

# SYMONS'S METEOROLOGICAL MAGAZINE.

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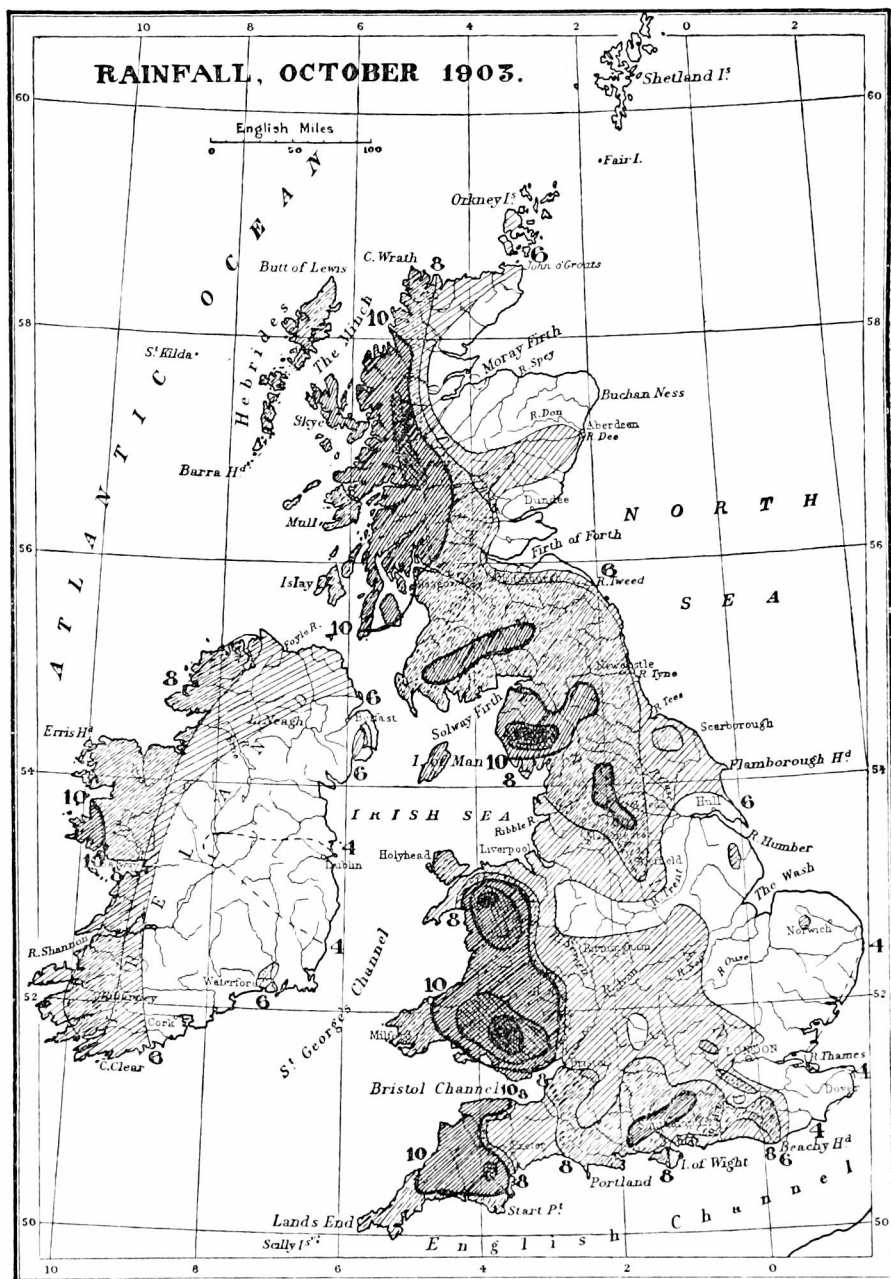
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## THE RAINFALL OF OCTOBER, 1903.

THE remarkable abundance of the rainfall of the present year has, we hope, convinced the public that the British Isles are not drying up. Up to last year there was some reason for the suspicion, if only a short series of years was considered. For instance, an observer who commenced to record rainfall in the seventies might find, on examining his records, that each successive period of ten years (though perhaps not each successive period of five years) was drier than the one before. He had no personal knowledge of the fact that dry spells came before the wet spell as well as after it, and so might fail to see the reasonableness of expecting a wet spell to follow. A year that bids fair to compete successfully for the title of unprecedented in wetness has now come upon us, teaching a wholesome lesson to those who were inclined to generalize from short views, though unfortunately causing much damage and distress in many parts of the country.

October is recognised as the wettest month of the year over all parts of our islands except the west and north-west, and heavy rain in October rarely attracts special notice; but the exceptional nature of the month just passed compels rather than induces us in allocating the space of the present number to give up to rainfall what was meant for all meteorology. The Table of Rainfall on p. 184 shows that all the stations for which an average is published were wetter than the average, and in about half the instances quoted the fall was more than double that of a normal October. The Supplementary Table on p. 185 shows at least 22 falls exceeding 10 inches, and only three less than 4 inches.

Coming after so long a succession of wet months, October 1903, has in many, if not in most, parts of the country brought the total rainfall for the year up to the highest figure previously recorded for any complete year. Considering the ten months alone, our table on p. 183 shows that the excess this year over the average of the ten years 1890—99 (which, however, was a somewhat dry decade) amounts to from 17 per cent. at Clifden, in the west of Ireland, to 88 per cent. at Camden Square; the average excess for the whole country is probably very close to 45 per cent., or we may say nearly



half as much again as the average. The actual fall for the month was very nearly twice the average amount, when the country is considered as a whole, and it is remarkable that scarcely any stations have recorded less than 4 inches, whereas in a normal October scarcely any stations record more than that amount. The distribution of the rainfall over the surface is so interesting that we have prepared a map from data supplied by about 400 stations, and reproduce it on a scale large enough to make the general features clear. A comparison with the similar map published for June (p. 94) will show that, although June was wetter than October in London, it was really a dry month compared with October.

No part of the British Isles could be called even moderately dry in October, and rain fell nearly every day. Several stations recorded 31 days with rain, a large number had 30, and very few indeed less than 25. Only a few stations on the coast of Kent, Essex, Suffolk and Nairn had less than 4 inches to report; but a considerable area in the middle of Ireland, from the east coast westward to the Shannon, had a lower fall. So far as we can ascertain, Dublin was the only place where less than 3 inches were measured, and there the fall had the unique distinction of being nearly half-an-inch below the average. The greater part of Ireland, the north-east and south-east of Scotland, the east of England and the valley of the Trent had less than six inches; all the rest of the country had more. It is curious to observe how closely the distribution resembles that of an average year; in fact, if the figures attached to each of the lines were multiplied by 5, the map would be a very fair representation of the average distribution of annual rainfall.

The wettest districts, with over 10 inches of rain, were a very small patch in the extreme west of Co. Galway, the Western Highlands, a portion of the Southern Uplands of Scotland, the Lake district (where the gauge at The Styne registered the enormous amount of over 32 inches in the single month), a small portion of the south of the Pennine chain, the whole of inland Wales, the Devon and Cornwall moors, and a narrow strip (mainly in Hampshire) running from Salisbury to Guildford. Over all these areas more than 1000 tons of water fell on every acre of land during the month.

Within the line of 10 inches it has only been possible to indicate on the map two zones of greater rainfall; these are bounded by the lines of 15 and 20 inches. It will be seen that in both South Wales and North Wales a very considerable amount of country was subjected to more than 15 inches in the month, or more than 1400 tons of water per acre.

Enormous damage has been done to crops, and it was pitiable to see corn and even hay standing in the sodden fields in the last week of October, ruined beyond all hope of saving. So wet a month has not been seen before in the present generation, and it is doubtful if so remarkable a series of wet months as this year has brought was ever previously experienced in this country.

There are only two previous Octobers in the long annals of British Rainfall which can bear comparison with the month just passed. Of these the more recent was October, 1891, when a very large proportion of the fall of a dry year took place in the one month, but many stations had less than the average amount of rain and a large part of the north of England, Scotland and Ireland received less than 4 inches. That month, although extremely wet, has now been far surpassed. The second case of a very wet October was in 1865, a year of average rainfall, when the one month following an almost rainless September, yielded about 30 per cent. of the yearly total. In 1865 October was considerably wetter than in 1903 in the south of England, but rather drier in the north. On the average the months probably differed little; but in the short time elapsing between the arrival of the monthly returns, which revealed the widespread wetness of last October, and the publication of this Magazine it has been impossible to examine the records for 1865 minutely enough to decide which ought to be placed first in order of the amount of rain. It is, however, certain that, with the possible exception of 1865, October, 1903, has been the wettest since *British Rainfall* was founded in 1860, and a rapid examination of the records back to 1800 has failed to show any other year except 1855 which might claim to be a second exception. It may be that October, 1903, was not the wettest month of the name at individual stations but was yet the wettest for the country as a whole, the wetter months in different places having occurred sporadically in different years.

