SYMONS'S

MONTHLY

METEOROLOGICAL MAGAZINE.

VOLUME THE THIRTY-FOURTH.

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METEOROLOGICAL MAGAZINE.

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METEOROLOGICAL OBSERVATIONS AT CAMDEN SQUARE, LONDON, N.W.

WE pointed out last year that only some features of the above record could be dealt with in the single page devoted to each month; but (as we were not sure that we could carry it out) we did not refer to that which we have now arranged to do—namely, to give a second series of tables entirely different from the others, but which had to be prepared before the others could be drawn up.

The head lines of the following table are, we think, sufficiently explicit, but they have had to be stated so briefly that perhaps some persons would like them amplified a little. Of course, the arrangement and definitions will be identical in each of the twelve months.

RAINFALL.—1, Total depth; 2, Total number of days with ·01 in.; 3, Maximum fall in any one day (the *date* had to be omitted for want of room); 4, Number of instances of a fall of 1 inch or more.

TEMPERATURE.—5, Mean of all the dry bulb temperatures at 9 a.m. and at 9 p.m.; 6, Similar means for the wet bulb temperatures; 7, Absolute, and 8, Average, max. temp. in shade; 9, Absolute, and 10, Average, min. temp. in shade; 11, 12, 13, 14, need no comment; 15 is the mean of observations at 9 a.m. and at 9 p.m.

Many persons will miss a column giving mean temperature; they are referred to the note on p. 3 of our last volume, and they will find that by using the figures given in columns 5, 8 and 10, they can compute it in any or all of the different ways there shown.

RESULTS OF METEOROLOGICAL OBSERVATIONS AT CAMDEN SQUARE FOR 40 YEARS, 1858–97.

JANUARY.

YEAR.	RAINFALL.				TEMPERATURE.										CLOUD.
	Total.		Max. Fall.	Falls of 1 in. or +	Dry Mean, 9a.&9p.	Wet Mean, 9a.&9p.	Shade Max		Shade Min		Sun Max. Black.		Grass Min.		
	Depth	Days					Abs.	Aver	Abs.	Aver	Abs.	Aver	Abs.	Aver	Aver
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	in.		in.		°	°	°	°	°	°	°	°	°	°	0–10
1858..	·88	6	·48	0	37·0	35·6	52·2	43·8	23·1	30·8	..	..	..	..	4·8
1859..	·72	10	·20	0	40·1	38·8	52·6	44·8	27·0	34·2	..	..	..	..	6·2
1860..	1·97	21	·34	0	39·8	38·4	54·8	44·7	27·2	35·0	..	..	26·3	34·6	5·8
1861..	·43	7	·18	0	33·2	32·4	52·4	38·4	14·3	28·9	..	..	8·5	26·3	6·5
1862..	1·92	19	·38	0	39·2	37·7	55·3	43·5	18·1	33·7	..	..	13·3	30·0	7·3
1863..	2·80	15	·66	0	41·9	40·4	53·7	46·2	26·7	37·6	..	..	19·8	34·5	7·1
1864..	1·02	8	·32	0	36·5	35·7	53·8	41·0	15·1	32·5	..	..	8·8	28·3	7·1
1865..	3·90	13	1·12	1	36·4	35·3	50·8	40·9	18·0	31·5	..	..	14·3	28·8	7·0
1866..	3·90	23	1·20	1	42·5	40·7	54·2	47·6	22·7	38·3	..	..	9·3	34·1	5·5
1867..	2·81	17	·51	0	34·7	32·4	56·0	39·7	6·7	29·3	..	..	0·5	25·8	6·3
1868..	3·89	19	·79	0	38·1	36·9	53·0	41·5	23·4	33·0	..	..	20·5	30·9	8·2
1869..	2·76	15	·58	0	41·7	40·6	56·3	46·3	25·0	35·9	..	..	22·0	32·5	7·7
1870..	1·38	17	·24	0	38·3	37·3	51·7	43·4	21·2	34·4	77·4	56·0	17·9	30·7	5·9
1871..	1·99	17	·42	0	33·8	33·1	45·2	37·4	19·7	29·5	71·1	48·6	20·8	27·4	8·4
1872..	3·46	22	·47	0	41·4	40·1	52·8	46·1	27·4	36·3	77·3	58·9	24·6	32·9	6·1
1873..	2·44	18	·44	0	42·1	40·4	53·9	46·7	28·4	38·3	76·9	61·5	23·6	35·0	6·7
1874..	1·18	17	·33	0	41·7	40·5	55·4	47·4	28·0	35·9	85·6	61·6	24·6	33·7	6·3
1875..	3·22	23	·42	0	43·7	42·8	53·8	48·2	20·7	39·2	83·2	60·8	20·6	36·4	7·1
1876..	·94	11	·32	0	37·1	36·2	54·8	42·5	18·9	31·5	85·3	53·5	17·8	29·6	7·2
1877..	4·74	25	·60	0	42·7	41·3	56·4	48·5	28·5	37·4	87·3	61·8	25·4	34·3	7·1
1878..	1·31	15	·30	0	40·0	38·7	55·6	45·2	26·9	35·5	76·6	59·9	21·6	32·1	7·1
1879..	2·87	12	1·12	1	31·8	31·1	51·0	35·8	19·2	28·7	63·5	44·1	18·3	26·9	7·2
1880..	·31	5	·19	0	33·0	32·3	55·4	37·7	19·2	29·5	73·0	48·7	13·7	26·4	6·8
1881..	1·85	8	1·08	1	31·2	30·6	48·4	36·7	11·8	26·1	79·8	50·0	0·6	21·9	7·2
1882..	1·30	7	·56	0	40·5	39·5	53·4	45·4	27·4	36·1	74·4	51·4	21·3	31·8	7·9
1883..	2·08	21	·34	0	41·1	39·7	55·3	46·3	28·8	36·9	73·9	55·7	24·5	33·1	7·5
1884..	2·30	16	·55	0	43·8	42·2	55·6	48·8	32·2	39·2	72·8	57·1	28·6	35·6	7·2
1885..	1·43	16	·31	0	36·9	35·7	53·3	41·0	22·8	32·2	67·1	45·6	16·8	28·4	8·1
1886..	4·02	23	·52	0	35·9	34·8	51·3	41·4	20·8	31·6	67·6	53·6	8·3	26·7	6·5
1887..	1·26	13	·34	0	36·0	35·3	52·2	40·3	14·5	30·6	68·3	46·4	11·0	27·7	7·4
1888..	·90	9	·24	0	37·5	36·6	51·8	42·7	23·1	33·2	78·3	52·3	19·0	29·2	7·1
1889..	·81	10	·19	0	37·3	36·3	53·1	41·8	22·0	32·4	76·8	49·6	16·4	28·1	7·3
1890..	2·46	21	·35	0	43·2	41·7	55·6	48·9	26·1	37·9	83·1	61·7	18·3	33·5	7·4
1891..	1·80	14	·35	0	34·0	33·1	53·0	39·4	16·9	28·9	78·2	52·8	12·5	24·9	6·6
1892..	·50	13	·13	0	36·3	35·3	52·0	41·5	22·8	30·9	78·9	51·8	15·8	26·6	6·3
1893..	1·44	17	·26	0	35·7	34·7	52·7	40·0	15·4	30·9	69·1	50·3	10·0	26·6	7·3
1894..	2·87	25	·34	0	38·2	36·9	52·0	43·2	13·1	32·6	76·8	56·1	14·3	29·0	7·2
1895..	1·96	16	·75	0	33·3	32·4	51·9	38·1	17·2	29·1	69·1	51·0	16·2	27·0	6·5
1896..	·78	9	·22	0	40·3	39·1	52·7	45·4	28·0	36·5	72·6	53·1	24·3	33·2	8·0
1897..	2·05	20	·83	0	35·1	34·5	47·0	39·8	23·4	31·7	69·0	50·6	16·6	28·2	7·3
Mean ...	2·02	15	·47	0·1	38·1	36·9	53·1	43·0	21·8	33·3	75·5	53·7	17·0	30·1	7·0
Ex- tremes	4·74	25	1·20	1	43·8	42·8	56·4	48·9	32·2	39·2	87·3	61·8	28·6	36·4	8·4
	·31	5	·13	0	31·2	30·6	45·2	35·8	6·7	26·1	63·5	44·1	0·5	21·9	4·8

CLIMATOLOGICAL RECORDS FOR THE BRITISH EMPIRE IN 1897.

The Annual Summary of the Climatological Returns for 1897, which should have appeared in September, 1898, has been crowded out by other matter which called for prompt publication.

It would be far too large a task to attempt to express an opinion as to the meteorology of the year in the individual colonies, but a comparison of the Summary of Extremes with the similar data for previous years reveals little that calls for special remark. Most of the extremes have occurred at the same stations in other years, and appear to be thoroughly normal. The chief exceptions are, the highest mean temp. and the least amount of cloud. The former, 82°·2 at Colombo, has not been exceeded in our tables since 1876, when the mean temp. at Madras was 83°·2, while the highest previous value for Colombo is 81°·9 in 1880. The latter, 2·5 at Grenada, is unprecedented in the 21 years; the nearest approach to it being 2·9 at Malta in 1885.

Grenada comes to the front, as it did last year, with four extremes —least total range, least mean daily range, greatest rainfall and least amount of cloud. The amount of cloud we have referred to above, but the three other values are far from remarkable. The returns from Trinidad are unfortunately not complete for the year, but in May a max. temp. in sun of 173°·0 was recorded, a higher reading than that quoted for Adelaide in the table.

SUMMARY.

Highest temp. in shade	...	110°·8 at Adelaide on Dec. 16th & 28th
Lowest „ „	...	—41°·0 at Winnipeg on Feb. 25th.
Greatest range in year	...	133°·7 at Winnipeg.
Least „ „	...	20°·6 at Grenada.
Greatest mean daily range	...	23°·6 at Winnipeg.
Least „ „ „	...	9°·7 at Grenada.
Highest mean temp.	...	82°·2 at Colombo, Ceylon.
Lowest „ „	...	34°·7 at Winnipeg.
Driest station	...	Adelaide, mean humidity 59.
Dampest „	...	Esquimalt, „ „ 86.
Highest temp. in sun	...	166°·3 at Adelaide.
Lowest temp. on grass	...	—11°·0 at Toronto.
Greatest rainfall	...	83·64 in. at Grenada.
Least „	...	14·22 in. at Malta.
Most cloudy station	...	Esquimalt, average amount 6·7.
Least „ „	...	Grenada, average amount 2·5.

The min. on grass is not recorded at the other Canadian stations.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE FOR 1897.

Stations. *Those in Italics are South of the Equator.*	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Mean.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Average. Cloud.
	°		°		°	°	°	°		°	°	in.		0—10
England, London ...	88·4	August 5	23·4	January 18	58·3	43·7	51·0	48·2	80	132·6	16·6	22·86	164	6·4
Malta	97·8	September 14	39·4	January 31	71·8	59·1	65·5	55·6	75	159·7	32·3	14·22	81	4·3
Cape Town.....	97·4	March 3	35·7	July 5	70·8	53·8	62·3	52·8	77	...	...	20·17	86	4·6
Mauritius	88·0	January 18	57·4	May 21	80·4	69·2	74·8	64·6	74	135·7	49·1	27·26	168	6·0
Calcutta	104·6	May 9	49·0	{January 19 / Dec. 17}	86·7	71·3	79·0	68·3	72	161·7	39·2	58·33	91	4·6
Bombay	93·7	June 5	61·1	January 20	85·9	74·6	80·2	71·6	75	150·6	51·2	81·53	108	3·8
Ceylon, Colombo ...	93·2	March 2	68·0	January 13	88·0	76·4	82·2	73·6	80	153·0	65·0	82·73	211	5·7
Melbourne	107·3	December 30	31·5	June 13	67·0	49·1	58·1	47·6	70	157·9	20·9	25·85	117	5·6
Adelaide.....	110·8	Dec. 16 & 28	37·7	August 23	73·0	53·7	63·4	47·5	59	166·3	28·1	15·42	119	4·9
Wellington	81·0	January 12	31·0	July 20	61·7	49·4	55·6	46·2	71	145·0	21·0	48·51	176	4·4
Jamaica, Kingston..	94·0	August 8	62·0	January 12	87·8	71·7	79·7	69·1	73	...	...	42·93	78	3·8
Grenada	89·8	March 28	69·2	December 4	83·8	74·1	79·0	71·8	76	157·4	..	83·64	236	2·5
Toronto	93·3	July 5	— 7·2	January 25	53·9	37·6	45·7	39·4	76	110·0	—11·0	32·50	146	6·2
New Brunswick, Fredericton.....	92·7	July 8	—18·4	February 28	50·9	29·9	40·4	32·4	67	...	...	39·12	135	5·5
Manitoba Winnipeg	92·7	September 8	—41·0	February 25	46·5	22·9	34·7	...	...	...	...	17·59	111	5·2
British Columbia, Esquimalt	85·5	August 3	22·2	January 27	55·4	42·0	48·7	44·0	86	...	...	39·20	170	6·7

FLOODS IN JANUARY, 1899.

DECEMBER, 1898, was rather wet in the west of England, and in Wales, with considerable falls of rain in the last week. January also was wet in the same districts; very wet at some of them, *e.g.*— it is stated that on the south side of the Brecknock Beacons the fall during December and up to January 24th, was not far short of *thirty inches*. It is, therefore, natural that there should have been considerable floods. We are not now going to give a complete account of them, but on the other hand it would not be desirable to let them pass without such comment as is at present possible.

In the THAMES the flooding seems to have been much less than on many recent occasions. A few houses were invaded at ETON, WINDSOR, and EGHAM, and boats went where carriages should have gone, but owing either to less rain, or to better river administration, the records indicate little damage compared with previous years. It is in Divisions VI. and XI. that the floods were most serious, and perhaps most so at HEREFORD. Unlike York (which, after letting its archives be damaged by a flood, erected a first-class recorder of the level of the Ouse), HEREFORD has often suffered by flood, but has kept only a miserably incomplete record of the flood of the Wye, and has waited until London proposes to take some of its flood waters, and now, at the 11¾th hour, it *proposes* to begin a proper record. This, however, is by the way; but we fear that the lesson will not be taken to heart by any other city—each *will* buy its own experience.

To resume. We have not seen the scale of heights on the Wye bridge at HEREFORD, but as far as we can make out from the *Hereford Times* there is one on one of the piers, but, owing to the slope of the stream, the water on the scale stands at 16 ft. above datum, when the real level of the river is about 17 ft. above datum. But the writers upon the subject have confused it by (apparently) applying this correction to the present flood, but not to previous ones.

We infer that the facts for HEREFORD are approximately—

		ft.	in.
Absolutely highest flood on record,	Feb. 11th, 1795	20	0
Subsequent floods.....	Feb. 6th, 1852	18	4
	Nov. 15th, 1894	16	9
	Jan. 22nd, 1899	17	3

Another statement gives 1899 as exactly 3 ft. below 1795. Therefore the recent flood has been exceeded only once in a century, and then only by about 1 foot.

The city engineer of Hereford should do as his brother officer at York has done: hunt up all trustworthy records, reduce them to Ordnance Datum, and, in one or more places in the city, erect cast iron plates with the levels marked upon them from 1795 downwards.

For Ross a list of flood levels was given by Mr. H. Southall, F.R.Met.Soc., in the *Quar. Jour. R. Met. Soc.* Vol. XXI. p. 38, from which we select the following, making, upon Mr. Southall's authority, two small corrections, and adding the recent flood :—

		ft.	in.
Absolutely highest flood on record,	Feb. 12th, 1795	17	9
Subsequent floods.....	Jan. 27th, 1809	17	3
	Nov. 24th, 1824	17	3
	Feb. 10th, 1831	17	3
	Feb. 8th, 1852	16	10
	Nov. 12th, ,, ...	16	5
	Nov. 15th, 1894	14	5
	Jan. 23rd, 1899	14	7

At Bridgnorth the flood is said to have been exceeded as recently as 1886.

For Shrewsbury no heights are given, merely the statement that the height had not been equalled since 1869.

For Worcester details are given by Messrs. Marriott and Gaster (*Quar. Jour. R. Met. Soc.* Vol. XII. p. 280), whence we get—

		ft.	in.
Absolutely highest flood on record,	Nov. 18th, 1770	17	7
Subsequent floods.....	Feb. 11th, 1795	16	11
	May 15th, 1886	17	1
	Nov. 16th, 1894	12	10
	Jan. 23rd, 1899	14	0

At York the automatic recorder showed that the flood rose to 12 ft. 10 in., being the highest since the apparatus was erected after the great flood of 1892.

At Monmouth the floods are said to have been higher than since 1852, but no measures are given.

At Abergavenny also no heights are given, merely the statement that they were higher than in 1894.

At Rhyl there is only the vague statement that "they have not been equalled since 1879."

FROST AND ANTICYCLONES.

In our last number, on page 179, we mentioned the paper upon the above subject which was read before the Roy. Met. Soc., on Dec. 21st, by Mr. W. H. Dines.

Our attention has since been called to the fact that the subject had been considered in the early part of 1895 by M. A. Lancaster in his paper, *Sur la période de froid du 27 Janvier au 17 Février*, 1895, published in the *Bulletins de l'Académie royale de Belgique.*

As the paper is not accessible to all our readers, we give a free translation of the concluding paragraph and the (rather long) footnote to it, converting the measures into English units :—

"It is, then, an error to consider, as is frequently done, that the

severity of a winter is in distinct relation to the height of the barometer during it.* The error is especially obvious when it refers to December, in which we often have high pressures with mild misty weather. Then it is that we have fogs lasting sometimes a fortnight, and gradually changing to a drizzling rain."

We see that there is a note upon the subject by M. Lancaster in the last number of *Ciel et Terre.*

ROYAL METEOROLOGICAL SOCIETY.

THE Annual Meeting of this Society was held on January 18th, at the Institution of Civil Engineers, Great George Street, Westminster; Mr. F. Campbell Bayard, LL.M., President, in the chair.

The Council, in their Report, stated that, owing to the premises now occupied by the Society, at 22, Great George Street, being required by the Government, they had been obliged to seek accommodation elsewhere; but not being able to secure offices in the immediate neighbourhood, they had taken a suite of rooms at 70, Victoria Street.

GOVERNMENT METEOROLOGICAL ORGANIZATIONS.

Mr. Bayard, in his presidential address, gave an account of the Government meteorological organisations in various parts of the world. He first briefly described the founding of each system, and mentioned the names of the various directors, and then stated the number of observing stations associated with each organisation. In most countries forecasts of the weather are issued, and Mr. Bayard gave some interesting particulars as to the success attained by each office. The amount of money voted by the various Governments for the support of meteorology showed what a very small portion of the revenue of the different countries goes towards the promotion of this science. In the British Isles it is only about one-third of a farthing per head of the population.

The address was illustrated by a large number of lantern photographs of the various observatories and portraits of the directors.

Mr. Bayard was re-elected President for the ensuing year.

"* If we examine the table of monthly mean pressure at Brussels from 1833 to 1895, we find that for December the 7 highest had a mean of 766 mm. (30·158 in.) at 57 m. (187 ft.); that of them only 1 had a temperature below the mean, the other 6 were all above it—on the average 1°·2 C. (2°·2 F.)

"For February, the 7 with the highest barometric pressure averaged 765·4 mm. (30·134 in.); of these, also, only 1 was colder than the mean, 1887, by 1°·1 C. (2°·0 F.), and the other 6 were all above it by, on the average, the same amount, 1°·1 C.

"Finally, the 8 months of January with the highest mean pressures, about 765 mm. (30·118 in.), have had temperatures below the mean by 1°·2 C. (2°·2 F.); but this is little compared with what we observe when with a lower barometer our country is under the influence of an anticyclone. Thus, the 11 coldest Januaries, with an average temperature of 4° C. (7°·2 F.) below the mean, have had as their mean barometric height 758 mm. (29·843 in.)

TEMPERATURE REVERSAL.

To the Editor of the Meteorological Magazine.

SIR,—One morning in January about 14 years ago we woke up surrounded by a white world, with about an inch of snow; but the curious thing was, that the higher you looked up the hills the less snow there was. At 1,200 ft. high there was practically no snow, and none above this limit; the Clees, reaching 1,800 ft., were quite green above about 1,000 ft. They must have had the storm, because the tops of the hills to our west, 1,200 ft. high, had just a trace of snow, while the Clees, being to the N.E. and much higher, the phenomenon was more marked on them. At Church Stretton, 16 miles N.N.W., the case was similar---the valleys were white, while the hills on each side, rising to 1,500 and 1,600 ft., were bare. At 11 a.m. there was a sharp snowstorm; when it reached the Clees it brought down a thick cloud, so I thought that surely they would be white when it lifted; but no, they were as green as before. About 4 p.m. the Clees had another storm of a more snowy character—they were white over in a minute or two, and thus the country regained a normal aspect. Up till 4 p.m. the sight was most peculiar; instead of snow-clad hills and green valleys, the case was reversed, and there were white valleys and green hills, and on every hill there was little or no snow over 1,000 ft.

The snow must have been *snow* on the hills, as it could not have formed between the height of the hills and the valleys; but somehow the air above 1,000 ft. must have been very much warmer, not only here but over at least half of Shropshire, as shown by the same state of things at Church Stretton. The wind was W. to W.N.W. There was a frost early, as far as I remember; but after 10 a.m. the temperature was slightly above 32°.

I trust that you will be able to give space in your Magazine for this, as it may elicit some useful remarks.—Yours very truly,

RICHD. P. DANSEY.

The Sheet, Ludlow, Oct. 26th, 1898.

GODFRIDUS—THE BOOK OF KNOWLEDGE.

[OUR suggested emendation of "grazing" for "gazing" does not seem acceptable. We at once withdraw it, as country observers are infinitely more likely to be right than we are; but if we might be permitted one remark it would be that, as cattle normally stand on the grass and graze on it, we think that that is grazing from below; but what was running in our mind was the idea that in bad weather cattle remained in the valleys, and therefore grazed from below—

i.e., not from the top of the hills. However, we do not know, and we thank our correspondents for helping us.—ED. *M.M.*]

"I should be rather disinclined to accept your conjectured emendation in the *Met. Mag.*, p. 181. Surely cattle when they bellow lift up their heads in a way that might well be described as 'gazing from below.' But although they graze below, I do not see that they graze *from* below."

REV. W. C. PLENDERLEATH, *Mamhead Rectory, Exeter.*

"In p. 181 of *Met. Mag.* you put a ? to 'gazing from below.' May I suggest whether it is not right ? I have heard it said, 'It will be fine, the cattle are on the *tops* of the hills;' so, if wet, they would be down below—gazing from below.

"I merely throw out this suggestion.

"A shepherd tells me that rooks lighting on *dead wood*—*i e.*, hurdles—are a sign of rain; also, thunderstorms come up *with* the wind before midsummer, and *against* it after midsummer."

REV. J. CROSS, *Bailie House, Wimborne.*

REVIEWS.

Traité élémentaire de Météorologie, par ALFRED ANGOT. Gauthier-Villars, Paris, 1899. Royal 8vo, vi.-418 pages, 4 plates and about 100 engravings.

WE think that Dr. Angot has been rather severe upon his own work in giving to it the designation "elementary," for it is much more than that—it is a thoroughly well-considered, well-written work. The author has wisely recognised that everything need not be put in every book, and has, therefore, left all who want to learn the manipulation of instruments to seek descriptions of them in the numerous "Instructions" which are accessible, and those who need statistics and tabular matter, to look for it in other works; and he has (inasmuch as this work is designed specially for tuition) given very little history. The almost complete exclusion of these three subjects has given him ample room to treat fully pressure, temperature, vapour, storms, halos, weather forecasting, &c.

The whole book is remarkably uniform in style and treatment. No one subject is unduly prominent or unduly neglected, but each is calmly considered and explained by reference to the physical laws which bear upon it.

It is not very often that Dr. Angot gives details of actual phenomena, but when he does the cases are usually very striking. Here is a specimen, he is speaking of *Verglas*, which in England we call a "silver thaw":—

"This phenomenon is sometimes intense, and prevails over a large area. Such was the case with the noteworthy *verglas* of January

22nd and 23rd, 1879, which covered nearly one-quarter of the surface of France—from Epernay to Nantes, and from Mézidon to Parthenay and Romorantin. At Vendôme the rain, at a temperature below 32°, lasted 30 hours, and amounted to 1·26 in., and formed, on flat or convex surfaces exposed to the free air, a coat of ice 0·98 in. thick. Exposed ropes were surrounded eccentrically by a layer of ice $\frac{3}{4}$-inch in diameter. Naturally, telegraph wires, twigs, branches and even entire trees, being incapable of bearing the weight of this mass of ice, were broken. At Fontainbleau the telegraph wires were surrounded by a coat of ice 1·49 in. in diameter; trees, with trunks $27\frac{1}{2}$ inches in diameter, were broken, others were so bent over that their tops reached the ground."

We have noticed only two omissions. In diagram Fig. 75 the vertical circle through the sun is not shown. Engravings of portions of it are given in *Met. Mag.*, Vol. VI., p. 56 and 96; IX., p. 76, and an explanation is given by Mr. Cherrill in the second paragraph on p. 69 of Vol. XXVI. It is the simultaneous presence of this and of the parhelic circle (intersecting at an angle of 90° at the sun) which explains the records by old writers, and, even recently, one Good Friday, of "the sun in a perfect cross."

Ozone is another subject on which we have seen no remarks. We admit that this is on the debateable land between chemistry and meteorology; but chemists have no observations to make daily at a fixed hour, and it would therefore be much better left to the meteorologist to make the observations, if the chemist would but tell him exactly how, and what, to observe. It is a fact that country air after passing over a city is materially changed. We think that some method should be devised to show this; and while admitting the force of the criticisms which chemists have passed upon the methods employed by meteorologists, we think that in addition to destructive criticism, they should instruct us as to the path we should follow. Of course, we are not for a moment suggesting that Dr. Angot should have done this; all that we say regarding his book is, that in his 400 pages half of one might have been devoted to ozone.

On page 357 there are three charming and unique diagrams—two from the vicinity of Paris, and one from Little Rock, Arkansas, U.S.A., giving, on the natural scale, the depression shown by recording aneroids during the passage of whirlwinds very near to them. In each case the duration of passage is so short that it is not possible to distinguish between the down and the upstroke of the pen, and the amounts are about 0·3 in. When we remember (1) that these instruments were indoors, where friction would prevent the full diminution of pressure being felt; (2) that, considering the rapidity of transit of the depression, inertia and friction would prevent the pen going its full distance; (3) that there is no evidence that any one of these barometers was even momentarily at the true centre of the depression, we therefore conclude that out of doors a frictionless barometer would, in the centre of a depression, show a

diminution at least two or three times that above shown. Take it at only twice, and we get a difference of pressure of about 40 lbs. per square yard. Is it any wonder that buildings are burst open by the expansion of the contained air?

Among the many good sections of this book it is not easy to say that any one is the best; but we recommend all who treat themselves to a copy, to read the section upon *Orages de dépressions* (summer thunderstorms); it is excellent.

Seismology, by JOHN MILNE, F.R.S., F.G.S., &c. Kegan Paul, Trench & Co., London, 1898. Crown 8vo, xvi.-320 pages and 53 engravings.

QUITE recently we reviewed Prof. Milne's "Earthquakes" (same publishers), and knowing that the present work was to follow, we were much puzzled to know what boundary line could be laid down between the two subjects. As we expected, the author has not been able to draw one; and this is virtually an account of recent researches on the measurements of earthquakes (with a delicacy still quite unrealised by the general public), on the principles of construction best suited for countries where earth movements are large, and on the study of flexures of the earth's crust which produce no structural damage, but which cause trouble to astronomers by disturbing the level of their instruments. In fact, except from a publisher's view, we can see no reason why this should not have been called "Earthquakes, Part II."

The book, like all those written by Prof. Milne, is crammed with facts, illustrations and suggestions—so full indeed that sometimes one could wish for a little more narrative and consecutive argument instead of illustrative facts. All who have heard Prof. Milne lecture know how fascinatingly he runs on, conveying an enormous amount of information with apparently no fatigue either to lecturer or listener. It seems to us that when he has to write a book he feels more responsibility, regards it as a serious matter, and backs up every suggestion with an unassailable array of facts. He is perfectly safe inside the fortress thus constructed, and as in a volume of the International Scientific Series probably no joke is admitted, that fact also doubtless had a depressing influence upon the author. We can hardly give a better illustration of Prof. Milne's promptitude and of the delicacy of his instruments than by adding that the same issue of *The Times* which announced the recent earthquake in Greece, contained a telegram from Prof. Milne to the effect that that shock was duly recorded at his house in the Isle of Wight.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, AUGUST, 1898.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	TotalRain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	87·9	22	45·9	8	76·1	55·9	54·6	71	99·1	42·2	1·13	10	5·3
Malta	92·3	3	67·0	1	85·7	73·1	68·1	75	151·5	61·0	·00	0	1·2
Cape of Good Hope	89·0	25	41·1	1	66·6	51·0	50·3	83	...	...	1·37	5	2·4
Mauritius	76·6	20*a*	59·2	6	74·8	64·1	60·0	75	126·2	52·5	6·61	16	6·6
Calcutta	90·4	1	75·1	30	86·5	78·3	77·9	88	157·2	73·9	17·68	19	8·9
Bombay	86·5	26	75·0	11	84·6	77·3	75·6	84	135·3	73·2	5·28	27	8·6
Ceylon, Colombo	88·1	10	75·0	23	86·3	77·7	73·1	79	150·0	71·5	·97	7	5·0
Melbourne	69·1	26	32·8	3	60·1	44·4	44·5	76	127·2	25·5	·89	10	5·6
Adelaide	74·4	26	36·4	17	63·6	46·9	46·2	73	135·6	29·5	2·15	13	5·5
Sydney	72·4	28	42·7	18	61·7	48·4	48·2	81	125·8	33·2	3·89	17	4·8
Wellington	62·0	28	31·9	1	53·1	42·1	38·1	71	92·0	19·0	5·76	18	5·0
Auckland	61·0	19	41·0	1	57·9	47·2	44·1	74	122·0	37·0	5·94	23	5·7
Jamaica, Kingston	91·8	9	71·1	1	88·1	73·4	70·9	76	...	...	1·86	12	...
Trinidad	90·0	1, 22	68·0	3	86·6	70·3	72·3	84	171·0	67·0	10·55	23	...
Grenada	85·0	24	68·4	17	82·6	73·5	71·6	80	150·0	...	19·11	23	3·6
Toronto	96·0	31	46·5	28	81·8	59·8	59·9	71	113·0	42·5	1·08	8	5·2
New Brunswick, Fredericton	81·7	9	45·0	29	73·7	55·8	56·1	70	...	...	4·66	13	6·1
Manitoba, Winnipeg	88·2	19	39·8	13	74·8	51·1	...	...	...	...	2·15	8	5·9
British Columbia, Esquimalt	88·0	10	45·2	29	72·3	51·2		...	...	...	·27	2	4·7

a—and 21, 29.

REMARKS.

MALTA.—Mean temp. 77°·5, or 0°·6 below the average. Mean hourly velocity of wind 7·3 miles. Mean temp. of sea 78°·8. L on 18th, 27th, 28th and 29th.
J. F. DOBSON.

Mauritius.—Mean temp. of air equal to, dew point 0°·7 above, and rainfall 4·19 in. above, the average. Mean hourly velocity of wind 12·0 miles, or 0·4 below average; extremes, 30·4 on 4th and 1·8 on 19th; prevailing direction E.S.E. and E. by S. The wettest August on record in 24 years. T. F. CLAXTON.

CEYLON, COLOMBO.—Mean temp. of air 81°·3, or 0°·7 above, of dew point 0°·1 above, and rainfall 2·90 in. below, the average. Mean hourly velocity of wind 8·6 miles; prevailing direction S.W. L on 16th and 25th. H. O. BARNARD.

Adelaide.—Mean temp. 1°·3 above, and rainfall ·22 in. below, the average for 41 years. C. TODD, F.R.S.

Sydney.—Temp. equal to, humidity 8° above, and rainfall 1·01 in. above, the average. Rains not so good as those in July. H. C. RUSSELL, F.R.S.

Wellington.—Cold and generally showery, with prevailing S.E. winds, and some very cold, frosty nights; finer weather towards the end. Earthquake on 7th. Mean temp. 0°·4 below, and rainfall ·56 in. above, the average. R. B. GORE.

Auckland.—The early part and middle of the month were unusually wet and stormy; the end dry, or with slight showers only. Mean temp. slightly, and rainfall 1·75 in., above the average. T. F. CHEESEMAN.

TRINIDAD.—Rainfall ·23 in. above the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, JANUARY, 1899.

[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..	2·53	XI.	Builth, Abergwesyn Vic.	14·61
II.	Dorking, Abinger Hall .	3·14	,,	Rhayader, Nantgwillt...	11·55
,,	Birchington, Thor	2·27	,,	Lake Vyrnwy	10·22
,,	Hailsham	3·06	,,	Corwen, Rhug	7·05
,,	Ryde, Thornbrough	3·81	,,	Criccieth, Talarvor	5·76
,,	Emsworth, Redlands ...	3·20	,,	I. of Man, Douglas	6·60
,,	Alton, Ashdell	4·18	XII.	Stoneykirk, Ardwell Ho.	4·40
III.	Oxford, Magdalen Col..	2·59	,,	New Galloway, Glenlee	7·96
,,	Banbury, Bloxham	3·20	,,	Moniaive, Maxwelton Ho.	7·09
,,	Northampton, Sedgebrook	2·99	,,	Lilliesleaf, Riddell	3·57
,,	Stamford, Duddington..	2·57	XIII.	N. Esk Res. [Penicuick]	6·40
,,	Alconbury	1·84	XIV.	Glasgow, Queen's Park..	5·61
,,	Wisbech, Bank House...	2·09	XV.	Inverary, Newtown	...
IV.	Southend	2·37	,,	Ballachulish, Ardsheal...	7·02
,,	Harlow, Sheering..... ...	2·04	,,	Islay, Gruinart School...	1·62
,,	Colchester, Lexden	1·80	XVI.	Dollar.....	6·78
,,	Rendlesham Hall	2·15	,,	Balquhidder, Stronvar...	9·63
,,	Scole Rectory	2·12	,,	Coupar Angus Station...	3·57
,,	Swaffham	2·06	,,	Dalnaspidal H.R.S.....	...
V.	Salisbury, Alderbury ...	3·38	XVII.	Keith H.R.S.....	4·08
,,	Bishop's Cannings	4·63	,,	Forres H.R.S.	2·56
,,	Blandford, Whatcombe .	4·90	XVIII.	Fearn, Lower Pitkerrie..	2·99
,,	Ashburton, Holne Vic...	8·83	,,	S. Uist, Askernish	7·18
,,	Okehampton, Oaklands.	9·23	,,	Invergarry.....	6·56
,,	Hartland Abbey	6·00	,,	Aviemore H.R.S.	...
,,	Lynton, Glenthorne ...	9·48	,,	Loch Ness, Drumnadrochit	3·91
,,	Probus, Lamellyn	6·06	XIX.	Invershin	4·08
,,	Wellington, The Avenue	6·00	,,	Durness	4·96
,,	North Cadbury Rectory	3·73	,,	Watten H.R.S.....	3·15
VI.	Clifton, Pembroke Road	5·17	XX.	Dunmanway, Coolkelure	12·06
,,	Ross, The Graig	3·88	,,	Cork, Wellesley Terrace	5·05
,,	Wem, Clive Vicarage ...	3·08	,,	Killarney, Woodlawn ..	9·32
,,	Wolverhampton, Tettenhall	3·31	,,	Caher, Duneske	5·05
,,	Cheadle, The Heath Ho.	3·95	,,	Ballingarry, Hazelfort...	3·65
,,	Coventry, Priory Row ..	3·82	,,	Limerick, Kilcornan ...	2·29
VII.	Grantham, Stainby	2·75	,,	Broadford, Hurdlestown	3·86
,,	Horncastle, Bucknall ...	2·28	,,	Miltown Malbay	5·35
,,	Worksop, Hodsck Priory	1·90	XXI.	Gorey, Courtown House	4·48
VIII.	Neston, Hinderton	3·22	,,	Moynalty, Westland ...	4·31
,,	Southport, Hesketh Park	3·73	,,	Athlone, Twyford	3·92
,,	Chatburn, Middlewood.	7·39	,,	Mullingar, Belvedere ...	4·02
,,	Duddon Val., Seathwaite Vic.	12·58	XXII.	Woodlawn	4·37
IX.	Melmerby, Baldersby ...	2·87	,,	Crossmolina, Enniscoe ..	5·88
,,	Scarborough, Observat'y	3·08	,,	Collooney, Markree Obs.	4·15
,,	Middleton, Mickleton ...	5·85	,,	Ballinamore, Lawderdale	3·84
X.	Haltwhistle, Unthank...	3·60	XXIII.	Warrenpoint.....	4·59
,,	Bamburgh	2·22	,,	Seaforde..	5·38
,,	Keswick, The Bank.....	10·26	,,	Belfast, Springfield	4·63
XI.	Llanfrechfa Grange	7·11	,,	Bushmills, Dundarave..	3·51
,,	Llandovery	7·95	,,	Stewartstown	3·58
,,	Castle Malgwyn	8·56	,,	Killybegs	6·55
,,	Brecknock, The Barracks	6·40	,,	Horn Head	6·12

JANUARY, 1899.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Greatest Fall in 24 hours. Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	No. of Nights below 32°. On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	2·52	+ ·90	·46	15	20	56·2	21	28·1	25	6	18
II.		Tenterden	2·10	+ ·20	·36	15	19	54·0	4	30·0	31	3	16
,,		Hartley Wintney	3·04	...	·60	12	21	54·0	21	24·0	25	11	16
III.		Hitchin	2·46	+ ·92	·48	15	19	53·0	15*a*	24·0	24*f*	12	...
,,		Winslow (Addington)	2·54	+ ·72	·45	20	20	53·0	*c*	24·0	25	9	17
IV.		Bury St. Edmunds (Westley)	2·09	+ ·62	·35	15	20	54·0	20	20·0	25	...	...
,,		Norwich (Brundall)	2·24	...	·41	11	22	56·0	21	24·6	6	5	21
V.		Winterbourne Steepleton ...	5·59	...	1·11	20	23	53·0	13	23·3	25	11	20
,,		Torquay (Cary Green)	5·49	...	1·10	20	19	54·9	13	30·0	29	2	10
,,		Polapit Tamar [Launceston]..	6·73	+ 3·71	1·03	1	22	57·8	12	25·7	24	8	13
VI.		Stroud (Upfield)	3·93	+ 1·73	·57	20	24	53·0	20	25·0	25	9	...
,,		ChurchStretton(Woolstaston)	4·27	+ 2·11	·75	20	21	53·0	15	24·0	26	10	20
,,		Worcester (Diglis Lock)	3·39	+ 1·59	·69	21	22	...	..	...	...	...	..
VII.		Boston	2·03	+ ·64	·40	11	18	55·0	22	28·0	25	10	...
,,		Hesley Hall [Tickhill].....	2·14	+ ·37	·36	15	22	57·0	21	20·0	26	13	...
,,		Breadsall Priory	3·31	...	·42	15	21	58·0	20	24·0	25	13	22
VIII.		Manchester(PlymouthGrove)	...	...	...	...	...	...	...	...	...	...	...
IX.		Wetherby (Ribston Hall) ..	3·68	+ 1·79	·47	15	19	...	...	...	...	...	...
,,		Skipton (Arncliffe)	12·40	+ 6·76	2·75	18	25	...	...	...	...	...	...
,,		Hull (Pearson Park).	1·68	— ·09	·23	1	19	56·0	21	23·0	25	13	17
X.		Newcastle (Town Moor)	2·72	+ ·91	·45	2	19	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	21·35	+ 9·17	4·78	18	20	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	6·64	+ 3·35	1·18	20	25	...	...	...	...	...	...
,,		Haverfordwest	8·26	+ 3·84	1·62	20	21	53·9	13	25·3	29	7	16
,,		Aberystwith (Gogerddan) ...	6·28	+ 2·75	1·30	20	20	50·0	4*d*	...	...	...	...
,,		Llandudno.....	4·58	+ 2·30	·73	18	20	56·0	18	25·5	28	5	...
XII.		Cargen [Dumfries]	7·06	+ 3·29	·98	18	18	51·0	4*a*	18·0	27	13	...
XIII.		Edinburgh (Blacket Place)...	3·69	...	·62	20	21	51·5	19	22·0	27	9	15
XIV.		Colmonell	5·21	...	·63	18	20	52·0	18	18·0	27	...	...
XV.		Tighnabruaich	7·46	...	·92	18	21	45·0	18*e*	25·0	27	14	...
,,	SCOTLAND.	Mull (Quinish).....	5·74	+ ·07	·88	17	21	...	...	...	...	...	...
XVI.		Loch Leven Sluices	6·20	+ 3·30	·90	16*a*	18	...	...	...	...	...	..
,,		Dundee (Eastern Necropolis)	3·40	+ 1·43	·45	20	20	47·1	19	19·8	25	14	...
XVII.		Braemar	2·68	— ·01	·75	21	21	49·0	5	9·5	27	25	31
,,		Aberdeen (Cranford)	4·02	...	·56	2	26	46·0	17	13·0	24	20	...
,,		Cawdor (Budgate)	3·77	+ 1·60	·60	20	18	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	3·79	— 1·09	·80	19	...	...	...	...	...	...	...
,,		Glencarron Lodge.....	7·70	...	1·83	18	21	51·7	9	20·0	25	14	...
XIX.		Dunrobin	4·24	+ 1·78	1·30	21	15	49·0	28	25·5	27	15	...
,,		S. Ronaldshay (Roeberry) ...	5·46	+ 2·51	1·07	18	24	46·0	9, 10	26·0	16	8	...
XX.		Darrynane Abbey.....	6·69	...	·58	20	22	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	5·67	+ 2·11	·93	20	23	54·5	15	24·0	24	11	...
,,	IRELAND.	O'Briensbridge (Ross)	...	...	...	...	...	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	4·42	+ 1·52	·65	20	23	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	2·48	+ ·62	·47	6	24	55·7	4	28·3	24	4	16
XXII.		Ballinasloe	4·43	+ 1·35	·59	11	23	54·0	3	27·0	27*g*	14	...
,,		Clifden (Kylemore)	8·15	...	·75	5, 21	21	...	...	...	...	..	...
XXIII		Waringstown	3·16	+ ·51	·65	17	19	54·0	19	19·0	28	18	21
,,		Londonderry (Creggan Res.).	3·90	+ ·48	·50	17*b*	23	...	...	...	...	...	...
,,		Omagh (Edenfel)	4·74	+ 1·72	·82	18	22	51·0	4, 20	22·0	27*h*	15	23

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

a—and 19. *b*—and 18. *c*—Various. *d*—and 8, 21. *e*—and 21. *f*—and 25. *g*—and 28, 29. *h*—and 28.

METEOROLOGICAL NOTES ON JANUARY, 1899.

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 warm month, with temp. above 50° on 14 days, but there were five brilliant days from 24th to 28th, with E. wind, and a colder feeling and more ice than the temp. seemed to warrant. Much wind, the worst gales being, from N.W. on 2nd and 3rd, W. on 12th, and S.W. on 20th and 21st. Duration of sunshine 86 hours. Mean temp. 42°·6. Wells rose a little, some considerably; others still very low. L in S. on 16th, followed by high wind.

HARTLEY WINTNEY.—An abnormally mild and wet month. Rough and stormy, with strong S.W. winds for the first three weeks, and heavy gales on 20th, 21st, and 22nd. Keen dry N.E. winds and frosts during the last week. Springs rapidly rising. Fog on 29th and 31st. Ozone on 22 days. Snowdrop and primrose in flower on 15th; crocus on 22nd.

ADDINGTON.—The greatest rainfall in January since 1886. The month was generally mild, with frequent high wind, and although frost was registered on nine nights, it was not severe, and the ponds were never quite covered with ice. The brook was much flooded on 20th and 21st.

WESTLEY, BURY ST. EDMUNDS.—A mild, windy month, with R in small quantities on many days.

NORWICH, BRUNDALL.—A very mild month, though the mean temp. (41°·7) is 1°·4 lower than that of January, 1898. Heavy gales occurred at times, principally from S.W., and the weather was generally unsettled and very mild till 23rd, after which N. winds were prevalent, with lower temp. but no severe frost. L on 16th. S on 2nd; sleet and H on 23rd and 24th.

WINTERBOURNE STEEPLETON.—The features of the month were the great rainfall and high temp. for the first three weeks, and after that a succession of cold and bright days. By the 20th all the springs in the valley of Winterbourne were running over. Mean temp. 42°·0, but the mean of the first three weeks was 44°·5. S on 2nd. Fog on hills on 6th and 15th.

TORQUAY, CARY GREEN.—R 2·38 in. above the average; mean temp. 44°·8, or 3°·0 above the average. Duration of sunshine 50 hours 5 mins., or 12 hours 55 mins. below the average; 8 sunless days.

POLAPIT TAMAR [LAUNCESTON].—The wettest January in 19 years. The middle third of the month was remarkably wet and stormy, accompanied by unusually high temp. H on 1st, 2nd, 11th and 12th. Gales from N.W. on 2nd, W.S.W. on 12th, S.W. on 13th and S.S.W. on 21st. L and T on 2nd and 16th; T on 11th.

STROUD, UPFIELD.—N.W. gale on 2nd; S.W. gales on 12th, 20th and 22nd. Slight S on 2nd.

WOOLSTASTON.—A wild, wet month, with constant gales of great violence—that on 12th being especially furious, and accompanied by H and T. The continuous R caused sudden and extensive floods throughout the valley of the Severn, and much damage was done. On 24th, a sharp frost set in, and continued to the end of the month. Mean temp. 38°·7. T on 16th; a little S on 1st.

BREADSALL PRIORY.—Very wet and mild in the first part of the month, followed by several sharp frosts.

ARNCLIFFE VICARAGE.—The heaviest rainfall ever recorded in one month here. In the seven days 15th to 21st, 7·88 in. fell.

WALES.

HAVERFORDWEST.—January was characterised by excessive R and mildness, and from 9th to 23rd atmospheric conditions of the most disturbed character prevailed. On the night of the 23rd, after two days of unprecedented R, which produced enormous floods, exceeding anything experienced since 1869, the wind suddenly changed to N.E., and a severe frost set in, which lasted till the 29th, when a partial thaw occurred, followed by frost again.

GOGERDDAN.—The first three weeks were very wet, with strong winds, mostly from S. and S.W.

SCOTLAND.

CARGEN [DUMFRIES].—Wet, unsettled weather prevailed during the first three weeks; excessive R, high temp., and almost entire absence of sunshine characterising the period. Although the mean temp., 38°·2, closely approximates the average, unwonted warmth characterised the first three weeks; the mean temp. of the first 22 days being 41°·4, and of the last 9 only 30°·0. Rainfall is the heaviest in January since 1882, when 7·54 in. fell. Gale from W. on 12th. S on 17th. H on 16th. Lunar halos on 27th and 28th. Vegetation very forward until checked by the frost.

EDINBURGH, BLACKET PLACE.—Very mild till 22nd, with strong S.W. winds and much R. The last 9 days cold and dry. Temp. 1°·3, and rainfall 52 per cent., above the average. S on 12th and 16th. Sleet on 12th. Fog on 25th and 28th. Solar halo on 31st.

COLMONELL.—R ·74 in., and temp. 2°·4, above the average of 22 years. L on 11th.

TIGHNABRUAICH.—For the first two-thirds of the month the weather was excessively wet; for the remainder, frosty. S on 17th.

MULL, QUINISH.—The wet and stormy weather of December, 1898, continued without intermission till January 23rd, when it suddenly cleared up, and fine weather with slight frost prevailed till the end of the month.

ABERDEEN, CRANFORD.—Very little S, but many gales of wind and much R.

S. RONALDSHAY, ROEBERRY.—Very wet and changeable, and the wettest January in 32 years. Mean temp. 38°, or 0°·3 below the average of 9 years.

IRELAND.

DARRYNANE ABBEY.—The first three weeks were very wet, mild and close, but from 23rd to the end was very cold and dry, with E. wind and frost from 27th to 29th. From December 22nd to January 22nd inclusive there was no day without R, the total fall being 9·41 in.

WATERFORD, BROOK LODGE.—All the early part of the month was very wet and stormy, also very mild. East winds prevailed during the last week. S on 2nd. S on the Comeraghs on 1st and 11th. Fog on 29th,

DUBLIN, FITZWILLIAM SQUARE.—Cloudy, rainy and generally open. R fell on each of the first 22 days, followed by a dry, cold period. Mean temp. 42°·7, or 1°·3 above the average. Fog on 10 days. High winds on 13 days, reaching the force of a gale on 8. S and sleet fell on 2nd, 11th, and 17th; H on 2nd. The temp. in shade exceeded 50° on 13 days.

OMAGH, EDENFEL.—Up to the 22nd the weather was made up of strong gales, heavy R and mild temp. From 23rd calm, clear and frosty weather prevailed, which was of much benefit to the country. From 1.30 to 2.30 p.m. on 12th there was a violent hurricane, doing an amount of damage to roofs, windows and trees, which, had the gale been prolonged, would have been almost unprecedented.

SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CCCXCVIII.] MARCH, 1899. [PRICE FOURPENCE, *or 5s. per ann. post free.*

EXTREMES OF TEMPERATURE IN LONDON AND ITS NEIGHBOURHOOD FOR 104 YEARS.

ON February 10th the shade temperature at Camden Square rose to 64°·8; this was much above any temperature previously recorded in February, either at Camden Square or at Greenwich, for at least fifty years.

It led us to look farther back, and finally we have prepared the following little table, which we hope will be generally acceptable.

Absolute Maxima.

Reference.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
A	57°·7 1843	61°·0 1821	66°·0 1803 1820 1822	77°·0 1807	84°·0 1807	87°·5 1826	93°·5 1808	89°·0 1800	83°·0 1810	75°·0 1802	63°·0 1821	58°·0 1821
B	57·0 1843	62·3 1846	71·5 1848	81·5 1865	87·0 1868	94·5 1858	97·1 1881	94·2 1884	92·1 1868	81·0 1859	67·3 1847	62·4 1848
C	56·4 1877	62·5 1868	70·1 1858	81·4 1865	87·6 1868	92·6 1858	94·6 1881	93·6 1893	91·0 1868	80·9 1859	63·9 1894	58·9 1888

Absolute Minima.

A	7·0 1795	17·7 1830	23·0 1800	27·0 1808	31·0 1802	40·0 1797 1802	44·5 1796	45·4 1839	37·0 1824	30·0 1796 1810 1836	23·8 1827	4·0 1796
B	4·0 1841	7·7 1845	13·1 1845 1890	23·0 1847	28·1 1877	35·6 1869	38·7 1863	38·1 1864	30·6 1885	24·7 1890	18·3 1890	8·0 1860
C	6·7 1867	7·3 1895	15·6 1890	24·5 1859	28·4 1892	35·6 1869	40·3 1863	38·2 1864	33·0 1872	23·8 1890	20·1 1858	6·7 1860

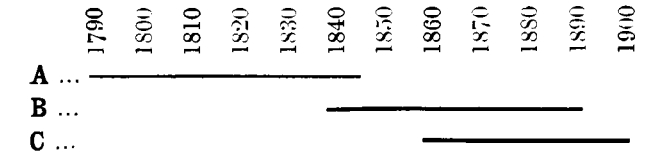
A. Royal Society, Somerset House, 1794–1843, by J. Glaisher, F.R.S., *Phil. Trans.*, 1850.

B. Royal Observatory, Greenwich, 1841–90, *Reduction of Greenwich Meteor. Obs.*, Part III.

C. Camden Square, 1858–97 abstracts in *Met. Mag.*, XXXIII.

The foregoing is probably sufficiently clear to need no explanation, but we will add a few words of comment by way of conclusion.

It will be noticed that the three records combined cover more than a century—roughly as is indicated by these lines :—



Except during January, the maxima given by series **A** are in every month lower than those for **B** or **C**; and, except in December, the minima are always higher—that is to say, the range of temperature shown by the **A** record is considerably less than at **B** and **C**. This might be due to an increase in the variability of climate, but it is probably really due to one or more of the following causes :—(1) The thermometers at **A** were suspended outside a window on the N. front, and on the first floor, of Somerset House, a cool position during the hot part of the day ; (2) The position in the very centre of London would be much warmer at night than in the open country; (3) From 1794 to 1841 the patterns of registering thermometers were inferior to those now in use.

We therefore think that the difference is not due to any real change in climate, but to difference in mode of observation.

The extremes for **B** and **C** agree very closely, but **B** (Greenwich) is hotter on very hot summer days. Whether this is real or due to the limited space hitherto allowed for meteorological purposes will, we believe, soon be shown by the records from the new station in Greenwich Park.

In any future table, carried down to date, the max. values for February will have to be for Greenwich **B 63°·9** in 1899 instead of **62°·3** in 1846, and for Camden Square **C 64°·8** in 1899 instead of **62°·5** in 1868.

FLOODS IN JANUARY, 1899.

WE take it as a compliment that directly a word is wrong in these pages somebody writes to point it out. On page 5 of the last number, in the second line of the second paragraph, we stated, on the authority of several newspapers, that "A few houses were invaded at ETON, WINDSOR and EGHAM, and boats, &c." We are informed that *no* house in ETON or WINDSOR was flooded. Accepting this correction, it seems to us to strengthen the arguments at the beginning and end of the sentence. We understand that the level was 2 ft. 5 in. below that reached in 1897.

We shall be glad to be favoured with any details of damage by these floods, and photographs showing their extent.

ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, February 15th, at the Institution of Civil Engineers, Mr. F. C. Bayard, LL.M., President, in the chair.

PHENOLOGICAL REPORT.

Mr. E. Mawley read his annual report on the Phenological Observations, and stated that the weather of 1898, taken as a whole, had been throughout the British Isles very warm and dry. Wild plants blossomed much in advance of their average dates until about the end of March, but after that time, until the close of the flowering season, they were mostly late in coming into bloom. Favoured by the rains in May, the crop of hay was everywhere a remarkably heavy one, but the long drought which followed dried up the pastures and caused a scanty yield of roots. The dry season suited the cereals admirably, and especially the wheat, of which there was a very abundant crop. The yield of barley was nearly as exceptional, while that of oats, except in the north-east of England, and in Scotland, was also unusually good. There was a splendid crop of potatoes in Ireland and in parts of Scotland, but elsewhere the yield was moderate. Apples, pears and plums flowered abundantly, but adverse weather conditions, and the dry sub-soil in the spring, caused an irregular "set" of fruit; so that in all parts of the Kingdom these crops were, as a rule, below average. On the other hand there were good crops of all the smaller fruits.

CIRCULATION OF THE ATMOSPHERE.

A paper by Prof. W. M. Davis, of Harvard University, U.S.A., on "The Circulation of the Atmosphere," was read by the Secretary. The author said that the circulation of the atmosphere is ordinarily inadequately treated, inasmuch as the serious student seldom gains from the text-books in current use a comprehensive view of this great problem. After giving a brief historical development of the subject, the author went more particularly into the question of the outflowing polar winds, especially in the Antarctic regions. He called attention to the remarks made by Dr. Buchan, at the conference on the "Scientific Advantages of an Antarctic Expedition," held at the Royal Society last year, and maintained that Prof. W. Ferrel's views on the circulation of the atmosphere, as far as they touch Antarctic winds and pressure, had been misunderstood. Prof. Davis said that the convectional circulation of the atmosphere, as ordinarily stated was seriously incompetent, for the most striking features in the distribution of atmospheric pressure are not accounted for by it. As long as the effect of the winds in modifying the distribution of pressure is left out of consideration, no broad understanding of atmospheric processes can be reached.

ON A RECENT RECURRENCE IN WEATHER.

To the Editor of the Meteorological Magazine.

SIR,—One often finds weather curiously repeated—a recurrence of the same kind of weather, time after time, at about the same intervals, for a limited period. It is well, I think, to note such recurrence, if at all frequent or persistent. It sometimes throws light on the way in which certain popular beliefs about weather may have arisen. Sometimes it may afford a presumption as to coming weather. As to causation, this may be quite obscure; but the meteorologist does well to remember the possibility of some influence, (terrestrial or cosmic) on weather, being at one time apparent, at another masked by some other influence.

The following facts and figures relate to the last eight months (July, 1898, to February, 1899). Consider each week, or group of seven days, having a day of new moon central, and the same for full moon; tabulate for each of these days the plus or minus value of mean temperature (from the Greenwich tables); next add the values for each seven-day group, and take the averages. Also note the numbers of plus and minus values in each group. Thus we have these tables:—

NEW MOON. Days.	Sum of differences from aver.	Average difference.	+ cases.	− cases.
	°	°		
1. July 18	+ 8·5	+ 1·2	4	3
2. Aug. 17	+54·2	+ 7·7	7	—
3. Sep. 16	+49·4	+ 7·1	6	1
4. Oct. 15	+ 8·7	+ 1·2	4	3
5. Nov. 14	+43·9	+ 6·3	7	—
6. Dec. 13	+55·4	+ 7·9	7	—
7. Jan. 11	+49·2	+ 7·0	7	—
8. Feb. 10	+83·1	+11·9	7	—
	Sums.....	+50·3	49	7
	Average	+ 6·3		

FULL MOON. Days.				
1. July 3	— 5·1	— 0·7	3	4
2. Aug. 2	+ 2·7	+ 0·4	4	3
3. ,, 31	+ 7·9	+ 1·1	3	4
4. Sep. 29	—12·3	— 1·8	—	7
5. Oct. 29	+41·4	+ 5·9	6	1
6. Nov. 28	+ 4·2	+ 0·6	3	4
7. Dec. 27	+33·4	+ 4·8	5	2
8. Jan. 26	—15·3	— 2·2	1	6
9. Feb. 25	—21·5	— 3·1	2	5
	Sums	+ 5·0	27	36
	Average	+ 0·6		

The greater warmth generally in weeks about new moon is thus apparent. Excepting Nos. 5 and 7 in the full moon table, all the

values of the latter in the "average difference" column are *under* the lowest value in the other table.

I give these facts as I find them, and do not affirm lunar influence in the case, especially as the data for some time previous to July do not apparently yield a like result. Still, the facts seem worth consideration by those who think the idea of the moon having anything to do with our weather is quite exploded.

It remains to be seen how much further the correspondence in question will be traceable.—Yours faithfully,

ALEX. B. MACDOWALL.

[Has the author been reading Webster's *Recurring Atmospheric Periods*, 1857? if not, it is curious that he should use the word so often.—ED.]

WILL-WI'-THE-WISP.*

THE phenomenon known as "will-o'-the-wisp" appears so rarely that its existence has been doubted by some scientists. It is observed most frequently in graveyards and in muddy channels. In graveyards, where the gas escapes from the soil, without traversing a layer of water, the will-o'-the-wisp takes the form of a long flame; in the water the gas escapes in bubbles that take fire on reaching the air, producing, when the air is calm, white wreaths of phosphoric anhydride. These phenomena can be reproduced artificially with all their characteristics by burying in moist soil, or by throwing into the water, some calcium phosphide, a substance prepared by causing phosphorus vapour to pass over red-hot lime. Under the action of the water, the phosphide gives off the gases hydrogen and hydrogen phosphide, which inflame spontaneously on coming into contact with the oxygen of the air. The white rings are due to the combustion of the phosphorus, which gives rise to phosphoric anhydride, a white powder that takes the form of wreaths. The formation of wreaths is due solely to the issue of smoke through the circular opening made by the bubble in issuing from the water. All smoke while escaping suddenly through a circular hole forms similar wreaths.

I had occasion, during the months of August and September last, to observe some very numerous and intense will-o'-the-wisps in the port of Croisic (Loire-Inférieure). During several evenings, especially about the middle of August, the production of will-o'-the-wisps became so abundant and manifested itself with so much energy that the phenomen was noticed by all the bathers and sailors on the quays. The sailors were particularly astonished, for these will-o'-the-wisps were entirely new to them. The captain of the port of Croisic, although he had lived many years in the place, said that this was the first time in his life that he had ever seen these singular lights. It is unnecessary to add that both bathers and sailors gave the most fantastic explanations of the phenomenon. I owe it to the truth to confess that at first I

* For personal testimony as to this phenomenon see also *Met. Mag.*, Vol. XV. (1880), p. 156.

thought it was the trick of some chemist, who was amusing himself by throwing into the sea sticks of calcium phosphide; but this hypothesis was not admissible. The bubbles were so large that to produce them there would have been required sticks of huge dimensions, not found in commerce. Besides, the will-o'-the-wisps reappeared every evening and over a considerable extent of water, so that it would have been necessary to undergo a large expense, quite disproportionate to a simple practical joke. I never saw anyone throw the smallest object into the sea. Finally, all my doubts were removed by the fact that the bubbles of gas, which were very large in August, during the season of thunderstorms, became smaller and smaller during September as the temperature fell. Towards September 20, when the phenomenon ceased, only very small bubbles appeared, though perhaps they were more numerous and scattered over a very great surface. It was then necessary to conclude that the productive cause of the phosphuretted hydrogen underwent variations corresponding to the changes of temperature and electric state of the atmosphere. Just as certain ferments decompose mineral and organic bodies rich in sulphur and produce sulphuretted hydrogen, so there must exist in the waters of the port of Croisic ferments hitherto unknown, capable of decomposing phosphates and organic substances rich in phosphorus, setting free phosphuretted hydrogen. Now we know how atmospheric conditions act on ferments. On certain days, especially during thunderstorms, milk sours with prodigious rapidity, and meat also spoils in a few hours.

I will close by giving some details regarding the production of the will-o'-the-wisps. These were very large and reproduced on a large scale the well-known experiment of bubbles of phosphuretted hydrogen obtained by the action of water on calcium phosphide. I observed plainly the formation of the white fumes of phosphoric anhydride, and the characteristic odour of garlic. Wreaths were not produced, because of the constant agitation of the air. The bubbles occurred principally in the two basins that adjoin the fish market, whence the refuse is often cast into the water, especially the heads of sardines. They rose somewhat in all parts of these basins, but especially in certain localities where the tide would heap up the refuse. This part of the port of Croisic is very clean, and contains no mud. The bubbles sometimes reached an enormous size. I saw flashes so bright that the whole port was illuminated as if by lightning. I noticed sometimes, but quite rarely, regular series of bubbles in a straight line, as if the substance from which the bubbles were escaping were carried along by the current. Some persons, I should say, believed that the bubbles were due to the putrefaction of large jellyfish, then quite abundant. The production of the will-'o-the-wisps was coincident generally with the phosphorescence of the sea, another phenomenon quite distinct from it, and having quite another origin. I have, nevertheless, about the middle of September, seen will-o'-the-wisps when the sea presented no trace of phosphorescence.—Dr. M. A. Blunard, in *La Nature*.

REVIEWS.

Regen-karte der Provinz Schlesien mit erläuterndem text und tabellen in amtlichem auftrage bearbeitet von Prof. Dr. HELLMANN, Dietrich Reimer, Berlin 1899. Roy. 8vo, 24 pp., one coloured map.

IN the summer of 1887 the Roy. Meteor. Institute of Silesia distributed about 200 new rain gauges to various persons in that province. The present pamphlet deals almost exclusively with the results of these and other gauges during the decade 1888–97.

Silesia has a length N.W.—S.E. of about 200 miles and an average breadth of 80 miles, therefore its area is roughly 16,000 square miles, or about a seventh of that of the British Isles. Dr. Hellmann gives results for 294 stations which would, on the average, give about one station to each 50 square miles, but he does not give a map showing their positions, and it is, therefore, not easy for a foreigner to ascertain whether they are equably distributed. We agree with the author as to the desirability of placing only a few names on the map, but 300 small black dots would give valuable information and obscure nothing. We should have preferred to find the true mean printed over the site of each station, as in the map between pp. 22–23 of *Brit. Rain.*, 1897; or alternatively the coloured map (which is excellent) might be left as it is, each station in the table might have a consecutive number, and an outline map might be printed (uncoloured) from the same stone, and small rings containing the number might be placed over the site of each station.

We are quite ready to accept Dr. Hellmann's curves, but think that it is always well to produce the facts on which they are based.

The head line of the table on pp. 12–13 misled us, and may possibly mislead others. It is true that in the text it is stated "for Görlitz there is a continuous record for 50 years and that for some of the other stations the 50-year mean can be obtained by computation"; but still it seems to us rather misleading to head the column "50 years' mean" and in no way to indicate which are "observed" values and which "computed" ones, or on how many years the latter are based—the addition of three columns "Period observed," "Number of Years," "Mean observed," would have enabled one to realize the precise value to be attached to the subsequent columns. Apparently part of this information is given in Table II., but if so there is a good deal of "computing," for only one record is complete for the 50 years, one for 47, one for 40, two are for between 30 and 40, and all the others for 28 or less.

We have mentioned, as is our duty, points which seem to us weak, but wish as a whole to write of the pamphlet with warm approval; we do not remember one of equal size which gives so much all round information on the various details of rainfall. Mean annual fall (22 inches on the plains, 45 on the mountains) and the probable limits of its fluctuation, percentage falling in each month

(chiefly in summer—slight in winter, even on the mountains), greatest falls in individual months; also in days, hours, and even shorter periods—these are among the data given in this, which in many respects may be regarded as a pattern. Would that it were generally imitated.

Annuario storico meteorologico Italiano redatto dal P. GIUSEPPE BOFFITO Ba dell'Osservatorio di Moncalieri. Volume I. 1898. Torino, 1899. Post 8vo, 152 pages.

WE are glad to be able to offer a warm welcome to this annual. It is very good as far as it goes, and the Editor invites authors to send him copies of their works so that he may make it better. But we see no chance of it being ever possible to give in one small annual volume an abstract of *all* the works upon Meteorology published in the previous year—which is what Padre Boffito is attempting.

This little volume is divided into two parts. Part I. is entitled "Articles and Memoirs," and contains five:—(1) On the origin of the Magnetic Compass, and on some of its principal modifications; (2) On Sunspots and Terrestrial Magnetism; (3) Doni, a precursor of Galileo; (4) On an explanation of the star of the Magi, falsely attributed to Kepler; (5) On the Meteorology of Cecco [? 1260–1327 A.D.] as indicated by his *Acerba*.

Part II. is entitled "Bibliography," and is divided into two portions—Italian (notices of 135 works and occupying 64 pages) and Foreign (noticing 80 works and occupying 23 pages).

The articles in Part I. prove that in tracing the early history of Meteorology we may expect very valuable aid from Padre Boffito and the writers who are assisting him.

Part II. is, as we have already said, excellent as far as it goes; but evidence of the impossibility of this becoming more than a *contribution towards* a bibliography is afforded by the numbers quoted for Italy, and for the rest of the world. Italy has nearly twice the space, and nearly three times as many separate notices as all the rest of the world. If all the meteorological publications are to be noticed as fully as the Italian ones, instead of 23 pages, several hundred would be required. What is done is well done; but it serves chiefly to show how much more has to be accomplished.

Cloud Observations in Victoria, by P. BARACCHI, F.R.A.S., Government Astronomer, Melbourne. [Excerpt Report Australasian Assoc. for the Advance. of Science, 1898.] 8vo, 7 pages, 4 plates.

THE second report upon cloud work to reach us is this, which is merely a preliminary one, but interesting first, because it comes from nearly our antipodes and shows how widespread have been the efforts to carry out the proposals of the International Met. Com.,

and secondly, because the plates make it easy to follow the somewhat original methods employed at Melbourne.

In a few lines we can state only the general features of the method adopted. Two cameras were used—one at the Melbourne Observatory, the other at 6,820 ft. nearly due N. (N. 3° 38′ 51″ W.), on the roof of Parliament House. The cameras were extremely massive, made of heavy cast iron, built on stone columns, with the lens facing the zenith, and rigorously tested for precision in that respect. The dark slide was fitted in a massive brass frame running on a V-shaped groove, so that absolute identity of position for each plate was ensured.

When the 20,000 observations are all discussed, we expect to find that results of great excellence have been attained.

Annales de l'Observatoire Météorologique . . . . du Mont Blanc, par J. VALLOT. Tome III. 4to. Steinheil, Paris, 1898. xiv.-217 pages, map, and numerous illustrations.

AS regards contents, printing and illustrations, it is always a pleasure to read these sumptuous volumes, which embody the results of a devotion to science by the Vallot family which we are glad to see has been recognised by the French Government, who have given to M. J. Vallot the Cross of *Chevalier de la Légion d'honneur*; to his talented wife the decoration of *Officier d'Académie*, and to his brother, M. H. Vallot, that of *Officier de l'Instruction publique*. Rarely do three members of a family receive such recognition, but equally rare is it for a family to devote so much money and so much time to the prosecution of scientific work.

In noticing Tomes I. and II. we expressed our admiration of M. Vallot's vast and heroic undertaking; we need, therefore, merely refer to those reviews (Vol. XXX., p. 9, and XXXII., p. 42).

The contents of Vol. III. are—(1) Hourly temperatures at Chamonix 1,086 m. (3,563 ft.), Grands Mulets, 3,021 m. (9,911 ft.), and Bosses, 4,359 m. (14,301 ft.), with some very sensible remarks upon thermometer exposure for lofty stations; (2) Barometric means for the same stations; (3) Barometric diurnal range at the three stations; the disappearance at the high stations of the usual double maximum and minimum is very well illustrated by a series of diagrams; (4) Great barometric changes, *e.g.*, the effect at different altitudes due to the passage of cyclones. M. Vallot does not seem well satisfied with this part of the work, and we are inclined to take the same view. We should have tried the effect of representing the pressure at Chamonix by a straight line, and laying off the differences between it and the upper stations hour by hour. Perhaps M. Vallot did that, and did not find it a success.

The next section is very important, but too long for us to epitomize. It describes, and gives the results of, experiments in Chemical

Actinometry carried out synchronously at two stations by M. and by Madame Vallot respectively. It is an excellent piece of work, extremely suggestive and well thought out.

The two following sections report the progress of M. H. Vallot's trigonometrical survey of the Mont Blanc district, in preparation for his entirely new map on the scale of 3 inches to the mile. Subsequent ones deal with the state of the tunnel near the summit, of the temperature in it, and the density of the ice; another, illustrated by a dozen photo-blocks, deals with the erosion due to glacier action—but we must stop.

All who are fortunate enough to obtain a copy will join us in applying to it the one word—"charming."

Climate of Cuba, also a note on the weather of Manila, by W. F. R. PHILLIPS. Prepared under the direction of the Chief of the Weather Bureau. Washington, 1898. 23 pp., 8vo.

