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PROTECTION FROM LIGHTNING.*

As it is nearly thirteen years since the Report of the Lightning Rod Conference † was published, and as electrical knowledge has greatly increased during that period, we have read Prof. McAdie's work with great interest; and we hope that the Weather Bureau will place some copies on sale in this country, because we think that they would be of general utility.

Most of our readers have heard of—some of them have been privileged to see—the brilliant experiments upon electrical discharges devised and carried out by Prof. Oliver Lodge, F.R.S., and one's first curiosity is to see whether Prof. McAdie considers that Prof. Lodge's experiments have subverted the rules laid down by the Lightning Rod Conference. We see no sign of it. Prof. McAdie renders, as is quite right, full recognition to Prof. Lodge's good work; but when he has to approach the practical part—the laying down of the rules—he does so by the three following sentences:—

“In 1882 appeared the report of the Lightning Rod Conference; in many respects the most important contribution to the literature of the subject yet made. While so many foreign governments, and in particular France, had by means of officially constituted boards, taken a governmental interest in the protection of the people from the dangers of lightning, the English-speaking people of the world, aside from the few directions officially issued for the protection of magazines and lighthouses, remained without any authoritative utterance upon the subject; and while this conference itself did not have strictly official sanction, it carries, from the character of its make-up, a weight certainly as great, if not greater, than an official board. It was simply a joint committee of representative members of the Institute of British Architects, the Physical Society, the Society of Telegraph Engineers and Electricians, the Meteorological Society, and two co-opted members. As might be anticipated from such auspices, the report is an excellent one, and must stand for years as the embodiment of the most widely gathered information and well-considered decisions. The report is emphatically one based upon *experience*.”

* U.S. Department of Agriculture, Weather Bureau. Circular of Information. Protection from Lightning, by Alexander McAdie, U.S. Weather Bureau, Washington, D.C., 1894. 8vo, 20 pages and 11 pages of plates.

† E. and F. N. Spon, London, 1882, 8vo.

"The famous free-for-all discussion which occurred at the British Association Meeting in 1888, so far as our judgment goes, simply proved that the decisions of the conference could not at present be disregarded. As the president of the meeting, Sir William Thomson, said, we have 'very strong reason to feel that there is a very comfortable degree of security, if not of absolute safety, given to us by lightning conductors made according to the present and orthodox rules.'

"There are one or two further features to which attention may be called. There are some very prevalent misapprehensions with regard to lightning. For example : that it never strikes twice in the same place ; that the most exposed place is always struck ; that a few inches of glass or a few feet of air will serve as a competent insulator to bar the progress of a flash that has forced its way through a thousand feet of air, etc. These are alluded to in the following general directions."

We have not space to reprint Chapter III., and, as we have above said, we hope that our readers may be able to procure the whole pamphlet. We, therefore, limit ourselves to noting the few portions of it with which we do not agree. In Section II. we read :—
"Use a good iron or copper conductor. If the latter, one weighing about 6 ounces to the foot, and preferably in the form of tape. If iron is used, *and it seems to be in every way as efficient as copper*, have it in rod or tape form, and weighing about 35 ounces to the foot."

The above weights are practically identical with those recommended by the Lightning Rod Conference (6 oz. and $2\frac{1}{4}$ lbs.) ; but we do not understand the words which we have printed in italics. If iron is "in every way as efficient," why have six times as much of it as of copper ? The great objection to iron is its deterioration by rust. Except upon Government powder magazines, we may say that practically no lightning conductor is examined after it has once been put up. We think that very possibly *while new* an iron band seven times as large as a copper one would be more effective than a copper one ; but let 10, 20, 30 years pass, and where would be safety with the iron ? while the copper would be as good as on the first day.

Section V., attributed to Prof. Lodge, is really an epitome of the recommendation of the Lightning Rod Conference. (See its Report, bottom of page 11 and top of page 12.)

Section X.—"Area of protection. . . . Many lightning rod manufacturers consider that the rod protects an area of radius equal to the height. The truth is that buildings are struck sometimes within this very area, and we now hold [that] there is no such thing as a definite protected area." Prof. McAdie here accepts as a proved truth that which previously has never been so authoritatively stated. We should be glad to be referred to the facts upon which this sweeping assertion is based.

It must not be supposed that this pamphlet is merely a code of rules—quite the contrary ; it contains statistical tables of loss by lightning in the United States, deaths (average 200 annually), pecuniary loss by fire about $1\frac{1}{2}$ million dollars (£312,000 per annum).

There is a very clear account of the accident to, and the present protection of, the great Washington monument (555 ft. high), and there is a charming series of lithographs and photographs, with too little said about them.

THE RECENT DROUGHT IN THE MIDLANDS.

To the Editor of the Meteorological Magazine.

SIR,—It is strange that the recent spell of dry weather in parts of the Midland district should have attracted so little attention. Had it not been for the threatened water famine at Leicester, it seems likely that it would have passed altogether without notice by the Press. During the 26 days from August 27th to September 21st we had only one shower here, yielding 0·06 in. in the gauge. The nearest approach to this during the dry time (it could hardly be called a drought here) last year was the period between March 17th and April 13th, with a total of 0·09 in. Rain fell only on 4 days in September, and the total fall was 0·69 in. There was only one month last year with a smaller total, viz., April, of which the total was 0·47 in.

It is a pity that some of the duplicate meteorologists in and about London cannot be transferred to outlying and poorly-manned districts. As it is, anything exceptional occurring in the S.E. of England is apt to assume an exaggerated importance, while equally or more important occurrences in the provinces, receive no notice at all. Even the forecasts of the Meteorological Office, excellent as they are on the whole, are occasionally too much coloured by the weather prevailing at the time in the London district. There is a good deal of human nature even in meteorologists.