We give a list of the largest and smallest falls for the month that have been reported to us, and as a supplement we have selected from the great mass of correspondence we have received some representative communications which throw light on the abnormal conditions. We wish to thank very heartily those correspondents whose letters we do not print as well as those whose names appear below, and we would like it to be understood that we are always glad to hear of any phenomenon which strikes an observer as unusual or of special interest. With so much original matter we feel that we may be excused from reprinting or epitomising the records of floods and damage from the daily press, remarkable although these records are. To do justice to the matter we should require the whole space of several numbers.

This article is a mere record of fact; it does not attempt to explain the cause of the conditions which it chronicles, though beyond doubt a cause exists and should be ascertainable. A vast amount of rubbish has been printed on the subject; we advise our readers to pay attention only to the signed utterances of scientific men.

*List of the Wettest and Driest Stations in October, 1903, which have been reported up to November 8th.*

Div.					inches.
X.	The Sty (gauge B)	...	...	...	32.50
„	Sprinkling Tarn	...	...	...	27.60
„	Stye Head Tarn	...	...	...	27.40
„	Mickleden	...	...	...	26.72
„	Dungeon Ghyll	...	...	...	25.62
„	Seathwaite (monthly g.)	...	...	...	25.10
„	Little Langdale, Fell Foot	...	...	...	23.35
„	Grasmere, High Close	...	...	...	22.77
„	Wythburn	...	...	...	22.00
XI.	Rhiwbryfdir	...	...	...	21.45
X.	Grasmere, Pavement End	...	...	...	20.89
„	Buttermere, Hassness	...	...	...	20.82
„	Rosthwaite	...	...	...	20.70
XI.	Treherbert, Tyn-y-waun	...	...	...	20.56
VIII.	Skelwith Bridge [Ambleside]	...	...	...	20.22

Sixty-two stations reported falls exceeding 12 inches in the month; the above are all those exceeding 20 inches.

XXI.	Dublin, Fitzwilliam Square	...	...	...	2.61
II.	Minster, Gas Works	...	...	...	3.03
XXI.	Castledermot	...	...	...	3.29
IV.	Burgh Castle Rectory	...	...	...	3.73
XXI.	Athlone, Twyford	...	...	...	3.81
„	Ballybrack, Streamville	...	...	...	3.85
„	Carlow, Browne's Hill	...	...	...	3.92
„	Gorey, Courtown House	...	...	...	3.93
II.	Sheppey, Leysdown	...	...	...	3.96
„	Ramsgate, West Cliff Villas	...	...	...	3.97
VI.	Great Barrington	...	...	...	4.10
XVII.	Cawdor, Budgate...	...	...	...	4.11

## Correspondence.

*To the Editor of Symons's Meteorological Magazine.*

THE rainfall measured here in October came to the exceptional figure of 7.88 inches, and I am interested to know if any of your other correspondents in this district have measured so large an amount. Rain fell on 28 days in the month, and on two days the amounts exceeded an inch, viz., on the 11th of the month 1.62 in., and on the 27th 1.08 in. The rainfall from the beginning of the year up to the end of October is 37.28 in.

MORRIS BIRKBECK.

*Dippen Hall Cottage, Farnham, Surrey, Nov. 2nd, 1903.*

I SEND you the result of my records for this rainy season. From the 23rd of September to the 31st of October, there was only one day during the period of thirty-nine days on which I did not register rain, and that was Saturday, the 17th of October. In the last eight days of September the total was .85 in. In thirty days of October the total was 8.17 in., making a total for the period of 9.02 in. My average of 25 years is 3.14 in. for October. So this year's record for October is far more than double, as it exceeds the average by

5·03 in., and it exceeds the heaviest fall which I have registered in October (*i.e.*, 6·83 in. in October, 1891) by 1·34 in. The rainfall for the ten months of the year, at this station, is 30·64 in., whereas my average is 21·54 in. The excess, therefore, for the year up to this date is 9·10 in.

T. W. SIDEBOTHAM.

*The Bourne Vicarage, Farnham, Surrey, Nov. 2nd, 1903.*

I AM sending you my returns of rainfall up to date that you may see that even in a wet year we keep up our reputation for a lower rainfall than other parts of England.

Jan.	Feb.	Mar.	April.	May	June.	July.	Aug.	Sept.	Oct.
2·49	1·47	1·93	2·56	2·25	3·97	3·94	3·09	1·78	4·12

The total for 10 months is 27·60 in. October, usually our finest month, had more rain than any other month.

H. C. V. SNOWDEN.

*Hildersham House, St. Peter's, Kent, Nov. 1st, 1903.*

I WISH to inform you as to the very abnormal fall of October here. Rain fell on 28 days, and total measured 10·30 in. The total fall for 10 months ending October has reached 40·07 in.

WILLIAM ESDAILE.

*Park View, Burley Manor, Ringwood, Nov. 7th, 1903.*

AS you may like to use this report of excessive rainfall, I send it in advance of my yearly account. The total for October is 10·63 in., falling on 30 days. Every month so far has exceeded the average.

G. NORSWORTHY.

*Elderfield, Otterbourne, Winchester, Nov. 1st, 1903.*

THE following comparison of rainfall for the 10 months, January—October, of the present year, with previous wet years, at six of our older stations, may be of interest at the present time. The station Nash Mills (now Apsley Mills) is near Hemel Hempstead; Rothamsted is near Harpenden; and Bayfordbury is in the neighbourhood of Hertford, in a very central position.

	1903. 10 mths. in.	Diff. from average. 1840-99. in.	1879. 12 mths. in.	1852. 12 mths. in.
Nash Mills or Apsley Mills	34·46	+12·24	34·23	41·54
Hitchin .....	33·51	+13·38	29·13	34·11
Royston .....	30·86	+11·74	29·99	36·08
Rothamsted.....	34·07	+11·12	36·02	...
Berkhamsted .....	32·93	+ 9·47	34·90	...
Bayfordbury .....	31·82	+11·46	29·94	...
Average .....	32·94	+11·57	32·27	(36·08)

It will thus be seen that the fall for the past 10 months has exceeded the fall for the whole of 1879 by about half-an-inch, and is within about 3 inches of the fall of 1852. C. WIGAN HARVEY.

*Throcking Rectory, Buntingford.*

WITH all these portentous returns of rain in to-day's *Times* it seems absurd for me to write about our pigmy rainfall, now *circa* 34 inches, but the fact of only two days in the month being without a record of rain is unprecedented. In 1896 March had only three days without a record, and that is the only case at all similar since 1849, when our record began.

W. LUCAS.

*Hitchin, November 3rd, 1903.*

THIS is the first morning since the 27th of September that my rain gauge has not contained some measurable rain, 37 days giving a total of 7·23 inches.

WILLIAM HALL.

*Swerford, Oxford, November 5th, 1903.*

I WISH to call attention to the parallel between 1891 and 1903. It is really very close for a great part of the year, and especially for October. The question suggests itself, will there now be a ten days anti-cyclone as there was then?

H. A. BOYS.

*North Cadbury Rectory, November 2nd, 1903.*

[Mr. Boys is something of a prophet. The question he propounded has been answered by the barometer, for the anti-cyclonic condition which was fully established on November 4th, lasted, with one slight break, until the 13th, when we send this sheet to press.—ED. *S.M.M.*]

As you are aware, I have a rain record of over 30 years. My 30-years' average (1871--1900) is 26·965 in. I have already measured this year, for the ten months, 29·96 in.

During the near 33 years I have eight times measured 5 inches in a month, and three times upwards of 6 inches, including last month, which may be said to have had 31 wet days, for though under ordinary circumstances I should have returned Wednesday 21st as blank, I hesitated whether I should read it ·005 in. and put it down as ·01 in., so I have put it down ·004 in. The following are the eight wettest months.

1876, December.....	in. 6·48	1881, August .....	in. 5·20
1878, August .....	5·09	1892, October.....	5·59
1879, October.....	5·60	1900, February .....	5·36
1880, July .....	6·51	1903, October .....	6·82

July, August and September, 1903, (the three preceding months) had each 19 wet days), January 23, and March 21. October, then, is a record, and this September and October beat any two consecutive months.

1876-7.	in.	1880.	in.	1903.	in.
Dec., 1876...	6·48	Sept....	4·57	Sept....	3·58
Jan., 1877...	3·85	Oct. ...	5·60	Oct. ...	6·82
	10·33		10·17		10·40

Again, the average (30 years) for the six summer months, May to October, is 14·87 in. ; the actual this year 21·75 in., or 146 per cent., or 142 per cent. for the 10 months.

