1·35	12	18
	XXIII. Strabane (Leckpatrick) .....	0	5	260	5·30	1·00	29	22

Difference of rainfall in October, 1865, from the mean of ten years 1850—1859.

Goodamoor	+	4·40		Derby .....	+	2·91		Deanston	+	·70
Orleton ...	+	1·56		York .....	+	1·34		Sandwick	+	·07
Wigston ...	+	1·95		Seathwaite	—	·68		Killaloe	+	1·64

(+ Above the mean; — Below.)



## REMARKS.

## ENGLAND AND WALES.

*Camden Town.*—The most rainy month for 8 years. Lightning on 29th.

*Linton Park, Staplehurst.*—The first 8 days like September—hot and dry; the remainder, especially the last fortnight, very wet, 6·75in. falling during that time; 1·21in. also falling on 31st. The past month has been wetter than any single month since November, 1852, but the ground being dry its effects have been less apparent than on some other occasions. The wettest days have been with N. or N.E. winds, which are generally considered dry ones, but when rain does come in that direction it falls in large quantities.

*Selborne.*—Max. 69° on 3rd. Min. 28°·5 on 31st. On the 19th, a remarkably fine aurora, so bright that several persons thought that it was a great fire at a distance; at one time it threw up two beautiful diverging plumes of light. There was also a pale aurora on the 20th. Thunder on the 29th, and a few flakes of snow on the 31st.

*Banbury.*—Lightning on 7th, 26th, and 29th.

*Wisbech.*—First ten days fine. Lightning on 9th. Thunder on 11th and 17th. Gale (12lbs.) on 25th. Aurora on 19th and 26th. Fog on several days. Squally at the end of the month.

*Culford.*—The greatest fall in 24 hours; and during the month the largest amount of rain, I have yet had to register. Max. 67° on 1st. Min. 31° on 28th. Thunder 9th. High wind 25th.

*Calne.*—1·30in. fell in 5 hours on the 17th. A very stormy month. Swallows and Martins still here. Spanish chesnuts ripened in great numbers. Jerusalem artichokes in bloom. Max. 77° on 4th. Min. 30° on 16th.

*Goodamoor.*—The rainfall of this month (the largest I have ever recorded, except October, 1862,) has made up for the want of it in September; we are now full to the brim.

*Taunton.*—A great fall in temperature after the 10th. Max. 80° on 3rd. Min. 32° on 13th. Thunderstorm at 4·30 a.m. on 25th.

*Orleton.*—Very warm and bright till the 8th, then wet and stormy. Thunderstorm on the 9th, with violent rain. Great darkness at noon, with heavy rain on the 11th. Aurora on the 19th, at 8 p.m. Lightning on night of 29th. Max. 69°·8 on 3rd. Min. 29°·3 on 21st.

*West Retford.*—Rainfall 2·37 in. above the average of last 7 years. The drought continued from the 29th of August to 9th of October, during which time only ·16in. fell. ·01 of moisture was collected on the 4th and 6th of October from dew. Frost on 6 nights.

*Manchester.*—Temperature greatly above the average during the first half of the month, and considerably below it in the latter half.

*York.*—Aurora on 19th and 26th.

*Arncliffe.*—Violent storm on Sunday, the 24th, with snow and hail. Max. 61°. Min. 30°.

*North Shields.*—Very wet month, and stormy at times. Hail and aurora on 19th. Very perfect auroral arch on night of 26th.

*Seathwaite.*—On 5 days, more than an inch of rain. Magnificent weather during the first 10 days, rest of the month cold and damp. Max. at Tarnbank, 76°·7, a temperature never before recorded in October in the county of Cumberland.

*Haverfordwest.*—Fine until 6th. Splendid aurora on 19th and 20th. Heavy wind and rain on 25th; 2·00in. fell in about 14 hours. The rest of the month stormy and very wet. Much lightning at night, during which time the heaviest fall took place. Partial eclipse of moon well seen on the night of the 4th. Heavy gale from 29th to 31st; much damage to shipping.

*Cefnfaes.*—Max. 69°. Min. 33°. Much thunder. Snow on hills on 27th and 28th.

## SCOTLAND.

*Dumfries.*—Weather fine, with slight frosts till the 8th, which, and two following days were wet; fine to 16th, which, with 17th and 18th very stormy; and fine, with frosts, till the 24th; and the month closed with storm and rain. Snow on the hills on 28th. Rain was much needed to replenish the springs. Min. 25°·5 on 23rd.

*Auchendrane.*—Rainfall 1·26in. below the average of last 9 years. The prevailing winds were from the east and north. The early part of the month cold and dry; the latter part wet and boisterous—a great contrast with last month.

*Otter House.*—Rain near the average. First 8 days fine; after which it was wet and stormy. Hailstorm on the 20th. Frost on 4 nights. Lunar halo on 20th. Aurora on 18th and 30th, and a remarkable one on the 19th, covering half the sky.

*Nookton.*—No rain till the 9th. High winds on 17th and 18th. Min. 26°·2 on 29th.

*Deanston.*—Max. 67° on 3rd. Min. 24° on 23rd. Gales on 17th and 25th. One peal of thunder with lightning on 24th. Snow during 2½ hours on 29th, with rain and sleet. Very much snow on the hills.