OUR American friends have lost no time in collecting and tabulating all the meteorological data that they could find in the splendid library of the Weather Bureau, respecting Cuba, and the outcome is a satisfactory little paper.

We greatly regret that one result of the recent struggle was the death of our valued correspondent, Mr. F. W. Ramsden, H.B.M. Consul at Santiago, who could have rendered great assistance in the preparation of this paper.

Dr. Phillips has, we think, done his work well, and we agree with him that for low lying places like Habana, 77° may very well be accepted as the mean annual temperature; Dove gave 77°·2 more than half a century since. Monthly mean temperature is rarely below 70° or above 84°; absolute max. reaches 80° in every month of the year and 95° every year; but happily there are usually low minima in winter, 55° to 50°, and once to 49°·6.

As regards total annual rainfall, Dr. Phillips gives 52 inches for Habana, but his other records are in no case for more than one year, and therefore tell us very little. November to April are the drier months, June to October wet, with rain on nearly half of the days.

Manila is hotter, its mean temperature is given as 80°, the max. goes to 100°, and the absolute min. is 60°. There is a mistake on page 22, where it says "The lowest reading recorded is 74°, and was observed in January." 74° was the *mean temperature* of the coldest month January, but both in January and in December temperatures of 60° have been recorded.

As regards both Cuba and Manila one of the first things for the U.S. authorities to do, is to start Sanatoria at high altitudes.

RESULTS OF METEOROLOGICAL OBSERVATIONS AT CAMDEN SQUARE FOR 40 YEARS, 1858–97.

FEBRUARY.

YEAR.	RAINFALL.				TEMPERATURE.										CLOUD.
	Total.		Max. Fall.	Falls of 1 in. or +	Dry Mean, 9a.&9p.	Wet Mean, 9a.&9p.	Shade Max		Shade Min		Sun Max. Black.		Grass Min.		
	Depth	Days					Abs.	Aver	Abs.	Aver	Abs.	Aver	Abs.	Aver	Aver
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	in.		in.		°	°	°	°	°	°	°	°	°	°	0-10
1858..	1·80	5	·60	0	34·7	33·7	52·1	41·3	24·4	30·2	..	..	..	..	5·2
1859..	1·23	15	·22	0	42·5	40·3	57·9	49·3	28·7	35·6	..	..	..	..	5·8
1860..	1·25	15	·41	0	35·4	33·6	52·4	41·2	23·2	30·3	..	..	21·4	29·4	5·3
1861..	1·93	12	·56	0	41·6	40·0	54·7	47·6	23·2	36·8	..	..	18·8	33·1	6·8
1862..	·31	5	·10	0	41·1	39·7	56·1	45·7	23·2	36·9	..	..	17·6	33·4	7·4
1863..	·67	8	·20	0	41·2	39·7	53·6	48·0	24·5	36·0	..	..	17·8	32·2	6·4
1864..	·85	11	·29	0	35·9	34·9	54·4	42·0	18·9	31·4	..	..	12·6	28·6	6·9
1865..	2·01	20	·42	0	37·0	35·8	52·8	41·7	15·4	32·3	..	..	10·8	28·8	7·3
1866..	3·72	18	·49	0	40·5	38·8	55·8	47·2	25·2	36·1	..	..	18·1	30·2	5·5
1867..	1·44	11	·36	0	45·2	43·8	56·2	50·4	30·0	40·2	..	..	26·5	37·4	7·5
1868..	1·21	10	·50	0	43·3	41·1	62·5	50·1	26·6	38·3	..	..	23·0	34·8	6·3
1869..	2·48	17	·52	0	45·6	43·7	60·8	51·7	31·3	40·6	..	..	27·4	38·3	6·9
1870..	1·21	14	·35	0	36·6	35·4	54·9	41·8	20·1	32·4	87·1	63·3	17·2	29·7	7·2
1871..	1·27	14	·31	0	42·5	41·1	56·2	48·1	25·8	37·5	102·4	69·4	25·7	35·2	7·6
1872..	·96	15	·19	0	44·5	43·0	57·0	51·1	31·4	39·3	94·1	72·2	26·6	35·3	6·5
1873..	1·96	13	·61	0	34·7	33·2	50·1	39·5	25·8	31·3	88·3	55·1	24·1	30·1	8·9
1874..	·91	16	·58	0	38·7	37·7	54·5	44·8	22·4	33·3	89·8	60·9	19·5	31·1	6·5
1875..	1·06	16	·36	0	35·3	34·5	51·2	40·8	25·1	31·0	90·2	58·8	23·4	29·6	7·4
1876..	1·97	18	·36	0	41·2	39·7	58·6	46·7	23·0	36·6	99·0	69·0	21·0	33·9	7·0
1877..	1·78	17	·34	0	43·2	41·6	58·5	49·4	25·3	38·6	92·0	74·1	22·7	36·1	6·4
1878..	1·49	11	·41	0	42·3	41·0	59·7	47·7	25·7	37·7	98·2	64·2	23·8	34·1	8·0
1879..	3·77	24	·76	0	38·2	37·1	53·8	43·0	25·2	34·4	73·8	56·1	24·9	32·6	8·3
1880..	2·33	19	·43	0	41·2	40·3	53·7	47·8	27·0	35·9	93·5	68·4	22·3	31·8	7·1
1881..	3·09	16	·76	0	37·7	36·6	52·7	42·8	26·7	33·9	90·2	58·9	23·3	31·8	8·1
1882..	1·30	8	·38	0	41·7	40·3	56·2	48·2	24·6	36·3	95·4	64·8	19·4	33·0	7·6
1883..	3·62	14	·60	0	42·3	40·8	57·3	49·0	29·3	36·5	100·8	68·1	24·4	33·2	6·2
1884..	1·40	14	·30	0	41·7	39·9	56·3	48·2	28·2	37·2	81·7	64·4	25·0	33·6	6·7
1885..	2·86	18	·75	0	43·5	41·9	57·8	49·9	27·6	38·7	79·2	62·1	20·8	33·5	6·5
1886..	·63	8	·30	0	33·4	32·4	47·7	38·4	19·4	29·5	82·6	51·9	14·7	25·6	7·2
1887..	·48	5	·12	0	38·0	36·5	54·1	45·2	22·6	33·1	97·8	62·8	16·6	29·0	5·9
1888..	·78	14	·31	0	35·1	33·7	52·0	40·1	19·1	31·4	76·7	59·3	16·1	28·2	7·9
1889..	2·28	18	·63	0	36·5	35·1	58·1	43·3	20·4	31·7	86·3	65·3	13·5	28·1	6·8
1890..	1·05	9	·66	0	36·5	35·4	49·3	43·4	27·1	33·2	83·4	62·9	21·8	29·2	6·5
1891..	·01	1	·01	0	37·5	36·4	61·2	46·0	24·2	32·5	83·8	61·6	19·7	28·6	5·9
1892..	1·62	17	·43	0	38·4	37·1	53·0	44·7	17·5	33·9	86·1	62·3	12·2	30·4	6·9
1893..	2·87	22	·44	0	40·8	39·4	57·0	47·1	25·1	35·9	86·8	63·4	20·1	32·2	6·7
1894..	1·74	16	·41	0	41·3	39·4	56·4	47·8	23·3	35·5	91·1	67·0	18·0	31·1	5·7
1895..	·12	4	·06	0	28·8	27·8	46·2	36·1	7·3	22·5	80·8	58·2	5·0	19·0	5·8
1896..	·30	8	·08	0	39·6	38·2	56·4	46·2	23·2	34·7	86·9	63·4	19·8	30·9	6·9
1897..	2·75	14	·59	0	43·0	41·4	58·0	48·4	27·9	39·0	93·3	60·9	22·6	34·5	8·1
Mean ...	1·61	13	·40	0	39·5	38·0	55·2	45·5	24·1	34·7	89·0	63·2	20·0	31·5	6·8
Extremes	3·77	24	·76	0	45·6	43·8	62·5	51·7	31·4	40·6	102·4	74·1	27·4	38·3	8·9
	·01	1	·01	0	28·8	27·8	46·2	36·1	7·3	22·5	73·8	51·9	5·0	19·0	5·2

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, SEPTEMBER, 1898.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	91·2	8	36·8	29	74·2	51·6	51·4	70	125·7	32·4	·33	4	4·0
Malta	86·3	9	65·1	30	81·9	68·9	65·1	77	147·8	61·5	2·50	9	2·1
Cape of Good Hope	79·9	25	41·0	14	64·9	49·0	49·6	82	...	...	3·16	13	5·2
Mauritius	78·4	14	58·3	28	75·9	63·8	60·6	76	129·6	49·9	1·34	10	5·6
Calcutta	90·9	30	75·5	20	87·3	77·8	76·5	84	157·0	75·5	8·00	11	8·2
Bombay	87·4	27	73·9	12	84·5	76·6	75·6	85	140·3	72·0	19·94	21	7·3
Ceylon, Colombo	88·7	15	73·8	29	86·4	76·6	73·7	82	152·0	72·0	6·90	23	5·7
Melbourne	72·8	25	40·0	10	62·5	47·5	43·9	71	129·0	36·2	2·90	13	6·1
Adelaide	80·6	25	39·3	28	67·8	48·2	46·6	68	144·9	34·4	·72	14	4·4
Sydney	...	...	...	...	...	...	...	..	..	...	...	...	...
Wellington	65·0	28	37·0	2	58·2	45·1	40·9	67	92·0	29·6	3·03	10	4·2
Auckland	65·0	24	45·0	17	60·2	48·5	45·5	71	124·0	42·0	2·25	22	4·9
Jamaica, Kingston	92·3	30	70·8	9	87·9	72·7	71·3	77	...	...	2·95	12	...
Trinidad	91·0	14	68·0	30	87·7	70·3	72·7	86	167·0	63·0	7·13	15	...
Grenada	88·2	27	71·2	21	83·2	74·3	73·0	81	154·0	...	12·02	18	2·8
Toronto	97·1	2	38·3	11	73·9	54·6	56·0	77	115·0	35·2	2·79	9	4·3
New Brunswick, Fredericton	81·7	5	26·0	25	66·5	45·2	46·5	67	...	...	1·53	9	4·9
Manitoba, Winnipeg	79·8	27	31·8	9	67·3	43·9	...	...	...	...	2·50	11	5·5
British Columbia, Esquimalt	85·0	6	37·3	30	67·0	47·9	..	...	...	...	1·79	9	5·2

REMARKS.

MALTA.—Adopted mean temp. 73°·7, or 1°·4 below average. Mean hourly velocity of wind 6·0 miles, or 1·9 below average. Mean temp. of sea 78°·2. TSS on 5 days. L on 10 days. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·6 below, of dew point 0°·7 above, and rainfall ·09 in. below, the average. Mean hourly velocity of wind 10·8 miles, or 1·2 below average; extremes, 29·2 on 18th and 2·6 on 24th; prevailing direction E.S.E. T. F. CLAXTON.

CEYLON, COLOMBO.—Mean temp. of air 80°·6, or 0°·1 below, of dew point 0°·5 above, and rainfall 1·83 in. above, the average. Mean hourly velocity of wind 8·7 miles; prevailing direction W. and S.W. TS on 4th. H. O. BARNARD.

Adelaide.—Weather generally very dry. Rain everywhere below average. Mean temp. 0°·9 above, and rainfall 1·03 in. below, the average for 41 years. C. TODD, F.R.S.

Sydney.—In the August table the dew point should have been 46°·2 and the grass min. 32°·8.

Wellington.—Generally fine up to the 13th; heavy R on 14th and showery to the 20th; the latter part of the month finer. Prevailing winds N.W.; frequently strong. L on 14th. Earthquake on 16th. Mean temp. 0°·7 above, and rainfall 1·23 in. below, the average. R. B. GORE.

Auckland.—No storms or heavy falls of rain during the month, the rainfall being less by an inch than the average of 31 years. Mean temp. close to the average. T. F. CHEESEMAN.

TRINIDAD.—Rainfall ·57 in. above the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, FEBRUARY, 1899.

[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..	2·14	XI.	Builth, Abergwesyn Vic.	8·73
II.	Dorking, Abinger Hall .	3·19	,,	Rhayader, Nantgwillt ...	8·61
,,	Birchington, Thor	1·88	,,	Lake Vyrnwy	3·86
,,	Hailsham	3·25	,,	Corwen, Rhug	2·86
,,	Ryde, Thornbrough	2·81	,,	Criccieth, Talarvor	2·52
,,	Emsworth, Redlands ...	2·93	,,	I. of Man, Douglas	2·89
,,	Alton, Ashdell	3·68	XII.	Stoneykirk, Ardwell Ho.	2·31
III.	Oxford, Magdalen Col..	1·82	,,	New Galloway, Glenlee	3·85
,,	Banbury, Bloxham	3·23	,,	Monaive, Maxwelton Ho.	3·65
,,	Northampton, Sedgebrook	2·27	,,	Lilliesleaf, Riddell	2·05
,,	Stamford, Duddington..	1·63	XIII.	N. Esk Res. [Penicuick]	2·25
,,	Alconbury	·95	XIV.	Glasgow, Queen's Park..	1·84
,,	Wisbech, Bank House...	1·12	XV.	Inverary, Newtown	4·40
IV.	Southend	1·93	,,	Ballachulish, Ardsheal...	5·85
,,	Harlow, Sheering..... ...	2·61	,,	Islay, Gruinart School ...	1·82
,,	Colchester, Lexden	1·31	XVI.	Dollar.....	2·43
,,	Rendlesham Hall	1·38	,,	Balquhidder, Stronvar...	6·83
,,	Scole Rectory	1·07	,,	Coupar Angus Station...	2·89
,,	Swaffham	·98	,,	Dalnaspidal H.R.S.....	...
V.	Salisbury, Alderbury ...	3·39	XVII.	Keith H.R.S.....	1·10
,,	Bishop's Cannings	3·06	,,	Forres H.R.S.	1·28
,,	Blandford, Whatcombe .	3·86	XVIII.	Fearn, Lower Pitkerrie..	1·32
,,	Ashburton, Holne Vic...	5·14	,,	S. Uist, Askernish	2·80
,,	Okehampton, Oaklands.	...	,,	Invergarry.....	1·66
,,	Hartland Abbey	3·15	,,	Aviemore H.R.S.	...
,,	Lynton, Glenthorne ...	5·18	,,	Loch Ness, Drumnadrochit	2·03
,,	Probus, Lamellyn	5·70	XIX.	Invershin	1·22
,,	Wellington, The Avenue	4·08	,,	Durness	2·06
,,	North Cadbury Rectory	3·14	,,	Watten H.R.S.....	1·03
VI.	Clifton, Pembroke Road	3·91	XX.	Dunmanway, Coolkelure	8·12
,,	Ross, The Graig	2·77	,,	Cork, Wellesley Terrace	4·36
,,	Wem, Clive Vicarage ...	1·52	,,	Killarney, Woodlawn ..	8·24
,,	Wolverhampton, Tettenhall	2·51	,,	Caher, Duneske	3·23
,,	Cheadle, The Heath Ho.	2·33	,,	Ballingarry, Hazelfort...	2·34
,,	Coventry, Priory Row ..	2·86	,,	Limerick, Kilcornan ...	2·91
VII.	Grantham, Stainby	1·50	,,	Miltown Malbay	3·03
,,	Horncastle, Bucknall ...	...	,,	Gorey, Courtown House	3·67
,,	Worksop, Hodsck Priory	1·47	XXI.	Moynalty, Westland ...	2·84
VIII.	Neston, Hinderton	1·21	,,	Athlone, Twyford	2·78
,,	Southport, Hesketh Park	1·55	,,	Mullingar, Belvedere ...	2·60
,,	Chatburn, Middlewood.	1·89	,,	Woodlawn	3·00
,,	Duddon Val., Seathwaite Vic.	5·77	XXII.	Crossmolina, Enniscoe ..	5·26
IX.	Melmerby, Baldersby ...	1·56	,,	Collooney, Markree Obs.	3·33
,,	Scarborough, Observat'y	...	,,	Ballinamore, Lawderdale	3·05
,,	Middleton, Mickleton ...	2·13	,,	Warrenpoint.....	4·14
X.	Haltwhistle, Unthank...	1·97	XXIII.	Seaforde.....	3·70
,,	Bamburgh	1·34	,,	Belfast, Springfield	3·04
,,	Keswick, The Bank	4·98	,,	Bushmills, Dundarave..	1·75
XI.	Llanfrechfa Grange	3·94	,,	Stewartstown	3·08
,,	Llandovery	4·36	,,	Killybegs	2·64
,,	Castle Malgwyn	5·10	,,	Horn Head	2·67
,,	Brecknock, The Barracks	6·19	,,		

FEBRUARY, 1899.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Greatest Fall in 24 hours. Date	Days on which 0·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	No. of Nights below 32°. On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	2·00	+ ·12	·38	4	11	64·8	10	24·9	27	10	16
II.		Tenterden ...	2·51	+ ·39	·66	8	15	60·0	10	21·5	28	11	16
,,		Hartley Wintney ...	2·65	...	·55	6	12	62·0	10	21·0	26	11	15
III.		Hitchin ...	1·53	— ·22	·30	15	11	63·0	10	21·0	25	14	...
,,		Winslow (Addington) ...	2·04	— ·12	·40	6	11	61·0	10	20·0	27*c*	12	17
IV.		Bury St. Edmunds (Westley)	1·11	— ·45	·34	15	12	61·0	10	24·0	4	...	...
,,		Norwich (Brundall) ...	1·27	...	·33	15	16	63·6	10	23·8	28	10	19
V.		Winterbourne Steepleton ...	4·34	...	·88	12	12	55·9	17	21·8	28	10	16
,,		Torquay (Cary Green)	5·77	...	1·22	5	14	59·4	9	28·2	3	3	7
,,		Polapit Tamar [Launceston]..	3·60	+ ·33	·55	13	12	59·4	9	19·6	3	10	10
VI.		Stroud (Upfield) ...	3·18	+ ·62	·78	15	14	57·0	9, 10	25·0	3, 27	10	...
,,		ChurchStretton(Woolstaston)	3·54	+ 1·09	·71	13	14	55·5	10	23·5	26	13	17
,,		Worcester (Diglis Lock) ...	2·53	+ ·56	·50	6	12	...	..	...	...	...	...
VII.		Boston ...	·92	— ·76	·22	15	12	62·0	10	24·0	28	12	...
,,		Hesley Hall [Tickhill]...	1·49	— ·01	·31	15	9	59·0	10	21·0	22	15	...
,,		Breadsall Priory ...	1·46	...	·31	6	13	58·0	28	20·0	4	13	22
VIII.		Manchester(PlymouthGrove)	...	...	...	...	...	...	...	...	...	...	...
IX.		Wetherby (Ribston Hall) ..	1·33	— ·25	·35	9	9	...	...	...	...	...	...
,,		Skipton (Arncliffe) ...	4·53	— ·16	1·16	9	14	...	...	...	...	...	...
,,		Hull (Pearson Park).	1·00	— ·80	·18	7, 15	9	61·0	10	24·0	4, 24	13	15
X.		Newcastle (Town Moor) ...	·89	— ·51	·22	1	11	...	...	...	...	...	...
,,		Borrowdale (Seathwaite)...	9·07	— 2·57	2·22	13	13	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely)...	3·99	+ ·80	·76	4	14	...	...	...	...	...	...
,,		Haverfordwest ...	5·18	+ 1·06	·88	20	13	54·7	9	23·4	3	7	14
,,		Aberystwith (Gogerddan) ...	2·08	— 1·18	·46	7	11	55·0	11*a*	...	...	...	...
,,		Llandudno...	2·35	+ ·43	·44	11	15	65·0	10	27·0	4	5	...
XII.	SCOTLAND.	Cargen [Dumfries]	4·36	+ ·71	·74	8	11	52·0	22*b*	19·0	4	15	...
XIII.		Edinburgh (Blacket Place)...	1·45	...	·31	17	11	53·9	17	22·1	27	11	18
XIV.		Colmonell	2·97	...	·62	8	14	53·0	10	19·0	2	...	...
XV.		Tighnabruaich ...	3·19	...	·57	8, 10	11	47·0	28	26·0	3	11	...
,,		Mull (Quinish)...	4·19	— 1·28	·84	9	14	...	...	...	...	...	...
XVI.		Loch Leven Sluices ...	2·80	+ ·05	·60	11	10	...	...	...	...	...	..
,,		Dundee (Eastern Necropolis)	2·30	+ ·20	·50	8	13	51·7	11	23·3	4	15	...
XVII.		Braemar	1·96	— 1·40	·45	10	13	52·8	27	11·0	5	18	25
,,		Aberdeen (Cranford)	2·56	...	·51	9	17	53·0	12*c*	...	...	...	...
,,		Cawdor (Budgate) ...	1·46	— ·77	·45	17	9	...	...	...	...	...	...
XVIII		Strathconan [Beauly] ...	2·11	— 2·60	·50	11	7	...	...	...	...	...	...
,,		Glencarron Lodge...	3·54	...	·61	14	15	51·6	24	24·0	2	15	...
XIX.		Dunrobin ...	1·55	— ·54	·41	17	10	51·2	12	28·0	20	8	...
,,		S. Ronaldshay (Roeberry) ...	1·51	— 1·13	·37	13	17	49·0	28	27·0	4, 5	5	...
XX.	IRELAND.	Darrynane Abbey...	5·69	...	·80	16	18	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	4·53	+ ·45	·64	20	16	54·0	10	28·0	3	7	...
,,		Broadford (Hurdlestown) ...	2·50	...	·38	12	16	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill) ...	2·43	— ·65	·34	11	15	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	2·17	— ·18	·49	20	15	56·0	9	29·0	27	4	14
XII.		Ballinasloe	3·29	+ ·51	·54	11	17	52·0	28	25·0	3	9	...
,,		Clifden (Kylemore)	6·30	...	1·06	16	14	...	...	...	...	...	...
XIII		Waringstown ...	3·00	+ ·55	·48	17	18	56·0	12	22·0	2	14	15
,,		Londonderry (Creggan Res.).	1·92	— 1·11	·42	9	17	...	...	...	...	...	...
,,		Omagh (Edenfel) ...	3·19	+ ·50	·55	9	15	51·0	...	25·0	...	9	13

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

a—and 14, 24. *b*—and 23. *c*—and 28.

METEOROLOGICAL NOTES ON FEBRUARY, 1899.

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 first few days were cold, followed by 2·48 in. of R in the wet period, 4th to 15th, during which the springs rose at last and ponds filled up. Very warm from 8th to 14th and much wind, especially on 11th and 12th from S.W. The nights were very cold in the latter half of the month, and the wind generally E. Duration of sunshine 115 hours, of which 70 were in the last 8 days. Min. temp. in shade on 28th the lowest for four years. Thick rime on trees on 28th.

HARTLEY WINTNEY.—A Janus-like month—one face wet, the other dry. The rain which fell from the 4th to 15th was the greatest recorded here in any corresponding period. Gales of wind from S.W. and W. from 8th to 13th. From 16th to the end of the month, dry, calm and cloudless days, and sharp frosts from 22nd to 28th. Fogs on 5th, 19th, 20th, 26th and 27th. Ozone on 10 days. L on 11th, 12th and 13th. Lunar halo on 23rd. Brimstone butterfly on the wing on 16th.

ADDINGTON.—Between the 4th and 15th there was much rain and frequent high wind, then dry weather until the end. Very sharp frost on the 4th, and again on 26th, 27th and 28th. T to N. on 7th. The last six days very clear, with bright sunshine. S on 4th, 5th and 6th. Fog on 15th, 18th, 19th, 25th and 28th.

BURY ST. EDMUNDS, WESTLEY.—Dull to the 15th, then very fine. Very cold mornings from 22nd to end of the month, with much sunshine. Distant T on 7th. Fog on 23rd.

NORWICH, BRUNDALL.—S on 2nd, 3rd, 6th, and covering the ground on 4th. Fog on 4th, 17th and 18th. L in evening on 7th. Gales from S. on 8th, S.W. on 11th and 12th. The 10th was the warmest day ever registered so early in the year, but on February 28th, 1891, 64°·0 was recorded.

WINTERBOURNE STEEPLETON.—After a short spell of dry weather, heavy R fell between the 4th and 15th, filling up the springs to the full. The Winterbourne stream is running strongly, and a well by the side of the road about 1½ miles lower down is (March 3rd) still running over. The first five nights were cold, and again from the 21st we had continuous frosts on grass, and also in shade, except on the 24th, when 33° was registered. Mean temp. 41°·7. S on 4th. T on 7th and 13th. L on 12th and 13th. Fog on 17th and 18th.

TORQUAY, CARY GREEN.—R 3·24 in. above the average. Mean temp. 45°·6, or 2°·3 above the average. Duration of sunshine 94 hours, being 15 hours 35 minutes above the average; 8 sunless days.

POLAPIT TAMAR [LAUNCESTON].—The first half of the month was particularly stormy and wet, with high temp.; the latter half quite the reverse. Gales from S. on 8th and 9th, and S.S.W. on 13th. L on 8th. L and H on 13th.

STROUD, UPFIELD.—S on 4th. T and L on 7th, 8th and 13th. S.W. gales on 9th and 13th.

WOOLSTASTON.—The early part of the month was wet, cold and stormy, S falling lightly on 4 days. The last week was again very cold, but dry. Mean temp. 39°·6. Vivid L, with T and H, on the 8th.

BOSTON.—Rainfall again deficient, and the water in the river has not risen this winter to half the height that it usually does after heavy rains. TSS on 7th and 13th. The max. temp. (62°·0 on 10th) is the highest on record for this month.

HESLEY HALL [TICKHILL].—Heavy TS 10 to 10.30 p.m. on 8th.

BREADSALL PRIORY.—Mild and wet during the earlier part of the month, followed by fine weather with cold nights and warm days.

SEATHWAITE.—S 4½ inches deep at 9 a.m. on 6th.

WALES.

HAVERFORDWEST.—The cold weather of January continued till the 4th, followed by stormy, wet, and very disturbed weather, especially from the 6th to the 13th, and the high tide with the excessive R at the period of new moon occasioned inundations not exceeded during 30 years. At 3 p.m. on the 13th a sharp but short TS occurred, the L being very vivid, and the T following quickly. After the 20th a complete change took place, the wind blew from the E., and very sharp frost with clear sky prevailed.

GOGERDDAN.—The last ten days were very bright, with sharp frosts at night.

SCOTLAND.

CARGEN [DUMFRIES].—Normal conditions on the whole characterized the month, the mean of the readings of the bar. and ther., and the records of rainfall and sunshine closely approximating to the average of 40 years. From the 1st to 7th inclusive a mean temp. of 32°·9 was registered, the min. being below freezing-point each day; higher mean temp. then occurred until the 22nd, when frost was again recorded, continuing during the last seven nights. Upwards of 4 inches of R fell in the nine days, 6th to 14th; but on 19th fine bright weather set in, continuing until the end of the month. Three inches of S fell on 6th. A severe TS occurred on 7th. E. winds prevailed on 20 days.

EDINBURGH, BLACKET PLACE.—Mean temp. 1°·2 above average; pressure and bright sunshine normal; rain slightly below the average. S from 2 to 3 p.m. on 5th and early on 7th. Solar halo on 9th. Aurora on 12th. Lunar halo on 23rd. Dense mist all day with silver thaw at night on 26th.

COLMONELL.—R ·75 in. below, and mean temp. 2°·2 above, the average of 22 years. S on 5th, 1½ inches deep. Gale on 17th.

TIGHNABRUAICH.—In every respect a normal month. S on 6th.

ABERDEEN, CRANFORD.—The month was cold and wet, with sharp frost and very little S. Wind for the most part S.W. and W. Very little sunshine.

S. RONALDSHAY, ROEBERRY.—A very fair month upon the whole. Mean temp. 38°·7, or 0°·2 above the average.

IRELAND.

DARRYNANE ABBEY.—The first fortnight was very mild and wet, with unusually high tides from 10th to 14th. The last few days were very fine.

WATERFORD, BROOK LODGE.—Remarkably high tides on 12th. H showers on 13th. Fog on 17th, 18th and 19th. E. winds from 20th to 26th.

BROADFORD, HURDLESTOWN.—Rainfall ·72 in. above, and number of rainy days one below, the average for 14 years. A favourable month on the whole. S.E. gale on 5th and 6th. Distant T on 7th.

DUBLIN, FITZWILLIAM SQUARE.—Stormy and wet during the first half of the month; the weather then became fine, dry and seasonable, with a remarkably large diurnal range of temp. Mean temp. 44°·0 or 1°·2 above the average. Fog on 7 days; high winds on 12 days, reaching the force of a gale on 6th, 9th, 10th, 13th and 14th. Lunar halos on 4th and 6th. S or sleet and hail fell on the 2nd; L was seen on the 8th and 9th.

OMAGH, EDENFEL.—For the first fortnight the weather was very wet and unsettled, the third week somewhat less so; but from the 21st to the end there followed a very fine dry period, with but little frost—highly favourable for all agricultural operations.

SYMONS'S

MONTHLY

METEOROLOGICAL MAGAZINE.

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WINTER MINIMA ON BRITISH MOUNTAIN TOPS.*

ON May 13th, 1867, the late Mr. H. B. Biden placed a minimum thermometer at the altitude of 3,262 ft. on Y Glyder fach, a rough, stone-covered summit, about 4 miles E.N.E. of Snowdon. It was placed amid a chaos of large angular stones, beneath a protecting slab of feldspar porphyry, duly set, and left to its fate. For nearly 20 years Mr. Biden climbed up each spring, read and recorded the minimum of the previous winter, and reset the instrument. The site was too rough to tempt the ordinary tourist, but at last the repeated visits of nail-clad boots left a track of scratches, and finally, in 1895, some silly tourist found the thermometer and spoiled the record for 1894–95. Since then another spot has been selected, and there are now two thermometers on that lone top, where we hope that no unauthorized person will ever find them.

After Mr. Biden became unable to climb, and since his death, we believe that all the work has been done by Mr. Piffe Brown, of Gloucester, who read a short paper upon the subject a few years since.—(*Q. Jour. R. Met. Soc.*, xix. (1893), p. 149.)

He has recast the story, added comparative records, and completed the tables down to date in the article mentioned below, and (owing to its unique character) we think that the principal table should be quoted for general information—we have added the last two columns and a line of averages.

* W. Piffe Brown "On the Glyder thermometers and winter temperature on mountain summits" in *The Climbers' Club Journal*, February, 1899.

Winter Minima.

Year.	WALES. Glyder fach, 3,262 ft.	Church-stoke, 540 ft.	Llandudno 90 ft.	SCOTLAND. Ben Nevis, 4,407 ft.	Fort William, 35 ft.	Difference
	°	°	°	°	°	°
1867-68	14·5	...	...	...	...	...
1868-69 }						
1869-70 }	14·0	...	...	...	...	...
1870-71 }						
1871-72	14·0	...	...	...	...	...
1872-73	13·0	...	...	...	...	...
1873-74	14·0	..	...	...	...	...
1874-75	18·0	...	...	...	...	...
1875-76	15·0	15·7	22·9	...	...	...
1876-77	26·0	22·8	26·3	...	...	...
1877-78	17·0	23·5	28·0	...	...	...
1878-79	22·0	12·2	19·1	...	...	...
1879-80	15·5	13·2	23·0	...	...	...
1880-81	12·0	—1·0	14·5	...	...	...
1881-82	21·5	22·1	30·2	...	...	...
1882-83	16·0	10·7	25·5	...	...	...
1883-84	20·0	20·3	30·0	9·9 Feb., 1884	...	...
1884-85	26·0	21·8	27·0	11·1 Feb., 1885	18·9	7·8
1885-86	17·5	13·2	22·5	8·4 Dec., 1885	17·0	8·6
1886-87	18·0	14·7	24·5	8·4 Dec., 1886	14·0	5·6
1887-88	15·7	17·6	25·7	7·2 Mar., 1888	21·2	14·0
1888-89	15·0	14·4	25·5	6·4 Feb., 1889	15·7	9·3
1889-90	15·0	16·5	25·4	10·1 Mar., 1890	21·2	11·1
1890-91	11·0	9·2	20·0	5·6 Mar., 1891	17·2	11·6
1891-92	9·0	8·9	22·6	3·5 Mar., 1892	11·8	8·3
1892-93	10·0	11·2	25·0	6·4 Jan., 1893	13·9	7·5
1893-94	8·0	10·0	15·0	0·7 Jan., 1894	13·9	13·2
1894-95	No record	—5·0	17·5	1·8 Feb., 1895	8·9	7·1
1895-96	17·0	19·0	26·8	14·2 Jan., 1896	24·9	10·7
1896-97	15·0	19·0	26·0	4·0 Jan., 1897	...	...
1897-98	19·0	22·2	28·0	9·6 Feb., 1898	...	...
Averages—						
1867-98	16·0	...	...	...	...	...
1875-98	16·4	14·4	23·9	...	...	...
1883-98	15·4	14·2	24·1	7·1	...	...
1884-96(—94-5)	14·7	14·2	23·6	7·5	17·3	9·8

Mr. Piffe Brown was evidently surprised to find that the minima were not lower, and suggests that occasionally it may be due to an accumulation of snow covering the rocks and the thermometer, and so keeping it warm; but he points out, quite rightly, that it is improbable that there is *always* snow there at times of severe cold, and that if the high average is due to snow, the differences between the high and the low level minima ought to be very irregular, which, during the last 24 years, they are not.

There are, however, other points to mention. Mr. Brown has wisely brought into the table the only other record kept synchronously at an equal or greater height in the British Isles—Ben Nevis, at 4,407 ft. But with Ben Nevis it is necessary to compare some low level station in its immediate vicinity, and we have tabulated the figures for Fort William, corresponding with the dates of the summit minima. Here, on the 12-year mean, we get an average *decrease* for elevation of 9°·3.

There were, in 1866, thermometers at the hut on Snowdon, but they were of poor quality, and we never saw the records of their indications.

The only other high-level readings in the British Isles which we remember, were those made by Dr. J. F. Miller, F.R.S., on Sca Fell Pike, respecting which we reprint his account from the *Phil. Trans.* for 1849 and subsequent years.

"*Temperature on Sca Fell.*—Last summer I stationed a pair of Rutherford's self-registering thermometers (previously compared with a standard) on the top of Sca Fell Pike; they are suspended in a deal box, having the sides and base riddled with small circular holes, so that the instruments are freely exposed to the air, and at the same time thoroughly protected from the effects of terrestrial radiation. On the summit of the Pike is a cairn, or large pile of stones, about 8 ft. in height, having a stout pole in the centre, which projects about 2 ft. above the top of the pile. To this pole the box containing the thermometers is firmly fixed.

"From the maximum thermometer I have never been able to obtain any correct readings, as, from some cause, the steel needle is always found at the extreme end of the stem, furthest from the bulb. I cannot account for this, unless, indeed, the fine steel needle is affected by electrical currents at such an extreme height in the clouds. The readings of the maximum thermometer would, however, have probably been of little value, as it would be almost impossible to protect it from the effect of solar radiation.

"The following are the readings of the minimum thermometer for each month from July to the end of the year 1848:—

"July, 22°; August, 24°; September, 18°; October, —6°; November, —6°; December, —9°, or 41° below the freezing point of water.*

"The lowest extreme in these months, in the Vale of Borrowdale, at 4 ft. above the ground was as under:—

"July, 45°; August, 41°·5; September, 38°·5; October, 29°·5; November, 24°; December, 26°."

In his report for 1849, Dr. Miller said:—

"I regret that my endeavours to obtain the monthly extremes of temperature on the summit of Sca Fell Pike have hitherto failed.

* On the 29th and 31st of January, 1849, the box containing the thermometers was so thickly encased in ice that it could not be opened. The minimum temperature for the month was read off on the 12th of February, being no less than 34° below the zero point of Fahrenheit's scale. This unheard of extreme of cold undoubtedly occurred on the night between the 2nd and 3rd of January, when a naked thermometer on grass, at Whitehaven, fell to + 4°, and one on raw wool to —2°·8. J. F. M.

"The indications for 1849 are apparently so erroneous, that I cannot place any dependence upon them. The instruments are slightly inclined in the box, which is riddled with small circular holes, and it is supposed that strong currents of air passing through them have shaken the thermometers, and caused the indices to descend in the tubes. The instruments are now fastened in the case, and I hope to secure correct readings during the current year."

Finally, in the report for 1850, we have the following statement, with no indication of doubt as to the accuracy of the record:—

"The records of the self-registering minimum thermometer on Sca Fell, in 1850, are as under:—

"January and February, 31° below zero; March, 10° below zero; April, 10° below zero; May, 14°; June, 22°; July, observation lost; August, 9°; September, 7°; October, 7°; November and December, 15° below zero.

"In the valley, the minima at 4 ft. from the ground were: in January, 19°; February, 29°; March, 21°; April, 32°; May, 30°; June, 42°; July, 43°; August, 39°·5; September, 39°; October, 27°; November, 20°·5; and December, 22°.

"I have recently planted a minimum thermometer on the Gabel, and also one near Sprinkling Tarn, at the respective heights above the sea of 2,928 and 1,900 ft., and hope, in future, to obtain regular monthly readings at all the three stations."

We have copied these wonderful temperatures verbatim, instead of putting them in their proper form of "—31°," &c., because Dr. Miller, having used the words "below zero," seems to have desired to exclude all doubt as to the fact.

We do not think that it would be easy to produce evidence more contradictory than that from Glyder fach and from Sca Fell, or a clearer proof of the difficulty of the investigation, and of the desirability of renewed efforts to ascertain the facts.

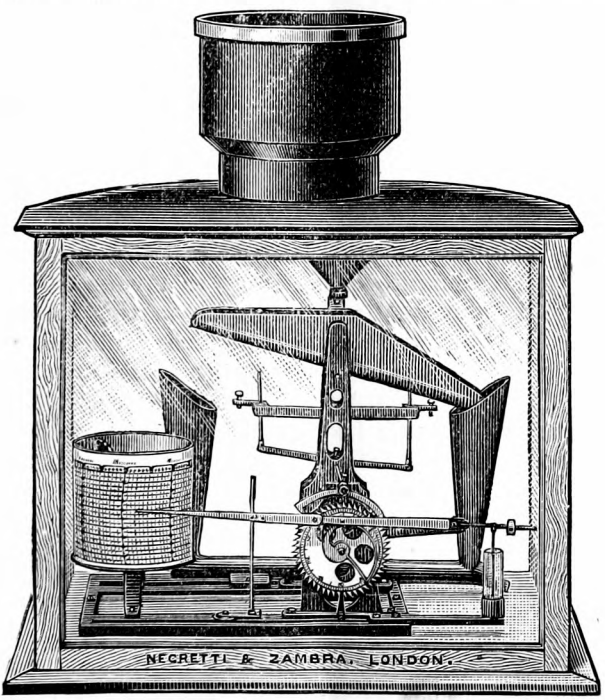
NEGRETTI AND ZAMBRA'S SELF-RECORDING RAIN GAUGE.

It is long since we have seen so simple and yet so efficient an instrument as this.

As a standard for determining the total fall of rain no one detests Crosley's and all mechanical gauges more heartily than we do. We saw with regret that a modified Crosley, with a pretty face, had been brought out. We were sure that it would fail, and have already heard of its having done so. How is it then that holding these views we can approve of this, which is also a modified Crosley?—(1) Because in this pattern every part is visible and easily accessible; (2) Because the two chief faults of a Crosley as a standard instrument, even when in good order, are unimportant in a recording one—viz., (*a*) the loss by evaporation from the bucket of (on the average) half of once its capacity, *i.e.*, with the gauge before us, of ·005 in.; (*b*) the loss during a torrential rain of what falls during the tip.

We have always held that the very best recorder should have an ordinary gauge by its side. We trust the recorders for the distribution of the fall in time and amount; but we take the real total from an ordinary gauge.

Now a brief description of the new pattern. The rain collected by the receiver passes down and falls into the upper half of the vibrating bucket (designed by Sir Christopher Wren). When ·01 in. has fallen, the weight of the water tips the bucket over, and sends the water down one of the ear-trumpet-like shoots. In tipping it falls on and drives down the vertical rod, which, being rigidly connected with the escapement, it advances the wheel one tooth. Attached to the wheel is a helix, on which rests the lever carrying the pen, and thus each ·01 in. raises the pen slightly 0·028 in. As the clock (the useful invention of MM. Richard) is turning the paper about ·001 in. per minute, a very clear curve is produced.



The proportions which we have just quoted, *i.e.*, 1 in. of rain represented by 2·8 ins. of paper, and 24 hours represented by 1·6 ins. of paper, are those adopted in the instrument which Messrs. Negretti sent to us for trial. It is obvious that by varying the size of the buckets and of the funnel and the length of the lever, any scale desired can be obtained. No recorder is known to us which will give minute details of thunderstorm rain, such as would stand high in the list of Heavy Rains in Short Periods in *British Rainfall*. Take, for instance, the first case in *British Rainfall*, 1897, viz., ·19 in. in 3 minutes, *i.e.*,

·01 in. in 10 seconds. There are 86,400 seconds in a day; how many yards of paper would be accumulated daily and yearly if the gauge were required to show every hundredth in the rare case of such a fall as that? It could be done, but no one would like the trouble or the cost of doing it. The scale adopted by Messrs. Negretti & Zambra seems to us a reasonable one; in all ordinary cases, every hundredth of an inch can be read off, and unless the fall exceeds two inches an hour we do not think that there will be the least difficulty in reading off the details.

We hope to place one at Seathwaite, which fact will probably be the best indication of our opinion as to its suitability.

ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, March 15th, at the Institution of Civil Engineers, Great George Street, Westminster, Mr. F. C. Bayard, LL.M., President, in the chair.

Messrs. T. W. Rundell and J. R. Williams, M.B., were elected Fellows.

THE DROUGHT OF 1897–8.

Mr. F. J. Brodie read a paper on "The prolonged deficiency of Rain in 1897 and 1898." For several years past there has existed over England, and especially over the central and south-eastern parts of the country, a remarkable tendency in favour of dry weather. Consequently the dry weather dealt with in this paper came at a very inopportune time, and its effects, which would in any case have been sufficiently evident, were greatly aggravated by the antecedent conditions. Mr Brodie discussed the rainfall records at 80 stations distributed over the British Isles for the 18 months, April, 1897, to September, 1898; these were divided into three periods of six months each.

During the period April to September, 1897, the rainfall was in excess of the average over practically the whole of Ireland, the greater part of Scotland, and the north-west and south-west of England and Wales, while in the north of Scotland, and the central and the whole of the eastern part of England, there was a deficiency, in some parts amounting to between 60 and 70 per cent.

During the period October, 1897, to March, 1898, with the exception of the north-west of Scotland and of England, the rainfall was below the average all over the British Isles, the deficiency over the midland and south-eastern parts of England being from 50 to 60 per cent.

During the period April to September, 1898, two of the six months were exceedingly dry, and in the southern parts of England at least two others had a deficiency of rainfall.

Taking the 18 months, the rainfall over the eastern, midland and southern counties was deficient by about 20 per cent. and in the

south-eastern counties more than 40 per cent., the greatest deficiency being 49 per cent. in London. From an examination of the Greenwich rainfall records since 1841, it appears evident that for length and severity combined, the recent spell of dry weather was the most remarkable experienced there during that period.

A paper on the "Climate of Jersey," by the Rev. H. W. Yorke, M.A., was read by the Secretary. The situation and geological formation of the island, together with the action of the tides, have a great local effect on the general character of the weather. The climate as a whole is bright, genial and sunny.

DR. HELLMANN'S RAINFALL MAP OF SILESIA.

To the Editor of the Meteorological Magazine.

SIR,—I cannot agree with the principles about the construction of maps of rainfall laid down in your review of my *Regenkarte der Provinz Schlesien* (p. 23 of last number).

I am of the opinion that such a map, and indeed all physical maps, should be as clear and as expressive as possible. The topographical details of this class of maps will, therefore, entirely depend upon their scale and special scope.

You suggest the indication of the positions of the 300 stations by small black dots. This could have been done in my map, the scale of which is 1:1250000, for all the stations in the plain—not without obscuring the map, as you suppose—but it would be quite impossible in the mountainous districts, *i.e.*, just in that part where the deepest shades of colour are to be found. In the Giant Mountains there are about 35 stations. If you would put these dot by dot, that part of the map would become one large dark spot and quite illegible.

Your reference to the map of rainfall in the Lake District (*British Rainfall*, 1897,) seems to me not strictly parallel, it being a special map of large scale which contains only isohyets but not shades of colour.

What you desire, the position of all stations and the true mean printed over the site of each station, you can find in a map of rainfall of Silesia, based on observations of five years, and published by Professor Partsch in 1895, the scale of which is larger (1:1000000) than that of mine. Please compare the two maps. I am sure that you will not hesitate a moment in deciding which is clearer and more expressive.

Your second suggestion—viz., to print an outline map in which the position of each station is marked with a number corresponding to the printed table—seems to me much more acceptable I did not do so because I desired to keep down the cost of the map. In publishing the pamphlet—similar ones for the other Prussian provinces are in preparation—it was my aim to offer to the public interested in rainfall work, especially to the farmer and to the engineer, reliable information, in text and in map, of the various

details of the rainfall of his province at a reasonable price. And I hope that I have not failed in this respect; for a pamphlet, royal 8vo, 24 pp., and a coloured map, at the price of *one mark*, is, I think, all that could be desired.

If anyone doubts the exactness of the curves on the map, he has the data wherewith to test them; for the letterpress contains all facts on which they are based, and a large atlas or a special map of Silesia affords the position of the stations.

Lastly, I beg to correct a misunderstanding in the review. Not the "Royal Meteorological Institute of Silesia" has distributed rain gauges to various persons in that province, but the Royal Meteorological Institute of Prussia has done that in Silesia (as well as in the other provinces).—Yours faithfully,

G. HELLMANN.

Reference to our Review will show how favourably we spoke of Dr. Hellmann's work; but as regards the points raised by his letter, we see no reason to alter a word which we wrote, except in as far as additional information is afforded by Dr. Hellmann himself.

In the third paragraph, Dr. Hellmann objects to our suggestion of marking the stations by black dots. A dot 1 mm. square would be amply large. The map occupies nearly 60,000 sq. mm., but as the country is irregular in shape, and there is much margin, we may say that the real area is 30,000 sq. mm.; and as there are 300 stations, evidently if the stations were equably distributed, each mm. dot would have 99 clear mm. around it. But it now appears that the stations are not at all equably distributed, which is just the fact which we wanted to elicit, and we admit that 35 black spots could not be shown on the dark shaded area. We doubt whether they could be shown individually unless the map were on a larger scale.

We have not seen Prof. Partsch's map, but as to Dr. Hellmann's, we wrote: "the coloured map (which is excellent)" . . . What more could we have said?

On the pamphlet which we reviewed there is no reference to price. We thought that it was an official publication, and then, in most countries, the cost does not matter. It is certainly a wonderful shilling's worth. They will have to sell a large edition to pay even the cost of paper and printing.

We did not in the least doubt the accuracy of the curves, but we thought, and think, that some map indicative of the geographical distribution of the stations would add to the value of the paper.

We fully admit the error mentioned in the last paragraph of Dr. Hellmann's interesting letter, but in palliation we reprint the two lines which led to the mistake:—"Im laufe des Sommers 1887 wurde vom Königlichen Meteorologischen Institut in der Provinz Schlesien, &c.' The sentence runs on for five lines, and of course we ought not to have made the mistake, but the word "Preussischen" is omitted—taken for granted, and the absence of a comma after the word "Institut," caused our fall.—ED.

THE POST OFFICE IN 1876 AND IN 1898.

To the Editor of "The Times."

SIR,—When the chiefs of a Government department reverse the decisions of their predecessors in office, and inflict fines upon the public for persisting in the course approved by their predecessors, and when, moreover, on their attention being called to it they refuse either apology or redress, there are three courses open to the aggrieved party. (1) He can put up with it; (2) he can bring an action, but even if he wins he will probably be out of pocket; (3) he can try to enlist the attention of the Press, the public, and Parliament.

I hope that, not for my sake but for the public benefit, as you will see later on, you will allow me to state my case.

About thirty years ago I prepared, for the use of rainfall observers, the form* respecting which the present Post Office officials have reversed the decision of their predecessors, and of which I enclose one taxed as being "of the nature of a letter."

Neither I nor any of my correspondents had the slightest doubt that such a document was entitled to go at the halfpenny rate. Tens of thousands of them did so go, and eventually the question was proved, for in 1876 several of them were taxed. I wrote to the Post Office, they apologized, said that it had been done in error, and should not occur again.

Subsequently, occasionally, if one was taxed I sent it to the Secretary, the taxation was cancelled, the penny was refunded, and I had to sign a receipt for the amount. Doubtless the Post Office hold these receipts, as I hold specimens of the forms with the taxation cancelled by their own officials.

Last autumn, however, when Parliament was not sitting, and most persons were out of town, the Office suddenly changed its mind and has been taxing me 10s. or 15s. a month ever since.

I thought that it was better not to take any action until the principal officers were in town, and then I sent in a memorandum with the necessary documentary evidence as to the change of front.

The result was that the present officials ignored the action of their predecessors, refused any apology or redress, and are so energetic in having all documents coming to me examined and taxed that they recently taxed one bearing the full letter postage. I am keeping it with other postal curios.

The London officials have not yet converted the chiefs of the colonial post offices, and so we have now the further amusing complication that returns coming to me from the colonies and passed by the colonial offices as sufficiently paid are being taxed 3d. each by the London authorities. Whether they send the 3d. to the colony concerned I do not know, but, from my personal knowledge of one of the colonial Postmasters-General, I think that St. Martin's-le-Grand will regret interfering with colonial rights.

* The monthly rainfall forms on which returns are received for the tables in his Magazine.

Of course, I am aware that if I chose to have the information sent to me on a card, instead of on a sheet of paper, the officials would be quite happy; but I do not see why what was right in 1876 was wrong in 1898.

I said that my object in writing is not merely personal, and I wish in conclusion to enquire whether the halfpenny rate is not capable of reduction to common sense.

At present a tradesman sends me an invoice with description and price of goods; that is not "of the nature of a letter." A scientific friend sends me a string of figures without a word of explanation; that is "of the nature of a letter."

What is the money value of the time spent by officials in opening and investigating documents coming to me I do not know, but I cannot see why all this inquisitorial business should not be abolished by the adoption of a common-sense rule which does not pretend to discriminate between commercial and scientific figures, and which is in accordance with what was until lately the practice of the Post Office.

I am, Sir, your obedient servant,

G. J. SYMONS, F.R.S.

62, Camden Square, N. W., March 24th.

[We should not have thought of reprinting the above letter in these pages had it concerned ourselves alone. If no member of either House of Parliament takes the matter up, and if the Post Office is allowed at its own sweet will to declare the same practice at one time correct and at another time incorrect, the responsibility rests not with us but with our rulers. We can either pay the fines or change our forms; but if such practices are to be condoned, a new work is wanted with the late Albany de Fonblanque's title lengthened, "How we are governed [in 1899]." Even that, however, would not justify our devoting space to the subject; but if our correspondents are to be so severely dealt with, it is well that they should know it.—ED.]

REMARKS (*continued from p. 43*).

Adelaide.—Mean temp. 1°·7 above, and rainfall ·13 in. above, the average for 41 years. C. TODD, F.R.S.

Sydney.—Temp. 2°·3 above, humidity 1°·9 below, and rainfall ·36 in. above, the average. H. C. RUSSELL, F.R.S.

Wellington.—The early part generally stormy from N.W., with light rain at intervals; fine in the middle; showery with stormy N.W. wind towards the end. L and T on 4th. Snow on hills on 5th. Rainfall1 ·52 in. below average. R. B. GORE.

Auckland.—Stormy and showery, with prevalence of S.W. winds, and occasional T. Rainfall 1·25 in. above, and mean temp. nearly 1° below, the average for 30 years. T. F. CHEESEMAN.

TRINIDAD.—Rainfall 1·86 in. below the average for 30 years. J. H. HART.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, OCTOBER, 1898.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	TotalRain. Depth.	TotalRain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	71·1	3	40·2	2	60·6	49·0	49·8	86	106·1	33·6	2·96	13	7·0
Malta	84·9	17	55·9	21	76·3	65·4	62·2	75	143·6	55·0	7·78	8	2·7
Cape of Good Hope	79·4	15	44·7	28	67·5	52·2	51·0	76	...	...	2·51	10	2·5
Mauritius	81·0	18*a*	60·0	11	78·7	65·5	61·6	73	134·3	52·6	·53	8	5·0
Calcutta	91·2	3	63·1	29	85·6	72·7	71·4	77	155·7	55·0	6·43	6	4·3
Bombay	94·2	23	76·0	2	90·1	78·2	75·3	75	137·3	66·9	·48	5	2·0
Ceylon, Colombo	90·0	21	72·0	31	86·2	75·0	72·5	83	152·0	71·5	20·60	25	6·9
Melbourne	89·0	26	38·2	5	70·5	49·8	44·5	61	143·1	27·9	1·21	11	5·4
Adelaide	90·7	16	41·8	28	75·9	51·5	45·8	54	152·0	33·2	1·91	10	4·3
Sydney	99·7	19	48·9	2	74·4	57·1	53·7	66	147·1	38·3	3·19	13	3·6
Wellington	75·0	26	37·0	6	60·8	47·7	44·1	69	130·0	25·0	2·85	12	4·1
Auckland	65·0	29	47·5	2, 6	61·2	51·2	47·9	73	130·0	43·0	4·68	19	6·4
Jamaica, Kingston	92·1	4	69·7	11	86·4	73·0	71·6	79	...	...	9·77	17	...
Trinidad	92·0	18	68·0	26	87·9	68·0	71·4	80	167·0	68·0	6·15	20	...
Grenada	86·0	2	71·4	26	83·9	75·2	72·0	77	154·0	...	7·74	24	3·0
Toronto	82·0	3	26·6	28	58·5	43·4	46·5	82	98·8	22·0	5·77	16	6·5
New Brunswick, Fredericton	80·9	4	21·4	19	56·2	37·7	36·5	67	...	...	7·25	13	5·6
Manitoba, Winnipeg	65·8	2	19·0	30	45·0	30·5	...	...	...	...	5·67	16	7·3
British Columbia, Esquimalt	61·1	7	36·0	15	55·8	43·6	..	...	...	...	3·14	12	6·9

a—and 24.

REMARKS.

MALTA.—Adopted mean temp. 69°·6, or 0°·3 above average. Mean hourly velocity of wind 9·2 miles, or 0·2 above average. Mean temp. of sea 75°·3. L on 6 days. At 2 p.m. on 19th a cyclonic TS precipitated hailstones the size of hens' eggs, many measured 2¼ inches in longest diameter. In other parts of the island they crashed through wooden venetians, and pierced corrugated iron roofing. A friend assures me that one mass of ice which fell, an agglomeration of walnut sized masses, congealed together, weighed just over two pounds. Nearly 300 panes of glass were destroyed in this College, and it is estimated that over 1,000,000 panes were destroyed in Valletta and suburbs. The storm centre passed over from N.W. to S.E., the wind gusts being of hurricane force, throwing down walls and uprooting trees. Most of the war ships in harbour were completely stripped of their awnings. A massive stone wall, flanking the botanical gardens at Floriano, was thrown down, for a length of 300 feet. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·3, of dew point 0°·2, and rainfall 1·04 in., below their respective averages. Mean hourly velocity of wind 10·3 miles, or 0·8 below average; extremes, 24·9 on 2nd and 0·0 on 8th, 23rd, and 24th; prevailing direction S.E. by E. to E. by N. The rainfall is the least on record in 24 years, excepting 1878, when ·46 in. fell on 3 days. T. F. CLAXTON.

CEYLON, COLOMBO.—Mean temp. of air 0°·1 below, of dew point 0°·4 above, and rainfall 6·24 in. above, the average. Mean hourly velocity of wind 7·5 miles; prevailing direction S.W. and W. L on 7 days. H. O. BARNARD.

(*Continued on p. 42.*)

RESULTS OF METEOROLOGICAL OBSERVATIONS AT CAMDEN SQUARE FOR 40 YEARS, 1858–97.

MARCH.

YEAR.	RAINFALL.				TEMPERATURE.										CLOUD.
	Total.		Max. Fall.	Falls of 1 in. or +	Dry Mean, 9a.&9p.	Wet Mean, 9a.&9p.	Shade Max		Shade Min		Sun Max. Black.		Grass Min.		
	Depth	Days					Abs.	Aver	Abs.	Aver	Abs.	Aver	Abs.	Aver	Aver
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	in.		in.		°	°	°	°	°	°	°	°	°	°	0-10
1858..	·69	5	·37	0	42·0	39·3	70·1	51·1	24·5	35·0	..	..	..	..	3·8
1859..	1·33	12	·40	0	45·9	43·3	62·6	53·5	27·8	39·9	..	..	..	..	6·4
1860..	1·87	17	·24	0	40·9	38·7	57·8	48·3	25·8	35·4	..	..	23·8	33·2	6·1
1861..	2·43	17	·39	0	43·7	41·1	62·7	52·7	27·8	36·9	..	..	19·9	32·8	5·4
1862..	3·69	20	·86	0	43·5	42·2	62·5	50·0	21·3	37·9	..	..	16·6	35·4	8·1
1863..	·85	9	·22	0	43·4	41·1	65·0	53·5	26·9	35·9	..	..	20·7	30·3	4·8
1864..	2·62	15	·53	0	41·0	39·2	60·5	50·3	26·4	34·6	..	..	19·4	31·8	6·6
1865..	1·12	15	·24	0	36·5	34·8	57·8	45·0	23·2	31·7	..	..	19·2	28·0	6·4
1866..	1·69	17	·40	0	40·8	38·7	65·2	48·9	22·5	35·1	..	..	14·2	29·5	5·9
1867..	2·48	21	·48	0	38·1	36·5	57·1	45·2	25·0	33·2	..	..	22·1	31·0	7·5
1868..	1·28	16	·44	0	44·7	42·2	60·5	53·0	29·2	37·4	..	..	24·4	33·9	6·0
1869..	1·97	16	·55	0	38·1	36·2	54·0	45·5	26·8	32·2	..	..	23·4	30·0	7·2
1870..	2·31	13	·95	0	40·0	37·8	60·5	48·3	23·8	35·5	101·5	80·0	20·8	32·3	7·4
1871..	1·19	12	·37	0	44·6	42·4	68·7	54·7	29·0	37·3	110·0	82·7	26·3	34·2	5·5
1872..	2·66	17	·69	0	44·8	42·8	61·1	53·5	26·1	37·9	101·2	84·1	23·1	34·6	6·1
1873..	1·46	17	·24	0	41·7	40·2	63·7	51·2	29·2	35·6	102·9	79·6	26·8	33·4	6·0
1874..	·39	12	·08	0	43·7	41·7	65·4	53·3	21·9	36·9	109·7	83·8	20·1	34·9	6·6
1875..	·69	11	·28	0	40·8	38·5	59·5	48·3	27·1	35·3	106·2	75·4	25·4	33·3	7·2
1876..	2·96	22	·74	0	41·2	39·1	63·3	48·9	26·4	35·2	104·2	84·0	19·2	31·2	5·4
1877..	2·38	20	·34	0	40·6	38·9	59·4	48·6	23·5	34·9	103·1	81·6	23·0	32·4	7·0
1878..	1·12	10	·50	0	42·1	39·2	58·0	51·0	26·4	36·3	99·2	86·2	19·3	31·8	6·6
1879..	·91	14	·14	0	40·5	38·8	63·1	49·4	29·2	34·8	107·1	78·7	27·4	32·4	6·1
1880..	·79	5	·31	0	43·4	41·3	62·6	54·4	28·7	37·0	111·2	91·3	22·7	32·3	6·0
1881..	2·30	11	·59	0	42·1	39·8	60·3	51·1	23·7	36·1	112·6	87·8	20·8	32·4	6·2
1882..	1·35	11	·67	0	45·0	42·9	63·9	55·5	28·5	38·1	128·7	91·4	25·2	34·0	5·1
1883..	·86	11	·29	0	35·9	34·1	57·0	44·9	22·4	30·4	101·4	81·0	19·3	27·8	5·4
1884..	1·41	7	·56	0	43·8	41·3	68·0	52·7	27·5	37·5	99·8	79·7	23·2	34·1	5·8
1885..	1·65	7	·74	0	39·7	37·1	62·6	49·4	26·5	33·0	105·9	78·7	21·5	28·0	5·4
1886..	1·38	14	·38	0	39·3	37·6	62·2	46·8	22·1	34·1	103·3	72·2	17·3	30·0	6·5
1887..	1·65	12	·37	0	37·4	35·8	57·5	45·8	22·4	32·2	100·4	74·4	17·4	28·4	6·1
1888..	3·34	20	·39	0	38·0	36·4	55·4	45·0	24·7	33·7	92·8	70·6	17·7	29·7	8·2
1889..	1·36	13	·37	0	40·5	38·1	59·6	48·2	19·2	33·8	98·8	77·6	16·4	29·5	7·0
1890..	1·76	14	·48	0	43·2	41·0	66·2	51·1	15·6	36·5	103·7	81·7	12·8	31·6	6·6
1891..	2·01	15	·55	0	40·1	37·7	57·7	47·8	23·7	34·6	101·1	79·4	18·0	30·0	6·4
1892..	1·04	9	·20	0	36·9	34·9	59·8	44·9	22·3	31·0	96·7	75·3	20·3	28·1	5·6
1893..	·32	6	·13	0	44·6	41·6	67·6	56·6	25·9	36·3	103·4	86·9	19·9	30·3	3·1
1894..	1·18	9	·40	0	43·3	40·9	65·8	54·2	28·6	36·0	108·8	88·0	22·1	29·5	4·4
1895..	1·42	14	·38	0	41·7	39·7	63·7	51·0	23·7	35·6	102·6	81·8	22·4	32·2	6·5
1896..	3·20	25	·53	0	45·7	43·4	65·2	53·3	29·4	39·9	103·2	80·5	24·9	34·4	6·9
1897..	3·42	17	·49	0	44·4	41·8	61·7	52·3	26·8	39·2	101·9	82·9	20·5	32·8	6·2
Mean ...	1·71	14	·43	0	41·6	39·5	61·9	50·2	25·3	35·5	104·3	81·3	21·0	31·6	6·1
Ex- tremes	3·69	25	·95	0	45·9	43·4	70·1	56·6	29·4	39·9	128·7	91·4	27·4	35·4	8·2
	·32	5	·08	0	35·9	34·1	54·0	44·9	15·6	30·4	92·8	70·6	12·8	27·8	3·1

SUPPLEMENTARY TABLE OF RAINFALL, MARCH, 1899.

[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..	·38	XI.	Builth, Abergwesyn Vic.	3·27
II.	Dorking, Abinger Hall .	·67	,,	Rhayader, Nantgwillt...	2·70
,,	Birchington, Thor	·88	,,	Lake Vyrnwy	2·97
,,	Hailsham	·95	,,	Corwen, Rhug	2·03
,,	Ryde, Thornbrough	·85	,,	Criccieth, Talarvor	2·04
,,	Emsworth, Redlands ...	·65	,,	I. of Man, Douglas	2·31
,,	Alton, Ashdell	1·11	XII.	Stoneykirk, Ardwell Ho.	2·04
III.	Oxford, Magdalen Col..	·25	,,	New Galloway, Glenlee	5·25
,,	Banbury, Bloxham	·55	,,	Moniaive, Maxwelton Ho.	5·47
,,	Northampton, Sedgebrook	1·26	,,	Lilliesleaf, Riddell	2·92
,,	Stamford, Duddington..	·75	XIII.	N. Esk Res. [Penicuick]	3·25
,,	Alconbury	·54	XIV.	Glasgow, Queen's Park..	3·18
,,	Wisbech, Bank House...	·66	XV.	Inverary, Newtown	6·19
IV.	Southend	·78	,,	Ballachulish, Ardsheal...	7·68
,,	Harlow, Sheering..... ...	·60	,,	Islay, Gruinart School ...	2·60
,,	Colchester, Lexden	·86	XVI.	Dollar.....	3·46
,,	Rendlesham Hall	1·23	,,	Balquhidder, Stronvar...	7·06
,,	Scole Rectory	1·16	,,	Coupar Angus Station...	1·85
,,	Swaffham	1·16	,,	Dalnaspidal H.R.S.....	...
V.	Salisbury, Alderbury ...	·85	XVII.	Keith H.R.S.....	2·23
,,	Bishop's Cannings	·46	,,	Forres H.R.S.	2·58
,,	Blandford, Whatcombe .	·82	XVIII.	Fearn, Lower Pitkerrie..	2·46
,,	Ashburton, Holne Vic...	1·45	,,	S. Uist, Askernish	3·47
,,	Okehampton, Oaklands.	1·41	,,	Invergarry.....	4·82
,,	Hartland Abbey	·92	,,	Aviemore H.R.S.	...
,,	Lynton, Glenthorne ...	2·20	,,	Loch Ness, Drumnadrochit	2·63
,,	Probus, Lamellyn	1·37	XIX.	Invershin	2·64
,,	Wellington, The Avenue	1·05	,,	Durness	6·46
,,	North Cadbury Rectory	·38	,,	Watten H.R.S.....	1·66
VI.	Clifton, Pembroke Road	1·17	XX.	Dunmanway, Coolkelure	4·12
,,	Ross, The Graig	·63	,,	Cork, Wellesley Terrace	1·38
,,	Wem, Clive Vicarage ...	1·13	,,	Killarney, Woodlawn ..	4·69
,,	Wolverhampton, Tettenhall	·97	,,	Caher, Duneske	·93
,,	Cheadle, The Heath Ho.	1·76	,,	Ballingarry, Hazelfort...	1·08
,,	Coventry, Priory Row ..	1·40	,,	Limerick, Kilcornan ...	...
VII.	Grantham, Stainby	·73	,,	Miltown Malbay	2·06
,,	Horncastle, Bucknall ...	...	,,	Gorey, Courtown House	·89
,,	Worksop, Hodsck Priory	·83	XXI.	Moynalty, Westland ...	1·46
VIII.	Neston, Hinderton	·96	,,	Athlone, Twyford	1·63
,,	Southport, Hesketh Park	1·28	,,	Mullingar, Belvedere ...	1·57
,,	Chatburn, Middlewood.	2·93	,,	Woodlawn	1·95
,,	Duddon Val., Seathwaite Vic.	6·63	XXII.	Crossmolina, Enniscoe ..	4·12
IX.	Melmerby, Baldersby ...	1·24	,,	Collooney, Markree Obs.	2·35
,,	Scarborough, Observat'y	2·05	,,	Ballinamore, Lawderdale	...
,,	Middleton, Mickleton ...	1·42	,,	Warrenpoint.....	1·61
X.	Haltwhistle, Unthank...	2·18	XXIII.	Seaforde.....	1·53
,,	Bamburgh	1·83	,,	Belfast, Springfield	2·15
,,	Keswick, The Bank.....	3·55	,,	Bushmills, Dundarave..	2·25
XI.	Llanfrechfa Grange	1·82	,,	Stewartstown	2·49
,,	Llandovery	2·15	,,	Killybegs	5·35
,,	Castle Malgwyn	2·72	,,	Horn Head	2·96
,,	Brecknock, The Barracks	1·35	,,		

MARCH, 1899.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	·50	— 1·11	·19	25	8	61·1	29	19·9	21	18	22
II.		Tenterden	·82	— ·97	·36	25	8	59·5	14	21·0	21	17	23
,,		Hartley Wintney	·76	...	·22	25	7	60·0	30	15·0	22	19	25
III.		Hitchin	·68	— ·66	·24	25	8	60·0	29	18·0	20	21	...
,,		Winslow (Addington)	·70	— 1·02	·19	8	9	62·0	29	14·0	22	20	22
IV.		Bury St. Edmunds (Westley)	1·23	— ·32	·40	25	10	58·0	29	15·0	22	...	...
,,		Norwich (Brundall)	1·99	...	·73	19	17	62·2	11	14·0	21	16	25
V.		Winterbourne Steepleton ...	·73	...	·27	8	12	60·2	15	16·5	23	16	25
,,		Torquay (Cary Green)	·76	...	·37	8	5	60·4	29	26·2	22	9	17
,,		Polapit Tamar [Launceston]..	1·51	— 1·02	·56	8	12	65·5	15	11·5	22	...	19
VI.		Stroud (Upfield)	·89	— 1·30	·50	8	8	60·0	13*a*	21·0	21	15	...
,,		ChurchStretton(Woolstaston)	1·38	— ·75	·53	25	11	62·5	16	21·0	23	11	21
,,		Worcester (Diglis Lock)	·47	— 1·31	·16	19	7	...	..	...	...	...	...
VII.		Boston	·73	— ·81	·25	30	9	62·0	11	20·0	21	15	...
,,		Hesley Hall [Tickhill].....	·91	— ·99	·34	30	12	61·0	13	20·0	21*f*	16	...
,,		Breadsall Priory	1·33	...	·40	25	14	60·0	14	18·0	21	15	26
VIII.		Manchester(PlymouthGrove)	...	...	...	...	...	...	...	...	...	...	...
IX.		Wetherby (Ribston Hall) ..	1·10	— ·96	·48	30	9	...	...	...	...	...	...
,,		Skipton (Arncliffe)	3·49	— 1·61	·93	25	15	...	...	...	...	...	...
,,		Hull (Pearson Park).	1·40	— ·65	·29	20	14	60·0	11*b*	19·0	21	14	21
X.		Newcastle (Town Moor)	1·35	— 1·28	·31	23	13	...	..	...	...	...	...
,,		Borrowdale (Seathwaite).....	9·38	— 1·12	2·91	25	17	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	1·67	— 1·31	·97	25	11	...	...	...	...	...	...
,,		Haverfordwest	2·38	— ·86	·96	25	13	62·8	15	22·1	24	12	21
,,		Aberystwith (Gogerddan) ...	1·67	— 1·31	·84	25	10	62·0	15*c*	...	...	...	...
,,		Llandudno.....	1·18	— ·90	·35	25	11	61·0	16*d*	26·0	24	6	..
XII.	SCOTLAND.	Cargen [Dumfries]	4·84	+ 1·54	1·46	28	10	60·0	17	18·0	24	12	...
XIII.		Edinburgh (Blacket Place)...	2·13	...	·58	25	12	62·9	17	23·5	24	8	14
XIV.		Colmonell	2·91	...	·51	28	16	66·0	17	19·0	23	...	...
XV.		Tighnabruaich	4·81	...	·95	25	17	52·0	14*e*	23·0	21	10	...
,,		Mull (Quinish).....	5·55	+ 1·71	·92	28	21	...	...	...	...	...	...
XVI.		Loch Leven Sluices	3·30	+ ·33	1·10	29	...	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	1·65	— ·75	·40	25	17	62·3	17	20·9	24	11	...
XVII.		Braemar	2·46	— ·18	·30	28	23	63·0	16	3·0	24	16	25
,,		Aberdeen (Cranford)	3·02	...	·65	20	22	60·0	14	14·0	23	16	...
,,		Cawdor (Budgate)	2·56	+ ·52	1·06	29	16	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	2·87	— 1·45	·56	7	10	...	...	..	...	...	...
,,		Glencarron Lodge.....	9·26	...	1·30	31	25	57·0	16	17·0	23	11	...
XIX.		Dunrobin	2·91	+ ·66	·46	28	21	57·0	14	22·0	24	17	...
,,		S. Ronaldshay (Roeberry) ...	2·54	·00	·56	31	26	52·0	16	23·0	21	14	...
XX.	IRELAND.	Darrynane Abbey.....	2·11	...	·65	8	18	...	..	...	...	...	...
,,		Waterford (Brook Lodge) ...	1·62	— 1·28	·43	28	10	64·0	31	22·0	24	9	...
,,		Broadford (Hurdlestown) ...	1·24	...	·38	8	16	..	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	1·21	— 1·16	·41	28	10	...	..	...	...	...	...
,,		Dublin (FitzWilliam Square)	·91	— 1·10	·29	25	12	59·9	31	26·6	22	5	13
XXII.		Ballinasloe	1·94	— ·69	·47	25	17	60·0	16*d*	26·0	23	7	...
,,		Clifden (Kylemore)	5·02	...	1·22	24	17	...	...	...	...	...	...
XXIII		Waringstown	1·71	— ·64	·52	25	9	68·0	18	20·0	23*g*	12	17
,,		Londonderry (Creggan Res.).	2·50	— ·23	·46	25	20	...	...	...	...	...	...
,,		Omagh (Edenfel)	2·35	— ·16	·80	25	16	64·0	16	22·0	22	11	14

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

a—and 29, 30. *b*—and 12. *c*—and 16. *d*—and 17. *e*—and 29. *f*—and 22. *g*—and 24.