I have never known fruit such an utter failure.

ROBT. ELMHIRST.

*Farnham Lodge, nr. Knaresborough, 2nd November, 1903.*

I ENCLOSE report of our rainfall for October just ended, the total being 8·50 in., falling on 27 days. The average fall for October for 20 years is 3·25 in. The ten months' rainfall of 1903 has been 36·08 in., the 20 years' average being 23·60 in.

There is no record of such a precipitation hereabouts at any previous time. The centres of so many of the depressions have travelled over us lately, that one is not surprised at the result.

G. PAUL,

*Harrogate, 1st November, 1903.*

*Borough Meteorologist.*

THE following may interest you :—Comparison of rainfall in 1903 at Aysgarth Vicarage with that of previous years, beginning with 1876. 1903, total rainfall to October 31st, 48·96 in. Average (1876—1900) for whole year 39·01 in. Wettest year, 1877, 52·03 in. Least rain, 1902, 27·18 in. (1887, 28·97 in.) 1903 rainfall in October, 9·74 in. Wettest October previously, 1892, 8·46 in. (of which, however, more than 5 inches fell in 46 hours). Average for October, 4·07 in.

I hear that at Hawes Junction the rainfall this year, up to date, is about 80 inches, of which, I think, about 35 inches fell in first three months ; also, that at Eastgate, Durham, Rev. J. G. B. Knight has measured nearly 12 inches in October. The rainfall at Eastgate is about the same as at Aysgarth generally ; it is in Weardale, similar hilly country to this, and about 800 ft. above sea. The wettest months previously were :—1888, November, with 9·44 in. ; 1876, December, with 9·28 in. ; 1894, February, with 8·74 in. ; 1892, October, with 8·46 in. ; 1884, January, with 8·27 in. ; 1877, November, with 7·86 in. ; 1895, July, with 7·74 in. (3 in. fell on 25th) ; 1903, March, with 7·70 in.

FENWICK W. STOW.

*The Vicarage, Aysgarth, Yorks, R.S.O., Nov. 2nd, 1903.*

THE rainfall in October has amounted to 8·16 in., which is the largest for any month in my record of 44 years ; the previous largest amount being 7·10 in. in November, 1878. The rainfall for the first ten months of this year is 29·21 in., which has been exceeded only in 1900, with a fall of 30·61 in. Two days only during October were quite rainless, '005 in. having been reached on every day except the 30th. The amount measured on the 8th was 2·59 in., and is the heaviest fall I have recorded in a day in 44 years, with the exception of 26th October, 1900, when the fall was 3·28 in.

T. W. BACKHOUSE.

*West Hendon House, Sunderland, November 2nd, 1903.*



THE rainfall here in October, viz., 6·88 in., is the largest total recorded here in *any one month* since January 1st, 1868, when observations were begun at this place. The nearest approach that I can find in my registers is 6·76 in. in May, 1886; the next in amount being October, 1872, with 6·65 in.

B. T. GRIFFITH-BOSCAWEN.

*Trevalyn Hall, Rossett, S.O., Denbighshire, Nov. 2nd, 1903.*

THE rainfall at Dolaucothy, Carmarthenshire, during the month of October, 1903, and throughout the year to date has been as follows:—

	in.	
January. .	7·65	five days over half-inch; heaviest ·95 in.
February	6·13	four days over half-inch; heaviest 1·49 in.
March ...	9·30	twice over 1 inch; 4 times over half-inch; heaviest 1·35 in.
April .....	2·82	once over half-inch, ·82 in.
May .....	5·50	three times over half-inch; heaviest ·78 in.
June .....	1·76	once over half-inch, ·98 in.
July .....	3·84	twice over half-inch; heaviest ·85 in.
August ...	8·03	once over 1 inch, 1·90 in.; 4 times over half-inch.
September	7·46	twice over 1 in.; 4 times over half-inch; heaviest 1·80 in.
October ...	16·68	five times over 1 inch; 7 times over half-inch; heaviest 1·95 in.

69·17

*Dolaucothy, 1st Nov., 1903.*

J. H.-J.

## METEOROLOGICAL NEWS AND NOTES.

DR. JULIUS HANN, of Vienna, has been designated by the Council of the Royal Meteorological Society as the recipient of the Symons' Gold Medal, in recognition of the valuable work which he has done in connection with meteorological science. This medal, which is awarded biennially, was founded in memory of the late Mr. G. J. Symons, and the only previous recipient has been Dr. A. Buchan. The medal will be presented at the annual meeting of the society, on January 20th, 1904.

A KITE AS THE MOTIVE POWER for a boat has recently been tested by Colonel S. F. Cody, who crossed from Calais to Dover on Saturday, 7th November, in a small collapsible boat, which was towed by a kite kept flying at the height of about a quarter of a mile. The voyage was made by night, with a favourable wind, and occupied about ten hours. It may be remembered that Benjamin Franklin, as a boy, amused himself when bathing by being drawn across a pond by means of a kite, and from time to time the proposal has been made to use kites instead of sails for ships.

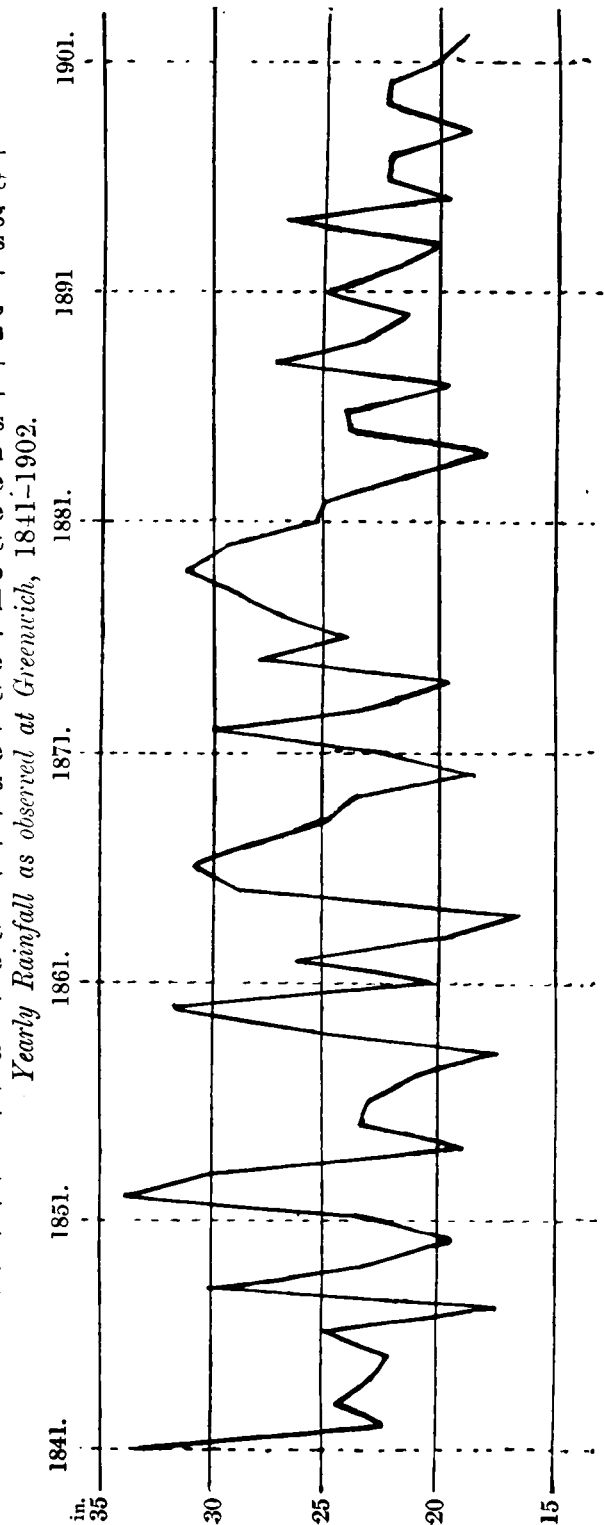
## GREENWICH RAINFALL, 1841-1902.

THE long record of rainfall at Greenwich Observatory is so frequently referred to that we have pleasure in reproducing the following article from our contemporary *The Observatory*, to the Editors of which, and to the author of the paper, we express our indebtedness.

GREENWICH  
RAINFALL,  
1841-1902.