G. T. RYVES, F.R.Met.Soc.,

Team Vicarage, October 8th, 1894.

It is not improbable that Mr. Ryves is right as to the influence of surroundings upon writers. With forecasting we have nothing to do, but Mr. Ryves writes of a drought, and compares it with that of 1893, and brings in the Leicester water famine in support of the argument. We have therefore taken up the subject in earnest, and append the result. The station in our regular table nearest to Leicester is Barkby, about 4½ miles N.E. of the town; the record is perfect from January 1st, 1870, to September 30th, 1894; we can have no better guide for investigation, and we therefore give the monthly fall for the 25 years.

YEAR.	1890	1891	1892	1893	1894	Mean 1870-89	Least, Amt.	Year.	Least in Amt.	1st 9 mth. Year.
	in.	in.	in.	in.	in.	in.	in.		in.	
January.	2.38	1.69	1.03	1.52	1.32	1.88	.33	1880	10.28	1870
Feb. ....	.84	.13	2.52	2.32	1.77	1.73	.13	1891	12.48	1874
March....	2.12	1.10	1.00	.37	.89	1.49	.37	1893	12.90	1887
April ...	.82	2.07	.85	.30	1.67	1.99	.30	1893	13.06	1893
May.....	1.85	2.64	2.21	1.81	1.99	1.92	.52	1870	14.01	1884
June ...	1.79	3.36	2.96	.73	1.91	2.43	.57	1870	15.11	1894
July.....	2.50	2.24	2.75	2.70	2.34	2.86	.09	1885		
August..	2.59	3.27	1.41	1.57	2.12	2.50	.59	1871		
Sept.	1.64	1.18	2.03	1.74	1.10	2.67	.91	1884		
October.	1.37	4.89	3.79	2.23		2.75	.52	1888		
Nov.	3.07	2.62	1.04	1.91		2.31	.86	1889		
Dec.....	.49	3.33	1.25	1.80		2.03	.36	1873		
Yearly } Total }	21.46	28.52	22.84	19.00		26.56				

The first nine months of 1894 according to this record have been dry, but not nearly so dry as in the previous years ending with 4, for we have

1874.		1884.		1894.	average for 20 years.
12.48	...	14.01	...	15.11	.. 19.47

and the last two columns in the table show that out of 25 years there have been five in which the first nine months were drier than they have been in 1894. So again, if we take the individual months there is not one month in 1894 which was unprecedentedly dry, while two of them, February and May, were above the average. The only thing that we can see in the least approaching justification for calling attention to a deficiency is the fact of one dry season following another dry season, but that is just what water works are intended to provide for. However, we are not here discussing why Leicester is short of water, but whether there has been in the Midland counties anything like the drought which we had in the South of England in 1893. It was shown in these pages, and by the map in *British Rainfall*, 1893, that the drought of 1893 was far less severe in Leicestershire than in the South, and yet the Barkby figures give for the driest four consecutive months of 1894 very nearly double the fall in 1893, 5.65 in. against 3.21 in.

That September, 1894, was dry, is amply shown by the table on page 142, for Seathwaite had only one-twentieth of its average, and actually had much less than Leicester, but we think that we have proved that there has not previously been during this year any exceptional drought in the Midland Counties, and therefore there had been nothing to overlook.

A DRY SEPTEMBER.

We have in the preceding note called attention to the remarkably small rainfall shown by the table on p. 142, and the supplementary table on p. 141 is equally striking. It in many respects resembled September, 1865, but at Northern and Irish stations surpassed it. Seathwaite, with an average for September of 11·73 in. and an actual fall of 0·59 in., or 1·20th of the average, seems a hard case to beat, but the following letter gives a still smaller proportion for Rothesay in Bute.

A DRY MONTH IN THE WEST OF SCOTLAND.

SIR,—In no part of Scotland was the deficiency of rainfall during September more marked than in that portion of the West Coast known as the Clyde sea area.

A rainfall register having been kept at Rothesay since the year 1800, we have reliable data for a West Coast station extending over the long period of 94 years. Previous to this year the smallest September rainfall noted was exactly one inch in the year 1865, while last month had but one-tenth of this small quantity and one forty-fifth of the average. The only months with a smaller downfall were those of April, 1842, and June, 1821; but April, 1873, and May, 1844, had the same rainfall as in September last. During the seven weeks ending on October 8th barely one-third of an inch of rain fell at Rothesay; while at Fort-William during this period only half an inch was measured, or in each instance about one-twentieth of the average. Edinburgh, on the other hand, had an inch and a quarter of rain during the period under review, or about a quarter of the average precipitation, many of the showers off the North Sea extending but a small way inland. Owing to the prevailing easterly winds but little sunshine was registered in Edinburgh, the sunshine recorded showing a daily average of three hours, but at the Ben Nevis Observatory four hours a day was attained.—I am, &c.,

R. C. MOSSMAN.

October 10th, 1894.

ENORMOUS HAILSTONES.

In the *Quarterly Journal of the Roy. Met. Soc.*, Vol. XV., p. 47, will be found description and full size engravings of some immense hailstones which fell about 50 miles S.E. of Paris on August 15th, 1888, and of which actual models to scale can be inspected at the rooms of the Society.

The stones seem to have been surpassed on August 26th, 1894, according to the *Journal d'Amiens* for August 30th, September 1st and 2nd, from which we proceed to translate a few statements:—

“The thunderstorm, accompanied by a cyclone (whirlwind), broke at 10 p.m., and for about half-a-mile blew down not only the trees, but the telegraph posts and the wires along the railway between Moreuil and Montdidier.”

“Most of the hailstones weighed 200 grammes (7 oz.), they broke not merely the windows, but also the tiled roofs; and at Mézières

one which came through a window and broke a workbox is stated by the *Propaganda* to have weighed 1 kilo 200 grammes (2 lbs. 10 oz.)!"