*Aberdeen.*—First 9 days fine, from which time a succession of gales from S.E., N., or N.N.W., with heavy rains and remarkable depression of barometer, which fell to 28·620 on 27th at 3 a.m., rose to 29·62 on 28th, and fell again to 28·589 at 9 p.m. on 29th. Max. on 3rd, 60°. Min. 28°·3 on 29th, on which day the ground was white with snow for 20 miles round Aberdeen. Hail on 18th, 20th, 25th, and 27th; snow 20th, 25th, 27th and 28th. Aurora on 15 nights.

*Culloden.*—Rainfall below the average. Rivers and burns lower than they have been observed for many years in October. The unusually hot and dry weather of September continued till the 9th of this month, after which the temperature declined considerably, and the weather became broken and unsettled, with frequent rain.

*Portree.*—Fine till 10th; thence to the end of the month wet and cold. Snow on 19th and 27th. Gales on 24th from S.W., on 25th from N.W. to N., and on 27th a heavy gale from N. Lunar halos on 28th and 29th.

*Scourie.*—Very dry to 16th; on 20th a good deal of rain; on the 24th it rained heavily—1·00in. in 12 hours. Aurora on the 18th and 19th, and hail showers. Snow on the hills.

*Sandwick.*—Our beautiful summer weather continued till the 15th; since then it has been cold, and the last week wet and stormy. The fall of 1·27in. on the 30th is the greatest for a long time; it was preceded by threatening festooned clouds on the 29th. Ground sprinkled with snow on 28th. Aurora on 8 nights.

#### IRELAND.

*Killaloe.*—The whole rainfall of 1·68in. was between 9 p.m. on the 27th, and 10 a.m. on 28th. Remarkable fall of the barometer towards the end of the month, with violent winds. About 3 p.m. on 29th, thunder and lightning.

*Monkstown.*—The drought having lasted 45 days broke up on the 8th. Heavy dews. On evening of 10th, heavy showers, with thunder and lightning, which struck in some places; 18th, gale in morning; 19th, bright aurora, with long and very distinct streamers; aurora again on 26th and 30th; 28th, bar. fell from 29·732 to 28·848; on 29th, at 10 a.m., after an almost perfect calm, there was a sudden and very severe squall, by which several trees were blown down; this was followed by a severe gale all day.

*Galway.*—Aurora on 19th.

*Doo Castle.*—First part of month fine, the latter part wet and stormy. Aurora on 19th. On 28th, at night, fearful wind, with rain.

*Owendoon.*—Peas have been very abundant this season; apples only a moderate crop. The harvest and turf crop have been remarkably well saved.

*Waringstown.*—Dry and warm till the 8th, since which time, the weather has been very changeable, though there have been a few bright days. First frost on 20th. Evaporation ·51.

*Leekpatrick.*—No rain for the first week; afterwards every day but one, the greater portion falling in the last week. Frost on the grass on six nights. Max. 69°. Min. 26°.

G. J. SYMONS.

136, Camden Road, N.W., November, 1865.

#### ACCIDENTS TO RAIN GAUGES.

I am sorry to hear of two gauges having "run over," and one being "blown down." Very simple measures will prevent either interruption, and I would turn the occurrence to good account by urging all those whose gauges hold not at the very least 3 inches, to have a tin case made, and place them therein, so that if there should be an overflow the measurement will not be lost, and the twelvemonth's observation vitiated. Of course care must be taken that no rain gets into the tin but what is really caught by the funnel. As to gauges being "blown down," this could never occur if the simple precaution mentioned on page 10 of last year's pamphlet were taken, and a few stakes driven into the ground, round the gauge, of course taking care that they are not higher than its rim; or if the gauge were, as is desirable, partially sunk on the ground.

# SYMONS'S RAINFALL CIRCULAR,

## NOVEMBER, 1865.

### WATERSPOUT—HEMEL HEMPSTEAD, AUGUST 24TH.

A phenomenon of the most extraordinary character, and one without a precedent in the experience of the "oldest inhabitant," occurred in this locality on Thursday evening, August 24th. About half-past 5 o'clock, a small but dark and strange-looking cloud was observed to the south-east of Box Moor. It suddenly and strangely assumed a cylindrical shape, and then expanding at the top, it, with a noise not unlike that occasioned by the steam of an engine, worked itself, with a spiral motion, into what to sailors is the well-known form of a waterspout. And a veritable waterspout it was, sailing majestically away, as if conscious of its power, in a westward direction—an object of deep interest, and of some degree of terror. Nor was the latter feeling wholly without foundation. This strange construction of the elements appears to have had its origin somewhere south of Shendish. In its course over the estate it took up a number of wheat-sheaves and deposited them on the farm of Mr. Arthur Austin, of Felden. It proceeded across Mr. Austin's farm, and in going over a wheat field caught up a large number of sheaves and carried them into an adjoining barley field. Some of Mr. Austin's men were mowing in a field close by, and hearing the noise of the water-spout became alarmed, threw down their scythes and fled. The scythes were drawn up and carried to some considerable distance. The cloud-cistern then pursued its way to Cold Harbour, and passed over the two solitary cottages which bear this name. Here the power of the elements was most manifested. A large ash tree at the end of the garden was torn up by the roots, and branches were scattered about in all directions. One of the cottages was empty; the other was occupied by a farm labourer of the name of Glenister. The force of the wind was so great that it stripped tiles and lead off the cottages, and entering Glenister's bedroom carried all the ornaments off the mantel-piece. The rain came down in such torrents as seemed to threaten to drown his wife and children. The water-spout continued its course towards Box Lane, and having gone over a plantation on the estate formerly held by the late Dr. Davis, turned to the left, and, after scattering some sheaves in Mr. Rose's wheat field, went over the adjoining wood, and then seemed to mingle with the clouds. The appearance of the sheaves of corn, and apparently young trees, careering fantastically through the air, was singularly strange. A most terrific storm of thunder, lightning, and rain ensued.