The abnormal rainfall of the present year approximating closely in ten months to the heaviest annual fall on record, has caused so much attention to be directed to the rainfalls in previous years that it has been considered desirable to print a complete table of the falls at Greenwich, and to exhibit the annual fluctuations graphically. It might have been expected that this curve would serve to indicate the coincidence which is alleged to exist between the well-established period of sun-spots and the rainfall, but this does not appear to be borne out. The revised table of Wolf's sun-spot numbers has already been printed in this journal (*Observatory*, vol. xxv. p. 397), and will need only to be referred to. The sun-spot epochs derived from this table are:-

Maximum.  
1848, 1860, 1870, 1883,  
1893.  
Minimum.  
1843, 1856, 1867, 1878,  
1889, 1901.



The rainfall aggregates for three years at these periods are :--

Sun-spot Maximum.			Sun-spot Minimum.				
	in.			in.			
1847-1849 .....	71.29	Mean	23.76	1842-1844 .....	70.24	Mean	23.41
1859-1861 .....	78.18	„	26.06	1855-1857 .....	68.02	„	22.67
1869-1871 .....	64.87	„	21.62	1866-1868 ...	84.33	„	28.11
1882-1884 .....	65.14	„	21.71	1877-1879 .....	87.62	„	29.21
1892-1894 .....	69.32	„	23.11	1888-1890 .....	72.65	„	24.22
				1900-1902 .....	61.94	„	20.65
Mean .....		23.25		Mean .....		24.71	

Showing a slight excess at the minimum sun-spot period.

Dr. Meldrum (Proc. Meteorological Society of Mauritius, February, 1873) considered, from the discussion of the results of observations at a number of stations, that the rainfall on the whole was greater at the maximum sun-spot periods than at the minimum periods, but many results in Dr. Meldrum's paper were found to be contradictory.

*Table of Annual Rainfall at Greenwich, 1841-1902.*

	in.		in.		in.		in.
1841 .....	33.26	1857 .....	21.16	1873 .....	23.36	1888 .....	27.51
1842 .....	22.57	1858 .....	17.70	1874 .....	19.95	1889 .....	23.28
1843 .....	24.47	1859 .....	25.83	1875 .....	27.97	1890 .....	21.86
1844 .....	23.20	1860 .....	31.90	1876 .....	24.10	1891 .....	25.04
1845 .....	22.34	1861 .....	20.45	1877 .....	27.28	1892 .....	22.31
1846 .....	25.29	1862 .....	26.32	1878 .....	28.98	1893 .....	20.12
1847 .....	17.61	1863 .....	19.66	1879 ...	31.36	1894 .....	26.89
1848 .....	30.10	1864 .....	16.38	1880 .....	29.68	1895 .....	19.73
1849 .....	23.58	1865 .....	28.70	1881 .....	25.72	1896 .....	22.42
1850 .....	19.53	1866 .....	30.72	1882 .....	25.18	1897 .....	22.13
1851 .....	23.53	1867 .....	28.46	1883 .....	21.91	1898 .....	18.85
1852 .....	34.01	1868 .....	25.15	1884 .....	18.05	1899 .....	22.33
1853 .....	29.99	1869 .....	24.02	1885 ...	24.00	1900 .....	22.31
1854 .....	19.01	1870 .....	18.55	1886 .....	24.21	1901 .....	20.29
1855 .....	23.59	1871 .....	22.30	1887 .....	19.86	1902 .....	19.34
1856 .....	23.27	1872 .....	30.02				

The average for the 60 years 1841-1900 = 24.15 inches.

W.C.N.

## THE UNEXAMPLED LONDON RAINFALL OF 1903.

THE following letter appeared in *The Times* of October 29th. It may be remarked that the total rainfall for the month at Camden Square was 6.03 in., falling on 26 days; making the total from January 1st to October 31st, 34.94 in.

*To the Editor of The Times.*

SIR,—You will, I hope, permit me to follow the custom of my predecessors in laying before your readers the facts concerning an interesting point in the history of British rainfall records. This is the certainty, now established, that 1903 is to prove the wettest year since Mr. Symons established his first rain gauge in Camden Town in 1858. During the period of 46 years there

were six complete years in which the rainfall exceeded 30 in., and of these the wettest was 1878, with 34·08 in. The rainfall for the portion of 1903, from January 1 to October 27, amounts to 34·61 in., so that, to use a phrase which seems to carry much significance to the general mind, the record is broken.

Table I. shows concisely the relation which each of the six wet years bears to the average, and also to the driest year of the series, 1864. The first column gives the total fall for the first ten months, the second that for the last two months, the third the total for the year, and the fourth the ratio which the total for the year bears to the average expressed as 100.

TABLE I.  
*Comparison of Wet Years at Camden Square.*

	Ten months, January— October.	Two months, November— December.	Year.	Year, per cent. of Average.
Average 1858-1902.....	20·59	4·40	24·99	100
Driest year, 1864 .....	14·08	2·85	16·93	68
Wet year, 1860 .....	27·01	5·23	32·24	129
Wet year, 1866 .....	27·24	4·36	31·60	126
Wet year, 1872 .....	25·53	8·33	33·86	135
Wet year, 1878 .....	29·67	4·41	34·08	136
Wet year, 1879 .....	32·23	1·59	33·82	135
Wet year, 1880 .....	25·26	5·02	30·28	121
Wettest year, 1903* ...	34·61	?	?	?

\* To October 27th.

It is interesting to notice that the three years 1872, 1878, and 1879, were almost equally wet, that the total fall was about one-third more than the average, and almost exactly double the fall of the driest year. It will be observed, further, that, while in 1872 the rainfall of the last two months was twice the average, in 1866 and 1878 it was as close to the average as possible, and in 1879 it was only one-third of the average; less, in fact, than in the driest year on record. The moral of this is a warning to prophets. It is impossible to predict what the rainfall of the next two months may be; it may raise the yearly total to little over 36 in., it may cause it to surpass 40, but in either case it will be unprecedented so far as Camden Square is concerned, and for the first time London will have had more than a yard of rain.

Table II. accentuates the variability of the distribution of rain throughout the months, and brings out the fact that in 1903 three months have already had a rainfall exceeding 5 in. each—no earlier year has had more than two.

TABLE II.  
*Monthly Rainfall of the Wettest Years at Camden Square,  
compared with the Average.*

	Jan.	Feb.	March.	April.	May.	June.	July.
Average.....	1·96	1·64	1·67	1·63	1·88	2·19	2·36
1878 .....	1·31	1·49	1·12	4·97	3·89	6·71	·64
1879 .....	2·87	3·77	·91	2·72	3·46	4·76	4·17
1903 .....	2·15	·83	2·30	2·14	2·99	6·43	5·20
	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	
Average .....	2·35	2·27	2·64	2·27	2·13	24·99	
1878 .....	6·72	·82	1·99	2·95	1·47	34·08	
1879 .....	5·11	3·67	·79	·73	·86	33·82	
1903 to October 27th	4·24	2·64	5·69	?	?	?	

It may be mentioned that on no previous occasion have more than five days each with over one inch of rain occurred in any one year ; but 1903 has already had seven such days. The greatest number of rainy days in October hitherto has been 23 ; that number has already been surpassed this year.

So far I have confined myself solely to Camden Square and its record since 1858 ; but I must now venture into the less certain fields of London and all time. There is little doubt that for the British Isles as a whole the wettest year of the 19th century was 1872, and that 1852 followed hard after it, and I think that 1903 will be found at the close of the year to have outstripped both. It so happened that 1878 and 1879 were wetter than 1872 in London, but that is a local incident and not of capital importance.

The rainfall of London before 1840 is largely a matter of speculation, but fragmentary records exist as far back as 1729, and these are capable of furnishing some information. A careful search through them fails to provide proof of any year before 1820 having a rainfall approaching 34 inches. The records exceeding that figure for parts of London within 300 feet of sea level are given in Table III. so far as I can ascertain them. If any other cases exist within the limits stated, I should be glad to be informed.

TABLE III.

*Annual Rainfall in London exceeding 34 in.*

Year.	Place.	Amount.
1821 .....	Greenwich Observatory .....	34·5*
1824 .....	Greenwich Observatory .....	36·3*
1852 .....	Greenwich Observatory .....	34·01
1852 .....	St. John's Wood .....	35·10
1860 .....	St. John's Wood .....	34·60
1872 .....	Dorset Square .....	35·11*
1878 .....	Camden Square .....	34·08
1878 .....	Stoke Newington .....	35·06
1879 .....	St. John's Wood .....	34·13
1879 .....	Regent's Park .. ..	34·29

\* Doubtful records.

Even including doubtful records we may say that so much as 36½ inches of rain in one year has never been measured in London. If satisfactory records only are considered, the highest fall at any station was 35·10 in. at St. John's Wood in 1852.

In conclusion, I may be allowed to point out that this is the season for planting rain-gauges, so that new observers may have time to become accustomed to their work before commencing a new year. And I may also say that it is eminently desirable that trustworthy rain gauges should be set up in open spaces in London, by public authorities, as a safeguard against the records being broken, in the unfortunate sense of that term, by the mortality of solitary enthusiasts.