METEOROLOGICAL NOTES ON MARCH, 1899.

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 first dry March since 1893, and the coldest weather since February, 1895. Sunny days and cold nights continued half through the month, with very little wind. From 19th to 25th a very cold spell occurred; calceolarias were killed, and apparently bamboo which had stood three winters. Average max. temp. 49°·8, average min. in shade 32°·3, and on grass 27°·4. Duration of sunshine 185 hours, 30 mins. Grass min. 15°·0 on 25th. T on 4th. S on 20th, 21st and 24th.

HARTLEY WINTNEY.—A bitterly cold and dry month. The driest March since 1893. There were only 6 mornings without frost, which in the third week was exceedingly severe, with ice in shade all day long. The temp. on grass fell to 8° on 22nd, destroying all peach, apricot and nectarine bloom. Slight S on 20th and 22nd. Fogs from 11th to 19th. The last week milder, with light S.W. breezes. Ozone on 12 days.

WINSLOW, ADDINGTON.—A dry month with much frost, which was very severe between 19th and 26th, damaging fruit blossom even when protection was given. There was high day temp. from 11th to 16th, which made things more susceptible to the cold which followed. Twice only in 29 years has there been less R in March; viz: ·55 in. in 1892, and ·14 in. in 1893. Fog on 11th, 13th, 14th, 16th and 17th.

BURY ST. EDMUNDS, WESTLEY.—Dry and cold. Several misty mornings. Min. temp. on grass 13° on 22nd. S on 20th, 21st and 22nd.

NORWICH, BRUNDALL.—Dry and mild to the 17th, followed by an exceedingly cold week from 18th to 25th, with S daily; that on 19th yielding ·73 ins., and being 8 inches deep on the level. Milder from 25th to the close. At Norwich on 20th at 1.2 p.m. a sharp flash of L, and long rolling peal of T occurred during a storm of S and H. The min. temp. on grass fell to 9°·4 on 21st. S on 7 days. H on 9th and 18th.

WINTERBOURNE STEEPLETON.—A very dry month, and until the last week the temp. was very low. In the three months of 1899 the mean temp. has retrograded, that for January being 42°·0, February 41°·7, and March 40°·7. The week ending March 25th was much the coldest this year, the mean being 31°·7. H on 8th. S on 21st and 23rd.

TORQUAY, CARY GREEN.—R 1·79 in. below the average. Mean temp. 44°·3, or 0°·3 above the average. Duration of sunshine 192 hrs. 5 mins., being 48 hrs. 55 mins. above the average.

POLAPIT TAMAR [LAUNCESTON].—The wind in the earlier part of the month kept in the N. or E., and it was fine up to the 8th, with more or less fog in the mornings. S and H fell on 8th, followed by generally fine weather till 21st, when it became wintry, and the 22nd was the coldest morning of the year, the temp. on grass falling to 10°. The latter part of the month was dull, damp and warm. Fog on seven days. S on 20th, 22nd and 23rd.

WOOLSTASTON.—A very cold month, with constant frosts till the last week, when it became genial and spring-like. S fell lightly on 4th, 21st and 22nd. Violent storms of H on 9th. Mean temp. 42°·2.

BREADSALL PRIORY.—Very cold and dry generally. S on 19th, 20th and 21st. Fog on 15th and 16th.

WALES.

HAVERFORDWEST.—The weather up to the 20th was fine and generally sunny, with keen frosts at night; unusual heat occurring on several days, notably the 15th. On the morning of 20th S began to fall, and the Precelly range was covered for 5 days; while on 21st the whole district was covered by from 3 to 4 inches of S. No such severe weather has occurred here since the great frost of February, 1895. Heavy R fell on 25th, and it continued rainy, stormy, and mild till the end.

GOGERDDAN.—Very changeable. From 5th to 17th it was unusually hot for March, while on 21st six inches of S fell after severe frost in the night.

SCOTLAND.

CARGEN [DUMFRIES].—The meteorological feature of the month was the remarkable variation of temp. After a period of unusual mildness (the mean temp. of the 8 days, 11th to 18th almost reaching 46°) the temp. suddenly fell and bitterly cold weather accompanied by sharp N.E. wind set in continuing till 25th, for which time the low mean of 32°·7 was recorded. Notwithstanding the coldness of these 7 days the mean for the month is nearly 1° above the average. The R is largely in excess of the average, but more than half the total fell on 25th and 28th. Prevailing winds N.E. S on 4th. Duration of sunshine 11 hours above the average. The frost and wet weather were unfavourable for sowing corn, and pastures made little growth.

EDINBURGH, BLACKET PLACE.—The mean temp. of the week ending 26th, was 32°·6 or 8°·6 below the average. The only colder week so far on in the season during the last 42 years, was that ending March 29th, 1879, with a mean temp. of 32°·0. Absolute drought from 9th to 23rd inclusive. Soft H on 19th and 22nd. Solar halo on 10th.

COLMONELL.—R ·46 in. below, and mean temp. 2°·6 above, the average of 23 years. S on 19th, 21st and 24th.

TIGHNABRUAICH.—More of a winter than a spring month. The ground cold and wet.

ABERDEEN, CRANFORD.—The first part of the month was fine and mild, but the weather changed on 17th, and on 18th there were strong winds from N.N.W. with S showers and between 20th and 21st a heavy fall of S.

S. RONALDSHAY, ROEBERRY.—A rough cold month. S from 18th to 27th inclusive. Mean temp. 38°·3 or 1°·1 below the average of 9 years. Mean max. 43°·3, mean min. 33°·2.

IRELAND.

BROADFORD, HURDLESTOWN.—A curious March. Some days were hot as any in July and others were very cold. Rainfall ·89 in., and rainy days one, below the average of 14 years. H on 7th. S on 20th, 21st and 22nd.

DUBLIN, FITZWILLIAM SQUARE.—A dry and generally favourable month. From 12th to 19th conditions were anticyclonic and the diurnal range of temp. was large. Mean temp. 45°·1 or 2°·0 above the average. Fog on 4 days. High winds on 9 days, reaching the force of a gale on 28th and 29th. S or sleet on 5 days. Solar halos on 26th and 27th, and lunar halos on 19th and 24th.

OMAGH, EDENFEL.—Up to the 18th, with but little intermission, the weather was remarkably fine, the third week being especially brilliant, culminating on 16th in a max. temp. of 64°, the highest ever recorded so early in the season; but on 19th there followed the inevitable rebound to cold, harsh, unsettled and snowy days, and keen, frosty nights; the month terminating with heavy rains and close, humid atmosphere.

SYMONS'S

MONTHLY

METEOROLOGICAL MAGAZINE.

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OBITUARY.

[THE rules which govern notices under this head, seem to be imperfectly known, and this has led to expressions of surprise, that our recent heavy losses of valued rainfall workers have not been noticed. Within a few weeks or months we have lost the Rev. Canon Du Port, Miss E. Brown, and three of the few remaining contributors to English Rainfall, 1860, viz., Hale Wortham, the Rev. Canon Slatter and Mr. Prince.

The explanation is that this Magazine is Meteorological, not merely rainfall, that a portion of *British Rainfall* has for many years been appropriated to notices of deceased observers, and that, greatly as we regret and suffer by such losses as those above mentioned, we consider that the rainfall volume is the place in which they should be recorded. This *Magazine* is so small that notices in it must be rare, and awarded only to those who, as authors, inventors, or directors of important systems, have contributed to the advance of the science of Meteorology. No one appreciates, more highly than we do, the services of the rank and file of meteorological observers, but the army is so large that we can notice fully, only the leaders.]

Charles Leeson Prince. Mariano de la Bárcena.

In Mr. Prince we have lost one who has been our fellow worker for more than 40 years, whose records cover nearly 60 years, whose publications give far and away the best information as to the climate of Sussex, and who proved his interest and ability, in matters meteorological and classical, by preparing and gratuitously distributing the best English translation and best bibliography in any language of the Διοσημεία of Aratus.

Signor Mariano de la Bárcena has held the distinguished appointment of Director of the Central Meteorological Observatory of Mexico, for the long period of 22 years, in fact he must, we believe, be regarded as the founder of the Mexican Meteorological Service.

OZONE.*

THE large volume, which has led to the preparation of this article, is composed of the series of reports submitted by the author to the Royal Society of Public Health of Belgium, from their commencement in 1886 to the end of 1896.

There is not that summary of the ten years work which we should have liked to see, but on the other hand, there are many very useful and sensible remarks scattered through the reports. Perhaps the best part of the literary matter (we have not attempted to analyse the 200 or 300 pages of tables) is an article of 17 pages with the title "*L'Ozone Atmosphérique et l'Ozonométrie en Belgique; résumé de six années d'observations 1886-91.*" M. Van Bastelaer seems to hold precisely the view which has repeatedly been expressed in this Magazine, that, granting all that opponents may allege as to the want of accuracy of Schönbein's original method, granting even that the papers are acted upon by other agents than ozone, it is better to improve the method as much as possible, and adopt it, rather than do as some advise, (and as 9 observatories out of 10 practice) viz., neglect the subject *in toto* because it cannot easily be done perfectly.

Even if it be true that Ozone papers do not indicate the presence of Ozone—we should still urge that a record of their discolouration should be kept—*Because* we know of no equally simple and trustworthy indication of the freshness of the atmosphere.

On this point we translate an interesting passage in M. Van Bastelaer's report.

"Perhaps I may be permitted to quote this subject of Ozone as one more proof that, frequently, new discoveries are merely the expression in scientific form of facts long known to everybody, but expressed in a different manner.

The ordinary citizen does not know the word ozone, but when ozone is abundant he says that 'the air is fresh'—Take the following remarks:—

Send the children into the country to get some fresh air.

Mountain air is always fresh.

Sea air is always good.

There is no freshness in the air of towns, houses and rooms.

Country air is a disinfectant, and whitens the linen, especially in April and May.

Fresh air bleaches clothes and ivory, and is life-giving to human beings.

Other things being equal, the conditions named above, are precisely those in which the maximum of coloration of ozone papers takes place,—and in all the above remarks it is merely necessary to

*Mémoires d'Ozonométrie. Observations et Rapports par D. A. Van Bastelaer. Directeur du service ozonométrique de la Société royale de médecine publique de Belgique. Bruxelles 1897, 8vo.

substitute the word 'ozone' for the words 'fresh air' to make the statements scientifically accurate."

Conclusions. Although at individual stations the amount of discolouration varies greatly from day to day, the means remain very steady from month to month and from year to year. Some places, especially Flanders and the neighbourhood of the Ardennes, have constantly much higher means than others, information as to which may be useful to medical men.

The author prints the mean for each station for each 5 days throughout the year. This he does apparently in the hope that some one will compare these figures with the number of deaths registered. But we find few instances of such workers arising, and think that, if it is to be done, it will probably fall to the lot of M. Van Bastelaer, and he could work just as well from MS., as from print. If the mass of printing given at present were reduced to a sixth, as it would be if *monthly* averages were given, (instead of the present penthemerals), the cost would be so much reduced that summaries and maps of great interest could be given, and then the records could be submitted to close scrutiny, and careless observers detected.

It seems to us that the author is allowing himself to be buried under the mass of data sent in, whereas his duty is to keep well above it, and to give the broad general features arrived at.

But, that his work should be stopped because the papers do not give absolute precision, or because the statistics of ozone and of disease and death have not yet been rigorously compared, seems to us very absurd. M. Van Bastelaer says with justice, "Compare the ozone records from my 150 observers with the statistics of disease and death, if a relation exists let me go on, if there is no relation then my work should be stopped." We decline to believe that this reasonable proposal was rejected.

WHIRLWIND AT WORSTEAD, NORFOLK, MARCH 20, 1899.

[Having heard of damage by a whirlwind in the north of Norfolk, we wrote to Mr. A. W. Preston (who has kindly continued the collection and publication of rain returns so long carried on by the late Canon Du Port), asking him for particulars. Fortunately, our observer at Worstead was an eyewitness and has favoured us with the following description, and a map which it hardly seems worth while to engrave. Worstead is 11 miles N.N.E. of Norwich and 6 miles S.S.W. of the Norfolk coast; about 52° 47′ N. and 1° 24′ E. The track was about 2 miles long, starting from a little E. of N. and ending slightly W. of S. Mr. Cross was driving from N.W., and therefore not far from at a right angle to the path, and not a quarter of a mile from it.]

About 12.20 noon I was driving from North Walsham and saw a large column of snow being raised from the ground and whirled about. Not only were the motions vertical and horizontal, but the snow was being driven in every possible direction. The wind was N. but very light, and no snow was falling at the time. The height of the column was about 30 yards and its diameter between 12 and 15 yards. Its rate of progress was not more than 30 miles per hour. In its track the snow was heaped in ridges or wreaths. Owing to the noise made by my trap I did not hear any sound, but persons living in the vicinity of its course compared the noise to distant thunder.* It was immediately followed by a very heavy fall of hail, some of the stones measuring upwards of one inch in circumference.

The first actual damage appeared to have occurred to a cottage on the White Horse Common, from the roof of which some tiles were stripped. No other buildings stood in its track until it reached Withergate, where it stripped some tiles off the roofs of two cottages and lifted the wood top from a well of water (the top would weigh roughly about 1 cwt.); it then crossed the road to Bunn's Farm, where it struck a corn stack and sent the thatch and corn flying in all directions. Beyond this place I can find no trace of it.

ROBERT CROSS.

Worstead.

WEATHER AT KLONDIKE.

"In the 'Klondike Number' of the *National Geographic Magazine*, (April), General Greely has collected, in a brief article, what little is known about the climatic conditions of the Klondike district. The observations of most interest are those made at Dawson between August, 1895, and November, 1896. From December 1st, 1895, to February 1st, 1896, the temperature fell below zero every day. It was below —40° on 28 days; below —50° on 14 days, and below —60° on 9 days. In 1896, the January mean was —40°·7, and the February mean —35°·4. Bright weather is the rule in winter, and from October 1st, 1895, to May 1st, 1896, snow fell on only one day in seven. During June, July and August, 1896, the temperature rose above 70° on 29 days and above 80° on 3 days. July was the only month in which the minimum did not sink below freezing point. In June it rained on 12 days. Observations at Fort Reliance, near Dawson, gave the following means: December, 1880, —31°; January, 1881, —7°; February, 1881, —29°. The thermometer registered between —40° and —66° on 35 days. Snow fell on but one day in February, and 25 days were perfectly clear."—*Science, New York.*

* Very probably it was T, partly because H is said to have followed, and partly because Mr. Preston reports that at Norwich there was a snow and hail storm and, at 1.2 p.m. one vivid flash of L, followed almost immediately by a long rolling peal of T, and also that at 1.30 p.m. a peal of T was recorded at Brundall, about 10 miles S. of Worstead.

WINTER MINIMA ON BRITISH MOUNTAIN TOPS.

To the Editor of the Meteorological Magazine.

SIR,—In reading of the extraordinary minimum temperatures recorded by Dr. Miller on Sca Fell, it occurred to me that the results were due to his minimum thermometer not being rigidly fixed, and so being liable to be shaken by wind. I have found that if an ordinary standard minimum thermometer be simply hung up horizontally on projecting screwheads, in a thermometer screen (Royal Meteorological Society's pattern), without being fixed perfectly fast, it is invariably shaken during severe gales, and the index moved downwards towards the bulb, thus giving an incorrect minimum. I have known an error of 10° or more due to this, my screen being unavoidably placed in a very windy spot, the only one available. I now always wedge fast my thermometers. If this can occur in a standard screen in my garden at Ilkley, why should not Dr. Miller's thermometer, "suspended in a deal box having the sides and base riddled with small holes," have been similarly affected on the summit of Sca Fell Pike, perhaps the windiest spot in England? I think that the above may explain how such remarkable results were obtained.

We know that although there is usually a fairly uniform reduction of temperature for increase in altitude, the reverse is often the case during calm, clear nights (especially during anti-cyclonic conditions in winter), at any rate up to a moderate elevation, say to 3,200 or 4,400 ft., the limit in height of English and Scotch mountains. In fact we find that the absolute yearly minima observed in our lowlands are often actually *lower* than those on our mountains. The minima on mountains frequently occur during more or less windy, unsettled weather, when the temperature is relatively high below. Our British mountains would probably have to be about 1,000 ft. higher (say a total of 4,000 to 5,000 ft.) before an elevation was reached at which the absolute yearly minima would be always lower than in the plains.

Yours truly,

ALBERT WILSON.

Eaton Road, Ilkley, April 25th.

[Although Dr. Miller reported that the thermometers were "*fastened* in the case," we insert this letter for two reasons, (1) because it is by no means improbable that the case itself vibrated considerably, and may thus have caused the error, and, (2) because it is not on Sca Fell only that observers need be watchful that vibration does not cause sensational minima.—ED.].

EXCESSIVE TERRESTRIAL RADIATION.

To the Editor of the Meteorological Magazine.

SIR,—I enclose register of the excessive terrestrial radiation during the last nine days, due to the *very* dry air and clear cloudless skies at night. I have three exposed thermometers, two close together and the third 4½ feet away. The former read practically the same, the mean difference being only 0°·05, and the greatest 0°·4, and it is the readings of one of these two that I give. The third reads somewhat higher—the mean difference 0°·6, and greatest 1°·6. They are all delicate thermometers, with bifurcated bulbs, and are examined after every observation to see that no spirit is condensed at the top, and they are often tested either with a standard in water or in melting snow when there is any.

I give also all the previous readings as low as, or lower than, 4°·6 since I began in April, 1882, and the only previous occasion on which, for five consecutive days, the readings were below 10°, namely in February, 1895, when, however, the screen readings were much lower than on this occasion.

	Screen.	Grass.	Difference.
	°	°	°
Mar. 19, 1899	26·9	13·3	13·6
,, 20, ,, ...	28·9	13·1	15·8
,, 21, ,, ...	22·3	5·8	16·5
,, 22, ,, ...	23·1	7·3	15·8
,, 23, ,, ...	23·1	5·6	17·5
,, 24, ,, ...	23·0	4·6	18·4
,, 25, ,, ...	27·2	8·6	18·6
,, 26, ,, ...	41·5	24·3	17·2
,, 27, ,, ...	40·0	21·4	18·6
Means ..	28·4	11·5	16·9
Dec. 15, 1890	18·0	4·5	13·5
Jan. 19, 1891	14·3	2·3	12·0
,, 10, 1892	20·2	4·0	16·2
,, 11, 1895	14·9	2·6	12·3
Feb. 5, ,, ...	18·6	8·1	10·5
,, 6, ,, ...	12·6	3·3	9·3
,, 7, ,, ...	14·4	7·6	6·8
,, 8, ,, ...	15·3	8·1	7·2
,, 9, ,, ...	13·8	0·6	13·2

The lowest reading in any previous March :—

Mar. 7, 1886	21·9	6·5	15·4

Yours very truly,

R H. BARNES.

Heatherlands House, Parkstone, Dorset, 27th March, 1899.

P.S.—Now that March is complete, I send you the means of minima in screen and on grass for March, 1899, showing the remarkable difference of 14°·7 :—

Mean minima in screen	34°·1
,, ,, on grass.....	19°·4
	14°·7

The greatest difference I have previously recorded has been 11°·5, on two occasions:—

	March, 1893.	April, 1898.
Mean minima in screen	37°·5	38°·6
,, ,, on grass	26°·0	27°·1
	11°·5	11°·5

R. H. B.

April 1st.

BOTANY AND METEOROLOGY.

[The following two notes have been submitted recently to the Scientific Committee of the Royal Horticultural Society, and will probably be of interest.]

FLOW OF SAP IN A SYCAMORE DURING FROST.—Mr. T. R. Bruce, The Old Garroch, New Galloway, sent the following communication:—"I noticed icicles hanging on a newly-cut branch during the whole of last week, and steadily increasing, although the mean temperature of the week was only 30°. The mean temperature of the 24th of March was only 25°·7. The cut branch would be about half an inch in diameter, and some pounds weight of icicles, or pints of sap, have flowed out during the week, and it still continues to flow. The maximum and minimum temperatures were as follows:—

19th.....	42·5	21·0	23rd.....	37·5	21·5
20th.....	42·5	23·0	24th.....	40·0	11·5
21st.....	38·5	15·0	25th.....	43·0	23·0
22nd	38·0	21·5			

EFFECT OF LIGHTNING ON AN OAK.—A specimen received from Dr. Plowright, of Lynn, showed how oak wood is sometimes torn into longitudinal fibres by electricity. "The trunk from which this specimen was taken was that of a tree grown in East Anglia, and purchased for timber by a timber merchant in King's Lynn, from whose wood yard it was obtained. The amount of injury was comparatively slight, consisting only of a groove cut from top to bottom of the trunk, about 2 inches wide, and extending only a very short distance into the woody tissues, but tearing them up longitudinally into strips several feet in length."

A MONSTER METEORITE.

A VALUABLE addition to the treasures of the Meteorological Section of the British Museum, is on the way from Australia. This is what is known as the "Bruce" meteorite—a monster stranger from the skies, weighing close upon four tons. It has had an interesting career. Where it came from of course no man knoweth, but it fell at Murrangeng, in South Australia. Mr. Bruce, who now lives in Scotland, bought it for £2 of a farmer (who had no use for

meteorites), for the purpose of presenting it to the British Museum. The Government of Victoria interested itself in trying to retain the curiosity, and offered Mr. Bruce £1,000 for his rights, but the Scotsman replied that "money would not buy it"; so the article is now on the way over. It is composed of almost pure iron, and is said to be the most rare specimen of its sort in the world, though as to weight and composition it does not beat the forty-ton meteorite, said to have been discovered by Sir John Ross in Greenland, in 1818. Another celebrated meteorite, the "Cranbourne," found in 1865 in Australia, which has been in England, has been re-purchased by the Colony, and returned.—*Grantham Journal*, January 7th, 1899.

[We never previously heard of the "Meteorological Section of the British Museum," but we are aware of the excellent specimens of meteorites in the Natural History Museum at S. Kensington, and are very glad that so large a one is to be added to the collection. ED.]

REVIEW.

Les bases de la Météorologie dynamique, Historique, État de nos connaissances par M. le Prof. Dr. H. H. HILDEBRANDSSON, Directeur de l'observatoire Météorologique d'Upsal, et M. LEON TEISSERENC DE BORT, Directeur de l'Observatoire de Météorologie dynamique, Trappes, Paris. 1re livraison. Gauthier Villars, Paris, 1898. Large 8vo, 60 pp., maps and engravings.

WE should have noticed this interesting paper earlier, but as our copy was marked "Probeshefte" we were not sure that it would be agreeable to the authors. As we see that a copy has been presented to the *Soc. Mét. de France* we regard the restraint as removed, and have pleasure in calling the attention of our readers to the paper.

We cannot give a better idea of the work than by quoting the head lines of the chapters of the Part now before us, and of those to follow.

PART I.

Early workers—Halley, Hadley, Dove, Maury.
Early researches on Tropical storms—the circular theory.
Early studies of the storms of the temperate latitudes—Centripetal theories of Brandes, Espy, and Loomis.

PART II.

Cyclonic storms in Europe—Organization of the International Meteorological service—Le Verrier, FitzRoy, and Buys Ballot.
Standard works in the various countries (1865–72). Buchan, Jelinek, Mohn, Hildebrandsson, Clement Ley, &c.
On the distribution of vapour in the atmosphere. Le Roy, Dalton, &c.

PART III.

Normal distribution of meteorological elements on the surface of the globe—Maps indicating the distribution of temperature, pressure, wind, rain, and cloud.
Distribution of meteorological elements around areas of maximum and of minimum pressure.

If the subsequent parts equal the first (and we do not doubt that they will) the volume will be a very pleasant, useful and interesting one.

There is one point only on which we think that the authors have been misled—they attribute the use of the word "Horn" by Piddington—*The Sailor's Horn-Book of the law of Storms*—to the two engraved transparent slices of horn which are in pockets in the covers of the book to enable readers to trace the positions of the centres of storms. The real origin of the term is interesting as a link with very early times—the very infancy of printing and (we might almost say, in this country) of learning. Horn-Books were, we believe, rather slabs than books, pieces of board on which the alphabet, and a few simple words printed upon paper, were placed, and then covered with thin horn to prevent their being dirtied or torn. The word "Horn-Book" is therefore synonymous with "Primer," something very easily understood, and, as the preface shows that that was Piddington's aim, his use of the word is fully explained.

ROYAL METEOROLOGICAL SOCIETY.

THE SOCIETY'S NEW HOME.

NOBODY probably, can explain why the English Government helps the great Scientific Societies, and does not help the little ones. THE ROYAL, THE SOCIETY OF ANTIQUARIES, THE ROYAL ASTRONOMICAL, THE LINNÆAN, THE GEOLOGICAL and THE CHEMICAL (several of them, be it noted, not "Royal" Societies), are provided with sumptuous quarters (in several cases with residences for the officials), free of rent and taxes. THE ROYAL METEOROLOGICAL, and others that we could name, are left to pay rent, rates, &c., in an expensive part of the metropolis, where alone their offices would be generally accessible.

The Royal Meteorological Society is no *protégé* of the Government: all that it has, and all that it does, it owes to its Fellows, past and present, and though it has not the help extended to the other Societies which we have named, it has something which the Fellows, being mostly Britons, esteem highly—absolute independence. Moreover the Society may well be proud of the work which it has done, and of the rooms now available for the use of the Fellows.

Until 1872 the Society had no rooms, and a few books in boxes at the President's and Secretary's houses represented the library. Then it took *one* room (if we are not mistaken) on a top floor in Great George Street, the books were collected, and a few shelves were prepared to hold them. After a few years a second room was obtained, then came an increase in the staff. Still more space for the rapidly growing library, and for additional assistants, was necessary, and the Society took the second floor of 22, Great George Street. The Council secured a lease of these premises, fitted them

up, plainly but comfortably, and hoped to continue there for many years. The site being exceptionally advantageous, because it was very handy (i.) to the many Fellows who are Engineers and whose offices were closely adjacent; (ii.) to the Institution of Civil Engineers, the Council of which has for nearly a quarter of a century gratuitously allowed the Royal Meteorological Society the use of their Meeting Room.

All this has been swept away by the Government Act which appropriated the site, and which was followed by the formal notice of ejectment. Of course, the Society claimed compensation, but it is an expensive luxury to fight a Government department, and the Society had to abate its claim, and to seek new quarters. These were exceptionally hard to find, for the wholesale clearance of surrounding property compelled hundreds (who all wanted to be near their old places) to compete for everything available. So the Society has had to move nearly to the Victoria Station end of Victoria Street, more than half-a-mile W.S.W. from its old rooms.

However, there was no help for it; and, as the Fellows will see on May 16th, the new rooms are more lofty and more spacious than the old. The contrast between the bare top room, single-handed worker and few shelves of 1872, and the handsome suite of rooms, four assistants and thousands of volumes of 1899, shows what Englishmen will do, whether their Govermnent help them or not.

The monthly meeting of the Society was held on Wednesday evening, April 19th, at the Institution of Civil Engineers, Westminster, Mr. F. C. Bayard, LL.M., President, in the chair.

Mr. W. H. Butlin, B.A., was duly elected a Fellow of the Society.

Earth Temperature.

Mr. H. Mellish, F.R.Met.Soc., read a paper on "Soil Temperature," in which he discussed the observations which have been made at the stations of the Royal Meteorological Society, with thermometers, at various depths in the soil. These records have been carried on at many of the stations since 1881, and at one or more of the following depths: 3 inches, 6 inches, 1 foot, 2 feet, and 4 feet. It appears that at nearly all stations the annual temperature, at a depth of 1 foot, is slightly higher than that of the air. In winter the air and the soil at 1 foot have about the same temperature, the soil being often a little warmer till about the end of January, after which, for the next two months, the air has a small advantage; but in the summer months the soil at one foot is generally warmer than the air, the difference at several stations exceeding 3°. Mr. Mellish shows that on the mean for the year, light soils are 1°·0 warmer than the air, while the strong ones are only 0°·2 warmer; and he is of opinion that near the surface we may expect to find wider extremes of temperature in light soils than in strong ones; but that as the heavier soils are better conductors of heat than light ones, extremes of temperature are propagated to greater depths in heavy soils than in light ones.

RESULTS OF METEOROLOGICAL OBSERVATIONS AT CAMDEN SQUARE FOR 40 YEARS, 1858–97.

APRIL.

YEAR.	RAINFALL.				TEMPERATURE.										CLOUD.
	Total.		Max. Fall.	Falls of 1 in. or +	Dry. Mean, 9a.&9p.	Wet. Mean, 9a.&9p.	Shade Max		Shade Min		Sun Max. Black.		Grass Min.		
	Depth	Days					Abs.	Aver	Abs.	Aver	Abs.	Aver	Abs.	Aver	Aver
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	in.		in.		°	°	°	°	°	°	°	°	°	°	0–10
1858..	2·90	10	·75	0	46·4	43·6	79·9	58·9	27·1	39·3	..	..	..	..	5·8
1859..	2·61	16	·44	0	47·0	43·8	78·5	56·4	24·5	38·1	..	..	..	..	5·9
1860..	1·45	13	·39	0	43·2	40·4	66·2	53·8	27·9	35·3	..	..	21·4	31·8	5·6
1861..	1·30	6	·46	0	44·9	41·9	64·8	56·2	27·8	35·9	..	..	19·6	30·9	5·6
1862..	2·30	15	·67	0	49·4	46·3	73·5	57·7	27·1	41·8	..	..	19·4	37·7	6·1
1863..	·52	7	·14	0	49·6	46·1	70·2	60·9	28·8	40·6	..	..	23·0	36·3	4·6
1864..	·82	4	·47	0	48·6	45·1	75·9	60·3	33·2	40·1	..	..	27·3	36·8	5·5
1865..	·33	5	·11	0	51·6	48·1	81·4	67·7	32·6	42·4	..	..	26·8	37·7	3·6
1866..	1·76	13	·74	0	48·5	45·3	79·4	58·5	33·8	41·4	..	..	26·8	36·1	5·4
1867..	2·36	21	·43	0	50·2	47·1	66·4	59·0	30·8	43·2	..	..	25·4	39·4	7·0
1868..	1·50	12	·66	0	48·8	45·7	68·8	59·3	30·5	41·1	..	..	24·0	37·0	7·0
1869..	1·28	8	·41	0	51·3	47·7	78·5	62·9	28·6	42·1	..	..	24·5	38·7	6·7
1870..	·47	6	·12	0	49·1	44·6	79·4	62·8	26·7	38·3	121·4	106·0	22·3	33·8	4·3
1871..	2·84	18	·71	0	48·2	45·7	66·0	58·1	28·3	41·6	122·0	96·5	24·9	38·9	6·2
1872..	1·39	16	·31	0	49·2	46·0	70·2	60·1	29·4	40·4	113·4	101·0	26·2	36·8	5·2
1873..	·55	11	·11	0	46·3	43·1	75·5	57·7	29·9	38·8	115·8	96·2	26·6	34·6	5·6
1874..	1·26	11	·33	0	50·4	47·0	79·2	61·9	32·7	42·1	121·6	100·5	28·9	38·8	5·2
1875..	1·53	10	·66	0	46·8	43·3	74·0	58·3	29·3	38·0	118·8	94·5	25·9	35·8	5·5
1876..	1·90	11	·37	0	47·7	44·9	71·1	57·5	30·7	41·5	117·2	96·2	25·4	36·3	6·2
1877..	2·59	16	·66	0	46·1	43·8	64·0	54·9	33·4	40·7	111·0	88·6	30·2	38·4	7·1
1878..	4·97	16	2·56	1	48·0	45·8	69·4	58·7	27·2	40·9	117·0	97·0	20·8	35·9	5·7
1879..	2·72	16	·53	0	43·6	41·3	61·7	53·1	26·8	37·2	117·6	92·5	24·7	34·3	6·9
1880..	2·15	17	·73	0	47·4	44·2	67·4	57·0	34·3	40·9	120·2	100·4	28·6	36·7	6·6
1881..	·46	9	·21	0	45·7	42·2	67·8	56·9	27·8	38·2	120·5	103·0	23·8	33·6	6·4
1882..	2·83	14	1·08	1	48·0	44·7	65·5	58·2	32·6	40·8	116·6	99·6	27·4	35·9	6·4
1883..	1·56	9	·60	0	47·0	43·3	68·9	58·7	29·3	38·9	111·6	94·2	24·7	35·7	5·7
1884..	1·02	14	·36	0	45·6	42·4	68·4	54·9	29·9	37·8	107·0	87·6	26·5	34·2	6·3
1885..	2·32	11	·79	0	47·5	43·9	72·8	58·4	29·3	39·7	112·8	92·6	22·3	33·8	5·6
1886..	1·22	15	·30	0	46·2	43·1	69·6	56·9	32·2	40·1	108·7	92·3	25·8	35·6	5·5
1887..	1·41	10	·30	0	43·2	40·5	68·2	55·1	26·2	36·4	113·4	94·2	21·8	31·6	5·3
1888..	2·37	13	·66	0	43·3	40·8	64·8	52·4	27·7	37·1	111·1	90·0	20·1	32·4	6·9
1889..	2·06	20	·35	0	45·4	43·1	63·9	54·4	32·4	39·5	104·4	88·7	25·1	35·8	6·7
1890..	2·02	16	·54	0	45·7	42·5	64·3	54·9	30·5	38·7	110·9	92·3	23·2	33·9	5·9
1891..	1·13	9	·46	0	44·5	41·2	66·3	53·7	28·1	36·6	111·3	87·9	21·9	30·4	6·1
1892..	·99	9	·27	0	46·3	42·0	73·0	59·6	28·2	36·8	118·7	100·4	21·7	30·2	3·2
1893..	·24	3	·20	0	49·8	45·2	78·2	65·6	30·9	40·4	117·8	101·9	25·2	37·0	3·1
1894..	1·74	14	·58	0	50·4	47·1	73·3	61·2	34·5	42·5	116·6	96·0	27·1	36·5	5·7
1895..	1·34	13	·61	0	47·7	44·9	67·1	57·9	29·1	40·8	113·6	93·8	25·4	37·0	6·3
1896..	·55	11	·08	0	49·2	45·4	68·4	58·6	32·8	41·5	114·7	96·5	24·0	34·0	5·2
1897..	1·57	16	·23	0	46·0	43·2	67·3	55·3	27·8	39·6	108·9	92·2	20·7	34·5	6·7
Mean ...	1·66	12	·51	0·1	47·3	44·2	70·7	58·1	29·8	39·7	114·8	95·5	24·5	35·4	5·8
Extremes	4·97	21	2·56	1	51·6	48·1	81·4	67·7	34·5	43·2	122·0	106·0	30·2	39·4	7·1
	·24	3	·08	0	43·2	40·4	61·7	52·4	24·5	35·3	104·4	87·6	19·4	30·2	3·1

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, NOVEMBER, 1898.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	TotalRain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	60·6	3	27·3	23	51·0	41·2	42·8	89	89·8	21·9	1·94	13	7·1
Malta	76·2	2	54·5	25	71·5	60·6	58·5	82	137·7	51·0	2·53	11	3·5
Cape of Good Hope	86·9	28	46·5	2	72·6	57·3	54·9	70	...	...	1·06	5	4·5
Mauritius	85·4	30	63·0	7	81·9	67·7	64·5	74	135·6	55·0	·90	9	5·2
Calcutta	85·7	9	57·7	16	82·0	63·6	62·0	70	144·8	49·2	·00	0	1·8
Bombay	92·4	8	70·5	25	88·9	75·4	70·2	68	139·2	61·1	·13	2	1·8
Ceylon, Colombo	90·4	26	72·0	20*b*	86·2	73·7	72·6	84	162·0	69·0	17·38	20	6·2
Melbourne	91·5	1	44·3	6	72·4	52·1	44·6	57	148·2	35·1	·67	9	6·6
Adelaide	98·2	11	45·6	25	74·4	54·0	47·4	56	155·7	38·6	1·34	12	5·4
Sydney	93·7	2	53·6	11	77·3	61·5	53·8	58	146·0	44·1	·46	4	4·5
Wellington	71·5	30	44·0	13	63·3	50·9	46·5	67	130·0	37·0	2·69	17	4·5
Auckland	78·0	26	48·0	1	67·5	54·9	52·9	74	132·0	42·0	2·39	12	5·3
Jamaica, Kingston	89·9	8	62·6	12	87·7	71·1	69·0	75	...	...	1·03	5	...
Trinidad	...	...	...	...	...	...	..	...	...	...	...	...	...
Grenada	86·2	9*a*	69·4	1	83·4	74·1	71·5	74	152·4	...	7·57	18	2·0
Toronto	58·0	4	8·0	27	43·9	28·5	32·1	82	72·5	5·0	3·02	15	6·7
New Brunswick, Fredericton	59·7	6	13·2	26	42·5	28·4	30·3	74	...	...	5·38	15	7·7
Manitoba, Winnipeg	50·7	3	−17·9	26	28·1	10·6	...	...	...	...	2·00	9	6·4
British Columbia, Esquimalt	53·4	15	31·3	20	47·6	39·4	..	...	...	...	4·44	24	7·6

a—and 13. *b*—and 21, 27.

REMARKS.

MALTA.—Adopted mean temp. 64°·9, or 2°·9 above the average. Mean hourly velocity of wind 8·4 miles. Mean temp. of sea 71°·1. TSS on 21st and 22nd. L on 10 days. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·3 below, of dew point 0°·3 above, and rainfall ·91 in. below, their respective averages. Mean hourly velocity of wind 8·9 miles or 1·9 below average; extremes, 20·2 on 2nd and 2·0 on 21st; prevailing direction S.E. by E. to E.N.E. L on 15th. T. F. CLAXTON.

CEYLON, COLOMBO.—Mean temp. of air 79°·0, or 0°·8 below, of dew point 0°·3 above, and rainfall 4·75 in. above, their respective averages. Mean hourly velocity of wind 7·6 miles; prevailing direction S.W., N.W., and N. TSS on 9 days. L on 16th. H. O. BARNARD.

Adelaide.—A cold and windy month, the mean temp. and pressure being respectively 2°·9, and ·104 in. below the average of previous years. Rain ·35 in. above the average. C. TODD, F.R.S.

Sydney.—Temp. 2°·8 above, humidity 11° and R 2·68 in. below, the average. The hot weather of September and October was not repeated, but the generally dry weather continued. H. C. RUSSELL, F.R.S.

Wellington.—Generally showery up to the 24th, with only a few fine days, the end of the month fine. Prevailing winds N.W., and frequently strong. T on 18th. Mean temp. 0°·6 above, and rainfall 1·48 in. below, the average. R. B. GORE.

Auckland.—Unusually fine. Rainfall ·75 in. below the average of 31 years. Mean temp. 1° above, the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Rainfall, 1·53 in. below the average at Kingston, and below the average in every division of the Island. R. JOHNSTONE.

SUPPLEMENTARY TABLE OF RAINFALL, APRIL, 1899.

[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..	2·29	XI.	Builth, Abergwesyn Vic.	7·48
II.	Dorking, Abinger Hall .	2·94	,,	Rhayader, Nantgwillt ...	6·60
,,	Birchington, Thor	2·65	,,	Lake Vyrnwy	5·22
,,	Hailsham	2·85	,,	Corwen, Rhug	...
,,	Ryde, Thornbrough	2·95	,,	Criccieth, Talarvor	3·92
,,	Emsworth, Redlands ...	2·76	,,	I. of Man, Douglas	4·57
,,	Alton, Ashdell	3·10	XII.	Stoneykirk, Ardwell Ho.	3·22
III.	Oxford, Magdalen Col..	1·83	,,	New Galloway, Glenlee	4·90
,,	Banbury, Bloxham	2·26	,,	Moniaive, Maxwelton Ho.	3·87
,,	Northampton, Sedgebrook	1·93	,,	Lilliesleaf, Riddell	2·69
,,	Stamford, Duddington..	1·72	XIII.	N. Esk Res. [Penicuick]	4·65
,,	Alconbury	1·81	XIV.	Glasgow, Queen's Park..	4·11
,,	Wisbech, Bank House...	1·64	XV.	Inverary, Newtown	5·51
IV.	Southend	2·61	,,	Ballachulish, Ardsheal...	5·79
,,	Harlow, Sheering..... ...	2·81	,,	Islay, Gruinart School ...	1·52
,,	Colchester, Lexden	1·82	XVI.	Dollar.....	3·33
,,	Rendlesham Hall	1·88	,,	Balquhidder, Stronvar...	6·80
,,	Scole Rectory	2·42	,,	Coupar Angus Station...	2·82
,,	Swaffham	2·41	,,	Dalnaspidal H.R.S.....	...
V.	Salisbury, Alderbury ...	2·77	XVII.	Keith H.R.S.....	3·59
,,	Bishop's Cannings	3·15	,,	Forres H.R.S.	3·43
,,	Blandford, Whatcombe .	3·25	XVIII.	Fearn, Lower Pitkerrie..	2·40
,,	Ashburton, Holne Vic...	4·64	,,	S. Uist, Askernish	5·70
,,	Okehampton, Oaklands.	4·17	,,	Invergarry.....	1·99
,,	Hartland Abbey	3·44	,,	Aviemore H.R.S.	2·06
,,	Lynton, Glenthorne ...	4·55	,,	Loch Ness, Drumnadrochit	3·38
,,	Probus, Lamellyn	2·87	XIX.	Invershin	4·74
,,	Wellington, The Avenue	3·29	,,	Durness	...
,,	North Cadbury Rectory	2·86	,,	Watten H.R.S.....	1·82
VI.	Clifton, Pembroke Road	3·46	XX.	Dunmanway, Coolkelure	7·27
,,	Ross, The Graig	2·13	,,	Cork, Wellesley Terrace	3·01
,,	Wem, Clive Vicarage ...	2·24	,,	Killarney, Woodlawn ..	4·08
,,	Wolverhampton, Tettenhall	2·49	,,	Caher, Duneske	2·98
,,	Cheadle, The Heath Ho.	3·11	,,	Ballingarry, Hazelfort...	3·05
,,	Coventry, Priory Row ..	2·15	,,	Limerick, Kilcornan ...	3·28
VII.	Grantham, Stainby	2·12	,,	Miltown Malbay	3·60
,,	Horncastle, Bucknall ...	1·98	,,	Gorey, Courtown House	2·26
,,	Worksop, Hodsck Priory	2·08	XXI.	Moynalty, Westland ...	3·11
VIII.	Neston, Hinderton	2·51	,,	Athlone, Twyford	3·77
,,	Southport, Hesketh Park	3·03	,,	Mullingar, Belvedere ...	3·10
,,	Chatburn, Middlewood.	3·67	,,	Woodlawn	3·85
,,	Duddon Val., Seathwaite Vic.	8·36	XXII.	Crossmolina, Enniscoe ..	5·50
IX.	Melmerby, Baldersby ...	2·46	,,	Collooney, Markree Obs.	4·54
,,	Scarborough, Observat'y	1·56	,,	Ballinamore, Lawderdale	4·08
,,	Middleton, Mickleton ...	3·09	,,	Warrenpoint.....	4·47
X.	Haltwhistle, Unthank...	2·77	XXIII.	Seaforde.....	4·37
,,	Bamburgh	2·10	,,	Belfast, Springfield	4·79
,,	Keswick, The Bank.....	4·70	,,	Bushmills, Dundarave..	4·52
XI.	Llanfrechfa Grange	4·23	,,	Stewartstown	3·89
,,	Llandovery	5·81	,,	Killybegs	7·75
,,	Castle Malgwyn	3·19	,,	Horn Head	4·59
,,	Brecknock, The Barracks	3·32	,,		

APRIL, 1899.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	2·64	+ ·90	·35	9	20	65·6	1	32·1	12	0	7
II.		Tenterden	2·91	+ 1·19	·66	13	22	62·5	1	31·0	12*d*	2	9
,,		Hartley Wintney	2·49	...	·46	20	20	66·0	2	28·0	17	7	11
III.		Hitchin	2·30	+ ·51	·50	16	20	63·0	1	29·0	16	4	...
,,		Winslow (Addington)	2·12	+ ·20	·32	6	19	64·0	1	27·0	17	6	6
IV.		Bury St. Edmunds (Westley)	2·18	+ ·52	·32	9	16	61·0	2	31·0	12*e*	...	...
,,		Norwich (Brundall)	2·88	...	·52	7	19	62·2	2	32·0	12	1	9
V.		Winterbourne Steepleton ...	3·93	...	·94	13	20	58·0	10	27·0	17	5	12
,,		Torquay (Cary Green)	2·78	...	·46	12*a*	17	61·0	29	35·2	18	0	6
,,		Polapit Tamar [Launceston]..	4·08	+ 1·86	·89	20	22	59·6	30	26·0	17	...	...
VI.		Stroud (Upfield)	1·85	— ·30	·34	6	20	63·0	1*c*	35·0	18	0	...
,,		ChurchStretton(Woolstaston)	2·96	+ ·62	·39	6	19	66·0	27	29·5	17	3	10
,,		Worcester (Diglis Lock)	1·84	+ ·13	·35	24	18	...	...	...	...	...	...
VII.		Boston	1·90	+ ·19	·45	9	18	60·0	1	26·0	17	6	...
,,		Hesley Hall [Tickhill].....	1·75	+ ·04	·40	9	16	63·0	28	28·0	17*f*	4	...
,,		Breadsall Priory	2·65	...	·47	29	20	64·0	1, 2	26·0	18	4	14
VIII.		Manchester(PlymouthGrove)	...	...	...	...	...	...	...	...	...	...	...
IX.		Wetherby (Ribston Hall) ..	1·79	— ·06	·25	6*b*	13	...	...	...	...	...	...
,,		Skipton (Arncliffe)	6·35	+ 2·92	·83	6	25	...	...	...	...	...	...
,,		Hull (Pearson Park).	2·06	+ ·14	·33	6	19	63·0	28	25·0	16	4	12
X.		Newcastle (Town Moor)	2·87	+ 1·04	·50	14	19	...	..	...	...	...	...
,,		Borrowdale (Seathwaite).....	13·28	+ 6·14	1·73	5	27	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	5·09	+ 2·68	·82	13	22	...	...	...	...	...	...
,,		Haverfordwest	3 77	+ 1·14	·77	20	23	56·8	29	27·3	18	2	7
,,		Aberystwith (Gogerddan) ...	4·03	+ 1·47	·65	9	20	62·0	28	20·0	17	7	...
,,		Llandudno.....	2·76	+ ·95	·62	9	21	58·0	28	32·0	18	1	..
XII.	SCOTLAND.	Cargen [Dumfries]	4·10	+ 1·87	·82	6	15	59·0	26	25·0	18	6	...
XIII.		Edinburgh (Blacket Place)...	2·29	...	·32	9	19	61·2	27	28·5	12	5	13
XIV.		Colmonell	4·29	...	·77	12	21	60·0	26	27·0	29	...	...
XV.		Tighnabruaich	6·25	...	·73	6	18	58·0	25	29·0	16*e*	6	...
,,		Mull (Quinish).....	5·12	+ 2·14	·96	18	22	...	...	...	...	...	...
XVI.		Loch Leven Sluices	3·20	+ ·98	·50	19	13	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	3·00	+ ·95	·85	6	19	61·2	26	27·7	18	5	...
XVII.		Braemar	4·07	+ 1·65	·76	13	25	58·0	28	17·0	22	11	23
,,		Aberdeen (Cranford)	3·81	...	·84	6	21	62·0	1	24·0	21	10	...
,,		Cawdor (Budgate)	4·36	+ 2·84	·83	28	21	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	5·78	+ 2·97	1·02	6	13	...	...	...	...	...	...
,,		Glencarron Lodge.....	7·91	...	1·17	28	26	59·4	26	22·0	22	10	...
XIX.		Dunrobin	4·04	+ 2·31	·67	5	18	55·0	3	28·5	22	8	...
,,		S. Ronaldshay (Roeberry) ...	2·45	+ ·84	·57	12	19	56·0	26	29·0	16*g*	9	...
XX.	IRELAND.	Darrynane Abbey.....	5·39	...	1·47	20	25	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	3·13	+ ·66	·67	12	18	61·0	4	29·0	18	2	...
,,		Broadford (Hurdlestown) ...	2·98	...	·52	24	21	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	2·55	+ ·27	·36	12	21	...	..	...	...	...	...
,,		Dublin (FitzWilliam Square)	2·00	— ·12	·38	24	20	64·0	28	35·1	16	0	7
XXII.		Ballinasloe	3·47	+ 1·13	·50	6	25	60·0	24	32·0	16*h*	3	...
,,		Clifden (Kylemore)	6·62	...	·93	12	26	...	...	...	...	...	...
XXIII		Waringstown	3·77	+ 1·35	·70	12	20	65·0	29	26·0	18	5	6
,,		Londonderry (Creggan Res.).	4·83	+ 2·59	·66	28	27	...	...	...	...	...	...
,,		Omagh (Edenfel)	4·75	+ 2·52	·60	24	23	63·0	28	27·0	17	5	8

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

a—and 20. *b*—and 13, 29. *c*—and 3, 27. *d*—and 19. *e*—and 17. *f*—and 18.
g—and 17, 20, 21. *h*—and 17, 18.

METEOROLOGICAL NOTES ON APRIL, 1899.

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 wettest April for 20 years, though 1882 and 1890 had within ·20 in. of the same total. The water in the well rose from 4 ft. 8 in. to 5 ft. 10 in. Much wind from 4th to 11th, especially from N.W. on 7th and 8th. Duration of sunshine 145 hours 25 minutes; 3 sunless days.

HARTLEY WINTNEY.—The first week was warm, with light S.W. breezes, afterwards to the end the weather was very cold and wet, with rough N. or N.W. winds. Mean min. temp. 39°·3. Rainfall 1·31 in. above the average. Many sunless days. Ozone on 9 days. Nightingale heard on the 4th, cuckoo on the 14th, swallow on the wing on 19th.

WINSLOW, ADDINGTON.—The greatest April rainfall since 1889, and the greatest number of rainy days. Not much frost. Frequent high winds. H and S on 8th. Cuckoo heard on 17th; swallows seen on 18th.

BURY ST. EDMUNDS, WESTLEY.—Cold, wet and unsettled, with low temp. Foreign birds came mostly on the 20th, about one week late. Vegetation backward. TS on 29th.

NORWICH, BRUNDALL.—A cloudy month, with more rain than usual, the total being 1·21 in. above the average, and the heaviest recorded for April since 1882. Much cloud prevailed, and although the mean temp. was well up to the average, vegetation was backward, through want of sunshine. Showers of H on 8th, 11th and 16th. T 1 p.m. on 8th. Strong N. wind all day on 30th.

WINTERBOURNE STEEPLETON.—A wet month, rain falling on two-thirds of the days. The temp. also was low; the mean being 45°·6. The third week (ending on 22nd) was specially cold, the mean temp. being 40°·3, and the mean min. in shade and on grass respectively, 32°·1 and 25°·2. The temp. this year has much resembled that of last year, the mean for the first four months being—

	Jan.	Feb.	Mar.	Apr.
1898—	44°·1	41°·0	39°·5	45°·0
1899—	42°·0	41°·7	40°·7	45°·6

The rainfall to the end of April is, however, nearly double that of 1898, viz.: 14·59 in., against 7·40 in. Vegetation is backward, more warmth being wanted. Fogs on 4th, 6th, 9th, and 29th. Strong winds on 7th, 11th, and 29th. Stormy on 12th.

TORQUAY, CARY GREEN.—R ·41 in. above the average. Mean temp. 48°·8, or 0°·6 above the average. Duration of sunshine 143 hours 45 minutes, being 36 hours 10 minutes below the average; 4 sunless days.

POLAPIT TAMAR [LAUNCESTON].—Dull, sunless, and cold, with strong winds up to the 12th, then calmer to the 19th, and rough and cold again to the end. Very wet from beginning to end.

WOOLSTASTON.—A cold, backward month, S on the 11th; T, with violent H, on 13th. Mean temp. 46°·5. Gale on 7th. Flight of wild geese passed over on 17th. Swallows seen on 19th.

BREADSALL PRIORY.—A very wet, cold, and sunless month.

BORROWDALE, SEATHWAITE.—On five days the rainfall exceeded 1·00 in., and on three days 1·50 in. S on 8th.

WALES.

HAVERFORDWEST.—The month was characterised by constant damp, and more or less wind up to the 15th, when the air became much colder, with

frost up to the 18th. From that date to the 23rd moderate gales prevailed, with heavy rain on two days. The last week of the month was much finer, with light breezes, a considerable amount of sunshine and higher temp. Blackthorn in bloom on 9th, and chestnut on the 25th; vegetation forward.

GOGERDDAN.—A very showery month, but some sharp frost about the middle did much damage to fruit trees and early potatoes.

SCOTLAND.

CARGEN [DUMFRIES].—A cold, rainy, sunless month. The readings of the bar. were uniformly low, being above 30 in. on only three days, and the mean for the month has only once been lower during 40 years. The mean temp. is nearly two degrees below the average, and sunshine has been very deficient. Every month of the year shows a considerable increase of R over the average, the total excess for the four months being 6·50 in. Vegetation is unusually backward, and fully three weeks later than last year. Hardly a bud has burst on the horse chestnut or plane, while the beech, in full leaves at this period last year, shows no sign of foliage. Pastures made little progress. The wet weather retarded farm work of every nature.

EDINBURGH, BLACKET PLACE.—Westerly gale on 4th. Solar halos on 9th, 12th, 18th, 23rd, and 27th. Lunar halo on 18th. Slight S on 17th.

COLMONELL.—Rain 1·89 in. above, and mean temp. 0°·4 above, the average of 23 years.

TIGHNABRUAICH.—A cold and wet month. Very little growth in the fields.

MULL, QUINISH.—A very cold, wet month, from first to last. The wettest April on record since the gauge was established in 1874.

ABERDEEN, CRANFORD.—Wet and cold, with high winds from N., N.W., and N.E., and very little sunshine.

CAWDOR, BUDGATE.—S on 10th, 11th, 12th, 16th, 18th, 19th, 21st and 29th.

S. RONALDSHAY, ROEBERRY.—A wet and very cold month. Mean temp. 41°·3, or 2°·6 below the average of 9 years.

IRELAND.

DARRYNANE ABBEY.—One of the strongest N.W. gales remembered on the night of the 6th. Some frost at night in the middle of the month, and H showers in forenoon of 17th, but not measurable. Distant T on 14th.

WATERFORD, BROOK LODGE.—Max. range of temp. in 24 hours 24°·5. Fog on 2nd. Heavy gale on 7th. H shower on 14th. First pair of swallows on 17th. Thick sea fog on 24th.

BROADFORD, HURDLESTOWN.—A wet month on the whole. Rainfall ·81 in., and rainy days four, above the April average for 14 years. N.W. gale on 6th. S on 17th. T on 24th.

DUBLIN, FITZWILLIAM SQUARE.—A changeable, showery, and cloudy month. The wind was particularly variable in direction and force, and a prolonged series of gales was experienced from the 4th to the 8th inclusive. There was a cold spell from the 13th to the 19th. As in April, 1898, at the close many forest trees were in full leaf. Mean temp. 48°·6, or 0°·9 above the average. Fogs on four days. High winds on ten days, reaching the force of a gale on the 4th, 5th, 6th, 7th and 8th. Sleet on the 17th. H on 8th 14th and 17th. Solar halos on 3rd, 16th, 18th and 19th. Lunar halos on 18th and 19th. Slight T and L on the 25th.

WARINGSTOWN.—The wettest April since 1889.

OMAGH, EDENFEL.—By far the wettest April recorded here, the rainfall, largely in torrential showers, having been about 130 per cent. above the average of 35 years, saturating the soil and rendering it unfit for the reception of seed, except on high and dry situations. Although the mean temp. varied but little from the average, the atmosphere was in a very unsettled state, with frequent and considerable barometric and thermometric fluctuations occasioning abnormal cold and mildness within unusually short periods of time. Corncrake on 21st, swallows on 25th, cuckoo on 30th.

SYMONS'S

MONTHLY

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UNPRECEDENTED FROST IN THE UNITED STATES IN FEBRUARY, 1899.

IN February, 1899, the contrast in temperature between the two sides of the Atlantic was probably greater than had occurred since the invention of the thermometer.

On February 10th, 1899, the shade temperature at Camden Square, London, rose to 64°·8, and there is no record of the heat in London in February exceeding 62°·5 during 104 previous years.

On February 12th-13th, 1899, the intensity of frost in the S. and S.E. of the United States was equally unprecedented; *e.g.*, 7° (25° below freezing) at New Orleans, on the Gulf of Mexico.

We have recently received the *Monthly Weather Review* for February, 1899, it is crammed with interesting facts, and the following extracts are but types of the mass which we have not space to reproduce.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

During the first half of February the most remarkable cold wave, or series of cold waves, in the history of the Weather Bureau traversed the United States from the north Pacific to the south Atlantic coasts, damaging crops and fruits in the Southern States to the extent of millions of dollars. During the first eight days of the month the lowest temperatures on record were reported at points in the north Pacific coast States; from the 9th to the 12th many places in the Central, Western, and North-Western States reported the coldest weather on record. During the 13th and 14th the cold wave overspread the Southern and Eastern States, attended (on the 13th) by the lowest temperatures on record from the southern Rocky Mountain slope to the south Atlantic coast, by zero temperatures to the Gulf coast of Alabama, and by a snowstorm of unprecedented severity in the Middle Atlantic States.

The visible cause of this period of intense cold is found in a series of barometric depressions in the South, combined with an area of high barometer of great magnitude which persistently occupied the British North-West Territory until the 11th, inclusive, when the highest sea-level pressure ever reported within the region of observation covered by the Weather Bureau and Canadian services (31·42 inches) was telegraphed from Swift Current, Assiniboia. After the 11th, this area of high barometer settled southward over the eastern Rocky Mountain slope and the central valleys, causing the severest winter weather ever experienced generally over the southern half of the country east of the Rocky Mountains. Ample and timely warning of the advance of the the cold wave was given to all interests that were likely to be injuriously affected by intense cold. It will also be noted that special reports and newspaper comments made in connection with the cold-wave visitation give unquestionable evidence that the warnings prompted protective measures, whereby crops, live stock, and perishable goods and merchandise to the value of hundreds of thousands of dollars were saved.

* * * * * * *

During the night of Sunday the 12-13th, the cold wave swept southward to the Gulf of Mexico, breaking all previous low-temperature records in the South and South-West, as shown in the following table :—

Station.	Lowest previous temperature recorded.	Minimum temperature February 13, 1899.	Departure below lowest previous temperature.
Concordia, Kans.	—25	—26	1
Dodge, Kans.	—20	—24	4
Wichita, Kans.	—14	—22	8
Oklahoma, Okla.	—11	—18	7
Amarillo, Tex.	—14	—16	2
Abilene, Tex.	— 5	— 6	1
Palestine, Tex.	— 1	— 4	3
San Antonio, Tex.	6	4	2
Galveston, Tex.	11	6	5
Springfield, Mo.	—17	—28	11
Little Rock, Ark.	— 5	—12	7
Nashville, Tenn.	—10	—12	2
Chattanooga, Tenn.	— 7	—10	3
Shreveport, La.	1	— 4	5
Vicksburg, Miss.	3	zero	3
New Orleans, La.	15	7	8
Mobile, Ala.	12	— 1	13
Montgomery, Ala.	5*	— 4*	8*
Atlanta, Ga.	— 2	— 6	4
Savannah, Ga.	12	8	4
Jacksonville, Fla.	14	10	4

* One of these figures must be erroneous.—Ed. *M.M.*

From Jacksonville, Florida, A. J. Mitchell, Local Forecast Official, Weather Bureau reported as under :—

Freezing conditions covered the territory set forth in the warnings, and ample time was given all interested to take the necessary precautions. The warning was telegraphed to 118 points, and every possible avenue was utilized to apprize the public of the expected severe weather. Railroads notified fruit and vegetable growers along their lines, cold-wave and frost signals were sounded by locomotives and river steamers, and along the 400 miles of the Florida Coast Line every section was promptly served. In the night of the 12th heavy sleet and snow prostrated telegraph lines north, and cut off communication with Washington, and on the 13th reports were not received in time to be of use. With a temperature of 10° at Jacksonville on the 13th, the official in charge sent the following warning throughout the central and southern portions of the State, the sections most vitally affected by a freeze at this time of the year : "*Severe freeze to-night throughout the Peninsula. Give widest possible distribution.*" The warning was lodged not only with every station and settlement, but special messengers were sent out by the Florida East Coast Line Railway notifying individuals throughout the extent of their lines. The action of this road was such that every point south of St. Augustine, except Key West, was notified. Other roads showed the same activity. The saving to fruit and vegetable growers was enormous. The methods of protection used, varied with the object to be protected. Orange trees were wrapped, banked, and some groves were covered. Additional protection was given by building fires. Pineapple fields were protected by a covering of lattice work under which fires were distributed. In every case through the north and north-central parts of the State the most heroic measures were necessary to save anything. The cold was so severe over the western, and parts of the northern, districts that cattle, horses and sheep died from exposure. The lowest temperature reported was 4° below zero over the western district. The temperature fell to 29° in the southern part of Dade County. The vegetable crop over central, northern and western portions of the State has been destroyed ; oats, peaches and pears damaged, and probably the greater portion of young citrus trees over the north-central counties has been seriously damaged. Citrus trees between latitudes 29° and 28° are thought not to be severely damaged, excepting young growth. Those south of the twenty-eighth parallel will escape with no serious consequences.

The total value of fruit, vegetables and property saved in Florida, as given by those who were benefited by the warnings, amounts to nearly $60,000. The figures are, however, necessarily incomplete, as many groves were saved whose values are not included in the above estimate.

It is a matter of sincere congratulation that, with the severest freeze in the history of the State, and with more property subject to loss or serious damage, the Weather Bureau so met the demands and expectations of the public that not one complaint has been received regarding the accuracy of the forecasts.

Chicago.

On account of the absence of snow the ground in the vicinity of Chicago was frozen in many places to the depth of five and one-half feet, causing great damage by the freezing up of the water and gas mains and service pipes. Plumbers have been unable to meet the damands for their services, and the

exigency has brought forth the novel method of thawing out frozen pipes by the use of an electric current. Great suffering was caused by the severe cold among the poorer classes, and many people were frozen to death. Several steamboats which maintain winter service on Lake Michigan were blocked by the thick ice and unable to reach port for three or four days.

THE MISSISSIPPI.

On February 6th, there was ½ inch of ice at Memphis, Tennessee; by the 13th this had increased to 1 inch, and had extended to New Orleans, where there were 2 inches, a record unparalleled in the history of the city, as far as is known.

ON A RECENT RECURRENCE IN WEATHER—A LUNAR OR 30-DAY PERIOD.

To the Editor of the Meteorological Magazine.

SIR,—I notice an article by Mr. Alexander MacDowall "On a Recent Recurrence in Weather," published in the March number of this Magazine (Vol. XXXIV., p. 20). For the purpose of comparison, I treated the temperatures observed at the Blue Hill Meteorological Observatory (near Boston, Mass., U.S.A.) exactly in the same manner as Mr. MacDowall treated the temperatures observed at Greenwich. That is, from July, 1898, to February, 1899, I took the average of the departures from normal temperature of each seven days having a new moon central, and the same for full moon. I next subtracted from the temperatures at new moon the temperatures at full moon in order to obtain the differences. The results are given in the following table:—

NEW MOON.	TEMPERATURE.		FULL MOON.	TEMPERATURE.		NEW MOON MINUS FULL MOON.	
	Greenwich.	Blue Hill		Greenwich.	Blue Hill.	Greenwich.	Blue Hill.
Days.	°	°	Days.	°	°	°	°
July 18.....	+ 1·2	+ 3·3	July 3.....	—0·7	+ 6·1	+ 1·9	— 2·8
Aug. 17.....	+ 7·7	+ 3·1	Aug. 2.....	+0·4	+ 4·3	+ 7·3	— 1·2
Sept. 16.....	+ 7·1	+ 4·4	,, 31.....	+1·1	+ 9·0	+ 6·0	— 4·6
Oct. 15.....	+ 1·2	— 2·7	Sept. 29.....	—1·8	+ 6·3	+ 3·0	— 9·0
Nov. 14.....	+ 6·3	+ 1·6	Oct. 29.....	+5·9	+ 0·1	+ 0·4	+ 1·5
Dec. 13.....	+ 7·9	— 9·9	Nov. 28.....	+0·6	+ 7·7	+ 7·3	—17·6
Jan. 11.....	+ 7·0	— 5·7	Dec. 27.....	+4·8	+ 1·1	+ 5·2	— 6·8
Feb. 10.....	+11·9	—18·0	Jan. 26.....	—2·2	+11·4	+14·1	—29·4

The figures show that both at Greenwich and at Blue Hill the temperatures were generally above the normal until about November,

after which they were considerably below normal at Blue Hill at the time of new moon. But in the columns of temperature differences headed "New Moon minus Full Moon" a remarkable contrast is found between the temperatures at Greenwich and Blue Hill. At Greenwich the temperatures at new moon are steadily higher than at full moon, but at Blue Hill, with one exception, they were all lower. Furthermore, it is notable that the greatest plus departure at Greenwich (+14°·1) coincides with the greatest minus departure at Blue Hill (—29°·4); the next to the greatest plus departure at Greenwich (+7°·3) coincides with the next to the greatest minus departure at Blue Hill (—17°·6);* and the smallest plus departure at Greenwich (+0°·4) coincides with the only case in which there was no minus departure at Blue Hill. In other words, the reversal of phase was complete in almost every sense.

Another curious fact is, that the largest departures occurred in alternate months. Thus the alternate months August, October, December and February contain every case in which the departures exceeded seven degrees.

The mean departures from the normal temperatures at Blue Hill for each day of the weeks about new moon, first quarter, full moon and last quarter, from July, 1898, to February, 1899, are given in the following table:—

Mean Departures from Normal Temperature at Blue Hill, July, 1898, to February, 1899.

	New Moon.	First Quarter.	Full Moon.	Last Quarter.
	° F.	° F.	° F.	° F.
3 Days before	—0·5	+1 5	+4·1	+0·7
2 Days before	—0·9	+3·1	+2·7	+0·9
Day before	—4·8	+4·2	+0·1	+3·5
Day of	—6·8	+5·2	+4·2	+0·7
Day after	—5·9	+4·2	+3·4	+1·5
2 Days after	—2·3	+2·6	+0·9	—2·1
3 Days after	—0·6	+4·2	+3·1	—2·9

These figures show a well-marked period of about 30 days. The interval is too short to determine whether the period had the exact length of the lunar period or had any relation of cause and effect, although the presumption favors it. I showed in the *American Meteorological Journal* for June, 1895, that these thirty-day oscillations in temperature reversed in phase at any given place and oscillated in different phases at widely separated places, as shown above for Greenwich and Blue Hill (see *American Meteorological Journal*, Vol. II., p. 87; see also Vol. I., p. 528, for discussion of the same phenome-

[* But the other case of +7°·3 does not support the argument so well.—Ed.]

non in a two-year period). The reversal of phase at the same place is a curious phenomenon which at present completely blocks the way to forecasting. In some cases it appears to be due to a movement of the centres of oscillation, the laws of which will undoubtedly yield to further research. I have maintained for twenty years the paramount importance of a study of these periodic phenomena in order to advance in weather forecasting, but so far, I regret to say, I have not made many converts in America. I am glad that Mr. MacDowall is taking up the subject in England.

H. HELM CLAYTON.

Boston, Mass.

REVIEWS.

The Hereford Earthquake of December 17th, 1896, by CHARLES DAVISON, Sc.D., F.G.S. Birmingham, Cornish Brothers, 1899, 8vo., XIV.—304 pages, 22 maps and diagrams.

WE congratulate Dr. Davison upon having collected data respecting the above from 3,092 stations, and we think that perhaps he is still more to be congratulated upon having thoroughly digested this enormous mass of facts and impressions.

The record occupies the first 200 pages of the work. It is, a remarkable specimen of compact statement, is indispensable as the foundation for the second part, and (when one has thoroughly mastered the classification and the code of abbreviations) is easily followed, but at first sight the 3,092 entries (of which we take No. 1,000 as a type), are rather puzzling:—

1000. *Publow.*—Miss H. T. Bellamy.† **3.** 5.32. **4.** bed raised and shaken. **5.** ab. 20 secs. **6.** 5. **7.** no.

