

# SYMONS'S

## MONTHLY

# METEOROLOGICAL MAGAZINE.

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### HEAT AND DROUGHT IN SEPTEMBER, 1898.

IN 1895 we had to chronicle a September phenomenally warm and dry, and now—only three years after—we have another September exceptionally dry, and even more remarkable for high temperatures, for referring to the article\* above mentioned we find no max. reading in 1895 as high as 90°, while this year we have at least a dozen readings exceeding that point.

#### RAINFALL.

Dealing first with the drought. Reference to the regular table of rainfall and temperature at 50 stations will at once show that the month was remarkably dry over the whole of England and Wales. We have extracted, to form the following table, all returns in those countries of less than half the average fall. There are 21 stations for which the average is available, and of these, 15 or nearly three-quarters, show a deficiency of more than 50 per cent., and 9 of 75 per cent. The deficiency is most marked in the E. and N.E. of England, where the falls are generally about a quarter-of-an-inch.

Station.	County.	Rainfall in.	Rainy days.	Per cent. of average
Bury St. Edmunds, Westley .. .. .	<i>Suffolk</i> .. . . .	·20	4	7
Boston .. . . .	<i>Lincoln</i> .. . . .	·27	3	10
Hull, Pearson Park .. . . .	<i>York, E. R.</i> .. . . .	·26	3	11
Hitchin .. . . .	<i>Hertford</i> .. . . .	·31	3	12
London, Camden Square .. . . .	<i>Middlesex</i> .. . . .	·33	4	13
Manchester, Plymouth Grove .. . . .	<i>Lancashire</i> .. . . .	·54	8	16
Newcastle, Town Moor .. . . .	<i>Northumberland</i> .. . . .	·61	5	22
Church Stretton, Woolstaston .. . . .	<i>Shropshire</i> .. . . .	·60	7	24
Hesley Hall [Tickhill] .. . . .	<i>Nottingham</i> .. . . .	·51	5	24
Tenterden .. . . .	<i>Kent</i> .. . . .	·77	6	26
Stroud, Upfield .. . . .	<i>Gloucester</i> .. . . .	·78	6	27
Wetherby, Ribston Hall .. . . .	<i>York, W. R.</i> .. . . .	1·13	5	46
Polapit Tamar [Launceston] .. . . .	<i>Devon</i> .. . . .	1·71	12	46
Haverfordwest .. . . .	<i>Pembroke</i> .. . . .	2·03	9	46
Aberystwith, Gogerddan .. . . .	<i>Cardigan</i> .. . . .	2·04	7	48

In the next table are given all the absolute and partial droughts which occurred at the 26 English and Welsh stations. Absolute

\* See *Met. Mag.*, November, 1895, pp. 150-156.

droughts occurred at nine stations, and partial droughts at 16 stations, but in no case is the duration exceptional, for as is well known, rain fell over the country generally on the 29th, this being the day of max. fall at the majority of stations. We should, perhaps, add, in explanation of the absence of drought of exceptional duration (according to the definitions so long adopted in *British Rainfall*) at a time when it is matter of common knowledge that wells and springs were failing and dry over vast areas of the kingdom, that in the dry districts not only was the rainfall of the years 1895, 1896 and 1897 below the average, but that for more than twelve months past almost every month had a deficient fall, and there was a marked absence of heavy rains.

*Droughts in September, 1898.*

ABSOLUTE DROUGHTS.—Periods of more than 14 consecutive days absolutely without rain.

PARTIAL DROUGHTS.—Periods of more than 28 consecutive days, the aggregate rainfall of which does not exceed 0·01 in. per diem.

STATION AND COUNTY.	ABSOLUTE DROUGHTS.			PARTIAL DROUGHTS.			
	Began.	Ended.	Lasted. days.	Began.	Ended.	Lasted. days.	Amount in.
London, Camden Square, ... <i>Middlesex.</i>	None.	...	...	Aug. 16	Sep. 28	44	·35
Tenterden, ..... <i>Kent.</i>	None.	...	...	Aug. 9	Sep. 17	40	·37
Hartley Wintney, ..... <i>Hampshire.</i>	Aug. 31	Sep. 16	17	Aug. 16	Sep. 28	44	·34
Hitchin, ..... <i>Hertfordshire.</i>	Aug. 31	Sep. 17	18	Aug. 16	Sep. 28	44	·25
Winslow, Addington, ..... <i>Buckingham.</i>	Aug. 31	Sep. 16	17	Aug. 8	Sep. 28	52	·36
Bury St. Edmunds, ..... <i>Suffolk.</i>	Aug. 30	Sep. 17	19	Aug. 30	Sep. 30	32	·20
Norwich, Brundall, ..... <i>Norfolk.</i>	None.	...	...	Aug. 11	Sep. 26	47	·46
Torquay, Cary Green, ..... <i>Devonshire.</i>	Aug. 31	Sep. 16	17	Aug. 19	Sep. 27	40	·40
Stroud, Upfield, ..... <i>Gloucester.</i>	Aug. 31	Sep. 16	17	Aug. 29	Sep. 28	31	·24
Church Stretton, Woolstaston <i>Shropshire.</i>	None.	...	...	Aug. 31	Sep. 28	29	·28
Worcester, Diglis Lock, ..... <i>Worcester.</i>	None.	...	...	Aug. 28	Sep. 28	32	·24
Leicester, Rotherby Hall, ... <i>Leicester.</i>	Aug. 30	Sep. 17	19	Aug. 28	Sep. 28	32	·22
Boston, ..... <i>Lincolnshire.</i>	Aug. 30	Sep. 18	20	Aug. 16	Sep. 28	44	·44
Hesley Hall [Tickhill], ..... <i>Nottingham.</i>	None.	...	...	Aug. 28	Sep. 28	32	·26
Wetherby, Ribston Hall, ... <i>Yorkshire, W.R.</i>	None.	...	...	Aug. 30	Sep. 28	30	·23
Hull, Pearson Park, ..... <i>Yorkshire, E.R.</i>	Sep. 11	Sep. 26	16	Aug. 30	Sep. 30	32	·26

The rain on the 29th was very irregularly distributed, and at several stations reached an exceptional amount, the following being all instances of two inches, or more, yet reported to us.

Haslemere, Lower Street.....	Surrey .....	in. 2·42
"    Hazelhurst.....	" .....	2·19
Chiddingfold .....	" .....	2·31
Chichester, Chilgrove .....	Sussex .....	2·09
Midhurst, Borden Wood .....	" .....	2·18
Seathwaite .....	Cumberland.....	2·29
Oakley Quarries .....	Merioneth .....	2·45
Stoneykirk, Ardwell House .....	Wigton.....	2·00

Comparing 1898 with 1895 we find that the former month yielded a larger number of both absolute and partial droughts, but a smaller number of stations with less than half the average fall.