I am, your obedient servant,

HUGH ROBERT MILL.

62, Camden Square, N. W., October 28th.

## ON THE RATE OF FALL OF RAIN AT SEATHWAITE.

By HUGH ROBERT MILL, D.Sc., LL.D.

*Abstract of paper read at the British Association, Southport Meeting.*

A recording rain gauge on Negretti and Zambra's pattern was established at Seathwaite in Cumberland in the wettest part of the Lake District in July, 1899, by the late Mr. Symons, and records were obtained up to the end of December, 1900. Ordinary observations of rainfall are available for many years at the same place, and as the result of 38 years (1865-1902) the average rate of fall is  $\cdot614$  inch per rainy day, a rainy day being one on which more than  $\cdot005$  in. falls, and on the result there are 216 such days in the year, the total mean annual rainfall being 132.53 in. The total number of rainfall days for the eighteen months (July, 1899—December, 1900) was 350; the total rainfall by the recording gauge 182.91 in., or at the rate of  $\cdot523$  in. per rainy day. The average duration of rainfall was  $4\frac{3}{4}$  hours per rainy day, or nearly double the duration in London. During the period in question rain fell during 1695 hours, or at an average rate, when raining, of  $\cdot108$  in. per hour.

Taking account of continuous falls of 6 hours' duration or longer, there were 91 occasions with a total length of 822 hours, a total fall of 99.99 in., and an average rate of  $\cdot122$  in. per hour.

Taking account of falls exceeding  $\cdot50$  in. in amount, there were 86 occasions with a total duration of  $703\frac{1}{2}$  hours, a total fall of 109.47 in., and an average rate of  $\cdot156$  in. per hour.

The maximum rate at which half-an-inch or more rain fell during the eighteen months in question was  $\cdot56$  in. per hour, a total of 1.40 in. falling in  $2\frac{1}{2}$  hours from 8 to 10.30 p.m. on September 21st, 1899. This is a trifling rate compared with the fall of from 2 to 3 inches in an hour which may occur in a thunderstorm in any of the drier parts of the country, and even if attention is confined to falls of one hour only, no instance occurred of a rate equal to  $\cdot75$  in. per hour. The peculiarity of the Seathwaite rainfall seems to be its long duration and comparatively small rate of fall. The longest and heaviest shower in the period considered was  $19\frac{1}{4}$  hours, during which 3.59 in. of rain fell, at an average rate of  $\cdot186$  in. per hour.

The duration of rainfall during daylight (sunrise to sunset) and during darkness (sunset to sunrise) was calculated for the year 1900, with the result:—

	No. of hours Rain.	Amount of Rain. in.	Rate. in. per hour.	No. of Days.
Daylight .....	595	61.28	$\cdot103$	197
Darkness .....	$596\frac{1}{2}$	64.66	$\cdot108$	172

This shows that the duration of rainfall in daylight and darkness was practically identical, but that there was a very slightly greater intensity in the night than during the day.

It is very desirable to extend the use of recording rain gauges, and to be of much value the scale should be open enough to give exact readings, preferably giving a separate record strip for each day.

## BOOKS RECEIVED.

Isforholdene i de Arktiske Have, 1902. [The state of the ice in the Arctic Seas, 1902.] Published by the Danish Met. Inst. Size  $12 \times 9\frac{1}{2}$ . Pp. 22 and six plates.

Annual Report of the Director of the Royal Alfred Observatory, Mauritius, for 1901. By T. F. Claxton. Size  $13\frac{1}{2} \times 8\frac{1}{2}$ . Pp. 24.

THE TEN MONTHS' RAINFALL OF 1903.

*Aggregate Rainfall for January—October, 1903.*

Stations.	Diff. from Aver.	Per cent. of Aver.	Stations.	Diff. from Aver.	Per cent. of Aver.	Stations.	Diff. from Aver.	Per cent. of Aver.
	in.			in.			in.	
London .....+	16·32	188	Arnccliffe ...+	24·47	150	Braemar ...+	11·28	141
Tenterden .....+	+6·75	131	Hull .....+	+6·29	130	Aberdeen .....+	+8·40	133
Hartly Wntn'y ..+	14·12	169	Newcastle.....+	+9·47	145	Cawdor .....+	+4·89	120
Hitchin .....+	14·62	177	Seathwaite ..+	38·64	137	Glencarron ..+	18·73	125
Winslow .....+	12·70	166	Cardiff .....+	16·17	151	Dunrobin .....+	+6·77	128
Westley .....+	+7·39	136	Haverf'dwest..+	14·88	144	Darrynane ...+	+7·93	120
Brundall .....+	+5·84	129	Gogerddan ..+	16·80	148	Waterford ..+	10·74	134
Alderbury .....+	13·33	161	Llandudno ...+	+7·59	131	Broadford ..+	12·08	145
Ashburton .....+	18·32	148	Dumfries .....+	18·86	154	Carlow .....+	11·70	143
Polapit Tamar ..+	14·89	151	Lilliesleaf ...+	14·15	158	Dublin .....+	+5·48	124
Stroud .....+	14·74	167	Colmonell .....+	+8·81	126	Mullingar ...+	13·54	146
Woolstaston ...+	14·56	162	Glasgow .....+	21·35	175	Ballinasloe ..+	11·75	140
Boston .....+	10·19	161	Inveraray ...+	19·04	134	Clifden .....+	11·07	117
Hesley Hall .....+	+7·14	141	Islay .....+	11·86	133	Crossmolina ..+	14·54	136
Derby .....+	+9·13	148	Mull .....+	14·12	132	Seaforde .....+	13·01	145
Bolton .....+	10·44	131	Loch Leven ..+	18·76	166	Londonderry..+	+6·87	121
Wetherby .....+	14·67	174	Dundee .....+	+9·37	143	Omagh .....+	15·57	149

REVIEW.

*Les Variations Passagères de la Température, causes ou effets des tourbillons atmosphériques.* P. MARC DECHEVRENS, S.J. Estratto dalle Memorie della Pontificia Accademia Romana dei Nuovi Lincei, vol. XIX. (1902).

WE are pleased to call the attention of readers interested in the theory of cyclones, to the above publication. The author concludes from observations made at Pike's Peak, Colorado, and various other high level stations, that, at an altitude of about 4000 metres, the temperature of the air in a cyclonic disturbance is much below the average, just as it is much above at sea level. He then proceeds to show that cyclones, at all events those of Europe, cannot be satisfactorily explained by the convection theory, which ascribes their origin to the ascent of masses of heated air, maintaining, on the contrary, that the abnormal development of heat in the lower atmosphere of a disturbance, as well as of cold in the elevated regions, is the product and not the cause of cyclone action, the excess of temperature below being due to a concentration of the particles of air and the deficit above to a radial dispersion or rarefaction of them. Father Dechevrens' pamphlet contains an impartial exposition of facts together with the results of original investigation.

