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A WET DAY IN A WET DISTRICT.

*To the Editor of the Meteorological Magazine.*

SIR,—When a man in any part of Britain finds over six inches of rain collected in his gauge in a day, it shows no unreasonable inquisitiveness if he asks his neighbours how they fared. Such was my position on the morning of 13th November, 1897, and I think your readers will care to see the result of my enquiry. There was nothing to call a storm—certainly no thunder storm—anywhere, only the rain kept pegging away (in my case for 23 hours out of the 24), as if it meant business, and indeed it was not idle the next day, for I measured 1·00 in. for 13th November.

I give, in the subjoined table, the record for 12th November: at 14 stations in “the Lake District,” and add the number of days on which the same gauges have registered 3·00 in., or more, in a day, during the 7 years 1890–96, and the highest day’s record in the same period. But, as these stations are in a wet district, I add also the average yearly rainfall at each for the same period. Seven years is, of course, an utterly inadequate period to give an average rainfall, but it serves to show the relative wetness of these stations, and for several of them no longer average is available. The figures for 12th November are very high, and I believe in most cases are the highest recorded since observations began, but to show how far the rainfall was excessive for the locality I have cast out how many average days rainfall that of 12th November amounted to, at each place. The highest equivalent in days is 28, or in other words, less than 8 per cent. of a year’s rainfall fell on 12th. I think you have stated that 20 per cent., or in dry places 25 per cent., of a year’s record may fall in a day, but those figures, fortunately, do not apply to this district,—if they did we should have no roads left.

Yours, &c.,

STEPHEN A. MARSHALL.

*Skelwith Fold, near Ambleside.*

*Rainfall in the Lake District, November 12th, 1897.*

STATIONS.	Rainfall 12th November, 1897.	Average yearly rainfall, 1890-96.	No. of average days rainfall to equal that of 12th Nov., 1897.	No. of days in 7 years, 1890-96, giving 3'00 in., or more.	Highest day's record in those 7 years.	Fall on Nov. 12th, per cent. of yearly mean.
<i>Lancashire—</i>	in.	in.			in.	
Hawkshead (Esthwaite Lodge).....	4·22	68·67	22	2	3·70	6·2
Duddondale (Seathwaite Vicarage).	4·07	80·25	19	2	3·80	5·1
Skelwith Fold.....	6·03	80·53	27	3	3·18	7·5
<i>Westmoreland—</i>						
Skelwith Bridge.....	6·35	81·92	28	2	3·56	7·8
Ambleside (Lesketh How).....	4·45	78·03	21	0	2·97	5·7
Elterwater (Birch Hill) ..	4·57	90·75	18	8	4·24	5·0
Dungeon Ghyll.....	5·90	112·27	19	18	4·90	5·3
Loughrigg (High Close).....	4·33	83·37	19	6	3·60	5·2
Grasmere (Pavement End).....	4·38	89·00	18	9	4·15	4·9
Patterdale.....	4·55	82·15	20	3	4·15	5·5
<i>Cumberland—</i>						
Borrowdale (Seathwaite).....	8·03	131·39	22	27	6·79	6·1
„ (Rosthwaite).....	6·94	101·43	25	10	5·33	6·8
„ (Grange).....	5·93	88·84	24	—	4·45	6·7
Derwentwater (Barrow House).....	3·98	72·19	20	1	3·01	5·5

[In the above letter Mr. Marshall has given the essential features of this remarkable rain, and the only addition which we can at present make to it, is to mention that in the much drier district round Cockermouth, the fall was between 4 and 4½ in., which of course was, relatively, even more remarkable. We are sorry to hear of one gauge having been washed away by a flood, and still more sorry (because it could have been prevented) to hear of two others having been allowed to run over. The following cutting gives a popular account of the rain. A few days later there were falls in North Wales (on 14th and on 18th) exceeding 4 in., but these must stand over for *Brit. Rain.*, 1897.—ED.]

HEAVY STORM IN KENDAL.—Until last week, for almost a whole month, there was no rain in the neighbourhood of Kendal, the fading autumn being remarkable in its mildness. In fact not since 1872 has there been such an autumn. As if to make amends for this long inaction a severe storm overwhelmed the district on Friday. Throughout the day the rain came down pitilessly—not in the half-hearted manner of the earlier showers which indicated the change, and between eight o'clock on Friday morning and eight o'clock the following morning no less than 2·73 in. of rain was registered by Messrs. Rhodes' rain gauge, only a third of an inch less than the whole quantity which fell in October. Naturally the Kent rose rapidly, and on Saturday morning had overflowed its banks, the footpath on Waterside being covered with water. On the shingle on New Road a number of swingboats had been erected for the Martinmas fair, but not a vestige of them remained this morning, the whole body being washed towards the estuary of the river. Other damage was done of a minor nature, and during the morning it was evident that the country above had not altogether escaped, hugh limbs of trees, &c., rolling along with the surging water. Between Kendal and Burneside many fields were flooded.—*Westmoreland Gazette.*

THE GREAT METEORIC SHOWER OF NOVEMBER.

*To the Editor of the Meteorological Magazine.*

SIR,—When a man writes upon a scientific subject he at once assumes a serious responsibility, and it behoves him to be careful in presenting the truth in all the statements he makes and the figures he quotes. Now, when I said in my pamphlet on “The Great Meteoric Shower of November” that one of the observers of the shower in 1866 must have made a mistake when he said “the largest of the meteors was not twice the apparent brilliancy of Sirius,” I did so on the best of evidence, and the statement can easily be substantiated. You take serious exception to it. Very well. There is a mass of observations in the *Monthly Notices Roy. Ast. Soc.*, Vol. 27; *British Association Report*, 1867; *Proceedings of the Meteorological Society* for November 21st, 1866; *Astronomical Register*, December, 1866, &c., &c., which distinctly proves one thing, and that is that some of the meteors were considerably brighter than Venus ever is, and far and away superior in lustre to twice that of Sirius. My pamphlet furnishes ample evidence on the point from the descriptions published at the time. I have not mentioned my own observations, but I may say that during the night I saw several meteors which momentarily lit up the sky and landscape with flashes more intense than the light of any planet. Taken as a whole, the meteors of November, 1866, were considerably brighter than the August Perseids; they were also brighter than the Andromedes of Biela’s comet in 1872 and 1885, and brighter also than the average of members of ordinary meteoric streams.