	Absolute Droughts.		Partial Droughts.		Difference from Average.					
	No. of Stations.	Average No.	Average duration.	No.	Average duration.	No. of Stations.	Below 50 p. c. per cent.	Below 25 p. c. per cent.	Average No. per cent.	
1895	50	4	19 days.	2	41 days.	41	30	28	13	17
1898	50	9	18 ,,	16	38 ,,	37	16	25	10	16

For Camden Square we have complete details of the rainfall for 40 years, and at this station, September, 1898, had only .33 in. of rain on four days, being the smallest September fall in the whole period, and with one exception (1895) the smallest number of rainy days.

TEMPERATURE.

Maximum Temperatures, September 3rd to 9th, and 14th to 17th, 1898.

STATIONS.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	14th.	15th.	16th.	17th.
Kensington (Edith Rd.)	82·7	82·7	80·0	81·1	88·2	92·1	85·7	78·5	82·8	85·8	88·6
Regent's Park .....	82·5	81·5	77·0	78·0	87·0	90·2	85·0	78·0	80·5	82·6	88·0
Camden Square .....	83·7	82·0	78·1	79·1	85·7	90·6	85·9	78·8	80·7	83·6	88·3
"    " .....	83·3	82·2	79·1	79·9	86·1	91·2	86·0	79·2	81·1	84·2	89·0
West Norwood.....	82·6	81·5	78·2	78·4	92·1	89·6	87·0	78·4	80·4	81·8	86·9
Brixton .....	83·0	86·0	80·0	82·0	87·0	91·0	88·0	80·0	81·0	86·0	88·0
Hythe.....	76·5	81·0	85·0	83·5	83·5	88·0	80·0	79·0	76·5	84·5	84·5
Greenwich.....	82·9	82·5	79·0	80·1	84·8	92·1	89·8	80·1	82·0	83·9	89·9
Berkhampstead.....	81·6	83·1	78·9	80·9	84·5	90·3	82·9	79·3	79·2	83·0	88·2
Addington Manor.....	80·0	82·0	80·0	81·0	85·0	91·0	81·0	80·0	80·0	83·0	89·0
Oxford (Radcliffe Obsy.)	79·0	83·0	79·0	82·0	85·0	90·0	78·0	75·0	78·0	83·0	86·0
Stamford (Duddington).	75·0	81·0	80·0	81·0	85·0	90·0	78·0	76·0	80·0	83·0	88·0
Cambridge Observatory	79·0	82·0	82·0	83·0	87·0	92·0	84·0	80·0	82·0	86·0	89·0
Norwich (Brundall) .....	79·0	77·2	67·0	78·0	83·6	87·0	89·0	80·0	77·6	79·0	82·0
Liskeard (Green Bank)..	74·5	78·0	80·0	79·0	75·0	80·0	70·5	69·0	72·0	78·0	62·5
Cheltenham .....	78·8	80·0	80·0	80·1	81·7	86·0	74·4	75·0	76·8	81·2	83·5
Rotherby Hall .....	73·0	80·0	81·0	79·0	83·0	89·0	77·0	77·0	78·0	81·0	86·0
Bolton (The Park).....	66·2	76·1	79·9	76·4	78·3	74·2	67·8	69·1	72·9	78·2	78·0
York (Phil. Soc.) .....	75·0	81·0	80·0	75·0	81·0	81·0	72·0	72·0	72·0	80·0	84·0
Pembroke .....	62·0	70·0	71·0	64·0	64·0	63·0	63·0	71·0	66·0	69·0	65·0
Llandudno.....	68·0	70·0	81·0	81·0	74·0	68·0	65·0	71·2	73·0	81·0	75·0
Edinburgh.....	67·0	82·0	82·8	80·0	76·2	72·0	63·9	66·3	64·2	78·6	78·5
Nairn .....	75·0	83·0	83·0	82·0	77·0	68·0	65·0	64·0	64·0	79·0	83·0
Parsonstown .....	77·0	79·0	78·0	76·0	73·0	66·0	67·0	71·0	70·0	72·0	71·0
Seaforde .....	73·0	68·0	70·0	71·0	69·0	68·0	65·0	72·0	72·0	70·0	73·0
Jersey.....	77·0	80·0	80·0	83·0	79·0	84·0	68·0	68·0	72·0	80·0	79·0
No. of entries of 80° or above	9	19	14	14	17	19	12	5	10	18	18

*a* Stevenson Screen.

*b* Glaisher Screen.

To illustrate the distribution of temp. during the month, we give in the first place a table of shade maxima at 25 stations, from the 3rd to the 9th, and the 14th to the 17th. On all of these days there are numerous entries above 80°, while on the 8th there are no fewer than eleven records of 90° and upwards, while on the 4th, 5th, 6th, 7th, 8th, 16th, and 17th, more than half the stations recorded 80° or upwards. At three stations, Kensington, Brixton, and Addington, the temp. rose to, or above, 80° for seven consecutive days; while there are only four stations in the table, Bolton, Pembroke, Parsonstown, and Seaforde, at which 80° was not reached.

If we take the average of the maxima for these seven days, we find that at 15 out of the 25 stations the average max. was above 80°, while at Brixton it was 85°·3.

Of the stations which give an average above 80°, Duddington, Stamford, is the most northerly, and Cheltenham the most westerly. In other words the area of extreme temperature was the S.E. of England. This is confirmed by the following table of additional max. readings, all believed to be from thermometers in Stevenson screens.

*Additional records of Absolute Shade Maximum in September, 1898.*

Addington Hills .....	<i>Surrey</i> .....	87·5	8th
Wallington .....	<i>Surrey</i> .....	88·9	8th
Birchington (Thor) .....	<i>Kent</i> .....	90·0	9th
Slough (Upton).....	<i>Bucks</i> .....	91·5	8th
Oxford (Mag. Col. Laboratory).....	<i>Oxford</i> .....	88·5	8th
Wisbech (Sutton Bridge) .....	<i>Cambridge</i> .	90·5	8th
Marlborough .....	<i>Wilts</i> .....	85·5	8th
Winterbourne, Steepleton.....	<i>Dorset</i> .....	81·0	7th
Shaftesbury .....	<i>Dorset</i> .....	83·8	7th
Ashburton (Druid House) .....	<i>Devon</i> .....	79·8	8th
Tavistock (Whitchurch).....	<i>Devon</i> .....	79·0	8th
Ross (The Graig) .....	<i>Hereford</i> ...	84·1	8th
Cheadle (The Heath House) .....	<i>Stafford</i> .....	79·4	7th
Worksop (Hodsock Priory) .....	<i>Notts</i> .....	85·8	17th
Chester .....	<i>Cheshire</i> ....	79·9	8th
Blackpool .....	<i>Lancashire</i> .	80·4	5th
Driffield (York Road).....	<i>York, E. R.</i>	84·5	17th
Llanbedr-y-Cennin .....	<i>Carnarvon</i> ..	81·5	6th
Killarney (Woodlawn) .....	<i>Kerry</i> .....	80·0	5th

That the intensity of the heat in 1895 was not nearly so great as in 1898 is readily shown by the following summary of the entries in the tables for the two years, which include almost identical stations.