## RAINFALL AND TEMPERATURE, OCTOBER, 1903.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					Days on which -01 or more fell.	TEMPERATURE.				No. of Nights below 32°.	
		Total Fall.	Differ- ence from average 1890-9.	Greatest Fall in 24 hours.	Dpth Date	Max.		Min.		In shade.	On grass.		
						Deg.		Date	Deg.			Date	
I.	London (Camden Square) ...	inches. 6·03	inches. + 3·44	in. .94	11	26	67·4	1	36·0	24	0	2	
II.	Tenterden .....	4·76	+ 1·77	·62	11	26	66·4	3	35·0	31	0	2	
III.	Hartley Wintney .....	7·49	+ 4·60	1·24	11	31	65·0	1b	33·0	24d	0	2	
IV.	Hitchin .....	5·73	+ 3·16	·90	11	29	65·0	1	37·0	23e	0	...	
V.	Winslow (Addington) .....	6·30	+ 3·61	·83	27	27	66·0	3	33·0	21	0	3	
VI.	Bury St. Edmunds (Westley) .....	5·30	+ 2·64	·83	11	25	68·0	3	35·0	10f	0	...	
VII.	Norwich (Brundall) .....	4·21	+ 1·59	·74	11	27	67·0	3	35·4	24	0	1	
VIII.	Winterborne Steepleton .....	8·32	...	·87	19	30	65·3	1	31·2	31	1	3	
IX.	Torquay .....	6·95	...	·69	14	28	63·8	3	40·9	29	0	0	
X.	Polapit Tamar [Launceston]..	11·27	+ 6·73	1·30	27	30	65·4	2	35·1	29	0	0	
XI.	Stroud (Upfield) .....	7·09	+ 4·31	1·15	11	29	65·0	1	33·0	30	0	...	
XII.	Church Stretton (Woolstaston)	6·78	+ 3·28	1·10	27	31	62·0	1	37·5	24	0	...	
XIII.	Worcester (Diglis Lock) .....	5·16	+ 2·51	·80	11	28	...	...	...	...	...	...	
XIV.	Boston .....	5·63	+ 3·36	·95	11	21	65·0	1	35·0	24	0	...	
XV.	Hesley Hall [Tickhill] .....	5·22	+ 2·65	·60	14	23	66·0	1	35·0	24	0	0	
XVI.	Derby (Midland Railway) .....	5·38	+ 2·84	·76	6	30	66·0	1	34·0	9	0	...	
XVII.	Bolton (The Park) .....	9·72	+ 5·16	1·35	27	30	60·0	6	36·5	10	0	2	
XVIII.	Wetherby (Ribston Hall) ...	8·61	+ 5·81	1·55	8	29	...	...	...	...	...	...	
XIX.	Arncliffe Vicarage .....	14·77	+ 8·13	1·33	8	30	...	...	...	...	...	...	
XX.	Hull (Pearson Park) ..	5·84	+ 2·80	·72	11	26	66·0	1	30·0	24	3	4	
XXI.	Newcastle (Town Moor) .....	9·24	+ 6·52	3·68	8	29	...	...	...	...	...	...	
XXII.	Borrowdale (Seathwaite) .....	23·64	+ 10·22	2·35	26	30	63·5	5	31·8	10	1	...	
XXIII.	Cardiff (Ely) .....	11·37	+ 6·94	2·19	14	29	...	...	...	...	...	...	
XXIV.	Haverfordwest .....	10·17	+ 5·09	1·02	14	29	61·6	4, 7	35·2	28	0	5	
XXV.	Aberystwith (Gogerddan) ..	12·08	+ 6·52	1·21	19a	29	64·0	11	32·0	23	1	...	
XXVI.	Llandudno .....	5·43	+ 1·43	·92	27	29	62·0	6	40·5	27	0	...	
XXVII.	Cargen [Dumfries] .....	10·40	+ 5·97	1·36	27	29	62·0	1	28·0	10	1	...	
XXVIII.	Edinburgh (Royal Observatory)	5·72	...	1·06	8	30	62·1	1	35·6	10	0	2	
XXIX.	Colmonell .....	9·01	+ 4·67	·85	6	28	65·0	24	32·0	9	1	...	
XXX.	Tighnabruaich .....	10·61	...	·88	4	29	57·0	3	34·0	9	0	...	
XXXI.	Mull (Quinish) .....	11·51	+ 5·94	1·16	4	27	...	...	...	...	...	...	
XXXII.	Loch Leven Sluices .....	7·55	+ 3·88	·97	7	29	...	...	...	...	...	...	
XXXIII.	Dundee (Eastern Necropolis)	5·30	+ 2·54	·70	6	27	62·6	2	32·6	24	0	...	
XXXIV.	Braemar .....	5·39	+ 1·51	·82	27	29	57·0	1	29·2	10	1	13	
XXXV.	Aberdeen (Cranford) ..	4·86	+ 1·50	·71	27	26	63·0	2	33·0	23	0	...	
XXXVI.	Cawdor (Budgate) .....	4·11	+ 1·17	·63	3	29	...	...	...	...	...	...	
XXXVII.	Strathconan [Beaul] .....	9·96	+ 4·31	2·49	16	17	...	...	...	...	...	...	
XXXVIII.	Glencarron Lodge .....	13·43	+ 4·14	2·61	15	29	61·0	1	29·2	10	2	...	
XXXIX.	Dunrobin .....	4·63	+ 1·35	·65	24	22	64·0	2	33·0	7f	0	...	
XL.	Castletown .....	6·18	...	1·07	5	30	60·0	1	27·0	8	2	...	
XLI.	Darrynane Abbey .....	8·31	+ 3·10	1·00	10	29	...	...	...	...	...	...	
XLII.	Waterford (Brook Lodge) ...	6·56	+ 2·66	1·36	28	26	61·0	1, 3	26·0	28	2	...	
XLIII.	Broadford (Hurdlestown) ...	5·73	+ 2·63	1·03	28	28	62·0	1	28·0	27	3	...	
XLIV.	Carlow (Browne's Hill) .....	3·92	+ ·52	·46	27	27	...	...	...	...	...	...	
XLV.	Dublin (Fitz William Square)	2·61	— ·42	·32	6	22	64·9	6	33·6	28	0	2	
XLVI.	Ballinasloe .....	4·59	+ 1·19	·62	28	30	66·0	6	22·0	28	4	...	
XLVII.	Clifden (Kylemore) .....	11·25	+ 3·31	50	28	29	...	...	...	...	...	...	
XLVIII.	Seaforde .....	7·43	+ 3·84	1·31	25	28	60·0	2c	32·0	26	1	3	
XLIX.	Londonderry (Creggan Res.) ..	6·82	+ 2·74	·93	6	31	...	...	...	...	...	...	
L.	Omagh (Edenfel) .....	7·28	+ 3·37	1·09	6	29	60·0	1, 4	32·0	26a	2	4	

+ Shows that the fall was above the average ; — that it was below it.  
a and 27. b and 2, 3. c and 3, 4. d and 31. e and 30. f and 24.



## SUPPLEMENTARY RAINFALL, OCTOBER, 1903.

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Harrow Weald .....	7.30	XI.	Llandefaelog-fach.....	10.29
II.	Dorking, Abinger Hall ..	8.93	„	New Radnor, Ednol.....	10.50
„	Sheppey, Leysdown .....	3.96	„	Rhayader, Nantgwillt...	15.06
„	Hailsham .....	7.01	„	Lake Vyrnwy .....	13.59
„	Crowborough.....	9.28	„	Ruthin, Plâs Drâw .....	7.86
„	Ryde, Beldornie Tower..	6.57	„	Criccieth, Talarvor .....	8.71
„	Bournemouth, Kempsey ..	9.33	„	I. of Anglesey, Lligwy..	7.45
„	Emsworth, Redlands ...	8.78	„	Douglas, Woodville.....	8.95
„	Alton, Ashdell .....	10.07	XII.	Stoneykirk, Ardwell Ho.	9.46
„	Newbury, Welford Park ..	8.35	„	Dalry, Old Garroch .....	12.34
III.	Oxford, Magdalen Coll..	6.30	„	Moniaive, Maxwellton Ho.	11.63
„	Banbury, Bloxham .....	6.21	„	Lilliesleaf, Riddell .....	8.21
„	Pitsford, Sedgebrook ...	6.22	XIII.	N. Esk Res. [Penicuik]	7.90
„	Huntingdon, Bampton..	5.35	XIV.	Dalry, Blair .....	9.30
„	Wisbech, Bank House...	4.87	„	Glasgow, Queen's Park..	7.47
IV.	Southend .....	4.55	XV.	Inveraray, Newtown ...	13.08
„	Colchester, Lexden .....	5.01	„	Ballachulish, Ardsheal...	15.68
„	Saffron Waldon, Newport	4.95	„	Campbeltown, Redknowe	11.27
„	Rendlesham Hall .....	4.18	„	Islay, Eallabus.....	9.59
„	Swaffham .....	6.19	XVI.	Dollar.....	8.64
V.	Salisbury, Alderbury ...	8.97	„	Balquhider, Stronvar...	15.58
„	Bishop's Cannings .....	6.97	„	Coupar Angus Station...	4.81
„	Ashburton, Druid House ..	12.98	„	Blair Atholl ...	6.45
„	Okehampton, Oaklands..	10.17	„	Montrose, Sunnyside ...	4.79
„	Hartland Abbey .....	11.43	XVII.	Alford, Lynturk Manse..	5.59
„	Lynmouth, Rock House ..	12.75	„	Keith H.R.S.....	4.98
„	Probus, Lamellyn .....	9.42	XVIII.	Fearn, Lower Pitkerrie..	5.00
„	Wellington, The Avenue ..	6.69	„	S. Uist, Askernish .....	8.77
„	North Cadbury Rectory ..	6.40	„	Invergarry .....	10.29
VI.	Clifton, Pembroke Road ..	8.03	„	Aviemore, Alvie Manse..	4.38
„	Ross, The Graig .....	7.40	„	Loch Ness, Drumnadrochit	5.72
„	Shifnal, Hatton Grange ..	5.40	XIX.	Invershin .....	5.76
„	Wem Rectory .....	5.76	„	Bettyhill .....	4.96
„	Cheadle, The Heath Ho..	5.79	„	Watten H.R.S.....	4.72
„	Coventry, Kingswood ...	6.58	XX.	Cork, Wellesley Terrace	5.82
VII.	Market Overton .....	6.37	„	Killarney, District Asyl.	8.59
„	Grantham, Stainby .....	6.06	„	Glenam [Clonmel] .....	5.32
„	Horncastle, Bucknall ...	5.59	„	Ballingarry, Hazelfort...	4.27
„	Workop, Hodsack Priory ..	4.88	„	Milltown Malbay .....	7.30
VIII.	Neston, Hinderton .....	7.30	XXI.	Gorey, Courtown House ..	3.93
„	Southport, Hesketh Park ..	6.98	„	Moynalty, Westland ...	4.34
„	Chatburn, Middlewood. ...	...	„	Athlone, Twyford .....	3.81
„	Duddon Val., Seathwaite Vic.	15.76	„	Mullingar, Belvedere ...	4.67
IX.	Langsett Moor, Up. Midhope	10.43	XXII.	Woodlawn .....	5.61
„	Baldersby .....	7.17	„	Westport, Murrisk Abbey	9.19
„	Scalby, Silverdale .....	7.61	„	Crossmolina, Enniscoe ..	8.13
„	Ingleby Greenhow Vic..	8.23	„	Collooney, Markree Obs.	6.81
„	Middleton, Mickleton ...	9.54	XXIII.	Enniskillen, Portora ...	6.10
X.	Beltingham .....	9.23	„	Warrenpoint.....	4.56
„	Bamburgh .....	6.64	„	Baubridge, Milltown ...	4.63
„	Keswick, The Bank.....	11.90	„	Belfast, Springfield .....	7.30
„	Melmerby Rectory .....	8.85	„	Bushmills, Dundarave..	7.13
XI.	Llanfrechfa Grange .....	11.43	„	Stewartstown .....	5.53
„	Treherbert, Tyn-y-waun	20.37	„	Killybegs .....	7.44
„	Castle Malgwyn .....	10.78	„	Horn Head .....	7.83