These two lines contain the following information from observer No. 1,000 at Publow, in Somersetshire. Miss H. T. Bellamy was awakened by the shock at 5.32 a.m., she felt her bed raised and shaken, she considered that the shock lasted about 20 seconds, that the intensity of the shock was 5 on the Rossi-Forel scale, but she heard no noise.

When one reflects upon the hundreds of pages which three thousand similar entries printed *in extenso* would have occupied, one sees that, though the first 200 pages may not look very inviting, no other course was practicable.

Having this enormous mass of information, Dr. Davison had to classify and to study it. He gives the results in chapters V. to XIII., but we think that it would be unfair to an author who has worked so hard, as in the present instance, for us to set out all the results at which he has arrived, or to say more than that those who are interested in the study of earthquakes ought to obtain a copy of this handsome and (as far as we have tested it), remarkably accur-

ately printed volume. We have not noticed a single misprint. The only part which seems to us rather weak is the artistic; the diagrams and maps, though no doubt correct, are not so explicit and clear as they might have been. We also think that the section upon previous shocks in Herefordshire might have been strengthened.

As regards the *time* of the shock, Dr. Davison has arrived at conclusions very closely accordant with those expressed in this Magazine (Jan. 1897, p. 181), where we said

TIME.

"Here, as in every previous earthquake, there is ample proof of the carelessness of most persons as to keeping accurate time, and of the tendency to quote round figures (*e.g.* 5.30 or 5.40), rather than accurate ones.

It will be for Dr. Davison, if he can, to bring order out of chaos; meanwhile we offer the following as our impression of what was the initial time of the disturbance—viz., 5.32 a.m.—and the rate of progress 30 miles per minute, from Hereford as a centre."

Dr. Davison seems to fix the centre as about 1 mile S.W. of Hereford (p. 225), the time as 5.31.45 a.m. (p. 275), and the mean surface velocity as 2,955 ft. per second (p. 274), which equals 34 miles per minute.

We are very glad to see how closely Dr. Davison's final results agree with our own very rough ones, determined from such information as we could collect within three weeks after the event; viz.: within 1 mile as to the centre, within 15 seconds as to time, and within 10 per cent. as to velocity of transmission.

It is satisfactory to find that the two important English earthquakes of recent years have been thoroughly investigated, and the results for each published. The former by Prof. Meldola, F.R.S., and Mr. White, in *The Essex Earthquake*, issued by The Essex Field Club, and the later in the work now before us.

One other monograph remains to be written: an exhaustive "List of British Earthquakes." All honour to the late Mr. Roper for his efforts in that direction; we drew attention to it when, after his death, his son showed filial affection and respect, by privately printing the MS. which his father did not live to complete. That work is an excellent foundation, but for such a book as we desire, it will be necessary to enlist the help of antiquarians, of the readers of *Notes and Queries*, of Parochial Clergy—especially of those of parishes with old Parish Registers,—it will need a seismologist, a geologist, and a draughtsman.

Such a work would not "pay;" the mere printing and publishing would probably cost £200 or £300, and therefore it could be done only as a "labour of love," but it would also be one of honour, and as regards the cost we believe that for a really useful object the funds can generally be obtained—as witnesses the work we are now reviewing.

Neudrucke von Schriften und Karten über Meteorologie und Erdmagnetismus, herausgegeben von Prof. Dr. G. HELLMANN. No. 12. Wetterprognosen u. Wetterberichte des XV. und XVI. Jahrhunderts. Berlin, A. Asher & Co., 4to., 1899, 34—184 pages, and seven folding sheets.

ENGLISH meteorologists who are unacquainted with the German language miss a great treat in not being able to follow the extremely learned and interesting series of publications of which No. 12 is now before us.

It deals with early weather almanacs, and with what we should call meteorological broad-sheets, *i.e.*, a sheet of paper of no uniform size but generally about 20 inches by 12 inches, printed on only one side, and usually with a large, coarse, wood-block representing "three sunnes," or an aurora, or other unusual appearance.

In the present volume we have reproductions (with an accuracy of which nothing but inspection can convey an idea) of a series containing 14 typical specimens of the weather almanacs (ranging from 1486 to 1899) and 12 of weather reports or broad-sheets.

These old publications were extremely numerous, at least 1,000 are known, so, possibly, the aggregate issue amounted to a million copies; but they were so rarely preserved that they are now nearly unobtainable, except at prices almost fabulous. Twenty years back, before Dr. Hellmann's work had directed attention to them, two were sold, one for 1,380 francs (£55) and the other for 680 francs (£27). This will give some idea of the money-value of the twenty-six reproduced in this volume. Added to which is the fact that many of the originals are in public libraries, whence no money could extract them, such as the National Museum, Nürnberg; the K. Library, München; the Bibliothéque National, Paris; and the British Museum.

We leave this question of money value, pointing out while so doing, that it at once puts out of the question all attempts at forming a *complete* meteorological library, and the hundreds of such publications of which every copy has perished, render it evidently equally impossible to form a *perfect* Bibliography of Meteorology.

These "Prognostica," as they are generally called, appear to have been among the early productions of the printing press; for Dr. Hellmann says that they appeared soon after 1470; but he does not give the title of any very early one, and the earliest which he reproduces is of 1486; this in no way contradicts his statement, for the probability of such a flimsy paper having been preserved for more than four centuries is not great. We wish, however, that he had stated the date and title of the earliest printed one known to him, and where it is.

We think that it would have been well that the Index should have stated in tabular form where the original of each of the 26 documents is preserved, For many of them this information is

given in the text, but for some we have not found it, and it would have saved time had all this information been given together.

As regards "Bauern Practica," which may be best rendered "Weather Almanacs," England was singularly behind the rest of Europe. Dr. Hellmann, with his unique knowledge and perseverance, has in this handsome—we might almost say priceless—volume given only one of English origin, viz., one issued for 1555 by A. Askham.*

BLACK RAIN.

To the Editor of the Meteorological Magazine.

SIR,—On Thursday, the 11th instant, we had a very heavy thunderstorm round Gloucester, but I think the storm was heaviest at Churchdown, between Gloucester and Cheltenham. There I have seldom seen so much rain fall within a limited time. The roads and ditches were watercourses in comparatively few minutes. What, however, I wish to mention to you is the fact that the rain seemed to be black. The ditches were quite inky in colour, and the puddles which remained in the road afterwards were also black. This was observed over a considerable district, and a number of people who caught water for household purposes were also struck with this peculiarity. The puddles which were left remained black for some days afterwards. Can you explain the phenomenon? The clouds were very black before the storm, but neither Gloucester nor Cheltenham produce any great amount of smoke. The course of the storm was from North-East to South-West., *i.e.*, from Cheltenham towards Gloucester. Perhaps you would reply to this in your Monthly Magazine, and this might save you the trouble of writing a reply.

I dare say you will allow me to insert it in the local papers, as a number of people in this locality would like to know your views about it.

Yours faithfully,

J. H. JONES.

Eldon Chambers, Gloucester, May 17th, 1899.

[We see that letters respecting the blackness of the rain on the above date appeared in the *Birmingham Daily Gazette* from correspondents at Upton-on-Severn, Staunton, Bromyard and Cheltenham. From this it is evident that the area affected included a triangle with Monmouth, Cheltenham and Bromyard for its three angles, say, an area of 500 square miles.

Many records of "black rain" have appeared in these pages, and we presume that until vigorous action is taken towards smoke abatement they will become more and more frequent. We cannot

* Wonderful to relate, the printer has put "Aksham" in the contents, and the Editor has not noticed it! A misprint in Dr. Hellmann's work is so rare that it has to be chronicled.

believe that it commercially "pays" to blow unconsumed carbon into the air, and we are certain that it is a nuisance.

There is no doubt whatever that smoke clouds from the manufacturing districts had been driven over Gloucester and Hereford, and the rain falling through, or from, them carried down the soot which they contained.—ED.]

OZONE.

To the Editor of the Meteorological Magazine.

SIR,—As I find that I am the only one reporting ozone to your *Met. Mag.*, I was pleased to read, and cannot forbear thanking you for, your interesting and instructive remarks on ozone on p. 50. Since you sent me "Hints to Meteorological Observers"—where I read that "the determination of ozone is not now included by the Royal Meteorological Society"—I have taken more notice of it myself, and wonder why others do not do so, for if not purely scientific from the mode of observation (*i.e*, ozone papers), I can fully corroborate M. van Bastelaer's report, and have long since found out, that it is merely necessary to substitute the word "ozone" for the words "fresh air" to make the statements scientifically accurate.

I had for some time an ozonometer hanging up in a disused room, but never could find in it any indication of ozone, bearing out the statement that there is no "fresh"-ness in rooms.

When there is a period of a week or so without any ozone present here in the atmosphere, many people complain of want of energy and lassitude, but I myself know that the cause arises from a want of ozone to make the air "fresh."—I am, yours faithfully,

W. G. MACHIN.

Winchfield, May 17th, 1899.

WHIRLWIND AT WORSTEAD, MARCH 20TH, 1899.

To the Editor of the Meteorological Magazine.

SIR,—I have just seen the note in the May *Met. Mag. re* Whirlwind at Worstead.

I recorded T and L at 1.3 p.m., which confirms Mr. Preston—March 20th was a "funny" day. I found 7½ inches of snow on the level on measuring at 9 a.m. (and a neighbour's measurement agrees closely), but only 0·26 in. of water was recorded. All but a very little fell in the night. The snow plough visited us. A slight jump occurred in the barograph at 1.10 p.m., and the curve previously was slightly unsteady for some hours.—Yours faithfully,

E. T. DOWSON.

Geldeston, June 2nd, 1899.

RESULTS OF METEOROLOGICAL OBSERVATIONS AT CAMDEN SQUARE FOR 40 YEARS, 1858–97.

MAY.

YEAR.	RAINFALL.				TEMPERATURE.										CLOUD.
	Total.		Max. Fall.	Falls of 1 in. or +	Dry. Mean, 9a.&9p.	Wet. Mean, 9a.&9p.	Shade Max		Shade Min		Sun Max. Black.		Grass Min.		
	Depth	Days					Abs.	Aver	Abs.	Aver	Abs.	Aver	Abs.	Aver	Aver
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	in.		in.		°	°	°	°	°	°	°	°	°	°	0–10
1858..	2·76	14	·94	0	52·2	48·5	80·6	63·1	34·8	43·4	..	..	..	..	5·7
1859..	2·13	12	·53	0	53·5	50·3	78·4	66·8	34·0	43·8	..	..	..	..	5·5
1860..	3·57	18	1·10	1	54·6	50·1	76·1	65·4	33·6	45·3	..	..	28·3	41·2	5·9
1861..	1·39	11	·58	0	52·8	49·0	80·8	64·9	30·0	43·6	..	..	23·5	38·8	6·2
1862..	3·06	16	·82	0	55·5	52·5	81·1	67·1	38·2	48·2	..	..	36·5	45·4	6·6
1863..	1·27	9	·27	0	52·1	48·9	79·4	65·1	32·2	42·9	..	..	27·4	39·7	4·7
1864..	1·86	10	·47	0	56·4	51·6	84·5	66·9	34·2	45·8	..	..	30·5	42·2	5·6
1865..	3·40	17	·75	0	56·5	52·6	81·0	69·2	31·9	46·4	..	..	28·6	42·9	5·0
1866..	2·03	10	·76	0	50·9	46·4	72·2	62·6	33·0	41·6	..	..	25·5	36·2	4·4
1867..	2·45	9	1·03	1	54·6	50·4	84·0	64·8	31·8	45·1	..	..	25·1	39·8	4·9
1868..	1·58	6	·93	0	58·6	54·4	87·6	70·4	35·6	47·9	..	..	32·2	42·5	5·2
1869..	3·27	17	·61	0	51·6	48·3	71·2	61·8	33·0	44·5	..	..	31·5	41·7	7·2
1870..	·70	6	·32	0	54·1	49·8	85·1	67·3	30·8	43·3	126·9	112·0	24·4	38·9	4·7
1871..	·92	7	·36	0	52·7	48·6	79·0	65·5	35·0	42·5	124·0	109·5	33·2	41·3	4·8
1872..	3·05	18	·73	0	52·1	48·6	75·9	62·9	33·2	43·6	127·8	107·6	29·0	40·5	6·1
1873..	1·56	14	·52	0	51·0	47·1	72·9	63·1	32·9	43·2	123·1	108·7	29·6	39·8	6·2
1874..	1·14	7	·66	0	51·5	47·3	73·9	63·2	33·3	42·5	120·8	107·0	28·0	39·3	5·9
1875..	1·61	13	·41	0	55·8	51·4	82·0	67·2	39·8	46·7	131·3	109·8	36·8	43·8	4·8
1876..	·94	6	·43	0	49·7	45·9	71·1	62·0	32·8	40·5	119·8	107·5	27·7	35·7	5·1
1877..	1·91	15	·28	0	50·2	46·3	68·0	59·8	29·2	42·1	121·0	101·0	25·7	39·2	6·6
1878..	3·89	19	1·71	1	55·0	52·0	74·9	65·8	36·7	48·4	122·4	107·6	36·6	46·2	6·7
1879..	3·46	19	1·30	1	49·2	45·6	69·0	59·3	30·6	41·4	122·4	105·3	25·4	37·6	6·2
1880..	·26	5	·21	0	52·6	47·7	85·0	65·2	33·8	43·4	131·5	110·8	30·0	39·0	5·6
1881..	1·52	11	·57	0	54·6	50·3	80·7	66·7	31·2	44·9	128·6	112·5	23·8	40·1	4·6
1882..	1·20	11	·41	0	54·9	50·0	74·2	66·9	37·3	45·5	129·7	114·0	32·8	40·5	4·8
1883..	1·97	11	·60	0	53·1	49·0	79·6	64·8	31·0	44·5	121·6	100·2	26·3	40·7	5·5
1884..	·78	11	·15	0	54·6	49·8	81·3	66·3	35·0	44·7	121·4	102·2	31·3	40·9	5·1
1885..	2·63	19	·39	0	49·9	46·1	73·8	59·7	31·1	42·2	119·3	101·8	26·9	37·5	5·8
1886..	4·79	19	1·27	2·	53·0	48·9	75·3	62·9	31·6	44·6	115·8	94·8	23·7	39·5	5·8
1887..	1·45	21	·28	0	50·2	47·2	71·2	59·8	32·8	43·4	118·8	95·2	24·9	39·5	7·1
1888..	1·18	7	·33	0	53·1	48·2	77·2	64·0	35·3	44·1	125·3	105·8	29·3	38·8	4·9
1889..	3·22	14	1·08	1	56·1	53·0	81·2	66·2	42·7	49·3	125·9	101·2	32·8	46·9	6·2
1890..	1·25	13	·41	0	54·6	49·8	77·6	65·5	39·1	45·8	120·2	106·6	34·0	40·6	4·7
1891..	2·72	19	·66	0	50·3	46·7	80·2	60·5	30·7	43·0	122·7	98·7	28·0	38·9	6·8
1892..	1·51	11	·74	0	55·6	49·9	84·7	66·4	28·4	45·4	130·2	106·0	23·1	39·2	4·9
1893..	·80	8	·35	0	57·1	51·8	78·6	70·2	38·2	47·4	127·9	112·0	34·0	42·5	4·3
1894..	1·85	16	·41	0	50·7	46·4	71·5	61·0	33·0	42·4	116·9	105·0	25·0	37·2	5·7
1895..	·34	5	·12	0	55·6	50·5	86·2	68·3	35·7	46·0	128·9	109·3	30·2	41·5	3·8
1896..	·14	3	·12	0	54·5	49·1	78·9	67·2	36·1	45·2	122·9	110·2	25·6	38·9	4·3
1897..	1·08	9	·41	0	52·0	47·1	78·0	63·7	33·9	43·2	124·7	107·7	27·1	37·7	4·7
Mean ...	1·92	12	·60	0·2	53·3	49·2	78·1	64·7	33·8	44·4	124·0	106·1	28·8	40·3	5·5
Extremes	4·79	21	1·71	2	58·6	54·4	87·6	70·4	42·7	49·3	131·5	114·0	36·8	46·9	7·2
	·14	3	·12	0	49·2	45·6	68·0	59·3	28·4	40·5	115·8	94·8	23·1	35·7	3·8

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, DECEMBER, 1898.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	57·1	4	27·1	24	49·8	40·8	41·1	84	68·9	22·9	2·54	12	7·1
Malta	66·4	7	41·4	23	61·3	51·5	49·1	79	120·8	37·1	8·14	18	5·2
Cape of Good Hope	81·0	28	49·3	16	74·0	56·5	52·9	64	...	...	·44	4	2·8
Mauritius	86·6	6	68·3	14	83·8	72·5	68·1	74	137·4	60·1	5·70	12	5·8
Calcutta	81·6	14	51·4	5	77·5	56·7	55·2	67	138·4	41·6	·00	0	1·0
Bombay	89·3	18	64·0	29	85·6	72·4	67·6	69	137·3	55·9	·00	0	1·5
Ceylon, Colombo	92·4	18	70·8	10	88·7	72·8	71·8	81	154·0	68·6	3·05	17	5·7
Melbourne	109·4	5	44·0	1	78·7	54·5	49·5	57	158·2	36·9	·97	5	3·8
Adelaide	108·5	30	50·0	17	89·7	63·2	48·4	38	165·0	42·4	·53	2	2·3
Sydney	86·1	3	51·5	11	74·6	61·3	56·9	65	145·8	46·1	1·22	10	4·6
Wellington	77·3	11	47·0	25	69·4	55·1	50·8	67	138·0	37·0	2·71	14	4·2
Auckland	77·0	16*a*	53·0	3*c*	71·1	58·3	56·2	73	146·0	47·0	3·76	13	4·9
Jamaica, Kingston	89·9	1	65·9	20	87·0	68·8	66·0	76	...	...	·14	3	3·6
Trinidad	89·0	1, 5	60·0	4	86·7	68·3	70·5	82	161·0	60·0	3·57	11	...
Grenada	84·0	13*b*	71·0	15*d*	82·0	72·7	66·1	70	152·0	...	6·35	24	2·6
Toronto	44·8	30	—5·2	13	32·9	19·8	23·7	83	57·8	—8·0	2·55	13	7·8
New Brunswick, Fredericton	43·1	30	—17·5	16	28·4	9·8	11·3	75	...	...	2·29	17	6·6
Manitoba, Winnipeg	36·2	17	—34·6	31	15·1	—6·6	...	...	...	...	·61	6	3·6
British Columbia, Esquimalt	53·0	27	26·0	30	44·0	35·3		...	...	...	4·11	17	6·8

a—and 30. *b*—and 19. *c*—and 25. *d*—and 27.

REMARKS.

MALTA.—Adopted mean temp. 55°·9, or 0°·4 below, mean hourly velocity of wind 11·3 miles, or 0·2 above, average. Mean temp. of sea 65°·0. TSS on seven days; L on three days and H on 23rd. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·4, of dew point 0°·1. and rainfall ·70 in., above their respective averages. Mean hourly velocity of wind 10·4 miles or 0·5 mile below average; extremes, 23·5 on 20th and 1·9 on 14th; prevailing direction E.S.E. to E. by N. L and T on 6th and 29th, and L on 16th and 28th. During heavy local rain on December 5th to 7th the seismograph was powerfully affected, the boom on the first two days going clean out of range to E., and on the third moving gradually to W. The rain on the two first days was generally from westward. T. F. CLAXTON.

CEYLON, COLOMBO.—Mean temp. of air 79°·5, or 0°·4 above, of dew point 0°·9 above, and rainfall 3·52 in. below, the average. Mean hourly velocity of wind 7·6 miles; prevailing direction N.W. and N.E. TSS on 6 days and L on 6 other days. H. O. BARNARD.

Adelaide.—A hot, dry month, the mean temp. being 5°·2 above the average of 41 years. Rainfall ·30 in. below average. C. TODD, F.R.S.

Sydney.—Temp. of air 1°·9 below, humidity 4°·5 below, and rainfall 1·42 in. below, the average. H. C. RUSSELL, F.R.S.

Wellington.—Generally fine and pleasant, though showery during the middle and latter part of the month. Distant T on 18th. Prevailing wind from N.W., strong at times. Slight earth shock on 30th. R. B. GORE.

Auckland.—Rainfall rather more than an inch above the average of 30 years. Mean temp. slightly above the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Rainfall only 7 per cent. of the average. Island rainfall 47 per cent. of the average. Mean hourly velocity of wind 1·6 miles. R. JOHNSTONE.

TRINIDAD.—Rainfall 1·24 in. below the average of 30 years. J. H. HART

SUPPLEMENTARY TABLE OF RAINFALL, MAY, 1899.

[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..	1·81	XI.	Builth, Abergwesyn Vic.	5·26
II.	Dorking, Abinger Hall .	1·31	,,	Rhayader, Nantgwillt ...	3·82
,,	Birchington, Thor	2·48	,,	Lake Vyrnwy	3·68
,,	Hailsham	1·54	,,	Corwen, Rhug	2·02
,,	Ryde, Thornbrough	1·06	,,	Criccieth, Talarvor	3·77
,,	Emsworth, Redlands ...	·92	,,	I. of Man, Douglas	3·72
,,	Alton, Ashdell	1·20	XII.	Stoneykirk, Ardwell Ho.	3·90
III.	Oxford, Magdalen Col..	1·28	,,	New Galloway, Glenlee	5·07
,,	Banbury, Bloxham	1·45	,,	Moniaive, Maxwelton Ho.	4·80
,,	Northampton, Sedgebrook	1·41	,,	Lilliesleaf, Riddell	3·00
,,	Stamford, Duddington..	2·16	XIII.	N. Esk Res. [Penicuick]	3·75
,,	Alconbury	2·02	XIV.	Glasgow, Queen's Park..	4·45
,,	Wisbech, Bank House...	2·15	XV.	Inverary, Newtown	2·65
IV.	Southend	1·75	,,	Ballachulish, Ardsheal...	2·17
,,	Harlow, Sheering..... ...	3·00	,,	Islay, Gruinart School...	1·48
,,	Colchester, Lexden	1·49	XVI.	Dollar.....	4·65
,,	Rendlesham Hall	2·05	,,	Balquhidder, Stronvar...	4·20
,,	Scole Rectory	2·15	,,	Coupar Angus Station...	3·78
,,	Swaffham	1·57	,,	Dalnaspidal H.R.S.....	...
V.	Salisbury, Alderbury ...	1·81	XVII.	Keith H.R.S.....	1·79
,,	Bishop's Cannings	2·64	,,	Forres H.R.S.	2·65
,,	Blandford, Whatcombe .	1·34	XVIII.	Fearn, Lower Pitkerrie..	1·96
,,	Ashburton, Holne Vic...	3·18	,,	S. Uist, Askernish	1·51
,,	Okehampton, Oaklands.	3·72	,,	Invergarry.....	1·91
,,	Hartland Abbey	2·47	,,	Aviemore H.R.S.	2·95
,,	Lynton, Glenthorne ...	3·43	,,	Loch Ness, Drumnadrochit	1·75
,,	Probus, Lamellyn	2·45	XIX.	Invershin	2·40
,,	Wellington, The Avenue	1·65	,,	Durness	...
,,	North Cadbury Rectory	1·22	,,	Watten H.R.S.....	2·18
VI.	Clifton, Pembroke Road	2·27	XX.	Dunmanway, Coolkelure	5·51
,,	Ross, The Graig	2·23	,,	Cork, Wellesley Terrace	3·95
,,	Wem, Clive Vicarage ...	2·50	,,	Killarney, Woodlawn ..	3·66
,,	Wolverhampton, Tettenhall	2·06	,,	Caher, Duneske	3·13
,,	Cheadle, The Heath Ho.	2·64	,,	Ballingarry, Hazelfort...	2·96
,,	Coventry, Priory Row ..	2·37	,,	Limerick, Kilcornan ...	1·42
VII.	Grantham, Stainby	2·36	,,	Miltown Malbay	2·78
,,	Horncastle, Bucknall ...	...	,,	Gorey, Courtown House	2·87
,,	Worksop, Hodsck Priory	2·82	XXI.	Moynalty, Westland ...	3·80
VIII.	Neston, Hinderton	2·09	,,	Athlone, Twyford	3·32
,,	Southport, Hesketh Park	2·39	,,	Mullingar, Belvedere ...	3·75
,,	Chatburn, Middlewood.	2·85	,,	Woodlawn	3·78
,,	Duddon Val., Seathwaite Vic.	6·34	XXII.	Crossmolina, Enniscoe ..	3·10
IX.	Melmerby, Baldersby ...	3·83	,,	Collooney, Markree Obs.	2·57
,,	Scarborough, Observat'y	3·33	,,	Ballinamore, Lawderdale	...
,,	Middleton, Mickleton ...	4·30	,,	Warrenpoint.....	3·49
X.	Haltwhistle, Unthank...	2·39	XXIII.	Seaforde.....	3·93
,,	Bamburgh	3·16	,,	Belfast, Springfield	3·53
,,	Keswick, The Bank.....	4·37	,,	Bushmills, Dundarave..	3·04
XI.	Llanfrechfa Grange	3·29	,,	Stewartstown	3·96
,,	Llandovery	2·82	,,	Killybegs	2·46
,,	Castle Malgwyn	3·25	,,	Horn Head	2·72
,,	Brecknock, The Barracks	2·24	,,		

MAY, 1899.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	1·38	— ·52	·40	14	12	74·2	31	34·4	5	0	5
II.		Tenterden	1·72	+ ·16	·69	22	11	71·5	31	32·0	26	1	8
,,		Hartley Wintney	1·49	...	·37	16	13	74·0	31	28·0	5	2	10
III.		Hitchin	1·73	— ·22	·35	14	11	72·0	31	29·0	4	6	...
,,		Winslow (Addington)	2·28	+ ·18	·59	12	14	72·0	31	31·0	4, 5	3	8
IV.		Bury St. Edmunds (Westley)	2·38	+ ·63	·74	12	12	67·0	18	31·0	5	...	...
,,		Norwich (Brundall)	1·97	...	·40	24	16	69·0	18*a*	30·6	1	1	5
V.		Winterbourne Steepleton ...	1·44	...	·45	19	12	66·4	31	30·2	5	2	10
,,		Torquay (Cary Green)	2·07	...	·46	19	12	65·4	8	41·9	4	0	0
,,		Polapit Tamar [Launceston]..	3·62	+ 1·79	1·09	23	13	67·9	31	31·2	6	...	6
VI.		Stroud (Upfield)	2·75	+ ·71	·91	19	12	69·0	31	36·0	5	0	...
,,		ChurchStretton(Woolstaston)	2·01	— ·86	·39	24	15	70·0	31	31·0	4	2	7
,,		Worcester (Diglis Lock)	2·13	— ·15	·37	16	16	...	...	...	...	...	...
VII.		Boston	2·52	+ ·80	·47	8	13	75·0	31	30·0	5, 6	2	...
,,		Hesley Hall [Tickhill].....	2·18	+ ·14	·50	15	16	75·0	31	29·0	5, 6	7	...
,,		Breadsall Priory	2·92	...	·50	22	14	71·0	31	32·0	4*c*	4	10
VIII.		Manchester(PlymouthGrove)	...	...	...	...	...	...	...	...	...	...	...
IX.		Wetherby (Ribston Hall) ...	4·23	+ 2·28	1·69	11	16	...	...	...	...	...	...
,,		Skipton (Arncliffe)	4·46	+ ·74	1·17	11	15	...	...	...	...	...	...
,,		Hull (Pearson Park).	3·33	+ 1·45	·79	15	18	70·0	30	30·0	5	3	10
X.		Newcastle (Town Moor)	3·59	+ 1·84	·85	11	17	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	8·78	+ ·17	2·47	19	16	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	2·84	— ·01	·80	19	15	...	...	...	...	...	...
,,		Haverfordwest	2·43	+ ·07	1·01	19	15	68·9	30	33·3	27	0	7
,,		Aberystwith (Gogerddan) ...	4·26	...	·95	21	16	73·0	31	...	...	...	...
,,		Llandudno.....	2·26	+ ·33	·45	23	14	66·0	31	36·0	5	0	..
XII.		Cargen [Dumfries]	4·11	+ 1·59	·98	18	9	69·0	31	30·0	4, 5	3	...
XIII.		Edinburgh (Blacket Place)...	3·80	...	1·25	19	15	70·8	31	33·2	6	0	3
XIV.		Colmonell	3·09	...	·96	18	9	71·0	29	28·0	3	...	...
XV.		Tighnabruaich	2·81	...	·75	19	12	66·0	31	32·0	3	1	...
,,		Mull (Quinish).....	2·39	— ·56	·48	19	13	...	...	...	...	...	...
XVI.	SCOTLAND.	Loch Leven Sluices	4·60	+ 2·04	1·50	20	12	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	4·00	+ 2·34	·95	18	16	73·0	31	32·7	8	0	...
XVII.		Braemar	3·05	+ ·64	·77	19	15	67·0	31	24·8	4	14	22
,,		Aberdeen (Cranford)	3·26	...	·94	19	14	71·0	31	29·0	4*e*	8	...
,,		Cawdor (Budgate)	2·57	+ ·82	·70	15	13	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	2·64	— ·45	1·02	17	6	...	...	...	...	...	...
,,		Glencarron Lodge.....	4·55	...	1·51	16	14	65·9	8	30·1	3	5	...
XIX.		Dunrobin	2·53	+ ·43	1·13	15	7	65·0	31	33·0	4	0	...
,,		S. Ronaldshay (Roeberry) ...	3·09	+ 1·37	1·23	15	11	62·0	29	35·0	3*f*	0	...
XX.		Darrynane Abbey.....	2·55	...	1·34	17	13	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	3·74	+ 1·51	·58	9	16	66·0	30	33·0	15*d*	0	...
,,		Broadford (Hurdlestown) ...	3·15	...	1·16	17	15	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	2·66	+ ·32	·59	19	13	...	..	...	...	...	...
,,		Dublin (FitzWilliam Square)	2·09	+ ·16	·36	17	16	69·6	31	38·0	27	0	0
XXII.	IRELAND.	Ballinasloe	2·90	+ ·21	1·03	17	14	71·0	31	38·0	6*g*	0	...
,,		Clifden (Kylemore)	2·65	...	·63	19	11	...	...	...	...	...	...
XXIII		Waringstown	5·03	+ 2·59	·85	19	17	68·0	10*b*	29·0	6	5	6
,,		Londonderry (Creggan Res.).	3·80	+ 1·28	·79	23	17	...	...	...	...	...	...
,,		Omagh (Edenfel)	3·40	+ ·93	·84	23	16	69·0	31	32·0	3	1	7

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

a—and 31. *b*—and 11, 12. *c*—and 5, 27, 28. *d*—and 27. *e*—and 5, 26.
f—and 24. *g*—and 7, 8.

METEOROLOGICAL NOTES ON MAY, 1899.

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 first and last weeks were cold and dry. Showery from 13th to 16th, and from 19th to 24th. Heavy R on Whit Monday, 22nd, but very partial, 1·13 in. falling at Benenden, but none further S. Duration of sunshine 233 hours 40 mins. Bamboo and blue gum recovered from the March frost.

HARTLEY WINTNEY.—Much cold throughout the month, especially in the first and last weeks with strong N.E. winds; a sharp snap of frost from 26th to 30th damaging young shoots. The middle of the month was showery, but the total R is ·14 below the average. Distant T on 11th. 13 hours sunshine on 31st. Ozone on 14 days. Oak in leaf on 20th and ash on 31st.

WINSLOW, ADDINGTON.—A rather cold May with a good deal of R between the 8th and 24th, then very fine and bright to the end with slight morning frosts, but sharp enough to cut down potatoes and French beans. Heavy TS on 12th with heavy R, and H within a few miles; several accidents to sheep and cattle caused by the L.

WESTLEY, BURY ST. EDMUNDS.—A dull and unpleasant month and vegetation backward. Very cold from 4th to 6th. T on 8th, 19th, 22nd, and 23rd. TS on 15th. H on 8th.

NORWICH, BRUNDALL.—An ungenial month with much cold, harsh weather, rendering vegetation unusually late. R slightly over the average, and mean temp. about 2° deficient. The second May in succession with no max. temp. as high as 70°. Fine, dry, and much warmer towards the end. T and L from 5 to 6 p.m. on 15th, T at 4 p.m. on 16th, distant T on 20th, TS and heavy R at 3 p.m. on 24th.

WINTERBOURNE STEEPLETON.—Very cold and dull, the mean temp. being only 48°·9, or the lowest for May, except 1894, in seven years, and 2°·2 below the average.

TORQUAY, CARY GREEN.—R ·05 in. above the average. Mean temp. 52°·8, or 0°·4 below the average. Duration of sunshine 210 hours 50 min., being 14 hours 10 mins. below the average. No sunless day, the least duration being 10 mins. on 3rd, 19th, and 24th, and the greatest 14 hours 20 mins. on 31st, or 90 per cent. of the possible.

POLAPIT TAMAR [LAUNCESTON].—The early part of the month was fine and dry with cold nights and easterly winds. From 11th to 26th the weather was rough and cold with strong wind, heavy R and H. From 27th to the end finer with E. wind again.

STROUD, UPFIELD.—Heavy TS to the N. on 11th, but only a few drops of R here. S.W. gale on 18th.

WOOLSTASTON.—A very cold and backward month. Violent storms of H on 16th; mean temp. 50°·4.

BREADSALL PRIORY.—A very cold, sunless, and wet month.

HULL, PEARSON PARK.—TSS on 16th, 20th, and 23rd, with H on the latter day.

SEATHWAITE.—S on the mountains on 22nd.

WALES.

HAVERFORDWEST.—May was cold to the 7th, with ground frosts. From 7th to 26th R fell in small quantities nearly every day. From 26th to the end fine,

bright days, with low night temp., prevailed. Wind mostly N., N.E., and S.E. In 5 mins. at 1.30 a.m. on 17th ·10 in. of R fell, and at 3.15 a.m. on the same day there were violent squalls lasting from 10 to 15 mins. The oak was in leaf more than 15 days in advance of the ash.

GOGERDDAN.—The second and third weeks were very wet, but the last week was very hot, with bright sunshine.

SCOTLAND.

CARGEN [DUMFRIES].—Except the last five days, when fine, warm weather prevailed, there was a continuance of the cold unsettled weather of April. Excessive R, low temp., and absence of sunshine having been the unusual concomitants of a bar. pressure somewhat above the average. The mean temp. was lower only in 1869, 1885, and 1894 during 40 years, and in only seven Mays was there a heavier R or less sunshine. Of the 4·11 in. of R 3·13 in. fell in the seven days, 17th to 23rd. E. winds prevailed on 21 days. The R for the first five months of the year is 24·47 in., exceeding the mean by upwards of 8 in., the fall in each month being in excess. Vegetation fully three weeks later than in 1898. T in afternoon on 1st. H showers on 16th.

EDINBURGH, BLACKET PLACE.—Very cold and wet. Mean temp. 3°·1 below, and R nearly double, the average. The fall on 19th, 1·25 in., is the greatest daily amount in May since 1865, and in 54 hours on 18th, 19th, and 20th, 2·09 in. fell. Fog on 10th.

COLMONELL.—R ·66 in. above, and mean temp. 2°·3 below, the average of 23 years. T on 1st and 15th. T and L on 16th.

TIGHNABRUAICH.—A cold, backward month, with small R. Prevailing winds E. and S.E., N. and N.W.

ABERDEEN CRANFORD.—Cold and wet, with N. and N.E. wind, and little sunshine.

S. RONALDSHAY, ROEBERRY.—The first half of the month was dry, the middle very wet and cold, the latter part drier and warmer. Mean temp. 45°·8, or 1°·6 below the average of 9 years.

IRELAND.

DARRYNANE ABBEY.—Fine on the whole, but heavy R on 17th and 18th. Heavy T with L on 10th, and T on 26th. The last few days very fine and warm. Total R for the first 5 months ·15 in. more than in 1898, but on 30 fewer days.

WATERFORD, BROOK LODGE.—T on 9th and 11th, H on 16th, fog on 21st.

BROADFORD, HURDLESTOWN.—A favourable month on the whole. The R of 17th, 1·16 in., is the greatest in 24 hours since July 24th, 1896, when 2·10 in. fell. R ·60 in. above, and rainy days 1 below, the average of 14 years.

DUBLIN, FITZWILLIAM SQUARE.—Both at the beginning and at the close fair, calm, anti-cyclonic weather prevailed; cold nights, and sunny, and sometimes warm, days. During the middle fortnight conditions were cyclonic, and the weather very disturbed, rainy and cold, R falling daily from 11th to 24th. Mean temp. 51°·4, or 0°·2 below the average. High winds on 6 days, never reaching the force of a gale. Fog on 10th, 12th, and 29th. H on 16th. T on 15th. Lunar corona on 20th. Solar halos on 1st, 17th and 29th.

WARINGSTOWN.—The wettest May since 1886.

OMAGH, EDENFEL.—The first week was fine and generally bright, with somewhat arid days and cold nights. In the fortnight that followed a R 50 per cent. above the average for the whole month fell, accompanied by a generally dark, raw, saturated atmosphere. The last week was brilliant, but without any real warmth till the last day.

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METEOROLOGICAL EXTREMES.

INTRODUCTORY.

THE very remarkable record of barometric pressure which we quoted on page 66 (31·42 in.) has led one of our correspondents to suggest that it would be interesting to give in this Magazine a list of extremes, not merely of Pressure, but also of Temperature, Wind, Rain, &c. This is by no means easy. Information is widely scattered, in many languages, and in many books. The "infallible" Editor does not exist, and the inevitable result of the attempt will be the disproval and contradiction of many statements. But we wish for nothing but facts, and think that the more severe and the more widespread the criticism of the facts and opinions we put forth, the greater will be the advantage.

Desiring to avoid confusion, we intend to take one subject in each alternate month, leaving the intervening ones for the comment and criticism which we cordially invite.

PRESSURE.

Inasmuch as the barometric pressure is modified by the altitude above the earth's surface, it is obvious that for comparison, all records must be reduced to sea level. But for the benefit of those who have not thought much about the subject, we may mention that if the pressure at the level of the sea were 31 inches, it would be about 33 inches at the bottom of a mine 600 yards deep. Similarly when Messrs. Glaisher and Coxwell were at their greatest height (6 or 7 miles) in the balloon on September 5th, 1862, the barometer read only 7 inches, and in some of the recent experiments, when balloons have been sent up, carrying recording aneroids, *but no passengers*, the instruments have been recovered, indicating the following extremely low pressures: 1895, October 20, 4·33 in.; 1896, November 14, 4·45 in., and 1897, February 18, 4·02 in.

HIGH SEA LEVEL PRESSURES.

Leaving these artificially produced extremes, and taking records reduced to the mean level of the sea, we have collected the following paragraphs, and arranged them in the sequence of their publication:—

"*Extreme Fluctuations of the Barometer.*—The greatest height which

the barometer at Boston, U.S.A., has attained in 37 years is 31·125 in., and the least is 28·47 inches [1846, Nov. 25th]; the difference being 2·655 inches."—*Treatise on Meteorology*, by ELIAS LOOMIS, LL.D. (1880), page 21."

"In a letter to the *Times* (Jan. 18th, 1882), Mr. Symons quoted a reading at Greenwich Observatory on February 11th, 1849, which, reduced to sea-level, would be about 30·895 ins. (·080 in. lower than that of 1882), and adds:—Rather more than a century since, Sir George Shuckburgh (a remarkably accurate observer) is stated to have observed in 1778, 'the barometer in London at 30·935 inch, which he believed to be the greatest elevation ever seen.'"

"I do not know whence Belville quotes this statement, and it is not clear whether any corrections have been applied for temperature or for altitude. As the corrections would be of nearly equal amounts and of opposite sign, we shall, I think, be safe in assuming that 30·935 ins. was about the point reached in 1778." . . . .

"Belville gives a table of extreme pressures at Greenwich (not at the Royal Observatory), from 1811 to 1848, and from it, applying all necessary corrections, I find that on January 9th, 1825, the sea-level pressure recorded by Belville, reduced to sea-level, is 30·908 ins."

"In 1835 also, on January 2nd, the pressure recorded by Belville, reduced to sea-level, is 30·908 ins."

"In a leading article in *Nature*, of Jan. 26th, 1882, it is stated that readings of 31·046 ins. at 11 p.m. on January 8th, 1820, and of 31·007 ins. at 9 p.m. on February 24th, 1808, were observed at Gordon Castle, Banff, by Mr. James Roy; and it appears from the *Journal of the Scottish Meteorological Society*, that these observations were made with a barometer with a wooden scale, which is believed to have been fairly correct, though it would not now be accepted as a standard instrument."

"The reading of January 9th, 1820, is also supported by the following values, which I have reduced to sea-level as accurately as was possible without particulars of the exact position and external temperature:—Greenwich, 30·818 ins; Leith, 9 a.m., 31·065; Kinfauns, 9 a.m., 31·054 ins."

"M. Renou, in a note to the Paris Academy of Sciences, states that the maximum pressure at the Parc St. Maur was 786·92 mm. (30·981 ins.), at 10 a.m. on Jan. 17th, 1882, and adds that during nearly a century, only once has a pressure slightly exceeding this, been recorded at the Paris Observatory."

"On February 6th, 1821, at 9 a.m., the height was 787·52 mm. (31·004 ins.) and it would appear that at Paris, with these two exceptions, the barometer has during two centuries, never exceeded 785·1 mm. (30·910 ins)."

In an article in the *Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie*, Dr. Hann says: "The maximum pressure on Jan. 16th, 1882, at 10 a.m., 768·3 mm. (30·249 ins.) or 787·9 mm. (31·020 ins.)

at sea-level, is probably the highest in Vienna since 1775, for the sea-level pressure of 788·3 mm. (31·036 ins.) on Feb. 8th, 1821, cannot be relied upon as within ·01 in. or ·02 in. of the truth.

"With the exception of that occasion, the previous maximum sea-level pressure was only 785·6 mm. (30·930 ins.) on the 9th of January, 1859."—H. SOWERBY WALLIS, *Quar. Jour. Roy Met. Soc.*, Vol. viii. (1882), pp. 149–150.

"We have thus found that over Europasia areas of high pressure frequently cover a vast extent of territory; the barometer rises to a height unknown in any other part of the world, the thermometer sinks very low, and the centre of the high area—although it vibrates to-and-fro from day-to-day—appears to have no decided progressive motion.

"The highest pressure shown in Table LVIII. is 31·63 inches at Barnaul, and is the highest pressure at any of the stations reported in the *International Bulletin*.

"The number of Russian stations from which reports were received is only 22, whereas the number reported in the *Annalen des Physikalischen Central Observatoriums* is over 100, and one of these stations shows a pressure higher than Barnaul.

"At Ssemipalatinsk on December 16th, 1877, the pressure was 784·5 mm., which, reduced to sea-level (altitude 607 feet, and temperature —49° Cent.) amounts to 31·72 inches.

"This is the highest pressure I have found reported at any time for any part of the globe."—*Contributions to Meteorology*, by E. LOOMIS. 4to edition, 1887, p. 105.

"*High Pressures.*—Fort Conger, 31·00 in., March, 1883; "Jeannette," 31·09 in., 1880; Barnaul, 31·21 in., January 9th, 1877; Fort Assinaboine, 31·21 in., January 6th, 1886."—*American Weather*, by A. W. GREELY (1888), page 99.

"It may be of interest to add to these notes, as a supplement to Mr. Wallis's paper of 14 years' back, a notice of the excessive readings which have occurred in Siberia of late years. In vol. x. of the *Meteorologische Zeitschrift*, in the part for March, 1893, there is a note by our Honorary Member, Dr. Woeikof, on this subject.

"Herr Sresnewski had stated that on January 14th, 1893, a reading had been recorded at Irkutsk, which, when duly reduced, came to 807·2 mm., or 31·78 in. Dr. Woeikof disputes this statement, *inter alia*, because the temperature for reducing *up* to the freezing-point had been taken at —51°·34 F., and had been assumed to prevail from Irkutsk to the sea. He maintains that the reading of 803 mm., or 31·62 in., at Barnaul, December 14th, 1877, is really the best established barometrical maximum as yet on record.

"These readings, however, have been so much corrected, especially as to the reduction to sea-level, from stations some thousands of miles from the nearest sea, that they are not so easily intelligible as our own readings taken, so to speak, on the sea-shore.

"We can, however, feel pretty confident that as yet no reading of 32 in. has been registered.

"The highest sea-level pressures during January, 1896, given in the above paper are 31·108 in. at Ochtertyre, and 31·106 in. at Fort William."—Dr. R. H. SCOTT, *Quar. Jour., Roy. Met. Soc.*, Vol. xxii. (1896) p. 157.

Highest Pressures at Camden Square, 1858–99.

Above 30·750 inches.

		in.			in.
1859	Jan. 9, 11.4 p.m.	30·830	1882	Jan. 18, 10.30 a.m.	30·975
1865	Dec. 15, 9.0 ,,	30·782	1886	Feb. 8, 9. 0 p.m.	30·751
1867	Mar. 2, 9.0 a.m.	30·788	1893	Dec. 30, 1.50 a.m.	30·772
1873	Feb. 18, 11.0 ,,	30·846	1896	Jan. 9, 9. 0 p.m.	30·934
1879	Dec. 23, 10.0 ,,	30·813	,,	,, 30, 11. 0 a.m.	30·927

As regards the recent case in the N.W. of America, we have the precise figures only for the station at Swift Current, but the chart reproduced in the *Weather Review* shows that at 8 a.m. on February 11th, 1899, the isobar of 31·0 inches started N. of Fort Garry in 98° W. and 48° N., went nearly due S., between Lincoln and Topeka, then turned westward between Denver and Cheyenne, and went N.-Westward to a point in 117° W., and 48° N; it therefore included a vast area about 8° by 20°, and the records from the surrounding stations amply support the highest reading of 31·42 in., at Swift Current, Assiniboia.

It will be seen from the extract above given from General Greely's *American Weather*, and it is further proved by a table of 81 instances of pressures exceeding 31 inches reported during seven years (1877–84), given by Loomis, that Assiniboia is a locality in which these extreme pressures are comparatively frequent.

Instances of Sea-Level Pressures exceeding 31 *inches.*

[This list is far from complete as there must be several hundred such records, but these have been selected partly for extreme height, and partly for rarity in the respective localities.]

						in.
Irkutsk	52° 20′ N.	104° 36′ E.	1893	Jan. 14	...	31·780
Ssemipalatinsk	50 33 N.	80 36 E.	1877	Dec. 16	...	31·720
Barnaul	53 14 N.	83 22 E.	,,	,, 14	...	31·620
Swift Current	50 30 N.	108 15 W.	1899	Feb. 14	8 a.m.	31·420
Barnaul	53 14 N.	83 22 E.	1877	Jan. 9	...	31·210
Fort Assinaboine	50 12 N.	100 30 W.	1886	,, 6	...	31·210
Boston, U.S.A.	42 20 N.	71 18 W.	Before 1880		...	31·125
Ochtertyre	56 24 N.	3 53 W.	1896	Jan. 9	9 a.m.	31·108
Fort William	56 48 N.	5 5 W.	,,	,, ,,	10.12 a.m.	31·106
"Jeanette"	In Arctic Regions.		1880	...	...	31·090
Leith	55 58 N.	3 10 W.	1820	Jan. 9	9 a.m.	31·065
Kinfauns Castle	56 23 N.	3 20 W.	,,	,, ,,	9 ,,	31·056
Gordon Castle	57 38 N.	3 4 W.	,,	,, 8	11 p.m.	31·046
Vienna	48 13 N.	16 22 E.	1821	Feb. 8	..	31·036
,,	,,	,,	1882	Jan. 16	10 a.m.	31·020
,,	,,	,,	,,	,, 17	7 ,,	31·012
Gordon Castle	57 38 N.	3 4 W.	1808	Feb. 24	9 p.m.	31·007
Paris	48 50 N.	2 20 E.	1821	,, 6	...	31·004

Low Pressure.

"At Unalaska, January 21st, 1879, a reading of 27·70 was noted, and at Stykkisholm 27·91 was recorded February 1st, 1877.

Even more remarkable readings have been noted in connection with the typhoons of the China Sea and the cyclonic storms of the Atlantic. On September 27th, 1880, the ship "Chateaubriand," in 22° N., 121° E., near Grand Turk Island, experienced a violent typhoon, during which the barometer sank in four hours from 29·64 to the unprecedented point of 27·04. Wind of force 12, from the northwest, was followed by a dead calm, and then by south and south-east winds, force 12, thus showing that the vessel was in the centre of the typhoon."—*American Weather*, by A. W. Greely, p. 97.

"Mr. Blanford, in a communication to *Nature*, vol. 35, p. 344, dated January 6th, 1887, referring to the reading of 27·332 ins. (reduced to sea-level) at Ochtertyre, which was quoted as the lowest reading observed by man anywhere on the land surface of the globe, states that 'the cyclone, which on the morning of September 22nd, 1885, swept over False Point, on the cost of Orissa, gave the lower reading 27·135 ins., at the beginning of the central calm, and 27·154 ins. half an hour later (both readings reduced to 32° and sea-level).'

The readings are shown by Mr. Blanford to be thoroughly authentic, and were made by a verified Standard barometer.

For comparison with English Standards, a further subtractive correction of ·011 in. has to be applied, which would make the lowest reading 27·124 ins."—C. Harding, in *Quar. Jour., Roy. Met. Soc.*, Vol. xiii, 1887, p. 212.

Lowest Sea-Level Pressures at Greenwich, 1811—1884.

Below 28·600 inches.

			in.				in.
1812	Oct. 19,	6.0 p.m.	28·542	1847	Dec. 7,	2.30 a.m.	28·550
1814	Jan. 29,	5.0 ,,	28·233	1848	Feb. 26,	9.45 ,,	28·469
1817	Dec. 8,	—	28·532	1865	Jan. 14,	11.55 ,,	28·560
1818	Mar. 4,	night	28·530	1872	,, 24,	5.20 ,,	28·380
1821	Dec. 25,	5.0 a.m.	28·016	1873	,, 19,	10.30 p.m.	28·453
1824	Nov. 23,	—	28·484	1876	Dec. 4,	11.0 a.m.	28·407
1843	Jan. 13,	0.53 p.m.	28·266	1884	Jan. 26,	7.35 p.m.	28·520

W. Marriott, *Quar. Jour.*, *Roy. Met. Soc.*, vol x., 1884, p. 121.

Lowest Pressures at Camden Square, London, 1858—99.

Below 28·600 inches.

			in.				in.
1865	Jan. 14,	11.30 a.m.	28·557	1884	Jan. 26,	7.30 p.m.	28·529
1872	,, 24,	4.47 ,,	28·332	1886	Dec. 9,	4.45 a.m.	28·295
1873	,, 20,	1.0 ,,	28·447	1891	Nov. 11,	11.45 ,,	28·456
1876	Mar. 12,	0.30 p.m.	28·447	1893	Dec. 20,	5.0 p.m.	28·565
,,	Dec. 4,	11.0 ,,	28·364	1896	,, 5,	1.11 a.m.	28·515

Rapid Fall of Barometer.

"Thus during the hurricane which devastated Guadaloupe on the 6th September, 1865, it is stated in the *Bulletin International* that the barometer at Marie Galante, a neighbouring island, was 29·929 inches at 4 a.m., 29·646 at 6.30 a.m., 29·174 at 6.47 a.m., and 27·953 at 7.40 a.m., having thus fallen 1·693 inches in one hour and ten minutes!"—*Handy Book of Meteorology.* By Alexander Buchan. 1868.

EFFECT OF THE MOON ON TEMPERATURE.

To the Editor of the Meteorological Magazine.

Sir,—In the March and June numbers there are articles on the effect of the moon on temperature at Greenwich, England, and Blue Hill, Mass., giving figures showing a most extraordinary effect from the moon, and in opposite directions at the two places. Oftentimes it seems best to let errors go, as they will be righted sometime; but these articles are so extremely wild that forebearance ceases to be a virtue. Leaving out the question whether a dead moon can influence the earth's temperature in any way. Furthermore, ignoring the most careful experiments of Lord Rosse with his big reflector, in which he showed that, if anything, the earth receives a slight cooling from the full moon, also omitting the still later bolometric work on the moon, in which it was shown that it gives just the least bit of heat to the earth, is it possible to reason as to the manner in which the moon must affect the earth if at all? Is it not impossible to consider that the moon can have a tendency to heat the earth at one time and at another to cool it? Is it possible to assume that the moon can cool one part of the earth in its apparent diurnal motion and can heat another part at the same time? An answer to these two questions gives the death blow to all researches of the kind here published.

The inquiry remains, how can such remarkable statistics as those given be explained if they are of no value. We have a familiar saw in this country "figures can't lie," and there are a great many people, and some scientists, who believe that all that is necessary is to turn a mass of statistics into a machine and grind out the results. The present case is a fine example of the utter futility of such methods of work. In all studies of meteorologic data for relationships, there are, at least, three absolutely essential conditions to be observed:—

1. The data must be sufficiently abundant to establish a law.
2. It is very essential to be able to show *a priori* how such a law or relationship can come about.
3. The data must be homogeneous, that is, all sources of modification or variation must be first eliminated before research on a suspected law can be begun.

Now these three principles have been grossly neglected in the above discussion.

The following examples may make these points clearer :—

1. It is related of Sir Isaac Newton that,—one day driving with a friend, he passed a shepherd boy tending his flock. The boy warned him of an impending storm, though the sky was without a cloud ; and sure enough, within two hours, a heavy storm came up, and the two were drenched. The next day the philosopher approached the boy, hoping to get the secret of his remarkable prophecy. It was only after a guinea rested in the boy's palm that he ventured to impart his secret. "Do you see that old black sheep in the flock? Well, when he turns his nose into the wind, shakes his head, stamps his foot, and wags his tail, it will surely rain within two hours."

2. The ancients were perfectly justified by statistics and coincidences, in teaching that the earth was stationary and the whole universe revolved about it. Millions upon millions of such statistics could not establish the true law.

3. Statistics have been massed to show that there are more deaths among adults in winter than in summer, and some have taught that cold is inimical to good health. It has also been stated that convicts in prison have greater weight in summer than in winter. On the other hand, it is almost the universal testimony that cold air is invigorating, and certainly much better work is done in the cold season than in the warm. If such statistics were properly studied and arranged, it would be found that it is not the cold air that causes sickness in winter, but carelessness and exposure. The reason convicts weigh less in winter is because of confinement in closed cells, while in summer regular out-door exercise, and a better diet, increases their weight. Most everyone weighs more in winter than in summer.

Taking the case before us, we find (1), all efforts to establish such a law in the past have failed whenever enough statistics have been massed. Take, for example, the data at Boston, Mass., very near Blue Hill, for 1898 and 1899, to the present time, 18 lunations. I will give the figures as arranged by Mr. Clayton, that is, I will subtract the temperature at full from that at new moon :—

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
+3°	+4°	−8°	+4°	+8°	+7°	−1°	−4°	−4°	−10°	+2°	−6°	−6°	−19°	−1°	+1°	+1°	+5°

It will be seen that the figures between the dark lines, or from the 7th to the 14th lunations, are almost the same as those given for the same period at Blue Hill. Even in this short interval, we see that there are just as many plus departures as minus, though, if we pick out the eight given by Mr. Clayton, we shall find 88 % in favour of the view that the full moon heats the earth. (2), We have already seen that *a priori* reasoning establishes the fact that the moon can have no effect upon temperature. (3). Changes in temperature are due entirely to the progress of high and low pressure areas, to the clearness or cloudiness of the sky, and to several other conditions, not clearly understood. Take the enormous difference of 29°, given

by Mr. Clayton, for the February lunation. During those seven days, the eastern United States had one of the severest cold waves ever experienced, and the fall in temperature was due to this cold wave, and in no manner whatsoever to the moon. In addition it may be said the figures given at Greenwich and Blue Hill really prove too much. Everyone knows that the moon cannot have so marked an effect.

H. A. HAZEN.

Washington, D.C., U.S.A.

LUNAR HALO.

To the Editor of the Meteorological Magazine.

SIR,—Last night (April 18th), between 9 and 9.30 p.m., I saw what I venture to think is rather an unusual form of lunar halo.

There was, in the first place, the upper half *only* of the usual primary halo, extremely bright and clearly defined. I measured this roughly with the finder of my telescope, and made the inner edge at the highest part to be about 21° above the moon. At this point, and for some distance on each side of it, there were distinct traces of a reddish-brown tinge of colour (also on the inner edge, which just touched the star α Lyncis). At the points east and west of the moon, where you would expect mock moons to form, and where they are shown on Mr. Stow's engraving, there was a slight brightening and a good deal of scattered light; from these points there stretched a circle entirely round the heavens, apparently at the same altitude above the horizon as the moon, the only part wanting being that within the circumference of the primary halo. Following round by the south from the S.W., this large halo passed just below Arcturus, above γ and β Draconis, but below θ of the same constellation, then about 8° below the Pole star, and finally over β Aurigæ. About 9.20 p.m. in that part of the heavens opposite the moon, this halo became very bright, almost as much so as the primary halo, but I could not detect any colour. If I am correct in my estimate that at 9.20 p.m. the large halo passed 8° below the Pole, this would make the altitude about 45° above the horizon all round.

On referring to notices of lunar halos in the *Met. Mag.*, I find that this must be the same halo as that described in Vol. IV., p. 145, but Mr. Stow appears to have seen only a comparatively small part of it.

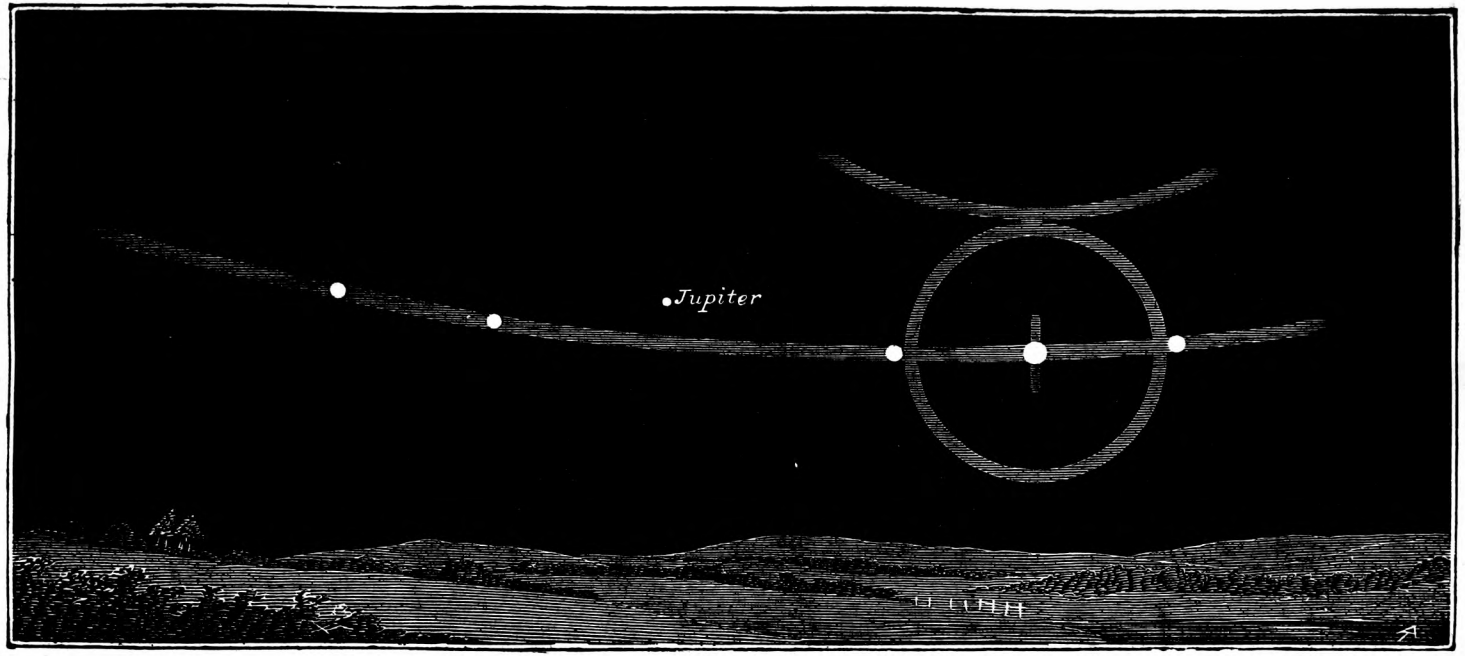
Everything disappeared shortly after 9.30 p.m., but at 11.15 p.m. the primary halo was again seen (this time complete, though much fainter), but no trace of the large halo.

I am, yours sincerely,

CHARLES L. BROOK.

Harewood Lodge, Meltham, April 19th, 1899.

[It is not easy to arrange a view of the phenomenon which goes



HALOS AND PARASELENÆ SEEN AT HAWSKER, NEAR WHITBY,
By the Rev. F. W. Stow, 9.45 p.m., Oct. 15th, 1869.

Reprinted from *Meteorological Magazine*, November, 1869.]

[See page 88.

"entirely round the heavens;" therefore, instead of attempting to do so, we reprint the engraving to which Mr. Brook refers. It, and his carefully-worded description, will, we think, convey to everyone an accurate idea of the phenomenon he was so fortunate as to see. The explanation of the formation of this horizontal white band was given by Mr. Cherrill in *Met. Mag.*, XXVI. (1891), p. 69.—ED.]

ROYAL METEOROLOGICAL SOCIETY.

The last Monthly Meeting of the present session was held on Wednesday afternoon, June 21st, at the Society's new rooms, 70, Victoria Street, Westminster. Mr. F. C. Bayard, LL.M., President, in the chair.

The following gentlemen were elected Fellows:—H. O. Barnard, Surveyor Generals' Office, Colombo, Ceylon; Augustine Marshall, M.D., 145, London Road South, Lowestoft; Captain R. H. Potter, 6, Alwin Street, Aigburth Road, Liverpool.

Dr. R. H. Scott, F.R.S., read a paper on the heavy falls of rain recorded at the seven Observatories connected with the Meteorological Office during the 28 years, 1871—98. The data have been derived from the records of the Beckley self-recording rain gauges at the following places:—Valencia, Armagh, Glasgow, Aberdeen, Falmouth, Stonyhurst, and Kew. These records have been tabulated for each hour, and it is from these hourly tabulations that Dr. Scott has extracted the heavy falls. He finds that Falmouth has the greatest frequency of heavy falls, the next station being Valencia, and then Stonyhurst. The most exceptional fall during the whole period was at Glasgow, at 5 p.m. on August 11th, 1895, when as much as 0·80 in. was collected in ten minutes. The information given in this paper is likely to be of much service to engineers who want to know the rate at which rain sometimes falls for short periods.

A paper by Mr. J. Baxendell, describing his new self-recording Anemoscope, was read by the Secretary. This instrument, which records the direction of the wind on an open scale, has been in use at Southport for more than a year, and works very satisfactorily. The vane, which is an exceedingly light, but large double-bladed one, is sensitive even in light airs, and steady in the strongest gales. The records from this Anemoscope, which were exhibited at the meeting, were very clear, of an interesting character, and showed the instrument to be a valuable companion to the Dines pressure tube anemometer.

A paper by Mr. R. C. Mossman, F.R.S.E., on the average height of the barometer in London was also read by the Secretary. Some years ago Mr. H. S. Eaton worked out the mean monthly and annual height of the barometer in London for 100 years. Mr. Mossman has carried on this discussion for a further period of 20 years, but he finds that the results for the 120 years are practically identical with those for 100 years.

OZONE.

To the Editor of the Meteorological Magazine.

SIR,—Your effort to revive observations on ozone will, I think, be gratifying to old-fashioned meteorologists. I was very glad to see the article on this subject in the May No. of the *Met. Mag.* (p. 50), also Mr. Machin's letter in the June No.; this writer states that he is "the only one reporting ozone to your *Met. Mag.*", but I fail to find his records, and should be pleased to see what he has reported.

Twenty years ago I registered ozone here, at Lowestoft, and used Schönbein's tests, I had good results; but as the Roy. Met. Soc. did not include that element in the Report (this station was adopted by the Society as one of the "Second Order"), I let the matter slide.

Twelve months ago I made a fresh start, using Dr. Moffat's tests, scale (0—10), and append the *means* for the six months of 1899 :—

Jan. ...	5·4	Feb. ...	4·2	Mar. ..	5·1
April ...	5·6	May ...	5·4	June ...	5·3

I know of no records with which to compare these means, except the few in Mr. Glaisher's Reports to the Registrar General.

I noticed that ozone was entirely absent here from the 7th to the 11th of January, and I noted that a large fire at a timber yard, $1\frac{1}{4}$ mile distant, just S.W. of this Station, occurred on the 7th of January,—which seemed to have burnt out all the ozone (or while the débris was smouldering, the fumes neutralized it); the wind being S.W., except for a short time it was S.S.E., and then I found 1 on the scale.

Generally, I observe the largest amount when the wind is from the sea, i.e., between N. and S.S.E. But I think results should be collated not only with the direction of wind, but also with hygrometric conditions.

There was a drought here from May 26th to June 18th (only 0·01 in. on June 10th), but ozone was manifest every day, ranging between 4 and 8, the mean being 5·3 for the 22 days. Sea breezes prevailed.

I do not know whether we possess, in this country, the necessary records for a thorough discussion.

Yours faithfully,

SAM. H. MILLER.

Lowestoft, July, 1899.

[Mr. Miller seems to have overlooked Mr. Machin's "Remarks" on each month, but the mean amount should be given as well as the frequency. Probably the best plan would be for those who would like to co-operate to intimate the fact, and if the wish seemed sufficiently supported, the Council of the Roy. Met. Soc. might be asked to nominate a Committee to consider and advise upon the subject; for if observations are to be resumed, several points must be considered so as to ensure the closest possible approach to uniformity.—ED.]

RESULTS OF METEOROLOGICAL OBSERVATIONS AT CAMDEN SQUARE FOR 40 YEARS, 1858–97.

JUNE.

YEAR.	RAINFALL.				TEMPERATURE.										CLOUD.
	Total.		Max. Fall.	Falls of 1 in. or +	Dry. Mean, 9a.&9p.	Wet. Mean, 9a.&9p.	Shade Max		Shade Min		Sun Max. Black.		Grass Min.		
	Depth	Days					Abs.	Aver	Abs.	Aver	Abs.	Aver	Abs.	Aver	Aver
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	in.		in.		°	°	°	°	°	°	°	°	°	°	0-10
1858..	·92	5	·59	0	65·8	61·0	92·6	79·1	46·1	55·1	..	..	..	..	4·1
1859..	2·90	12	1·01	1	62·4	58·6	80·8	73·8	44·9	53·3	..	..	..	..	6·0
1860..	5·47	25	·87	0	55·6	52·4	71·9	64·7	43·4	49·6	..	..	36·3	47·0	7·6
1861..	2·13	17	·39	0	60·1	57·0	83·6	71·2	42·0	50·9	..	..	39·1	47·7	5·4
1862..	2·43	17	·53	0	56·9	53·2	76·8	67·5	42·7	49·4	..	..	37·8	46·7	5·8
1863..	4·86	15	1·55	2	58·8	55·7	80·9	70·4	40·8	49·6	..	..	40·9	48·0	6·2
1864..	1·28	14	·35	0	58·4	54·1	78·2	70·5	42·7	50·2	..	..	40·1	46·9	5·5
1865..	2·21	5	·64	0	60·6	55·9	88·2	75·2	41·8	51·3	..	..	36·9	47·6	4·2
1866..	3·98	12	1·33	1	61·5	57·8	86·1	73·5	42·1	52·4	..	..	36·8	48·3	4·2
1867..	1·22	6	·74	0	59·6	55·0	82·5	70·8	42·8	53·6	..	..	35·1	43·6	5·7
1868..	·78	4	·25	0	63·6	57·8	87·8	75·5	44·6	51·5	..	..	37·4	45·3	3·5
1869..	1·03	6	·47	0	57·1	52·2	89·3	68·6	35·6	46·9	..	..	32·8	43·4	5·1
1870..	·83	4	·49	0	61·7	55·6	91·2	75·4	43·5	51·4	136·8	120·4	..	..	4·7
1871..	3·49	16	·67	0	55·4	52·6	76·0	66·8	39·0	48·3	123·6	110·4	37·2	47·8	6·7
1872..	2·55	15	·58	0	60·7	55·8	85·9	71·7	40·6	50·1	130·5	115·0	38·8	48·2	5·3
1873..	2·24	11	·69	0	59·6	55·7	79·2	70·7	42·3	51·1	131·8	114·8	39·2	48·7	6·5
1874..	2·05	12	·72	0	58·9	53·8	81·7	70·8	39·5	49·4	129·0	116·3	34·6	46·8	5·7
1875..	2·40	15	·56	0	59·9	55·4	85·1	72·3	43·3	50·9	127·9	115·9	42·0	48·5	6·0
1876..	1·27	11	·44	0	59·5	55·0	84·8	71·0	39·4	50·3	129·9	112·2	34·6	47·3	5·9
1877..	·42	6	·21	0	63·0	57·1	84·7	75·3	44·7	52·3	131·0	118·3	38·9	47·5	3·7
1878..	6·71	15	3·28	2	60·9	56·9	86·5	71·7	41·6	51·6	129·6	112·3	41·2	48·8	5·8
1879..	4·76	22	1·07	1	57·4	54·2	74·0	67·1	40·6	50·6	131·6	112·3	37·1	47·1	6·7
1880..	4·04	17	1·13	1	57·6	54·1	79·8	69·1	38·3	50·1	133·7	113·4	34·2	46·1	7·0
1881..	1·72	10	·58	0	59·6	54·4	82·7	70·6	37·4	50·4	131·3	115·9	34·5	46·5	6·2
1882..	2·30	18	·41	0	57·4	53·0	74·3	66·8	41·5	49·4	130·0	111·1	36·9	46·5	6·7
1883..	1·35	12	·49	0	59·7	54·8	85·6	71·4	41·3	50·4	125·5	111·2	36·8	46·6	5·7
1884..	2·84	7	1·47	2	58·7	54·4	81·7	69·9	40·6	50·0	120·6	107·3	31·0	45·7	6·3
1885..	1·99	11	·79	0	59·6	54·3	84·7	70·9	41·4	50·7	127·4	108·4	36·4	47·2	4·9
1886..	·63	8	·25	0	57·6	52·5	80·2	69·6	40·2	49·2	127·7	112·5	36·0	44·7	5·3
1887..	·91	3	·51	0	60·9	56·0	85·3	73·8	43·0	51·3	130·4	114·0	38·2	47·4	4·6
1888..	2·31	20	·60	0	57·8	54·0	84·7	68·1	43·9	50·8	127·6	106·9	36·7	47·4	6·9
1889..	2·03	6	·61	0	61·1	56·9	84·5	72·7	46·9	53·4	126·3	110·0	39·6	49·9	5·5
1890..	2·82	17	·53	0	58·3	54·0	78·2	69·0	40·8	50·9	124·8	109·7	36·9	48·0	6·4
1891..	·86	10	·32	0	60·3	55·8	79·0	71·5	44·9	52·2	125·9	114·8	38·9	48·9	5·4
1892..	2·46	13	·71	0	58·2	53·4	82·7	69·6	38·6	49·6	129·6	115·4	31·9	44·6	5·3
1893..	·73	9	·24	0	61·2	55·1	90·4	74·9	38·3	51·4	134·3	116·4	35·0	47·1	4·5
1894..	1·84	12	·43	0	58·9	54·8	83·8	68·9	43·7	50·6	125·9	108·3	36·6	46·3	5·8
1895..	·30	4	·20	0	61·2	54·8	83·9	73·6	42·2	50·6	135·3	117·0	34·4	45·2	4·8
1896..	2·27	11	·70	0	63·3	57·4	85·1	75·2	41·1	54·0	135·9	119·7	32·3	48·0	5·6
1897..	1·87	11	·68	0	61·5	57·1	87·8	71·7	43·3	53·0	132·6	109·8	37·2	49·1	6·8
Mean ...	2·23	12	·70	0·3	59·8	55·2	83·1	71·3	41·8	50·9	129·5	113·2	36·8	47·0	5·6
Extremes	6·71	25	3·28	2	65·8	61·0	92·6	79·1	46·9	55·1	136·8	120·4	42·0	49·9	7·6
	·30	3	·20	0	55·4	52·2	71·9	64·7	35·6	46·9	120·6	106·9	31·0	43·4	3·5

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JANUARY, 1899.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	TotalRain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	56·2	21	28·1	25	47·7	37·5	38·7	88	71·2	22·4	2·52	20	6·0
Malta	65·5	29	43·2	7, 8	60·9	49·4	47·1	80	120·0	35·5	1·46	11	4·3
Cape of Good Hope	92·1	1	51·0	3, 9	76·8	58·7	56·7	69	...	...	·80	5	3·5
Mauritius	86·6	28	70·7	18	84·6	73·9	69·2	74	137·2	64·0	2·18	14	5·7
Calcutta	79·8	27	44·4	20	74·3	53·5	51·6	66	136·2	34·6	·21	1	1·8
Bombay	89·0	31	59·1	7	81·5	64·6	59·2	62	132·9	51·9	·00	0	0·4
Ceylon, Colombo	90·9	11	67·5	8	88·3	71·7	70·6	79	153·0	65·5	6·98	9	4·8
Melbourne	102·3	9	46·0	25	73·0	54·6	49·7	68	153·0	39·5	3·91	14	6·1
Adelaide	105·1	15	48·9	23*a*	77·3	56·8	48·8	54	163·0	37·5	1·00	10	4·9
Sydney	88·7	2, 3	54·2	31	79·2	64·0	59·8	64	146·7	46·1	2·06	12	3·4
Wellington	76·3	1, 2*b*	50·0	11	69·9	57·4	52·8	68	141·0	44·0	4·84	15	4·5
Auckland	80·0	1, 30	54·0	10	73·0	59·8	56·5	71	144·0	49·0	3·64	11	5·0
Jamaica, Kingston	88·8	5	64·6	21	85·7	68·5	66·0	76	...	...	·78	8	4·4
Trinidad	89·0	9	61·0	21*c*	85·7	66·8	68·5	80	165·0	61·0	1·95	12	...
Grenada	82·0	14	69·4	6	79·8	71·0	65·9	70	147·8	...	9·10	24	5·4
Toronto	50·0	4	—6·9	11	29·7	15·1	20·6	79	58·0	—11·0	2·87	13	6·5
New Brunswick, Fredericton	47·8	5	—16·8	2	25·1	1·5	4·3	69	...	...	3·30	12	4·7
Manitoba, Winnipeg	34·5	11	—43·7	9	5·7	—15·3	...	...	...	...	1·77	6	4·5
British Columbia, Esquimalt	54·7	25	9·7	4	43·2	35·3	..	...	...	...	5·00	19	8·3

a—and 31. *b*—and 6. *c*—and 30.