You suggest that an index would have improved the pamphlet. So it would; but it was only a reprint, and extras were avoided to save expense. As to the stationary meteors, I have devoted a long paragraph to them on p. 27, and it is quite sufficient for the purpose, for the Leonid shower presents a hundred points besides end-on meteors. You say there is no reference to efforts to photograph the area surrounding the radiant. There is such a reference on p. 46, brief though it is, but I refrained from enlarging on the subject of meteoric photography, as it is a department in which I can boast of no experience whatever, and it is sometimes just as well not to assume to teach before one has played the part of pupil.—Yours faithfully,

W. F. DENNING.

*Bristol, Dec. 7th, 1897.*

[It is strange that Mr. Denning does not see that this letter does not carry matters farther than his pamphlet, for he has not disposed of either of the authorities we quoted—viz., Backhouse, Baxendell, and Hind—but he will probably be gratified by our printing the letter, and we have no objection to so doing. The concluding statements are excellent illustrations of the difficulty of finding what there is in a book without an index. We cannot devote any more space to the subject.—ED.]

## TEMPERATURE VARIATIONS IN NOVEMBER.

*To the Editor of the Meteorological Magazine.*

SIR,—The variations in the temperature at 9 a.m. during the past week have been so extraordinary that I think they are worthy of record :—

November 14th	.....	55·1	} a fall of 17·0
„ 15th	.....	38·1	
„ 16th	.....	39·5	} a rise of 14·8
„ 17th	.....	54·3	
„ 18th	.....	52·9	} a fall of 21·4
„ 19th	.....	31·5	
„ 20th	.....	46·3	} a rise of 14·8

This changeable weather has been very trying to the delicate and to old people, accompanied, as it has been, by considerable fog.

Yours very truly,

RICHARD TYRER.

*Cheltenham, November 23rd, 1897.*

Although at Camden Square the fluctuations of temperature in November, 1897, were not quite so great as at Cheltenham, they appeared to be sufficiently so to call for a study of back years to see how far they were exceptional, and the following table is believed to contain all cases in the 39 years, 1858–96, which approximate to the 1897 values. It will be seen that in five out of these eight November weeks the total range was greater than in 1897.

TABLE I.—*Weeks in November with great Variation of 9 a.m. Temperature at Camden Square.*

1897		1895		1893		1883		1867		1866		1865		1861	
Date.	Reading.	Date.	Reading.	Date.	Reading.	Date.	Reading.	Date.	Reading.	Date.	Reading.	Date.	Reading.	Date.	Reading.
14	54·8	14	48·2	22	39·1	4	45·2	1	61·2	8	55·0	14	38·2	23	38·5
15	42·8	15	45·3	23	30·4	5	42·5	2	45·8	9	45·0	15	51·8	24	30·4
16	42·2	16	60·9	24	35·0	6	55·0	3	35·0	10	35·0	16	36·0	25	42·4
17	54·1	17	49·2	25	45·2	7	36·9	4	49·5	11	54·6	17	54·3	26	54·7
18	55·0	18	34·0	26	46·3	8	40·4	5	43·0	12	47·0	18	42·6	27	43·6
19	35·4	19	38·8	27	30·3	9	49·6	6	38·8	13	52·9	19	50·0	28	36·5
20	44·3	20	47·0	28	50·0	10	38·4	7	41·2	14	43·8	20	54·0	29	52·7
Total Range	19·6	...	26·9	...	19·7	...	18·1	...	26·2	...	20·0	...	18·3	...	24·3

It is not easy to adopt any rigid system of comparison between such variable data, but the seven calculations set out in the columns of the second table were assumed to give a fair indication of the variableness of each period, and every instance in which any four of the columns equalled or exceeded 1897 is set out in the table.

TABLE II.—*Sum of the Variations of 9 a.m. Shade Temperature at Camden Square in November weeks showing excessive range.*

YEAR.	Greatest Variation in one direction.		Cumulative Variations in both directions.				
	Between 2 days.	Between 3 days.	3 days.	4 days.	5 days.	6 days.	7 days.
1897	19°·6	19°·6	28°·5	32°·4	41°·3	45°·0	53°·9
1895	15°·6	26°·9	27°·3	42°·5	47°·3	55°·5	58°·4
1893	19°·7	19°·7	35°·7	36°·8	47°·0	51°·6	60°·3
1883	18°·1	18°·1	30°·6	34°·1	43°·3	54°·5	57°·2
1867	15°·4	26°·2	26°·2	40°·7	47°·2	51°·4	53°·8
1866	19°·6	20°·0	29°·6	39°·6	47°·2	53°·1	62°·2
1865	18°·3	18°·3	34°·1	47°·7	59°·4	66°·8	70°·8
1861	16°·2	24°·3	24°·3	35°·4	46°·7	58°·7	66°·8

In 1897 the greatest difference between any two consecutive 9 a.m. readings is 19°·6, while in 1866 it is the same (19°·6), and in 1893 slightly greater (19°·7); but taking periods of several days, 1866, 1865 and 1861 far exceed 1897 for variability of 9 a.m. temperature. Thus in one week in 1865 the 9 a.m. temperatures show a total zigzagging of 70°·8, while the 1897 fluctuations add to only 53°·9, which is with one exception the smallest value for a whole week in the table.

### THE DROUGHT OF OCTOBER AND NOVEMBER, 1897.

*To the Editor of the Meteorological Magazine.*

SIR,—In your interesting paper on the dryness of October, 1897, I see no mention of Somersetshire; but the deficiency of rain here, at a point 8 miles W. from the Wiltshire boundary, and 5 miles N. from that of Dorset, though we did just pass the one inch, was, for a western county, more remarkable than that in many of the places which you did name; and now that an even drier November has followed it, the result seems worthy of record.

October yielded here 1·04 in. in 10 days, of which ·80 in. fell in four days (15th to 18th). November yielded ·96 in. in ten days, of which ·66 in. fell in the last four days, and a third part of that really in December. There was absolute drought from early morning of October 19th to late evening of November 7th, *i.e.*, more than 19 days. N.B.—A few heavy drops, not enough to measure, fell in the evening of October 29th. Partial drought could be reckoned till evening of November 27th, *i.e.*, more than 39 days with ·30 in. of rain. The total for the two months thus goes down as exactly two inches!

H. A. BOYS, M.A.

*North Cadbury Rectory (250 ft. above sea), Dec. 1st, 1897.*

P.S.—The first frost at all felt in my garden this autumn was on November 26th.

*To the Editor of the Meteorological Magazine.*

SIR,—A dry November has followed a still drier October, 0·86 in. of rain having fallen here in October, and 0·95 in. in November. The average for the 10 years, 1887-96, is, for October, 3·31 in., and for November, 2·97 in., together 6·28 in., so that this year the fall in the two months was under 29 per cent. of the average for the last 10 years. Previously the least fall in October was 1·01 in. in 1888, in November, 1·14 in. in 1889, and for the two months together 4·03 in., in 1890. The remarkable circumstance is not, therefore, the small rainfall in *either* of these months, but that *both* the consecutive months which are usually about the wettest in the year should have been so dry.