"Sheep were killed, and the next day small birds and game could be picked up by the dozen."

"At Blancfosse (Oise) some of the hailstones weighed more than 300 grammes (10½ oz.)."

"At Beaucourt hailstones were picked up weighing nearly a kilogram (2 lbs.). Great as this appears, we are assured by a person well worthy of confidence that it is correct. Dead hares and partridges have been picked up."

"The damage at Mézières is estimated at 800,000 francs (£32,000), but in the official list it is given as 600,000 francs (£24,000), and the total for the arrondissement of Montdidier as 1,115,766 francs (£44,631)."

Further information is supplied by the following cuttings from *The Times* and the *Morning Post* :—

BRUSSELS, August 27th.—A storm of extraordinary violence yesterday passed over that portion of Belgium situated between Mons and the German frontier. The wind was of almost cyclonic character, and swept across the country, destroying everything in its path, along a well-defined track three kilometres in width. Several farms were struck by lightning and burned to the ground, while much damage was done also by the shower of enormous hailstones which accompanied the storm.

LIEGE, August 27th.—The storm which passed over the S.E. of Belgium yesterday caused considerable damage here. The atmospheric disturbance continued to-day, and the violence of the hurricane was especially felt in this city and the surrounding country. Many houses are flooded, streets are under water, and railway traffic is interrupted. The circular railway connecting the various stations is blocked by a wall having been blown down, and fallen across the line.

BERLIN, August 28th.—The unseasonable weather which has prevailed for the last five weeks throughout Germany has culminated in a series of violent hailstorms and hurricanes, which have done great damage in many parts of the country. At Crefeld the streets were flooded, and a building three storeys high collapsed. Near Breslau a railway carriage was driven down the line by the force of the wind, and three workmen were killed.

VIENNA, August 28th.—The excessive heat which has prevailed in Austria-Hungary during the last few days caused many cases of sunstroke. From Temesvar, in Hungary, it is reported that among the troops leaving for the manoeuvres ten cases, three of which ended fatally, occurred during a march of 12½ miles. Yesterday, during the manoeuvres, about 100 soldiers, the majority of whom belonged to cavalry regiments, were attacked by sunstroke.

BRUSSELS, August 28th.—Immense damage has been done by the recent storms over all the district between the Sambre and the Meuse, and in many cases the harvest has been completely destroyed by the hail.

PARIS, August 28th.—During the great storm which raged in France yesterday, the 117th Regiment of the line was on the march near Eventeul. The horses of the officers, frightened by the enormous hailstones, bolted across

country. A thoroughbred belonging to the colonel was so seriously injured that it is now unfit for further service. With such force did the hailstones fall that some of them pierced the trumpets and other brass instruments of the regimental band.

WHIRLWINDS.

To the Editor of the Meteorological Magazine.

SIR,—In your July issue, page 90, you have an interesting report on a whirlwind which occurred near Reigate on June 21st. Some person, who does not give his name, expresses his ideas as to the formation of these phenomena, founded on the conditions of this one. I regret having to differ from his conclusions: A calm day in June, on a hill side, “high and exposed, under a brilliant sun, and very warm,” with its action on the air, is in summer time so very usual an occurrence, that we might expect a whirlwind in almost every hillside field in such weather. Mr. Burchall does not give the hour, but it curiously happens that at 5.0 p.m. on the same day, a similar phenomenon occurred at the racing grounds of the Athletic Club at Fulham, under, I fancy, as to locality, very different conditions, but apparently with as much force and effect. That at Fulham, however, showed a refined taste in selecting the music looks of the band, and carrying their leaves to an inconceivable height. Both these reports were published in the *Times* within a few days of their occurrence. Now, Sir, my contention is that a whirlwind, such as these, is caused by a silent electric current of large volume, but of small intensity, passing from the earth to the higher atmosphere, the electricity in both positions, or places, being of opposite species, that in the earth, as in ordinary thunderstorm, being induced by that in the upper atmosphere; the discharge carries the air and its contents along with it, the whirling motion being given, as is well-known, by the unequal friction, or resistance, on the opposite sides of the current; the effect of this current on the air, giving it almost the force of a gale, was shown by the dilemma in which the poor rooks found themselves; it must have been stronger than anything we can imagine to arise from ordinary heated air. It is much to be desired that meteorologists would give more of their attention to the subject of atmospheric electricity, which next to the heat and light of the sun, produces the greatest effects in meteorology, and is at present thoroughly ignored.

Yours faithfully,

ROBERT J. LECKY.

London, July 23rd, 1894.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE FOR 1893.