### COLONIAL RAINFALL.

[The following cutting from the "Berbice Gazette and British Guiana Advertiser," of October 14th, 1865, is interesting, as showing how wide-spread is the attention now given to rainfall matters. I am indebted for the cutting to Messrs. Silver of Bishopsgate Street, through whom it is not impossible I may eventually add a table of colonial rainfall to my present British one.]

*To the Editor of the Berbice Gazette.*

Dear Sir,—The rain that fell on Thursday, the 5th instant, between 9 o'clock a.m., and noon was, by my rain-gauge, 5·40 inches, or nearly five-and-a-half inches in three hours.

The enclosed, cut from the "Times," shews what is considered a heavy fall in England.

Yours truly,

A. WINTER.

*To the Editor of the Times.*

Sir,—Yesterday morning, about 6.30 a.m., commenced an extraordinary fall of rain, which lasted steadily until 5.30 p.m., registering during that time 2·18 inches. The amount registered in the 24 hours comprehended between 9 a.m. on the 23rd, and 9 a.m. on the 24th, being 2·02 inches. This large amount has only once (in this district at least) been approached during the present year—viz., on June the 1st, when the amount registered between 6 p.m. on June the 1st, and 6 a.m. on June the 2nd, was 1·82.—I have the honour to be, Sir, your obedient servant,

HENRY J. B. HANCOCK.

Duke's Hill, Bagshot, August 24th.

## RAINFALL, NOVEMBER, 1865.

STATIONS.		HEIGHT OF GAUGE.		DEPTH OF RAIN.			Days on which Rain, Snow, or Hail measured 0·1
		Above Ground	Above Sea Level	Total in the Month.	Greatest Fall in 24 hours.		
					Depth.	Date	
[The Roman numerals denote the division of the Annual Tables to which each station belongs.]		ft.	in.	feet.	inches.	inches.	
ENGLAND AND WALES.	I. London (Camden Town) .....	0	6	100	1·97	·38	29 18
	II. Staplehurst (Linton Park) ...	0	6	200 ?	2·74	·41	22 17
	II. Selborne .....	4	0	500 ?	4·83	1·28	20 16
	III. Banbury .....	7	0	345	2·52	·61	20 19
	III. Wisbech .....	0	6	10	1·82	·49	20 15
	IV. Bury St. Edmunds (Culford)	1	2	...	1·59	·28	20 16
	V. Calne .....	0	11	250	3·21	·82	20 21
	V. Plymouth (Goodamoor) .....	0	2	580	6·80	1·24	19 22
	V. Taunton .....	1	6	38	3·94	·73	25 21
	VI. Tenbury (Orleton).....	0	9	200	2·98	·62	20 20
	VII. Leicester (Wigston) .....	0	6	220	2·42	·71	20 18
	VII. West Retford.....	0	6	50	2·04	·46	23 18
	VII. Derby .....	5	0	180	1·90	·52	20 18
	VIII. Manchester.....	2	7	106	2·77	·54	22 15
	IX. York .....	0	6	50	2·06	·37	23 16
	IX. Skipton (Arncliffe) .....	3	0	750	6·60	1·23	23 15
	X. North Shields.....	1	0	124	2·36	·30	16 16
	X. Borrowdale (Seathwaite).....	1	0	422	13·83	2·60	17 21
	XI. Haverfordwest .....	2	0	60	7·64	1·36	25 19
	XI. Rhayader (Cefnfaes).....	2	0	880	4·84	...	... 17
SCOTLAND.	XII. Dumfries.....	0	5	70	3·10	·95	25 15
	XIV. Ayr (Auchendrane House) ...	2	3	94	2·88	·40	26 19
	XV. Otter House, Argyll.....	0	6	130	4·31	·67	21 21
	XVI. Leven (Nookton) .....	0	6	80	3·23	·65	28 13
	XVI. Stirling (Deanston) .....	0	0	130	3·31	·60	26 16
	XVII. Aberdeen .....	4	8	115	4·23	·89	26 17
	XVIII. Inverness (Culloden).....	3	0	104	1·98	·37	25 15
	XVIII. Portree, Isle of Skye .....	0	4	60	7·23	1·72	19 18
	XIX. Scourie, Sutherland .....	0	3	26	2·20	1·00	19 8
	XIX. Sandwick, Orkney .....	2	0	78	3·07	·41	26 25
IRELAND.	XX. Cork .....	6	0	65	6·84	1·42	21 14
	XX. Waterford .....	4	0	60	6·00	1·10	17 19
	XX. Killaloe, Clare .....	5	0	128	5·06	1·10	27 18
	XXI. Portarlinton.....	9	0	236	3·84	·80	26 9
	XXI. Monkstown, Dublin .....	0	6	100	4·03	·93	26 16
	XXII. Galway .....	6	0	25	3·97	1·14	28 18
	XXII. Bunninnadden (Doo Castle)...	1	0	...	4·98	1·50	27 15
	XXIII. Bawnboy (Owendoon) .....	1	3	218 ?	4·14	1·74	28 22
	XXIII. Waringstown, Down .....	0	4	191	3·65	·88	26 13
	XXIII. Strabane (Leckpatrick) .....	0	5	260	4·81	1·95	28 24

Difference of rainfall in November, 1865, from the mean of ten years 1850—1859.