Yours faithfully,

JOHN HOPKINSON.

*The Grange, St. Albans, 6th December, 1897.*

#### GALE ON NOVEMBER 28TH, 1897.

THE above ought not to pass without record in these pages. Although with many statements as to its severity we cannot agree, there is no doubt that very many lives were lost, and hundreds of thousands of pounds worth of property destroyed. The mischief, however, was due to tidal action rather than to that of wind. In London the barometric pressure fell fast (0·30 in. in 4 hours, noon to 4 p.m. on Sunday 28th), but this rate is by no means unprecedented, and we have known the wind much stronger. Confirmation thereof is afforded by the very trifling structural damage in the metropolis; one hoarding blown down, and a few slates and chimney pots carried away.

In the centre, E. and N. of England the gale was heavier, many chimneys and a few partly built premises, trees, and telegraph posts were blown down; but the damage was not comparable with that of the storms of March 24th, 1895, and of March 3rd, 1897.

Over the North Sea, and Southwestward, as far as Boulogne, the wind force was no doubt great, but the chief source of mischief was due to the intensity of the storm occurring at nearly the time of high water spring tide. Hence the Eastern coasts and both sides of the mouth of the Thames suffered severely, buildings being wrecked or flooded at Southwold, Ipswich, Harwich, Ramsgate, Margate, Herne Bay, Whitstable, Sheerness, Southend, Purfleet, Woolwich, and other places.

As is usual with such storms, there was some electrical disturbance. The first was at 8 p.m. on 27th, a single brilliant flash and very loud T at Durness, Sutherland. There was a TS in South Lincoln in the afternoon of 28th, and L was seen at various points along the coast from Suffolk to Yorkshire; later in the evening the TS became severe in South Nottinghamshire (the church of All Saints', Nottingham, was struck) and in the East Riding of Yorkshire. The L and T did not entirely cease until the early hours of the 29th.

## REMARKABLE HAILSTONES.

ABOUT 5 o'clock in the afternoon of August 10th I was at Manassas depôt, in Prince William County, Va., near the famous battlefield, waiting for a train. There was some pretty severe thunder and lightning for a half-hour or so, and then came a heavy shower of rain, during which there was the most remarkable fall of hail I have ever witnessed. I hurried out in the rain to examine the stones and picked up several. These were nearly square flattish blocks, say from  $\frac{3}{4}$  to 1 inch in length and breadth, and from  $\frac{1}{4}$  to  $\frac{1}{2}$  an inch in thickness. They suggested, by both shape and size, the ordinary "chocolate caramels" of the confectioner. There were some 8 or 10 persons, I think, in the station house with me, and several of these, observing my interest and enthusiasm, began to pick up the larger stones and bring them in to me and to my friend, Professor Hargrove, of Luray, Va. Soon larger and larger ones were thus collected, and I sought for means of measuring or weighing them. No rule or scales could be found, and so we set ourselves, several of us, conjointly and carefully to estimate the dimensions. I recorded at the time one as being, honestly estimated, "2 inches long,  $1\frac{1}{2}$  inches wide and  $\frac{3}{4}$  of an inch thick," these being rather the average than the extreme dimensions.

It then occurred to me to make an outline drawing of the largest by laying it flat upon a page of my pocket memorandum and carefully running a pencil around it. I secured in this way, a rather rough but fairly accurate outline of two. These outlines have been exactly copied (including some lines due to a slipping of the block or to a different inclination of the pencil) and are given in the accompanying cuts. The extreme lengths of these will be found to be, respectively, about  $2\frac{1}{2}$  and 3 inches; their extreme breadths about  $1\frac{1}{2}$  and 2 inches. The thickness of No. 1 was recorded at the time as being by estimate  $\frac{3}{4}$  inch; that of No. 2 as being 1 inch. I estimate their volumes as about  $1\frac{1}{2}$  cubic inches for No. 1, and nearly 3 cubic inches for No. 2. The drawing of No. 2 was done more hastily, as just in the midst of it my train rushed in and I had to leave. But I took my trophy with me, and, with perhaps pardonable enthusiasm, paraded it through the cars, and, exhibiting it to the passengers, asked expressions of opinion from them as to its size relatively to that of a popular object of comparison, a guinea egg. Perhaps 20 or 30 passengers agreed, without dissent, that it was as large or larger. Some said, "It is as large as a hen's egg;" all agreed, also, that they had never seen so large a hailstone before. Upon breaking it to pieces, I found a sort of nucleus of somewhat less transparent ice at the centre, but observed no concentric layers or other marked structure of any kind; it was quite solid and tolerably transparent throughout. Both of these stones were characterized by blunt points or projections, as shown in the figures; and the sides also, while flat in the main, were uneven, with low, rounded elevations and depressions of the same sort, the general thickness being fairly uniform.

I think that very few of these stones or blocks fell. Perhaps they would have been a yard or two apart as they lay on the ground. I think it likely also that the storm of hail was of brief duration, say 10 or 15 minutes, and that it embraced a very limited area.

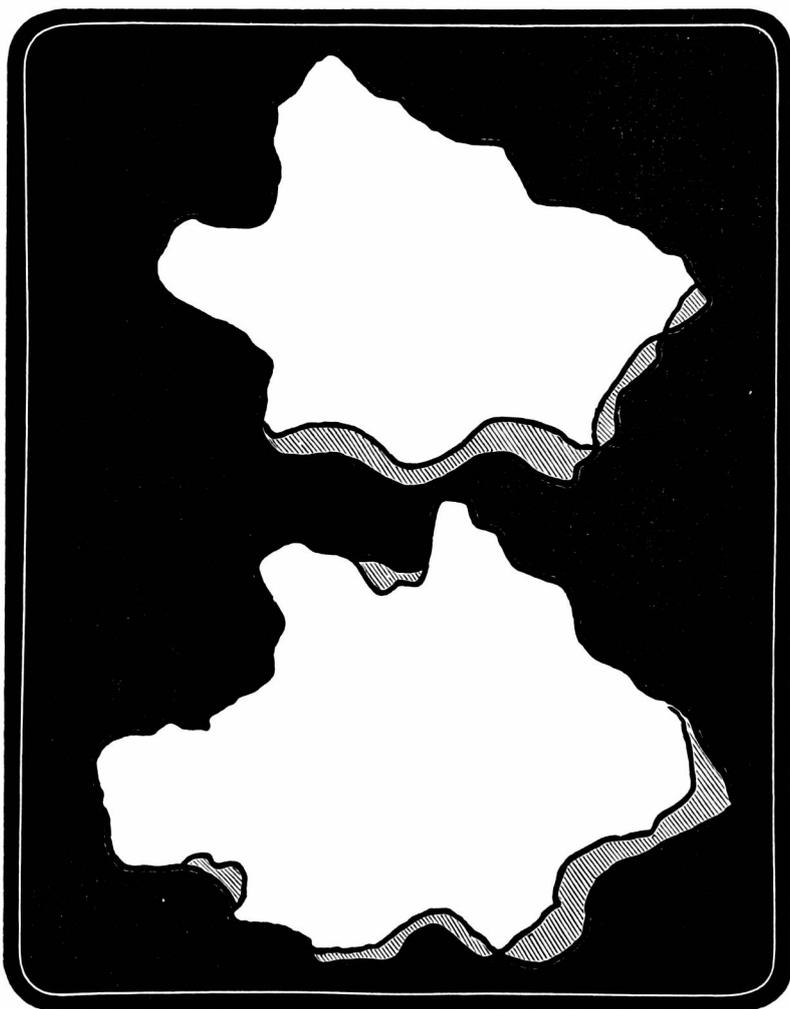
It was, perhaps, about over when I took the train, as I infer from the fact that I have seen no account of it in the papers; and I found at the next station, only 5 miles off, that the road was dry and dusty.