STATIONS.	ABSOLUTE.			AVERAGE.					ABSOLUTE.		TOTAL RAIN.		AVER. AGE. Cloud.	
	Maximum. Temp.	Date.	Temp.	Minimum. Date.	Max.	Min.	Mean.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.		Days.
<i>Those in Italics are South of the Equator.</i>														
England, London ...	93·6	August 18	15·4	January 5	60·6	43·2	51·9	43·2	76	134·3	10·0	in. 19·80	148	0-10 5·3
Malta	98·8	September 25	39·0	January 19	73·0	59·6	66·3	56·5	75	148·8	36·3	25·30	80	3·9
<i>Cape of Good Hope.</i>	98·7	April 5	35·1	August 22	70·5	53·6	62·0	54·9	79	...	...	23·37	93	4·1
<i>Mauritius</i>	85·6	December 30	57·4	August 16	78·6	67·7	73·1	64·1	76	141·0	48·2	...	...	5·8
Calcutta	96·9	May 20	45·9	January 28	83·9	69·7	76·8	69·9	81	159·0	37·7	85·23	97	5·2
Bombay	94·6	April 16	57·9	February 8	85·3	74·1	79·7	70·9	76	149·0	49·3	67·24	124	3·9
Ceylon, Colombo ...	92·2	March 9	65·8	February 8	85·9	74·7	80·3	70·7	77	157·0	53·0	89·65	192	5·0
<i>Melbourne</i>	105·5	March 2	31·0	July 28	67·6	50·1	58·8	...	74	155·5	24·9	26·82	140	6·0
<i>Adelaide</i>	108·0	February 2	35·7	July 3	72·4	52·9	62·7	48·0	60	166·4	26·1	21·50	129	...
<i>Sydney</i>	93·6	December 6	38·7	July 4	68·8	56·2	62·5	53·6	78	153·0	24·0	49·91	208	4·8
<i>Wellington</i>	82·0	January 24	34·0	June 11	62·6	50·9	56·8	48·4	75	150·0	24·0	53·03	183	4·9
<i>Auckland</i>	81·5	January 26	38·5	August 12	66·5	54·6	60·6	54·8	82	146·0	30·0	53·81	203	5·9
Jamaica, Kingston..	92·9	July 4	63·8	Mar. 17, Dec.7	86·5	70·6	78·6	69·4	79	...	...	34·29	97	5·3
Trinidad.....	93·0	{ May 15, 17 Jly 12, Aug 29	{ 61·0	March 9	87·9	68·6	78·3	71·4	81	171·0	57·0	92·49	194	...
Toronto	93·3	July 25	—17·8	January 11	51·0	34·9	42·9	37·4	77	...	—22·0	39·09	198	5·9
New Brunswick, { Fredericton. ... }	94·7	August 11	—26·0	December 15	49·9	28·3	39·1	32·9	72	...	...	43·59	148	5·1
Manitoba Winnipeg	92·8	June 13	—48·0	February 1	42·1	18·5	30·3	...	...	...	...	23·93	134	5·5
British Columbia, { Esquimalt	80·0	June 5	—1·5	January 31	53·5	41·0	47·2	43·3	87	...	...	51·03	212	6·7

Summary.

Highest Temp. in Shade	108°·0 at Adelaide, on Feb. 2nd.
Lowest " " "	—48°·0 at Winnipeg, on Feb. 1st.
Greatest Range in Year	140°·8 at Winnipeg.
Least " " "	26°·4 at Colombo, Ceylon.
Greatest Mean Daily Range.....	23°·6 at Winnipeg.
Least " " " "	10°·9 at Mauritius.
Highest Mean Temp. 	80°·3 at Colombo, Ceylon.
Lowest " " " "	30°·3 at Winnipeg.
Driest Station	Adelaide, mean humidity 60.
Dampest " " " "	Esquimalt, mean humidity 87.
Highest Temperature in Sun ...	171°·0 at Trinidad.
Lowest Temperature on Grass...	—22°·0 at Toronto.*
Greatest Rainfall	92·49 in. at Trinidad.
Least " " " "	19·80 in. at Camden Square.
Most Cloudy Station.....	Esquimalt, average amount 6·7.
Least " " " "	{ Malta... } " " " 3·9
	{ Bombay }

REVIEW.

Report on the Epidemic of Enteric Fever in 1893 in Worthing
. . . . by C. KELLY, M.D., M.O.H. for West Sussex. Southern
Publishing Co., Brighton, 1894. 8vo, 60 pages, and 15 maps and
plates.

IN bygone times the Worthing disaster of 1893 would have been regarded as a visitation beyond human control. We now know more ; we know that this disease arises from dirt ; and when human beings realise that cleanliness is of greater importance than politics, this disease will be numbered with the things of the past. Worthing had its water supply fouled, and severe indeed was the penalty. It would be a good thing for the country could Worthing's lesson be brought to the notice of every Borough or County Councillor throughout the land, for Worthing is not the only place where an outbreak of enterics or typhoid fever may occur.

Dr. Kelly has, we think, done most wisely in making this Report perfectly clear and frank. He seems to have concealed nothing, and to have proved his case—the sad one that the fouling of the water (aggravated by warm weather) was the direct cause of 1,416 cases and 188 deaths. Happily, he is able to report the abandonment of the old water works, and the return of the population to an extremely good state of health.

* The Min. on Grass in not recorded at Canadian stations except Toronto.

INJURY TO VEGETATION IN MAY.

To the Editor of the Meteorological Magazine.

SIR,—It is, as another of your correspondents observes, some time since May, yet I venture to think all interest in the injury which many gardens sustained in that month is not yet exhausted.

The greatest cold in May occurred here on the morning of the 21st, when the minimum was 30°·9 ; this degree of cold would not ordinarily have produced the effects observed, it was, however, the fruit trees that principally suffered, and I believe the cause must be sought in the dryness, and the force of the wind which blew all night, and the rainfall.

The degrees of humidity at 9 a.m. were as here given :—

May 20.....	0·70	May 25.....	0 68
„ 21.....	0·65	„ 26.....	0·69
„ 24.....	0·70		

There had been considerable drought for 27 days, from the middle of March to the middle of April, then came about an inch of rain which started the buds again, just before a dry period, from May, 17th to 27th came an inch of rain, and a fresh impulse to the roots, only to cause the tender leaves to feel the full force of the scorching wind and sun. I noticed that potatoes when screened from wind by walls and houses in some instances escaped entirely, while neighbouring gardens had theirs cut to the ground.—Your obedient servant,

JOHN SLATTER.

Whitchurch Rectory, Oxon, 20th Sept., 1894.

WESTMORELAND WEATHER.

To the Editor.

SIR,—Referring to the paragraph in your number of to-day with regard to the fine weather in North Scotland during September, it may interest your readers to learn that similar conditions have prevailed in Westmoreland and the North-West Riding of Yorkshire. On Thursday last I left Westmoreland for London, and the contrast between the bright sunshine there and the chill fog and dampness here is most remarkable.