REMARKS.

MALTA.—Adopted mean temp. 54°·4, or 1°·5 above average; mean hourly velocity of wind 9·3 miles, or 2·1 below average. Mean temp. of sea 60°·2. TSS on 4th and 13th; L on 12th, H on 4th. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·2 above, of dew point 0°·7, and rainfall 4·87 in., below, their respective averages. Mean hourly velocity of wind 13·0 miles, or 1·8 above average; extremes, 33·3 on 8th, and 1·7 on 11th; prevailing direction E.S.E. and E. by S. L on 9th and 12th. T. F. CLAXTON.

Adelaide.—This was the coldest January ever experienced; the average max. (77°·3) being 9°·6 below the average of 42 years, and the mean temp. (67°·0) 7°·3 below average. C. TODD, F.R.S.

Sydney.—Temperature equal to average. Humidity 8, and rainfall 1·63 in., below their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—Showery in the early part, with fresh N.W. winds; from 20th generally fine until 30th, when 1·22 in. of rain fell, with strong N.W. wind. T on 18th and 19th. Prevailing winds N.W. Mean temp. 1°·0, and rainfall ·93 in. above their respective averages. R. B. GORE.

Auckland.—Showery and unsettled through most of the month, the rainfall being an inch more than the average of 32 years. Mean temp. very slightly, barometric pressure much, below the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Average hourly velocity of wind 2·1 miles. Rainfall one-half the average, Island rainfall one-eighth less than the average. Double shock of earthquake in the neighbourhood of Kingston on 21st at 9·35 a.m. Aurora borealis seen at Windsor Pen, on the north side of the Island, on 26th; the only previous record being in 1860. R. JOHNSTONE.

TRINIDAD.—Rainfall ·99 in. below the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, JUNE, 1899.

[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..	1·82	XI.	Builth, Abergwesyn Vic.	1·93
II.	Dorking, Abinger Hall .	1·36	,,	Rhayader, Nantgwillt ...	2·10
,,	Birchington, Thor	1·63	,,	Lake Vyrnwy	3·34
,,	Hailsham	·65	,,	Corwen, Rhug	2·55
,,	Ryde, Thornbrough	1·07	,,	Criccieth, Talarvor	2·26
,,	Emsworth, Redlands ...	1·06	,,	I. of Anglesey, Lligwy..	2·20
,,	Alton, Ashdell	2·03	,,	I. of Man, Douglas	...
III.	Oxford, Magdalen Coll..	·95	XII.	Stoneykirk, Ardwell Ho.	2·06
,,	Banbury, Bloxham	1·08	,,	New Galloway, Glenlee	3·39
,,	Northampton, Sedgebrook	1·12	,,	Moniaive, Maxwelton Ho.	2·76
,,	Stamford, Duddington..	1·17	,,	Lilliesleaf, Riddell	1·68
,,	Alconbury	1·02	XIII.	N. Esk Res. [Penicuick]	1·35
,,	Wisbech, Bank House...	1·60	XIV.	Glasgow, Queen's Park..	1·55
IV.	Southend	1·35	XV.	Inverary, Newtown	1·91
,,	Harlow, Sheering..... ...	·86	,,	Ballachulish, Ardsheal...	2·29
,,	Colchester, Lexden	1·43	,,	Islay, Gruinart School ...	1·06
,,	Rendlesham Hall	1·32	XVI.	Dollar.....	1·96
,,	Scole Rectory	1·10	,,	Balquhidder, Stronvar...	2·34
,,	Swaffham	·91	,,	Coupar Angus Station...	1·41
V.	Salisbury, Alderbury ...	2·33	,,	Dalnaspidal H.R.S.....	...
,,	Bishop's Cannings	1·86	XVII.	Keith H.R.S.....	2·04
,,	Blandford, Whatcombe .	1·42	,,	Forres H.R.S.	1·17
,,	Ashburton, Holne Vic...	2·48	XVIII.	Fearn, Lower Pitkerrie..	1·81
,,	Okehampton, Oaklands.	1·45	,,	S. Uist, Askernish	3·04
,,	Hartland Abbey	1·59	,,	Invergarry.....	1·20
,,	Lynton, Glenthorne ...	·67	,,	Aviemore H.R.S.	...
,,	Probus, Lamellyn	1·36	,,	Loch Ness, Drumnadrochit	1·56
,,	Wellington, The Avenue	·90	XIX.	Invershin	2·14
,,	North Cadbury Rectory	·99	,,	Durness	...
VI.	Clifton, Pembroke Road	1·54	,,	Watten H.R.S.....	1·09
,,	Ross, The Graig	2·04	XX.	Dunmanway, Coolkelure	2·03
,,	Wem, Clive Vicarage ...	2·14	,,	Cork, Wellesley Terrace	1·27
,,	Wolverhampton, Tettenhall	2·64	,,	Killarney, Woodlawn ..	1·42
,,	Cheadle, The Heath Ho.	2·12	,,	Caher, Duneske	2·13
,,	Coventry, Priory Row ..	1·57	,,	Ballingarry, Hazelfort...	1·96
VII.	Grantham, Stainby	1·51	,,	Limerick, Kilcornan ...	1·43
,,	Horncastle, Bucknall ...	1·71	,,	Miltown Malbay	2·58
,,	Worksop, Hodsck Priory	1·88	XXI.	Gorey, Courtown House	2·45
VIII.	Neston, Hinderton	2·47	,,	Moynalty, Westland ...	1·90
,,	Southport, Hesketh Park	1·56	,,	Athlone, Twyford	3·86
,,	Chatburn, Middlewood.	1·56	,,	Mullingar, Belvedere ...	3·05
,,	Duddon Val., Seathwaite Vic.	2·59	XXII.	Woodlawn	2·81
IX.	Melmerby, Baldersby ...	2·61	,,	Crossmolina, Enniscoe ..	3·74
,,	Scarborough, Observat'y	1·84	,,	Collooney, Markree Obs.	3·51
,,	Middleton, Mickleton ...	1·42	,,	Ballinamore, Lawderdale	2·03
X.	Haltwhistle, Unthank H.	1·06	XXIII.	Warrenpoint.....	2·25
,,	Bamburgh	1·57	,,	Seaforde.....	2·99
,,	Keswick, The Bank	·75	,,	Belfast, Springfield	2·16
XI.	Llanfrechfa Grange	2·01	,,	Bushmills, Dundarave..	2·25
,,	Llandovery	1·16	,,	Stewartstown	2·06
,,	Castle Malgwyn	1·30	,,	Killybegs	3·07
,,	Brecknock, The Barracks	1·77	,,	Horn Head	2·65

JUNE, 1899.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date	Min. Deg.	Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	1·49	— ·52	·92	30	6	87·1	5	42·3	15	0	0
II.		Tenterden	1·48	— ·37	·74	28	6	81·5	6	40·0	14	0	...
,,		Hartley Wintney	1·24	...	·55	28	6	84·0	3*a*	35·0	15	0	2
III.		Hitchin	...	...	...	...	...	...	...	...	...	...	...
,,		Winslow (Addington)	·96	— ·90	·39	19	6	82·0	4, 5	36·0	15	0	...
IV.		Bury St. Edmunds (Westley)	1·23	— ·56	·52	30	9	78·0	5	45·0	15	0	...
,,		Norwich (Brundall)	·89	...	·40	30	9	81·2	5	38·4	1	0	1
V.		Winterbourne Steepleton ...	1·99	...	·82	30	4	77·6	5	33·4	14	0	5
,,		Torquay (Cary Green)	1·17	...	·53	19	5	75·3	6, 7	45·7	15	0	...
,,		Polapit Tamar [Launceston]..	1·03	— 1·18	·35	30	8	79·3	6	37·1	3	0	0
VI.		Stroud (Upfield)	1·80	— ·59	·82	30	7	80·0	7	48·0	14	0	...
,,		ChurchStretton(Woolstaston)	2·32	— ·23	·74	28	10	76·0	6*b*	42·0	9	0	...
,,		Worcester (Diglis Lock)	1·18	— 1·25	·35	18	8	...	...	...	...	...	...
VII.		Boston	1·16	— ·73	·52	19	9	85·0	4*b*	40·0	15	0	...
,,		Hesley Hall [Tickhill].....	1·49	— ·43	·52	30	8	84·0	6	35·0	15	0	...
,,		Breadsall Priory	2·63	...	·89	18	8	79·0	5, 6	39·0	9*d*	0	5
VIII.		Manchester(PlymouthGrove)	...	...	...	...	...	...	...	...	...	...	...
IX.		Wetherby (Ribston Hall) ...	1·36	— ·53	·40	19	10	...	...	...	...	...	...
,,		Skipton (Arncliffe)	1·81	— 1·55	·51	30	11	...	...	...	...	...	...
,,		Hull (Pearson Park).	1·20	— ·55	·29	30	10	79·0	6	37·0	15	0	...
X.		Newcastle (Town Moor)	1·67	+ ·03	·46	29	8	...	..	...	...	...	...
,,		Borrowdale (Seathwaite).....	2·02	— 4·56	·38	20	12	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	1·41	— 1·02	·65	30	6	...	...	...	...	...	...
,,		Haverfordwest	2·01	— ·55	·74	20	5	81·2	6	38·9	4	0	1
,,		Aberystwith (Gogerddan) ...	2·71	...	·59	20	9	84·0	6	30·0	3	...	...
,,		Llandudno.....	2·52	+ ·75	·58	20	11	77·0	1	44·0	3	0	..
XII.	SCOTLAND.	Cargen [Dumfries]	2·94	+ ·99	1·18	28	9	81·6	16	38·0	3	0	...
XIII.		Edinburgh (Blacket Place)...	1·48	...	·43	28	8	79·6	12	44·4	3	0	...
XIV.		Colmonell	1·76	...	·51	28	11	79·0	17	35·0	2	0	...
XV.		Tighnabruaich	2·15	...	·68	27	8	74·0	16	42·0	2	0	...
,,		Mull (Quinish).....	3·23	— ·06	·63	27	18	...	...	...	...	...	...
XVI.		Loch Leven Sluices	1·90	+ ·15	1·10	29	7	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	1·70	+ ·20	·95	28	10	80·0	12	41·2	3	0	...
XVII.		Braemar	1·09	— ·90	·27	27	13	75·8	14	33·3	1	0	5
,,		Aberdeen (Cranford)	1·42	...	·40	20	11	75·0	15	34·0	13	0	...
,,		Cawdor (Budgate)	1·25	— ·15	·18	28	14	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	·92	— 1·57	·32	21	5	...	...	...	...	...	...
,,		Glencarron Lodge.....	2·22	...	·42	18	18	78·6	14	40·0	3	0	...
XIX.		Dunrobin	1·50	— ·52	·35	28	12	75·0	12	41·0	3	0	...
,,		S. Ronaldshay (Roeberry) ...	1·57	— ·19	·41	29	15	70·0	15	42·0	7	0	...
XX.	IRELAND.	Darrynane Abbey.....	2·03	...	·62	27	12	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	2·70	+ ·63	1·04	19	8	78·5	7	42·0	19*e*	0	...
,,		Broadford (Hurdlestown) ...	...	...	...	...	...	..	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	1·90	+ ·06	·63	20	8	...	..	...	...	...	...
,,		Dublin (FitzWilliam Square)	1·64	— ·02	·90	20	8	74·4	11	45·9	19	0	0
XXII.		Ballinasloe	2·82	+ ·52	·87	17	11	76·0	7*c*	44·0	19*f*	0	...
,,		Clifden (Kylemore)	4·03	...	1·05	27	11	...	...	...	...	...	...
XXIII		Waringstown	2·69	+ ·62	·78	17	8	87·0	7	41·0	29	0	...
,,		Londonderry (Creggan Res.).	2·27	— ·15	·80	27	13	...	...	...	...	...	...
,,		Omagh (Edenfel)	2·83	+ ·36	1·00	27	12	81·0	14	39·0	18	0	...

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

a—and 4, 5. *b*—and 17. *c*—and 10, 11. *d*—and 15. *e*—and 30. *f*—and 20.

METEOROLOGICAL NOTES ON JUNE, 1899.

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.

LONDON, CAMDEN SQUARE.—Absolute drought prevailed for 24 days from May 25th to June 17th, a period exceeded only five times in 41 years.

TENTERDEN.—A dry month with only a few showers until the great TS8 of 28th and the wet night of 30th. The first week was hot, as was also part of the last week. Duration of sunshine 265 hours. On the 17th ended a period of 24 days absolute drought, and on 27th a period of 36 days of partial drought with ·35 in. of R.

HARTLEY WINTNEY.—The dry weather which began on May 26th did not break up until June 18th. The month was dry and bright, with plenty of sunshine. The average max. shade temp. for the first week (82°) was abnormally high. A terrific TS occurred on 28th, lasting from 5.15 to 7.45 p.m.; the storm passed off to S.E.; L damaged several trees and buildings. Ozone on 19 days. Many perfect summer evenings. L on 18th.

WINSLOW, ADDINGTON.—The dry weather which set in on May 25th was not broken until June 18th, there being 24 days without a drop of R. From 1st to 7th the day temp. was high, but it was cool at night. On the 28th there was a good deal of T, but not heavy, with little R. The ground was very dry at the end.

BURY ST. EDMUNDS, WESTLEY.—No R fell in the 24 days from May 25th to June 17th, but the effect on vegetation was not so injurious as might have been expected. Distant T on 24th, 28th and 29th.

NORWICH, BRUNDALL.—Exceedingly dry till the 18th, after which slight rains occurred. The country was much parched, and R was greatly wanted. Winds N. or N.E. from 6th to 17th. A great fall of temp. occurred at the close of the first week. Distant T on 29th.

WINTERBOURNE STEEPLETON.—The early part of the month was hot and dry, the mean temp. of the week ending on 10th being 58°·4. With the exception of ·01 in. on May 28th, no R was registered between May 24th and June 18th. Distant T was heard on the afternoon of the 28th, with slight drizzle. A useful R fell steadily on 30th.

TORQUAY, CARY GREEN.—R 1·06 in. below the average. Mean temp. 60°·2, or 1°·3 above the average. Duration of sunshine 302 hours, being 65 hours 45 mins. above the average, and 62 per cent. of the possible amount; no sunless day. R of the first six months of the year 3·23 in. above the average.

POLAPIT TAMAR [LAUNCESTON].—*Correction.*—Owing to the absence abroad of the regular observer, the results for March, April and May were sent from a new gauge, *not* for the old one which was in use during 1880–89, with which alone strict comparison can be made. The figures for the three months for the several columns in the monthly tables should have been :—

March.....	1·40	—1·13	·54	8	11	The temperature details were correct.
April	3·79	+1·57	·84	20	21	
May	3·38	+1·55	1·06	23	13	

POLAPIT TAMAR [LAUNCESTON].—A dry month, particularly the first fortnight; the total R being considerably below the average. Distant T on 4th; loud T and vivid L on 6th.

STROUD, UPFIELD.—TS8 on 20th, 28th and 30th.

WOOLSTASTON.—The earlier part of the month was hot and dry, with cold winds at intervals, and no R fell till the 18th. A violent storm of T and L

raged from 5 to 6 p.m. on 28th, doing much damage. A labouring man working in the middle of a field in the neighbourhood was killed by L. Mean temp. 60°·6.

BREADSALL PRIORY.—Very dry and warm during the first half of the month. Very unsettled after the 18th.

ARNCLIFFE VICARAGE.—A very dry and hot month.

WALES.

HAVERFORDWEST.—Absolute drought prevailed for 22 days from May 26th to June 16th. From June 1st to 17th the sky was nearly cloudless, with very high temp., the max. exceeding 80° on 3 days, and the hay crop suffered from drought. From 17th to 21st R fell in large quantities, but from that date to the end it was fine and summer-like, with cloudy sky and without excess of temp. A sharp TS occurred at 2.30 a.m. on 28th, lasting for about half-an-hour.

GOGERDDAN.—Very bright sunshine every day for the first fortnight; the rest of the month very showery.

LLANDUDNO.—T and L on 20th, 28th and 30th.

SCOTLAND.

EDINBURGH, BLACKET PLACE.—Very warm and dry. Mean temp. 2°·5 above, and R 30 per cent. below, the normal. Distant T on the afternoon of 28th. Absolute drought for 25 days ended on 18th.

COLMONELL.—R 1·12 in. below, and mean temp. 2°·2 above, the average of 23 years. T and L on 20th; T on 27th and 28th.

TIGHNABRUAICH.—The beau ideal of a summer month.

ABERDEEN, CRANFORD.—The month was fine and warm, and the long continued drought told on the turnip crop; some land in this district has had to be sown three times.

S. RONALDSHAY, ROEBERRY.—A very good month upon the whole. Mean temp. 53°·0, or 1°·1 above the average of 9 years.

IRELAND.

DARRYNANE ABBEY.—On the whole dry. The first part was very dry and hot, but on 17th it changed and became cold for several days. The last few days were showery but mild.

CARLOW, BROWNE'S HILL.—No R fell for 23 consecutive days from May 25th to June 16th. On 21st ·20 in. of R fell in ten minutes.

DUBLIN, FITZWILLIAM SQUARE.—A fine, warm and sunny month, rainless until the 17th, when an absolute drought of 23 days' duration was broken by a genial fall of R. At the close of the month the weather was broken, rainy and chilly, and a TS on 28th brought ·24 in. of R, but large falls occurred in the surrounding districts. Mean temp. 61°·3, or 3°·5 above the average. High winds on 2 days. Fog on 22nd. H on 28th. L on 17th. Solar halos on 3rd and 19th.

BALLINASLOE.—TSS occurred from 4 to 6 p.m. on 6th, and 6 p.m. to 10 p.m. on 21st.

OMAGH, EDENFEL.—Athough the drought which commenced on May 24th and ended on June 16th was prevented from being absolute by a drizzle yielding ·02 in. on June 2nd, there had not been before in 35 years (at least) a period of 24 days with only that amount of R; the nearest being 22 days' absolute drought in 1889. The remainder of the month, however, was so continuously and torrentially wet that the average R was considerably exceeded, and, as a result, abundant vegetation of all kinds covered the country at the close.

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DEFINITION OF A PROTRACTED DROUGHT.

THE dry period through which we are now passing has drawn attention to the above subject, and we have had more correspondence respecting it, than we have been able to deal with individually. The subject is therefore presumably one upon which some statement should be made.

Our first remark may seem rather uncourteous, but it is by no means so meant. Few persons have time to read up a subject thoroughly, and it is very much more easy to write a suggestive letter, than to weigh carefully what has been printed previously. We do not like reprinting what we have already written, but eight pages of *British Rainfall*, 1887, were devoted to considering "What is a Drought?" and yet not one of our correspondents refers to, or deals with, the difficulties pointed out in that paper.

The definitions of "Absolute" and of "Partial" Droughts have been accepted, there is therefore no need to refer to them.

Three others were mentioned, and of them the third was considered the best.

(1). *Long Droughts.* Periods of not less than 60 days with a total rainfall of less than 2·00 in."

This was rejected as being merely a modified form of the "Partial Drought," and partly also because of the tautology involved in speaking of "a long drought of 68 days."

(2) *Dry Periods.* This was an attempt to reduce to strict definition what is meant by a Hydraulic Engineer when he says that he must provide "for a drought of 160 or 180 days." He does not mean a rainless period of that duration, nothing of the kind ever occurred in this country, what then does he mean? We devoted about a page to pointing out the difficulties of deciding upon any satisfactory definition, and finally submitted

(3) "*Engineer's Drought.* A period of three or more consecutive months of which the rainfall is less than half the average."

On the following page we give the rainfall at Camden Square for 41 years, all those monthly totals which are less than half the mean fall for the month being printed in black type. It will be seen that this occurs about once in five months, but with extreme irregularity, *e.g.*, from October, 1865, to October, 1867, 25 months,

Total Rainfall at Camden Square, Middlesex, in each month of the Years 1858–99.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
1858	·88	1·80	·69	2·90	2·76	·92	3·01	1·10	·85	1·58	·53	1·75	18·77
1859	·72	1·23	1·33	2·61	2·13	2·90	2·93	2·65	4·04	2·53	2·90	2·24	28·21
1860	1·97	1·25	1·87	1·45	3·57	5·47	2·26	4·48	2·92	1·77	2·72	2·51	32·24
1861	·43	1·93	2·43	1·30	1·39	2·13	2·42	·94	2·15	1·05	4·65	1·45	22·27
1862	1·92	·31	3·69	2·30	3·06	2·43	2·61	2·74	2·19	3·50	1·13	1·71	27·59
1863	2·80	·67	·85	·52	1·27	4·86	·92	1·44	3·49	1·62	1·84	1·31	21·59
1864	1·02	·85	2·62	·82	1·86	1·28	·62	1·33	2·55	1·13	2·49	·36	16·93
1865	3·90	2·01	1·12	·33	3·40	2·21	2·33	4·10	·55	6·22	1·96	1·35	29·48
1866	3·90	3·72	1·69	1·76	2·03	3·98	1·19	2·76	3·89	2·32	1·73	2·63	31·60
1867	2·81	1·44	2·48	2·36	2·45	1·22	4·30	2·63	2·23	1·92	·86	1·59	26·29
1868	3·89	1·21	1·28	1·50	1·58	·78	·45	2·28	1·74	2·54	1·03	5·12	23·40
1869	2·76	2·48	1·97	1·28	3·27	1·03	·62	1·26	3·56	1·87	2·38	2·94	25·42
1870	1·38	1·21	2·31	·47	·70	·83	1·22	2·69	2·00	3·68	1·76	3·07	21·32
1871	1·99	1·27	1·19	2·84	·92	3·49	4·12	·85	5·28	1·34	·60	1·13	25·02
1872	3·46	·96	2·66	1·39	3·05	2·55	2·57	2·05	1·64	5·20	3·98	4·35	33·86
1873	2·44	1·96	1·46	·55	1·56	2·24	1·81	2·87	2·46	2·97	1·87	·48	22·67
1874	1·18	·91	·39	1·26	1·14	2·05	·82	1·32	2·62	3·34	2·21	1·58	18·82
1875	3·22	1·06	·69	1·53	1·61	2·40	4·63	1·79	2·86	4·35	3·36	·94	28·44
1876	·94	1·97	2·96	1·90	·94	1·27	·81	1·79	2·86	1·40	3·07	6·25	26·16
1877	4·74	1·78	2·38	2·59	1·91	·42	3·94	2·23	·82	1·97	3·88	1·51	28·17
1878	1·31	1·49	1·12	4·97	3·89	6·71	·64	6·72	·83	1·99	2·95	1·46	34·08
1879	2·87	3·77	·91	2·72	3·46	4·76	4·17	5·11	3·67	·80	·72	·86	33·82
1880	·31	2·33	·79	2·15	·26	4·04	5·11	·45	4·04	5·78	1·85	3·17	30·28
1881	1·85	3·09	2·30	·46	1·52	1·72	1·85	4·89	2·03	2·99	2·75	2·47	27·92
1882	1·30	1·30	1·35	2·83	1·20	2·30	2·95	1·48	2·39	4·96	2·57	2·51	27·14
1883	2·08	3·62	·86	1·56	1·97	1·35	2·92	·93	3·83	1·75	2·78	·75	24·40
1884	2·30	1·40	1·41	1·02	·78	2·84	2·46	·89	1·77	·99	1·92	2·57	20·35
1885	1·43	2·86	1·65	2·32	2·63	1·99	·52	·85	4·30	3·73	3·31	1·05	26·64
1886	4·02	·63	1·38	1·22	4·79	·63	2·37	·76	1·73	2·43	2·71	4·34	27·01
1887	1·26	·48	1·65	1·41	1·45	·91	1·07	3·15	1·81	1·24	3·40	1·38	19·21
1888	·90	·78	3·34	2·37	1·18	2·31	4·91	3·61	1·43	1·23	4·38	1·29	27·73
1889	·81	2·28	1·36	2·06	3·22	2·03	2·64	1·80	1·77	3·75	·89	1·23	23·84
1890	2·46	1·04	1·76	2·02	1·25	2·82	4·19	1·55	·64	1·20	1·62	·68	21·23
1891	1·80	·01	2·01	1·13	2·72	·86	3·82	4·75	1·03	4·80	1·98	3·24	28·15
1892	·50	1·62	1·04	·99	1·51	2·46	1·62	3·06	2·12	3·78	2·53	1·37	22·60
1893	1·44	2·87	·32	·24	·80	·73	2·46	1·61	1·07	3·87	2·16	2·23	19·80
1894	2·87	1·74	1·18	1·74	1·85	1·84	3·25	2·85	1·04	4·45	2·85	2·28	27·94
1895	1·96	·12	1·42	1·34	·34	·30	3·42	3·09	1·28	2·84	3·17	2·19	21·47
1896	·78	·29	3·20	·55	·14	2·27	1·03	1·92	5·51	3·05	1·17	3·61	23·52
1897	2·05	2·75	3·42	1·57	1·08	1·87	·64	2·92	2·75	·56	1·05	2·20	22·86
1898	·73	1·08	1·46	1·01	2·26	1·11	1·09	1·18	·33	2·96	1·94	2·54	17·69
1899	2·52	2·00	·50	2·64	1·38	1·49	1·45	...	...	...	...	...	...
Mean, 1858-97	2·02	1·61	1·71	1·66	1·92	2·23	2·39	2·39	2·39	2·71	2·30	2·13	25·46

there was no such month, and from May, 1881, to July, 1883, there were 27 consecutive months without such a month; on the contrary during the 36 months ending with December, 1898, instead of the average of 7, there were 13.

The yearly numbers have been—

1858...	6	1868...	3	1878...	2	1888...	3	1898...	5
9...	1	9...	2	9...	3	9...	2	9...	1
1860...	0	1870...	3	1880...	4	1890...	3		
1...	3	1...	4	1...	1	1...	3		
2...	2	2...	0	2...	0	2...	1		
3...	4	3...	2	3 ..	2	3...	5		
4...	4	4...	2	4...	3	4...	1		
5...	2	5...	2	5...	3	5...	3		
6...	1	6...	3	6...	3	6...	5		
7...	1	7...	2	7...	4	7...	3		
Total.	24		23		25		29		

The distribution of these less-than-half-the-average-months throughout the year is very equable, the only inequality being that (as the result of TS rains) they are rather more frequent than usual in June and July.

Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
10	8	7	8	8	11	13	9	9	9	8	7

We have examined the table for instances fulfilling the definition (3) quoted above, and have obtained the following "Engineer's Droughts"—

PERIOD.	Duration in Months.	Total Rain.	Half-Mean Rain.
		in.	in.
1858. Aug.—Nov.	4	4·06	4·90
1863. Feb.—May	4	3·31	3·45
1868. May—July	3	2·81	3·27
1869. June—Aug.	3	2·91	3·51
1870. Apr.—July	4	3·22	4·10
1871. Oct.—Dec.	3	3·07	3·57
1873-4. Dec.—Mar. ...	4	2·96	3·73
1879-80. Oct.—Mar....	6	5·81	6·24
1884. Aug.—Oct.	3	3·65	3·75
1885. June—Aug.	3	3·36	3·51
1890-1. Sept.—Feb. ...	6	5·95	6·58
1893. Mar.—July	5	4·55	4·95
1895. Jan.—June	6	5·48	5·58
1896. Apr.—July	4	3·99	4·10
1897-8. Oct.—Jan. ...	4	4·54	4·58
1898. June—Sept.....	4	3·71	4·70

In computing the above we have come upon a fact which we do not like, and which seems to show that this definition will not do *as it stands.* We had better illustrate this by an actual case—

1893.	Total Rain.	Mean. / 2	Deficiency Monthly.	Cumulative.
	in.	in.	in.	in.
March.....	·32	·85	— ·53	— ·53
April	·24	·83	— ·59	— 1·12
May	·80	·96	— ·16	— 1·28
June	·73	1·12	— ·39	— 1·67
July	2·46	1·19	+ 1·27	— ·40
	4·55	4·95		

The drought had evidently ceased after June, but the total of the *five* months is less than half the mean for the five months, and therefore a month is included which apparently would be better out, though after such a dry period it is doubtful whether the excess of 1·27 in. would be of use.

This evil might be cured by specifying that *all* the months must have less than half the mean; but this would give only two droughts of 4 months in 41 years, in 1893 and in 1898, and three others of 3 months, viz., in 1863, 1870, and 1879.

Another objection to this definition is that until you have accumulated at least twenty or thirty years observations, you cannot tell precisely what your monthly mean is, and therefore cannot tell whether you have a drought or not.

But on the other hand if the definition specifies any fraction of an inch per week or month, droughts would never be recorded in wet districts, or else would occur every month or two in dry ones.

That is one objection to the suggestion made by the Rev. H. A. Boys in the interesting letter which we append. There are two others—(1) Individual observers can easily work up a drought at one station, but if they are to be worked out at headquarters (and we should certainly not print them without checking) it will imply that we must have another assistant—there must be some limit to the work thrown upon us. (2) The effect of droughts is so very different according to the season at which it occurs that it would be much better if this could be recognised.

We agree with Mr. Boys that the subject "bristles with difficulties."

WANTED—A DEFINITION OF A PROTRACTED DROUGHT.

To the Editor of the Meteorological Magazine.

SIR,—During the 156 days from February 16th to July 21st inclusive, *i.e.*, for more than 5 months, the rainfall here was only 5·77 in. in all, or not quite ·037 in. per diem.

During the 87 days from April 26th to July 21st inclusive, that is, during the time when rain is most wanted in at least fair quantity, I measured only 2·57 in., or just over ·029 in. per diem.

The state of my garden, my pond, and my well, impels me to ask whether we do not need a definition of a "Protracted Drought?"

For all practical purposes a protracted drought concerns us much more than an "absolute" and a "partial" drought which just come within their respective definitions. This July has seen a far more injurious drought than June or March, though it can chronicle neither "absolute" nor "partial" drought by the definition.

I am well aware of the difficulty of framing a satisfactory definition of a protracted drought, for regard should be had to the season of the year—the spring and early summer months being those when a long drought is most serious—and to the average rainfall of the station concerned; but I offer the following as a fairly suitable basis for a definition where the average annual rainfall is not above 35 ins.

Let a protracted drought be claimed for—

60	days,	or 2	months,	with	not	more	than	·02 in. per diem.
90	,,	,, 3	,,	,,	,,	,,	·03	,,
120	,,	,, 4	,,	,,	,,	,,	·04	,,

and intermediate numbers of days in proportion.

The allowance per diem must clearly be on a sliding scale; and the above scale can hardly be called too lax, seeing that it would allow me only 2·52 in. for my 87 days of drought. The subject bristles with difficulties, but they should not be beyond solution.

Yours truly,

H. A. BOYS.

North Cadbury Rectory, Somerset, August 1st, 1899.

NOTES ON THE THUNDERSTORMS OF JULY 22ND–23RD.

CITY ROAD, LONDON, E.C.—TS in early hours of 23rd; R ·97 in. *J. Bigwood.*

TENTERDEN.—TS 10 p.m., 22nd, till 1 a.m. on 23rd; R ·81 in. *J. E. Mace.*

RIVERHEAD VICARAGE, SEVENOAKS.—Heavy R 10.30 to 11.45 a.m. on 23rd, probably 1·30 in.; the total for the day was 1·48 in. *J. Burn Murdoch.*

REDLANDS, EMSWORTH.—TS passed from S.W. to N.W. between 1.50 and 4.10 p.m., 23rd, yielding 1·58 in. of R. *F. Jacomb Hood.*

BROOMFIELD HALL, CHELMSFORD.—Very heavy TS from 5.30 to 7.0 a.m., R about 2·00 in., the total up to 9 a.m., 23rd, 2·78 in. *W. Impey.*

BEECH HOLME, BOCKING, BRAINTREE.—TS from 2.30 to 9.0 a.m., 23rd, with 2·24 in. of R. During the previous ten years the greatest fall on one day had been 1·87 in. on July 26th, 1894. *T. Taylor.*

SUDBURY.—Heavy R from 3 to 8 a.m., total ·88 in., and in the 24 hours (mostly before 6 p.m., 23rd) the total was 2·31 in. *J. Alexander.*

GELDESTON, BECCLES.—R for 23rd 0·78 in., and for 24th 1·26 in. *E. T. Dowson.*

STEEPLETON MANOR, DORCHESTER.—TS and heavy R, 6 to 9 a.m., 23rd; total (entered to the 22nd), 1·39 in. *H. Stilwell.*

SOUTHTOWN HOUSE, KENTON, EXETER.—The R on the night of July 22nd–23rd was unprecedented during the 21 years I have lived here. A TS began at 7.45 p.m. on 22nd, with jagged H. Although no drains were choked, they were insufficient to carry the water, which consequently flowed through the house. Several chickens were drowned in their coops. In less than an hour 1·10 in. of R fell, and during the rest of the night there was a further fall of ·11 in., making the total 1·21 in. *G. H. Courtenay.*

A HOT MORNING IN CHELTENHAM.

To the Editor of the Meteorological Magazine.

SIR,—The abnormal heat at 9 a.m. on 20th July, 79°·7, has never been surpassed here during the past twenty-two years, and was reached once only on June 26th, 1878. On August 18th, 1893, it was 79°·2, and on July 20th, 1878, it was 78°·7. These are the only dates on which the shade temperature at 9 a.m. during the above period was within at least two degrees so high.

The maximum temperature was by no means so high as would be expected, as it reached only 86°·0.

Faithfully yours,

RICHARD TYRER, B.A.

The Observatory, Cheltenham, July 22nd, 1899.

ERRATA IN METEOROLOGICAL MAGAZINE, 1898.

REGULAR TABLE.

Glencarron	July ...	Total rain *should be*	6·66 in.	*not* 5·66 in.
Wetherby, Ribston ...	February...	,, ,,	,, 1·09 ,,	,, 1·04 ,,
Carlow, Browne's Hill	Nov.	Diff. from average	,, +1·35 ,,	,,—1·35 ,,

SUPPLEMENTARY TABLE.

Ballinamore, Lawderdale...	Jan....	Total rain *should be*	2·61 in.	*not* 6·55 in.
North Cadbury Rectory ...	April..	,, ,,	,, 2·01 ,,	,, 1·85 ,,
New Galloway, Glenlee ...	Nov...	,, ,,	,, 6·66 ,,	,, 6·96 ,,

DRYNESS AT PARKSTONE, DORSET.

To the Editor of the Meteorological Magazine.

SIR,—Perhaps the enclosed record of another very dry day (July 30th) may be of sufficient interest for a place in the Monthly Magazine :—

Year. Month, Day.	Time.	Dry Bulb.	Wet Bulb.	Dew point.	R. H.	
1886. July 4	2. 5 p.	85·2	63·1	48·7	28	The R.H. was 34 and below from noon to 6 p.
	3. 5 p.	85·6	63·3	48·8	28	
1887. July 4	3. 5 p.	83·6	62·5	48·5	30	The R.H. was 35 and below from noon to 4 p.
1892. April 2	3. 0 p.	69·7	49·9	34·6	27	The R.H. was 30 and below from 2.30 p. to 5.30 p.
	3.15 p.	69·5	49·3	33·6	27	
April 3	2. 0 p.	67·9	49·5	35·0	29	The R.H. was 36 and below from noon to 4 p.
	3. 0 p.	67·7	49·1	34·4	29	
1893. May 11	3. 0 p.	71·9	52·7	38·2	29	The R.H. was 31 and below from 3 to 5 p., and 40 and below from 9.15 a. to 6 p.
June 16	1. 0 p.	85·1	64·1	50·3	30	The R.H. was 35 and below from 0.15 p. to 3 p.
1899. July 30	1.20 p.	84·2	64·3	51·2	32	The R.H. was 40 at noon, and 39 at 6 p.
	2. 0 p.	86·7	66·1	52·8	31	
	2.30 p.	85·0	64·5	51·0	31	
	3. 0 p.	87·0	65·5	51·6	30	
	3.15 p.	86·8	65·1	51·2	29	
	3.30 p.	86·7	65·9	52·5	31	
	3.45 p.	86·5	66·2	53·1	32	

With a max. temp. of 87°·6, July 30th was the hottest day since June 19th, 1893, when the max. was 87°·9, and the driest day since June 16th of same year. I give all the days on which the R.H. was 30 and under since April, 1882, when I began observations, and some of which I believe you have had before in detail. It will be seen that the greatest difference between dry and wet was 22°·3 on July 4th, 1886, but the lowest R.H. was 27, with a difference of 20°·2 on April 2nd, 1892, the temperature being 16° lower.

I remain, yours very truly,

R. H. BARNES.

P.S.—July rainfall here *0·51* in.

Heatherlands House, Parkstone, Dorset, August 1st, 1899.

THE MOON IN RELATION TO AIR TEMPERATURE.

To the Editor of the Meteorological Magazine.

SIR,—Those who read my letter, "On a recent recurrence in weather," and Mr. Helm Clayton's a little later, may have found it difficult, I think, to account for the vigour, not to say vehemence, of Prof. Hazen's onslaught! For myself, I distinctly said that "I do not affirm lunar influence in the case;" pointed out that the recurrence noticed in those eight months was not met with some time, at least, previous; and hinted that it might disappear in future (which it has apparently done). This "extremely wild" letter merely suggested a matter that seemed worth investigating. The striking relations brought out by Mr. Helm Clayton, and, I may add, the researches of Herr Barthe in Germany,* further show the interest of the subject.

It seems to me that there are some weak points in Prof. Hazen's argument. He sets out with a remarkable "established fact," got by "*a priori* reasoning," viz., that "the moon can have no effect on temperature." Are we really in possession of such a fact, so gained? Then we may at once close our book of records. For not only is this recurrence in eight months inadequate to prove lunar influence (it is admittedly so in any case), but any amount of such recurrence, with the utmost regularity, if we found such, would obviously have no weight whatever. We have a true doctrine about the moon which cannot be disturbed.

One is prompted, however, to ask, Is this science? Does it not rather savour of obscurantism? If we grant (as we may) that the moon gives too little heat to materially affect air temperature, are there not other ways in which she might do so? The chain of causation in nature is sometimes "far to seek," as where Huxley connected the fertilisation of red clover with the number of old maids in the country (through bees, field-mice and cats). But here we need not, I think, be greatly at a loss, if explanation were required; for, a connection of the moon with temperature through barometric pressure is surely not very unthinkable. Not only is it *a priori* very probable that the moon influences air-pressure, but we have some good evidence of such action (through the researches of Garrigou Lagrange, Poincaré and others). Prof. Hazen says that "changes of temperature are due entirely to the progress of high and low pressure areas, &c." These are, no doubt, proximate causes, but what of more remote ones? Do we know enough about these things to be able to say that the moon has nothing to do with the course of such areas? No thoughtful meteorologist, I feel sure, will say so. And even if the conditions of that progress were clearly understood, might not the moon be concerned in the "several other conditions, not clearly

* *Das Wetter*, March. Taking the lunations of 1896-98, he finds, on an average, a maximum of temperature shortly before new moon, and a minimum shortly before full moon.

understood?" In short, it seems important to keep an open mind in view of the countless possibilities in Nature.

The figures given by Prof. Hazen I cannot regard as necessarily fatal to the view in question, considering the possibility of a meteorological influence being at one time apparent, at another masked. If this be a sound principle (as I believe it is, though it must be applied with care and judgment), then the mere "massing of statistics" (those of times of "apparent" and "masked" influence alike) may lead to obscuration rather than to the eliciting of truth.

I am not prepared, however, to say that this principle applies with satisfactory results in the present case; and, what little further study I have given to the matter has not, thus far, I think, yielded such evidence as to put the lunar relation beyond doubt.

The following notes may, perhaps, save some labour of inquiry on the part of others. The total length of the "recent recurrence" appears to be *ten* lunations (June, 1898, to March, 1899). Having gone through the lunations since 1880, I am able to say something about the frequency of those long spells. Each case with the new-moon week (relatively to the average) *warmer* than the full-moon week before, is represented by a *plus* quantity (call them A cases); and each with new-moon week *cooler*, by a *minus* (B cases). In 1894 came a long spell of 8 A cases (February to September), and in 1896–97 two spells of 6 A cases each, divided by one B case (February, 1896—February, 1897). These are the only spells of this class coming up to *six* lunations. It is a curious fact that while A cases preponderate in the nineties (64 against 46), B cases preponderate in the eighties (70 against 53). A cumulative curve, got through algebraic addition, step by step, of the successive items, goes steadily down (on the whole) in the eighties, but mounts in the nineties, at least from about 1892 (pointing, perhaps, to some slow secular change?) In the eighties the longest spells are those of B cases, and they do not exceed six lunations. There are three groups of six—one in March to October, 1882; another, December, 1883, to May, 1884; the third, July to December, 1887. These facts may be left for the consideration of your readers; and I would merely note the practical, as well as theoretical, interest of these long spells in our weather.

With regard to another point in Prof. Hazen's letter, I would invite attention to the section on "lunar periods" in M. Angot's excellent "*Traité élémentaire de Météorologie*" (1899). As to lunar influence on weather, he considers that we cannot at present affirm it; but also we cannot deny its possible existence. "En tous cas," he remarks (p. 400), "elle se manifesterait par des phénomènes complexes, tels que le déplacement des zones de hautes et de basses pressions, et pourrait ainsi se traduire par des résultats immédiats très différents d' une région à l'autre" (a view which seems more philosophical than that of our present critic).—Yours faithfully,

ALEX. B. MACDOWALL.

REVIEW.

Quelques Recherches sur les centres d'action de l'Atmosphère. II. La Pluie par H. Hildebrand Hildebrandsson. K. Svenska Vetenskaps-Akad. Hand. Band 32 No. 4. 4to., Stockholm, 1899, 22 pages, 4 plates.

ON receiving this paper we glanced rapidly through it, noticing chiefly the lines printed in Italics—for instance on page 5, "The diagram shows that the depth of rain during the cold season of different years is almost always opposite" at each of certain pairs of stations.

On page 6, "Now the rainfall of Siberia from October to March is generally inverse to that which falls during the subsequent wet season in India."

Lastly, on page 9, "During 15 consecutive seasons there exists a satisfactory concordance between the winter rainfall of British Columbia and that of the following autumn at the Azores."

Needless to say that we resolved upon reading the whole memoir, and examining the curves—for there are few things more tempting to the meteorologist than the chance of knowing what is to happen six months hence. We may say at once that with regard to the third of the above extracts the figures and diagram show an agreement between the records at British Columbia and at the Azores to which no word is so appropriate as "marvellous," but the demonstration would be immensely strengthened if a chain of stations on the line joining these widely separated localities showed analogous or even opposite features. We admit the similarity of the curves, and we hope that they prove interdependence and relation, but we should like confirmatory evidence.

The three curves which form Diagram No. 29 fit very well and quite justify Dr. Hildebrandsson's remarks "With only one or two exceptions they show that the winter rains at Thorshaven have the same character as the *previous* summer at St. John's, Newfoundland and as the *following* summer at Berlin."

There can be no question as to the interest, or the importance, of the research upon which Dr. Hildebrandsson has entered, everybody will wish him success. We notice his complaint respecting the difficulty of obtaining in Continental cities the publications of British Colonies, and his offer to exchange publications. Until statesmen learn a little meteorology, we have no hope that Directors will be allowed a free hand in the distribution of their reports; but our opinion is that (1) the number of copies authorised is too small, (2) that the Directors are so short-handed that they have to do clerical work of which they ought to be relieved, so as to give them more time to keep in touch, and in correspondence, with workers in the Northern Hemisphere. It is not economy to make a man do so much routine that he has not time to think.

RESULTS OF METEOROLOGICAL OBSERVATIONS AT CAMDEN SQUARE FOR 40 YEARS, 1858–97.

JULY.

Year.	RAINFALL.				TEMPERATURE.										CLOUD.
	Total.		Max. Fall.	Falls of 1 in. or +	Dry. Mean, 9a.&9p.	Wet. Mean, 9a.&9p.	Shade Max		Shade Min		Sun Max. Black.		Grass Min.		
	Depth	Days					Abs.	Aver	Abs.	Aver	Abs.	Aver	Abs.	Aver	Aver
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	in.		in.		°	°	°	°	°	°	°	°	°	°	0-10
1858..	3·01	10	·77	0	61·2	56·4	87·4	73·3	44·7	51·9	..	..	..	..	5·6
1859..	2·93	8	·96	0	68·0	62·9	91·9	81·2	47·5	58·4	..	..	..	..	4·4
1860..	2·26	12	·76	0	58·7	55·3	75·9	69·9	41·4	51·2	..	..	38·1	48·5	6·6
1861..	2·42	18	·40	0	61·5	57·2	76·8	71·9	48·2	53·8	..	..	40·8	48·8	5·7
1862..	2·61	15	·59	0	59·6	55·4	80·2	70·3	43·3	50·7	..	..	38·8	47·3	6·1
1863..	·92	3	·49	0	61·2	56·7	85·0	74·2	40·3	50·2	..	..	32·8	45·4	4·1
1864..	·62	6	·18	0	62·5	58·9	86·6	76·2	45·5	51·9	..	..	38·5	48·6	6·2
1865..	2·33	15	·87	0	64·2	59·8	85·3	77·6	46·8	55·4	..	..	43·6	51·0	4·7
1866..	1·19	11	·24	0	61·4	57·5	87·2	72·9	46·8	53·3	..	..	36·3	45·9	5·3
1867..	4·30	14	1·82	1	60·5	55·9	76·9	70·9	44·0	52·0	..	..	38·7	48·6	5·4
1868..	·45	3	·22	0	68·1	61·1	93·3	82·4	48·0	56·5	..	..	45·2	53·8	4·1
1869..	·62	5	·38	0	64·5	60·0	91·0	77·8	47·5	54·8	..	..	43·8	51·8	5·1
1870..	1·22	11	·31	0	65·7	59·6	90·8	78·3	44·6	56·6	136·8	119·6	41·9	53·1	5·5
1871..	4·12	18	1·23	1	61·5	57·2	82·2	72·6	45·8	54·4	131·0	117·1	45·2	53·5	6·2
1872..	2·57	13	·89	0	65·5	60·6	92·3	78·5	47·2	56·6	132·9	123·2	45·2	54·6	5·4
1873..	1·81	12	·97	0	63·7	58·5	90·1	76·1	45·8	54·1	135·2	123·1	43·1	51·4	5·5
1874..	·82	11	·22	0	64·6	59·8	90·8	78·4	47·3	54·6	134·0	123·4	42·6	52·4	4·3
1875..	4·63	17	1·29	1	59·6	56·3	80·4	69·8	42·5	52·2	129·0	107·7	36·6	49·8	5·8
1876..	·81	7	·27	0	65·9	60·2	92·6	78·7	47·3	56·7	134·2	121·9	40·8	53·5	4·9
1877..	3·94	14	·70	0	62·1	57·6	87·1	71·9	43·6	53·0	133·9	115·6	32·0	49·5	6·0
1878..	·64	7	·28	0	63·7	59·3	86·2	75·1	43·5	55·2	135·2	121·6	41·1	52·5	5·4
1879..	4·17	20	·91	0	58·3	55·5	80·2	67·7	45·6	52·1	130·3	107·7	41·6	49·7	7·9
1880..	5·10	23	·85	0	61·6	57·6	79·2	72·5	47·5	54·5	132·0	118·8	45·0	51·7	6·5
1881..	1·85	14	·55	0	65·5	59·1	94·6	77·9	44·3	55·8	137·7	119·8	38·3	52·0	4·9
1882..	2·95	18	·95	0	60·4	56·2	77·8	71·5	46·0	53·0	128·8	116·4	44·1	50·3	6·1
1883..	2·92	14	1·43	1	60·0	55·5	84·7	70·5	42·1	52·1	127·6	112·9	38·6	48·1	6·3
1884..	2·46	17	·60	0	63·2	59·1	86·9	74·1	42·2	54·4	125·0	111·8	35·7	50·0	6·3
1885..	·52	6	·25	0	63·3	57·6	90·4	76·6	47·6	54·7	129·3	117·0	40·5	49·6	5·3
1886..	2·37	11	·66	0	63·0	57·8	87·5	74·4	44·4	54·4	133·4	117·0	40·0	50·0	5·5
1887..	1·07	9	·29	0	66·0	59·8	88·8	78·9	45·6	55·6	133·4	123·1	43·8	51·9	4·0
1888..	4·91	26	·90	0	58·1	55·3	72·7	67·1	42·8	52·3	120·2	105·9	41·6	50·3	7·6
1889..	2·64	17	·86	0	61·0	56·6	80·9	71·0	46·1	54·0	126·3	111·7	41·4	50·7	6·8
1890..	4·19	14	1·67	1	59·9	55·6	76·2	69·3	42·4	52·6	126·9	111·5	40·6	51·0	6·3
1891..	3·82	17	·76	0	60·4	56·2	84·3	70·6	44·6	52·8	127·1	113·4	40·3	48·6	5·8
1892..	1·62	9	·68	0	59·9	55·3	81·7	70·5	46·3	52·2	129·0	113·4	41·6	48·1	6·5
1893..	2·46	17	·46	0	62·9	57·7	90·7	74·5	47·3	55·2	130·3	115·6	43·0	51·8	5·9
1894..	3·25	17	1·12	1	62·2	58·0	88·2	73·0	48·9	54·8	128·2	114·1	42·6	50·9	6·8
1895..	3·42	12	·57	0	62·0	56·5	82·0	72·7	47·7	54·6	125·2	114·1	43·1	50·7	6·0
1896..	1·03	7	·49	0	64·6	58·3	88·7	77·5	47·7	55·2	133·0	119·3	41·1	49·4	5·7
1897..	·64	8	·38	0	64·1	58·3	83·6	75·8	44·0	55·3	130·1	117·8	36·1	49·9	4·0
Mean ...	2·39	13	·71	0·2	62·5	57·8	85·2	74·1	45·4	54·0	130·6	116·2	40·6	50·4	5·7
Extremes	5·10	26	1·82	1	68·1	62·9	94·6	82·4	48·9	58·4	137·7	123·4	45·2	54·6	7·9
	·45	3	·18	0	58·1	55·3	72·7	67·1	40·3	50·2	120·2	105·9	32·0	45·4	4·0

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, FEBRUARY, 1899.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	64·8	10	24·9	27	48·6	35·8	36·4	82	95·6	22·1	2·00	11	5·2
Malta	66·1	1	44·0	6	61·5	50·6	49·4	85	129·6	40·0	1·52	9	3·3
Cape of Good Hope	94·6	23	49·7	7	78·9	59·5	57·0	73	...	...	·22	1	2·6
Mauritius	87·4	9	69·1	6	84·3	74·1	71·5	81	162·3	63·4	7·24	20	6·6
Calcutta	87·6	26	50·4	2	82·5	60·8	57·6	63	144·0	40·5	·06	2	2·0
Bombay	88·4	3	65·9	19	82·8	69·0	64·9	69	136·0	56·4	·00	0	1·2
Ceylon, Colombo	93·7	28	68·5	5	89·2	71·9	70·0	76	153·0	65·6	2·78	4	0·8
Melbourne	101·8	14	48·2	2	82·4	58·3	53·5	57	153·8	41·9	1·44	2	3·4
Adelaide	113·6	12	50·0	28	91·5	65·5	52·0	41	167·8	44·8	1·50	7	3·1
Sydney	83·1	27	56·6	1	76·4	64·6	64·8	67	146·9	52·6	1·04	13	5·4
Wellington	73·0	16	44·0	10	66·9	53·7	49·6	68	135·0	36·0	8·42	7	4·1
Auckland	84·5	17	50·0	9	74·4	59·1	55·0	67	141·0	43·0	1·86	7	3·8
Jamaica, Kingston	88·6	24	63·9	24	85·9	67·8	64·8	74	...	...	·49	4	3·2
Trinidad	89·0	1	63·0	4	86·1	67·3	67·9	76	161·0	60·0	1·82	11	...
Grenada	84·0	7	67·8	16	80·1	70·6	68·7	76	150·4	...	7·16	20	2·0
Toronto	46·2	26	—12·6	11	25·5	11·9	18·0	80	66·2	—16·5	1·73	11	5·7
New Brunswick, Fredericton	43·9	18	16·3	8	24·1	4·0	4·7	66	...	...	3·63	11	4·9
Manitoba, Winnipeg	35·8	20	—46·5	8	3·7	—17·4	...	...	...	...	·84	7	4·5
British Columbia, Esquimalt	52·9	19	12·1	4	41·8	33·7		...	...	...	5·36	20	7·9

REMARKS.

MALTA.—Adopted mean temp. 55°·2, or 1°·3 above average. Mean hourly velocity of wind 10·3 miles, or 1·6 miles below average. Mean temp. of sea 61°·2. L on 22nd and 23rd. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·3 below, of dew point 1°·4 above, and rainfall ·38 in. above, their respective averages. Mean hourly velocity of wind 9·7 miles, or 1·7 below average; extremes, 24·8 on 1st, and 2·6 on 5th and 18th; prevailing direction E. by N. and variable. L and T on 4th, 9th and 21st, and T on 10th, 18th to 20th and 28th. T. F. CLAXTON.

CEYLON, COLOMBO.—Mean temp. of air 79°·6, or 0°·5 below, of dew point 0°·3 below, and rainfall ·38 in. above, average. Mean hourly velocity of wind 7·1 miles; prevailing directions, N.E., S.W. and W. TSS on 3 days. H. O. BARNARD.

Adelaide.—A very hot and dry month, the mean max. temp. being 5°·5 above the average of 42 years. C. TODD, F.R.S.

Sydney.—Mean temp. 0°·5 below, humidity 9·9 below, and rainfall 4·21 in. below, average. Weather still very dry over all western districts. H. C. RUSSELL, F.R.S.

Wellington.—Very wet during the early part of the month, especially between 5th and 9th, the max. fall being 3·53 in. on 6th, which caused heavy floods. The remainder of the month was fine. Prevailing N.W. and S.E. winds, generally moderate. H on 8th. Temp. 2°·2 below, and rain 4·88 in. above, their respective averages. R. B. GORE.

Auckland.—A fine warm and dry month. Mean temp. slightly below the average; rainfall little more than half the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Rainfall two-thirds of the average. Mean hourly velocity of wind 3·2 miles. Island rainfall one-third over the average. R. JOHNSTONE.

TRINIDAD.—Rainfall ·13 in. above the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, JULY, 1899.

[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..	·79	XI.	Builth, Abergwesyn Vic.	3·22
II.	Dorking, Abinger Hall .	·93	,,	Rhayader, Nantgwillt ...	2·65
,,	Birchington, Thor	1·42	,,	Lake Vyrnwy	2·04
,,	Hailsham	1·41	,,	Corwen, Rhug	3·82
,,	Ryde, Thornbrough	·40	,,	Criccieth, Talarvor	2·59
,,	Emsworth, Redlands ...	2·26	,,	I. of Anglesey, Lligwy..	3·78
,,	Alton, Ashdell	·94	,,	I. of Man, Douglas	4·04
III.	Oxford, Magdalen Coll..	1·18	XII.	Stoneykirk, Ardwell Ho.	2·49
,,	Banbury, Bloxham	·92	,,	New Galloway, Glenlee	2·34
,,	Northampton, Sedgebrook	1·78	,,	Moniaive, Maxwelton Ho.	2·97
,,	Stamford, Duddington..	1·04	,,	Lilliesleaf, Riddell	3·15
,,	Alconbury	1·25	XIII.	N. Esk Res. [Penicuick]	4·95
,,	Wisbech, Bank House...	1·95	XIV.	Glasgow, Queen's Park..	3·69
IV.	Southend	1·30	XV.	Inverary, Newtown	5·27
,,	Harlow, Sheering..... ...	...	,,	Ballachulish, Ardsheal...	5·54
,,	Colchester, Lexden	2·55	,,	Islay, Gruinart School ...	2·14
,,	Rendlesham Hall	2·87	XVI.	Dollar.....	3·20
,,	Scole Rectory	1·96	,,	Balquhidder, Stronvar...	4·58
,,	Swaffham	1·89	,,	Coupar Angus Station...	2·09
V.	Salisbury, Alderbury ...	·37	,,	Dalnaspidal H.R.S.....	...
,,	Bishop's Cannings	·53	XVII.	Keith H.R.S.....	2·82
,,	Blandford, Whatcombe .	·90	,,	Forres H.R.S.	2·82
,,	Ashburton, Holne Vic...	·83	XVIII.	Fearn, Lower Pitkerrie..	2·50
,,	Okehampton, Oaklands.	1·25	,,	S. Uist, Askernish	1·86
,,	Hartland Abbey	1·00	,,	Invergarry.....	1·69
,,	Lynton, Glenthorne ...	·78	,,	Aviemore H.R.S.	2·90
,,	Probus, Lamellyn	1·01	,,	Loch Ness, Drumnadrochit	2·47
,,	Wellington, The Avenue	·60	XIX.	Invershin	4·12
,,	North Cadbury Rectory	1·25	,,	Durness	3·30
VI.	Clifton, Pembroke Road	·68	,,	Watten H.R.S.....	2·15
,,	Ross, The Graig	·49	XX.	Dunmanway, Coolkelure	4·00
,,	Wem, Clive Vicarage ...	1·58	,,	Cork, Wellesley Terrace	1·62
,,	Wolverhampton, Tettenhall	...	,,	Killarney, Woodlawn ..	3·47
,,	Cheadle, The Heath Ho.	2·03	,,	Caher, Duneske	3·72
,,	Coventry, Priory Row...	1·14	,,	Ballingarry, Hazelfort...	...
VII.	Grantham, Stainby	1·29	,,	Limerick, Kilcornan ...	...
,,	Horncastle, Bucknall ...	1·24	,,	Miltown Malbay	1·71
,,	Worksop, Hodsck Priory	1·70	XXI.	Gorey, Courtown House	3·77
VIII.	Neston, Hinderton	2·14	,,	Moynalty, Westland ...	2·67
,,	Southport, Hesketh Park	1·55	,,	Athlone, Twyford	1·78
,,	Chatburn, Middlewood.	2·05	,,	Mullingar, Belvedere ...	2·71
,,	Duddon Val., Seathwaite Vic.	4·50	XXII.	Woodlawn	1·52
IX.	Melmerby, Baldersby ...	1·85	,,	Crossmolina, Enniscoe ..	1·29
,,	Scarborough, Observat'y	2·07	,,	Collooney, Markree Obs.	2·01
,,	Middleton, Mickleton ...	3·80	,,	Ballinamore, Lawderdale	...
X.	Haltwhistle, Unthank H.	3·23	XXIII.	Warrenpoint.....	2·80
,,	Bamburgh	4·01	,,	Seaforde.....	3·17
,,	Keswick, The Bank	3·21	,,	Belfast, Springfield	2·88
XI.	Llanfrechfa Grange	·27	,,	Bushmills, Dundarave..	2·84
,,	Llandovery	2·60	,,	Stewartstown	2·79
,,	Castle Malgwyn	1·75	,,	Killybegs	4·29
,,	Brecknock, The Barracks	·82	,,	Horn Head	2·28

JULY, 1899.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	1·45	— 1·23	·89	22	10	89·2	20	50·9	5	0	0
II.		Tenterden	1·42	— ·93	·81	22	7	85·0	20*a*	49·0	5, 14	0	0
,,		Hartley Wintney	·42	...	·16	22	6	89·0	20	45·0	5, 28	0	0
III.		Hitchin	1·53	— 1·19	·55	23	10	88·0	19*b*	48·0	4, 27	0	...
,,		Winslow (Addington)	1·17	— 2·12	·61	22	8	88·0	19*b*	45·0	28	0	0
IV.		Bury St. Edmunds (Westley)	2·72	+ ·15	·83	22	7	79·0	20	49·0	5	0	...
,,		Norwich (Brundall)	1·87	...	1·06	23	6	85·0	20	48·6	18	0	0
V.		Winterbourne Steepleton ...	2·01	...	1·39	22	7	81·4	20	45·8	15	0	0
,,		Torquay (Cary Green)	·34	...	·12	22	6	79·5	30	51·7	16	0	0
,,		Polapit Tamar [Launceston]..	·99	— 2·42	·22	23	11	...	...	...	...	...	...
VI.		Stroud (Upfield)	1·03	— 2·54	·30	22	6	86·0	20	50·0	4	0	...
,,		ChurchStretton(Woolstaston)	1·29	— 1·68	·50	1	12	77·5	31	48·0	2	0	0
,,		Worcester (Diglis Lock)	1·44	— 1·43	·42	11	7	...	...	...	...	...	...
VII.		Boston	1·21	— 1·58	·36	23	9	87·0	12	48·0	5, 27	0	...
,,		Hesley Hall [Tickhill].....	·92	— 1·75	·27	12	9	85·0	31	46·0	16*e*	0	...
,,		Breadsall Priory	1·89	...	1·14	1	9	79·0	*f*	46·0	5, 25	0	...
VIII.		Manchester(PlymouthGrove)	...	...	...	...	...	...	...	...	...	...	...
IX.		Wetherby (Ribston Hall) ...	1·20	— 1·98	·32	3	9	...	...	...	...	...	...
,,		Skipton (Arncliffe)	3·42	— 2·22	·87	12	11	...	...	...	...	...	...
,,		Hull (Pearson Park).	1·59	— 1·00	1·14	12	7	81·0	11*c*	46·0	5	0	0
X.		Newcastle (Town Moor)	...	...	...	...	...	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	6·57	— 4·42	1·73	9	19	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	·81	— 3·25	·20	1	11	...	...	...	...	...	...
,,		Haverfordwest	2·31	— 1·90	1·19	10	9	81·5	31	43·6	29	0	0
,,		Aberystwith (Gogerddan) ...	3·25	...	1·08	1	8	86·0	20	...	...	...	...
,,		Llandudno.....	1·85	— 1·15	·39	20	10	...	...	...	...	...	..
XII.	SCOTLAND.	Cargen [Dumfries]	1·99	— 1·94	·76	11	9	80·0	31	45·0	5	0	...
XIII.		Edinburgh (Blacket Place)...	3·98	...	1·24	1	15	78·0	31	48·0	5	0	0
XIV.		Colmonell	3·68	...	1·50	11	13	79·0	5	47·0	4, 23	0	...
XV.		Tighnabruaich	5·05	...	·66	12	16	67·0	6	47·0	9	0	...
,,		Mull (Quinish).....	4·00	— ·05	·84	25	22	...	...	...	...	...	...
XVI.		Loch Leven Sluices	...	...	...	...	...	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	2·05	— 1·41	·45	12	14	82·8	30	47·7	9	0	...
XVII.		Braemar	2·39	— ·82	·45	1	15	76·0	30*d*	37·0	5	0	1
,,		Aberdeen (Cranford)	2·97	...	·55	18	16	77·0	29	46·0	4, 14	0	...
,,		Cawdor (Budgate)	3·35	+ ·05	·63	1	17	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	4·06	+ ·56	·65	28	11	...	...	...	...	...	...
,,		Glencarron Lodge.....	6·57	...	1·26	28	23	70·1	31	45·4	9	0	...
XIX.		Dunrobin	3·18	+ ·33	·80	2	18	73·0	30	45·0	24	0	...
,,		S. Ronaldshay (Roeberry) ...	2·59	+ ·23	·50	25	18	67·0	6	47·0	8	0	...
XX.	IRELAND.	Darrynane Abbey.....	2·25	...	·41	10	22	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	3·00	— ·53	1·19	11	11	77·5	30	43·0	13	0	...
,,		Broadford (Hurdlestown) ...	2·12	...	·63	10	18	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	5·13	+ 1·61	1·89	6	15	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	3·12	+ ·44	1·40	11	12	74·9	5	49·1	13	0	0
XXII.		Ballinasloe	1·87	— 1·68	·44	10	17	78·0	31	47·0	2	0	...
,,		Clifden (Kylemore)	3·07	...	1·31	8	15	...	...	...	...	...	...
XXIII		Waringstown	2·82	— ·70	·78	11	11	73·0	29	43·0	3	0	0
,,		Londonderry (Creggan Res.).	2·23	— 1·89	·38	18	20	...	...	...	...	...	...
,,		Omagh (Edenfel)	2·54	— 1·18	·59	1	17	77·0	31	43·0	12	0	0

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

a—and 21. *b*—and 20. *c*—and 19. *d*—and 31. *e*—and 17. *f* several days.

METEOROLOGICAL NOTES ON JULY, 1899.

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.—Very dry and hot after the first week. Duration of sunshine 270 hours. Sharp TS on 6th from 0.28 to 1.30 p.m.; trees and buildings struck. Severe TS on evening of 22nd, with very heavy R; at Little Westwell, ¾-mile S.W. of Tenterden, 1·44 in. fell. L in evening on 21st; distant thunder on 23rd.

HARTLEY WINTNEY.—A very hot, dry month, with plenty of sunshine. The driest July recorded, the rainfall being ·07 in. less than in 1898 and 1·85 in. below the average. There were TSS to the S. or S.W. on the 20th, 21st, 22nd and 23rd, but the fringe of the cloud reached here on only 2 days. L on the 6th, 7th, 10th, 21st, 22nd and 23rd. Ozone on 9 days, with a mean of 3·2.

HITCHIN.—There have been only two hotter Julys in the last 50 years—1859, mean temp. 65°·3, and 1868, 64°·8. Mean for this month, 64°·7.

WINSLOW, ADDINGTON.—A very fine month, hot and dry. The max. temp. was 80° or above on 12 days, the greatest number ever registered here, the next greatest being 11 in 1887; the min. being above 60° on five nights. T on 7th, 17th and 23rd. The temp. at night was often high.

BURY ST. EDMUNDS, WESTLEY.—A very hot month. TSS on 1st, 7th and 23rd; distant T on 12th and 22nd.

NORWICH, BRUNDALL.—Mean temp. 63°·9, being the highest recorded in July since 1887. TS 11.30 a.m. on 1st, and severe from 4 to 5 a.m. on 23rd. T on 8th.

WINTERBOURNE STEEPLETON.—The temp. during the month was very high, and, with the exception of the rain, which fell principally on the 23rd, the weather was very dry. The mean temp. is 61°·6, which is the highest monthly mean recorded since observations began in 1893. The previous highest is 60°·8 in August, 1893. Fog on 10th, 11th and 14th; T in afternoon and L at night on 21st; slight TS between 3 and 6 a.m. on 22nd; T and L about 6 a.m. on 23rd.