I regret exceedingly that no more accurate observations seem to have been made of what must have been a most notable hailstorm, and I diffidently submit my own crude and imperfect account in the hope that thereby something further may be elicited in regard to it.

CHARLES H. WINSTON.

*Richmond College, Va., August 25th, 1897.*

[*Science, September 17th, 1897.*]



Natural size of Hailstones which fell at Manassas, Virginia, U.S.A.  
(Lat.  $38^{\circ} 41' N.$ , Lon.  $77^{\circ} 33' W.$ ), August 10th, 1897.

ROYAL METEOROLOGICAL SOCIETY.

THE opening meeting of the session was held on Wednesday evening, at the Institution of Civil Engineers, Mr. E. Mawley, F.R.H.S., President, in the chair.

The following candidates were elected Fellows of the Society—Charles Aburrow, A.M.I.C.E., William Berridge, Ronald Stanley Clarke, Lawrence Gibbs, A.M.I.C.E., Sholto Henry Hare, F.R.H.S., Henry George Hollingworth, F.R.G.S., F.R.A.S., Major Henry King, Arthur Newsholme, M.D.

Mr. R. H. Curtis reported the Results of a Comparison between the Sunshine Records of a Campbell-Stokes Burning Recorder and a Jordan Photographic Recorder.

The paper opens with a history and description of the two forms of recorder, and sets out the following conditions as requisite for a satisfactory comparison :—

- (1)—Care must be taken that the instruments are in proper adjustment, and are fair examples of the types.
- (2)—They should occupy positions similar in every respect, and such as to give an absolutely clear horizon.
- (3)—The comparison should extend over a period sufficiently long to test them under varying seasons; and to detect any circumstance which might unfairly prejudice either instrument.

The observations were all made by Mr. E. T. Dowson, at Geldeston, Norfolk, in a position fulfilling the above requirements.

The curves from both instruments were measured independently by the author, and by three gentlemen, all experienced in dealing with sunshine traces, but neither tabulator saw the measurements of the others, nor did he know when tabulating the cards of one instrument what had been recorded for the same days by the other instrument.

The final values adopted for the twelve months, June, 1896,—May, 1897, are—

Tabulators.	A. Hours.	B. Hours.	C. Hours.	D. Hours.
Campbell-Stokes recorder...	1,500	1,500	1,522	...
Jordan recorder.....	1,363	1,412	1,416	1,454

The conclusions drawn from the figures are :—

The Campbell-Stokes records are capable of being measured with a very fair degree of accuracy.

The records of the Jordan instrument afford room for greater difference of opinion as to what ought to be tabulated, but when the whole of the photographic trace which can be distinctly seen, is carefully measured, the amount will approximate sufficiently to that of the Campbell-Stokes instrument to allow of records obtained from both forms of instrument being compared *inter se*.

A section on the capabilities of the Campbell-Stokes recorder shows that it will register up to 15 minutes of the time of sunrise and sunset, while at Geldeston 94.5 per cent. of the possible duration was recorded on May 30th, 1881, and the same percentage at Jersey, on June 23rd, 1896.

The paper also discusses at some length the question how much of the trace of each instrument should be measured, photographic chemicals, effect of age on plates, and effect of washing to fix the trace. It gives for 12 years records for May at 7 Observatories, the results of tabulation at the Observatories and at the Meteorological Office, to show the effect of personal equation. It gives also a suggested specification for the Stokes recorder fixing density and size of sphere, and concludes with an appendix on the faulty instrument at Greenwich.

The President (Mr. Mawley) proposed a vote of thanks to Messrs. Dowson and Curtis. He was surprised to hear that the Jordan recorder gave a smaller value than the Stokes. He did not think that the Greenwich ball, which had a milk and water like appearance, could have been put up in that condition, but his own, which had been in use for 17 years, shows no sign of deterioration.

Mr. Ellis described the various instruments which had been used at various times at Greenwich, and gave a critical examination of the records to show the falling off in recent years.

Mr. Marriott spoke of the defects which he most frequently found in sunshine recorders when inspecting stations, and described his methods of testing their adjustment and exposure.

Mr. Kendrick spoke, as a scientific expert on glass, describing the composition of a ball supplied to Greenwich Observatory, the most suitable glass for the spheres, and the chemical action which is likely to take place and cause deterioration in some qualities of glass.

Mr. Davis said, that in the Argentine, glass spheres had remained perfect for 10 years. Stations at the foot of the Cordilleras recorded from 70 to 75 per cent. of the possible duration of sunshine, while those in the region of the great rivers recorded from 56 to 58 per cent.

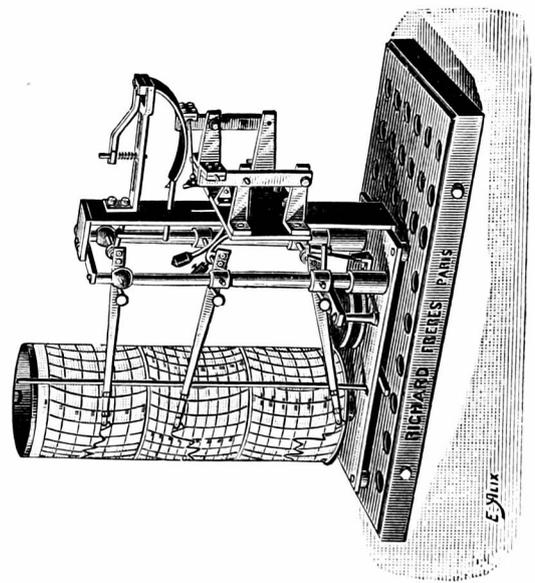
Mr. Jordan, speaking of the photographic recorder, said that it was wrong to ignore any trace, no matter how faint. It cannot record too much, the faintest trace being necessarily due to the sun's rays, and as washing reduces faint traces it is all the more necessary to record everything. Experiments at Kew, and elsewhere, gave identical results for the two instruments, and he was, therefore, surprised at the results in the paper.