It is not only a few days of this glorious weather which has prevailed in our mountainous and generally rainy county.

Since August 25th, and over a continuous period of six weeks no rain of any moment has fallen. Days of bright sunshine and summer heat, with cool nights, have been almost uninterrupted.

Taking the rainfall at two places about fifty miles apart, viz., Kendal, in Westmoreland, and Foulridge (near Skipton) in the West Riding, the results are nearly alike during the six weeks, viz. :—At Kendal 31 in., and at Foulridge 39 in., whereas in 1893 the rainfall in September at these places was nearly seven inches.

The effect of this fine weather upon land and farming prospects has been very beneficial. The corn crop, which is up to the average, has been housed in a perfectly dry condition, and with much less labour than usual, whilst the after growth of grass and clover, stimulated by rain in August and sunshine in September, has been so luxuriant that the cattle are feeding knee-deep in herbage.

I hear to-day that rain fell yesterday for three hours in Westmoreland, six weeks and one day having elapsed since the last heavy fall.

The Athenæum, London, Oct 8.

ALFRED HARRIS.

[*From the Westminster Gazette.*]

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, APRIL, 1894.

STATIONS. (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain.		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
	°		°		°	°	°	0-100	°	°	inches		
England, London	73·3	8	34·5	22	61·2	42·5	42·9	76	116·6	27·1	1·74	14	5·8
Malta.....	72·5	22	47·0	7	66·8	53·9	53·8	82	138·8	41·6	1·51	8	5·6
<i>Cape of Good Hope</i> ...	...	...	...	...	...	...	...	...	...	...	...	...	...
<i>Mauritius</i>	82·4	3, 12	67·3	25	80·5	70·8	67·4	78	131·2	56·1	6·11	18	6·0
Calcutta	103·3	7	65·1	21	94·6	75·4	74·0	73	158·5	61·6	3·47	4	2·7
Bombay.....	91·4	24	74·2	3	88·9	77·9	74·4	75	140·0	67·0	·01	1	1·7
Ceylon, Colombo ...	90·2	24	72·6	25	87·9	74·9	73·2	80	150·0	69·0	12·51	21	5·9
<i>Melbourne</i>	84·5	12a	43·9	14	68·1	53·2	51·7	75	134·8	37·2	2·84	9	3·1
<i>Adelaide</i>	90·2	5	45·2	29	74·2	54·7	49·4	61	145·2	39·6	2·62	11	4·6
<i>Sydney</i>	77·8	17	50·5	28	71·1	59·4	57·4	82	135·5	40·5	3·59	15	4·9
<i>Wellington</i>	71·5	7	39·0	16	63·3	50·3	45·3	66	130·0	27·0	2·11	13	4·4
<i>Auckland</i>	73·0	7	42·0	10	66·7	52·8	52·6	79	136·0	40·0	1·04	14	5·2
Jamaica, Kingston.....	89·5	29	66·6	20	85·7	69·8	67·7	78	...	...	·61	7	4·0
Grenada	84·8	25b	67·0	3	82·2	72·3	67·9	72	157·0	...	2·32	16	3·6
Trinidad .....	...	...	...	...	...	...	...	...	...	...	...	...	...
Toronto	69·3	19	18·4	3	53·3	35·6	40·4	68	...	11·0	1·33	10	5·0
New Brunswick, Fredericton	66·7	28	6·5	3	48·9	27·1	28·0	63	...	...	2·06	7	6·0
Manitoba, Winnipeg ...	76·8	29	3·0	1	49·3	30·8	...	...	...	...	3·56	13	4·0
British Columbia, Esquimalt	69·2	25	31·8	15	52·5	38·8	41·2	86	...	...	4·23	24	6·0

a And 15. b And 26.

REMARKS.

MALTA.—Mean hourly velocity of wind 10·4 miles. The temperature of the sea rose to 63°·7. Thunderstorms on the 13th and 29th; lightning on 30th. Mean temp. 0°·3 below, humidity 5° above, cloud 1·3 above, and wind velocity 1·4 miles per hour below, their respective averages. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·9 below, dew point 0°·9 below, and rainfall 1·15 in. above, their respective averages. Mean hourly velocity of wind 11·0 miles, or 0·4 mile above average; extremes, 29·8 on 27th, and 1·7 on 30th; prevailing direction, E.S.E. to E. Lightning on 6th and 7th, and thunder and lightning on 19th. C. MELDRUM, F.R.S.

CEYLON, COLOMBO.—Thunderstorms occurred on 12 days, and lightning alone was seen on 3 other days. D. G. MANTELL.

Melbourne.—Thunder and lightning on the 1st and 16th; fogs on 7th and 8th; lunar halos on 14th and 15th. R. L. J. ELLERY, F.R.S.

Adelaide.—Both mean pressure and shade temperature slightly above the average of 37 years; cloud slightly less than the average, and 4·2 hours more sunshine than usual. First half of the month fine and very dry; good showers in the latter half over the southern districts, but moderate over more northern areas. C. TODD, F.R.S.

Sydney.—Temperature 0°·5 above, humidity 6 above, and rainfall 1·35 in. below, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—Showery at the beginning of the month, then fine from 4th to 20th, with slight rain at intervals; from 21st to the end very showery and unsettled. Rainfall 1·41 in. below the average. Thunder on the 25th; hail on 9th. Prevailing N.W. winds. R. B. GORE.

Auckland.—An unusually fine and dry month, the rainfall being less than one-half the average of 27 years. Mean temp. 2°·0 below the average. T. F. CHEESEMAN.

JAMAICA.—Weather fair. Rainfall below the average in Kingston, but above it for the whole Island. Mean hourly velocity of wind 3·6 miles. R. JOHNSTONE.

SUPPLEMENTARY TABLE OF RAINFALL,
 SEPTEMBER, 1894.