	Entries of	80°	85°	90°
1895 .....	74 .....	7 .....	0	
1898 .....	155 .....	52 .....	12	

It must not be forgotten that in 1898 the hot period occurred at the beginning of the month, while in 1895 it was at the extreme end.

The Camden Square records for the 40 years give as the means for September—

	9 a.m.	9 p.m.	Max.	Min.	Mean of 9 a.m., 9 p.m., M. & m.
Mean of 40 years.....	58·1	55·6	67·3	49·7	57·7
1898 .....	60·8	59·7	74·2	51·6	61·6
Excess in 1898 .....	2·7	4·1	6·9	1·9	3·9
1858 .....	61·4	58·7	70·7	53·5	61·1
1865 .....	63·9	59·7	76·4	54·5	63·6
1868 .....	61·9	58·0	71·8	50·0	60·4
1869 .....	60·0	57·4	68·4	51·9	59·4
1875 .....	61·7	58·0	70·8	52·3	60·7
1880 .....	60·3	58·2	69·7	52·8	60·3
1884 .....	60·4	58·8	68·8	52·3	60·1
1886 .....	59·8	56·8	68·7	52·5	59·5
Instances higher than 1898...	4	0	1	7	1

The eight earlier years quoted are the only instances in which the 1898 value for any one of the above columns has been exceeded, and it will be noticed that 1895 does not appear. From it we see, first, that the max. and 9 p.m. temperatures are the most remarkable, and second, that only once has there been a warmer September than that of 1898, namely in 1865. In the 40 Septembers, 1858-97, there were 39 days on which the temp. rose to, or above, 80°; six days on which it rose to 85°, and one on which it rose above 90°, the most notable being—

	Instances of		Readings of		Instances of		Readings of
	80° or above.	85° or above.			80° or above.	85° or above.	
1858 .....	2	1	85°·0	1880 .....	3	1	88°·3
1865 .....	10	2	85°·0, 85°·0	1895 .....	4	0	86°·1, 91°·2
1868 .....	5	2	86°·5, 91°·0	1898 .....	8	4	86°·0, 89°·0

From this it will be seen that although the absolute max. in 1898 (91°·2) is unprecedented, and that no other September has had so many days above 85°, yet in 1865 there were two more days above 80°. In 1898 the mean temp. (mean of 9 a.m., 9 p.m., max. and min.) for the seven days 3rd to 9th averaged 69°·6, for the three days 7th to 9th was above 70° and averaged 72°·3, and on the 17th also was above 70°, making a total of 4 days in the month with mean temp. above 70°, while in the whole of the 40 preceding Septembers there were only three days on which the mean temp. reached that value, September 4th, 1880, 73°·0, September 7th, 1868, 71°·7, September 8th, 1865, 70°·7.

## OBSERVERS' NOTES.

*Kensington, Edith Road, Middlesex.*—The highest temperature was  $92^{\circ}\cdot 1$  on 8th, exceeding by  $0^{\circ}\cdot 3$  even the max. of August, 1893. The mean temp.,  $63^{\circ}\cdot 7$ , is exactly the same as that of September, 1895. Ten days with max. above  $80^{\circ}$ , and eight nights with min. above  $60^{\circ}$ . September rainfall  $\cdot 40$  in., and for the nine months of the year  $10\cdot 00$  in.—much the lowest recorded in 15 years.

*Haslemere, Hazelhurst, Surrey.*—The max. temp. reached  $86^{\circ}$  on 8th, and  $80^{\circ}$  or upwards on seven days; the mean max. for the seven consecutive days 3rd to 9th was  $81^{\circ}$ . There is no previous record of  $80^{\circ}$  in September. Rain fell on five days; total  $2\cdot 39$  in. Absolute drought prevailed for 18 days, August 31st to September 17th; partial drought for 29 days, with  $\cdot 19$  in. of R, from August 31st to September 28th. On September 29th R began at 6 p.m., and from midnight to 5 a.m. fell in torrents; by 8 a.m. it had nearly ceased, and the total for the 14 hours was  $2\cdot 17$  in.; total for 24 hours,  $2\cdot 19$  in. Even this heavy fall did not penetrate two inches deep through the turf, so dry had it become. The previous heaviest fall in 24 hours is  $2\cdot 06$  in. on September 1st, 1896. Some houses here have been closed in consequence of empty wells and tanks.

*Chiddingfold, Surrey.*—Records for the past 20 years show no parallel to the present autumnal heat and drought.

1898. Absolute drought for 20 days, August 29th to September 18th, being unprecedented in the second half of the year.

*Periods of Great Heat in September.*

1898.				1895.			
Sept.	Max.	Min.	Mean.	Sept.	Max.	Min.	Mean.
3	79	47	63	24	78	48	63
4	80	51	65·5	25	76	53	64·5
5	80	50	65	26	79	51	65
6	81	62	71·5	27	78	50	64
7	84	55	69·5	28	77	49	63
8	82	53	67·5	29	74	49	61·5
9	79	52	65·5	30	73	49	61
Mean	80·7	52·9	66·8	Mean	76·4	49·9	63·1

The only other instance of a max. of  $80^{\circ}$  in September was in 1880,  $80^{\circ}$  on 4th. The max. quoted for September, 1895, occurred three weeks later in the year, and are, therefore, not strictly comparable with 1898.

*Hitchin, The Firs, Herts.*—From 1849 the temp. never reached  $90^{\circ}$  until the middle of August, 1893, while on the 8th of September, 1898, it rose to  $91^{\circ}\cdot 5$ . Comparing the two hot periods we have—

Average max. for 17 days in August, 1893	.....	$77^{\circ}\cdot 5$
"    "    "    September 1898	.....	$77^{\circ}\cdot 1$

I expected to find September, 1898, the hottest we have ever had, but 1895 just beats it.