Mr. Gaster considered both the burning and photographic recorders excellent, and vastly superior to the estimates before they came into use. In the paper the measurements of the Jordan traces had been unduly restricted. The Jordan was introduced because the Campbell did not record the faintest sunshine, and originally the traces of the Jordan instrument were measured before washing, but the result was

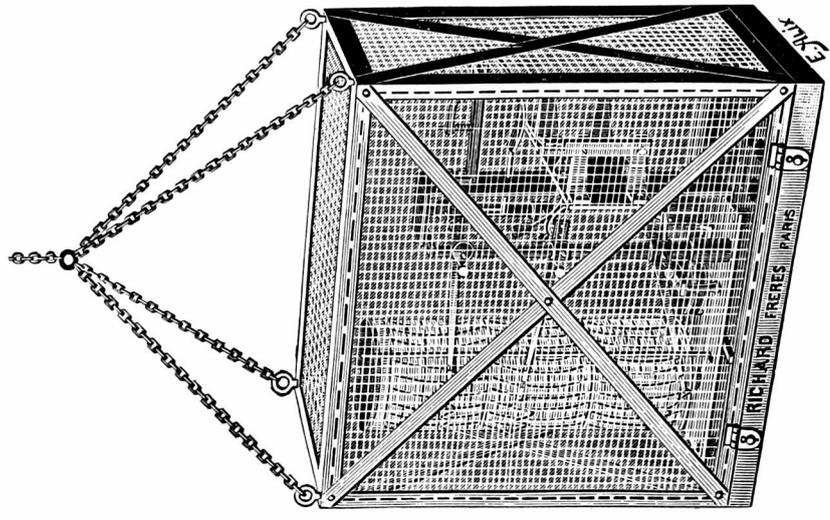


**RICHARD'S BAROGRAPH, HYGROGRAPH,  
AND THERMOGRAPH.**

*(For use with Kites or a Balloon.)*



**THE INSTRUMENT.**



**In its Cage.**

[See page 175.]

so large that comparison was impossible, and, therefore, washing was introduced to make the records of the two instruments fit.

Mr. Brodie thought that the apparent agreement of the two instruments disappeared if the monthly values were examined, instead of the totals for the year; for in one winter month the Jordan gives 30 per cent. less, though on a fine winter day even the Stokes does not record enough.

Mr. Dixon hoped this excellent work would be continued, but it was impossible that the results of the two should agree, owing to the different absorption by the atmosphere, of the heat and of the actinic rays.

Mr. Symons read some remarks by Mr. Dowson on the different effect of an equal amount of washing, on the morning and afternoon traces of the Jordan record.

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#### REVIEW.

*Instruments de Précision. Ancienne Maison RICHARD FRÈRES, JULES RICHARD, Fondateur et successeur. Catalogue No. 1 Météorologie.* 4to, Paris, 1897. 40 pp. and numerous engravings.

(See *Frontispiece.*)

THE catalogues of this firm are always interesting, for, the ingenuity of their instruments is remarkable, and the engravings are usually excellent; we mention this because the two which we have asked M. Richard to lend us are the weakest in the whole book.

We asked for these two because England is being left hopelessly in the rear in the exploration of the upper strata of the air—England, which, through Mr. Welsh, was the first to organise elaborate scientific work in balloons; which, through Mr. Glaisher, carried the same work to a point never before reached; England, which (through a Scotchman, Dr. Wilson) began the use of kites for scientific purposes in 1749; which, through the Rev. George Fisher and Admiral Back, used them in the Arctic regions in 1822–23 and 1836–37; which, through Mr. Douglas Archibald, was the first to send anemometers to great altitudes by means of kites—England and all the English colonies are doing absolutely nothing, and letting the Americans carry off all the honours for kite work, and our Continental neighbours all those relating to balloons.

We thought that an engraving of the compact little apparatus might tempt some Englishman to take up the subject of continuous records at high altitudes. Of course we cannot here go into full details, they are given in the work we are noticing; but it will be seen that pressure, humidity and temperature are simultaneously recorded on a single sheet of paper; and when we add that the total weight (the instrument being made of aluminium) is only 36 ounces, it will be seen that the lifting of the apparatus is no difficulty.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JUNE, 1897.

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 .....	87·8	24	43·3	10	71·7	53·0	52·7	74	132·6	37·2	1·87	11	6·9	
Malta.....	92·8	28	57·7	2	80·5	63·8	60·5	70	155·5	52·3	·00	0	2·4	
<i>Mauritius</i> .....	80·9	1	59·8	25	76·7	66·7	61·6	73	126·2	50·4	2·51	13	5·8	
Calcutta.....	97·1	10	73·5	2	90·5	79·0	77·6	81	161·0	72·7	10·98	12	7·0	
Bombay.....	93·7	5	74·8	11	89·5	80·1	78·2	79	147·3	72·6	14·40	21	7·4	
Ceylon, Colombo .....	91·2	9	73·8	20	86·4	77·7	76·1	87	142·5	72·0	10·14	25	7·8	
<i>Melbourne</i> .....	67·7	18	31·5	13	59·2	43·4	43·9	76	117·1	20·9	1·64	7	3·2	
<i>Adelaide</i> .....	69·0	8	39·1	12	60·2	47·8	44·9	72	124·0	28·1	1·59	11	6·5	
<i>Sydney</i> .....	68·0	10	44·8	30	61·3	50·3	50·8	87	108·8	34·8	8·06	16	5·4	
<i>Wellington</i> .....	60·0	8, 25	36·0	19	55·7	43·9	41·3	73	101·0	28·0	2·43	14	4·3	
<i>Auckland</i> .....	64·0	13	40·0	21	58·7	47·3	44·0	72	120·0	34·0	3·70	17	6·1	
Jamaica, Kingston.....	92·2	24	71·8	25	89·1	74·5	70·7	67	...	...	·58	5	5·3	
Trinidad .....	90·0	a	69·0	6, 9	87·7	71·5	73·6	83	165·0	68·0	11·19	19	...	
Grenada.....	85·8	1	71·0	4, 5	82·7	74·6	71·4	81	148·2	...	8·15	23	3·3	
Toronto .....	84·0	24	38·8	2	71·2	51·0	51·2	68	100·0	32·2	2·92	10	5·7	
New Brunswick, Fredericton .....	83·7	24	36·5	3, 8	67·1	45·6	47·4	60	...	...	3·18	14	5·9	
Manitoba, Winnipeg ...	90·8	14	28·0	5	72·1	46·4	...	...	...	...	2·31	13	6·0	
British Columbia, Esquimalt.....	72·2	21	41·2	10	65·2	50·5	48·2	72	...	...	·86	9	7·4	

a—Several.