[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.			
II.	Dorking, Abinger Hall.	2.10	XI.	Rhayader, Nantgwillt..	1.75
„	Birchington, Thor	1.83	„	Lake Vyrnwy .....	.94
„	Hailsham	3.27	„	Corwen, Rhug	1.18
„	Ryde, Thornbrough	3.98	„	Carnarvon, Cocksidia ...	.89
„	Emsworth, Redlands ...	3.18	„	I. of Man, Douglas .....	.53
„	Alton, Ashdell	2.71	XII.	Stoneykirk, Ardwell Ho.	.21
III.	Oxford, Magdalen Col...	1.80	„	New Galloway, Glenlee	.16
„	Banbury, Bloxham	2.35	„	Melrose, Abbey Gate ..	.83
„	Northampton, Sedgebrook	1.37	XIII.	N. Esk Res. [Penicuick]	.45
„	Alconbury	1.18	„	Edinburgh, Blacket Pl..	.48
„	Wisbech, Bank House..	1.29	XIV.	Glasgow, Queen's Park.	.14
IV.	Southend	1.76	XV.	Inverary, Newtown .....	.11
„	Harlow, Sheering ...	1.59	„	Islay, Gruinart School..	.29
„	Colchester, Lexden.....	1.20	XVI.	Dollar.....	.08
„	Rendlesham Hall .....	.98	„	Balquhider, Stronvar..	.21
„	Diss .....	.97	„	Ballinluig .....	.12
„	Swaffham	2.06	„	Dalnaspidal H.R.S. ...	.55
V.	Salisbury, Alderbury...	1.92	XVII.	Keith H.R.S.	2.17
„	Bishop's Cannings	2.01	„	Forres H.R.S. ....	.78
„	Blandford, Whatcombe.	2.77	XVIII.	Fearn, Lower Pitkerrie.	.29
„	Ashburton, Holne Vic....	5.05	„	Loch Shiel, Glenaladale	.40
„	Okehampton, Oaklands.	2.10	„	N. Uist. Loch Maddy ...	.46
„	Hartland Abbey	2.26	„	Invergarry .....	.21
„	Lynmouth, Glenlithorne.	2.08	„	Aviemore H.R.S. ....	.98
„	Probus, Lamellyn	2.06	„	Loch Ness, Drumnadrochit	.60
„	Wellington, Sunnyside..	2.20	XIX.	Invershin .....	.07
„	Wincanton, Stowell Rec.	2.90	„	Scourie	1.51
VI.	Clifton, Pembroke Road	3.22	„	Watten H.R.S. ....	.60
„	Ross, The Graig	3.78	XX.	Dunmanway, Coolkelure	1.97
„	Wem, Clive Vicarage ...	.78	„	Fermoy, Gas Works ...	1.07
„	Cheadle, The Heath Ho.	.80	„	Killarney, Woodlawn ...	...
„	Worcester, Diglis Lock	1.79	„	Tipperary, Henry Street	.55
„	Coventry, Coundon	2.70	„	Limerick, Kilcornan ...	.30
VII.	Ketton Hall [Stamford]	1.15	„	Ennis .....	.16
„	Grantham, Stainby .....	.75	„	Miltown Malbay.....	.62
„	Horncastle, Bucknall ...	1.00	XXI.	Gorey, Courtown House	.83
„	Worksop, Hodsck Priory	.67	„	Athlone, Twyford .....	.17
VIII.	Neston, Hinderton .....	.76	„	Mullingar, Belvedere...	.37
„	Lancaster, Rose Bank...	...	„	Longford, Currygrane...	.10
„	Broughton-in-Furness..	.98	XXII.	Galway, Queen's Coll...	.08
IX.	Ripon, Mickley .....	.63	„	Crossmolina, Enniscoe..	.77
„	Scarborough, South Cliff	2.16	„	Collooney, Markree Obs.	.26
„	East Layton [Darlington]	.98	„	Ballinamore, Lawderdale	.29
„	Middleton, Mickleton..	1.07	XXIII.	Lough Sheelin, Arley ..	.23
X.	Haltwhistle, Unthank..	.83	„	Warrenpoint .....	.36
„	Bamburgh	1.28	„	Seaforde .....	.35
„	Keswick, The Breches...	.69	„	Belfast, Springfield ....	.30
XI.	Llanfrechfa Grange	3.41	„	Bushmills, Dundarave...	.41
„	Llandovery	1.29	„	Stewartstown .....	.14
„	Castle Malgwyn	1.41	„	Buncrana .....	.40
„	Builth, Abergwessin Vic.	1.66	„	Loughswilly, Carrablagh	.77