TORQUAY, CARY GREEN.—R 2·20 in. below the average. Mean temp. 64°·4, being 3°·0 above the average. Duration of sunshine 306 hours 55 mins., being 106 hours 10 mins. above average; one sunless day. Mean amount of ozone at 9 a.m. 3·5; greatest 6·5 on 1st, least 1·0 on 12th, 19th, 27th, 28th and 31st.

POLAPIT TAMAR [LAUNCESTON].—A hot, dry, generally calm month, the total R being 2·07 in. less than the average for 18 years. Fog on 5th, 6th, 7th, 16th and 29th; T and L from 3.30 till midnight on 22nd; distant T on 23rd.

WOOLSTASTON.—An extremely hot and sultry month, with very little R after the first 11 days, which were showery. T on the 7th and 17th. Mean temp. 61°·9.

HULL, PEARSON PARK.—TS with heavy R and H in the evening on 12th, 1·14 in. fell in 40 mins.; T also on 7th, 8th and 17th.

WALES.

HAVERFORDWEST.—The month commenced cool and rainy, but was warmer from the 5th to the 9th. A very wet period then occurred up to the 14th, followed by fine summer weather, which continued to the end.

GOGERDDAN.—Very hot and sultry, with much bright sunshine throughout. A few thunder-showers.

SCOTLAND.

CARGEN [DUMFRIES].—The mean bar., 30·013 in., was unusually high, and was accompanied by fine warm weather; the mean temp. for the month, 60°·5, being the highest since 1877, while only in ten out of the last 40 years has the mean for July exceeded 60°. Considerably over the half of the total rainfall occurred in the three days 11th to 13th; on the first of these days a violent TS took place lasting several hours. A continuance of fog during the third quarter of the month accounts for sunshine showing a total of 27 hours less than the average. Splendid weather for haymaking was experienced, but the rye grass crop proved light.

EDINBURGH, BLACKET PLACE.—Mean pressure ·148 in. above, and mean temp. 1°·1 above, the average. Sunshine below the normal. The mean minimum temp., 53°·7, is the highest since 1855, when the mean was 53°·8. Distant thunder on 2nd; TSS on 12th and 17th.

COLMONELL.—R ·23 in. above, and mean temp. 2°·8 above, the averages of 23 years.

TIGHNABRUAICH.—A month of high bar. pressure, the reading on only four days being below 30 inches, yet there was an average rainfall.

MULL, QUINISH.—A very warm and sultry month. Both pressure and temp. were unusually high throughout, the former never falling below 30·00 in. after the 2nd. R about the average, with a great many days of mist and fog. A difficult month for haymaking, but the growth of vegetation was wonderful.

ABERDEEN, CRANFORD.—Warm, with light winds and little sunshine, the sky often overcast. Strong winds from 26th to 29th.

S. RONALDSHAY, ROEBERRY.—A very fine month up till the last week, which was very rough and stormy. Mean temp. 56°·3, or 1°·8 above the average of 9 years.

IRELAND.

DARRYNANE ABBEY.—Rather wet at the beginning of the month; very hot during the last few days. T on 20th and 22nd.

WATERFORD, BROOK LODGE.—Sea fog on 4th, 19th and 21st. T on 5th, 20th and 22nd. H on 5th. Lunar halo on 22nd.

BROADFORD, HURDLESTOWN.—R 1·04 in., and rainy days 1, less than the average of 14 years. On the 22nd, between 4 and 5 p.m., there were two distinct TSS going on at the same time; one to S.W., the other to S.E.

CARLOW, BROWNE'S HILL.—On the 11th, 1·75 in. of R fell in an hour-and-a-half.

DUBLIN, FITZWILLIAM SQUARE.—A warm but changeable month, with very cloudy skies and occasional heavy rains. Winds from westerly points largely predominated. Mean temp. 61°·8, or 1°·6 above the average. High winds on 5 days, and a moderate gale on 26th. Temp. reached or exceeded 70° in the screen on 11 days, while in July, 1887, it reached or exceeded 70° on no fewer than 17 days. TS on 6th; T on 17th. Solar halo on 8th. Fogs on 19th, 20th, 21st, 22nd and 31st.

OMAGH, EDENFEL.—Until the last week the weather of the month was fitful and uncertain, with but little sunshine, a warm humid atmosphere and occasional heavy rains, favourable for growth but rendering hay saving difficult. The last week was fine and dry and progressively warmer until the last day, which was the beginning of a hot spell running into August.

SYMONS'S
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CUTTINGS.

THIS magazine is so largely occupied with original matter that we can rarely insert anything else; but it seems a pity never to relax—so we are reprinting a few items which we think will be of general interest.

ELECTRIC SNOW.

The story of a very remarkable snow-storm, is told, says "Science Siftings," by Lieutenant John P. Finley, one of the best informed meteorologists in the United States, who encountered the storm in making an ascent of Pike's Peak. He says that the storm could be described as a "shower of cold fire." In reality it was so charged with electricity as to present a scene more easily imagined than described. At first the flakes discharged their tiny lights only on coming into contact with the hair of the mule on which the lieutenant was mounted. Presently they began coming thicker and faster, each flake emitting its spark as it sank into drifts of the snow, or settled on the clothing of the lieutenant, or the hair of the mule. As the storm increased and the flakes became smaller, each of the icy particles appeared as a trailing blaze of ghostly white light; and the noise produced by the constant electric explosions conveyed an expression of Nature's power which Lieutenant Finley will never forget. When the storm was at its height and each flake of snow was like a drop of fire, electric sparks were shaken in streams from the Lieutenant's finger tips as well as from his ears, beard and nose, and a wave of his arms was like the sweep of flaming sword-blades through the air, every point of snow touched giving out its little snap and flash of light. This phenomenon, though rather rare, is by no means new to meteorologists, it having been recorded several times before. By some authors, it seems to have been treated as a sort of phosphorescence, but if Lieutenant Finley's description is correct there can be no doubt that in this case each flake was charged with electricity.—*Globe.*

Lieutenant Finley is so skilled an observer that the above may be implicitly trusted. As regards the streams of sparks from his finger tips, we once had the privilege of being shown by Prof. Mascart the electric installation of the Grand Opera at Paris, and in a brilliantly lighted basement, he showed us the electric energy present, by holding his hand within a foot or so of a driving-band, when each separate finger had at its extremity a brush discharge from

2 to 3 inches long. In the dark they would probably have been twice or thrice as long. Trying it ourselves, we saw the same blue flame, and found it quite painless. Electric engineers are doubtless accustomed to it, but to have St. Elmo's fire on our finger tips was to us a new experience.

A COMPASS PLANT.

On some of the prairies in America is found what is called the compass plant, of great value to travellers. The long leaves at the base of its stem assume a vertical position, and point north and south. Travellers on dark nights have only to feel the edges of the leaves to ascertain the points of the compass.

If the leaves "assume a vertical position" how do they "point north and south"?

TREES AND CHANGE OF TEMPERATURE.

It looks as if we were gradually but surely passing to a lower general temperature in these latitudes. Observation does not, it is true, show that the mean temperature is lower than it was a century ago; but the disappearance of many plants which formerly flourished on this island and in Central Europe seems to indicate that such a change is in progress. A writer in *La Semaine Horticole* draws attention to certain changes which have occured and are occurring in France at the present time, which favour the idea that the climate is becoming cooler. Many trees that formerly flourished in the North of France are no longer found there, and can only be met with in the extreme south, while several have entirely disappeared from the country. The lemon, once so general and prevalent in Languedoc, no longer grows there, and an orange tree cannot be found in Roussillon, where orange groves existed long ago. The Italian poplar so common and so picturesque in ancient French etchings, is now rarely found on French soil, and only in the southern part of the Republic. France was of old the fruit garden of Europe; but the changes of temperature have greatly limited the number and variety of fruits which can be grown in that country, and considerably restricted the area in which they flourished.—*English Mechanic, 17th December, 1897.*

THE RAINBOW WONDERS OF WINDERMERE.

"About the first week in October," writes Wordsworth in his "Guide to the Lakes," "the rich green which prevailed through the whole summer is usually passed away, the brilliant and various colours of the fern are then in harmony with the autumnal woods; bright yellow or lemon colour at the base of the mountains, melting gradually through orange to a dark russet-brown towards the summits, where the plant, being more exposed to the weather, is in a more advanced state of decay."

Wordsworth was a faithful observer of the changes of the varying year at the English Lakes, but he would have been obliged to confess that there is no rule without an exception, and that this year the exception holds good. It is true that a Spanish chestnut here and there or a wild cherry upon an upland slope has changed colour, but to-day is the 4th of October, and there is hardly a speck of amber in the woods. A greener autumn can hardly be imagined; yet for all the mellow mistfulness of to-day the wind is going eastward; and if the heavens be clear to-night, and Cassiopeia be bright at the Zenith, we may have

all the larches yellow, and all the brackens gleaming gold to-morrow morn. So runs my diary for October the 4th.

But the heavens were not clear; the mists gathered in a fleecy cloud bed upon the bosom of the lake, and gradually floated upward till all that we could see from our cottage on the Furness Fell were the purple tops of the Fair field range, and the summit of Woden's fell—the Wansfell or Wonsfell of our modern day.

"The morning rose in memorable pomp," the flush of dawn fell upon the steady cloud-pack of mist in the valley, and in a moment as it seemed the quiet sea of vapour was stirred into life; there were writhings innumerable, and the whole mass of soft restfulness became convulsed with passionate movement. Then from beneath the ascending vapour, the sun, reflected in the water, "gleamed upward like the flashing of a shield," and we went down through the roses and the dahlias and the giant lilies still untouched by frost, through the woodland still un-umbered by the touch of October, down through the bracken slopes as green as June, towards the lake shore of Winandermere. Half an hour ago it had seemed as if there would never be sun any more, so densely obscured was the great day star by the white mists that steamed upward. Now we were rejoicing in sunshine that seemed as bright as August noon, by a lake that shone as fair and blue almost as an Italian water-flood. There was no ripple on the mere, and when we pushed out into middle lake, so marvellous were the reflections of fell and wood, so transparent the depths, that one could hardly tell whether we were upon water or suspended in middle air.

Suddenly my companion cried, "Look at the rainbows! look at the rainbows!" Gazing south towards "Belle Isle," one saw the whole water iris-hued, as if all the rainbows that had ever sprung from earth to heaven, had melted into the bosom of the lake, and filled the sunny depth with liquid iridescence.

Slowly we rowed towards them, and the rainbows stayed for us till our boat pushed into the lucent flood, and then as we moved forward on each side our wake, the rainbows curved and quivered, and sprang like horns of multi-coloured light to right and left, and lengthening out, shone far astern. On we went, wondering at the glory and the glow. Our boat's motion seemed momently to kill the marvellous prismatic flood, but it was only for a moment that the rainbows faded, and again, beyond the ripple and the washing of our oars, there sprang into being new rainbow-tinctured beauty of liquid purple shot with green, and orange, and rose, and behind us, as well as before us, the lake mirror lay one mighty opal, one flood of lucent pearl and fire.

Beyond the rainbow lustres far away the lake seemed to have been silvered over with frost; one could have staked one's life, unless one's eyes were playing one false, that the ice-king had been at work, and the thin ice mirrors he had made were powdered with the hoary rime. But as one neared it the phantom ice-floe faded, and nothing but liquid rainbows for the keel to cleave and fashion again to wondrous loveliness, and the finest dust like floating meal remained where before we might have supposed was a fair field for the skater's joy and curler's game.

It was rainbows, rainbows all the way! and what was the cause of this October glory of rainbow flood? It was nothing in the world but a smooth lake surface and the fine dust of the pollen of a humble water-plant—some say

the pollen of the American water-weed Vallisneria, others aver it is the gold dust of the water-lobelia, which, floating upward through the tranquil water on a calm October day, lies on the surface of the polished lake-mirror with power to change the face of the water into such a refracting and diffracting medium as to splinter all the sun into iridescence, and unravel the beam of white light into the colours of the prism.

It seems that the water must be of a certain temperature to encourage the plant to send forth its prism-makers to the surface. No breath in Heaven must stir if the lake-mirror is to work its magic charm. Only on rare days such as was October the 5th could Windermere be clad in rainbow hue. One may live by the shore of the lake for another fifteen years before one may be fortunate enough to witness again the glorious phenomenon of yesterday, or be privileged to push one's shallop through a league of liquid iris, or row through miles of rainbow.—*Daily News, 12th October, 1898.*

The writer's language is as brightly coloured as are the phenomena he describes. They are, perhaps, hardly meteorological facts, but so little over the border line that we may be excused for quoting the account. We have also another reason for reproducing it. We do not impeach the accuracy of the antecedent account, but we once saw on Derwentwater a sight equally beautiful, of which we assumed another explanation. It also was on a very calm day, in early autumn; we were in a small boat, nearly in the centre of the lake, and merely using an oar occasionally to prevent drifting, when we noticed, away to the N., lying on the lake, not a mere rainbow, but a spectrum far more brilliant than any rainbow we ever saw. We thought, but it might have been fancy, that we could trace variations in its brilliancy when wavelets, produced by dipping our oars, had reached its apparent position; and having only the "dangerous" knowledge (*i.e.*, very little) of optics, we thought that we quite understood it, and contented ourselves with admiring, instead of investigating, it.

Our theory, which perhaps some one versed in optics will demolish, was, that as our eyes were so near the level of the water, the crests of the wavelets acted as a diffraction-grating and broke up the sunlight into its component parts. That seems to be the idea of the writer in the *Daily News*, but he brings in the pollen as the diffracting agent.

PERSIAN RAINFALL.

It appears, from a Consular report from Meshed, Persia, that the rainfall there last year was only 9·58 inches, the number of wet days being 44. The year, nevertheless, was one of the wettest on record, and absolutely the wettest since the beginning of the present decade. The average annual rainfall seems to be no more than between 4 and 5 inches. In 1891, it reached 5·73, and in 1895, 8·78. But in 1893, a year of general drought, it was only 3·46 in. Those in search of a dry climate, therefore may be recommended to turn their attention to Meshed. A really wet day, such as we rarely experience in Newcastle, but such as is a common occurrence in Cumberland and Westmoreland, yields as much moisture in a few hours as Meshed gets in a twelvemonth, and would cause the inhabitants of the Persian city to think that the Day of Judgment had come.—*Newcastle Chronicle, 26th October, 1897.*

THE MOON AND THE WEATHER.

To the Editor of the Meteorological Magazine.

SIR,—I fear I must not consider myself a "thoughtful meteorologist," as I am prepared to assert most emphatically that the moon has no influence upon the motion of high and low pressure areas; also, if Prof. Hazen has waded through as much matter on the subject of the moon's influence on the weather, and of the same character, as I have, his "vehemence," I think, is easily explained.

We know the moon's radiant heat to be infinitesimal, and we are able to calculate so accurately the effect of the mutual attraction of the earth, sun and moon, that we can foretell the time and position of a solar eclipse many years hence with the greatest precision.

Although much may remain to be discovered, it cannot be said that we are ignorant of the two chief ways in which the moon might influence the weather. The heat is so small that it may certainly be neglected. The same science which enables us to assign to the moon its precise position in the sky for hundreds of years to come enables us also to assert that the only result of the moon's attraction on our atmosphere is a small aërial tide—a tide which is so small that it can hardly be detected by the barometer. Air being non-magnetic, we can hardly conceive of any magnetical action, and an electrical effect seems equally improbable.

To prove an inherently improbable event very strong evidence is required, but the evidence offered for most of these theories is of the flimsiest description. In fact, a careful search would unearth many pairs of mutually destructive theories—that it rains most at the time of new moon; that it rains least at the time of new moon, &c.

We have, roughly, one hundred years record of the weather, and were there any real connection between it and the moon, it seems likely that it must indisputably have appeared before now.

Careful search for any sort of weather connection should not be discouraged; but if the authors of these theories would study the laws of probability, and apply them rigidly before publishing, it would save the waste of much paper. Take any purely chance numbers, such as the figures after the decimal in a daily temperature column, or the numbers given by a throw of dice. It is very unlikely that the average of ten throws with the left hand will coincide with the average of ten throws with the right hand; and if the numbers be extended to fifty, there may even then be a fair difference between the averages. The averages of alternate figures in the temperature column will show the same discrepancy. Similarly with the moon; if the rainfall for fifty lunations be greater or less at full moon than at new moon, it by no means follows that there is a connection between the fall of rain and the age of the moon, since *à priori* we may naturally expect to find a difference. Considering the many independent elements of variation both of the moon and of the weather, it would be odd if some accidental coincidences in the changes of the various elements did not occasionally happen.

September 2nd, 1899. W. H. DINES.

REVIEWS.

Lightning and the Electricity of the Air, prepared under the direction of WILLIS L. MOORE, U.S. Weather Bureau, by ALEXANDER G. MCADIE and ALFRED J. HENRY. Bulletin No. 26. Weather Bureau, Washington, 1899. 8vo. 74 pages, many engravings and plates.

IN the States this can be bought for half a dollar, we wish that some enthusiast would import a few hundred copies, sell some at half a crown each, and stir up our educational authorities to distribute the remainder to our schools, and thus instruct the children and save lives.

We do not suggest that the pamphlet could itself be put into children's hands,—but that a master would find in it good material for teaching his pupils the general features of atmospheric electricity, thunderstorms, and injury by lightning; while the excellent photographs would give them an object lesson which would prevent their ever running under a tree for "shelter!" However, we suppose that such knowledge would not secure "marks," and therefore probably another generation will be allowed to "shelter" in the worst place possible.

No one, however, must run away with the idea that this is a mere elementary or "paste and scissors" pamphlet. It does contain much that has been said before, it would be useless if it did not; but each of its two sections is extremely well arranged and supported by the best available data.

The lack of esteem for prophets in their own country is proverbial, it is therefore with some satisfaction that we see the following paragraph in Mr. McAdie's paper:—

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, remain 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 as, 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 coöpted members. As might have been 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.

The famous free-for-all discussion which occurred at the British Association Meeting in 1888, as 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."

Part II. deals chiefly with injury by lightning, and statistics as to the number of deaths, of fires, &c., in different years, and in different countries. It contains three beautiful photo-electros of damaged trees, a walnut and two oaks. These induce us to mention an opinion which we have long held, viz., that it is easy for anyone who hardly knows an oak when he sees it growing, to pick out, from a series of photos of trees struck by lightning, all the oaks. We should be glad if any of our readers who have photographed damaged trees would favour us with copies. We would see whether it were possible to reproduce a series of types. For instance, Mr. Henry intimates that when a maple is struck it is rare for any injury, except a groove, to be perceptible, whereas an oak is splintered like a birch broom. We used to think that this disruptive action was caused by the conversion of the sap into high pressure steam, but we gave up that idea after examining the rafter of a house which had been split into shreds, like wooden matches, although the wood was absolutely dry and sapless; this showed that the cause must be electrical repulsion between the particles of wood all similarly electrified. But if so, why is oak so splintered? and why is not maple, or poplar?

Nedboriagttagelser i Norge udgivet af det Norske Meteorologiske institut. Aargang I., II. og III. Two parts. Kristiania, 1899. Fol., 152 and 218 pages, 2 maps and 4 tracings.

Two excellent works; but Dr. Mohn was a regular attendant at the Official Meteorological Congresses, at which we thought that it was decided that it was desirable that meteorological publications should be uniform in dimensions, and here we have two handsome publications which will not go comfortably on anybody's shelves, and which are sure to suffer accordingly. They are 16 inches high by 11 inches broad, and we can see no reason whatever for these unusual and uncomfortable dimensions.

Having recorded our protest—which, moreover, applies to others besides Dr. Mohn—we turn to the more pleasant duty of reporting what the volumes contain.

Part I. gives the daily rainfall from July 1st, 1895, to December 31st, 1897, at about 200 Norwegian stations.

Part II. gives monthly summaries for all the stations at work during 1895–97 (about 400), and also various remarks, summaries, and an introduction.

On pages 206–209 there is a very useful table which gives the total rainfall in each year from 1867 to 1895 inclusive, at every station at which any record was kept for any one or more of those

years. There are only seven returns for the first year (1867), and of these Kristiania, Mandal, Skudenes, Bergen and Aalesund are perfect for the whole period of 29 years.

It will be useful to give some data for these stations.

	Kristiania	Mandal.	Skudenes.	Bergen.	Aalesund.
Latitude N.	63° 7′	58° 2′	59° 9′	60° 23′	62° 28′
Longitude E.	7° 45′	7° 27′	5° 16′	5° 21′	6° 10′
Altitude (feet)	52	56	13	72	46
Mean R. (in.)	22·95	52·20	45·00	73·09	43·54
Max. Total (in.)	38·82	75·04	57·95	111·58	66·59
,, Year	1877	1891	1877	1887	1893
,, % of Mean	169	144	129	159	153
Min. Total (in.)	16·26	31·02	31·46	43·82	27·21
,, Year	1871	1875	1875	1870	1872
,, % of Mean	71	59	70	60	62

Bergen has long been known to have a large rainfall, and it will be seen that the average is 73 inches. Apparently the wettest place in Norway is Farstveit,* in Lat. 60° 50′ N. and Lon. 5° 56′ E., about 350 feet above sea level, at which place the average rainfall is 90 inches, or about half that of the wettest English station.

We congratulate Dr. Mohn upon this useful publication, and upon the beauty of the typography and of the maps.

Meteorologiske Middeltal og Extremer for Faroerne, Island og Grønland. [Meteorological Means and Extremes for the Faroe Islands, Iceland and Greenland.] Appendix to the danske meteorologiske Instituts Aarbog, 1895, II. Del. Copenhagen, 1899, 4to, 32 pages, 1 map.

We thank Dr. Paulsen heartily for this very useful paper, but we wish that he had added a few more pages of text. He is, of course, familiar with the instruments used at these nine stations, with their mounting, and with the environments of each, but there is not a word upon the subject in the text, nor any reference to any other work in which such information is given—so that those who have not visited the stations are left very much in the dark.

We have applied some rather severe tests to the barometric records and they seem to be excellent; we, therefore, assume that the other elements are equally trustworthy, except where distinct warning to the contrary is given—as for example, in the statement that at four of the stations there was no *maximum* thermometer.

As this paper deals chiefly with means and extremes, dates are of minor importance, but we should certainly have given for each

* At the head of a Fjord some 50 miles N.E. of Bergen.

station the years upon which the records are based. We *infer* that the latest year is in all cases 1895, and that therefore, *e.g.*, at Berufjord the "23 years" were 1873–95, but we cannot be sure. We regret this omission, because in preparing the following table we should have liked to show whether the greatest, and the least rainfall, occurred in the same year, or in different years at the respective stations. However, we give what we can :—

Details as to Rainfall.

	Faroe.	Iceland.				Greenland.			
	Thorshavn.	Berufjord.	Grimsey.	Stykkis-holm.	Vestmanno.	Ivigtut.	Godthaab.	Jacobshavn.	Upernivik.
Latitude N.	62° 2′	64° 40	66° 34′	65° 5′	63° 26′	61° 12′	64° 11′	69° 13′	72° 47′
Longitude W.	6° 44′	14° 15′	18° 3′	22° 46′	20° 18′	48° 11′	51° 46′	50° 55′	55° 53′
Altitude (feet)	31	59	8	37	26	16	37	41	12
No. of Years	25	23	16–22	18–23	15	21	19–23	21–23	21
Mean yearly Rain (in.)	62·73	43·76	14·72	24·57	49·83	48·61	26·45	8·50	8·90
Max. yearly Rain (in.)	77·01	68·39	25·85	29·50	62·48	72·50	35·61	14·68	17·77
,, ,, ,, % of Mean	123	156	176	120	125	149	135	173	200
Min. ,, ,, (in.)	52·28	22·50	6·59	14·95	37·25	20·87	15·66	5·26	3·35
,, ,, ,, % of Mean	83	51	45	61	75	43	59	62	38
Max. in 24 hours (in.)	2·46	4·31	1·35	2·04	2·46	5·88	3·30	1·43	2·07
Month, Wettest	I.	XII.	X.	IX.	IX.	X.	IX.	VIII.	VIII.
,, Driest	VI.	VII.	IV.	IV.	V.	IV.	IV.	II.	VI.

Remarks.

Double figures as to the number of years are given for four stations. We presume that at these stations some monthly records have been lost; so that the final yearly mean is the total of twelve monthly means, which are based, some upon one number of years, some upon another.

We do not know the reason for the rapid decrease in the fall of rain with increase of latitude in Greenland. It will be seen that taken to the nearest inch it is in—

Lat. 61°	... 49 inches.	Lat. 69°	... 9 inches.
,, 64°	... 26 ,,	,, 73°	... 9 ,,

Is it possible that at these latter Arctic stations, where the fall must be chiefly snow, the mode of measuring it needs more care than it receives? A fall of 3⅓ inches in a whole year would not provide many icebergs for the N. Atlantic,

We are also doubtful as to the record of rainfall at Grimsey; it is an Island station, perhaps a lighthouse, exposed, and wind swept. The return is much the lowest of the four, and is about half that

reported for Reikiavig by Dr. Thorsten for 1829–37, in *Collectanea Meteorologica.*

As regards seasonal rainfall, the figures, though irregular, seem to show that the wettest month is generally in the latter half of the year, most frequently in September. The driest month is usually in Spring, most frequently in April. The mean annual temperature at Upernivik is 16°·2 F., and the lowest observed is —41°·1 F., *i.e.*, 73° below freezing point. At Jacobshavn it was once rather colder, viz., —43°·6 F.

THUNDERSTORM ON AUGUST 15TH.

THUNDERSTORMS prevailed between 2 and 7 p.m. on this date over an area which (roughly) may be said to have been bounded on the S.E. by a line reaching from Salisbury to Norwich, and on the N.W. by a line from Gloucester to Boston.

As heavy rains have lately been very scarce, we give all the returns exceeding an inch, in the order of their amount. We are inclined to think that the largest amount is too *small*, our impression being that the gauge ran over.

	in.	
Wallingford	3·10	
Dorchester, Oxfordshire	2·37	
(1) Manor Ho., Long Wittenham, Berks	2·35	(1) 1·75 in. fell in 50 mins.
(2) Letcombe Regis, Wantage, Berks	2·25	(2) All fell between 2 & 5 p.m.
Drayton, Wallingford	2·20	
Lovegrove's Cottage, Long Wittenham	2·17	
(3) Pyrton Manor, Watlington, Oxon	2·04	(3) All fell between 3 & 8 p.m.
Dorchester, Oxfordshire (Mr. Latham)	1·97	and 1·58 in. fell between
Sedgbrook, Northampton	1·61	3 and 3.45 p.m.
Abingdon, Berks	1·53	
Swaffham, Norfolk	1·52	
Milton, Didcot, Berks	1·50	
(4) Culham, Abingdon	1·25	(4) Storm from S.W., 2 to
Elm, Wisbech	1·22	5 p.m.
Magdalen College, Oxford	1·10	
Alconbury	1·04	
St. Giles, Oxford	1·00	

Taking merely the district round Abingdon, there seems to have been an area of 135 square miles with an average fall of 1½ inches. This would equal (taking 1 in. of rain per square mile as 14 million gallons) 2,835,000,000 gallons of water deposited in about 3 hours, or about 13 million tons weight. How many locomotives would have been required to deliver that load in three hours?

RESULTS OF METEOROLOGICAL OBSERVATIONS AT CAMDEN SQUARE FOR 40 YEARS, 1858–97.

AUGUST.

Year.	RAINFALL.				TEMPERATURE.										CLOUD.
	Total.		Max. Fall.	Falls of 1 in. or +	Dry. Mean, 9a.&9p.	Wet. Mean, 9a.&9p.	Shade Max		Shade Min		Sun Max. Black.		Grass Min.		
	Depth	Days					Abs.	Aver	Abs.	Aver	Abs.	Aver	Abs.	Aver	Aver
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	in.		in.		°	°	°	°	°	°	°	°	°	°	0–10
1858..	1·10	7	·61	0	61·6	57·4	84·5	74·9	42·4	52·4	..	..	..	..	4·8
1859..	2·65	14	·46	0	63·0	59·3	87·1	74·1	46·9	54·7	..	..	..	..	4·9
1860..	4·48	26	·77	0	58·1	55·0	70·3	66·6	44·8	51·8	..	..	38·7	48·9	7·4
1861..	·94	9	·24	0	62·6	58·8	89·5	75·6	46·2	53·8	..	..	40·0	48·7	5·0
1862..	2·74	11	·94	0	59·2	55·6	79·6	70·9	43·7	51·4	..	..	34·3	46·9	6·0
1863..	1·44	13	·54	0	61·8	57·8	83·8	73·3	45·1	54·2	..	..	37·8	49·9	6·3
1864..	1·33	6	·57	0	59·9	55·7	89·4	74·4	38·2	49·0	..	..	31·9	45·7	4·7
1865..	4·10	16	1·01	1	59·4	57·1	78·7	71·7	43·4	51·8	..	..	36·8	47·7	5·3
1866..	2·76	17	·87	0	59·5	56·6	80·0	71·6	40·7	52·3	..	..	34·9	44·2	6·7
1867..	2·63	10	·89	0	62·9	59·2	88·2	73·4	40·9	54·4	..	..	35·6	49·7	5·6
1868..	2·28	12	·53	0	63·7	59·3	88·2	73·9	46·0	54·7	..	..	44·8	53·0	6·9
1869..	1·26	9	·28	0	61·0	56·2	89·0	73·3	42·0	51·5	..	..	36·5	48·1	5·5
1870..	2·69	8	·85	0	60·9	57·1	82·5	73·4	40·5	53·5	134·0	119·2	36·4	49·2	4·8
1871..	·85	7	·62	0	65·1	60·0	90·0	77·9	46·2	54·2	127·5	119·4	42·6	52·2	2·0
1872..	2·05	12	·38	0	61·2	57·4	83·0	72·6	43·4	52·8	127·8	114·9	43·2	51·9	4·7
1873..	2·87	16	·87	0	62·1	58·4	86·4	73·9	47·7	54·6	132·7	120·2	43·2	51·2	5·4
1874..	1·32	16	·28	0	60·7	57·3	84·0	72·2	45·5	52·1	129·3	112·2	44·3	50·2	5·9
1875..	1·79	12	·66	0	62·5	59·0	86·1	74·7	45·3	55·0	131·0	116·2	41·8	51·8	5·5
1876..	1·79	12	·42	0	63·3	58·6	92·3	76·0	43·8	54·4	131·2	119·7	38·0	50·6	4·9
1877..	2·23	17	·55	0	62·6	57·9	82·9	72·8	42·4	55·0	130·0	118·4	39·3	52·4	5·8
1878..	6·72	22	1·41	1	62·3	59·1	79·4	72·6	50·1	55·8	127·8	116·2	47·3	52·8	7·2
1879..	5·11	16	·82	0	60·1	56·9	78·3	69·9	44·8	53·8	131·9	108·7	40·6	50·9	6·9
1880..	·45	4	·21	0	62·6	59·3	82·6	74·5	47·8	55·9	131·4	115·4	44·8	53·8	6·3
1881..	4·89	19	·84	0	59·1	55·5	84·6	69·3	42·3	51·3	126·3	110·6	37·8	47·7	6·5
1882..	1·48	12	·39	0	60·1	56·1	80·8	70·6	45·0	52·7	128·3	111·8	40·2	49·3	6·3
1883..	·93	10	·39	0	62·1	57·6	82·7	73·4	46·9	54·2	124·8	113·2	37·2	49·6	5·6
1884..	·89	10	·30	0	65·6	59·9	92·0	77·1	45·7	54·5	125·4	112·2	38·7	52·7	3·6
1885..	·85	12	·25	0	57·8	53·6	79·3	69·2	43·3	51·0	122·7	105·4	36·7	45·9	6·0
1886..	·76	12	·14	0	61·8	57·9	88·4	73·9	44·6	54·6	124·4	114·6	39·0	49·7	5·1
1887..	3·15	8	1·44	1	61·9	56·3	88·5	74·4	42·5	52·5	129·2	113·9	40·3	49·9	5·0
1888..	3·61	14	1·39	1	59·2	55·8	84·6	69·3	43·9	52·1	126·6	109·1	38·4	48·0	5·8
1889..	1·80	16	·31	0	59·7	56·2	84·4	70·5	44·2	52·6	125·9	110·2	40·2	49·0	5·7
1890..	1·55	13	·40	0	59·1	55·7	79·7	69·9	40·4	52·5	124·6	111·4	38·4	50·3	5·9
1891..	4·75	22	1·44	1	58·8	55·6	75·8	68·2	43·2	52·7	126·2	110·8	39·3	49·1	7·1
1892..	3·06	17	1·71	1	61·5	57·4	82·1	72·6	43·1	53·7	126·7	113·3	37·3	49·4	5·6
1893..	1·61	11	·78	0	65·5	59·5	93·6	77·1	44·8	56·4	131·9	117·8	39·0	52·3	4·9
1894..	2·85	18	·90	0	59·7	56·4	79·3	69·2	44·3	53·3	124·9	107·5	41·9	50·7	7·0
1895..	3·09	18	·67	0	61·4	57·6	81·3	72·2	46·0	54·2	123·8	113·3	41·0	50·3	5·1
1896..	1·92	14	·37	0	59·6	55·5	77·1	69·9	45·4	51·6	123·9	109·9	40·1	46·9	5·8
1897..	2·92	16	·76	0	62·8	58·6	88·4	73·6	48·1	54·8	130·1	116·2	42·4	49·9	5·2
Mean ...	2·39	13	·68	0·2	61·3	57·4	84·0	72·6	44·3	53·3	127·9	113·6	39·5	49·8	5·6
Extremes	6·72	26	1·71	1	65·6	60·0	93·6	77·9	50·1	56·4	134·0	120·2	47·3	53·8	7·4
	·45	4	·14	0	57·8	53·6	70·3	66·6	38·2	49·0	122·7	105·4	31·9	44·2	2·0

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, MARCH, 1899.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	TotalRain. Depth.	TotalRain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, CamdenSquare	61·1	29	19·9	21	50·2	32·1	35·8	84	106·7	20·8	·50	8	5·1
Malta	76·9	23	44·9	29	65·8	51·9	49·5	80	133·9	39·9	·84	7	2·6
Cape of Good Hope	93·6	1	53·1	22*e*	78·9	59·7	56·4	73	...	...	·43	1	2·5
Mauritius	85·3	29	70·2	15	83·0	73·9	71·5	81	163·8	65·3	12·13	24	6·3
Calcutta	99·7	18	62·7	4	94·7	70·2	64·0	58	152·5	52·5	·01	1	1·0
Bombay	89·4	29	70·0	2	86·5	73·7	70·2	72	132·4	61·8	·00	0	0·4
Ceylon, Colombo	93·2	14*a*	70·0	9	91·2	73·7	72·2	79	153·9	67·5	·88	6	3·0
Melbourne	98·2	15	48·0	20	78·2	56·8	51·7	61	153·4	43·0	2·98	7	4·6
Adelaide	103·3	8	51·4	22	83·2	61·0	51·1	50	156·0	44·9	1·26	7	3·8
Sydney	90·4	23	56·8	21	77·6	62·5	59·7	66	141·5	45·9	1·76	14	3·5
Wellington	76·0	20*b*	41·9	15	67·5	54·1	50·7	69	127·0	35·0	4·58	12	4·2
Auckland	77·0	1	52·0	10	70·7	57·6	53·9	70	137·0	49·0	2·20	16	4·0
Trinidad	90·0	20*c*	64·0	7, 24	87·0	67·2	68·0	72	164·0	61·0	1·00	9	...
Grenada	86·0	21*d*	68·4	2	81·3	71·2	68·9	77	154·0	...	2·85	16	2·0
Toronto	56·8	11	4·9	21	34·3	21·5	23·7	79	73·8	1·5	4·28	16	6·6
New Brunswick, Fredericton	50·8	6	11·7	15	34·7	14·7	16·5	65	...	...	4·52	15	6·5
Manitoba, Winnipeg	29·2	24	−34·8	6	16·1	−9·8	...	...	...	...	·36	4	4·4
British Columbia, Esquimalt	54·8	29	28·0	25	48·5	35·7		...	...	...	2·45	15	6·4

a—18. *b*—23. *c*—27, 28. *d*—28. *e*—24.

REMARKS.

MALTA.—Adopted mean temp. 56°·7, or 0°·8 above average. Mean hourly velocity of wind 12·3 miles, or 1·4 above average. Mean temp. of sea 62°·0. H on 26th.
J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·5, of dew point 1°·6, and rainfall 3·87 in. above, their respective averages. Mean hourly velocity of wind 10·3 miles, or 0·3 above average; extremes, 43·5 on 6th and 0·0 on 13th; prevailing direction E.S.E. to E. by N. and variable. L on 7th, T on 15th, 17th, 27th and 28th, and L T on 18th and 30th.
T. F. CLAXTON.

CEYLON, COLOMBO.—Mean temp. of air 80°·2, or 1°·7 below, of dew point 0°·6 below, and rainfall 4·08 in. below, their respective averages. Mean hourly velocity of wind 6·6 miles; prevailing direction S.W. TSS occurred on 6 days; L on the 1st only.
H. O. BARNARD.

Adelaide.—Mean temp. of air 1°·7, and rainfall ·25 in., above the average of 42 years.
C. TODD, F.R.S.

Sydney.—Temp. 0°·7 above, humidity 9·6 below, and rainfall 3·44 in. below, their respective averages.
H. C. RUSSELL, F.R.S.

Wellington.—Fine in the early part of the month, with N.W. and S.E. winds; strong wind from N.W. on 1st and 2nd; middle of month heavy R, 2·75 in. on 13th, then fine till end of the month when it was showery, with light, variable wind or calm, and warm nights. Temp. 1°·3 below, and rainfall 1·04 in. above, their respective averages.
R. B. GORE.

Auckland.—Fine and dry during the early part and middle of the month. Heavy N.E. gale from 23rd to 28th, with heavy rain on 27th and 28th. Mean temp. and rainfall slightly under the average of 32 years.
T. F. CHEESEMAN.

TRINIDAD.—Rain ·87 in. below the average of 30 years.
J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, AUGUST, 1899.

[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..	·60	XI.	Builth, Abergwesyn Vic.	2·38
II.	Dorking, Abinger Hall .	·88	,,	Rhayader, Nantgwillt ...	2·59
,,	Birchington, Thor	·81	,,	Lake Vyrnwy	2·29
,,	Hailsham	·71	,,	Corwen, Rhug	1·74
,,	Ryde, Thornbrough	·55	,,	Criccieth, Talarvor	1·09
,,	Emsworth, Redlands ...	·97	,,	I. of Anglesey, Lligwy..	·92
,,	Alton, Ashdell	1·52	,,	I. of Man, Douglas	1·31
III.	Oxford, Magdalen Coll..	2·02	XII.	Stoneykirk, Ardwell Ho.	1·85
,,	Banbury, Bloxham	·82	,,	New Galloway, Glenlee	1·16
,,	Northampton, Sedgebrook	2·11	,,	Moniaive, Maxwelton Ho.	3·14
,,	Stamford, Duddington..	·84	,,	Lilliesleaf, Riddell	1·13
,,	Alconbury	1·62	XIII.	N. Esk Res. [Penicuick]	·95
,,	Wisbech, Bank House...	1·15	XIV.	Glasgow, Queen's Park..	1·38
IV.	Southend	·78	XV.	Inverary, Newtown	2·25
,,	Harlow, Sheering..... ...	...	,,	Ballachulish, Ardsheal...	2·91
,,	Colchester, Lexden	·34	,,	Islay, Gruinart School ...	1·41
,,	Rendlesham Hall	·02	XVI.	Dollar.....	1·50
,,	Scole Rectory	1·09	,,	Balquhidder, Stronvar...	2·08
,,	Swaffham	2·03	,,	Coupar Angus Station...	·57
V.	Salisbury, Alderbury ...	1·84	,,	Dalnaspidal H.R.S.....	...
,,	Bishop's Cannings	1·38	XVII.	Keith H.R.S.....	2·07
,,	Blandford, Whatcombe .	1·32	,,	Forres H.R.S.	1·59
,,	Ashburton, Holne Vic...	2·27	XVIII.	Fearn, Lower Pitkerrie..	·44
,,	Okehampton, Oaklands.	1·78	,,	S. Uist, Askernish	2·02
,,	Hartland Abbey	2·81	,,	Invergarry.....	·15
,,	Lynton, Glenthorne ...	2·65	,,	Aviemore H.R.S.	·78
,,	Probus, Lamellyn	1·59	,,	Loch Ness, Drumnadrochit	1·02
,,	Wellington, The Avenue	1·93	XIX.	Invershin	·80
,,	North Cadbury Rectory	1·32	,,	Durness.....	3·11
VI.	Clifton, Pembroke Road	1·44	,,	Watten H.R.S.....	1·16
,,	Ross, The Graig	1·06	XX.	Dunmanway, Coolkelure	2·41
,,	Wem, Clive Vicarage ...	1·08	,,	Cork, Wellesley Terrace	2·01
,,	Wolverhampton, Tettenhall	1·46	,,	Killarney, Woodlawn ..	2·33
,,	Cheadle, The Heath Ho.	1·39	,,	Caher, Duneske	1·61
,,	Coventry, Priory Row...	1·17	,,	Ballingarry, Hazelfort...	3·77
VII.	Grantham, Stainby	·99	,,	Limerick, Kilcornan ...	1·10
,,	Horncastle, Bucknall ...	·59	,,	Miltown Malbay	5·04
,,	Worksop, Hodsck Priory	·85	XXI.	Gorey, Courtown House	2·02
VIII.	Neston, Hinderton	1·50	,,	Moynalty, Westland ...	...
,,	Southport, Hesketh Park	1·51	,,	Athlone, Twyford	2·52
,,	Chatburn, Middlewood.	2·34	,,	Mullingar, Belvedere ...	2·57
,,	Duddon Val., Seathwaite Vic.	2·81	XXII.	Woodlawn	2·96
IX.	Melmerby, Baldersby ...	1·44	,,	Crossmolina, Enniscoe ..	2·30
,,	Scarborough, Observat'y	1·45	,,	Collooney, Markree Obs.	2·92
,,	Middleton, Mickleton ...	1·21	,,	Ballinamore, Lawderdale	3·00
X.	Haltwhistle, Unthank H.	·50	XXIII.	Warrenpoint.....	1·65
,,	Bamburgh	·83	,,	Seaforde.....	1·60
,,	Keswick, The Bank.....	1·96	,,	Belfast, Springfield	1·84
XI.	Llanfrechfa Grange	1·76	,,	Bushmills, Dundarave..	2·26
,,	Llandovery	2·60	,,	Stewartstown	2·09
,,	Castle Malgwyn	1·37	,,	Killybegs	2·68
,,	Brecknock, The Barracks	1·07	,,	Horn Head	1·59

AUGUST, 1899.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	·70	— 1·18	·49	31	6	91·2	15	48·6	21	0	0
II.		Tenterden	1·09	— ·77	·38	31	8	86·0	15	48·0	21	0	...
,,		Hartley Wintney	·68	...	·25	29	5	89·0	15	42·0	22	0	0
III.		Hitchin	1·27	— ·55	·72	15	8	86·0	15	45·0	21	0	...
,,		Winslow (Addington)	1·13	— ·84	·42	30	7	90·0	25	43·0	11*d*	0	...
IV.		Bury St. Edmunds (Westley)	1·02	— 1·18	·51	15	7	77·0	15*c*	49·0	11	0	...
,,		Norwich (Brundall)	·76	...	·25	15	7	84·0	15	46·0	11	0	0
V.		Winterbourne Steepleton ...	2·67	...	1·32	29	7	82·0	24	42·4	22	0	0
,,		Torquay (Cary Green)	3·26	...	1·32	7	9	77·2	19	52·6	22	0	...
,,		Polapit Tamar [Launceston]..	1·35	— 1·13	·60	29	10	81·7	14	44·1	11*e*	0	0
VI.		Stroud (Upfield)	·94	— 1·15	·39	29	9	86·0	3	54·0	31	0	...
,,		ChurchStretton(Woolstaston)	1·26	— 1·50	·62	29	6	83·0	24	47·5	9	0	...
,,		Worcester (Diglis Lock)	...	...	...	...	...	...	...	...	...	...	...
VII.		Boston	·69	— 1·43	·15	28*a*	8	87·0	25	45·0	9, 11	0	...
,,		Hesley Hall [Tickhill].....	·94	— 1·22	·28	31	9	89·0	25	43·0	11	0	...
,,		Breadsall Priory	·64	...	·11	15*b*	9	86·0	25	46·0	9	0	...
VIII.		Manchester(PlymouthGrove)	...	...	...	...	...	...	...	...	...	...	...
IX.		Wetherby (Ribston Hall) ...	·95	— 1·39	·25	27	8	...	...	...	...	...	...
,,		Skipton (Arncliffe)	1·40	— 2·93	·44	27	11	...	...	...	...	...	...
,,		Hull (Pearson Park).	·68	— 1·96	·40	27	4	87·0	1	42·0	12	0	...
X.		Newcastle (Town Moor)	·87	— 1·84	·25	28	9	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	3·94	— 4·51	1·44	29	14	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	1·44	— 2·17	·44	29	8	...	...	...	...	...	...
,,		Haverfordwest	2·25	— ·67	·67	7	10	82·0	2	46·1	11	0	0
,,		Aberystwith (Gogerddan) ...	3·26	...	1·25	6	6	88·0	24	42·0	10	0	...
,,		Llandudno.....	2·44	+ ·08	·76	28	14	86·0	24	51·0	9	0	...
XII.		Cargen [Dumfries]	2·71	— ·28	·78	29	8	83·0	2, 25	45·0	9, 10	0	...
XIII.		Edinburgh (Blacket Place)...	·55	...	·28	29	8	82·7	24	47·0	10	0	0
XIV.		Colmonell	1·68	...	·60	6	11	88·0	1	39·0	8	0	...
XV.		Tighnabruaich	2·18	...	·71	29	9	70·0	1, 2	46·0	8, 9	0	...
,,		Mull (Quinish).....	1·86	— 2·29	·74	29	11	...	...	...	...	...	...
XVI.		Loch Leven Sluices	1·30	— 1·64	·40	30	6	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	·55	— 2·02	·25	29	7	83·0	22	45·0	29	0	...
XVII.		Braemar	1·30	— 2·03	·82	30	8	79·7	23	34·5	10	0	2
,,		Aberdeen (Cranford)	·58	...	·19	29	7	85·0	1	35·0	9	0	...
,,		Cawdor (Budgate)	·82	— 1·43	·27	30	9	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	1·21	— 2·09	·35	14	6	...	...	...	...	...	...
,,		Glencarron Lodge.....	2·72	...	·83	16	12	80·8	24	42·0	9	0	...
XIX.		Dunrobin	...	...	...	...	...	...	...	...	...	...	...
,,		S. Ronaldshay (Roeberry) ...	2·09	— ·47	·55	30	8	69·0	22	43·0	18	0	...
XX.	IRELAND.	Darrynane Abbey.....	2·68	...	1·05	24	13	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	...	...	...	...	...	...	...	...	...	...	...
,,		Broadford (Hurdlestown) ...	2·14	...	·43	29	15	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	1·57	— 1·40	·29	27	11	...	..	...	...	...	...
,,		Dublin (FitzWilliam Square)	3·78	+ 1·26	2·23	5	10	77·8	24	49·1	10	0	0
XXII.		Ballinasloe	2·58	— ·60	·61	5	12	79·0	1	46·0	12	0	...
,,		Clifden (Kylemore)	6·38	...	·96	26	11	...	...	...	...	..	...
XXIII		Waringstown	1·60	— 1·51	·60	18	10	89·0	1	40·0	28*f*	0	...
,,		Londonderry (Creggan Res.).	2·11	— 2·01	·42	29	14	...	...	...	...	...	...
,,		Omagh (Edenfel).....	3·32	— ·17	1·09	29	11	81·0	22	43·0	15	0	0

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

a—and 30. *b*—and 27, 31.. *c*—and 25. *d*—and 22. *e*—and 12. *f*—and 29.

METEOROLOGICAL NOTES ON AUGUST, 1899.

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.—Very dry and hot; splendid harvest weather. Six days with temp. over 80°, and only seven below 70°. Duration of sunshine 270 hours. Grass was much burnt up. TS on 5th; L on 15th and 31st.

HARTLEY WINTNEY.—The driest August known, and remarkable for extreme heat, cloudless days and starlight nights. The severity of the protracted drought was keenly felt; the period of 93 days from May 25th to August 27th yielded only 1·24 in. of R, or ·018 in. per diem. R 2·48 in. below the average. Sunshine was registered each day at 9 a.m. until the 29th. The temp. in shade at 9 a.m. on 24th and 25th was respectively 79°·2 and 80°·0. Distant T on 3 days, and L on 3rd, 4th and 5th. Ozone on 5 days. Swifts last seen on 11th.

WINSLOW, ADDINGTON.—Very hot and dry, with little R until 30th. There have been Augusts with less R than this, but they were all preceded by very wet Julys, notably in 1880, when the R in August was only ·84 in., but in July 8·24 in. On 15th there was a heavy TS, lasting over five hours, with vivid L but little R. During the TS on 30th the L entered the chimney of a house near Winslow, breaking its way through an iron stove-pipe into the room, but did no further damage.

BURY ST. EDMUNDS, WESTLEY.—Splendid month for the harvest. R below half the average. Ponds and wells getting very low. Many complaints of want of water. TS on 15th; distant T on 4 days.

NORWICH, BRUNDALL.—An exceedingly dry month, with an unusually large number of fine, bright and sunny days. The max. temp. was frequently considerably lower than further inland, owing to the prevalence of E. and N.E. winds. Severe TS on the evening of 15th; T and L on 28th and 30th.

WINTERBOURNE STEEPLETON.—A month of great heat, with a long absolute drought of 20 days, but good rains fell both at the beginning and the end. Mean daily temp. 62°·9, being the highest in any month since record commenced in 1893. A splendid harvest season, and the root crops, from the heavy R which fell at intervals, look well. T and L on 3rd; L on 6th.

TORQUAY, CARY GREEN.—Mean temp. 65°·9, or 4°·4 above, and R ·51 in. above, the average. Duration of sunshine 306 hours 25 mins., being 113 hours 35 mins. above the average. One sunless day.

POLAPIT TAMAR [LAUNCESTON].—A very dry month, in fact the driest August in 19 years. Exceptionally high shade temp. prevailed throughout, the mean max. being 75°·5. T on 5 days; L on 3 days.

STROUD, UPFIELD.—TSS on 3rd, 6th, 15th and 30th.

WOOLSTASTON.—Intensely hot and dry, the drought continuing till 28th. An excellent harvest well gathered in, but grass and root crops almost burnt up. Mean temp. 64°·1.

BOSTON.—Although the max. temp. was not so great as on some previous occasions, the mean temp. of this month was the highest recorded, being 5°·7 above the average. On 14 days the max. temp. in shade exceeded 80°.

BREADSALL PRIORY.—Exceptionally dry and hot. T on 15th.

ARNCLIFFE VICARAGE.—Unusually dry, with great heat.

WALES.

HAVERFORDWEST.—One of the finest Augusts and certainly the warmest during 50 years. The temp. exceeded 80° on each of the first three days, and was between 70° and 80° on 24 days. A special feature was the high night

temp., 4 nights having a temp. above 60°, 23 between 50° and 60°, and only 4 below 50°. From 9th to 24th absolute drought prevailed with cloudless skies. Vegetation has suffered severely, the grass lands being almost burnt up. Violent TS from 5.30 to 7 p.m. on 7th, flooding the lower parts of the town.

GOGERDDAN.—Very hot and dry throughout.

LLANDUDNO.—T and L on 4th, 5th and 31st.

SCOTLAND.

CARGEN [DUMFRIES].—The warmest August since observations commenced in 1860. Higher daily temp. was registered in 1868, 1869 and 1870, but the mean max. of 73°·0 in 1899 has never been exceeded. On only 11 days was the max. temp. below 70°. Upwards of half the R fell on the four days 27th to 30th. Easterly and southerly winds prevailed, always light. Harvest operations commenced in the middle of the month under most favourable conditions.

EDINBURGH, BLACKET PLACE.—R the same as in 1880, the only smaller fall in August being ·45 in. in 1796. Partial drought for 35 days ended on 28th. Mean temp. 61°·5, which has been exceeded in only five Augusts since 1764. The air was very calm throughout. TS with no R on 25th. Fog on 14th and 23rd.

COLMONELL.—R 2·44 in. below, and mean temp. 62°·2, or 4°·2 above, the average of 23 years, the mean temp. being the highest in that period and equal to that of 1893. T on 4 days. L on 25th.

TIGHNABRUAICH.—A model summer month.

BRAEMAR.—T and L from 6 to 8 p.m. on 25th; a house struck. T and L at 8 p.m. on 30th.

ABERDEEN, CRANFORD.—Very warm and dry, the temp. on some nights varying from 60° to 68°. A heavy W.N.W. gale from 4 p.m. on 16th till 2 a.m. on 17th, destroyed garden plants and stripped trees of foliage. The tents filled with exhibits at the Horticultural Exhibition were blown down.

S. RONALDSHAY, ROEBERRY.—A very fine month, but with a great deal of fog. Mean temp. 56°·0, or 1°·7 above the average of 9 years. Mean max. 61°·0, min. 51°·0.

IRELAND.

DARRYNANE ABBEY.—The first three weeks very hot and dry, and the last ten days cooler and showery.

BROADFORD, HURDLESTOWN.—R 2·08 in., and rainy days 6, below the average of 14 years, and the smallest on record. Want of R was much felt in many places, but not here. Crops of all kinds very good. L on 3rd. S.E. gale on 26th.

DUBLIN, FITZWILLIAM SQUARE.—The hottest August for many years. Mean temp. 63°·4, or 3°·7 above the average, and 0°·4 above that of August, 1893, the record hitherto. Mean temp. reached 70° on 18 days. It was a month of paradoxes—the R was much in excess, rainy days much in defect; the weather was dry, the air was damp; E. and W. winds were the most prevalent. High winds on 9 days, but never reaching the force of a gale. T on 4 days, and L on 4 days. Violent TSS on 4th, 5th and 6th, the R accompanying that on 5th being 2·23 in. Fog on 7 days. Solar parhelia were seen on 24th.

BALLINASLOE.—TSS on 4th and 6th.

CLIFDEN, KYLEMORE HOUSE.—TS on 5th.

OMAGH, EDENFEL.—The magnificent spell of summer weather which commenced on July 25th and lasted till August 24th with but four rainy days, was finally followed by a week's copious R, bringing the month's total close to the average. It is many years since so abundant a harvest of all crops was so well secured.

SYMONS'S
MONTHLY
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METEOROLOGICAL EXTREMES.—II.

WE are rather surprised that no criticisms on the first of these papers have reached us—we also regret it, because we cannot believe that our list was perfect, and we relied upon our readers to correct us and make it so.

TEMPERATURE.

Difficult as it was to obtain comparable and accurate data as to barometric pressure, it is much more so to obtain trustworthy data as to temperature. Six's thermometer was not invented till the end of last century, and it is overstating the case rather than the reverse, to put the *general* use, throughout the world, of maximum and minimum thermometers much earlier than 1850; and, without registering thermometers the recorded extremes can be regarded only as approximations. Moreover, the positions in which thermometers were placed differed greatly. The Glaisher pattern thermometer stand dates only from 1840, the Lawson from 1845, the Stevenson only from June, 1864. The Montsouris, as its name implies, cannot have been introduced before that observatory was founded, which was about 1871. And even now, in 1899, no uniformity of exposure in different countries exists, and there are few comparative series enabling strict comparisons to be made. We shall not consciously quote any inaccurate or doubtful figures, but as in all cases we indicate whence the statements are derived, we can be held responsible only for their correct reprinting.

We have found that so much repetition and alteration of the wording of the various writers would be required to bring the statements into perfectly systematic arrangement, that we have thought it best to leave them all *verbatim*; but, *roughly*, statements as to high temperatures come first, and low ones follow. Also, as far as possible, records from neighbouring countries are put together.

DR. BUCHAN'S ISOTHERMS.

The plate devoted to yearly mean temperature prepared by Dr. Buchan, F.R.S., and published in one of the "Challenger" volumes, gives no yearly isotherm higher than 85°, of these there are three,

the largest covering a large portion of Central Africa bounded on the N. by latitude 18° N., turning S.E.-wards near Suakin, including Massowah and Mocha but not Aden, and then running S.S.W. to about 150 miles S. of the Victoria Nyanza. This map therefore gives no support to the extreme temperature so often mentioned at the Southern end of the Persian Gulf; and on the monthly maps for the hot months also we fail to trace it. Dr. Buchan also gives two small areas of 85° one in Central India about Lat. 15° N., and the other in the Northern portion of South Australia in about Lat. 15° S. and Lon. 130° E.

As regards cold, Dr. Buchan assigns the lowest yearly mean temperature to an area surrounding the N. pole, but for the winter months he shows that far lower temperatures occur in Lat. 65° N. and Lon. 132° E., to which, for January, he assigns the frightful mean temperature of —60° F., *i.e.* 92° below freezing point, and 21° below the temperature of frozen mercury.

Extremes of Temperature.

The absolute range of the Northern Hemisphere, and doubtless of the world, is 217°·8, depending on the absolute maximum of 127°·4 at Ouargla, Algeria, July 17th, 1879, and the absolute minimum of —90°·4 at Werchojansk, on the Jana river, Siberia, lat. 67° 34′ N., long. 133° 51′ E, January 15th, 1885. It was once questioned if the human body could undergo, unharmed, such enormous temperature changes, and the question is now answered in the affirmative, although probably no person has ever experienced the entire range. The author, however, has closely approximated it, having experienced at Fort Conger, February, 1882, the very low temperature of —66°·2, and on the Maricopa Desert, Arizona, August 28th, 1877, he saw the temperature of the air at 114°, while the metal of his Aneroid barometer, beside him as he rode, assumed a steady temperature of 144°.—*American Weather*, by Gen. Greely, p. 121.

The Hottest Spot on Earth.

The hottest region on the earth is on the south-western coast of Persia, where Persia borders the gulf of the same name. For 40 consecutive days, in the months of July and August, the thermometer has been known not to fall lower than 100°, night or day, and often to run up as high as 128° in the afternoon. At Bahrin, in the centre of the torrid part of the torrid belt, as if it were Nature's intention to make the region as unbearable as possible, no water can be obtained from digging wells 100, 200 or even 500 ft. deep, yet a comparatively numerous population contrive to live there, thanks to copious springs which break forth from the bottom of the gulf, more than a mile from shore, The water from these springs is obtained by divers, who dive to the bottom and fill goatskin bags with the cooling liquid and sell it for a living. The source of these submarine fountains is thought to be in the green hill of Osman, about 500 or 600 miles away.—*Boston Herald*, 1890.

Heat in Western Asia.

The heat probably reaches its maximum in the low-lying coast district of the Tehama on the Red Sea, and along the west coast of the Persian Gulf. From the bare rocky walls skirting both sides of these land-locked basins the sunbeams are reflected with redoubled strength on the glowing waters, thus producing an enormous evaporation, which converts the surrounding atmosphere into a vapour bath. For Europeans a trip across the Persian Gulf is considered at these times extremely perilous, and the unhealthy climate of the Tehama has become proverbial.—*Stanford's Asia*, p. 127.

A Temperature of 122° at Night.

Advices from the Red Sea continue to describe the discomforts experienced at Suakin as very serious. The English soldiers it is said are "a pitiful sight," not one man is in fairly healthy condition; while even the Indian troops are grumbling bitterly and almost mutinous. The heat is tremendous, the frequent sandstorms are most distressing, and the deaths very numerous.

But if Suakin is bad, Massowah, which the Italians have occupied, is worse. A private letter says:—We called in at Massowah, and had to anchor for the night; and a more frightful, horrible night I never spent, not a breath of air, and the thermometer 122° Fahr. This is no exaggeration; we were panting about the deck, the heat seemed to choke you: sleep was out of the question. Some negroes seemed to feel the heat more than Europeans, and were groaning fearfully, and pouring buckets of water over their heads, which, however, was of very little use, as the water was between 95° and 100° Fahr. Five Italian Officers have committed suicide, and no wonder! Aden, after Suakin and Massowah, is a perfect paradise.—*British Medical Journal*, 1885.

High Temperatures.

The highest temperature is met with near the level of the sea in the Circars, and in the Great Western Desert.

The thermometer is recorded to have stood in 1799 in the northern Circars, at midnight, at 108°, and at 8 a.m. at 112° F. A land wind had blown for a fortnight. In the Arabian desert the temperature of the night is remarkably sultry, (1) being generally 100°, rising towards morning, and during the day being much higher. In the "suffocating pandemonium" of the great salt lake of Bahr Assal, in lat. 11° 37′ 30″ N., and long. 42° 33′ 6″ E., 570 ft. below the sea level, Major Harris (2) found the thermometer at 126° F., though covered up, and this suffocating heat continued throughout the day of his encampment. The physical features of the locality explain most satisfactorily this extraordinary heat, for this "unventilated and diabolical hollow" is engulfed between lofty and rugged

(1) Fraser's Journey into Korassan; ch. 1. Climate of Omán.

(2) Highlands of Ethiopia, vol. I.

mountains, being reached by a narrow defile. The station immed iately adjoining is 1,700 ft. above the level of the sea, and consequently 2,270 ft. higher than the lake. It has been observed (3) that in Lower Egypt, during the hot season, the thermometer in the shade ranges at noon from 90° to 100°; in Upper Egypt, from 100° to 110°; in Nubia, from 110° to 120°, and even, though rarely, to 130°; exposed to sand and sun it has risen even to 150° in the latter country. Near the Euphrates, in the desert, Griffiths (4) observed the heat during the land winds amount to 132° in shade, and even 156° in the sun. Buckingham (5) records having seen the thermometer in the shade at 126° two hours after noon; and Burckhardt (6) at 117°·5 at Esné, in Upper Egypt.

Thomson's *Introduction to Meteorology*, p 55.

INDIAN STATIONS WITH SHADE MAXIMA EXCEEDING 120° F.

F.	Year.	Station.	Lat.	Lon.	Altitude.
°			° ′	° ′	feet.
120·3	1878	Agra	27 10 N.	78 5 E.	555
120·3	1879	Lahore	31 34 ,,	74 20 ,,	732
120·9	1882	Jacobabad	28 24 ,,	68 18 ,,	186
121·0	1886	Hyderabad	25 25 ,,	68 27 ,,	94
121·3	1877	Sialkote	32 29 ,,	74 35 ,,	830
121·5	1882	Dera Ishmail Khan..	32 0 ,,	71 5 ,,	573

Blanford's *Climates and Weather of India.*

[It will be seen that all these stations are in the N.W. of India, most of them in the Punjab.]

TEMPERATURE IN KUTCHEE.

At Bhag (Lat. 29° N.; Lon. 68° E.; Altitude 650 ft.) the Max. temp. in May, 1859, was 126°·0. [The difference between the dry and wet bulb averaged 23°·7 and often reached 35°].

Dr. Cook in *Quar. Jour. Met. Soc.*, Vol. ix. (1883) p. 137.

HEAT IN AUSTRALIA.

Melbourne.—The highest temperature on record for Melbourne is 111°·2, in January, 1862; in 1876 it reached 110°·7, and 110°·5 on January 19th, 1882.—P. Barachi.

Sydney.—The highest temperature on record for Sydney is 108°·5, on January 13th, 1896; previous to that, the highest (since 1859) was 106°·9, in January, 1863.

H. C. Russell, F.R.S., in *Met. Mag.*, March, 1896.

Adelaide.—The highest shade temperature during 39 years ending December 31st, 1896, was 116°·3 on January 26th, 1858.

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(3) Lane's Englishwoman in Egypt, let. VI.

(4) Travels in Arabia, p. 384.

(5) Travels in Mesopotamia.

(6) Travels.

Shade temperature in 1896.

Station.	January.												
	1	2	3	4	5	6	7	8	9	10	11	12	13
	°	°	°	°	°	°	°	°	°	°	°	°	°
Wilcannia...	100	93	98	—	113	116	111	110	112	109	—	111	115
Gundabooka	112	107	112	114	118	121	123	118	118	115	114	124	117
	14	15	16	17	18	19	20	21	22	23	24	25	
	°	°	°	°	°	°	°	°	°	°	°	°	
Wilcannia...	98	104	120	111	—	99	115	117	114	—	116	—	
Gundabooka	121	120	128	128	124	129	126	120	126	129	119	98	

A telegram in the South Australia papers on January 28th, 1896, from Wilcannia, says, "Reports from White Cliffs state that last week the record went as high as 125° in the shade by day, and 110° on one occasion in the middle of the night. Rabbits have succumbed by thousands from the heat. No feed anywhere, and stock cannot subsist beyond a month."

Wilcannia is in 31° 31′ S. and 143° 23′ E., on the Darling river, about 600 miles W. of Sydney; Gundabooka is also on the Darling, but further N.E., at its junction with the Warrego, in about 30° S., and 146° E.

The thermometer at Mildura, in the extreme north-west of Victoria, reached 120° F. on the 23rd of January, 1896, being the highest ever officially registered in any part of Victoria by properly tested instruments.—P. Barachi.

Meteorological Observations, Adelaide, 1896, by Sir C. Todd, K.C.M.G.

Extreme Temperatures in Australia.

The following, given in Dr. Hann's *Klimatologie*, 1897, are additions to the foregoing:—

	Lat.	Lon.	Altitude. feet.	Max. Temp.
Fort Bourke	30° 3′ S. ...	145° 48′ E ..	361 ...	121°·5
Euston	34 34 ,, ...	142 24 ...	— ...	124·5
Wolgett	30 6 ,, ...	148 12 ...	525 ...	123·8 (Dec., 1876.)

and Dr. Hann adds that Sturt, on his explorations on January 21st, 1845, reported the temperature as 131°.

Surface Temperature of the Soil.

It is no uncommon thing in dry and light (*i.e.*, badly conducting) soils, in hot climates, to find a superficial temperature of 120°, 140° F, and even more. We have ourselves observed it at 159° at the Cape of Good Hope. In the arid regions of Australia, Captain Sturt reports that a lucifer match dropped on the ground takes fire.

Herschel's *Meteorology* (1862), p. 41.

Intensity of Frost in the Arctic Regions.

Place.	Lat.	Lon.	Min.	Date.
	° ′	° ′	°	
Fort Simpson	62 7 N	121 33 W	—50·2	1851 Jan.
,, Constance	66 40	119 0 W	—59·4	1848 Dec.
,, ,,	,,	,,	—51·0	1849 Jan.
,, ,,	,,	,,	—56·0	,, Feb.
,, ,,	,,	,,	—72·0	1851 Jan.
,, ,,	,,	,,	—58·0	,, Feb.
Cambridge Bay	69 3 N	105 12 W	—52·5	1853 Jan.
,, ,,	,,	,,	—50·2	,, March
Victoria Harbour, Boothia Felix	70 8 N	91 35 W	—56·5	1831 Jan.
Camden Bay	,,	145 29 W	—51·0	1853 Dec.
,, ,,	,,	,,	—51·0	1854 Feb.
Princess Royal Island	72 47 N	117 35 W	—51·0	1851 Jan.
,, ,, ,,	,,	,,	—51·0	,, Feb.
,, ,, ,,	,,	,,	—51·0	,, March
Port Leopold	73 50 N	90 12 W	—52·0	1849 Feb.
Mercy Bay	74 6 N	117 55 W	—51·0	1851 Jan.
,, ,,	,,	,,	—51·0	,, Feb.
,, ,,	,,	,,	—51·0	,, March
,, ,,	,,	,,	—51·0	1852 Jan.
,, ,,	,,	,,	—65·0	1853 ,, *
,, ,,	,,	,,	—57·0	,, Feb.
,, ,,	,,	,,	—58·0	,, March
,, ,,	74 42 N	101 22 W	—52·0	1854 Jan.
Melville Sound	,,	,,	—53·0	,, Feb.
Beechey Island	74 43 N	91 54 W	—53·0	1853 Jan.
Dealy Island	74 56	108 49 W	—61·0	,, ,,
Wolstenholm Sound	76 34 N	68 45 W	—54·0	1850 Feb.
,, ,,	,,	,,	—51·0	,, March
Northumberland Sound	76 52 N	97 0 W	—57·0	1853 Jan.
,, ,,	,,	,,	—51·0	,, March
Van Rensselaer Harbour	78 37 N	70 53 W	—58·3	1854 Jan.
,, ,, ,,	,,	,,	—66·4	,, Feb.
,, ,, ,,	,,	,,	—54·2	,, March
,, ,, ,,	,,	,,	—59·9	,, Dec.
,, ,, ,,	,,	,,	—65·5	1855 Jan.
Franz Josef Land	79 51 N	59 0 E	—51·0	1873 Feb.
,, ,, ,,	,,	,,	—50·6	1874 Jan.
,, ,, ,,	,,	,,	—51·0	,, March
Discovery Harbour	81 44 N	65 0 W	—54·0	1875 Dec.
,, ,,	,,	,,	—63·0	1876 Jan.
,, ,,	,,	,,	—62·0	,, Feb.
,, ,,	,,	,,	—70·8	,, March
Fort Conger	,,	64 45 W	—52·2	1881 Dec.
,, ,,	,,	,,	—58·2	1882 Jan.
,, ,,	,,	,,	—62·1	,, Feb.
,, ,,	,,	,,	—50·6	1883 Jan.
,, ,,	,,	,,	—56·5	,, Feb.
Floeberg Beach	82 27 N	61 22 W	—59·2	1876 Jan.
,, ,,	,,	,,	—66·5	,, Feb.
,, ,,	,,	,,	—73·8	,, March

* "In January, 1853, the temperature fell lower than has ever been experienced by any former expedition, to 65° below zero, and in the interval of the usual period for taking the observations it fell to —67°, and the force of the wind likewise was greater. The mean temperature of the month was —43°·8, lower than we had known it during any former winter, and, I believe, surpassing in degree anything recorded in former Polar voyages. January 6th was the coldest day that has ever been known in these latitudes; the mean temperature for twenty-four hours was 61°·6 below zero; and in the twenty-four subsequent hours —56°·7, from which some idea may perhaps be formed of the intensity of the cold during this the coldest of the cold winter months."

We have compiled the preceding table from the excellent *Contributions to the knowledge of the Meteorology of the Arctic Regions*, prepared for the Meteorological Office by Mr. R. Strachan, and from General Greeley's *Three Years of Arctic Service*. The entries are of minima below —50°F., but it is not to be assumed that they are *all* the instances; they are mostly monthly minima, and evidently if on two days the temperature fell to —51° F., and on one to —53° the latter alone would be entered.