REMARKS.

MALTA.—Adopted mean temp. 71°·0, or 0°·6 below the average. Mean hourly velocity of wind 8·3 miles. Average sea temp. 71°·0. L on 6th, 7th and 8th.

J. F. DOBSON.

*Mauritius*.—Mean temp. of air 1°·0, of dew point 1°·0, and rainfall ·49 in., above their respective averages. Mean hourly velocity of wind 12·0 miles, or 0·6 above average; extremes, 26·1 on 6th, and 2·0 on 28th; prevailing direction E.S.E.

T. F. CLAXTON.

CEYLON, COLOMBO.—Thunderstorms occurred on 8 days. Lightning was seen on the 22nd, 23rd and 27th.

H. O. BARNARD.

*Adelaide*.—Mean temp. 0°·5 above the average of 40 years. Rainfall 1·22 in. below the average.

C. TODD, F.R.S.

*Sydney*.—Rainfall 2·36 in. above, temperature 1°·4 above, and humidity 9 above, their respective averages. Soft, warm rains fell all over the Colony so abundantly that the drought conditions were completely broken up, and the weather was very mild.

H. C. RUSSELL, F.R.S.

*Wellington*.—Generally a showery month, but no heavy falls except 1·21 in. on 5th; some pleasant days at the beginning and end of the month. Prevailing wind from N.W., strong on 6 days; frequent fogs. Temperature 0°·8 above, and rainfall 2·67 in. below, their respective averages. Slight earthquake on 9th.

R. B. GORE.

*Auckland*.—An unusually fine June, the rainfall being more than an inch under the average of 30 years. Mean temp. slightly under the average.

T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Rainfall about one-eighth of the average.

J. F. BRENNAN.

TRINIDAD.—Rainfall 3·15 in. above the average of 30 years.

J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL,  
NOVEMBER, 1897.

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.)	1·01	XI.	Rhayader, Nantgwillt ...	5·76
II.	Dorking, Abinger Hall .	1·18	„	Lake Vyrnwy .....	6·51
„	Birchington, Thor .....	1·39	„	Corwen, Rhug .....	3·76
„	Hailsham .....	1·45	„	Criccieth, Talarvor .....	5·31
„	Ryde, Thornbrough .....	1·70	„	I. of Man, Douglas .....	5·99
„	Emsworth, Redlands ...	1·45	XII.	Stoneykirk, Ardwell Ho.	3·60
„	Alton, Ashdell .....	1·39	„	New Galloway, Glenlee	5·66
III.	Oxford, Magdalen Col..	1·09	„	Mouiaive, Maxwelton Ho.	3·84
„	Banbury, Bloxham .....	·97	„	Lilliesleaf, Riddell .....	2·08
„	Northampton, Sedgebrook	1·06	XIII.	N. Esk Res. [Penicuick]	3·75
„	Duddington [Stamford].	1·18	XIV.	Glasgow, Queen's Park..	3·37
„	Alconbury .....	·89	XV.	Inverary, Newtown .....	5·63
„	Wisbech, Bank House...	1·69	„	Oban, The Corran .....	4·55
IV.	Southend .....	·94	„	Islay, Gruinart School...	2·43
„	Harlow, Sheering.....	1·16	XVI.	Dollar .....	3·87
„	Colchester, Lexden .....	·93	„	Balquhiddier, Stronvar...	5·82
„	Rendlesham Hall .....	1·05	„	Ballinluig .....	2·65
„	Rushall Vicarage .....	1·32	„	Dalnaspidal H.R.S.....	4·72
„	Swaffham .....	1·56	XVII.	Keith H.R.S.....	2·58
V.	Salisbury, Alderbury ...	·80	„	Forres H.R.S. ...	1·43
„	Bishop's Cannings .....	1·10	XVIII.	Fearn, Lower Pitkerrie..	1·10
„	Blandford, Whatcombe .	·91	„	N. Uist, Loch Maddy ...	3·97
„	Ashburton, Holne Vic...	4·38	„	Invergarry.....	3·60
„	Okehampton, Oaklands.	3·01	„	Aviemore H.R.S. ....	2·25
„	Hartland Abbey .....	3·03	„	Loch Ness, Drumadrochit	2·87
„	Lymouth, Glenthorne.	3·80	XIX.	Invershin .....	3·11
„	Probus, Lamellyn .....	3·48	„	Scourie .....	...
„	Wellington, The Avenue	1·52	„	Watten H.R.S.....	1·77
„	Wincanton.....	1·21	XX.	Dunmanway, Coolkelure	9·65
VI.	Clifton, Pembroke Road	2·06	„	Cork, Wellesley Terrace	4·86
„	Ross, The Graig .....	1·87	„	Killarney, Woodlawn ...	6·25
„	Wem, Clive Vicarage ...	1·96	„	Caher, Duneske .....	5·38
„	Cheadle, The Heath Ho.	2·99	„	Ballingarry, Hazelfort...	5·31
„	Worcester, Diglis Lock	1·61	„	Limerick, Kilcornan ...	4·72
„	Coventry, Priory Row ..	1·50	„	Broadford, Hurdlestown	5·60
VII.	Grantham, Stainby .....	·97	„	Miltown Malbay .....	6·53
„	Horncastle, Bucknall ...	1·98	XXI.	Gorey, Courtown House	4·71
„	Worksop, Hodsck Priory	2·02	„	Athlone, Twyford .....	4·42
VIII.	Neston, Hinderton .....	2·78	„	Mullingar, Belvedere ...	5·21
„	Southport, Hesketh Park	4·74	„	Longford, Currygrane...	4·14
„	Broughton-in-Furness ...	8·43	XXII.	Woodlawn .....	4·58
IX.	Ripon, Mickley.....	1·54	„	Crossmolina, Ennisiscoe ..	3·94
„	Melmerby, Baldersby ...	1·53	„	Collooney, Markree Obs.	3·72
„	Scarborough, Observat'y	2·48	„	Ballinamore, Lawderdale	4·28
„	Middleton, Mickleton ...	2·11	XXIII.	Warrenpoint.....	4·49
X.	Haltwhistle, Unthank...	2·67	„	Seaforde.....	3·52
„	Bamburgh .....	2·26	„	Belfast, Springfield .....	3·22
„	Keswick, The Bank .....	7·00	„	Bushmills, Dundarave..	2·35
XI.	Llanfrechfa Grange .....	4·44	„	Stewartstown .....	2·64
„	Llandoverly .....	4·46	„	Killybegs .....	4·67
„	Castle Malgwyn .....	4·64	„	Lough Swilly, Carrablagh	2·74
„	Builth, Abergweayn Vic.	7·43			

NOVEMBER, 1897.