Mean temp., September, 1895 .....	60 <sup>5</sup> ·4
"                    "          1898 .....	60·1

This heat was accompanied by a water famine, miles and miles of country being without a drop anywhere, and people coming from all parts to the rivers here. The two driest periods of 12 months recorded in 48 years are—

August, 1867, to July, 1868 .....	Rainfall. 16·54 inches.
October, 1897, to September, 1898 .....	15·79 "

*Lowestoft, Belle Vue Park, Suffolk.*—In September rain was recorded only on 8th, ·12 in., and 27th, ·04 in., total ·16 in. ; being 2·12 in. less than the average for 20 years. In the three months July–September the total fall was only 3·22 in. on 21 days, a deficiency of 4·22 in.

*Yarmouth, Market Place, Norfolk.*—September, 1898, total rainfall ·20 in. on 5 days, being 2·44 in. less than the average. Previous driest September, 1895, ·57 in.

Total rainfall to September 30th, 1898 ...	13·11 inches.
"                    "          "          1893 ...	13·07 "

Max. temp., September, 1898, 85° on 9th, the highest since July, 1881. Mean temp. 60°·2. Mean temp., September, 1895, 60°·3.

*Garstang, Bruna Hill, Lancashire.*—I wrote you at the time *re* the high min. temp. (65°) registered here on the night of the 4th August, 1897. That reading was exceeded so late as September 17th, the min. in Stevenson screen recorded at 8 a.m. on that day being 65°·5, and the max. 78°. This reading is unprecedented in 12 years.

## METEOROLOGY IN BELGIUM.

It is nearly two years since M. Folie resigned the appointment of Director of the Brussels Observatory. It is rather more than a year since we epitomized (*Met. Mag.*, Vol. XXXII. p. 91) some articles in *Ciel et Terre*, dealing with the subject.

We are very glad to announce that by Royal decree, dated Sept. 2nd, 1898, the work of the observatory has been divided. All subjects of finance, maintenance of buildings, library, and what may be called business matters, are placed under Professor Goedseels as "Administrateur-inspecteur." M. C. Lagrange has been appointed Scientific Director, Astronomical Department; and M. A. Lancaster Scientific Director, Meteorological Department. We congratulate both these gentlemen on the well-earned public recognition of their services, and we hope that such funds may be placed at their disposal that the work of both departments may speedily be brought up to date and kept there.

## THE EFFECT OF LIGHTNING ON AN OAK TREE.

*To the Editor of the Meteorological Magazine.*

SIR,—Charlton Kings (Gloucestershire) was visited by three very severe thunderstorms on August 15th, 18th and 21st respectively. On September 4th I first noticed that a fine oak tree growing on the bank of a narrow stream or ditch in that parish was blasted, and the leaves over the whole of the upper two-thirds of it burnt and curled up.

On examining the tree I found two grooves cut out of the bark on opposite sides of the main stem; each passed downwards (as I found by probing) beneath the surface of the soil, and continued upwards, quite distinct from each other, to where the tree bifurcated at about 20 feet from the ground, thence each groove continued upwards, following respectively one of the principal leaders to its very top. There were thus from the top to the ground two entirely separate cuts. That on the north had removed the bark for its whole depth to the width of about  $1\frac{1}{2}$  inch, some shreds hanging detached, which were quite brittle but showed no appearance of scorching. The groove on the south side was slightly wider and of similar appearance, with one remarkable exception—that a further groove, about one inch wide, was cut out of the wood down the middle of the groove in the bark.

Whether the tree was struck by two flashes with such corresponding results, or whether one flash so entirely separated itself into two as to produce such results, the case seems sufficiently remarkable to deserve recording.

The tree stands about half-a-mile to the north of, and 550 feet below the top of, Leekhampton Hill. I am inclined to think from my observations of the three storms that this occurred during the last, but I have no evidence on the point.

JAMES G. WOOD, M.A., F.R.Met.Soc.

*115, Sutherland Avenue, W., Sept. 9th, 1898.*

## THE AURORA OF SEPTEMBER 9TH, 1898.

[Although we believe that this is not the time when such a phenomenon ought to have occurred, an exceptionally large spot upon the sun came into view in the early days of September, and about the date at which it became central on the sun's disc there was (as usual) a very fine aurora. We have room only for two accounts, which we have selected, one, because of the accurate details which it contains—the other because of the great experience of the writer. It was seen from almost all parts of the British Isles, and indeed from most parts of the North West of Europe. Several pages of *Ciel et Terre* are devoted to accounts of the appearance in different parts of Belgium, one of them, illustrated by a sketch, showing the appearance at 21h. 50m. (8.50 p.m.), the time of greatest brilliancy. We shall not be surprised to hear of Aurora

Australis having been seen at the same time. We have seen no account of the previous appearance of this spot, but notices of an aurora on August 16th have been published. As the rotation period of the sun is about 25 days, it follows that (August 16 + 25 =) Sept. 10 would be the theoretical date, and the 9th was not very far off.

It has been said that Auroræ produce unsettled and stormy weather—certes that has not been the case in the S.E. of England this time.—ED.]

*To the Editor of the Meteorological Magazine.*

SIR,—8.25 p.m.—Strong patches of white light noticed due north and to the west and east of north—that in the north-east the strongest.

8.30.—The patches widened out and formed into an arc, with a depression nearly in the centre, the upper edge of the band fairly well defined, but the lower edge much broken by what appeared to be the upper edge of cumulus; but this proved not to be such, for whenever the brilliancy above faded, stars could be seen in the darker space below, and when finally the display ceased, there were no clouds in the sky but a few fleecy ones of small extent. During the whole time some principal stars were visible through the arc of light.

8.32.—A brilliant meteor shot from east to west horizontally across the northern sky, almost tangentially to the arc of light.

8.35.—Streamers began to shoot upwards, principally from the extremities of the arc.

8.40.—The streamers in the N.E. became slightly pink.

8.45.—The base of the arc determined to subtend an angle at the horizon of  $135^\circ$ , of which  $80^\circ$  were to the west and  $55^\circ$  to the east of due north. The depression remained uniformly in the middle of the arc. The streamers, now very clearly defined, were not productions of radii of arc, but converging towards the zenith, which they nearly reached, presenting the appearance of the ribs in the groined roof of an apse.

8.55.—A brilliant pink and broad streamer from the extreme west of the arc assumed and retained for some minutes the form of a fluted spiral column.