Goodamoor	+	1·70	Derby	—	·04	Deanston	+	·36
Orleton	+	·57	York	+	·31	Sandwick	—	·62
Wigston	—	·01	Seathwaite	+	3·44	Killaloe	+	1·87

(+ Above the mean; — Below.)

## REMARKS.

## ENGLAND AND WALES.

*Camden Town.*—A regular November, constant damp and slight fogs. Sun seldom visible. Min. on 2nd  $31^{\circ}2$ , and on grass,  $26^{\circ}5$  on 4th. Max.  $57^{\circ}$  on 20th.

*Linton Park.*—Very little frost. Thunder on 23rd.

*Selborne.*—Frost on 14 nights. High wind and storms of rain from 19th to 25th. Thunder at 1 a.m. 21st. Rain daily from 16th to 29th, excepting 24th and 27th.

*Banbury.*—Lightning on 5th and 21st. Violent wind on 22nd, 24th, and 25th.

*Wisbech.*—Frost on grass on 12 days. Stormy from 22nd to 26th—max. pressure 25 lbs. on 22nd; 15 lbs. on 24th, and 12 lbs. on 25th.

*Culford.*—Very high wind on 22nd, 23rd, and 24th. Min. temp.  $27^{\circ}$  on 4th.

*Calne.*—Heavy gale from 21st to 23rd, with lightning during the nights. Another gale on 25th. Min.  $24^{\circ}6$  on 6th. Max.  $56^{\circ}$  on 20th.

*Goodmoor.*—Max.  $56^{\circ}$ . Min.  $26^{\circ}$ . The mildest November on my record, strawberries, figs, &c., having ripened out of doors.

*Taunton.*—Strong gales from 22nd to 26th. Min.  $27^{\circ}$  on 27th.

*Orleton.*—First half cloudy, latter half very damp and rainy. Max.  $57^{\circ}2$  on 17th and 19th. Min.  $26^{\circ}$  on 27th. Barometer unusually low on 22nd, 24th, and 25th, with violent winds each day, especially on 22nd, when much damage was done to buildings and trees. Lightning on night of 22nd. Solar halo on 23rd at 2 p.m.

*Wigston.*—Upon the whole a fine month. Terrific wind on 22nd, which continued (with short lulls) for several days.

*W. Retford.*—Frosty on 8 nights. Min. on 14th,  $25^{\circ}$ .

*N. Shields.*—Very damp and cloudy month. Solar halo on 2nd. Lunar halos on 6th and 27th. Fog on 13th.

*Seathwaite.*—Rainfall over 1 inch on 5 days, and over 2 in. on two. A damp month, the air on most days being near the point of saturation. Violent storms the last 10 days.

*Haverfordwest.*—Month commenced showery and cold, with sharp frost at night, succeeded by rain, some days very fine and clear. The second week calmer—mostly fine. Weather stormy about 13th, 16th, 20th, 22nd, and 25th, accompanied by much rain, especially on 22nd and 25th, which were fearfully stormy periods, wind blowing with hurricane violence on each occasion. On the 25th, for three hours, it raged like a tornado or cyclone from the S.E., uprooting large trees and unroofing houses. Extreme depression of barometer (corrected)  $28.485$  inches.

*Cefnfaes.*—Violent gale on 23rd, 25th, and 26th, from S.W. Much damage sustained in this neighbourhood.

## SCOTLAND.

*Dumfries.*—First half of month unusually fine and Autumn-like. Latter half wet and stormy till 28th; fine after. Rainfall for past 11 months is  $10.57$  in. below the mean of the preceding 5 years.

*Auchendrane.*—Month stormy; severest gales from 16th to 22nd. From 24th to end of month (so stormy elsewhere) moderate winds and variable barometer.

*Otter House.*—Rain near the average, mostly fell in latter half of month. Although the distant hills were capped with snow on 26th, the weather may be stated as comparatively mild, with brisk gales now and then.

*Nookton.*—Mean min.  $34^{\circ}3$ , the month being almost without frost. No rain from 2nd to 14th.

*Deanston.*—Very little rain till after 15th. Gale on 26th, from 3 to 5 a.m. Min.  $20^{\circ}$  on 6th.

*Aberdeen.*—More than half the rain fell in the last 5 days of the month. The last fortnight has been characterised by very low bar. and high winds. Showers of snow on 26th and 27th. Aurora on 11 nights. Max.  $51^{\circ}$  on 11th. Min.  $26^{\circ}7$  on 13th.

*Culloden.*—No severe frost. Weather generally open and variable.

*Portree.*—Mild month. The first 6 days quite calm. Gale from S.W. on 16th. Frost on 14 nights. Ground coated with snow on 26th. Solar halo on 27th. Lunar halos on 3rd & 4th.

*Scourie.*—Fine open weather. Rain much below the average. Lightning on 19th. Snow in showers and slight frost on 26th and 27th.