There is also the great uncertainty as to the correctness of the thermometers shadowing almost all the entries; but we are sure that both authors did all that was possible, and that therefore no better data can be obtained for byegone years. Science has progressed, and the old difficulties will exist no longer.

Frost in the U.S.A.

At Poplar River, Montana, North America, the thermometer fell to —63°·1 in January, 1885.

Meteorology, by Dr. J. W. Moore (1894), p. 310.

Intense Frost in Scotland.

On December 4th, 1879, intense frost prevailed in the S. of Scotland, —16° was reported from Kelso, and —23° from Blackadder in Berwickshire. This was the reading of a Six's thermometer on a post 2 ft. above ground, and with a board above to keep off rain. The thermometer agreed closely with one which had been verified at Kew.

The Frost of 1895 in Scotland.

In valleys where the chilled air can accumulate and lie stagnant, temperatures were recorded below zero Fahrenheit, the lowest being —17° at Braemar, and —11° at Drumlanrig.

R. C. Mossman, in *Jour. Scot. Met. Soc.*

London Extremes for 104 Years.

Somerset House, 93°·5 in July, 1808, and 4° in December, 1796.
R.O., Greenwich, 97°·1 in July, 1881, and 4° in January, 1841.
Camden Square, 94°·6 in July, 1881, and 6°·7 in December, 1860, and in January, 1867. *Met. Mag.*, March, 1899.

THE MOON IN RELATION TO AIR TEMPERATURE.

To the Editor of the Meteorological Magazine.

Sir,—I do not think that my position relative to the relation between the moon and our weather has been at all met by Mr. MacDowall on page 104 of the August issue. I still maintain, that there should be some possible reasoning by which such a relation may be premised, before pure coincidences can be regarded as of real value. It appears that Mr. MacDowall realizes this, for he suggests

that "a connection of the moon with temperature through barometric pressure is surely not very unthinkable." It seems to me that if Mr. MacDowall really advances this as a valid argument to support his contention, he has practically surrendered his position. The effect of the moon on pressure has been most carefully worked out, and has been found almost inappreciable; in fact, it has been found necessary to study records at St. Helena and other places where the atmosphere is but slightly disturbed, in order to get any effect at all. Now, are we to believe that a secondary effect on temperature from the moon through pressure is going to be appreciable when the direct effect on pressure is so slight; I trow not. It seems that such weak efforts to bolster up a doubtful theory, or at best a surmise, simply add weight to the crash which must come with its final downfall.

This matter reaches out much farther than appears at first sight. In a review of a paper by Hildebrandsson on page 106, it is remarked upon a comparison in which a supposed relation is presented between the spring rainfall in British Columbia and the autumn rainfall at the Azores, "The figures and diagram show an agreement between the records to which no word is so appropriate as marvellous."* This agreement is more marvellous than it seems at first sight. On looking up the Canadian records, there are none for any one station in British Columbia, and this probably accounts for the omission of the name of a station. If the B.C. record is made up from several independent stations and without a continuous series of observations, this supposed agreement is all the more remarkable, but does it not also serve to overthrow the alleged relationship? Fortunately, the United States has a continuous record from 1870 to the present time at Portland, Oregon, just across the border from British Columbia, and most persons will admit that a record there, ought to very fairly represent the rainfall in B.C. It should be stated that, in the original comparison by Dr. Hildebrandsson, a curve is drawn, showing the rainfall by years in the *spring* in B.C. from 1878 to 1890 (evidently by far too short an interval to prove anything), and this is compared with a similar curve at Ponta Delgada, in the Azores, for the *autumn* rainfall. A similar comparison between the rainfall at Portland, Oregon, and Ponta Delgada shows slight similarity between the curves (the curves are not reproduced). If there is anything that can be asserted positively about rainfall, it seems to be that, the conditions for rain on the middle Pacific coast are so dissimilar from those in the mid-Atlantic, that any apparent similarity in such curves must be set down at once and without hesitation as purely fortuitous. The cause of rain at any point may be regarded as extremely obscure, but surely it can

* If Prof. Hazen had quoted the whole sentence, instead of stopping at a comma, he would have seen that we did not accept the "marvellous agreement" as proof of interdependence.—ED.

be said without fear of contradiction, that by no possibility can the forces operative in producing rain in British Columbia in spring, have a like influence in the rainfall nearly half-way around the world, and six months later.

Surely we may conclude that in attempting to prove relationship between dissimilar phenomena in meteorology the three rules already formulated should be observed.

(1) There must be enough data, at least 50 coincidences.

(2) It should be posssible to show by *a priori* reasoning, how such a relation can exist.

(3) The data used should be strictly homogeneous. Prof. Wild, of St. Petersburg, has well said: "Without exact and satisfactory (and we may add properly studied) data, meteorology cannot develop as a science, but will be, as heretofore, mainly a tumbling-ground for vague speculations and dilettante investigations."

H. A. HAZEN.

Box 216, Washington, D.C., Aug. 30th, 1899.

TREES AND CHANGE OF TEMPERATURE.

To the Editor of the Meteorological Magazine.

SIR,—I note on p. 114 of the September number a paragraph on "Trees and Change of Temperature" that has interested me very much. It is stated that "Observation does not, it is true, show that the mean temperature is lower than it was a century ago, but the disappearance of many plants which formerly flourished on this island and in Central Europe seems to indicate that such a change is in progress." I am aware that the original of this quotation was a newspaper article, and can be judged accordingly; but do you not give it too much authority, if not indeed endorse it, by this publication? [Surely not. We inserted it in order to elicit opinions and explanations.—ED.] If the temperature has not changed, and certainly that fact has been established, then we cannot ascribe the disappearance of the trees and plants to such change. I think that the records show no appreciable change in climate since historic times. Plants from the mummy cases of 4,000 years ago do not show much difference, if any, from those of the Nile valley at the present time. Whether the effect of temperature or rainfall is different because of the cutting away of forests, or whether the soil has changed in its properties because of continual plant growth, or the plants and trees themselves have run out (a not unusual occurrence), it may be impossible definitely to state; but surely we may say, without hesitation, that the climate or its changes have had nothing to do with this disappearance. Some have predicted the end of the world by a freezing to death of all life, still others by just the contrary effect, or by a burning up of every living thing; but there is no evidence of any permanent change. Some have thought that Greenland, at one time,

must have had a much milder climate, else how came it by its name. The early voyagers from the ice-bound rocks of Iceland would be charmed by the spring-time green of this land, noted even at this later day, and would readily give the name by which it is known. In the United States, we have had great stories from old-timers of the very remarkable winters they used to experience when they were boys, and of their very mild character at present, but all such stories were given a death-blow last winter by a storm and blizzard which exceeded anything in the memory of man. In the fair city of Washington, where a snow of six inches is rare, there were 34 inches on a level. The question of a change in climate is an intensely interesting one, and merits the most careful study, but there is no evidence of such change within historic times. Of course, it is admitted, without question, that there have been marked changes since glacial times, or within 40,000 years or so.

H. A. HAZEN.

September 25th, 1899.

METEOROLOGICAL NOTES AT TAI-YÜEN-FU, SHANSI, NORTH CHINA.

Lat. 37° 55′ N. Lon. 112° 52′ E.

	1896.				1897.				1898.			
	Average Max.	Average Min.	Mean.	Rain.	Average Max.	Average Min.	Mean.	Rain.	Average Max.	Average Min.	Mean.	Rain.
	°	°	°	in.	°	°	°	in.	°	°	°	in.
January ...	35	8	22	—	29	8	19	·25	34	11	23	·10
February..	39	15	27	—	36	10	23	—	40	19	28	·68
March.....	47	23	35	—	48	29	38	·51	47	26	37	·42
April	64	42	53	2·73	66	41	54	·83	66	40	53	·79
May.....	75	50	62	1·81	76	53	64	·53	82	56	69	·46
June	87	63	75	2·21	88	62	75	1·67	86	61	73	·36
July.....	94	67	81	1·71	90	70	80	3·94	90	68	79	5·81
August ...	84	64	74	5·73	87	66	76	2·95	82	62	72	3·16
September	74	52	63	·36	77	54	65	·50	69	55	62	·84
October ..	61	39	50	·18	65	38	52	·40	63	40	52	·71
November.	51	29	40	—	46	29	37	·89	46	30	38	—
December.	31	10	20	·30	29	9	19	—	34	12	23	—
Means or Totals	62	38	50	15·03	61	39	50	12·47	62	40	51	13·33

Meteorological observations from the interior of China are always so difficult to obtain that we are much indebted to Mr. F. Jacomb Hood for sending us the abstract of observations by Mr. E. H. Edwards, M.B., C.M., which we have arranged in the above table.—ED.

RESULTS OF METEOROLOGICAL OBSERVATIONS AT CAMDEN SQUARE FOR 40 YEARS, 1858–97.

SEPTEMBER.

YEAR.	RAINFALL.				TEMPERATURE.										CLOUD.
	Total.		Max. Fall.	Falls of 1 in. or +	Dry. Mean, 9a.&9p.	Wet. Mean, 9a.&9p.	Shade Max		Shade Min		Sun Max. Black.		Grass Min.		
	Depth	Days					Abs.	Aver	Abs.	Aver	Abs.	Aver	Abs.	Aver	Aver
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	in.		in.		°	°	°	°	°	°	°	°	°	°	0–10
1858..	·85	9	·32	0	60·1	57·0	85·0	70·7	44·0	53·5	..	..	..	..	6·1
1859..	4·04	18	1·66	1	57·1	54·1	76·6	66·6	41·6	49·6	..	..	..	..	5·9
1860..	2·92	14	·89	0	53·9	51·5	71·0	63·3	36·4	46·1	..	..	31·3	42·1	6·2
1861..	2·15	15	·49	0	56·9	53·9	82·0	71·9	36·0	47·3	..	..	29·0	42·9	5·7
1862..	2·19	13	·88	0	57·8	54·7	74·2	67·5	38·8	50·2	..	..	32·0	46·2	5·7
1863..	3·49	13	·63	0	54·2	51·1	71·8	63·7	33·8	45·6	..	..	27·7	41·3	5·8
1864..	2·55	12	·67	0	56·6	54·1	74·9	68·4	39·0	48·8	..	..	35·4	45·1	6·4
1865..	·55	4	·42	0	61·8	58·0	85·0	76·4	41·5	54·5	..	..	40·0	49·2	2·1
1866..	3·89	27	·47	0	56·4	54·7	74·0	65·5	39·0	50·1	..	..	28·5	41·9	7·0
1867..	2·23	11	·55	0	57·6	55·0	79·0	68·1	36·0	50·4	..	..	30·0	45·9	6·7
1868..	1·74	11	·33	0	60·0	56·3	91·0	71·8	43·0	50·0	..	..	42·6	48·8	5·8
1869..	3·56	14	·84	0	58·7	55·1	76·0	68·4	41·2	51·9	..	..	(30·2)	(45·9)	7·1
1870..	2·00	9	·41	0	55·1	52·8	74·0	67·7	37·6	47·6	119·7	104·6	36·2	43·2	5·1
1871..	5·28	13	1·22	1	57·2	53·9	81·0	67·8	38·1	50·6	122·0	102·6	37·4	49·2	5·5
1872..	1·64	13	·38	0	57·5	54·0	83·1	67·9	33·0	49·9	131·8	108·7	31·1	47·4	5·1
1873..	2·46	11	·93	0	54·0	51·3	72·0	64·9	40·3	46·3	120·0	105·9	35·7	41·8	4·9
1874..	2·62	15	·99	0	57·9	55·3	78·2	68·1	43·3	50·7	125·6	104·5	42·0	48·3	6·0
1875..	2·86	15	·77	0	59·9	57·3	80·8	70·8	44·2	52·3	123·0	107·0	40·2	49·1	4·8
1876..	2·86	22	·64	0	55·6	53·8	71·4	65·5	41·3	49·4	120·2	101·2	38·0	45·6	6·3
1877..	·82	10	·28	0	53·2	50·3	73·3	63·7	36·1	46·2	119·5	102·1	31·3	41·7	6·0
1878..	·83	12	·20	0	56·4	54·1	75·4	66·7	37·7	49·1	120·2	103·3	34·9	45·8	4·7
1879..	3·67	12	1·49	1	56·0	53·4	72·6	65·6	39·6	49·5	120·7	101·2	35·8	46·2	6·0
1880..	4·04	12	1·33	2	59·2	56·7	88·3	69·7	42·1	52·8	129·8	107·1	38·2	48·5	5·7
1881..	2·03	11	·85	0	55·4	53·4	73·7	65·4	41·7	49·7	119·3	100·9	36·3	46·5	6·7
1882..	2·39	9	·86	0	54·8	52·3	70·6	64·7	37·8	47·3	125·2	99·7	34·7	42·8	6·0
1883..	3·83	18	·65	0	56·1	54·2	75·3	66·7	41·4	50·2	120·7	100·4	35·4	45·8	6·1
1884..	1·77	15	·57	0	59·6	56·4	81·5	68·8	40·6	52·3	116·6	99·6	33·6	46·7	5·6
1885..	4·30	19	1·48	1	55·0	52·3	76·5	64·8	33·7	48·4	116·3	97·7	27·7	43·0	5·6
1886..	1·73	11	·42	0	58·3	54·9	84·2	68·7	42·2	52·5	117·7	101·4	33·8	47·1	4·6
1887..	1·81	19	·35	0	54·2	51·1	69·5	62·8	34·3	47·9	118·6	99·4	31·4	43·8	6·2
1888..	1·43	14	·37	0	55·6	53·4	72·7	65·2	42·4	50·0	116·3	98·7	36·3	45·3	6·0
1889..	1·77	10	·73	0	55·4	52·4	80·3	65·6	35·1	48·9	125·6	99·3	28·4	44·6	5·6
1890..	·64	5	·26	0	58·7	56·0	75·9	70·1	37·8	51·3	119·9	104·0	37·1	48·0	4·8
1891..	1·03	15	·17	0	58·0	55·3	80·4	68·5	43·3	51·4	116·9	102·5	39·4	47·1	4·6
1892..	2·12	13	·94	0	56·3	53·0	73·6	65·7	36·4	49·0	118·4	101·4	28·0	43·6	5·1
1893..	1·07	10	·22	0	56·7	53·0	81·6	67·9	35·3	49·1	123·4	105·4	30·9	45·0	4·7
1894..	1·04	11	·27	0	54·0	51·6	71·2	63·0	36·7	48·0	113·6	93·6	31·6	43·1	6·7
1895..	1·28	2	1·24	1	59·6	57·0	82·8	73·7	42·6	51·5	121·3	108·0	33·5	45·1	2·8
1896..	5·51	22	·73	0	56·8	54·6	71·9	64·9	39·6	51·5	114·1	96·2	35·3	47·5	6·9
1897..	2·75	13	·68	0	55·4	52·5	70·6	64·0	38·1	48·5	115·0	100·6	34·0	44·4	6·5
Mean ...	2·39	13	·69	0·2	56·8	54·0	77·1	67·3	39·1	49·7	120·4	102·0	34·1	45·4	5·6
Extremes	5·51	27	1·66	2	61·8	58·0	91·0	76·4	44·2	54·5	131·8	108·7	42·6	49·2	7·1
	·55	2	·17	0	53·2	50·3	69·5	62·8	33·0	45·6	113·6	93·6	27·7	41·3	2·1

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, APRIL, 1899.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	TotalRain. Depth.	TotalRain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, CamdenSquare	65·6	1	32·1	12	55·9	41·3	40·1	76	106·4	27·1	2·64	20	6·8
Malta	77·0	16	48·4	3	67·8	54·8	52·2	77	136·6	42·5	·11	3	2·3
Cape of Good Hope	90·3	21	40·6	7	72·2	52·4	52·0	82	...	...	1·48	7	2·3
Mauritius	84·0	1	63·1	29	81·8	71·5	68·7	79	153·1	56·9	4·61	20	5·2
Calcutta	105·4	29	67·8	11	97·2	75·4	71·1	63	158·6	65·6	2·75	6	3·8
Bombay	92·2	17	74·7	22	88·6	77·8	73·1	72	141·3	66·9	1·57	4	2·2
Ceylon, Colombo	92·2	3*a*	73·2	2	89·5	76·3	75·0	83	151·5	71·5	6·66	19	5·7
Melbourne	84·1	1	40·0	27	69·3	51·3	50·9	75	137·0	33·9	2·52	9	5·5
Adelaide	90·9	21	45·8	26	74·0	55·6	49·0	59	142·9	37·3	2·07	9	4·9
Sydney	...	...	...	...	...	...	...	...	...	...	...	...	...
Wellington	73·0	2,3	38·9	28	65·1	52·8	49·5	71	125·0	33·0	3·61	13	4·2
Auckland	...	...	...	...	...	...	...	...	...	...	...	...	...
Trinidad	92·0	Sev.	64·0	4	89·2	67·8	65·7	65	165·0	59·0	·75	3	...
Grenada	85·0	11*b*	69·0	2	82·3	72·8	66·9	70	154·2	...	1·05	6	1·3
Toronto	78·4	30	21·3	4	53·5	36·0	37·6	72	93·0	17·2	1·62	14	5·3
New Brunswick, Fredericton	81·7	30	14·8	7	53·1	28·8	24·5	46	...	...	·37	3	3·6
Manitoba, Winnipeg	79·0	26	—12·8	2	48·4	25·1	...	81	...	...	2·17	8	5·3
British Columbia, Esquimalt	...	...	...	...	...	...	.	...	...	...	...	...	...

a—and 4, 28. *b*—and 15.

REMARKS.

MALTA.—Adopted mean temp. 60°·0, or 0°·4 above average. Mean hourly velocity of wind 12·0 miles, or 0·3 above average. Mean temp. of sea 63°·0. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·1 above, of dew point 0°·4 above, and rainfall ·84 in. below, their respective averages. Mean hourly velocity of wind 9·9 miles, or 0·8 below average; extremes, 26·2 on 18th and 1·8 on 25th; prevailing direction E.S.E. to E. by S. L on 23rd, and T on 25th. T. F. CLAXTON.

CEYLON, COLOMBO.—Mean temp. of air 82°·0, or 0°·5 below, of dew point 0°·7 above, and rainfall 4·81 in. below, their respective averages. Mean hourly velocity of wind 7·4 miles; prevailing direction S.W. TSS occurred on 8 days; L on 5 days. H. O. BARNARD.

Adelaide.—Mean temp. of air 0°·7, and rainfall ·28 in., above the average of 42 years. A warm spell occurred between the 14th and 22nd, which is quite exceptional for this time of the year. C. TODD, F.R.S

Wellington.—Fine in the early part of the month, then showery, with intervals of very fine weather. Prevailing wind N.W.; generally moderate. Fog on 8th and 9th. Slight earthquake on 16th. Temp. 1°·9 above, and rainfall ·08 in. above, their respective averages. R. B. GORE.

TRINIDAD.—Rain 1·28 in. below the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, SEPTEMBER, 1899.

[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..	1·86	XI.	Builth, Abergwesyn Vic.	5·59
II.	Dorking, Abinger Hall .	2·93	,,	Rhayader, Nantgwillt ...	4·83
,,	Birchington, Thor	2·30	,,	Lake Vyrnwy	4·25
,,	Hailsham	4·46	,,	Corwen, Rhug	3·13
,,	Ryde, Thornbrough	2·34	,,	Criccieth, Talarvor	3·26
,,	Emsworth, Redlands ...	2·44	,,	I. of Anglesey, Lligwy..	3·85
,,	Alton, Ashdell	2·39	,,	I. of Man, Douglas	3·07
III.	Oxford, Magdalen Coll..	2·18	XII.	Stoneykirk, Ardwell Ho.	4·17
,,	Banbury, Bloxham	2·32	,,	New Galloway, Glenlee	5·73
,,	Northampton, Sedgebrook	4·73	,,	Moniaive, Maxwelton Ho.	3·16
,,	Stamford, Duddington..	...	,,	Lilliesleaf, Riddell	3·39
,,	Alconbury	3·59	XIII.	N. Esk Res. [Penicuick]	3·90
,,	Wisbech, Bank House...	4·66	XIV.	Glasgow, Queen's Park..	4·04
IV.	Southend	2·17	XV.	Inverary, Newtown	10·38
,,	Harlow, Sheering..... ...	...	,,	Ballachulish, Ardsheal...	8·59
,,	Colchester, Lexden	2·31	,,	Islay, Gruinart School ...	2·27
,,	Rendlesham Hall	3·72	XVI.	Dollar.....	3·55
,,	Scole Rectory	2·81	,,	Balquhidder, Stronvar...	7·30
,,	Swaffham	4·95	,,	Coupar Angus Station...	4·19
V.	Salisbury, Alderbury ...	2·09	,,	Dalnaspidal H.R.S.....	...
,,	Bishop's Cannings	3·21	XVII.	Keith H.R.S.....	4·27
,,	Blandford, Whatcombe .	2·67	,,	Forres H.R.S.	3·33
,,	Ashburton, Holne Vic...	3·49	XVIII.	Fearn, Lower Pitkerrie..	...
,,	Okehampton, Oaklands.	4·04	,,	S. Uist, Askernish	6·75
,,	Hartland Abbey	3·36	,,	Invergarry.....	5·81
,,	Lynton, Glenthorne ...	4·58	,,	Aviemore H.R.S.	5·16
,,	Probus, Lamellyn	3·32	,,	Loch Ness, Drumnadrochit	4·65
,,	Wellington, The Avenue	1·49	XIX.	Invershin	5·33
,,	North Cadbury Rectory	3·18	,,	Durness	6·97
VI.	Clifton, Pembroke Road	3·79	,,	Watten H.R.S.....	5·09
,,	Ross, The Graig	2·34	XX.	Dunmanway, Coolkelure	2·22
,,	Wem, Clive Vicarage ...	2·74	,,	Cork, Wellesley Terrace	1·21
,,	Wolverhampton, Tettenhall	2·67	,,	Killarney, Woodlawn ..	3·16
,,	Cheadle, The Heath Ho.	4·14	,,	Caher, Duneske	2·08
,,	Coventry, Priory Row ..	4·64	,,	Ballingarry, Hazelfort...	2·19
VII.	Grantham, Stainby	3·82	,,	Limerick, Kilcornan ...	1·98
,,	Horncastle, Bucknall ...	2·58	,,	Miltown Malbay	4·47
,,	Worksop, Hodsck Priory	2·50	XXI.	Gorey, Courtown House	1·94
VIII.	Neston, Hinderton	3·45	,,	Moynalty, Westland ...	3·69
,,	Southport, Hesketh Park	3·87	,,	Athlone, Twyford	2·40
,,	Chatburn, Middlewood.	7·11	,,	Mullingar, Belvedere ...	3·04
,,	Duddon Val., Seathwaite Vic.	8·98	XXII.	Woodlawn	2·91
IX.	Melmerby, Baldersby ...	3·28	,,	Crossmolina, Enniscoe ..	4·66
,,	Scarborough, Observat'y	3·39	,,	Collooney, Markree Obs.	5·00
,,	Middleton, Mickleton ...	5·18	,,	Ballinamore, Lawderdale	...
X.	Haltwhistle, Unthank H.	4·13	XXIII.	Warrenpoint.....	3·41
,,	Bamburgh	2·73	,,	Seaforde.....	4·37
,,	Keswick, The Bank.....	6·80	,,	Belfast, Springfield	3·43
XI.	Llanfrechfa Grange	3·27	,,	Bushmills, Dundarave..	6·55
,,	Llandovery	3·14	,,	Stewartstown	3·29
,,	Castle Malgwyn	3·22	,,	Killybegs	7·77
,,	Brecknock, The Barracks	3·35	,,	Horn Head	4·93

SEPTEMBER, 1899.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date	Min. Deg.	Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	2·65	+ ·14	·95	29	14	88·1	5	36·4	29	0	0
II.		Tenterden	2·39	— ·52	1·04	29	18	84·0	5	37·0	29	0	3
,,		Hartley Wintney ...	1·91	...	·74	29	15	88·0	5	32·0	29	1	2
III.		Hitchin	2·09	— ·41	·67	29	18	85·0	5	35·0	28	0	...
,,		Winslow (Addington) ...	1·88	— ·79	·66	29	17	88·0	5	34·0	29	0	2
IV.		Bury St. Edmunds (Westley)	2·48	— ·22	·82	29	15	79·0	5	33·0	29	0	...
,,		Norwich (Brundall) ...	3·29	...	1·14	29	19	87·0	5	33·6	29	0	2
V.		Winterbourne Steepleton ...	2·54	...	·81	30	14	77·3	5	34·4	29	0	3
,,		Torquay (Cary Green)	2·57	...	·68	30	14	79·5	5	42·8	30	0	...
,,		Polapit Tamar [Launceston]..	3·99	+ ·28	·67	30	20	82·4	5	39·8	30	0	0
VI.		Stroud (Upfield) ...	1·47	— 1·44	·36	29	16	79·0	5	41·0	27	0	...
,,		ChurchStretton(Woolstaston)	2·55	+ ·05	·68	29	21	80·5	5	41·0	28*b*	0	0
,,		Worcester (Diglis Lock) ...	3·12	+ ·68	·97	6	17	...	...	...	...	...	...
VII.		Boston ...	2·18	— ·59	·58	30	13	87·0	5	34·0	29	0	...
,,		Hesley Hall [Tickhill]...	2·17	+ ·01	·56	29	17	81·0	5	31·0	29	1	...
,,		Breadsall Priory ...	3·12	...	·87	29	15	82·0	5	33·0	29	0	2
VIII.		Manchester(PlymouthGrove)	5·10	+ 1·63	·68	16	24	79·0	5	36·0	29	0	...
IX.		Wetherby (Ribston Hall) ...	3·46	+ 1·00	1·25	21	16	...	...	...	...	...	...
,,		Skipton (Arncliffe) ...	8·95	+ 4·19	1·65	29	18	...	...	...	...	...	...
,,		Hull (Pearson Park).	2·55	+ ·11	·73	29	17	84·0	5	35·0	29	0	1
X.		Newcastle (Town Moor) ...	2·60	— ·18	·74	29	16	...	...	...	...	...	...
,,		Borrowdale (Seathwaite)...	14·02	+ 2·29	2·85	15	25	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely)...	3·94	+ ·20	·77	1	19	...	...	...	...	...	...
,,		Haverfordwest	1·99	— 2·41	·38	29	13	75·8	5	34·3	29	0	1
,,		Aberystwith (Gogerddan) ...	4·20	— ·07	·86	27	16	80·0	5	32·0	28	1	...
,,		Llandudno...	3·90	+ 1·68	·79	29	20	76·0	4	43·0	29	0	..
XII.	SCOTLAND.	Cargen [Dumfries] ...	4·07	+ ·51	·52	15	15	79·0	6	34·0	28	0	...
XIII.		Edinburgh (Blacket Place)...	3·78	...	1·38	30	23	69·1	4	37·2	28	0	...
XIV.		Colmonell	6·30	...	1·75	26	25	77·0	7	30·0	14*c*	...	...
XV.		Tighnabruaich ...	8·12	...	·93	15	25	64·0	1*a*	35·0	27	0	...
,,		Mull (Quinish)...	6·90	+ 1·87	·79	15	28	...	...	...	...	...	...
XVI.		Loch Leven Sluices ...	2·30	— ·49	·90	29	10	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	3·80	+ 1·29	1·75	30	18	73·0	11	35·6	28	0	...
XVII.		Braemar	4·92	+ 2·06	1·91	30	25	65·2	11	32·6	29	0	10
,,		Aberdeen (Cranford)	3·62	...	·57	30	28	71·0	12	35·0	21*c*	0	...
,,		Cawdor (Budgate) ...	4·72	+ 1·97	·49	22	26	...	...	...	...	...	...
XVIII		Strathconan [Beauly] ...	8·30	+ 4·62	1·02	23	15	...	...	...	...	...	...
,,		Glencarron Lodge...	14·92	...	2·00	26	30	66·0	4	34·5	29	0	...
XIX.		Dunrobin ...	4·81	+ 2·22	·70	17	23	67·0	4	38·0	22	0	...
,,		S. Ronaldshay (Roeberry) ...	5·14	+ 2·48	·54	10	30	67·0	4	40·0	18*d*	0	...
XX.	IRELAND.	Darrynane Abbey...	2·40	...	·65	12	23	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	1·03	— 1·89	·25	21	12	74·5	5	34·0	29	0	...
,,		Broadford (Hurdlestown) ...	2·93	...	·52	21	26	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill) ...	1·86	— ·96	·48	21	18	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	2·75	+ ·78	1·04	30	21	71·8	4	39·0	28	0	0
XXII.		Ballinasloe	2·70	— ·09	·68	21	21	72·0	5	33·0	30	0	...
,,		Clifden (Kylemore)	7·09	...	1·33	1	24	...	...	...	...	...	...
XXIII		Waringstown ...	3·09	— ·07	·48	25	19	73·0	6	35·0	28*b*	0	3
,,		Londonderry (Creggan Res.).	4·90	+ 1·12	·68	26	28	...	...	...	...	...	...
,,		Omagh (Edenfel) ...	4·84	+ 1·46	·82	21	24	69·0	3	34·0	27	0	4

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

a—and 5, 6. *b*—and 29, 30. *c*—and 27. *d*—and 19.

METEOROLOGICAL NOTES ON SEPTEMBER, 1899.

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 first week was very hot, and though there were slight showers after the middle of the month, the ground continued dry and parched till the rough and stormy weather set in at the end. L on 6th; T on seven days. Fog on 7th. Duration of sunshine 173 hours.

HARTLEY WINTNEY.—Continued heat and dryness still prevailed, and the great drought was not broken up till 19th, slight showers falling after that date until the end of the month. R only ·02 in. below the average. TSS on 6th, 16th and 28th, and much L every night from 24th to 30th. Light S.W. winds prevailed till 16th, then more boisterous till the end. Ozone on fifteen days; mean 3·7.

WINSLOW, ADDINGTON.—Nice warm weather prevailed until quite the end. T and L on 2nd, and T on 6th and 28th. Vegetation touched by frost on 29th.

BURY ST. EDMUNDS, WESTLEY.—A normal September. The deep chalk wells were nearly dry at the close, and there were great complaints of want of water. The 5th was the hottest day of the year. TS on 6th; T on five days.

NORWICH, BRUNDALL.—Like last year the warmest day of the summer occurred in September. The latter part of the month was very unsettled. The heavy R of the 29th helped to make up the deficiency for the year, which was, at the end of the month, only 1·56 in., notwithstanding the dry summer. L on 2nd, 5th, 6th, 27th, 28th and 30th. T on 2nd, 6th and 27th.

WINTERBOURNE STEEPLETON.—The temp. kept up until the 18th, when a squally period set in, the mean for the fortnight ending 16th being 61°·0, and for the month 57°·1. Although R fell on 14 days, the fall was slight, except on 5th, 21st, 29th and 30th. T and L on 5th; T on 7th.

TORQUAY, CARY GREEN.—R ·22 in. above the average. Mean temp. 60°·5, or 2°·4 above the average. Duration of sunshine 185 hours 35 mins., being 22 hours 50 mins. above the average. No sunless days. Mean amount of ozone 5°·8.

POLAPIT TAMAR [LAUNCESTON].—The first fortnight was hot and comparatively dry, the latter very wet, and rather stormy, with considerably reduced temp. R ·67 in. above the average. Thick fog on three mornings. L on 6th; T on 7th; L and T on 29th.

WOOLSTASTON.—A seasonable month, with frequent showers. T on 6th. Mean temp. 55°·7.

BREADSALL PRIORY.—There were several hot days during the first week, but the latter half of the month was very cold for the time of year.

MANCHESTER, PLYMOUTH GROVE.—Very unsettled weather upon the whole. Fine in the first week. Mean temp. 51°·3. Very stormy, with T and L on 23rd.

WALES.

HAVERFORDWEST.—September, 1899, was in strong contrast to that of 1898. Up to the 15th it was fine, warm, and practically rainless, but after that the temp. fell, the weather became unsettled, and R fell on most days, while from the 26th to the end was very stormy. The harvest was unprecedentedly fine.

ABERYSTWITH, GOGERDDAN.—Stormy throughout, with strong winds from N.W. and S.W.

LLANDUDNO.—T and L on 23rd. T on 27th and 30th. H on 22nd.

SCOTLAND.

EDINBURGH, BLACKET PLACE.—Mean temp. and rainfall slightly above the average. The last week was stormy and unsettled. Heavy TS from 2.40 to 4 p.m. and L at night on 27th.

COLMONELL.—R 2·29 in., and mean temp. 0°·2, above the average of 23 years. T and L on 17th; T and very large H on 23rd.

TIGHNABRUAICH.—A bad harvest month; frequent strong winds from N., N.E. and E., with too much R. T and L on 17th.

ABERDEEN, CRANFORD.—A wet and cold month, with high winds and little sunshine.

S. RONALDSHAY, ROEBERRY.—A very wet and unsettled month, R falling every day. Mean temp. 50°·8, or 0°·9 below the average of 9 years.

IRELAND.

DARRYNANE ABBEY.—On the whole, a fairly fine month. The first three weeks were mild, the last ten days rather cold.

BROADFORD, HURDLESTOWN.—A cold and wet month. R ·20 in., and rainy days 8, above the average of 14 years. T at 3.30 p.m. on 27th.

DUBLIN, FITZWILLIAM SQUARE.—A month of sharp contrasts as regards temp. At first it was decidedly warm, afterwards it became still more decidedly cold. Unsettled and very squally, and showery, with blustering W. and N.W. winds almost constantly from 15th to 26th. Mean temp. 56°·2, being 0°·4 above the average. High winds on 13 days, reaching the force of a gale on 6. Fog on 3 days. TS on 30th; T and L on 29th; L on 5th.

OMAGH, EDENFEL.—The first ten days were reasonably fine and favourable for harvest purposes, but it is a long time since a more inclement period marked the month of September than that which prevailed from 10th to the end; strong winds, heavy R, and low temp. being persistent throughout.

HEAVY RAINFALL ON OCTOBER 1ST.

To the Editor of the Meteorological Magazine.

SIR,—On Monday last we recorded a torrential downpour, which fell on Sunday, October 1st, in a very short time, and I have since looked through our fifty years' record for falls of over 1·50 in.; they are as under, few and far between:—

		in.			in.			in.
1853.	July 14	1·82	1875.	July 3	2·06	1885.	Sept. 10	1·56
1857.	Oct. 23	3·09	1879.	Aug. 2	1·94	1889.	July 12	2·10
1865.	Oct. 17	1·68	1880.	Sept. 11	1·86	1890.	July 17	1 88
1868.	Aug. 19	2·22	1884.	July 9	1·75	1899.	Oct. 1	1·59
1874.	July 10	1·62						

From 1890 to now is the longest interval without a heavy fall in late summer or early autumn.—Yours truly,

W. LUCAS.

The Firs, Hitchin, October 9th, 1899.

SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CCCCVI.] NOVEMBER, 1899. [PRICE FOURPENCE, *or 5s. per ann. post free.*

THE BRITISH ASSOCIATION AT DOVER.

THE pressure on our space compelled the omission of our usual notice last month, and necessitates considerable abridgement in the following note :—

There were five reports and nine papers distinctly meteorological or magnetical, and several of the papers read in the Geographical Section also bore upon the subject. We purpose giving the titles of all the strictly meteorological papers, and notes upon them where we are able.

Climatology of Africa.—Eighth report, prepared by the Chairman, Mr. E. G. RAVENSTEIN.

Meteorological returns have reached your Committee, in the course of last year, from forty stations in Africa.

Niger Territories.—One year's observations from Old Calabar have been received from Mr. E. G. Fenton, the medical officer. We regret that no information respecting the interior of the country has become available.

British Central Africa.—The scientific department, under the zealous direction of Mr. J. McClounie, is now in full working order, and full reports have been received for two stations of the second order, namely, Zomba on the highland, and Fort Johnston on the Lake Level, and also reports, more or less complete, from twenty-two other stations. Mr. McClounie hopes to be able, in the course of the present year, to equip two more stations of the second order, namely, Chinde on the coast, and another station on the lake. He has attempted to make two-hourly observations on term days, but as the exposure in the morning air resulted in fever, he has given up the attempt.

We have, in addition, received three years' registers for Lauderdale, from our most faithful correspondent, Mr. John W. Moir, as also fifteen months' record from Kambole, a station of the London Missionary Society, near the southern extremity of Tanganyika. The observer at the latter place is Dr. James F. Mackay.

British East Africa.—Returns from eight Government stations have been received. These returns are, of course, most welcome, and they speak well for the zeal of Mr. Cranfurd and the officers working under him ; but considering the practical importance of meteorological work, it is much to be desired that something should be done. Let us hope that the satisfactory working of a

"Scientific Department" in the South African Protectorate may induce the authorities to organise a similar institution for East Africa and Uganda. As a proof of the high value placed upon work of this kind in the neighbouring German Protectorate, we may state that a professional meteorologist has been appointed as inspector, and that there are now at work twenty-six stations, including two of the first, and seven of the second, order.

We are likewise in receipt of rainfall observations made by the Rev. R. M. Ormerod at Galbanti, on the Tana river.

The old Scottish Missionary Station at Kibwezi has been abandoned, and the missionaries have removed to a new station in Kikuyu, whence three months' observations have already been forwarded.

Uganda.—The valuable observations on the level of the Victoria Nyanza have been resumed since the suppression of the mutiny.

Mr. C. M. Hopley has forwarded two years' record of the rainfall at Mumia's, the headquarter station of Kavirondo.

Meteorological Observations on Ben Nevis.—Report drawn up by Dr. A. BUCHAN, F.R.S.

The hourly observations at the two observatories, *i.e.*, on Ben Nevis and at Fort William, have continued without any interruption. It is earnestly to be hoped that they will still continue, as there is no first-class observatory of which as much can be said. Want of funds seriously threatened the service two years ago, and it is only by private munificence that Mr. Angus Rankin and his assistants and volunteers, are enabled to carry on the work. The mean barometric difference between the two stations is 4·552 in.; it varies very little. The absolute extremes of temperature are remarkable. On September 6th, 79°·7 was registered at Fort William and 62°·6 on Ben Nevis; this was very late in the season, and occurred during anticyclonic weather. The greatest cold at Fort William (21°·1) occurred on November 29th; on Ben Nevis the extreme was 9°·6, on February 20th. Once, on December 8th, the dew point fell below zero, to — 6°·5. The mountain got 17 per cent. of the possible sunshine, Fort William 36 per cent. The mean hourly wind velocity on the top was 14 miles, the maximum being 27 miles in October, and the minimum 6 miles in July, the lowest value ever recorded. The rainfall, 240·05 in., also beats all records; December alone had 43·65 in., but the heaviest, almost tropical fall of 5·39 in. was on November 2nd. Fort William was, with 106·5 in. of rain, only 38 per cent. above average, whilst Ben Nevis exceeded the average by 59 per cent. Aurora was observed on thirteen nights; St. Elmo's fire on seventeen; of thunderstorms there are only four records; solar halos were seen on nineteen days, and lunar halos on five.

Meteorological Photography.—Report drawn up by Mr. A. W. CLAYDEN, M.A.

This Committee is practically a one-man Committee, and as Mr. A. W. Clayden has been unable to give so much attention to the work as in former years, there was only a short report. Some rare types of clouds and narrow ribbon streaks of lightning have been photographed. A narrow flash, seen at Exeter on July 22nd, lasted almost two seconds and broke up into sparks; it was not photographed, but well observed, and would explain the beads of bright light, noticed on certain photographs. Lightning seems frequently to

occur under the following conditions :—A lower cumulus cloud disc spreads out again from the middle to a higher cirriform disc. Discharges begin to play between the margins of the two discs, and then follows a discharge between the lower disc and the earth, corresponding to Lodge's impulsive discharge; these discharges go together with heavy rains, and may have something to do with the dissociation of water.

Seismological Committee.—Report drawn up by Prof. MILNE, F.R.S.

The Report stated that as the British Association was now receiving co-operation from a number of observatories in foreign countries it was desirable that a central seismological laboratory should be established, at which earth movements could be recorded and analysed in relation to the corresponding registers received from abroad.

At Prof. Milne's station in the Isle of Wight, notwithstanding serious difficulties arising from the darkness and dampness of the room in which the instruments were placed, he had succeeded during the past year in recording 103 earthquakes. Over 70 per cent. of the Isle of Wight records are repeated in the register from Kew; 58 to 65 per cent. of them were common to Nicolaiew, Potsdam, and Trieste; and 56 per cent. to Victoria in British Columbia. From the times at which disturbances reached these and other observatories it had been possible to locate the centres from which they had originated. In many instances these were shewn to be sub-oceanic, and whilst they give evidence of geological activity on ocean beds they promise to indicate localities which it would be unwise to cross with telegraph cables.

A curious feature occasionally exhibited in a collection of seismograms referring to the same earthquake is that the large waves may be less in amplitude at a station near their origin, than they are at stations more remote. For example, an earthquake originating in Japan, crossing beneath the Pacific to Victoria, B.C., may yield a smaller diagram at that place than the one obtained in the Isle of Wight at double the distance. In this latter case the large waves swept over the free surface of two continents. The inference is that oceans exert a damping influence upon undulations of their beds. This possibly explains why seismograms from Mauritius show small amplitude.

The large waves, which appear to be surface waves, travel with a velocity that is practically constant. The preliminary tremors, however, although they out-race the large waves at a constant rate near to an origin, have an average velocity practically proportionate to the square root of the average depth of the chord joining the earthquake centrum and the distant station. Taking this observation as the foundation for the assumption that the square of the speed is a linear function of the depth, Dr. C. G. Knott arrives at the result that the square of the speed increases 0·9 per cent. per mile of descent. Assuming that the waves are compressional, and that the density of the earth increases uniformly towards its centre, then the co-efficient of its elasticity increases at a rate of nearly 1·2 per cent. per mile of descent.

One of the last sections in the Report referred to what Mr. Milne provisionally called Earthquake Echoes. As an earthquake dies, it does so by a rhythmical succession of similar movements, which are more suggestive of surgings following reflections than of a spasmodic settlement of disjointed strata. The first of these surgings often appears about five minutes after the chief shock, and this, but on a continually decreasing scale, may be repeated many times before the earthquake has ceased.

Solar Radiation.—Report of the Committee.

It was stated that the instrument designed by Prof. Balfour Stewart, F.R.S., and constructed by Mr. Casella for the Committee (many years since) has now been placed in the hands of Prof. Callendar, F.R.S., for comparison with his own pattern of Solar recorder.

Recent Magnetic Work in N. America—by Dr. L. A. BAUER.

No abstract received.

Seismology at Mauritius—by T. F. CLAXTON, Director.

A Milne seismograph was established at Mauritius Observatory in September, 1898. The diurnal waves are of greater amplitude than at any other station. Rapid changes in the vertical have been observed on a good many occasions; on December 5th the boom went out of range after an easterly movement, due to heavy rains at the spot and to the west of it. A gradual change in the vertical is also going on. Air tremors occur every night, dying away at sunrise; they are not sufficiently explained. The amplitudes of earthquake records are disappointingly small.

The Hydro-Aerograph—by F. NAPIER DENISON.

The author has for some years been studying the fluctuations of large bodies of water in their relation to atmospheric pressure, and has constructed excellent apparatus for obtaining automatic records. A brief reference to his work will be found in *Meteorological Magazine*, Vol. xxxii. (1897), p. 74. Mr. Napier Denison has now, we are glad to say, been placed (by Mr. Stupart, the Director of the Canadian Meteorological Service) at Victoria, British Columbia, at the head of what we suppose may be defined as a westernmost look-out station for the Canadian service—something like what we have always thought that Valentia ought to be. Finding himself there, charged with responsibilities as to forecasting and the preparation of weather maps, Mr. Denison has put up a new recorder, and has already succeeded in getting curves which we take to be the instrumental representations of the "calling of the waves," which are often useful monitors on our own coasts. We wish him great success.

Of the following papers we have no abstracts, but we add a word or two respecting some of them :—

H. N. DICKSON.—The Temperature and Salinity of the Surface Water of the North Atlantic during 1896 and 1897.

We believe that this paper did not differ materially from that recently read by the author before the Royal Meteorological Society.

J. HOPKINSON.—The Rainfall of the S.E. Counties of England.

This was a compilation from *British Rainfall*, similar to that for the S.W. of England, mentioned on p. 151 of our last volume.

Dr. van RIJCKEVORSEL.—On some connection between Sun-spots and Temperature.

A. L. ROTCH.—Progress in Exploring the Air with Kites.

A. L. ROTCH.—On the First Crossing of the Channel by a Balloon.

Dr. G. SCHOTT.—Oceanographical and Meteorological Results of the German Deep Sea Expedition in *s.s. Valdivia.*

HEAVY RAINFALLS, AUGUST & SEPTEMBER, 1899.

To the Editor of the Meteorological Magazine.

SIR,—With reference to Mr. Lucas's letter in the *Meteorological Magazine* for October, p. 144, I send the following falls of over one and a half inches which occurred in Northamptonshire during August and September. On August 15th—

	ins.		ins.
Ravensthorp Water Works ...	1·64	Sedgebrook	1·61
Great Brington	1·75	Aldwincle St. Peter	1·58
Althorp	1·68	Oundle	1·83

Of the last-named, 1·63 in. fell between 6.0 and 6.30 p.m.

On September 6th and 7th the fall was—

	ins. 6th.	ins. 7th.		ins. 6th.	ins. 7th.
Berrywood	1·90	·20	Kingsthorp	1·52	·26
Sedgebrook	2·48	·50	Oundle	·45	1·90

Yours truly,

FRED. COVENTRY.

The Vale, Ketton, Stamford, October 19th.

[See also *ante* p. 122.—ED.]

METEOROLOGICAL EXTREMES: II.—TEMPERATURE.

ON p. 132 of our last number we gave, on the high authority of the the late Mr. Blanford, 120°·9 as the maximum for Jacobabad. We have just found a letter (to which we could not reply because we could not read the signature) in which were enclosed the Indian Weather Tables for June 10th and 12th, 1897, giving maxima for Jacobabad of 122°·5 and 123°·5 respectively. Of course Mr. Blanford could not, in 1889, know what was going to occur eight years later.

SMOKE-FOG AND MAXIMUM TEMPERATURE.

To the Editor of the Meteorological Magazine.

SIR,—The effect of smoke-fog in modifying the temperature of our large towns and surrounding districts during calm anticyclonic weather is well known, but the following instance is so remarkable that I think it worthy of record.

From Wednesday to Friday, October 18th to 20th, a dense black fog enveloped the cities of Leeds and Bradford, and the Aire valley from Keighley downwards. It was particularly bad on Friday, October 20th, the atmosphere then being perfectly calm. In the Bradford district the sun never penetrated the smoke-fog, and it was almost as dark as night the whole day.

At Ilkley, 9 miles N.N.W., there was a sharp frost in the morning (min. 28°·4 in Stevenson Screen), and at 8.30 a.m., when I left for Bradford, the sun shone brightly.

As usual on such mornings, I entered the fog on reaching the Aire valley near Shipley.

During the afternoon I went by rail from Bradford to Lancaster, and at about 4.15, when travelling between Shipley and Bingley (4 miles from the centre of Bradford), in the *bottom* of Airedale, I noticed that the thick hoar frost or rime on the trees, grass, etc., remained still unmelted, showing conclusively that the max. temperature during the day had not exceeded 32°. This was, perhaps, not to be wondered at, considering the darkness in the valley. (On the hills above it was brilliantly sunny all day, with a cloudless sky). On passing Bingley the hoar frost disappeared except in the shadows of hedges, walls, etc., showing that the sun had there penetrated the fog at some time during the day.

This state of things continued as far as Keighley. Beyond Keighley the frost entirely disappeared, and the fog rapidly diminished. After passing Skipton and leaving the smoky towns behind, the clear blue sky became visible.

The following day I went on to Garstang, a place situated in pure country, 10 miles S. of Lancaster, where I learned that Friday there had been a day of summer-like weather and temperature, the max. having reached 66°·2 in Stevenson Screen, or about 34° higher than at Bingley! The distance in a straight line from Bingley to Garstang is 39 miles.

Yours truly,

ALBERT WILSON.

4, Eaton Road, Ilkley, October 24th, 1899.

WONDERFUL STORY OF A THUNDERBOLT!

DEEPING ST. JAMES.—During the storm on Sunday week, October 1st, between 5 and 6 o'clock, a thunderbolt fell down the chimney of a house occupied by Mrs. Atkin, near Deeping St. James station. In its passage it grazed the side of Mrs. Atkin's head, leaving a bad scar, and passing out by the open door it exploded in the road, burning fiercely.—*Stamford Post*, October 13th, 1899.

This is a fine specimen of the power of imagination. We accept as facts—(i.) that there was a thunderstorm; (ii.) that the chimney was struck; (iii.) that Mrs. Atkin's head was grazed. But we do not believe in the fall of a "thunderbolt" inasmuch as no such thing has ever been found. Possibly some portion of a brick from the chimney may have been knocked down and so wounded the lady, and as to the final story, the only explanation which occurs to us is that perhaps the discharge scattered the coals in the grate. The only "burning" thunderbolt we ever heard of was the chemical one manufacted by a sprightly youth at Notting Hill, for the express purpose of "taking in" the public—in which he was very successful. See *Quar. Jour. Roy. Met. Soc.*, Vol. XIV., p. 208. We wish that someone in the neighbourhood would ascertain precisely what happened.

DEFINITIONS OF DROUGHT.

To the Editor of the Meteorological Magazine.

SIR,—The suggestion of Mr. H. A. Boys in your issue for August, p. 101, is a reasonable one—that for a "protracted drought" (or any other) the allowance of rain per diem should be on a sliding scale. I have always thought that the definition of drought which appears to be thus far accepted is defective in this respect; for example, this spring we had a drought which has only *once* been exceeded in the over 39 years of my record—it was May 24th to June 17th inclusive, a period of 25 days with only ·01 in. of rain. Yet this does not come into the record as a drought at all, being neither an "absolute" nor a "partial drought," for the ·01 in. so fell that there were but 14 consecutive days rainless. Yet surely such a drought is greater than one lasting 29 days with ·29 in. of rain, which would be recorded as a "partial drought." The one occasion on which the late drought was exceeded was 1893, March 18th to April 14th, 28 days, with ·01 in., on which occasion there was an "absolute drought" of 19 days. It is true the drought this spring would not be so prejudicial as it might have been on account of the excessive rain which preceded it (3·22 in. in 16 days).

We have since had a partial drought, ·32 in. in the 35 days ending August 26th, again, fortunately, following a rainy period.

Yours truly,

T. W. BACKHOUSE.

A COMPASS PLANT.

To the Editor of the Meteorological Magazine.

SIR,—In the September number, at p. 114, there is a short note on "A Compass Plant" that should be explained more fully. This is the *Silphium laciniatum*, one of the compositæ, and is also called Pilot weed, Polar plant, Rosin weed, and so on. It is 3 to 6 feet tall, rarely 11 feet, and has lower radicle leaves 12 to 30 inches long. These leaves in a strong plant, fully exposed on the prairie, will stand erect with their faces toward the east and west, thus having their edges toward the north and south. In the blackest, stormy night, one can feel the edge of the leaf and thus determine the true north. A singular fact in this connection is, that, when planted in a garden, it seems to lose this directive tendency, but the peculiar position of the leaves on the open prairie has been attested by a host of competent observers.

H. A. HAZEN.

September 25th, 1899.

FLOOD IN CAPE TOWN.

WE have been favoured by Mr. Stokes, of Apsley House, Margate, with a copy of the *Cape Times* for August 16th, 1899, giving 15 excellent photo-engravings of the flood in Cape Town, and in the Worcester and Wex River district on August 6th. The streets of Cape Town appear to have had about a foot of water, and outside the town a tramway track and the railway, at more than one place, were washed away. It always seems to us a pity that such volumes of water should be allowed to run to waste, especially now that persons are realising the value of water both for its own sake and because of the power which could be extracted from its fall.

The following are all the data respecting the rainfall which we found in the *Cape Times* :—

	Royal Observatory. in.	Wynberg Hill. in.	Table Mountain. in.
July 31	·40		
Aug. 1	·63	...	·79
,, 2	1·82	2·64	2·18
,, 3	·18	...	·79
,, 4	·00		
,, 5	·71		
,, 6	1·57		
Total	5·31		
Total, 1st to 10th...		7·58	

REMARKS.

Royal Observatory.—On August 2nd, 1·31 in. fell between 1 and 4 p.m. ; and on 6th, 1·25 in. fell between 10 a.m. and noon.

Wynberg Hill.—This heavy rain was badly needed. In 1898 between January 1st and August 31st, 42·63 in. fell ; the total in 1899 up to date is only 27·60 in., whereof July contributed very little : less than half what fell in 1898.

Table Mountain.—This rainfall of 2·97 in. raised the depth of water in the Woodhead reservoir 24 ft. 5½ in., and this report does not include any record of the further effect produced by the subsequent storm of August 6th.

Another account gives the following details as to the fall on the 6th. Apparently it is the Royal Observatory record differently divided :—

August 6—1 a.m. to 8 a.m.	·70 in.
,, 6—8 a.m. to 10.45 a.m.	·85 ,,
,, 6—10.45 a.m. to 11.25 a.m.	·72 ,,

This rain, though heavy, does not seem one which should have caused so much damage, and there seem to be two explanations—(1) the fall may have been much greater in other parts than at the Royal Observatory : (2) the channel provided is not large enough.

A WET PERIOD, OCTOBER & NOVEMBER, 1899.

To the Editor of the Meteorological Magazine.

SIR,—The rainfall at Hazelhurst has recently been exceptionally heavy. I give the daily record :—

Oct. 26	...	·25 in.	Nov. 3	...	2·11 in.
,, 27	...	1·10 ,,	,, 4	...	·78 ,,
,, 28	...	—	,, 5	...	1·45 ,,
,, 29	...	·61 ,,	,, 6	...	·04 ,,
,, 30	...	·04 ,,	,, 7	...	·78 ,,
,, 31	...	—			
Nov. 1	...	·09 ,,			7·88 ,, in 13 days.
,, 2	...	·63 ,,			

The first five days of November averaged just over 1 inch per day.

During the twenty-six* years, 1873 to 1899, there have been seven instances of 2 inches or more falling within twenty-four hours. The 2·11 in. of November 3rd, began at 4 p.m. on that day, and ended at 8 a.m. on the 4th; but the rain was practically continuous until 9 a.m. on November 6th, a period of 65 hours, during which 4·38 in. fell.

There was also a fall of 1·49 in. on October 1st.

Yours faithfully,

T. P. NEWMAN.

Hazelhurst, Haslemere, Surrey, Nov. 9th, 1899.

[Several other correspondents have sent us their records for the early part of November, and from them we have compiled the following table :—

COUNTIES.	STATIONS.	NOVEMBER				4 Days.
		2nd.	3rd.	4th.	5th.	
		in.	in.	in.	in.	in.
Middlesex .	Staines (Knowle Green)	·67	1·42	·09	1·22	3·40
,,	Camden Square	·30	1·36	·30	1·30	3·26
Surrey.....	Haslemere (Hazelhurst)	·63	2·11	·78	1·45	4·97
,, ...	Chiddingfold	·43	1·62	·59	1·67	4·31
,, ...	Farnham (Great Down, Seale)	·46	1·45	·57	1·30	3·78
,, ...	Guildford (Epsom Road)	·40	1·34	·52	1·35	3·61
,, ...	Frimley (Ridgemont)	·36	1·44	·68	1·27	3·75
Sussex	Burgess Hill (Silverdale Road)	·76	·57	·42	2·19	3·94
Hants	Botley (Curdridge).....	·39	1·73	·62	1·31	4·05
,, ...	Crondall (Warren Corner) ...	·38	1·58	·70	1·30	3·96
Bucks	Slough (Upton)	·21	·91	·47	·95	2·54

* As the Hazelhurst record did not commence until 1888, we believe that the earlier years are from the Lower Street record.—ED.

THE MOON AND THE WEATHER.

To the Editor of the Meteorological Magazine.

SIR,—In opposition to Prof. Hazen, I think we may have strong and convincing evidence of a connexion between two sets of phenomena, while unable, *a priori*, to comprehend the *how* satisfactorily; (take, *e.g.*, the case of sunspots and the magnetic needle).

Prof. Hazen's statement as to the effect of the moon on the barometer, I cannot think exhaustive of what may fairly be said to be known on the subject; still less, of all that is discoverable. Nature is apt to have surprises for those who shelve a subject as being thoroughly understood.

Curiously, just after reading the confident letter in which Mr. Dines tells us what the moon can and cannot do, excluding, *inter alia*, any electrical effect, I found in the *Meteorologische Zeitschrift*, that two able meteorologists, Ekholm and Arrhenius, had been arguing in the Swedish Academy, on a comprehensive basis, that the moon has an influence both on polar lights and on thunderstorms. It is further curious to discover that Prof. Hazen believes in the moon's influence on thunderstorms. In a paper to *Popular Science*, New York,* he says: "There seems good evidence to show that there are more thunderstorms during new than full moon."

Now I confess I find it difficult to understand, *a priori*, how the dead moon can have anything to do with thunderstorms; but I should not thereby be deterred from believing in such influence if a sufficient correspondence has been made out. Prof. Hazen, however, cannot have been, or at least *remained*, in such difficulty. On his own showing, moreover, the moon cannot here act either through pressure or temperature. Is it then a direct electrical effect, or what? Perhaps the professor would kindly say by what *a priori* reasoning he was able to supplement, in this case, as required, the results of observation.

Again, certain definite temperature changes usually accompany thunderstorms. If, then, the moon gives us more thunderstorms at one time than another, can it be truly said that she has no influence on temperature?

Yours faithfully,

ALEX. B. MACDOWALL.

* Given in *English Mechanic*, October 20th.

RESULTS OF METEOROLOGICAL OBSERVATIONS AT CAMDEN SQUARE FOR 40 YEARS, 1858–97.

OCTOBER.

YEAR.	RAINFALL.				TEMPERATURE.										CLOUD.
	Total.		Max. Fall.	Falls of 1 in. or +	Dry. Mean, 9a.&9p.	Wet. Mean, 9a.&9p.	Shade Max		Shade Min		Sun Max. Black.		Grass Min.		
	Depth	Days					Abs.	Aver	Abs.	Aver	Abs.	Aver	Abs.	Aver	Aver
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	in.		in.		°	°	°	°	°	°	°	°	°	°	0–10
1858..	1·58	11	·30	0	50·3	48·3	69·2	59·3	32·9	43·6	..	..	..	..	5·9
1859..	2·53	20	·75	0	50·9	49·2	80·9	57·9	26·6	45·8	..	..	..	..	6·9
1860..	1·77	12	·43	0	50·5	48·6	65·2	57·8	31·4	44·8	..	..	27·2	39·4	5·5
1861..	1·05	10	·39	0	54·4	53·0	74·7	64·4	39·5	48·1	..	..	34·6	44·2	6·2
1862..	3·50	18	·75	0	51·9	49·8	69·4	60·1	31·8	45·2	..	..	24·7	41·1	6·0
1863..	1·62	17	·43	0	51·8	49·7	65·2	58·5	35·1	46·4	..	..	28·2	40·8	6·5
1864..	1·13	7	·43	0	50·6	49·2	67·4	58·7	35·4	43·9	..	..	25·2	39·9	6·1
1865..	6·22	22	1·05	1	50·1	48·4	73·5	59·6	33·4	44·8	..	..	27·8	40·9	5·7
1866..	2·32	14	·89	0	51·2	50·0	68·5	59·2	33·6	45·4	..	..	23·6	37·8	6·7
1867..	1·92	16	·42	0	49·8	48·1	66·0	56·9	31·0	42·4	..	..	25·5	37·6	6·9
1868..	2·54	11	·59	0	47·8	46·1	66·2	57·2	27·8	39·4	..	..	26·4	37·0	5·5
1869..	1·87	12	·71	0	48·7	46·7	74·6	58·1	26·6	42·9	..	..	23·4	39·3	5·5
1870..	3·68	20	·46	0	49·9	48·0	69·7	58·8	31·0	43·1	110·0	86·0	29·0	39·0	5·8
1871..	1·34	12	·34	0	48·7	47·4	67·0	58·5	31·2	41·6	106·4	82·3	29·1	38·5	5·7
1872..	5·20	20	1·05	1	48·1	46·8	65·3	56·0	31·8	41·3	110·4	79·2	29·8	38·5	5·7
1873..	2·97	15	1·04	1	47·7	46·4	73·4	57·0	26·2	40·4	110·7	81·7	20·9	36·8	6·3
1874..	3·34	18	·59	0	52·3	50·4	68·1	59·5	34·3	46·6	109·6	85·3	33·6	44·3	6·3
1875..	4·35	18	·78	0	49·1	47·4	70·2	56·0	32·8	43·7	109·0	75·5	32·1	41·6	7·0
1876..	1·40	14	·43	0	52·3	50·7	71·2	60·0	34·2	47·8	111·1	82·8	26·4	43·3	6·8
1877..	1·97	16	·44	0	48·8	46·4	67·5	58·9	30·9	41·7	106·3	89·1	26·6	37·7	5·1
1878..	1·99	13	·50	0	50·5	48·7	73·3	59·4	31·6	45·3	108·9	87·3	26·6	41·4	6·2
1879..	·80	9	·33	0	49·1	47·5	67·4	57·1	33·4	43·9	116·9	80·1	29·0	40·1	6·7
1880..	5·78	20	·99	0	45·8	44·1	66·3	54·5	29·6	40·9	110·8	76·7	26·7	38·7	7·2
1881..	2·99	12	1·03	1	44·8	42·7	63·4	52·6	27·3	39·6	112·4	83·9	20·6	34·1	5·7
1882..	4·96	23	·59	0	50·4	48·8	70·4	58·0	31·9	44·5	116·7	80·8	27·2	41·6	7·5
1883..	1·75	14	·46	0	50·1	48·4	64·6	57·7	36·9	45·0	103·6	81·1	28·4	39·7	5·7
1884..	·99	10	·43	0	49·0	46·6	63·9	57·1	32·2	41·9	105·8	81·2	25·6	36·7	5·8
1885..	3·73	17	·98	0	46·0	43·8	60·9	53·1	33·4	41·1	104·8	75·9	25·8	35·7	6·4
1886..	2·43	23	·47	0	52·8	51·3	78·8	60·3	39·6	47·8	112·2	81·1	32·3	42·3	6·2
1887..	1·24	9	·61	0	44·6	42·3	63·6	53·2	25·4	39·0	103·4	80·3	23·2	35·2	5·8
1888..	1·23	7	·51	0	45·4	43·7	68·8	55·4	28·2	38·9	99·3	80·1	21·3	33·1	5·2
1889..	3·75	22	·73	0	48·0	46·7	60·6	55·9	35·5	43·1	96·8	78·9	31·8	38·4	7·0
1890..	1·20	13	·28	0	48·6	46·4	68·5	57·9	23·8	42·4	109·4	82·7	16·8	37·9	5·1
1891..	4·80	20	·64	0	50·7	48·9	65·9	58·3	29·7	45·0	104·0	83·3	24·4	39·9	5·4
1892..	3·78	21	1·11	1	45·3	43·5	60·4	53·0	29·2	39·4	101·9	78·8	22·3	34·3	5·4
1893..	3·87	16	1·15	1	50·8	48·5	66·3	59·3	30·9	44·9	106·3	88·2	27·2	41·3	5·0
1894..	4·45	17	1·35	1	49·6	47·9	62·1	56·9	31·2	45·2	101·9	77·1	29·2	41·8	7·5
1895..	2·84	14	1·14	1	45·9	44·1	74·4	54·1	26·6	40·5	111·9	75·8	24·1	36·3	6·0
1896..	3·05	18	·67	0	46·1	44·3	62·9	53·6	29·2	40·5	100·6	76·2	24·8	35·3	6·0
1897..	·56	9	·14	0	49·7	47·7	67·2	58·4	31·9	44·3	106·9	84·5	29·8	39·0	5·6
Mean ...	2·71	15	·66	0·2	49·2	47·4	68·1	57·5	31·4	43·3	107·4	81·3	26·6	39·0	6·1
Extremes	6·22	23	1·35	1	54·4	53·0	80·9	64·4	39·6	48·1	116·9	89·1	34·6	44·3	7·5
	·56	7	·14	0	44·6	42·3	60·4	52·6	23·8	38·9	96·8	75·5	16·8	33·1	5·0

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, MAY, 1899.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	TotalRain. Depth.	TotalRain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, CamdenSquare	74·2	31	34·4	5	63·3	43·9	43·1	72	120·4	29·2	1·38	12	5·4
Malta	84·3	25	54·3	4	74·7	60·1	58·0	75	150·0	48·7	·00	0	1·8
Cape of Good Hope	82·9	22	36·1	26	69·4	49·2	47·1	80	...	...	3·48	7	3·0
Mauritius	82·3	3	60·3	31	78·0	68·2	64·5	76	153·6	52·0	1·73	11	5·7
Calcutta	104·9	8	70·4	10	95·9	78·6	77·5	76	153·8	69·8	9·65	9	6·0
Bombay	92·2	28	77·9	1	90·5	81·2	75·5	72	138·5	72·7	·08	2	3·5
Ceylon, Colombo	92·2	2, 5	70·5	20	88·8	77·3	75·9	83	148·8	66·5	17·73	20	5·5
Melbourne	70·0	2	35·9	29	59·8	45·9	46·0	79	128·2	32·1	3·54	13	6·6
Adelaide	76·7	13	39·9	29	64·9	48·5	46·1	72	134·0	31·4	2·36	11	4·2
Sydney	72·0	3	44·3	24*c*	63·8	51·3	46·3	76	117·8	35·0	6·82	10	3·4
Wellington	65·0	6	37·0	11	55·5	45·9	42·3	74	115·0	30·0	6·87	26	5·3
Auckland	73·0	7	41·0	29	61·3	48·8	43·9	67	125·0	33·0	2·98	15	5·0
Trinidad	95·0	9*a*	66·0	Sev.	93·2	69·4	70·1	72	169·0	60·0	·52	5	...
Grenada	86·0	8*b*	73·0	24*d*	83·9	74·5	67·9	67	150·8	...	·49	9	1·5
Toronto	80·0	2	32·9	15	64·7	45·9	46·4	72	101·4	28·0	3·29	12	5·7
New Brunswick, Fredericton	77·7	25	30·0	6	63·0	38·1	35·4	50	...	...	2·64	10	4·6
Manitoba, Winnipeg	76·4	9	21·0	13	62·0	39·6	...	71	...	...	2·20	10	6·6
British Columbia, Esquimalt	...	...	...	...	...	...		...	...	...	...	...	...

a—and 23. *b*—and 25. *c*—and 27. *d*—and 28, 29.

Remarks.

Malta.—Adopted mean temp. 65°·9, or 1°·9 above average. Mean hourly velocity of wind 8·7 miles, or 1·4 below average. Mean temp. of sea 68°·4. L on 2nd. J. F. Dobson.

Mauritius.—Mean temp. of air 0°·1 and of dew point 0°·2 above, and rainfall 2·60 in. below, their respective averages. Mean hourly velocity of wind 9·8 miles, or 0·5 below average; extremes, 26·2 on 21st and 2·0 on 28th; prevailing direction S.E., and variable. L on 3rd; T on 4th and 7th. A. Walter.

Ceylon, Colombo.—Mean temp. of air 82°·4, or 0°·1 below, of dew point 0°·8 above, and rainfall 5·84 in. above, their respective averages. Mean hourly velocity of wind 9·9 miles; prevailing direction S.W. Max. velocity on 14th, 25 miles per hour, for 45 minutes. TSS on 7 days. L on 7 days. H. O. Barnard.

Adelaide.—Mean temp. of air 0°·8 below, and rainfall ·50 in. below, the average of 42 years. A fairly good, seasonable month. C. Todd, F.R.S.

Sydney.—Temp 0°·9 below; humidity 8·7 above; and rainfall 1·60 in. above, their respective averages. H. C. Russell, F.R.S.

Wellington.—A very wet, unpleasant month; winds chiefly S. and S.E., and strong from 12th to 15th, also strong N.W. wind on 18th; generally dull, damp weather. H on 12th: fog on 4 days. Earthquake on 22nd. Mean temp. 1°·3 below, and R 1·98 in. above, their respective averages. R. B. Gore.

Auckland.—Unusually dry for the time of the year, the rainfall being 1·25 in. below the average. Mean temp. nearly 2° under the average. T. F. Cheeseman.

Trinidad.—Rain 3·13 in. below the average of 30 years. J. H. Hart.

SUPPLEMENTARY TABLE OF RAINFALL, OCTOBER, 1899.