9.5.—The arc suddenly contracted itself so that its base subtended an angle of  $110^\circ$  only, the depression at the same time disappearing and the arc becoming regular throughout. Directly this was established only one streamer was visible—a broad, pink band, sloping from the vertical slightly to the right, and stretching well above the Pole Star, which was seen exactly in the centre of the band. This band distinctly moved eastward, for without changing its form or width, its western edge gradually approached, and in about two minutes passed eastwards of, the Pole Star.

For some minutes there was a constant variation in the position and number of the streamers and little or no colour, but all streamers

now assumed the direction of radii of the circle of which the arc was part.

9.15.—Two strong flickers of light like “sheet” lightning were succeeded by the fading out of all the streamers and a diminution of the “arc” light; but the aurora did not entirely disappear for some hours. At 10 o'clock it looked like a luminous haze or cloud over the water.

The weather preceding this display has been remarkable all over England, and will, no doubt, be fully recorded. A few notes of the local conditions may be useful:—

Sept. 7th.—Intensely hot day. Somewhat cloudy in afternoon. Hazy, with electrical clouds in the offing.

Sept. 8th.—Thick mist in the morning, cleared by midday under a hot sun; but about 5 p.m. clouds of mist rolled in from the sea and enveloped from time to time even low hills. Still very warm.

Sept. 9th.—Cloudy morning, with fresh wind from S.E. Sun broke through at times, and very hot. 2.30 to 3.30 p.m., drizzling fine rain or Scotch mist from S.W., afterwards cloudy and threatening. Clouds on hills at 700 feet level. Just before sunset temperature fell considerably, with a little rain. The clouds then lifted regularly all along the western and northern horizon just enough to show the sun setting a brilliant yellow into the ocean, without any bank of clouds. Lundy Island and the coast of Glamorganshire became suddenly visible, and so remained until it was dark. At 10 p.m. the wind had veered to N., and barometer, which before was falling, had risen .1 since 6 p.m. Stars brilliant, and the lights on Welsh coast very distinct.

JAMES G. WOOD, M.A., F.R. Met. Soc.

*Ilfracombe, Devon, September 9th, 1898.*

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*To the Editor of the Meteorological Magazine.*

SIR,—On Friday last, September 9th, an aurora was well observed here, which was probably the most brilliant, if not the most highly-coloured which has been seen since August 12th, 1880, not to go further back to the grand displays of 1847 and 1870–1871. It was preceded by a magnificent sunset, the sky carmine to the zenith, and fine masses of clouds to the eastward being illumined with a pink light similar to that of snowy Alpine peaks, changing later to a deep copper shade.

At 9 p.m. a large arch was seen spanning the northern horizon, a little to the west of north and at an altitude of about 20°. The centre was dark and apparently transparent. Streamers were continually shooting upwards for fully 60° in height.

The light given out was equal to that of a full moon, and was generally white, although with a tint of red occasionally. After midnight the exhibition gradually died away.—Yours, &c.,

HENRY SOUTHALL, F.R. Met. Soc.

*The Graig, Ross, September 12th, 1898.*



CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, APRIL, 1898.

STATIONS.  <i>(Those in italics are South of the Equator.)</i>	Absolute.				Average.				Absolute.		Total Rain.		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	Cloud.
	Temp.	Date.	Temp.	Date.									
England, London .....	66·5	8	28·9	6	58·0	39·9	39·0	77	109·9	23·5	1·01	12	5·4
Malta .....	77·6	1	48·3	6	68·5	56·0	54·0	85	149·6	42·5	1·95	5	5·3
<i>Cape of Good Hope</i> ...	81·5	22	38·0	7	68·0	53·0	51·4	82	...	...	3·37	8	2·6
<i>Mauritius</i> .....	84·6	4	68·3	2	81·9	73·6	69·3	78	133·6	61·4	4·82	20	6·6
Calcutta .....	103·4	8	67·8	13	94·4	76·2	72·5	68	157·2	64·3	1·04	4	2·1
Bombay .....	92·2	3	75·0	9	89·2	78·7	74·6	74	143·5	66·7	·00	0	1·9
Ceylon, Colombo ...	94·2	1	73·3	12	89·8	76·2	74·6	81	157·5	69·5	22·81	24	6·6
<i>Melbourne</i> .....	85·9	1	41·2	21	67·3	50·3	47·6	68	138·9	36·3	1·68	12	5·9
<i>Adelaide</i> .....	85·7	13	45·0	24	70·3	52·9	48·9	65	144·8	34·6	3·41	13	5·8
<i>Sydney</i> .....	83·0	3	48·5	22	64·5	57·3	51·1	73	132·3	38·7	·58	9	4·0
<i>Wellington</i> .....	71·6	3	41·0	20 <sup>b</sup>	63·3	51·2	49·9	76	124·0	30·6	5·63	12	4·7
<i>Auckland</i> .....	74·0	14	45·0	24	67·6	54·6	51·8	72	133·0	42·0	·97	8	4·7
Jamaica, Kingston.....	88·9	9	67·3	4	85·9	69·7	66·9	74	...	...	·17	4	4·2
Trinidad .....	92·0	28 <sup>a</sup>	62·0	16	88·7	68·6	69·6	74	165·0	61·0	1·17	8	...
Grenada.....	86·0	29	71·8	11	83·6	73·7	66·7	65	148·0	...	1·66	12	2·0
Toronto .....	67·1	15	15·7	5	51·5	35·2	29·1	58	87·0	11·8	1·70	7	4·7
New Brunswick, Fredericton .....	60·7	12	3·6	5	47·7	28·1	24·3	59	...	...	4·23	11	6·0
Manitoba, Winnipeg } British Columbia, } Esquimalt .....	68·5	14	-9·0	1	51·3	25·3	...	...	...	...	·98	5	4·7
	66·2	30	30·4	2	55·4	38·2	40·0	81	...	...	·88	10	5·9

a—and 29. b—and 24.

REMARKS.

MALTA.—Mean temp. 60°·0, or 0°·4 above the average. Mean hourly velocity of wind 12·7 miles, or 1·1 above the average. Mean temp. of sea 62°·0. TS on 29th; L on 4th. J. F. DOBSON.

*Mauritius*.—Mean temp. of air 1°·0 above, of dew point 1°·1 above, and rainfall ·67 in. below, their respective averages. Mean hourly velocity of wind 14·0 miles, or 3·3 above average; extremes, 29·7 on 9th and 2·0 on 30th; prevailing direction E.S.E. and E. by S. L and T on 23rd. A. WALTER.

CEYLON, COLOMBO.—Mean temp. of air 82°·3, or 0°·4 above, of dew point 0°·4 above, and rainfall 11·75 in. above, the average. TSS on 16 days; L on 3 days. H. O. BARNARD.