*Sandwick.*—Max.  $51^{\circ}1$ . Min.  $31^{\circ}4$ . Lunar halos on 2nd, 27th, and 28th. Aurora on 4 nights. Bar. at 0.30 a.m. on 23rd,  $28.615$  (reduced) but the gale did not reach here. There was one, however, on 25th, at night, about 40 miles per hour.

## IRELAND.

*Monkstown.*—Nearly all the rain in the last fortnight. On 25th very heavy rain all day, with N.E. gale. Severe gales also on 21st and 28th. Aurora on 24th. Lunar halo on 26th. Bar. down to  $28.420$  on 22nd, and  $28.542$  on 25th; the former lower than it has

been since Nov. 1859, with the exception of January last. Between 8 p.m. 24th and 8 p.m. 25th bar. fell .79 in., and in the next 24 hours rose .92 in. No frost.

*Doo Castle*.—Frost on 7 days. Mean Min. 34°·4. From 14th to end, very wet.

*Owendoon*.—The rainfall on the 28th (1·74 in.) was the greatest fall for two years.

*Waringstown*.—First fortnight remarkably dry and fine. More than half the month's rain fell between 24th and 28th. Min. (grass) on 5th, 21°.

*Leckpatrick*.—Nearly all the rain fell in the last ten days. The fall on 28th greater than measured here for four years, the next being 1·29 in. on 28th of August last, and 1·19 in. on June 17th, 1863. Great floods after the rain of the 28th inst.; river banks carried away, and all the low grounds under water. Frost on grass on 13 nights.

ERRATUM.—*Owendoon*.—In the October remarks "peas" should have been "pears." The latter I believe to have been an unusually heavy crop throughout the country. Scarcely any peas are grown here except in gardens.

G. J. SYMONS.

## IMMENSE FLOODS IN IRELAND.

The heavy rain of Monday night last, November 27th, caused the rivers and streams of the surrounding district to be greatly flooded on Tuesday, and considerable damage has been done and railway travelling seriously retarded in consequence. In the neighbourhood of Omagh large tracts of land were inundated in the afternoon of Tuesday, and the roads were covered with water to a considerable depth. The water had entered the houses at Mountjoy Terrace and the low lying parts of the town, and the inhabitants were obliged to retire to the upper rooms of their dwellings. The water continued to rise until it was five or six feet deep on some of the roads, neither cart nor car being able to pass along, and the country around resembling a vast lake. The inhabitants of the locality never remember to have witnessed such a flood before, or one that rose so suddenly. Boats were plying over fields where they had never been seen previously, or visiting houses where the under stories were submerged, to extricate or assist the inmates.

At Strabane, the business of the market had to be suspended on Tuesday, the grain and flax market places being flooded, and the principal streets laid under water, so as to be impassable to foot passengers, and the ground-floor of many of the houses was rendered uninhabitable, a good deal of damage being also done to property. Indeed, business was generally interrupted throughout the evening. The railway train of the Irish North-Western Railway Company, conveying the day mails from Dublin to Derry, was unable to continue its journey beyond Strabane, the line being inundated, and the train which left this city at 3 o'clock, p.m., could not proceed farther than Porthall. Business people who proceeded by train to attend the market at Strabane, had great difficulty in reaching the town from the terminus on cars, the roadway being covered to such a depth that the horses could scarcely wade through it. The extensive valley between Porthall and Ballindreat was one immense sheet of water, presenting the appearance of a lake. The embankments of the railway in the vicinity of Porthall were swept away, and the bridge which crosses at what is called "The Islands" was covered to the depth of several feet, so that the mid-day mail train was obliged to stop there, the driver not considering it prudent to run the risk of crossing. The mail was brought to Derry on a car during the night. The night mail train, despatched from Derry at half-past eight, on reaching this place was obliged to turn back to Derry, and send the mail bags back to the Post-office, when those on the line for Dublin were despatched yesterday morning *via* Belfast.

The river Fahan burst its usual bounds and covered the low lands with water on either side to an immense distance. A detention of about two hours occurred to the train which runs from Coleraine to Derry, in consequence of a crossing near Ballykelly Railway Bridge having been carried away, and the timber and materials of which it was composed having been drifted on the railway bridge. We have been informed, on creditable authority, that the road leading from the Ballykelly terminus was cut up by the water for a considerable distance several feet deep, and some parts to a width of from fifteen to twenty feet. On the flood abating, it was found, on examination, that the bridges on both lines of railway were quite secure, and a number of hands having been employed on the line between St. Johnston and Strabane, they had before the close of yesterday evening put the dilapidated portions of the embankment into a state of thorough repair. It is said that there have not been such inundations in this neighbourhood for the last fifty years.

We have rarely seen such high tides in the Foyle as within the last fortnight. This has been partly owing to the influence of the winds and the tempestuous state of the weather, but also in a great measure to the long-continued and heavy rains. For two or three days after the new moon, the tide rose to within nearly a foot of the level of our new line of quays, and even at ebb tide the waters seemed to fall very little below the level of the highest neap tides. This phenomenon was occasioned chiefly by the easterly and north-easterly winds that prevailed at the time, and which prevented the tide from running down towards the sea with its ordinary rapid flow.