SEPTEMBER, 1894.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					Days on which ≥ 1 or more fell.	TEMPERATURE.				No. of Nights below 32°.	
		Total Fall.	Differ- ence from average 1880-9.	Greatest Fall in 24 hours		Max.		Min.					
				Dpth	Date			Deg.	Date	Deg.	Date		
												inches.	inches.	in.
I.	London (Camden Square) ...	1.05	— 1.46	.27	7	11	71.2	1	39.3	29	0	1	
II.	Maidstone (Hunton Court)...	2.96	+ .37	.44	2	13	...	...	...	...	...	...
III.	Strathfield Turgiss	2.42	— .03	1.04	7	11	70.6	1	32.5	29	0	3	
III.	Hitchin	1.77	— .73	.31	23	15	68.0	1d	34.0	28	0	...	
IV.	Winslow (Addington)	1.77	— .90	.37	25	10	66.0	2	31.0	29	2	3	
IV.	Bury St. Edmunds (Westley)	1.41	— 1.29	.77	25	10	64.0	19	38.0	28	0	...	
V.	Norwich (Brundall)	1.68	...	.62	25	16	71.0	19	40.0	11	0	3
V.	Weymouth (Langton Herring)	4.06	+ 1.64	1.32	22	10	67.0	2, 24	40.0	29	0	...	
"	Torquay (Cary Green) ...	3.05	...	1.18	21	12	66.6	15	42.5	29	0	0	
VI.	Polapit Tamar [Launceston]..	2.10	— 1.61	1.12	21	13	71.5	1	38.0	30	0	4	
VI.	Stroud (Upfield)	2.51	— .40	.91	7	10	70.0	2	38.0	27	0	...	
"	Church Stretton (Woolstaston)	1.45	— 1.05	.67	25	9	65.0	11	37.0	29	0	3	
"	Tenbury (Orleton)	2.51	— .10	.63	22	11	70.0	11	32.0	28	1	3	
VII.	Leicester (Barkby)	1.10	— 1.54	.45	25	12	70.0	2	28.0	27	4	7	
"	Boston .....	.74	— 2.03	.25	5	11	71.0	1	38.0	27	0	...
"	Hesley Hall [Tickhill].....	.47	— 1.69	.17	25	9	66.0	1, 14	35.0	28	0	0	
VIII.	Manchester (Plymouth Grove)	.98	— 2.49	.62	19	6	68.0	1	30.0	27	4	5	
IX.	Wetherby (Ribston Hall) ...	.94	— 1.52	.42	6	8	...	...	...	...	...	...
"	Skipton (Arncliffe) .....	.54	— 4.22	.27	5	8	...	...	...	...	...	...
"	Hull (Pearson Park) .....	.84	— 1.60	.24	7	10	69.0	11	38.0	27	0	0
X.	Newcastle (Town Moor) .....	.83	— 1.95	.20	1	11	...	...	...	...	...	...
"	Borrowdale (Seathwaite).....	.59	— 1.14	.38	5	3	...	...	...	...	...	...
XI.	Cardiff (Ely).....	2.32	— 1.42	.91	23	9	...	...	...	...	...	...
"	Haverfordwest	1.89	— 2.51	.78	7	7	65.3	3	30.3	30	2	7	
"	Aberystwith (Gogerddan) ...	1.60	— 2.67	1.10	7	8	71.0	20	27.0	29	7	...	
XII.	Llandudno .....	.64	— 1.58	.25	4	7	63.6	1	38.8	28	0	...
"	Cargen [Dumfries] .....	.20	— 3.36	.14	1	3	69.8	14	29.8	27	2	...
"	Jedburgh (Sunnyside).....	1.15	— 1.54	.37	1	9	79.0	10	31.0	28	1	...	
XIV.	Colmonell .....	.21	...	.21	1	1	72.0	1, 16	26.0	27	4	...
XV.	Lochgilphhead (Kilmory).....	.24	— 4.89	.08	25	5	...	...	30.0	27	7	...
XV.	Mull (Quinish) .....	.14	— 4.89	.11	14	2	...	...	...	...	...	...
XVI.	Loch Leven Sluices .....	.30	— 2.49	.10	5a	3	...	...	...	...	...	...
XVI.	Dundee (Eastern Necropolis)	.15	— 2.36	.06	25	7	70.9	11	36.2	27	0	...	
XVII.	Braemar .....	.96	— 1.90	.68	4	12	65.1	17	32.2	24	0	12
XVIII.	Aberdeen (Cranford) .....	.62	...	.14	7	14	...	...	...	...	...	...
XVIII.	Strathconan [Beaully] .....	.43	— 3.25	.20	5	4	...	...	...	...	...	...
"	Glencarron Lodge .....	.42	...	.08	10c	11	65.0	17	34.7	26	0	...
"	Cawdor [Nairn]	1.08	— 1.67	.28	3	12	...	...	...	...	...	...
XIX.	Dunrobin .....	.19	— 2.40	.08	6	5	64.0	10	41.0	4	0	...
"	S. Ronaldsay (Roeberry).....	.42	— 2.24	.10	4	13	58.0	14e	44.0	22	0	...	
XX.	Darrynane Abbey	1.37	...	.97	7	4	...	...	...	...	...	...
"	Waterford (Brook Lodge) ...	1.16	— 1.76	.66	7	5	67.0	10f	35.0	10	0	...	
"	O'Briensbridge (Ross) .....	.32	...	.23	7	2	...	...	...	...	...	...
XXI.	Carlow (Browne's Hill) .....	.35	— 2.47	.18	7	6	...	...	...	...	...	...
"	Dublin (Fitz William Square)	.44	— 1.53	.16	7	8	63.9	10	39.8	28	0	0	
XXII.	Ballinasloe .....	.23	— 2.56	.09	1	6	67.0	29g	29.0	28	8	...
"	Clifden (Kylemore) .....	.31	...	.14	10	4	...	...	...	...	...	...
XXIII.	Waringstown .....	.20	— 2.96	.10	5, 24	2	75.0	9	29.0	27	3	7
"	Londonderry (Creggan Res.)..	.50	— 3.28	.33	1	6	...	...	...	...	...	...
"	Omagh (Edenfel) .....	.17	— 3.21	.08	24	5	64.0	13h	26.0	27	3	7

a And 23, 26. *c* And 14. *d* And 2, 18. *e* And 17. *f* And 25. *g* And 30.

h And 16. *i* And 29.

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

METEOROLOGICAL NOTES ON SEPTEMBER, 1894.

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

ENGLAND.

STRATHFIELD TURGISS.—A fair month with several wet days, but with little R. A sharp TS circulated round this station on 7th, with much R, but did not develop, being heavier to the E. T on 6th. Ivy in flower on 12th. Red admiral butterfly flying on 14th.