*Adelaide*.—Mean temp. 2°·5 below, and rainfall 1·66 in. above, their respective averages for 41 years. C. TODD, F.R.S.

*Sydney*.—Temp. 0°·1 below, humidity 4·9 below, and rainfall 5·00 in. below, their respective averages. H. C. RUSSELL, F.R.S.

*Wellington*.—The early part of the month was stormy from N.W., then followed fine weather until the middle of the month, when rain came on, and it continued showery until the 24th; the last part was fine. TS on 21st; fog on 17th. Temp. 0°·2 above, and rainfall 2·10 in. above, their respective averages. R. B. GORE.

*Auckland*.—An unusually dry April, the rainfall being considerably less than one-third of the average. Mean temp. slightly under the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Mean hourly velocity of wind 2·1 miles. Rainfall one-sixth of the average. The Island rainfall for the month is about the average. R. JOHNSTONE.

TRINIDAD.—Rainfall ·86 in. below the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL,  
SEPTEMBER, 1898.

For the Counties, Latitudes, and Longitudes of most of these Stations,  
see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Uxbridge, Harefield Pk..	·46	XI.	Builth, Abergwesyn Vic.	2·37
II.	Dorking, Abinger Hall .	1·01	„	Rhayader, Nantgwiltt ...	1·84
„	Birchington, Thor .....	·43	„	Lake Vyrnwy .....	2·32
„	Hailsham .....	1·03	„	Corwen, Rhug .....	1·77
„	Ryde, Thornbrough .....	1·00	„	Criccieth, Talarvor .....	2·38
„	Emsworth, Redlands ...	1·73	„	I. of Man, Douglas .....	2·47
„	Alton, Ashdell .....	1·04	XII.	Stoneykirk, Ardwell Ho.	4·22
III.	Oxford, Magdalen Col. .	·34	„	New Galloway, Glenlee	4·13
„	Banbury, Bloxham .....	1·07	„	Moniaive, Maxwelton Ho.	3·46
„	Northampton, Sedgebrook	·48	„	Lilliesleaf, Riddell .....	1·32
„	Stamford Duddington...	·36	XIII.	N. Esk Res. [Penicuick]	4·25
„	Alconbury .....	·20	XIV.	Glasgow, Queen's Park..	3·99
„	Wisbech, Bank House...	·20	XV.	Inverary, Newtown .....	10·14
IV.	Southend .....	·17	„	Ballachulish, Ardsheal...	9·60
„	Harlow, Sheering.....	·24	„	Islay, Gruinart School...	3·50
„	Colchester, Lexden .....	·32	XVI.	Dollar .....	6·58
„	Rendlesham Hall .....	·44	„	Balquhidder, Stronvar...	7·39
„	Scole Rectory .....	·21	„	Coupar Angus Station...	2·33
„	Swaffham .....	·26	„	Dalnaspidal H. R. S. ....	...
V.	Salisbury, Alderbury ...	1·88	XVII.	Keith H. R. S. ....	2·86
„	Bishop's Cannings .....	·98	„	Forres H. R. S. ...	2·82
„	Blandford, Whatcombe .	1·31	XVIII.	Fearn, Lower Pitkerrie..	3·96
„	Ashburton, Holne Vic...	1·53	„	N. Uist, Loch Maddy ...	...
„	Okehampton, Oaklands. .	1·26	„	Invergarry .....	4·27
„	Hartland Abbey .....	1·75	„	Aviemore H. R. S. ....	3·89
„	Lynnton, Glenthorne ...	1·60	„	Loch Ness, Drumnadrochit	2·76
„	Probus, Lamellyn .....	1·22	XIX.	Invershin .....	3·82
„	Wellington, The Avenue	1·26	„	Durness .....	5·21
„	North Cadbury Rectory	1·55	„	Watten H. R. S. ....	2·85
VI.	Clifton, Pembroke Road	1·30	XX.	Dunmanway, Coolkelure	6·22
„	Ross, The Graig .....	·46	„	Cork, Wellesley Terrace	2·79
„	Wem, Clive Vicarage ...	·69	„	Killarney, Woodlawn ..	4·71
„	Wolverhampton, Tettenhall	·56	„	Caber, Duneske .....	3·50
„	Cheadle, The Heath Ho.	1·00	„	Ballingarry, Hazelfort...	3·13
„	Coventry, Priory Row ..	·65	„	Limerick, Kilcornan ...	2·95
VII.	Grantham, Stainby .....	·59	„	Broadford, Hurdlestown	3·88
„	Horncastle, Bucknall ...	·40	„	Miltown Malbay .....	3·59
„	Worksop, Hodsck Priory	·52	XXI.	Gorey, Courtown House	2·01
VIII.	Neston, Hinderton .....	1·33	„	Athlone, Twyford .....	3·21
„	Southport, Hesketh Park	1·48	„	Mullingar, Belvedere ...	3·75
„	Chatburn, Middlewood.	1·24	„	Longford, Currygrane...	...
IX.	Melmerby, Baldersby ...	·60	XXII.	Woodlawn .....	3·14
„	Scarborough, Observat'y	·16	„	Crossmolina, Enniscoe ..	2·95
„	Middleton, Mickleton ...	·88	„	Collooney, Markree Obs.	3·23
X.	Haltwhistle, Unthank...	·90	„	Ballinamore, Lawderdale	...
„	Bamburgh .....	·63	XXIII.	Warrenpoint .....	3·66
„	Duddon Valley, Ulpha School	4·00	„	Seaforde .....	3·62
„	Keswick, The Bank .....	2·14	„	Belfast, Springfield .....	4·09
XI.	Llanfrehfa Grange .....	2·60	„	Bushmills, Dundarave..	5·06
„	Llandovery .....	1·63	„	Stewartstown .....	5·16
„	Castle Malgwyn .....	1·63	„	Killybegs .....	4·38
„	Brecknock, The Barracks	·71	„	Horn Head .....	4·01