## METEOROLOGICAL NOTES ON OCTOBER, 1903.

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

## ENGLAND.

LONDON, CAMDEN SQUARE.—Exceedingly wet and very mild, the mean temp. being  $53^{\circ}\cdot 1$ , or  $3^{\circ}\cdot 3$  above the average, and the highest with three exceptions in 46 years. Measurable R fell on 29 days, but of these only 26 rank as days with rain.—See p. 180.

ABINGER HALL.—Mild and open weather, with extraordinary R, beating all records since 1879, and bringing the total since January 1st to 42·94 in., which is in excess of all yearly records. In this neighbourhood the great fall was welcome, as all wells were low and some had had to be deepened.

CROWBOROUGH.—R exactly the same as in October, 1891, and has not been exceeded since 1870, while the number of rainy days (28) forms a record for the month. Mean temp.  $50^{\circ}\cdot 7$ .

EMSWORTH, REDLANDS.—Continuous gales. The largest R ever recorded at this station in any month and 5·48 in. above the October average of 19 years.

HARTLEY WINTNEY.—R fell every day and exceeded in amount that of any month recorded at this station. Slight TSS on 22nd and 25th and L on 6 days. Ozone on 8 days with a mean of 4·6. Oaks still in luxuriant autumn foliage.

WINSLOW, ADDINGTON.—With the exception of 1891 the greatest R recorded in October. Meadows have been under water many times during the month.

PITSFORD, SEDGEBROOK.—A month of constant R, wind and gloom. Heavy floods in the last week.

COLCHESTER, LEXDEN.—Continuously mild, overcast and very wet, save from 28th to 30th, when it was colder, with a few hours' sunshine.

WINTERBOURNE STEEPLTON.—Remarkable for the number of rainy days. More than 26 has never been recorded in 11 years. Mean temp.  $51^{\circ}\cdot 9$ .

TORQUAY, CARY GREEN.—R 3·01 in. above the average. Mean temp.  $54^{\circ}\cdot 2$ , or  $2^{\circ}\cdot 4$  above the average. Duration of sunshine 101·3 hours, being 13·5 hours below the average. Mean amount of ozone 5·6; max. 8·5 on 14th with S.S.W. wind; min. 3·0 on 8th with S.W. wind, and on 21st with W. wind.

POLAPIT TAMAR [LAUNCESTON].—Gloomy and extraordinarily wet. Much damage was caused on 28th by the highest floods remembered. The R was by far the greatest in one month for 23 years.

OKEHAMPTON, OAKLANDS.—A record wet month; only two days without R.

WELLINGTON, THE AVENUE.—The largest R, about double the average, and number of rainy days recorded in about 12 years. R on 29 years.

NORTH CADBURY RECTORY.—A month of one character throughout. Temp. high and very equable. Only one day wholly without R and 28 with a measurable quantity. The pond, strange to say, has often been seen higher.

CLIFTON, PEMBROKE ROAD.—R more than double the average. Frequent strong winds and gales from S.E. to S.W. The wettest October in 48 years with the single exception of 1891, when 8·71 in. of R fell.

ROSS, THE GRAIG.—The R beat the record for any October for which observations were made since 1818, both for total amount and number of days. It rained every day. Round Ross most of the farmers succeeded in harvesting their corn, but in the later districts in Herefordshire many fields were uncut.

CHURCH STRETTON, WOOLSTASTON.—Exceedingly wet. Hurricane on 25th and violent gale on 27th with heavy R. Much harvest still out at the end.

BOLTON, THE PARK.—Without precedent for number of wet days and amount of R, surpassing the fall of 9·14 in. in September, 1896. Mean temp.  $48^{\circ}\cdot 6$ , or  $1^{\circ}\cdot 7$  above the average.

SEATHWAITE VICARAGE.—The wettest October for the last generation.

ARNCLIFFE VICARAGE.—The wettest month on record in this district.

NEWCASTLE, TOWN MOOR.—The greatest monthly fall, the greatest number of rainy days and the greatest fall in 24 hours since 1868.

# WALES AND THE ISLANDS.

**HAVERFORDWEST.**—The greatest R in October during 55 years. Great quantities of R fell in short periods, including 1·02 in. on 15th. It was mild from beginning to end.

**BRECON.**—TS on evening of 25th.

**ABERYSTWITH, GOGERDDAN.**—R a record for the month and more than any of the inhabitants can remember, but little damage was done.

**DOUGLAS, WOODVILLE.**—The R exceeded that of any previous October and, with two exceptions, that of any month in at least 30 years. Gales of unusual violence blew on 13 days. TS on 25th March. R and the worst of the gales occurred at night and there were at least 15 days fine.

# SCOTLAND.

**CARGEN [DUMFRIES].**—The R has only twice been exceeded in a single month since observations were commenced in 1860. In December, 1897, 11·24 in. were registered, and in October, 1874, 10·72 in. Neither of these months, however, had nearly so many rainy days. No harvest work was possible and most of the grain crop was absolutely valueless.

**LILLIESLEAF, RIDDELL.**—In 39 years record no month has equalled this, the highest previous fall being 7·72 in. in July, 1877, and the highest in October 5·85 in. in 1896. In the whole month there were only four fine days, and it was practically impossible to get any corn in dry. For mild and warm weather the month has probably never been equalled.

**BALLACHULISH, ARDSHEAL.**—R 9·34 in. above the average. The second wettest month during 11 years.

**MULL, QUINISH.**—The R of the month has only twice been exceeded—12·49 in. on 30 days in Nov., 1877, and 11·57 in. on 26 days in Sept., 1879.

**COUPAR ANGUS.**—The most persistent R in a quarter of a century, not so much for total fall as for number of wet days and continually saturated atmosphere. In many cases the harvest was unfinished, the sheaves being half covered with water, so that farmers despaired of saving more. The most disastrous harvest on record. Mean temp. 46°·3.

**BLAIR ATHOLL.**—Very late harvest. Fully two-thirds of the crop of oats was still in stooks at the end of the month and in a bad condition.

**DRUMNADROCHIT.**—R 2·26 in. above the average of 17 years. The fall from January 1st exceeds that of any previous whole year for 17 years.

**CASTLETOWN, THE CLETT.**—Cold and damp, with overcast skies and abnormal R. Harvesting operations were carried on under most disheartening conditions and at the end of the month great parts of the crop were still uncut, and where cut the corn remains wet in the fields.

# IRELAND.

**CORK, WELLESLEY TERRACE.**—Remarkable for excessive R and low temp., the R being 2·52 in. in excess of the average, and for the 10 months 16·77 in. over the average. The mean temp. was 3°·3 in. below the average, and that of 18th the lowest in October for 21 years.

**MILTOWN MALBAY.**—R every day but one. Mild throughout and vegetation on dry rich lands was vigorous. Owing to the unceasing R, gales and high winds, it is proving a most disastrous year for agriculturists.