# SYMONS'S RAINFALL CIRCULAR,

## DECEMBER, 1865.

### BAROMETER IN DECEMBER, 1865.

The readings of the barometer in the middle of the month having been exceedingly high, and towards its close very low, a few facts respecting the extremes may be acceptable. Probably the most unusual features of the high period, December 7th to 19th, were its duration and its extensive area. During the 6 days, December 11th to 16th, the mean pressure over the whole of the British Isles was 30·62 inches, and I am not aware that it was less (at sea level) than 30·30 inches in any part of the Kingdom during that time. The greatest pressures I have yet heard of, have been as under :—

Bodmin .....	15th, 3 p.m.....	30·87	Valentia.....	15th, 8 a.m.....	30·79
Banbury .....	15th, 8 p.m.....	30·84	Leckpatrick .....	15th, .....	30·78
Haverfordwest ..	15th, 9 p.m.....	30·83	Leith .....	11th, 8 a.m.....	30·78
Calne .....	15th, 9 p.m.....	30·82	Camden Town ...	15th, 9 p.m.....	30·78
Plymouth .....	16th, 8 a.m.....	30·82	Ryde .....	16th, 9 a.m.....	30·76
Penzance .....	16th, 8 a.m.....	30·81	Tunbridge .....	16th, 9 a.m.....	30·75

The following table contains the readings at a few stations given for comparison :—

#### READING OF BAROMETER CORRECTED TO 32° AND REDUCED TO SEA LEVEL.

Dec.	Camden Town.		Leyton.		Tunbridge.		Ryde.	Haverfordwest.	
	9 a.m.	9 p.m.	10 a.m.	10 p.m.	9 a.m.	3 p.m.	9 a.m.	9 a.m.	9 p.m.
	in.	in.	in.	in.	in.	in.	in.	in.	in.
7	30·215	30·352	30·239	30·444	.....	.....	30·194	30·149	30·391
8	·580	·586	·584	·575	30·549	30·594	·561	·538	·537
9	·556	·572	·567	·573	·585	·560	·538	·516	·543
10	·627	·658	·630	·674	·635	·629	·631	·626	·644
11	·721	·720	·737	·736	·702	·710	·680	·693	·702
12	·688	·594	·696	30·651	·679	·632	·657	·697	·621
13	·545	·523	30·567	.....	·572	·509	·537	·608	·591
14	·516	·477	.....	.....	·517	·477	·543	·632	·628
15	·713	·782	.....	.....	·663	·744	·717	·774	·832
16	·711	·687	.....	.....	·747	·706	·764	·777	·769
17	·687	·619	.....	.....	·701	·668	·697	·737	·675
18	·544	·444	.....	.....	·567	30·501	·553	·556	·452
19	30·372	30·231	.....	.....	30·388	.....	30·344	30·271	30·102

So far as my own station is concerned the maximum has previously been exceeded, viz., on January 9th, 1859, when the pressure was 30·830. On December 10th, 1859, the pressure was 30·773, and on the 26th of the same month, at 6 a.m., it had fallen to 28·629.

Turning briefly to the low readings on the 29th, the minimum appears to have passed over the North of Ireland. The readings, reduced to sea level, were, Leckpatrick, 28·48; Greencastle, 28·78; and Nairn, 28·96. At Dumfries the range in the month was 2·07 in.

One result even of these few details is of some practical interest. I refer to the close agreement of the readings on the mornings of the 8th, 9th, 10th, 11th, and 12th, when it will be seen that the difference between Camden Town and Tunbridge, Ryde, and Haverfordwest, never exceeded 0·042 in., that is to say, the pressure at 9 a.m. was uniform within half a tenth of an inch over the whole of the South of England, and the means, of course, are still more accordant. This then shows how easy is the determination of the height of stations (where an accurate barometer is recorded) above sea level, and how accurately it may be determined, provided a suitable period is chosen, and due care exercised. Of course, in calculating the height of any station, less distant points of comparison than those above quoted would be taken, and then the height may be ascertained within a few feet.