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.		In shade.	On grass.
				Dpth	Date		Deg.	Date	Deg.	Date.		
I.	London (Camden Square) ...	1·05	— 1·61	·31	27	14	59·1	18	28·0	26	2	7
II.	Tenterden .....	1·07	— 2·32	·28	27	17	60·0	14 <sup>b</sup>	25·0	26	2	8
III.	Strathfieldsaye .....	...	...	...	...	...	...	...	...	...	...	...
IV.	Hitchin .....	1·13	— 1·55	·31	28	12	58·0	14 <sup>a</sup>	27·0	25	8	...
V.	Winslow (Addington) .....	1·25	— 1·68	·26	28	14	59·0	14	27·0	19	7	9
VI.	Bury St. Edmunds (Westley) .....	1·09	— 1·46	·24	27	10	58·0	13	29·0	26	...	...
VII.	Norwich (Brundall) .....	1·54	...	·41	28	16	60·2	14	29·6	26	4	16
VIII.	Weymouth (Langton Herring) .....	...	...	...	...	...	...	...	...	...	...	...
IX.	Torquay (Cary Green) .....	1·25	...	·24	14	12	60·3	18	34·0	30	0	1
X.	Polapit Tamar [Launceston] .....	2·70	— 1·64	·47	28	12	62·8	1	25·8	6	9	12
XI.	Stroud (Upfield) .....	1·72	— 1·61	·57	27	16	58·0	13 <sup>c</sup>	31·0	29	1	...
XII.	Church Stretton (Woolstaston) .....	2·02	— 1·50	·37	28	14	57·0	9, 11	30·0	16	2	7
XIII.	Tenbury (Orleton) .....	...	...	...	...	...	...	...	...	...	...	...
XIV.	Leicester (Rotherby Hall) .....	1·32	...	·24	14	20	...	...	...	...	0	14
XV.	Boston .....	1·58	— ·62	·35	28	12	58·0	20	30·0	11	5	...
XVI.	Hesley Hall [Tickhill] .....	1·94	— ·08	·68	30	16	58·0	12 <sup>d</sup>	29·0	23	5	...
XVII.	Manchester (Plymouth Grove) .....	4·20	+ 1·20	1·36	30	14	61·0	1	32·0	...	4	8
XVIII.	Wetherby (Ribston Hall) .....	1·06	— 1·01	·40	14	11	...	...	...	...	...	...
XIX.	Skipton (Arncliffe) .....	5·78	— ·97	·95	28	17	...	...	...	...	...	...
XX.	Hull (Pearson Park) .....	2·58	+ ·57	·69	30	14	58·0	13 <sup>e</sup>	28·0	16	6	8
XXI.	Newcastle (Town Moor) .....	1·67	— ·73	·38	14	14	...	...	...	...	...	...
XXII.	Borrowdale (Seathwaite) .....	20·85	+ 6·06	8·03	12	15	...	...	...	...	...	...
XXIII.	Cardiff (Ely) .....	3·28	— 1·63	·81	12	13	...	...	...	...	...	...
XXIV.	Haverfordwest .....	5·06	— ·80	1·14	12	18	60·0	1	31·0	19 <sup>f</sup>	2	11
XXV.	Aberystwith (Gogerddan) .....	5·58	+ ·47	1·27	26	14	61·0	1	...	...	...	...
XXVI.	Llandudno .....	4·66	+ 1·57	2·43	30	11	63·0	1, 9	35·0	15	0	...
XXVII.	Cargen [Dumfries] .....	4·50	— ·06	1·26	12	14	59·4	1	26·0	15 <sup>g</sup>	5	...
XXVIII.	Edinburgh (Blacket Place) .....	1·97	...	·41	12	16	57·3	12 <sup>d</sup>	27·3	16	2	5
XXIX.	Colmonell .....	4·34	...	·78	12	12	60·0	2	24·0	3	...	...
XXX.	Lochgilhead (Kilmory) .....	4·36	— 2·93	·69	27	17	...	...	26·0	14	3	...
XXXI.	Mull (Quinish) .....	4·05	— 2·94	·79	11	19	...	...	...	...	...	...
XXXII.	Loch Leven Sluices .....	2·90	— 1·06	·90	13	11	...	...	...	...	...	...
XXXIII.	Dundee (Eastern Necropolis) .....	1·85	— ·85	·45	12	16	57·9	12	24·1	16	2	...
XXXIV.	Braemar .....	2·23	— 2·35	·54	28	13	55·0	12	11·6	16	8	15
XXXV.	Aberdeen (Cranford) .....	1·95	...	·60	14	19	60·0	19	20·0	15	6	...
XXXVI.	Cawdor (Budgate) .....	2·44	— ·41	·63	13	15	...	...	...	...	...	...
XXXVII.	Strathconan [Beauly] .....	4·15	— 2·41	·80	22	14	...	...	...	...	...	...
XXXVIII.	Glencarron Lodge .....	9·25	...	1·47	13	20	57·0	8	19·8	16	6	...
XXXIX.	Dunrobin .....	2·01	— ·82	·60	28	14	56·0	19 <sup>e</sup>	28·0	16	6	...
XL.	S. Ronaldsay (Roeberry) .....	4·35	+ ·93	·81	13	22	54·0	12	30·0	15	5	...
XLI.	Darrynane Abbey .....	7·25	...	1·97	16	16	...	...	...	...	...	...
XLII.	Waterford (Brook Lodge) .....	6·81	+ 3·14	1·25	24	15	60·0	8	31·0	16	1	...
XLIII.	O'Briensbridge (Ross) .....	7·63	...	1·34	30	14	...	...	...	...	...	...
XLIV.	Carlow (Browne's Hill) .....	4·59	+ 1·53	·70	13 <sup>a</sup>	16	...	...	...	...	...	...
XLV.	Dublin (Fitz William Square) .....	3·42	+ ·59	·94	13	14	60·9	12	34·0	15	0	3
XLVI.	Ballinasloe .....	4·33	+ ·42	·69	24	18	58·0	9, 10	27·0	26	2	...
XLVII.	Clifden (Kylemore) .....	6·92	...	1·71	11	16	...	...	...	...	...	...
XLVIII.	Waringstown .....	3·47	+ ·37	·58	26	17	59·0	1	29·0	14	3	10
XLIX.	Londonderry (Creggan Res.) .....	2·88	— 1·64	·66	28	18	...	...	...	...	...	...
L.	Omagh (Edenfel) .....	...	...	...	...	...	...	...	...	...	...	...

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

a—and 17. b—and 18. c—and 14. d—and 13. e—and 20. f—and 23. g—and 16.

METEOROLOGICAL NOTES ON NOVEMBER, 1897.