SEPTEMBER, 1898.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					TEMPERATURE.				No. of Nights below 32°.	
		Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours		Days on which <sup>°</sup> 01 or more fell.	Max.		Min.		In shade.	On grass.
				Dpth	Date		Deg.	Date	Deg.	Date.		
		inches.	inches.	in.								
I.	London (Camden Square) ...	·33	- 2·18	·20	29	4	91·2	8	36·8	29	0	0
II.	Tenterden .....	·77	- 2·14	·41	29	6	88·0	9	37·0	29	0	1
	Hartley Wintney .....	·82	...	·71	29	5	89·0	8	44·0	28	0	7
III.	Hitchin .....	·31	- 2·19	·27	29	3	90·0	8	34·0	23b	0	...
	Winslow (Addington) .....	·41	- 2·26	·31	29	4	91·0	8	30·0	26	3	4
IV.	Bury St. Edmunds (Westley) .....	·20	- 2·50	·11	29	4	81·0	8	41·0	29	0	...
	Norwich (Brundall) .....	·17	...	·10	18	4	89·0	9	35·7	29	0	2
V.	Winterbourne Steepleton ...	1·80	...	1·36	29	7	81·0	7	31·1	25	1	8
	Torquay (Cary Green) .....	·80	...	·58	29	6	76·3	8	46·2	29	0	0
	Polapit Tamar [Launceston]..	1·71	- 2·00	·59	17	12	80·6	6	35·3	1, 26	0	0
VI.	Stroud (Upfield) .....	·78	- 2·13	·61	29	6	83·0	8	40·0	24	0	...
	ChurchStretton(Woolstaston)	·60	- 1·90	·30	29	7	81·0	7	40·0	24b	0	2
	Worcester (Diglis Lock) .....	·61	- 1·83	·50	29	6	...	...	...	...	...	...
VII.	Leicester (Rotherby Hall) ...	·42	...	·37	29	3	86·0	18	28·0	29	3	1
	Boston .....	·27	- 2·50	·20	29	3	90·0	8	35·0	29	0	...
	Hesley Hall [Tickhill].....	·51	- 1·65	·41	29	5	87·0	17	34·0	29	0	...
VIII.	Manchester(PlymouthGrove)	·54	- 2·93	·16	29	8	85·0	5, 7	36·0	24	0	4
IX.	Wetherby (Ribston Hall) ...	1·13	- 1·33	·90	29	5	...	...	...	...	...	...
	Skipton (Arncliffe) .....	3·03	- 1·73	·91	29	14	...	...	...	...	...	...
	Hull (Pearson Park).....	·26	- 2·18	·18	29	3	85·0	17	37·0	28c	0	0
X.	Newcastle (Town Moor) .....	·61	- 2·17	·30	7	5	...	...	...	...	...	...
	Borrowdale (Seathwaite).....	10·98	- 75	2·29	29	16	...	...	...	...	...	...
XI.	Cardiff (Ely).....	2·57	- 1·17	1·48	29	9	...	...	...	...	...	...
	Haverfordwest .....	2·03	- 2·37	·75	29	9	77·0	6	37·7	26	0	3
	Aberystwith (Gogerddan) ...	2·04	- 2·23	·98	29	7	82·0	5, 7	...	...	...	...
	Llandudno.....	1·56	- 66	·51	29	9	81·0	5a	43·0	25	0	...
XII.	Cargen [Dumfries] .....	3·33	- 23	·86	29	9	80·0	6	35·0	29	0	...
XIII.	Edinburgh (Blacket Place)...	2·21	...	·75	29	14	82·8	5	39·2	24	0	0
XIV.	Colmonell .....	3·92	...	·94	29	15	83·0	4	34·0	24	0	...
XV.	Tighnabruaich .....	7·54	...	1·44	1	18	71·0	6	41·0	24	0	...
	Mull (Quinish) .....	7·05	+ 2·02	1·11	27	20	...	...	...	...	...	...
XVI.	Loch Leven Sluices .....	3·60	+ 81	1·60	30	11	...	...	...	...	...	...
	Dundee (Eastern Necropolis)	1·95	- 56	1·05	29	15	82·9	4	38·0	23	0	...
XVII.	Braemar .....	2·53	- 33	·49	8	15	80·0	4	29·8	23	1	10
	Aberdeen (Cranford) .....	1·62	...	·60	1	15	82·0	4	32·0	18	1	...
	Cawdor (Budgate) .....	3·34	+ 59	·54	1	13	...	...	...	...	...	...
XVIII.	Strathconan [Beaul] .....	4·61	+ 93	·80	30	10	...	...	...	...	...	...
	Glencarron Lodge.....	9·43	...	1·22	1	21	80·6	6	34·0	25	0	...
	Dunrobin .....	3·84	+ 1·25	·70	29	13	73·0	6	39·0	19	0	...
XIX.	S. Ronaldshay (Roeberry) ...	4·74	+ 2·08	·98	3	18	71·0	5, 6	43·0	19	0	...
XX.	Darrynane Abbey.....	5·23	...	1·20	8	19	...	...	...	...	...	...
	Waterford (Brook Lodge) ...	2·69	- 23	·70	26	13	75·0	15	37·0	28	0	...
	O'Briensbridge (Ross) .....	3·93	...	·77	8	14	...	...	...	...	...	...
XXI.	Carlow (Browne's Hill) .....	2·20	- 62	·62	8	14	...	...	...	...	...	...
	Dublin (Fitz William Square)	1·45	- 52	·52	8	13	77·8	6	43·0	25	0	0
XXII.	Ballinasloe .....	3·34	+ 55	·64	7	19	74·0	4, 5	40·0	29	0	...
	Clifden (Kylmore) .....	5·57	...	1·17	28	16	...	...	...	...	...	...
XXIII.	Waringstown .....	5·79	+ 2·63	1·42	27	15	82·0	7	37·0	22	0	2
	Londonderry (Creggan Res.)..	4·21	+ 43	1·36	29	20	...	...	...	...	...	...
	Omagh (Edenfel) .....	4·12	+ 74	·94	27	16	80·0	4	35·0	20	0	0

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

a—and 6, 16. b—and 25. c—and 30.

METEOROLOGICAL NOTES ON SEPTEMBER, 1898.

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

ENGLAND.

TENTERDEN.—The R of the twelve months ending September, is only 18·08 in. being the least in 35 years and ten inches less than the average, and the fall in July, August and September is only 2·68 in., there having been only three other years with less than five inches in that period. Only four other years have had less than one inch in September, 1865, 1886, 1891 and 1895. There were 9 days with max. temp. above 80°, but the mean max. temp. is 1°·5 lower than that of September, 1895. Duration of sunshine 234 hours; on 4th 11 hours 30 min., and on 16th 11 hours 25 min. were registered. Partial drought for 40 days with ·37 in. of R ended on 17th.

HARTLEY WINTNEY.—Another remarkable month for great heat and drought. The driest September since 1890, making, with the two preceding months, a very long and severe drought. Mean max. temp. 75°·6, mean min. 55°·5. Aurora visible on 9th. Remarkably clear and starlight nights until 29th. Frosts on the last 8 days. Ozone on 8 days. R of the first 9 months of the year 7·76 in. below the average. R for September 1·31 in. below the average.