## RAINFALL, DECEMBER, 1865.

STATIONS.		HEIGHT OF GAUGE.		DEPTH OF RAIN.			Days on which Rain, Snow, or Hail measured 0·01	
		Above Ground	Above Sea Level.	Total in the Month.	Greatest Fall in 24 hours.			
					Depth.	Date		
[The Roman numerals denote the division of the Annual Tables to which each station belongs.]								
		ft.	in.	feet.	inches.	inches.		
ENGLAND AND WALES.	I. London (Camden Town) .....	0	6	100	1·36	·42	31	14
	II. Staplehurst (Linton Park) ...	0	6	200 ?	1·93	·74	31	17
	II. Selborne .....	4	0	500 ?	3·59	·59	6	13
	III. Banbury .....	7	0	345	1·62	·40	29	13
	III. Wisbech .....	0	6	10	1·26	·33	8	9
	IV. Bury St. Edmunds (Culford)	1	2	...	·68	·19	29	7
	V. Calne .....	0	11	250	2·34	·55	29	11
	V. Plymouth (Goodamoor) .....	0	2	580	5·89	1·04	4	16
	V. Taunton .....	1	6	38	2·88	·65	4	15
	VI. Tenbury (Orleton).....	0	9	200	1·40	·29	30	12
	VII. Leicester (Wigston) .....	0	6	220	1·03	·32	28	7
	VII. West Retford .....	0	6	50	·68	·24	31	8
	VII. Derby .....	5	0	180	·75	·22	30	10
	VIII. Manchester.....	2	7	106	·74	·28	29	8
	IX. York .....	0	6	50	1·06	·37	31	7
	IX. Skipton (Arnccliffe) .....	3	0	750	2·09	·86	7	6
	X. North Shields.....	1	0	124	1·53	·48	3	7
	X. Borrowdale (Seathwaite).....	1	0	422	11·05	1·94	26	12
	XI. Haverfordwest .....	2	0	60	4·47	1·00	7&29	14
	XI. Rhayader (Cefnfaes).....	2	0	880	3·09	...	...	19
SCOTLAND.	XII. Dumfries .....	0	5	70	2·40	·69	6	11
	XIV. Ayr (Auchendrane House) ...	2	3	94	2·51	·48	26	16
	XV. Otter House, Argyll.....	0	6	130	5·93	1·26	7	20
	XVI. Leven (Nookton) .....	0	6	80	2·22	·64	6	12
	XVI. Stirling (Deanston) .....	0	0	130	4·60	·91	31	17
	XVII. Aberdeen .....	4	8	115	2·43	·51	31	14
	XVIII. Inverness (Culloden).....	3	0	104	1·57	·13	26	10
	XVIII. Portree, Isle of Skye .....	0	4	60	11·36	1·40	31	25
	XIX. Scourie, Sutherland .....	0	3	26	4·10	1·20	13	11
	XIX. Sandwick, Orkney .....	2	0	78	2·79	·61	7	19
IRELAND.	XX. Cork .....	6	0	65	6·69	1·10	3	16
	XX. Waterford .....	4	0	60	6·22	·98	5	19
	XX. Killaloe, Clare .....	5	0	128	4·08	1·04	25	19
	XXI. Portarlington.....	9	0	236	2·78	·51	3	17
	XXI. Monkstown, Dublin .....	0	6	100	3·35	·44	7	18
	XXII. Galway .....	6	0	25	4·52	·65	30	18
	XXII. Bunninnadden (Doo Castle)...	1	0	...	4·51	·67	25	21
	XXIII. Bawnboy (Owendoon) .....	1	3	218 ?	3·43	·56	5	22
	XXIII. Waringstown, Down .....	0	4	191	2·36	·34	31	18
	XXIII. Strabane (Leckpatrick) .....	0	5	260	3·64	·70	31	19

Difference of rainfall in December, 1865, from the mean of ten years 1850—1859.

Goodamoor	+	·35	Derby	—	·76	Deanston	—	·18
Orleton	—	·74	York	—	·25	Sandwick	—	1·44
Wigston	—	·60	Seathwaite	—	4·07	Killaloe	+	·16

(+ Above the mean; — Below.)



## REMARKS.

## ENGLAND AND WALES.

*Camden Town.*—Very high barometer throughout the month. Mean at sea level, 30·257 in., and mean temperature 42°·6. Lunar halo on 26th.

*Linton Park.*—High winds on 29th and 31st, the rest of the month mild, and often foggy. Only four frosty mornings. The pastures as fresh as in April, and birds singing as in Spring.

*Selborne.*—Max. 47° on 7th. Min. 23° on 16th. The high range of the barometer from the 7th to the 27th has been very remarkable; it then fell suddenly—not less than an inch in four days. Gale from S.W. and W. on evening of 28th.

*Banbury.*—High winds on 29th and 30th. Barometer (reduced) at 8 p.m. on 15th, 30·84 in.

*Wisbech.*—No rain from 13th to 28th. Barometer 30·74 in. on 11th and 15th. Min. 30°·7 on 24th, and 24°·4 on grass on 27th. Gale 15 lbs. on 29th, and 20 lbs. on 31st at 3 a.m.

*Culford.*—A mild but cloudy and foggy month. No rain from 7th to 28th. High winds on last three days. Max. 51° on 31st. Min. 28° on 26th.

*Calne.*—Barometer very high, 30·74 (corrected) on morning of the 11th, and 30·819 on evening of 15th. Very mild month, crocuses and jonquils above ground on 22nd. Common daisy and buttercup in bloom on 24th. Max. 53°·5 on 7th and 20th. Min. 25° on 16th.

*Goodamoor.*—A very mild month, though stormy at times; very much so on Friday the 29th, when some damage occurred. On 16th two house martens were flying about near here.

*Taunton.*—The month has been one of storms and heavy gales, though the barometer has ranged high, being on 16th 30·61, the highest point attained in the year. Max. ther. 60° on 7th. Min. 25° on 16th.

*Orleton.*—The first and last weeks of the month very stormy; the middle dry and fine. Barometer very low on 4th and 29th, and very high on 11th and 15th. Heavy gales on 29th, 30th, and 31st. Max. 56° on 7th. Min. 24°·6 on 13th.

*Wigston.*—A remarkably fine month for December, only eight nights on which it froze.

*West Retford.*—Rainfall ·96 in. below the average of last seven years. No rain from 5th to 26th. Frost on 13 nights. Min. 27° on four days.

*Derby.*—December has been unusually open and mild, the wind being from W., S.W., and N.W. The high reading of the barometer has been frequently alluded to, reaching on several occasions 30·55, falling on the 29th to 28·89, accompanied by a heavy gale.

*Manchester.*—Average rainfall (71 years) 3·260. The fall this month is unusually small, and accompanied by a mean temperature considerably above the average.

*Arncliffe.*—A remarkably dry month, except the last three days; very mild, and little snow.

*N. Shields.*—Frequent high winds. Lunar halos on 1st, 5th, 28th and 30th. Lunar rainbow on 29th. Fog on 8th and 24th. Aurora on 13th. Snow on 30th.