**DUBLIN, FITZWILLIAM SQUARE.**—Frequent but not very heavy R; comparatively high temp.; S.W., W. and N.W. winds; and a high percentage of sunshine. Mean temp. 51°·4, or 2°·0 above the average. High winds on 14 days, reaching the force of a gale on 5. Duration of sunshine 132·75 hours.

**COLLOONEY, MARKREE OBSERVATORY.**—Very wet and stormy, reaching the force of a gale at times. H showers on 13th, 15th and 17th, and frost on 27th and 28th. The nights were generally cloudy.

**BANBRIDGE, MILTOWN.**—The R of the last 10 months was 33·97 in., the greatest for 42 years except 1872, which was 36·8 in.

**OMAGH, EDENFEL.**—The third month this year with R over 7 inches, bringing the total to 47·56 in., over 10 inches above the average for the whole year. A great deal of the grain and late hay was either entirely lost or hopelessly damaged. The only set off was the abnormal mildness, which kept the trees in leaf to the end, accompanied by a magnificent display of autumn tints.

## CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, MAY, 1903.

STATIONS.  (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain.		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity-  0-100	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
	°		°		°	°	°		°	°	inches		
London, Camden Square	80·9	30	34·9	13	65·1	45·8	47·6	81	122·8	30·1	2·99	17	5·2
Malta.....	81·2	21	50·2	18	73·4	58·7	56·5	76	132·7	42·9	·00	0	3·5
Lagos, W. Africa .....	90·0	<i>a</i>	73·0	21	88·7	78·2	76·4	77	140·0	...	3·00	7	...
Cape Town .....	78·8	4	42·8	21	63·4	50·8	50·8	80	...	...	5·16	14	6·0
Durban, Natal .....	86·7	24	51·3	31	78·4	58·6	...	...	139·1	...	·91	6	3·2
Mauritius.....	81·8	<i>2 b</i>	58·5	13	80·1	65·7	72·2	76	145·2	49·4	1·00	11	4·5
Calcutta.....	106·2	<i>22 c</i>	73·2	9	98·6	78·8	73·5	64	164·0	71·0	1·53	3	3·8
Bombay.....	93·7	22	74·0	26	89·5	79·1	75·8	77	136·8	71·8	7·73	6	3·7
Madras .....	101·1	16	74·8	19	94·5	78·9	75·6	77	146·0	73·4	5·32	4	4·0
Kodaikanal .....	71·0	5, 7	49·4	20	67·3	54·3	52·7	79	143·6	42·7	6·00	11	5·8
Colombo, Ceylon....	92·2	5	69·6	18	88·5	76·7	76·6	90	146·2	69·1	20·76	25	7·1
Hongkong.....	87·0	20	66·3	2	79·5	72·2	71·2	87	139·1	...	13·96	16	8·5
Melbourne.....	71·2	6	33·4	28	58·9	45·6	46·2	83	129·1	24·2	1·94	12	7·1
Adelaide .....	76·6	7	38·7	31	64·4	47·7	45·9	71	133·5	33·1	1·70	11	...
Coolgardie .....	76·6	15	34·8	30	64·5	46·7	45·2	70	139·6	29·3	1·91	7	5·6
Sydney .....	73·0	8	44·7	29	63·9	52·6	48·4	78	103·8	36·0	3·23	24	5·6
Wellington .....	65·5	3	36·5	24	56·4	46·3	44·9	80	108·0	28·0	8·95	19	6·7
Auckland .....	64·5	14	44·0	23	60·5	51·5	48·8	77	122·0	42·0	6·09	20	5·1
Jamaica, Negril Point..	89·4	21	68·2	4	86·6	73·8	71·5	73	...	...	4·40	12	...
Trinidad .....	95·0	<i>a</i>	61·0	<i>24 e</i>	93·3	68·6	71·4	71	167·0	61·0	·95	7	...
Grenada.....	90·2	1	73·0	22	86·6	75·6	69·5	70	149·2	...	1·42	15	3·4
Toronto .....	83·2	<i>19 d</i>	28·6	1	66·6	45·2	45·3	67	104·0	25·0	1·80	8	4·1
St. John's, N.B.....	72·0	18	28·3	2	55·9	41·9	...	...	...	...	3·13	6	4·4
Winnipeg .....	84·1	15	17·0	2	67·8	40·6	...	...	...	...	3·40	9	5·0
Victoria, B.C. ....	64·6	11	38·6	21	57·9	45·3	...	...	...	...	·79	12	6·2
Dawson .....	65·5	19	18·4	5	53·9	33·0	...	...	...	...	·39	2	3·5

Trinidad.....	March..	93·0	29	61·0	26	89·9	66·6	64·9	65	162·0	60·0	1·74	...	...
	April ...	94·0	<i>28, 29</i>	61·0	29	91·3	65·5	71·0	75	170·0	75·0	2·17	6	...
<i>a</i> several. <i>b</i> and 3, 5, 10. <i>c</i> and 24. <i>d</i> and 20. <i>e</i> and 25, 26, 23.														

MALTA.—Mean temp. of air 64·5 or 0°·5 above, mean hourly velocity of wind 11·1 or 1·0 above, averages. Mean temp. of sea 65°·7.

MAURITIUS.—Mean temp. of air 0°·1 above, dew point 0°·9, and R 3·02 in., below, averages. Mean hourly velocity of wind 9·2 miles, or 1·0 below average.

MADRAS.—Bright sunshine 156·7 hours, or 39·9 per cent. of possible.

KODAIKANAL.—Mean temp. of air 59°·5. Mean velocity of wind 282 miles per day. Bright sunshine 174·6 hours.

COLOMBO.—Mean temp. of air 80°·4 or 2°·1 below, of dew point 1°·4 above, and R 8·90 in. above, averages. Mean hourly velocity of wind 5·5 miles, prevailing direction S. W.

HONGKONG.—Mean temp. of air 75°·4. R 1·42 in. above average. Bright sunshine 82·5 hours, or 70 hours below average. Mean hourly velocity of wind 13·8 miles.

ADELAIDE.—Mean temp. of air 56°·0 or 1°·6 below, R 1·06 in. below, 46 years' average.

WELLINGTON.—Mean temp. of air 0°·6 below, and R 4·06 in. above, averages.

TRINIDAD.—R 2·98 in. below the 40 years' average.





*Frontispiece.*

**THE SOUTHPORT METEOROLOGICAL BREAKFAST.**

*[Photograph by J. A. Kay, Southport.]*

- 1 Prof. J. Larnor.
- 3 Prof. L. Boltzmann.
- 4 W. E. Hoyle.
- 5 Dr. A. J. Herbertson.
- 6 Dr. W. J. S. Lockyer.
- 7 L. Tisserand de Bort.
- 8 Prof. H. Hergesell.
- 9 A. Lawrence Rotch.
- 10 Dr. A. Paulsen.
- 11 Capt. E. W. Creak.
- 13 Dr. W. G. Black.
- 14 P. Fabryan Amery.
- 15 Prof. W. W. Watts.
- 17 John Bolton.
- 18 J. H. W. Biggs.
- 19 W. H. Dines.
- 20 Sir Oliver Lodge.
- 21 Sir Norman Lockyer.
- 22 Dr. W. N. Shaw.
- 23 S. Hardman.
- 24 Dr. R. T. Glazebrook.
- 25 Dr. J. Y. Simpson.
- 26 Prof. E. Mascart.
- 27 A. R. Hinks.
- 28 Prof. Willis Moore.
- 29 H. Southall.



KEY TO PHOTOGRAPH OF THE METEOROLOGICAL BREAKFAST AT SOUTHPORT.

- 31 Hon. Rollo Russell.
- 32 H. J. Mackinder.
- 33 F. Crowley.
- 34 Prof. Hildebrandsson.
- 36 E. Douglas Archibald.
- 37 J. Smyth.
- 38 E. J. B. Sopp.
- 39 A. Warner.
- 40 J. Hopkinson.
- 42 Prof. A. Schuster.
- 43 Dr. A. Buchan.
- 44 Dr. G. Hellmann.
- 45 J. Smith.
- 46 General Rykatcheff.
- 47 Prof. H. H. Turner.
- 48 R. G. K. Lempfert.
- 49 R. S. Whipple.
- 50 E. Kitto.
- 51 F. J. Brodie.
- 52 Dr. Van Bebbler.
- 53 Rev. Dr. Parker.
- 54 F. W. Harner.
- 55 W. Marriott.
- 56 W. T. Ackroyd.
- 57 Dr. M. Snellen.
- 58 Prof. H. Mohn.
- 59 Dr. H. R. Mill.

[Frontispiece.]

THE SOUTHPORT METEOROLOGICAL BREAKFAST.

[Photograph by J. A. Kay, Southport.]