ADDINGTON.—A dull, cold month with a most unusual predominance of N.E. winds (twenty-nine days out of thirty). The max. shade temp. 66° is the lowest for the month noted during the last twenty-four years. A lower min. temp. has been registered, but not often. On the 28th and 29th many tender plants were cut off by frost. In September, 1880, the max. temp. was 85°, 19 degrees higher than the max. of this month. Fog on four days. T and H on 6th.

BURY ST. EDMUNDS.—A month of northerly winds, low temp. and little sunshine.

NORWICH, BRUNDALL.—A cool and cloudy month, with light rains and damp mists at times. Mean temp. 3° below the average. L on 8th, T on 27th, H on 28th and 29th.

LANGTON HERRING.—The first week of the month was wet and unsettled, with T and L on the 2nd, 5th, 6th and 7th; then followed thirteen days of fine dry weather, most favourable for the in-gathering of the harvest. From the 20th to the 24th 2·36 in. of R fell; the last six days of the month were bright and sunny. On the whole a fine month but rather cold, the mean temp. being 3·1 below the average. The mean reading of the bar. was higher than that of any September in the previous thirteen years, and the reading on the 30th was higher than that of any day during that time.

TORQUAY, CARY GREEN.—R 70 in. above the the average. Mean temp. 56°·3, or 0°·6 below the average. Amount of sunshine 156 hours 5 minutes, being 1 hour 20 minutes below the average; four sunless days.

POLAPIT TAMAR.—Total R less than half the average of thirteen years. The month was specially noticeable for the prevalence of E. wind and the absence of strong winds or gales. Fogs on three days, thick on 19th and 20th.

STROUD, UPFIELD.—T and L on the 4th, TS on 5th, and T on 6th. Fog at night on the 19th. Prevailing winds N. and N.E.

WOOLSTASTON.—A very dry month without much sunshine. The harvest generally well got in. Mean temp. 52°·0.

TENBURY, ORLETON.—A cold and sunless month with about the average quantity of R. With the exception of a few hours on the 7th the wind was N. or N.E. all the month. Sharp frosts on the 28th, 29th and 30th. Fog on 7 days. TS on 4th.

LEICESTER, BARKBY.—Warm nights till 26th. Mean temp. of the month 52°·4. Great scarcity of water. T on 5th.

MANCHESTER, PLYMOUTH GROVE.—The driest September experienced since observation commenced twenty-seven years ago, and, with the two exceptions of 1871 and 1878, when the mean temp. was 52°·6 each year, the coldest September during that time. Mean temp. 52°·9.

WALES.

HAVERFORDWEST.—During the first twelve days six cold nights occurred, and from 25th to 30th the nights were cold and frosty, but the bulk of the nights were above the average for the month. The weather was splendidly fine; the day temp. below the mean, with air crisp; prevailing winds N.N.E.; much bright sunshine; many nights very foggy; small rainfall. One of the finest harvest months on record; 23 days without R.

ABERYSTWITH, GOGERDDAN.—Very fine throughout the month with bright sunshine.

SCOTLAND.

CARGEN.—A remarkably fine month, with mean temp. one degree above the average. Mean bar. pressure 30·150 in. ; on only four occasions during the last 34 years has this mean pressure been exceeded, viz., November, 1867, January, 1880, June, 1887, and February, 1891. On only one occasion since observations were commenced has there been a less fall of R in any one month, viz., April, 1873, when ·10 in. fell. The total R from August 15th to the end of September was only ·40 in. E. winds prevailed for 24 days, and were remarkably light.

JEDBURGH.—The month was marked by generally cold ungenial weather for the season. The R was slight and fell at long intervals, allowing much corn to be saved, but frosts and dew prevailed a good deal, which retarded operations generally till mid-day. The cereal crops are above the average ; the turnip crop rather disappointing.

COLMONELL.—The least rainfall in any September from 1876–94, and, in fact, the least in any month in these years.

MULL, QUINISH.—An unprecedented month of sunshine and dry weather. The harvest in this district has been got in under most unusual conditions.

BRAEMAR.—A fine, dry month. Duration of sunshine 107 hours 45 minutes.

ABERDEEN, CRANFORD.—An exceptionally fine month. All grain crops cut and stacked in good order.

DUNROBIN.—The finest and driest September for at least a quarter of a century.

ROEBERRY.—Very dry and quiet throughout. The driest September recorded for 28 years.

IRELAND.

DARRYNANE ABBEY.—A very dry and fine, sunny month, the number of days with R being the smallest registered. The next smallest were seven days in May, 1876, and nine days in November, 1879, the corresponding falls being ·83 in. and ·75 in. The falls in May, 1874 (1·20 in.), March and April, 1893 (1·02 and 1·26 in.), were less than this month, but on more days (17, 13, 10). The first part of the month was very warm, but the last few days were rather cold.

O'BRIENSBRIDGE, ROSS.—The driest and most beautiful month in this record of 49 years. September, 1888, being the nearest to it, but with many more rainy days.

DUBLIN.—As in 1893, so in 1894, September proved a favourable month throughout ; quiet, cool weather, with an overwhelming prevalence of N. to E. winds, and a very scanty and infrequent rainfall. The mean temp. (53°·8) was exactly 2° below the average. High winds were noted on only two days. L on the 4th. Fog on 5 days.

WARINGSTOWN.—The driest month ever recorded here. Sharp frost on the 27th, earlier than usual by a fortnight or three weeks.

EDENFEL.—The drought which set in on the 27th August, and embracing the whole month of September, has now (6th October) reached its forty-first day, during which time but ·19 in. of R has fallen on seven days. This is by far the driest period of like duration recorded here in 30 years, and as far as I am able to ascertain from some records in my possession and the “oldest inhabitants,” for at least as far back as 1826. A high and steady bar., averaging about 30·3 in. ; winds, if any, from northerly or easterly points, and a smaller proportion of clear sunshine than is common to these conditions has accompanied them. A good harvest has been secured even in the mountain districts in perfect order.