*Seathwaite.*—Mild but gloomy weather to the 25th. Afterwards rain every day, accompanied by gales from S.S.W. and S.W., which on the 30th and 31st attained a hurricane violence. Frost only on two nights.

*Haverfordwest.*—The month commenced cold, damp and windy, which weather continued till the 7th, on which day an inch of rain fell. Barometer ranging from 28·99 on the 4th, to 29·75 on evening of 6th. The atmosphere then became calm, and the barometer rose to the unprecedented height of 30·78 (corrected) at 7 p.m. on the 15th. After the 20th the barometer sank gradually till the 29th (when another inch of rain fell), it being then only 28·93, and accompanied by a very heavy gale. The year went out stormy.

*Cefnfaes.*—Violent storms of hail, rain and wind, from S.W. on 28th and 30th. The meadows generally have a verdant appearance, many wild and garden flowers still in blossom, and the thrushes have been singing several times during the month.

## SCOTLAND.

*Dumfries.*—6th very wet, but little more rain till the 25th, thence to close of month stormy and wet, but temperature mild. Temperature 4°·3 above the average. The common field daisy in flower at Christmas, and snowdrops above ground. Range of barometer 2·07 in.

*Deanston.*—Month mild; first half dry and fine, close of month wet and stormy. Great gale on night of 30th. Snow 2 inches deep on 31st.

*Aberdeen.*—A remarkably fine month. Between the 7th and 26th not one-tenth of an inch of rain fell; night temperature high, being on Christmas night 50°·5. Max. on 21st, 52°·5. Min. on 12th, 30°·7. Aurora on 9 nights. Frequent heavy gales during the month. Hail on 3rd.

*Culloden.*—Weather generally mild and fresh. Strong gales on the 22nd, 25th, and 26th, and heavy storms on the 29th, 30th, and 31st, with great depression of the barometer.

*Portree.*—It may well be said that December came in like a lamb and went out like a lion. The first week very mild, then squally and stormy 'till 19th, when a heavy gale blew from the S., and continued so to do with very little lulls to the close of the month. From 8 p.m. on 30th to 7 a.m. on 31st it blew a perfect hurricane, accompanied with very heavy thunder and lightning, from 12 p.m. 30th to 2 a.m. on 31st; on the north-west part of the island it has scattered corn yards, blown roofs off houses, and smashed several fishing-boats.

*Scourie.*—Fine open weather till the 24th, when a strong gale commenced from 11 p.m. till 4 a.m. on 25th. Much lightning from 4 a.m., but no thunder. On 26th, a violent gale from 11 p.m. to 4 a.m. on following day. On 30th, a tremendous gale from 6 to 8 a.m. 31st very stormy, with thunder and lightning.

*Sandwick.*—This has been the driest December since 1853, and the mildest since 1857. 20 days were marked as fine, and though there were some gales, there was no wintry weather till the last two days, when there was snow and hail storms, with thunder and lightning. On 31st a storm till noon, blowing at 7 a.m. 60 miles an hour. Aurora on three nights.

#### IRELAND.

*Monkstown.*—Temperature of month generally high. Max. 57°; min. 33°; on grass only below 32° three times. Hail on 3rd; snow on 29th; gales on 2nd, 4th, 6th, 19th, 22nd, 23rd, 27th, 29th, and 30th. Those of 22nd and 27th very severe. On 29th from 9 to 12 a.m. blew very wild. From 7 p.m. 30th to 3 a.m. on 31st a more violent gale than for many years, at times almost a hurricane, direction S.S.W. Ozone very scarce from 8th to 14th, but in excess on 29th.

*Galway.*—Stormy from 27th to the end of the month. Violent storm on night of 30th.

*Bunninadden.*—Fine open month on the whole, but wet and stormy towards the end. Snow on the 30th. Max. 45°; min. 38°-3.

*Owendoon.*—Remarkably fine month; summer flowers still in bloom in exposed places; little or no frost. Severe gales on 30th, and some snow, the first in 1865.

*Waringstown.*—A very mild month; frost on grass on only 10 nights. Min. 28°, but the buds of gooseberry bushes, which were quite green at this time last year, have not pushed this season.

*Leckpatrick.*—Mild month; frost on ground on 9 nights. A little snow with gale the last 3 days. Vegetation far advanced. Very high barometer in the middle of month. 30·776 on 15th, being the max. for the whole year; min. 28·481 on 29th, than which it had only once been lower—viz., on 13th January.

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#### RETURNS OF RAINFALL IN 1865.

Up to the present time (January 13th) about 600 returns have been received. I take this opportunity of thanking those who have sent theirs in, and of asking those who have not, to do so as soon as they possibly can.

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#### MONTHLY METEOROLOGICAL MAGAZINE.

With this issue my little Monthly Circular ceases, but only to assume, with its new name, a more permanent form, a larger size (8 pages), and a more comprehensive scope next month. It ought to be a success as far as circulation is concerned, since those interested in the subjects it will discuss are to be counted by thousands; whether or not it will be so, rests, perhaps, on three points: (1) my making it as good as it ought to be, which partly depends on (2) my correspondents sending prompt and full reports from all parts of the kingdom; (3) by purchasers recommending it to the notice of their friends.

The price will remain 4d. per copy, or 5s. per annum, post free.

G. J. SYMONS,

136, Camden Road, January, 1866.