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.—Another very dry month, the total R being the least in November during 35 years, except .58 in. in 1871, .79 in. in 1879, and 1.03 in. in 1867. Partial drought for 45 days ended on 13th. Flowers, such as calceolarias, heliotrope, marigolds, &c., blooming fully till cut by frost of 26th. Two days with temp. above 60°. Duration of sunshine 69 hours. Fearful W. and N.W. gale on 28th and 29th. Fog all day on 9th and 23rd.

ADDINGTON.—Very little R until the end of the month. Fogs rather frequent, and sometimes dense, as on the 22nd and 23rd. High winds on the 28th, 29th, and 30th. On the 28th much lightning at night. On the 30th a very heavy R and H storm at 6 p.m., lasting about five minutes.

BURY ST. EDMUNDS, WESTLEY.—Mild and dry, with no frost till the 27th, tender plants remaining in bloom till that date. Very severe gale at night on 29th and on 30th; much damage to stacks, &c.

NORWICH, BRUNDALL.—Total R 1.25 in. below average. A very mild month. Mean temp. 45°.2. The gale on 28th and 29th was exceedingly severe from N.W., lasting nearly 24 hours, although not so destructive as that of March, 1895, when all the damage was wrought in about three hours. Much damage was done on the coast by the extraordinary high tide blown up by the gale, which is said to be the highest tide on the Norfolk coast within living memory. Generally dry, with high bar., bright days at times, but generally much cloud, and considerable fog at times.

TORQUAY, CARY GREEN.—Rainfall 2.79 in. below the average. Total rain of the eleven months, 29.12 in., being 1.90 in. below the average. Mean temp. 49°.4, or 2°.3 above average. Duration of sunshine 33 hours 55 minutes, being 30 hours 10 minutes below average; 15 sunless days.

POLAPIT TAMAR.—Generally a dry month, but the last four days were wet, stormy, and cold. Fog on seven days; half a gale from S.S.W. on 13th, and from N.W. on 28th, with H and T at 11 p.m. Stormy, with heavy H on 30th.

WOOLSTASTON.—Another warm, dry month, the nights especially warm. Severe gale on 28th, with L, and a little S, the remainder of the month was very stormy. Mean temp. 44°.8.

ROTHERBY HALL.—On the whole November was a dry month, with .74 in. less R than the average. The force of the wind varied from calm to a full half gale. The weather was very changeable, some days being bright, but more than half their number were dull. Fog on 10 days, sometimes dense.

HULL, PEARSON PARK.—Fog on 8 days, dense on 9th and 11th. TS with H, and stormy at night on 28th. H on 29th.

SEATHWAITE.—On 8 days the R exceeded an inch, while on the 12th 8.03 in. fell, causing a flood.

WALES.

HAVERFORDWEST.—Fine weather prevailed during the first six days, with some hoar frost, and partially clear sky; foggy, misty, damp weather succeeded, and continued to the 11th, when a moderate to fresh gale sprang up, culminating in a heavy rainfall, 1.92 in. falling in 24 hours, on 12th and 13th. Weather of a foggy, misty character prevailed throughout the remainder of the month, with an occasional frost at night, and from the 26th to the end it was very stormy and unsettled, with much rain. A vessel was wrecked in Fishguard Bay. Abundance of grass resulting from the unusual mildness.

**ABERYSTWITH, GOGERDDAN.**—Very stormy in the last week of the month.

**LLANDUDNO.**—A remarkably fine month for November, the amount of sunshine recorded being 72·8 hours. Stormy, with L and H at night on 28th, and wet and stormy on 30th, when 2·43 in. of R fell, mostly between noon and 2 p.m.

### SCOTLAND.

**CARGEN [DUMFRIES].**—Dry weather continued until the 7th, and during 20 days, 18th October to 6th November, no R fell. Mean temp. 3°·0 above the average, exceeded only in 1876, 1881, and 1894, during 38 years. On only two days, 15th and 16th, did the temp. fall below 32°, while on the night of the 20th the min. was 50°. Upwards of half the total R fell during the four days 11th to 14th. The total for the eleven months of the year is only ·25 in. less than the average. A feature of the month was the remarkable absence of sunshine, the number of hours registered being only 31, against the average of 79. Easterly winds, mostly light, prevailed on 16 days, somewhat unusual in November. The mild open weather was exceptionally favourable for farm stock, pastures looking fresh and green. L in evening of 28th.

**EDINBURGH, BLACKET PLACE.**—Mean temp. 45°·6, the only warmer Novembers since 1764 being 1818, 1881, and 1894, with mean temps. of 46°·7, 46°·3, and 46°·0, respectively. The mean of the minima was 41°·8, the highest since 1857, when the average was 41°·9. Barometric pressure ·295 in. above average, a value exceeded since 1770 in the Novembers of 1805, 1857, 1867, 1879, and 1896. Dense fog on 11th. Strong N.E. wind, with H and S on 14th. Strong gale, with sleet and S on 28th.

**COLMONELL.**—Rain ·91 in. below, and mean temp. 4°·9 above, the average for 21 years.

**BRAEMAR.**—A month more like summer than autumn.

**ABERDEEN, CRANFORD.**—The month was very warm, the min. temp. on several nights being above 45°, and on the 12th 50°. Little sunshine. A heavy gale from N.N.W. on 28th and 29th.

**S. RONALDSAY, ROEBERRY.**—The first half of the month was very good, the latter cold and wet. Mean temp. 44°·3, or 1°·3 above the average of 7 years.

### IRELAND.

**DARRYNANE ABBEY.**—Excepting the last week, a very mild month, some days quite summer-like. Although the total R is high, 7·25 in., yet the number of rainy days is not large; 5·56 in. of R fell in 8 days between 9th and 17th, leaving 1·69 in. for the rest of the month. N.W. gale and H on 30th.

**WATERFORD, BROOK LODGE.**—The weather was so mild that the following plants were in bloom in the garden up to the end of the month—nasturtiums, gentia, clematis, primroses, poppies, heliotrope, and roses. Gale from S.E. on 7th, and from W. on 30th. L on 29th.

**O'BRIENSBRIDGE, ROSS.**—The first week was beautiful, and there were some very fine days in the middle of the month, which closed with fierce rain storms, T and L.

**DUBLIN, FITZWILLIAM SQUARE.**—A dull, mild, foggy month on the whole, mean temp. 48°·6, or 3°·9 above the average. High winds were noted on 11 days, but attained the force of a gale only on the 28th. Fogs on 11 days. Lunar halos on the 8th and 29th. H, sleet and S fell in the gale on the 28th, when also L was seen.

**KYLEMORE HOUSE.**—Gale and R on 26th. Stormy, with W. wind on 27th, and the severest gale of the season on the 28th.