WINSLOW, ADDINGTON.—In no other September since observations began in 1871 has there been so small a rainfall or a continuance of weather so exceptionally hot. There were two hot periods, the first from 3rd to 9th, giving 7 consecutive days with temp. of 80°, or above, and an average max. of 83°; the second from 14th to 17th, 4 consecutive days, with 80° and upwards, making a total of 11 days above 80°; equalled since 1871 only in July, 1887. Towards the end the nights were cold.

BURY ST. EDMUNDS, WESTLEY.—The month was very dry and hot, being the driest September since 1865, when only ·11 in. of R fell. Water is very scarce in many villages in West Suffolk, and the outlook for winter sheep feed is very bad. Grand aurora on 9th.

NORWICH, BRUNDALL.—The warmest and driest September recorded here, the 9th being the hottest day since August 8th, 1893. Aurora on 9th.

WINTERBOURNE STEEPLTON.—Unusually hot and dry. Mean temp. 57°·9. The max. 81° on 7th was equalled only on August 15th. The weather was remarkably fine almost throughout, which intensified the effect of the absence of R. Until the last week of the month, there had been no week with an inch of R since May 21st, and there had been four rainless weeks. H and T on 28th.

TORQUAY, CARY GREEN.—R 1·62 in. below the average. Mean temp. 61°·8, or 3°·9 above the average. Duration of sunshine 213 hours 25 min., or 55 hours 40 min. above the average; no sunless day.

POLAPIT TAMAR.—A very dry month. The first 16 days were generally very hot and dry, with only ·10 in. of R. Easterly winds or breezes prevailed.

WOOLSTASTON.—Very dry, and for the first three weeks intensely hot and sultry, followed by a few bitterly cold days, with sharp frosts on the ground. Want of water was much felt, the streams and brooks having almost disappeared. Mean temp. 59°·8.

MANCHESTER, PLYMOUTH GROVE.—Fine summer weather from 4th to 9th and 15th to 17th and on the whole, fine Autumn weather during the remainder. The driest September in the 31 years recorded. Mean temp. 55°·5.

NEWCASTLE, TOWN MOOR.—The smallest monthly rainfall recorded in September since 1895 when ·44 in. fell on 5 days.

WALES.

HAVERFORDWEST.—One of the finest, driest, and warmest Septembers on record. There were 9 days on which the temp. rose to 70°, or above, and much more than the average of brilliant sunshine. From 24th to 30th there was a considerable fall of temp., with E. and N.E. winds and cold nights. A

gale of some violence occurred on 29th with heavy R. Crops were good and well saved and there was plenty of grass in most places. R from January 1st to September 30th only 24·15 in.

GOGERDDAN.—A very fine September after a very wet August. Plenty of grass and good root crops.

### SCOTLAND.

CARGEN [DUMFRIES].—Although the mean temp. of the month has been four times exceeded in 39 years, the average of the six days 3rd to 8th ( $66^{\circ}\cdot3$ ) is unprecedented. A sudden change to lower temp. occurred on 22nd and continued until the close, the mean from 22nd to 30th being  $48^{\circ}\cdot7$ , while from 1st to 21st it was  $60^{\circ}\cdot3$ . On seven days the max. temp. exceeded  $70^{\circ}$ . The max. temp. ( $80^{\circ}$  on 6th) has only once been exceeded, namely, on September 4th, 1880, when  $80^{\circ}\cdot4$  was registered. Of the 3·33 in. of R, 2·24 in. fell on 11th, 17th and 29th. The total R for the nine months of the year is 1·09 in. above the average. Duration of sunshine 17 hours above the average. Pastures were never more luxuriant.

EDINBURGH, BLACKET PLACE.—The heat wave lasted from the 2nd to the 17th, the mean temp. being  $63^{\circ}\cdot3$ , or  $8^{\circ}\cdot2$  above the average of the period for 100 years. On 4th, 5th and 6th the shade temp. exceeded  $80^{\circ}$  each day, and the mean temp. was  $70^{\circ}\cdot7$ , or  $14^{\circ}\cdot7$  above the normal. Rainfall 24 per cent. below the average, and sunshine slightly below the normal. The min. temp.,  $62^{\circ}\cdot0$  on 3rd, is the highest in September for 57 years; and the max.,  $82^{\circ}\cdot8$  on 5th, is the highest in September since 1838. The mean min. temp. for the week ending 9th is  $59^{\circ}\cdot8$ . L on 7th. Brilliant aurora on 10th.

COLMONELL.—R 10 in. below, and mean temp.  $3^{\circ}\cdot8$  above, the average of 22 years. Very brilliant aurora on 9th.

TIGHNABRUAICH.—The rainfall was excessive and very bad for harvest operations. Mean temp.  $3^{\circ}$  above that of September, 1897.

MULL, QUINISH.—Very warm and wet, with the wind from S.E. to S.W. continuously.

ABERDEEN, CRANFORD.—Charming weather throughout, and very warm. Water in many places very scarce. Brilliant aurora on 9th.

S. RONALDSHAY, ROEBERRY.—Warm and wet. Mean temp.  $53^{\circ}\cdot7$ , or  $2^{\circ}\cdot2$  above the average of 8 years.

### IRELAND.

WATERFORD, BROOK LODGE.—Aurora at night on 9th. Much L at night on 16th. T and H on 28th.

O'BRIENSBRIDGE, ROSS.—With a full rainfall there were many fine, bright days. Altogether a favourable harvest month. Brilliant aurora on 10th.

DUBLIN, FITZWILLIAM SQUARE.—A warm, dry, summer-like month. Mean temp.  $60^{\circ}\cdot2$ , being  $4^{\circ}\cdot4$  above the average, but  $1^{\circ}\cdot2$  below that of the wonderful September of 1865. High winds on 9 days, reaching the force of a gale on 18th, 29th and 30th. Fog on 4th, 15th and 25th. Solar halos on 7th and 8th, lunar halos on 28th and 30th. L on 16th. Magnificent aurora on 9th. R for the nine months ending September 30th 17·97 in.

WARINGSTOWN.—The wettest September on record, but a wonderfully good harvest.

OMAGH, EDENFEL.—Notwithstanding a rainfall about one-fourth above the average, and 16 rainy days, the month was the finest September recorded, surpassing even those of 1868 and 1893. The R mostly fell at night, and with temp. on seven days above  $70^{\circ}$ , and on the 4th as high as  $80^{\circ}$  (a point never before reached in September), a large proportion of the days were as perfect as weather could be, the atmosphere being frequently remarkably clear. Harvest correspondingly excellent.