[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..	3·56	XI.	Builth, Abergwesyn Vic.	5·67
II.	Dorking, Abinger Hall .	2·48	,,	Rhayader, Nantgwillt ...	4·96
,,	Birchington, Thor	1·74	,,	Lake Vyrnwy	4·84
,,	Hailsham	2·56	,,	Corwen, Rhug	4·31
,,	Ryde, Thornbrough	2·68	,,	Criccieth, Talarvor	2·69
,,	Emsworth, Redlands ...	2·65	,,	I. of Anglesey, Lligwy..	3·50
,,	Alton, Ashdell	3·43	,,	I. of Man, Douglas	3·53
III.	Oxford, Magdalen Coll..	2·69	XII.	Stoneykirk, Ardwell Ho.	2·37
,,	Banbury, Bloxham	2·24	,,	New Galloway, Glenlee	4·62
,,	Northampton, Sedgebrook	2·79	,,	Moniaive, Maxwelton Ho.	4·05
,,	Stamford, Duddington..	...	,,	Lilliesleaf, Riddell	1·71
,,	Alconbury	2·58	XIII.	N. Esk Res. [Penicuick]	3·60
,,	Wisbech, Bank House...	2·83	XIV.	Glasgow, Queen's Park..	3·27
IV.	Southend	1·89	XV.	Inverary, Newtown	8·92
,,	Harlow, Sheering..... ...	...	,,	Ballachulish, Ardsheal...	7·88
,,	Colchester, Lexden	1·84	,,	Islay, Gruinart School ...	2·49
,,	Rendlesham Hall	1·90	XVI.	Dollar.....	4·61
,,	Scole Rectory	1·98	,,	Balquhidder, Stronvar...	7·22
,,	Swaffham	1·99	,,	Coupar Angus Station...	1·06
V.	Salisbury, Alderbury ...	3·04	,,	Dalnaspidal H.R.S.....	...
,,	Bishop's Cannings	2·39	XVII.	Keith H.R.S.....	1·38
,,	Blandford, Whatcombe .	3·29	,,	Forres H.R.S.	·89
,,	Ashburton, Holne Vic...	4·96	XVIII.	Fearn, Lower Pitkerrie..	·93
,,	Okehampton, Oaklands.	4·17	,,	S. Uist, Askernish	4·37
,,	Hartland Abbey	5·94	,,	Invergarry.....	6·35
,,	Lynton, Glenthorne ...	5·01	,,	Aviemore H.R.S.	1·19
,,	Probus, Lamellyn	3·60	,,	Loch Ness, Drumnadrochit	3·05
,,	Wellington, The Avenue	2·45	XIX.	Invershin	2·46
,,	North Cadbury Rectory	2·10	,,	Durness.....	6·36
VI.	Clifton, Pembroke Road	3·69	,,	Watten H.R.S.....	2·01
,,	Ross, The Graig	2·95	XX.	Dunmanway, Coolkelure	4·22
,,	Wem, Clive Vicarage ...	2·76	,,	Cork, Wellesley Terrace	1·52
,,	Wolverhampton, Tettenhall	2·97	,,	Killarney, Woodlawn ..	2·76
,,	Cheadle, The Heath Ho.	3·23	,,	Caher, Duneske	1·54
,,	Coventry, Priory Row...	2·35	,,	Ballingarry, Hazelfort...	1·59
VII.	Grantham, Stainby	2·52	,,	Limerick, Kilcornan ...	1·02
,,	Horncastle, Bucknall ...	2·62	,,	Miltown Malbay	2·54
,,	Worksop, Hodsck Priory	2·70	XXI.	Gorey, Courtown House	2·03
VIII.	Neston, Hinderton	3·47	,,	Moynalty, Westland ...	1·97
,,	Southport, Hesketh Park	3·09	,,	Athlone, Twyford	1·55
,,	Chatburn, Middlewood.	2·89	,,	Mullingar, Belvedere ...	1·46
,,	Duddon Val., Seathwaite Vic.	5·81	XXII.	Woodlawn	2·18
IX.	Melmerby, Baldersby ...	2·03	,,	Crossmolina, Enniscoe ..	3·35
,,	Scarborough, Observat'y	2·59	,,	Collooney, Markree Obs.	2·39
,,	Middleton, Mickleton ...	2·65	,,	Ballinamore, Lawderdale	...
X.	Haltwhistle, Unthank H.	3·12	XXIII.	Warrenpoint.....	2·20
,,	Bamburgh	1·33	,,	Seaforde.....	1·86
,,	Keswick, The Bank.....	6·87	,,	Belfast, Springfield	2·55
XI.	Llanfrechfa Grange	3·84	,,	Bushmills, Dundarave..	1·98
,,	Llandovery	4·92	,,	Stewartstown	1·98
,,	Castle Malgwyn	4·28	,,	Killybegs	3·45
,,	Brecknock, The Barracks	3·86	,,	Horn Head	2·18

OCTOBER, 1899.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	2·03	— ·86	1·02	27	10	63·4	1	33·5	8	0	7
II.		Tenterden	2·33	— 1·70	·82	1	14	65·0	23	32·5	14	0	13
,,		Hartley Wintney	2·64	...	1·30	27	11	65·0	17	29·0	14	4	11
III.		Hitchin	3·14	+ ·07	1·59	1	12	62·0	16	30·0	17	5	...
,,		Winslow (Addington)	2·27	— ·82	·93	27	10	66·0	12	26·0	19	9	11
IV.		Bury St. Edmunds (Westley)	1·89	— 1·38	·57	27	9	60·0	27	31·0	6	...	...
,,		Norwich (Brundall)	2·30	...	·79	27	12	65·2	12	29·8	20	3	16
V.		Winterbourne Steepleton ...	2·26	...	·82	27	10	63·9	22	26·9	14	5	11
,,		Torquay (Cary Green)	1·99	...	·79	27	11	62·4	10*a*	36·2	14	0	1
,,		Polapit Tamar [Launceston]..	3·34	— 1·59	1·13	1	13	67·2	18	26·7	14	5	8
VI.		Stroud (Upfield)	2·30	— ·73	·50	1, 29	11	61·0	17	34·0	20	0	...
,,		ChurchStretton(Woolstaston)	3·30	— ·47	1·20	1	10	65·0	17	35·0	15	0	7
,,		Worcester (Diglis Lock)	2·10	— ·73	·56	1	11	...	...	...	...	...	...
VII.		Boston	2·83	— ·28	1·25	1	9	65·0	17	32·0	18*e*	2	...
,,		Hesley Hall [Tickhill].....	2·90	— ·20	1·36	1	11	65·0	17	26·0	20	6	...
,,		Breadsall Priory	2·85	...	·72	1	9	63·0	...	31·0	...	2	7
VIII.		Manchester(PlymouthGrove)	3·06	— ·31	·73	13	13	68·0	19	31·0	15	3	7
IX.		Wetherby (Ribston Hall) ...	3·61	+ ·48	2·25	1	10	...	...	...	...	...	...
,,		Skipton (Arncliffe)	5·16	— ·87	1·60	1	12	...	...	...	...	...	...
,,		Hull (Pearson Park).....	2·38	— 1·27	·81	1	10	64·0	12	30·0	20	6	12
X.		Newcastle (Town Moor)	1·78	— 1·34	1·29	1	9	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	13·34	+ 2·75	3·30	29	13	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	3·29	— 1·25	·67	27	12	...	...	...	...	...	...
,,		Haverfordwest	3·76	— 1·39	1·23	29	14	61·7	17	30·4	14	1	10
,,		Aberystwith (Gogerddan) ...	4·12	— 1·23	1·10	29	8	70·0	17*b*	...	...	...	...
,,		Llandudno.....	3·65	+ ·26	·93	1	12	70·5	18	38·5	15	0	..
XII.	SCOTLAND.	Cargen [Dumfries]	3·26	·00	1·10	29	8	63·0	18	26·0	15	6	...
XIII.		Edinburgh (Blacket Place)...	1·59	...	·48	1	13	67·4	19	32·2	15	0	5
XIV.		Colmonell	3·47	...	·88	3	14	66·0	20*c*	28·0	14	...	...
XV.		Tighnabruaich	5·08	...	·77	28	16	55·0	11*d*	34·0	13*g*	0	...
,,		Mull (Quinish).....	4·66	— ·63	1·05	2	19	...	...	...	...	...	...
XVI.		Loch Leven Sluices	2·30	— ·66	·80	30	9	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	·95	— 1·29	·20	1, 25	11	63·6	10	27·1	15	1	...
XVII.		Braemar	1·78	— 1·83	·36	30	15	60·2	10	25·0	15	5	16
,,		Aberdeen (Cranford)	·89	...	·15	9	16	70·0	10	30·0	14*h*	6	...
,,		Cawdor (Budgate)	1·26	— 1·47	·37	3	14	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	4·42	— ·23	·86	4	13	...	...	...	...	...	...
,,		Glencarron Lodge.....	10·58	...	1·70	11	23	67·0	19	30·0	15	2	...
XIX.		Dunrobin	2·05	— 1·26	·45	11	12	64·0	19	33·8	13	0	...
,,		S. Ronaldshay (Roeberry) ...	3·58	— ·15	·78	3	18	63·0	19	35·0	13*i*	0	...
XX.	IRELAND.	Darrynane Abbey.....	1·84	...	·21	26	17	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	2·29	— 1·53	·77	29	12	61·5	9	29·0	6	5	...
,,		Broadford (Hurdlestown) ...	1·72	...	·38	25	14	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	1·73	— 1·56	·58	29	15	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	1·54	— 1·84	·26	11	11	65·1	18	32·9	6	0	6
XXII.		Ballinasloe	1·77	— 1·22	·31	11	13	63·0	18	29·0	14	5	...
,,		Clifden (Kylemore)	4·45	...	·96	11	17	...	...	...	...	..	...
XXIII		Waringstown	2·71	·00	·50	1	15	68·0	18	30·0	15*j*	8	12
,,		Londonderry (Creggan Res.).	1·77	— 1·90	·51	11	15	...	...	...	...	...	...
,,		Omagh (Edenfel)	1·98	— 1·12	·49	11	14	63·0	18*f*	30·0	20	4	9

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

a—and 11. *b*—and 18, 19. *c*—and 28. *d*—and 18. *e*—and 20. *f*—and 19.
g—and 14. *h*—and 30. *i*—and 24. *j*—and 19, 23.

METEOROLOGICAL NOTES ON OCTOBER, 1899.

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.—There were several wet days at the beginning and end of the month, but from the 6th to the 23rd brilliant sunshine prevailed, except on the 12th. The max. temp. was 60°, or over, on 14 days. Heavy dews and foggy nights occurred from 17th to 23rd. TS with heavy R and high wind on 1st. Duration of sunshine 154 hours.

HARTLEY WINTNEY.—A pleasant month, warm and dry. Although heavy R fell on 27th the total for the month is ·67 in. below the average, and R was much needed at the close. There was a period of calm weather from 7th to 25th, with dense fog each morning. Ozone was registered on 11 days, with an average of 4.

WINSLOW, ADDINGTON.—Little R fell until after the 25th, and there were many frosty and foggy mornings. On the morning of the 26th, at about 6.45 a.m., a fine rainbow was seen, followed by a wet day. Fog on 8 days.

BURY ST. EDMUNDS, WESTLEY.—A month of high barometer. R and temp. below the average. Distant T on 1st.

NORWICH, BRUNDALL.—A fine month, with average temp., and rainfall ·75 in. deficient. Many very bright days in the second and third weeks. L on 13th. Fog on 5 days.

WINTERBOURNE STEEPLETON.—A very fine month. Between 5th and 25th, inclusive, the days were almost all sunny and bright, but towards the end of that period the mornings were rather foggy, soon clearing.

TORQUAY, CARY GREEN.—R 2·24 in. below the average. Mean temp. 54°·1, being 2°·6 above the average. Duration of sunshine 130 hours 35 mins., being 18 hours 25 mins. above the average; four sunless days.

POLAPIT TAMAR [LAUNCESTON].—A fine dry month, remarkable for absence of strong winds. Fog on 7 days.

STROUD, UPFIELD.—Fog daily from 20th to 24th. Westerly gale on 3rd.

CHURCH STRETTON, WOOLSTASTON.—Heavy R on 1st; otherwise dry and seasonable, without much frost. Gales on 3rd and 29th. Mean temp. 49°·6. H on 13th.

MANCHESTER, PLYMOUTH GROVE.—Fine autumn weather prevailed during the greater part of the month. H storm and T and L on 10th. Fog on 5 days. Mean temp. 45°·8.

WALES.

HAVERFORDWEST.—An unusually fine month. The first three days were wet and stormy, after which, till the 26th, the general character of the weather was fine. From the 26th to the end it was very unsettled. The wind reached the force of a gale on four days. Springs were very low and much more R is needed to bring them back to their normal volume. Agricultural operations well advanced.

ABERYSTWITH, GOGERDDAN.—A very fine and warm month.

SCOTLAND.

CARGEN [DUMFRIES].—L at night on 21st and 22nd.

EDINBURGH, BLACKET PLACE.—Mean temp. 1°·9 above, and R half, the average. Duration of sunshine slightly below the normal. Solar halo at 11 a.m., on 6th; lunar halo on 18th. H at 10 p.m. on 13th. TS with R and H on 30th at 7.35 p.m.

COLMONELL.—R 1·25 in. below, and temp. 2°·6 above, the average of 23 years. Gales on 6 days. T and L on 31st.

TIGHNABRUAICH, CRAIGANDARAICH.—An average rainfall. The best display of T and L of the year occurred on the 30th.

MULL, QUINISH.—On the whole a fine month, with unusually high temp., and R below the average. No sign of winter up to the close. The R on 2nd, 1·05 in., came from N.E., which is most unusual.

BRAEMAR.—A month of excellent weather.

ABERDEEN, CRANFORD.—A fine and warm month, with S.W. and W. winds.

S. RONALDSHAY, ROEBERRY.—The first and latter parts of the month were stormy and unsettled, but the middle was fine. Mean temp. 47°·6, being above the average of 9 years.

IRELAND.

DARRYNANE ABBEY.—Another dry month. The first part was very fine, but rather cold; the end was wild and rather stormy. H on 30th.

BROADFORD, HURDLESTOWN.—A very dry October. R 1·11 in., and rainy days 4, less than the average for 15 years. Fog on 3 days.

DUBLIN, FITZWILLIAM SQUARE.—A quiet, foggy, but withal, fine month. There was large range of temp., cold, foggy nights, alternating with sunny, warm days. The weather broke up on 24th, and to the end of the month R fell frequently. Mean temp. 50°·2, being 0°·5 above the average. L on 29th. High winds on 7 days, attaining the force of a gale only on 29th. Fog on 13 days. Solar halo on 18th. Lunar halos on 17th and 18th. H on 12th.

OMAGH, EDENFEL.—With seventeen fine and mostly brilliant days, the rainy and unsettled condition of the remaining fourteen was unable to destroy its general good character. Owing to the absence of frost, of any severity, the autumn tints never were more magnificent than they were up to the close of this month.

SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CCCCVII.] DECEMBER, 1899. [PRICE FOURPENCE, *or 5s. per ann. post free.*

THE AIMS OF METEOROLOGY.

THE exquisitely printed work, mentioned below,* puzzles us much. From its style we should without hesitation attribute it to Prof. Abbe, but it contains a second title, which is as follows: Part III. (not iii.A as on the other title). *Report on the Meteorology of Maryland*, prepared by direction of WILLIS L. MOORE, Chief of U.S. Weather Bureau, by CLEVELAND ABBE, O. L. FASSIG, and F. J. WALZ. And yet at the head of the text we again have the first title, and the name of Cleveland Abbe. As it begins with page 219 we infer that it is Part III., or III.A, of a volume to be called "*Report on the, &c.*," but if so, what is meant by "Special Publication, Vol. 1."? It seems rather difficult to see how it is to be catalogued: probably under "Maryland," with references from "Abbe," "Clark," "Fassig," "Moore," and "Walz"!

Although consisting of little more than a hundred pages, this article covers nearly all branches of meteorology, and (except that mathematics are absent) is really the outpouring of the mind of one of the leaders of meteorology of the present day. The *raison d'être* of the work is to tell meteorologists at what they ought to aim; and few persons are so competent to do that as is Prof. Abbe; but he does more, for he packs in a mass of facts and dates which make the perusal of the article not merely an instructive guide to the future, but also very useful as a record of past progress.

So many persons seem to consider that the object and duty of a meteorologist begin and end with punctually reading and recording a barometer, three or four thermometers, and a rain gauge, that we think it will be generally useful to reprint the following section of Prof. Abbe's article:—

SPECIAL OBSERVATIONS AND INVESTIGATIONS.

"While the national bureaus collect data for the study of the atmosphere, they have it in their power to make daily applications

* Maryland Weather Service, Wm. Bullock Clark, Director. The Aims and Methods of Meteorological Work, especially as conducted by National and State Weather Services by Cleveland Abbe. (Special Publication, Vol. I., Part iii.A). The Johns Hopkins Press. Baltimore. July, 1899. Royal 8vo. 111 pages. 13 plates.

of the useful knowledge thus acquired. Those bureaus that cover a large area are generally able to make rational predictions as to the probable weather of the coming twenty-four hours and, especially, to foresee the development and approach of severe storms. This is considered to be a primary duty to the public, since in this way they can render an immediate return for the money spent in the study of the atmosphere. In some bureaus the attention given to practical applications may seem to be too large in proportion to the needs of the fundamental study of the atmosphere. But this is probably an unjust criticism. Theoretical meteorology is not yet the predominating feature in the science. Our progress in unravelling the difficulties of meteorological problems is necessarily so slow and so dependent upon the general progress of mathematical physics that we may compare theoretical meteorology to the slow-growing pines, beeches and oaks of the forest which, when young, are protected by the rapid-growing and short-lived trees, but become the masters of the forest when the latter have died away.

"While, therefore, keeping alive the study of theoretical meteorology, most of the national weather bureaus have developed appropriate lines of useful work in addition to the daily storm and weather predictions already mentioned. Among these we may enumerate the following :—

1. The continuous record of all features of the weather is kept as an official record for use in the courts of law, especially a record of the high winds that can produce damage or destruction of property ; a record of heavy rains within short periods of time, such as produce destructive floods in cities and rivers ; a record of general rains, on which the general *régime* of the rivers depends.

2. A record of every climatic feature that is supposed to affect local agriculture, especially frosts, droughts, maximum and minimum temperatures, rainfall and sunshine, depth of snow and evaporation.

3. A record of the heights of rivers for the prediction of rising and falling water, and the study of erosion.

4. A record of the amount of sunshine and cloudiness in its bearing on the growth and health of animals and plants.

5. A record of the temperature of the soil at different depths for agricultural studies, and at great depths for geological studies.

6. A record of the amount of evaporation from the surface of fresh water and its bearing upon the storage of water for irrigation.

7. The record of thunderstorms and of damage by lightning, hail and wind gusts.

8. Observations on terrestrial magnetism, especially in case that this is not otherwise provided for by some other office or bureau of the respective governments. This record is not kept because any very important relation has yet been shown to exist between meteorology and terrestrial magnetism ; but there is a widespread belief that intimate relations of this character do exist and that the two subjects must be considered as cognate branches of terrestrial physics.

Continuous photographic records of the movements of the magnetic needle and of earth currents are kept for comparison with other phenomena, astronomical or terrestrial.

9. Earthquakes and seismic phenomena belong to geology, but in the absence of systematic attention to the subject by other bureaus, the meteorological records are often the principal source from which observations are drawn. It is also recognized that occasionally earthquakes and volcanic eruptions may be determined by meteorological conditions. In general, both earthquakes and oceanic tides and a certain class of atmospheric phenomena may be simply different manifestations of the tidal forces of the sun and moon, and it is appropriate that the meteorologist should join with other students of terrestrial physics in contributing to elucidate the phenomena.

10. The registration of tides in the ocean and fluctuations in the levels of the lakes with a study of these as far as they are affected by atmospheric changes.

11. The climatic conditions that affect health, disease and death for the students of hygiene.

12. The observation of the dust in the atmosphere, both as to its quantity and character and a study of its relations to disease, organic life, the production of fog and rain and the radiation of heat, and other phenomena.

13. The registration and study of atmospheric electricity and the elucidation of its origin and function in meteorology.

14. The observation of aqueous vapour, ozone, carbonic acid gas, ammonia, and other chemicals dispersed in small quantities through the otherwise pure air, and the study of their diverse influences on rock weathering, on animal and vegetable life.

15. Optical phenomena, such as the blueness of the sky and its relation to photographic effects, and its dependence upon the free moisture in the air: The polarization of sky light and its dependence on the moisture: solar and lunar halos and coronæ, their dependence upon moisture and their relation to storms.

16. The study of the clouds, their structure and method of formation; their altitude and motions.

17. Observations of evaporation and its relation to irrigation, water-storage and the growth of plants.

18. The depth of frost in the ground and its relation to the foundations of roads and buildings.

19. The relation between rainfall and evaporation on the one hand, and the quantity of water flowing in the rivers on the other.

20. The formation of frost-work at the surface of the ground and its relation to the soil beneath.

21. The formation of sleet or ice on the branches and leaves of trees and plants or on telegraph wires, and the injury done thereby to agriculture and business.

22. The record of the flow of water from springs, the flow of underground water, the temperature of spring water, all in relation to the water supply.

23. The comparison and standardization of meteorological instruments and apparatus, especially of the thermometers, barometers, anemometers, rain-gauges, sunshine recorders, actinometers, sextants and other apparatus used by explorers who keep meteorological records; the improvement and invention of self-registering apparatus.

24. The study of atmospheric absorption of solar energy by means of thermal, optical and chemical methods.

25. The study of the radiation of heat by the earth and air, the clouds and the invisible vapour.

26. The resistance to the motion of the air when opposed by various obstacles, or the effect of the wind on sails and buildings.

27. A record of the phenomena of the aurora, and the study of its connection with magnetic disturbances and natural electric currents on telegraph wires, and with the condition of the atmosphere as to wind and moisture.

28. Records of the audibility of sound and the visibility of signals in fogs, for use in marine signalling.

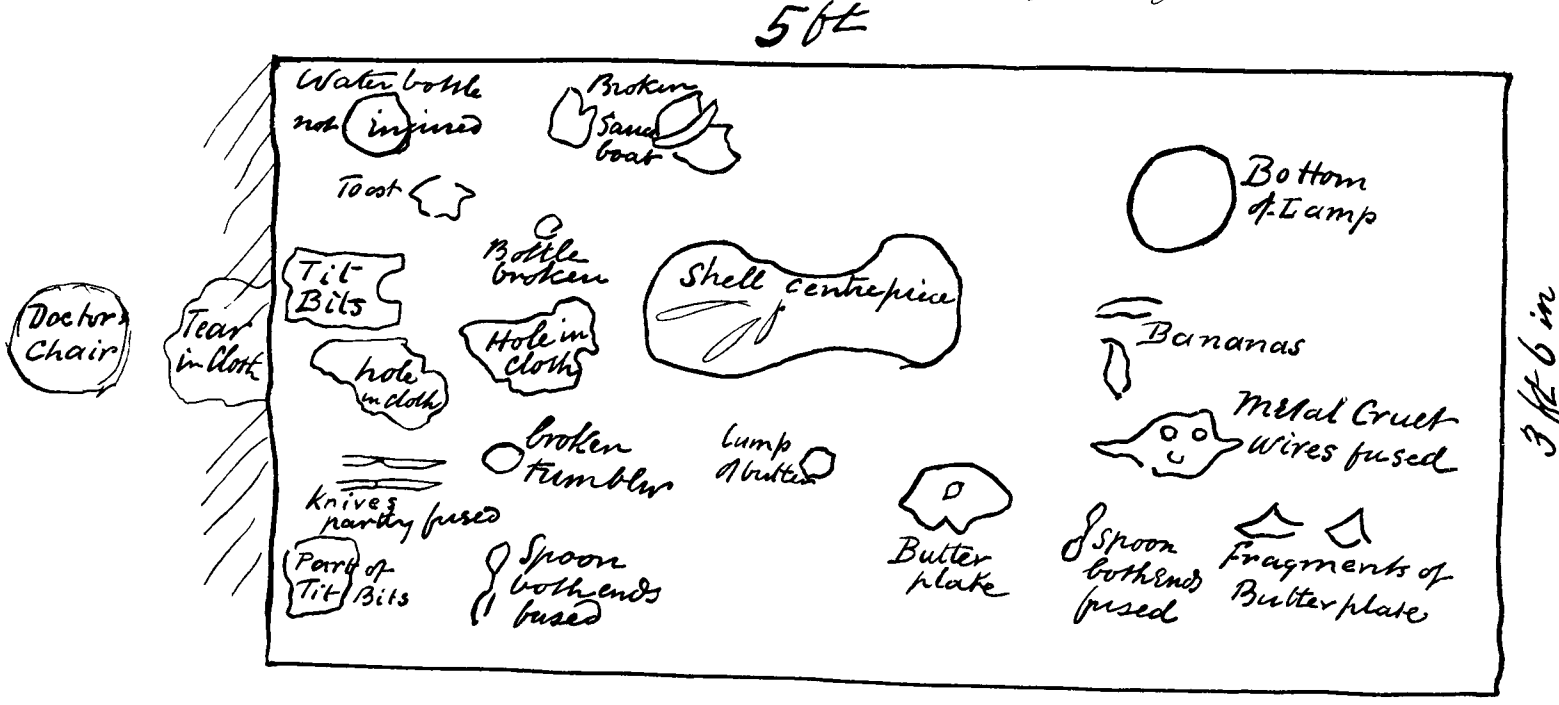
29. The education of the public, and the dissipation of popular errors by teaching, lecturings and popular writings."

There may be some errors in the work, but we have not noticed one of any importance. Those Englishmen who are always expatiating upon the errors of aneroids may perhaps feel a little indignant at the (perfectly true) remark on page 230, that "The aneroid barometer is not affected by the changes in the force of gravity," while others may feel their "gravity" (of another kind) slightly and pleasantly disturbed.

There is one sentence on page 287 which we regret to see: "The value of the lightning rod as a protection is still considered problematic by many; the question should be settled by careful enquiry." This, in an official publication in the country of Franklin, by one of the most able men in the country, and more than a century after the lightning rod began to save thousands of lives, is certainly remarkable. It will be seen that the author does not personally adopt the view, but he writes of the "many," and says that the question "should be settled," which implies that it is not settled yet. Probably the foundation of his doubt is the bad practice of a *genus homo*, which is, we believe, only to be found in the U.S.A., viz.: "the Lightning Rod man."*

* See the section on "Lightning Rod Swindles," in *Plain Directions for the Construction and Erection of Lightning Rods*, by J. PHIN, C.E. New York, 1873.

"Plan of the Table after the Lightning Stroke."



LIGHTNING AT DINNER.

AT 7.30 p.m., on Sunday, the 13th August, 1899, Labuan, North Borneo, was visited by a very severe thunderstorm, during which the house of the Government Medical Officer, the Medical Officer himself, and a tree near the Deputy Governor's house, were struck by lightning. The quarters and offices of the Eastern Extension Telegraph Company, which are situated midway between the above mentioned places, and within a quarter of a mile from them, escaped injury.

The Medical Officer's house is what is known as a native house, that is to say, it is built of wood, thatched with ripa palm leaves, and partitioned with palm leaves. It stands on wood piles about 4 feet long.

The lightning struck the point of one of the gables, passed down the king-post immediately beneath it, to the beam supporting the lower end of the king-post, thence it jumped about 8 feet to an iron rod, from which a large metal lamp was hanging, beneath which the table was laid for dinner, from the lamp to the handle of the centre-piece immediately below it, through the tablecloth, the table, down the doctor's clothes and legs, through the floor, down two piles, to earth. In transit it split the king-post into two pieces; the detached pieces knocked a hole in the roof, and then fell part way down through the ceiling into the dining-room below.

The iron rod from which the lamp was suspended, and the horizontal beam, were uninjured. Secured to the bottom of the lamp by thumbscrews was a brass plate, for catching drops of oil; this was knocked off on to the table. From the bottom of the lamp to the handle of the centre-piece below was about 15 inches. The centre-piece was composed of a pair of pearl shells, mounted, with an ornamental handle of metal, and stood on four metal legs screwed into the shells, the handle and legs not being in contact. The top of the handle was slightly fused. There was a join in the wood top of the table under one of the legs of the centre-piece, the lightning split a piece of wood off the edge of the join, and knocked a hole in the tablecloth that could be covered by a full-sized outstretched hand; a portion of the cloth so torn was doubled underneath and led into another hole, which could be covered by a closed hand.

The flash then appears to have gone through the table, making a small hole at the end of the join, which was slightly blackened, as from smoke, on the underneath side; it then jumped on to the hanging portion of the tablecloth, carrying away a piece 15 in. broad.

The doctor was having dinner, and sitting at this end of the table; having just come in from a long round, he had not troubled to dress, but changed into native costume, consisting of a loose jacket and sarong (a piece of cloth fastened round the waist and reaching to the ground)

The lightning having passed down the end of the tablecloth which was resting in the doctor's lap, continued its way down his sarong, tearing it in a similar manner, paralysing his legs from the knees downward, and making several superficial burns. He was also knocked off his chair and rendered insensible for a moment. He remembered seeing sparks, but not hearing anything of the thunder. He had just finished his fish. "Tit Bits" was lying at his side on the table, and he was reading it while he was having his dinner, this necessitated his leaning forward. The flash came just at the instant that the boy was changing his plate—the doctor having sat back to enable him to do so; this was most fortunate, as had he been leaning forward reading he would most probably have been struck on the head. A piece of "Tit Bits," the size of half a cheese-plate, was torn out of the top of the newspaper. The clean plate which the boy was putting on to the table was knocked out of his hand, himself being uninjured.

The floor was not close-jointed, so the flash probably found its way down through the cracks, thence it jumped about four feet on each side, and split two of the piles, eight inches in diameter, into eleven pieces. These pieces were lying about nine feet from the holes, where the ends were in the earth. They were split longitudinally, with the ends pointing towards the respective holes.

A sideboard, standing about five feet from the table, had some glasses broken that were standing on the top; the door and bottom of the left hand cupboard were affected, the former being blown open, and the latter downwards, letting a lot of aërated water fall through on to some more below, most of it being smashed.

The accompanying sketch will give the best idea of the state of the dinner table.

Absence of marks of burning, in bad conductors like wood, cloth, &c., and no horizontal timbers being marked or damaged, were the peculiarities of the occurrence.

[We are indebted to Mr. G. C. Bompas for the foregoing critical study of the effects of lightning by Mr. Rawlin Buckland, of the Eastern Extension Telegraph Company.—ED.]

EFFECTS OF FOG.

MR. WRIGHT sent to the Scientific Committee, Royal Horticultural Society, on November 7th, some vine leaves from Chiswick, to show the injurious effects of the recent fogs in the gardens of the Royal Horticultural Society. The Muscat class of grapes were most injured, the foliage being all scorched and the fruit more or less covered with a deposit. It was observed that the fog was remarkably early in the season. Prof. Church noticed that it was peculiarly pungent, causing a hundred buds of a Camelia to fall in a single day. Injury was also done to Orchids in Chelsea and Gunnersbury. The real cause of the injury is the presence of sulphurous acid gas, as well as the mechanical accumulation of sooty matters.—*Journal of Horticulture.*

REVIEWS.

The Altitude of the Aurora above the Earth's surface, by PROF. CLEVELAND ABBE. Reprint from *Terrestrial Magnetism*, Vol. III., 1898. Roy. 8vo. 68 pp.

WE have been reading with great interest the valuable papers which our able contemporary has had the privilege of publishing, and are glad to receive the above reprint.

All who desire to understand the formation of the beautiful phenomenon which we call aurora, must read and study the facts which Prof. Abbe has stated with clearness and precision. Taking in chronological order, all, or nearly all, who have dealt with the subject of the altitude of auroral appearances above the surface of the earth, he not merely points out their discrepancies but shows that their inconsistencies prove that there must be in the observations themselves some unconsidered source of error, as the observers have mostly been so competent that errors of observation cannot be accepted as the real explanation. Prof. Abbe does not (as far as we have seen) refer to the old theory that auroræ in temperate latitudes occur at a great height, and, as we approach the poles, at decreasing altitudes. He seems to confine himself to proving that the observations of those very persons who have deduced great altitudes afford internal evidence of their untrustworthiness, and to suggesting methods whereby all such observations can be tested; he accepts, as beyond dispute, the records of auroræ in arctic regions reaching almost to the ground, but we do not see any distinct expression of opinion as to the altitude in lower latitudes. Where so great an authority is silent, it is of course presumptuous for us to speak, but the impression left upon our mind is, that perhaps the altitude may not differ very widely from that of the mean snow line. Be that as it may, the paper is one which will give pleasure to all thoughtful readers.

Meteorological Observations taken at Kenilworth, Kimberley, during the year 1898, by J. R. SUTTON, B.A. [Excerpt, Report of the Cape Meteorological Commission]. Fcap. folio, 26 pages.

WE have, on one or two occasions, had the pleasure of printing letters from Mr. Sutton, but the above is the first annual report from him which we have seen. We congratulate him upon the splendid equipment which the De Beers Company has placed in his charge, and we thank these chiefs of the Diamond world for the valuable information which such instruments, under such a Superintendent, are supplying.

We have thus, in the centre of South Africa, in long. 24° 27′ E., and lat. 28° 42′ S., at an altitude of 3,950 ft., a meteorological observatory, certainly better equipped than Greenwich, and, having few, if any, equals in the British Isles. And the director is worthy

of the instruments, for though the present report is chiefly a statement of the results of the year's work, Mr. Sutton has dropped, on almost every page, hints which could, with advantage, be considered by meteorologists in the Old Country.

It would hardly be expected that a single year would give an accurate determination of the Diurnal Range of the Barometer—a datum much needed for the reduction of African observations. Here, however, are the Kimberley values:—

Midnight	+ ·006	6 a.m.	+ ·019	Noon	+ ·010	6 p.m.	— ·034
1 a.m.	+ ·003	7 ,,	+ ·031	1 p.m.	— ·011	7 ,,	— ·021
2 ,,	— ·001	8 ,,	+ ·040	2 ,,	— ·031	8 ,,	— ·007
3 ,,	— ·003	9 ,,	+ ·043	3 ,,	— ·041	9 ,,	+ ·002
4 ,,	·000	10 ,,	+ ·040	4 ,,	— ·046	10 ,,	+ ·008
5 ,,	+ ·007	11 ,,	+ ·029	5 ,,	— ·042	11 ,,	+ ·008

If these values are plotted, the resultant curve is one which will, we think, carry conviction as to its accuracy to all conversant with the subject.

Kimberley being so high (nearly 4,000 ft.) the air is generally dry, and rarely hot; the absolute max. was 101°·0 on December 15th, and the min. 22°·2 on August 2nd, when the grass min. fell to 18°·4. The rainfall was about 18 in., and Mr. Sutton has returns from ten stations in the neighbourhood.

In conclusion, we may perhaps state one or two "wishes." We should like some illustrations, plan of the station, views of the instruments, map of the district showing the sites of the rain gauges, we also hope to hear that either the anemometer pole, or the evaporator, has been moved. The evaporation work is extremely important, but it must be carried on under perfect conditions.

Then will the best African station be even better than it is.

UNUSUAL SNOW CRYSTALS.

To the Editor of the Meteorological Magazine.

SIR,—Perhaps the substance of this note may be suited for admission to the pages of the *Meteorological Magazine.*

The morning of December 12th was in this locality ushered in by a considerable fall of snow (4½ inches), the first in the present season. The night of the 10th was very cold, the minimum in screen down to 20°. On the morning of the 11th a *few* flakes of snow fell, but the shape of the crystals was in my experience unusual—flat, opaque, six-pointed star-shaped figures having blunt rounded points, in size about 3–16ths of an inch in diameter.

It would be of some interest if your readers have ever traced any connexion between the two, *viz.*, a fall of snow 4 or 5 inches deep preceded within 24 hours by snow crystals of the above form.

Yours very truly,

WILLIAM L. W. EYRE.

Swarraton Rectory, Hants, December 12th, 1899.

KITES AND METEOROLOGY.

[WE much regret that the following note, received long since, from the inventor of the well-known "Eddy" Kite, has been accidentally buried. Although many of the facts mentioned have been recorded in our pages, some have not, and it will, we think, be convenient to have them in chronological order on Mr. Eddy's authority.—ED.]

1749. As far as I can find out, the first attempt to raise instruments into the air by means of kites was made by Wilson and Melvill, at Camlachie, near Glasgow, who sent up a thermometer in 1749.

1836. Admiral Bach, commanding the *Terror*, used a kite for the purpose of sending up a thermometer in Hudson Strait.

1837. The Franklin Kite Club of Philadelphia, Penn., used kites in a scientific way in 1837, and observed that approaching clouds caused vertical ascending air currents, as shewn by increased elevation of the kites.

1847. On September 14th, 1847, Birt, of Kew Observatory, used a kite to test temperature, humidity, wind velocity, &c.

1882. Archibald, of England, used kites in 1882, to support anemometers.

1891. On February 4th, 1891, at Bayonne, N.J., the writer sent to a height of 600 feet, a Hicks thermometer, sustained by kites. At the earth the temperature was 10° Fahrenheit, and aloft, 5°.

1891. Again, on February 14th, 1891, with the same thermometer, the temperature aloft was 28° Fahrenheit, and at the earth 30°. In the first observation, published in the *American Meteorological Journal*, July, 1891, a cold wave was sweeping in along the west, the earth not having cooled to the temperature of the upper air.

1894. On August 4th, 1894, at Blue Hill Observatory, the first ink recording thermograph was sent to a height of 1,400 feet, by means of five Eddy tailless kites.

1896. On October 8th, 1896, a meteorograph was raised to 9,375 feet above the sea level, or 8,744 feet above the summit of Blue Hill, by means of seven Eddy and two Hargrave kites. A fall of 26° Fahrenheit was recorded.

32, East 3rd Street, Bayonne, New Jersey, U.S.A. W. A. EDDY.

ROYAL METEOROLOGICAL SOCIETY.

THE opening meeting of this Society for the present session was held on Wednesday evening, November 15th, at the Institution of Civil Engineers, Mr. F. C. Bayard, LL.M., President, in the chair.

The undermentioned were elected Fellows of the Society:—S. Campbell-Bayard, Wallington, Surrey; John Chadwick, Bletchley, Bucks; Alfred Mander, Belle Vue Pharmacy, Malvern; C. H. Millard, 70, Market Street, Wigan; Ernest Oxley, Melbourne

Lodge, Clay Cross; Dr. G. C. Walker, Junior, 19, Preston Road, Southport; C. L. N. Wilson, Assoc.M.Inst.C.E., Western Villa, Bilston.

Mr. R. H. Curtis read a paper on "The Diurnal Variation of the Barometer in the British Isles." The principal features of a curve exhibiting the diurnal march of barometrical pressure are two minima and two maxima, the first minimum occurring early in the morning, and the second in the afternoon, while the first maximum falls in the forenoon, and the second not far from 10 o'clock in the evening. In the tropics the oscillation may amount to as much as 0·10 in., but its amplitude decreases as the latitude increases, and the greatest amplitude in the British Isles amounts to not much more than 0·03 in. The author discusses the mean hourly readings of the barometer from 25 years' observations, 1871-95, at four observatories maintained by the Meteorological Council, viz., Kew, Aberdeen, Falmouth, and Valencia. The author is of opinion that the primary cause of the diurnal oscillation of the barometer is solar radiation, and that its amplitude is chiefly determined by the temperature of the lower strata of the atmosphere. The relative magnitudes of the different phases of the barometer oscillation, as observed, depend largely upon the geographical position and physical surroundings of the place of observation, in so far as these are capable of modifying its temperature conditions, and especially the relative distribution of temperature over the regions immediately surrounding it.

Mr. G. J. Symons, F.R.S., gave the results of observations which he made during the hot weather in July, 1899, with two thermometers 1 ft. below the surface of the ground, with the view of ascertaining (1) the influence of slight shade; (2) the amount of daily range; and (3) the approximate curve of daily fluctuation at that depth.

* WONDERFUL STORY OF A THUNDERBOLT!

To the Editor of the Meteorological Magazine.

SIR,—As far as I can gather, the newspaper account was rather exaggerated, and compiled from hearsay evidence. I have seen Mrs. Atkin, and she seems very much confused as to what really did happen. Her account is that she was sitting at a table between the fireplace and the door—the fire was low and she rose to attend to it. As she was leaving the fire-place something came down the chimney, passed her, scorching the hair on one side of her head, and her eyebrow. There was immediately a loud explosion outside the house, followed by a large flash or flame at the roadside. That seems to be all. The fire in the grate was untouched. If anything came down the chimney it must have gone straight out of the door, exploding when outside, and leaving no trace of anything. That it lay on the road and "burned fiercely," was a myth, The woman was certainly scorched. The station-master saw her hair singed afterwards, and a blister followed between her eye and ear.

I hope that this may clear the matter up.—Yours truly,

The Vicarage, Deeping St. James, Nov. 20th, 1899. SAM W. SKENE.

* See *Met. Mag.*, November, 1899, p. 150.

RESULTS OF METEOROLOGICAL OBSERVATIONS AT CAMDEN SQUARE FOR 40 YEARS, 1858–97.

NOVEMBER.

YEAR.	RAINFALL.				TEMPERATURE.										CLOUD.
	Total.		Max. Fall.	Falls of 1 in. or +	Dry. Mean, 9a.&9p.	Wet. Mean, 9a.&9p.	Shade Max		Shade Min		Sun Max. Black.		Grass Min.		
	Depth	Days					Abs.	Aver	Abs.	Aver	Abs.	Aver	Abs.	Aver	Aver
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	in.		in.		°	°	°	°	°	°	°	°	°	°	0–10
1858..	·53	8	·17	0	39·4	38·3	56·0	46·0	20·1	33·6	..	..	..	..	6·3
1859..	2·90	12	·68	0	41·9	40·0	59·2	48·0	24·3	36·4	..	..	..	..	5·7
1860..	2·72	13	·52	0	40·8	39·3	53·2	46·0	31·2	36·2	..	..	24·3	31·6	7·0
1861..	4·65	18	1·42	1	39·7	38·4	57·6	47·3	21·8	34·2	..	..	15·9	29·4	5·5
1862..	1·13	10	·51	0	39·6	38·5	56·9	43·9	23·7	34·4	..	..	17·2	29·7	6·1
1863..	1·84	13	·50	0	45·5	44·0	59·5	50·7	27·3	40·1	..	..	20·2	35·1	6·8
1864..	2·49	9	1·01	1	42·0	40·5	54·5	48·8	26·2	35·3	..	..	25·5	32·4	6·0
1865..	1·96	18	·38	0	44·6	42·9	57·0	50·6	31·2	40·0	..	..	26·5	35·8	5·4
1866..	1·73	14	·37	0	44·7	43·3	62·4	51·0	27·4	38·4	..	..	24·4	34·3	5·9
1867..	·86	4	·73	0	42·0	40·6	62·6	47·7	26·4	35·9	..	..	18·8	31·0	5·9
1868..	1·03	11	·39	0	41·7	40·1	59·3	47·2	25·4	36·5	..	..	22·2	33·8	7·2
1869..	2·38	14	1·03	1	43·3	41·4	58·2	49·1	27·6	37·4	..	..	..	(33·4)	6·1
1870..	1·76	13	·75	0	41·5	40·4	56·4	48·0	27·3	36·2	92·0	65·5	24·8	32·7	6·7
1871..	·60	8	·22	0	36·9	35·4	52·5	43·6	21·0	32·8	87·8	62·3	17·5	29·7	5·9
1872..	3·98	21	·65	0	45·1	43·5	61·2	50·9	31·7	40·2	90·0	70·1	28·2	37·4	6·4
1873..	1·87	14	·44	0	44·1	42·5	58·1	50·1	27·7	38·8	90·0	65·3	23·9	34·6	6·3
1874..	2·21	15	·90	0	41·8	40·6	60·0	47·4	25·6	36·9	89·2	62·1	24·8	34·6	6·5
1875..	3·36	20	·67	0	42·5	41·2	58·8	48·1	29·0	37·2	91·8	64·1	25·6	34·9	7·3
1876..	3·07	16	·46	0	43·6	42·5	61·4	49·7	27·6	38·8	90·6	66·8	24·1	35·7	7·1
1877..	3·88	22	·87	0	45·4	43·8	59·1	52·3	31·2	39·6	95·7	70·5	26·2	35·4	5·6
1878..	2·95	17	·51	0	39·5	38·1	53·5	44·9	29·4	34·8	87·0	61·2	24·6	31·9	7·1
1879..	·72	8	·27	0	38·3	36·8	55·2	44·1	23·0	34·4	84·7	63·7	17·8	30·1	6·0
1880..	1·85	13	·54	0	42·3	40·7	58·0	48·7	24·6	36·6	89·6	67·6	21·3	32·1	6·2
1881..	2·75	16	·55	0	48·9	47·2	62·5	54·2	31·9	43·3	95·2	70·2	27·2	38·5	7·4
1882..	2·57	18	·43	0	42·8	40·9	61·8	49·4	25·4	38·2	91·8	70·0	23·3	34·3	5·7
1883..	2·78	16	·40	0	43·4	41·7	55·8	49·9	28·7	37·2	82·0	65·7	20·3	32·6	6·5
1884..	1·92	12	·79	0	42·2	40·6	60·2	48·3	25·3	37·3	84·6	60·8	21·4	31·6	6·7
1885..	3·31	18	·68	0	43·3	42·0	58·7	48·5	28·3	38·6	82·2	57·7	17·8	33·7	7·3
1886..	2·71	14	·54	0	43·9	42·7	58·8	50·0	30·0	39·3	82·1	64·1	22·2	32·6	6·0
1887..	3·40	18	·60	0	40·6	39·2	55·4	45·7	22·1	36·4	89·9	59·3	18·7	32·6	7·3
1888..	4·38	20	·91	0	46·9	45·5	59·9	51·0	34·6	43·3	78·9	59·3	28·2	39·1	7·7
1889..	·89	8	·38	0	43·9	42·8	60·3	49·5	27·8	40·0	97·3	60·8	24·4	35·7	6·9
1890..	1·62	17	·34	0	42·8	41·4	58·1	48·8	20·8	37·4	87·5	62·9	17·8	32·3	6·7
1891..	1·98	18	·40	0	43·0	42·0	57·2	48·7	29·0	38·4	83·4	62·1	22·9	33·5	7·1
1892..	2·53	15	·77	0	45·0	44·0	60·8	50·2	30·8	40·6	86·8	58·6	25·6	36·2	7·8
1893..	2·16	15	·59	0	41·5	39·8	59·8	47·9	27·8	36·0	83·0	61·0	24·4	33·1	7·2
1894..	2·85	14	·66	0	45·8	44·4	63·9	52·0	31·3	41·5	98·1	67·0	26·1	37·3	6·2
1895..	3·17	19	·58	0	47·0	45·5	63·5	52·4	32·0	41·5	87·4	62·7	25·1	37·0	7·0
1896..	1·17	10	·43	0	40·0	38·5	50·3	46·0	25·4	34·9	80·1	59·3	19·1	29·2	6·0
1897..	1·05	14	·31	0	45·3	44·0	59·1	51·0	28·0	40·3	84·1	60·2	23·9	36·7	7·8
Mean ...	2·30	14	·58	0·1	42·8	41·4	58·4	48·7	27·2	37·7	88·0	63·6	22·8	33·7	6·6
Extremes	4·65	22	1·42	1	48·9	47·2	63·9	54·2	34·6	43·3	98·1	70·5	28·2	39·1	7·8
	·53	4	·17	0	36·9	35·4	50·3	43·6	20·1	32·8	78·9	57·7	15·9	29·2	5·4

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JUNE, 1899.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	TotalRain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, CamdenSquare	87·1	5	42·3	15	75·5	52·1	49·4	64	134·6	37·0	1·49	6	4·7
Malta	87·7	11	58·8	1	79·7	65·1	61·7	73	151·6	52·9	·55	4	2·6
Cape of Good Hope	79·9	12	37·7	3	64·0	46·6	45·8	84	...	...	2·01	11	5·0
Mauritius	77·4	8	55·0	18	74·4	63·8	59·6	73	149·7	48·1	1·63	13	4·8
Calcutta	97·2	1	73·2	11	90·6	78·3	77·5	82	157·0	73·6	16·94	16	8·6
Bombay	92·0	8	74·7	16	86·7	78·9	76·2	80	137·5	73·8	20·81	22	7·9
Ceylon, Colombo	87·7	1*a*	73·0	4	86·0	76·5	72·9	79	140·0	67·0	9·23	24	6·6
Melbourne	63·8	26	34·6	18	56·0	43·1	44·5	86	116·7	28·1	3·04	15	6·0
Adelaide	66·5	19	37·8	17	59·5	47·3	45·0	76	129·0	29·0	3·04	19	6·3
Sydney	68·3	23	43·3	29	59·1	49·4	47·7	83	105·6	33·9	10·89	23	5·8
Wellington	59·0	13*b*	35·0	5	54·4	42·7	41·4	77	105·0	28·6	2·66	15	4·7
Auckland	63·0	1	39·0	25	59·2	48·2	44·0	69	112·0	32·0	4·76	14	6·0
Trinidad	95·0	6	68·0	Sev.	90·2	70·0	72·5	80	169·0	65·0	7·63	17	...
Grenada	87·0	5	69·8	11	84·1	75·1	68·9	70	150·2	...	6·14	17	3·1
Toronto	88·0	23	46·0	11	76·6	54·7	55·4	70	104·0	39·0	·66	8	3·7
New Brunswick, Fredericton	85·5	14	38·3	30	72·4	47·7	47·6	60	...	...	3·38	15	5·0
Manitoba, Winnipeg	83·8	30	30·0	8	74·3	50·7	...	75	...	...	3·68	15	6 3
British Columbia, Esquimalt	...	...	...	...	...	...		...	...	...	...	...	...

a—and 22. *b*—and 14.

REMARKS.

MALTA.—Adopted mean temp. 71°·1, or 0°·5 below average. Mean hourly velocity of wind 10·0 miles, or 1·3 above average. Mean temp. of sea 71°·7. TSS on 2nd, 3rd, and 4th. L on 19th. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·9; of dew point 1°·0; and rainfall ·34 in., below their respective averages: mean hourly velocity of wind 10·2 miles, or 1·2 miles below average; extremes, 25·3 on 2nd and 29th, and 1·9 on 9th and 13th; prevailing directions, S.E. by E., and E.S.E. T on 6th. A. WALTER.

CEYLON, COLOMBO.—Mean temp. of air 80°·3, or 0°·7 below, of dew point 1°·2 below, and rainfall ·89 in. above, their respective averages. Mean hourly velocity of wind 10 miles; prevailing direction S.W. Max. velocity on 4th, at rate of 20 miles an hour, for 8 hours. Max. rainfall intensity 2·75 in. per hour for about 17 minutes on 4th. L on 3rd. TS on 4th. H. O. BARNARD.

Adelaide.—Mean temp. of air 0°·1, and rainfall ·25 in., above their respective averages for 42 years. Another good seasonable month, with good general rainfall over the whole of the colony. C. TODD, F.R.S.

Sydney.—Temp 0°·2 below; humidity 4·1 above; and rainfall 5·06 in. above, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—The weather during the month was unpleasant in consequence of the frequent, though not heavy, rains; the wind was variable and moderate, the temp. generally rather below the average; fogs occurred on 7 days. Mean temp. 0°·5 below, and rainfall 2·43 in. below, their respective averages. R. B. GORE.

Auckland.—Wet and disagreeable through the greater part of the month. Mean temp. and rainfall close to the average of 32 years. T. F. CHEESEMAN.

TRINIDAD.—Rain ·41 in. below the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, NOVEMBER, 1899.

[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..	3·71	XI.	Builth, Abergwesyn Vic.	6·10
II.	Dorking, Abinger Hall .	5·62	,,	Rhayader, Nantgwillt ...	6·05
,,	Birchington, Thor	2·04	,,	Lake Vyrnwy	4·07
,,	Hailsham	4·59	,,	Corwen, Rhug	3·60
,,	Ryde, Thornbrough	5·19	,,	Criccieth, Talarvor	2·45
,,	Emsworth, Redlands ...	4·34	,,	I. of Anglesey, Lligwy..	3·55
,,	Alton, Ashdell	6·09	,,	I. of Man, Douglas	2·94
III.	Oxford, Magdalen Coll..	2·44	XII.	Stoneykirk, Ardwell Ho.	2·79
,,	Banbury, Bloxham	1·99	,,	New Galloway, Glenlee	10·26
,,	Northampton, Sedgebrook	1·71	,,	Moniaive, Maxwelton Ho.	8·11
,,	Stamford, Duddington..	...	,,	Lilliesleaf, Riddell	3·75
,,	Alconbury	2·00	XIII.	N. Esk Res. [Penicuick]	4·85
,,	Wisbech, Bank House...	1·93	XIV.	Glasgow, Queen's Park..	5·85
IV.	Southend	3 98	XV.	Inverary, Newtown	8·98
,,	Harlow, Sheering..... ...	...	,,	Ballachulish, Ardsheal...	10·90
,,	Colchester, Lexden	3·31	,,	Islay, Gruinart School ...	1·39
,,	Rendlesham Hall	2·23	XVI.	Dollar.....	4·33
,,	Scole Rectory	2·79	,,	Balquhidder, Stronvar...	13·73
,,	Swaffham	2·27	,,	Coupar Angus Station...	2·83
V.	Salisbury, Alderbury ...	3·47	,,	Dalnaspidal H.R.S.....	...
,,	Bishop's Cannings	3·14	XVII.	Keith H.R.S.....	1·68
,,	Blandford, Whatcombe .	5·36	,,	Forres H.R.S.	2·00
,,	Ashburton, Holne Vic...	5·05	XVIII.	Fearn, Lower Pitkerrie..	1·79
,,	Okehampton, Oaklands.	4·60	,,	S. Uist, Askernish	6·21
,,	Hartland Abbey	3·43	,,	Invergarry.....	13·07
,,	Lynton, Glenthorne ...	4·24	,,	Aviemore H.R.S.	4·75
,,	Probus, Lamellyn	2·77	,,	Loch Ness, Drumnadrochit	5·51
,,	Wellington, The Avenue	2·62	XIX.	Invershin	3·37
,,	North Cadbury Rectory	3·65	,,	Durness	7·62
VI.	Clifton, Pembroke Road	3·12	,,	Watten H.R.S.....	1·71
,,	Ross, The Graig	2·30	XX.	Dunmanway, Coolkelure	7·32
,,	Wem, Clive Vicarage ...	1·60	,,	Cork, Wellesley Terrace	2·75
,,	Wolverhampton, Tettenhall	1·49	,,	Killarney, Woodlawn ..	6·10
,,	Cheadle, The Heath Ho.	1·46	,,	Caher, Duneske	3·33
,,	Coventry, Priory Row ..	1·62	,,	Ballingarry, Hazelfort...	2·46
VII.	Grantham, Stainby	1·20	,,	Limerick, Kilcornan ...	1·29
,,	Horncastle, Bucknall ...	1·19	,,	Miltown Malbay	4·48
,,	Worksop, Hodsck Priory	1·21	XXI.	Gorey, Courtown House	2·83
VIII.	Neston, Hinderton	1·53	,,	Moynalty, Westland ...	3·31
,,	Southport, Hesketh Park	2·08	,,	Athlone, Twyford	3·98
,,	Chatburn, Middlewood.	3·05	,,	Mullingar, Belvedere ...	2·50
,,	Duddon Val., Seathwaite Vic.	10·70	XXII.	Woodlawn	3·21
IX.	Melmerby, Baldersby ...	1·85	,,	Crossmolina, Enniscoe ..	6·33
,,	Scarborough, Observat'y	...	,,	Collooney, Markree Obs.	4·78
,,	Middleton, Mickleton ...	2·72	,,	Ballinamore, Lawderdale	...
X.	Haltwhistle, Unthank H.	3·52	XXIII.	Warrenpoint.....	2·03
,,	Bamburgh	2·19	,,	Seaforde..	4·41
,,	Keswick, The Bank	9·65	,,	Belfast, Springfield	3·62
XI.	Llanfrechfa Grange	4·81	,,	Bushmills, Dundarave..	2·47
,,	Llandovery	4·12	,,	Stewartstown	3·11
,,	Castle Malgwyn	4·72	,,	Killybegs	5·97
,,	Brecknock, The Barracks	4·67	,,	Horn Head	3·85

NOVEMBER, 1899.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which .01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	4·13	+ 1·47	1·36	3	10	61·8	2	29·9	30	3	6
II.		Tenterden ...	3·18	— ·21	·73	5	11	63·5	2	33·0	15*c*	0	12
,,		Hartley Wintney ...	4·30	...	1·38	3	10	60·0	10	26·0	30	4	6
III.		Hitchin ...	3·53	+ ·85	·89	5	13	61·0	2, 4	28·0	17	6	...
,,		Winslow (Addington) ...	2·69	— ·24	·77	3	10	61·0	2, 4	24·0	18*d*	5	6
IV.		Bury St. Edmunds (Westley)	2·91	+ ·36	·98	3	10	59·0	4	33·0	21	0	...
,,		Norwich (Brundall) ...	2·72	...	·74	5	12	61·0	10	31·6	18	1	10
V.		Winterbourne Steepleton ...	5·77	...	1·50	9	9	58·9	4	26·8	19	2	6
,,		Torquay (Cary Green)	4·54	...	1·02	9	9	59·3	4	33·9	19	0	2
,,		Polapit Tamar [Launceston]..	3·66	— ·68	·96	3	14	58·9	4	24·0	19	5	7
VI.		Stroud (Upfield) ...	2·63	— ·70	·81	3	12	61·0	4	28·0	18	...	...
,,		ChurchStretton(Woolstaston)	1·67	— 1·85	·44	3	13	58·5	2	30·0	19	1	3
,,		Worcester (Diglis Lock) ...	1·72	— 1·12	·57	3	11	...	...	...	...	...	...
VII.		Boston ...	1·08	— 1·12	·30	5	11	60·0	2, 4	25·0	19	5	...
,,		Hesley Hall [Tickhill]...	1·05	— ·97	·30	7	11	63·0	2	25·0	18	3	...
,,		Breadsall Priory ...	1·46	...	·38	7	8	...	...	25·0	18	2	...
VIII.		Manchester(PlymouthGrove)	1·58	— 1·42	·30	5	13	64·0	3	28·0	18*d*	3	4
IX.		Wetherby (Ribston Hall) ...	1·44	— ·63	·39	11	11	...	...	...	...	...	...
,,		Skipton (Arncliffe) ...	5·53	— 1·22	·95	7	17	...	...	...	...	...	...
,,		Hull (Pearson Park).	1·20	— ·81	·45	7	7	62·0	2, 5	27·0	18*d*	3	6
X.		Newcastle (Town Moor) ...	1·19	— 1·21	·23	9	12	...	..	...	...	...	...
,,		Borrowdale (Seathwaite)...	15·95	+ 1·16	2·65	4	24	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely)...	2·84	— 2·07	·85	3	13	...	...	...	...	...	...
,,		Haverfordwest	3·40	— 2·46	·86	7	13	59·7	5	34·0	18	0	4
,,		Aberystwith (Gogerddan) ...	2·97	— 2·14	·83	7	11	63·0	9	...	...	...	4
,,		Llandudno...	2·34	— ·75	·55	3	14	...	...	...	...	...	
XII.	SCOTLAND.	Cargen [Dumfries]	6·42	+ 1·86	1·13	2	12	57·0	5	27·0	18	2	...
XIII.		Edinburgh (Blacket Place)...	3·26	...	1·01	3	16	59·3	2	33·5	18	0	3
XIV.		Colmonell	5·99	...	1·23	3	17	59·0	11*a*	30·0	17	...	...
XV.		Tighnabruaich	5·23	...	·95	3	21	54·0	4	33·0	17	0	...
,,		Mull (Quinish)...	6·13	— ·86	·61	10	25	...	...	...	...	...	...
XVI.		Loch Leven Sluices ...	4·00	+ ·04	1·10	4	14	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	2·50	— ·20	·50	3, 9	16	57·8	2	29·0	16	2	...
XVII.		Braemar	6·70	+ 2·12	2·10	7	20	56·8	4	12·2	16	6	14
,,		Aberdeen (Cranford)	1·35	...	·21	10	16	58·0	23*b*	29·0	14*e*	5	...
,,		Cawdor (Budgate) ...	2·83	— ·02	·88	3	19	...	...	...	...	...	...
XVIII		Strathconan [Beauly] ...	6·00	— ·56	·89	9	14	...	...	...	...	...	...
,,		Glencarron Lodge...	16·79	...	...	...	28	60·9	4	29·4	15	2	...
XIX.		Dunrobin ...	2·52	— ·31	·58	3	21	57·0	8	32·0	15	1	...
,,		S. Ronaldshay (Roeberry) ...	3·36	— ·06	·46	19	21	55·0	4	35·0	19*f*	0	...
XX.	IRELAND.	Darrynane Abbey...	2·51	...	·83	2	15	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	2·86	— ·81	·62	7	11	58·0	4	40·0	4*g*	0	...
,,		Broadford (Hurdlestown) ...	2·65	...	·59	2	15	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill) ...	2·40	— ·66	1·39	7	13	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	1·96	— ·87	·39	3	13	64·9	4	38·1	18	0	2
XXII.		Ballinasloe	3·66	— ·25	·84	2	18	58·0	4	29·0	19	3	...
,,		Clifden (Kylemore)	8·93	+ 4·72	1·17	2	18	...	...	...	...	...	...
XXIII		Waringstown ...	3·00	— ·10	·92	3	8	57·0	18	34·0	21	0	2
,,		Londonderry (Creggan Res.).	3·27	— 1·25	·52	3	20	...	...	...	...	...	...
,,		Omagh (Edenfel) ...	3·04	— ·83	·47	3	18	60·0	4	31·0	18	1	3

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

a—and 17. *b*—and 24, 27. *c*—and 20, 30. *d*—and 19. *e*—and 15. *f*—and 24. *g*—and 12, 18, 19, 27, 29.

METEOROLOGICAL NOTES ON NOVEMBER, 1899.

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.

LONDON, CAMDEN SQUARE.—A remarkable November. With a total rainfall 79 per cent. above the average, and only twice exceeded in 40 years, there was absolute drought for 19 days; the longest on record in November. The mean temp. (47°·7) is 4°·7 above the average, and has been exceeded in November only in 1881. The temp. rose above 50° on 24 days (a number exceeded only in 1881), and above 60° on 3 days.

TENTERDEN.—Very wet from 2nd to 9th, but absolute drought for 16 days from 15th to 30th, with scarcely any sunshine. The gales, so common at the end of November, were conspicuous by their absence. Duration of sunshine, 64 hours. L on 8th.

HARTLEY WINTNEY.—The whole of the R fell in the first 10 days, the remaining 20 being very fine and dry, though dull, with extremely light S.W. winds. Dahlias, roses, verbenas, and geraniums were in flower until cut down by frost on 30th. Ozone was registered on 13 days, mean 4. L on 5th, 6th, 7th, and 10th. Fog on 17th, 18th, 19th, and 30th.

WINSLOW, ADDINGTON.—The first part of the month was wet and stormy, but not a drop of R fell after the 11th. There was a good deal of fog at times, very dense on the night of the 19th, ·01 in. of water being deposited in the rain gauge.

BURY ST. EDMUNDS, WESTLEY.—The mildest November for many years. Till the 9th, very wet, then very fine and dry to the end. T on 2nd, 6th, and 11th.

NORWICH, BRUNDALL.—The mildest November since the record commenced in 1886; rainy during the first week, afterwards dry. Dahlias in bloom in the open at the close. L on 8th. T L and H on 11th.

WINTERBOURNE STEEPLETON.—The earlier part of the month was very wet, and it followed a wet week, the rainfall for the 18 days ending 11th being 7·54 in. After that date no R fell. The temp. was high (mean 47°·8) and there was very little frost.

TORQUAY, CARY GREEN.—Rainfall ·62 in. above the average. Mean temp. (50°·8), 3°·5 above the average. Duration of sunshine 64 hours 40 minutes, being 4 hours above the average; 10 sunless days.

POLAPIT TAMAR [LAUNCESTON].—The first 10 days were wet and stormy; the remainder of the month was remarkable for general calm and absence of strong wind, the average daily velocity for the last 20 days being only 34·5 miles, while for the whole month it is 121·8 miles. T and L on 8th. Thick fog till 11 a.m. on 19th.

CHURCH STRETTON, WOOLSTASTON.—The early part of the month was wild and stormy, with heavy gales on 3rd, 7th, 8th, and 9th, but scarcely any R fell after the 11th. T and L on 8th. Fog on 14th and 15th. Mean temp. 47°·0.

WALES.

HAVERFORDWEST.—The month was unusually fine and mild, with temp. above the average, but very little sunshine. From the 1st to the 10th the weather was wet and stormy, but from that date to the end every day was fine, a little R falling in the night. Springs still somewhat low. L on 2nd and 7th.

ABERYSTWITH, GOGERDDAN.—Very mild throughout the month.

LLANDUDNO.—T and L at night on 2nd. S on the hills on 11th.

SCOTLAND.

CARGEN [DUMFRIES].—November opened with a spell of wet, boisterous weather, which continued until the 11th, when exceptionally fine weather set in, and lasted during the remainder. The mildness of the temp. was remarkable, the mean being the highest recorded in 40 years, and there was almost entire absence of frost. The warmth of the last 7 days was remarkable; the mean temp. being 50°·5, while the min. exceeded 50° on 3 nights, and averaged 48°·7. In the first 7 days 4·25 in. of R fell, while on 2nd, 3rd, and 7th, the fall exceeded an inch. Southerly winds prevailed on 21 days, and S. gales occurred on 4th, 7th, and 8th. Sunshine was much below the average, 15 days being sunless. T on 3rd and 4th.

EDINBURGH, BLACKET PLACE.—A remarkably mild month, with no frost, the mean temp. (47°·4) being 6°·5 in excess of the average of 135 years, and the highest in the period 1764 to 1899. The temp. rose above 50° on 23 days. Rainfall 20 per cent. above the normal. Gale with H and R on 3rd. Gale and heavy squalls on 7th.

COLMONELL.—Rainfall ·85 in. more than the average of 23 years. Mean temp. (48°·6) 7°·5 above the average. Between 7.30 a.m. and 3 p.m. on 3rd 1·69 in. of R fell. Gales on 5 days. H on 11th.

TIGHNABRUAICH, CRAIGANDARAICH.—A wet and windy month, with high temp. Mean 45°·2.

MULL, QUINISH.—T, L and H showers on 5th.

BRAEMAR.—A fine open month, notwithstanding a heavy rainfall. Hurricane and L on 12th.

ABERDEEN, CRANFORD.—A fine and very warm November, the temp. rising to 58° on several days.

S. RONALDSHAY, ROEBERRY.—An unsettled and windy month. The latter part very mild. Mean temp. 46°·5, or 3°·5 above the average of 9 Novembers.

IRELAND.

DARRYNANE ABBEY.—A dry month on the whole. From 1st to 10th, 2·14 in. of R fell, and these 10 days were very wild and stormy. The rest of the month was very fine and warm, and many days were quite spring-like. A severe TS occurred between 8 p.m. and 8.30 p.m., on 7th.

WATERFORD, BROOK LODGE.—A heavy gale, blowing down trees, and H showers, occurred on 3rd, a heavy S.W. gale on 7th, and T and L at night. The latter half of the month was very mild and calm.

BROADFORD, HURDLESTOWN.—A very fine November. Rainfall ·64 in., and rainy days 5, less than the average of 15 years. T on 5th, T and L on 8th.

DUBLIN, FITZWILLIAM SQUARE.—A record month for warmth, the mean temp. being 50°·7, compared with 50°·3 in November, 1881, and an average of 44°·7. The first half of the month was very stormy, wet, and generally unsettled, and on 3rd a tempest of wind and R swept over, doing much damage to trees and buildings. During the second half high pressure prevailed, with cloudy skies. High winds occurred on 16 days, and gales on 7. H fell on 8th and 11th. L was seen on 7th, 8th, 9th, and 14th.

BALLINASLOE.—L on 5th and 10th. W. gales on 10th and 11th.

EDENFEL [OMAGH].—The weather of the first 10 days was very mild, and very wet, nearly all the R of the month having fallen within that period, but for the remainder, calm, often clear, abnormally mild, and comparatively rainless weather, made November remarkable.

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LOW BAROMETRIC PRESSURE ON DECEMBER 29TH, 1899.

WE do not intend to give a complete or an exhaustive note upon the above subject—but merely to place upon record the principal facts which have been reported to us. The responsibility as to accuracy must rest with the authors, except that where they have not corrected their readings for altitude we have done so approximately, and given the equivalents in [ ].

Camden Square, London.—Min. S.L. pressure 28·427 in. at 5 p.m.; the only lower pressures since 1858 have been: 1872, January 24th, 4.47 a.m., 28·332 in.; 1876, December 4th, 11 a.m., 28·364 in.; and 1886, December 9th, 4.45 a.m., 28·295 in. G. J. SYMONS.

Edith Road, Kensington.—Min. S.L. pressure 28·420 in. G. VON U. SEARLE.

Speldhurst, Tunbridge Wells.—Min. bar. 28·30 in. [S.L. = ? 28·46 in.] E. W. WINTON.

Worthing.—Min. S.L. pressure 28·526 in., at 4.30 p.m. C. KELLY, M.D.

Crowborough.—At 7 p.m. bar. only 27·805 in. [S.L. = ? 28·51 in.]. J. J. S. DRIBERG.

Kempsey, Bournemouth.—Min. S.L. pressure 28·49 in. at 3.15 p.m. E. L. M. COLVILE.

West Dean, Hants.—Min. S.L. pressure 28·389 in. E. WELLS.

Redheath, Rickmansworth.—Min. by open scale glycerine bar. 28·325 in., at 6.30 p.m., at 285 ft. above sea level. W. NEWALL.

Upton, Slough.—Min. by open scale glycerine bar. 28·23 in., at 5.30 p.m., at 97 ft. above sea level. RICHARD BENTLEY.

St. Giles, Oxford.—Bar. 28·35 in. at 9 p.m., lowest since December 8th, 1886. Miss E. M. TAWNEY.

Writtle, Chelmsford.—The record of a Richard barograph gave a min. of 28·45 in., at 6.30 p.m. MISS USBORNE.

Brundall, Norwich.—Bar. 28·50 in., at 7 p.m. A. W. PRESTON.

Statsford, Whitchurch, Tavistock.—Min. S.L. pressure 28·271 in., at 1.40 p.m. E. E. GLYDE.

North Cadbury.—Bar. lowest between 3.30 and 4 p.m. Aneroid read 28·34 in. H. A. BOYS.

Orchardleigh, Frome.—My two aneroids both reached their lowest point (27·80 and 28·20 in.) at 11 a.m. They then rose a little and fell again, but not so low as at 11 a.m. W. A. DUCKWORTH.

Hampton Lodge, Bristol.—At 8 p.m. the bar. read 27·97 in. [S.L. = ? 28·16 in.], at 11 p.m. it had risen 0·43 in. J. H. DIX.

The Graig, Ross.—Min. S.L. pressure 28·285 in., at 5.40 p.m.; the only lower pressures since 1871 have been, 1872, January 24th, 3.45 a.m., 28·283 in.; and 1876, December 4th, 8.50 a.m., 28·232 in. H. SOUTHALL.

Underdown, Ledbury.—Lowest observed reading, 8 p.m., 28·096 in. [S.L. = 28·336 in.] SPENCER H. BICKHAM.

Highfield, Shrewsbury.—The record of a Richard barograph gives a min. of 28·60 in., at 6 p.m. T. M. HOWELLS.

The Firs, Bentley Heath, Knowle, Warwickshire.—Min., by Negretti standard, Kew verified, 27·914 in., at 6 p.m., giving S.L. pressure of 28·303 in. F. W. NASH.

Hodsock Priory, Worksop.—Min. S.L. pressure 28·362 in., at 9 p.m. H. MELLISH.

Queen's Park, Bolton.—Min. S.L. pressure 28·38 in., at 9 p.m. Lowest since 8th December, 1886. W. W. MIDGLEY.

Downham Hall, Clitheroe.—The record of a Richard barograph gave min. of 28·10 in., at 8 p.m. RALPH ASSHETON.

Llandefaelogfach, Brecon.—Bar. fell to 27·80 in., unprecedented here. W. WILLIAMS.

Douglas, Isle of Man.—Min. bar. 28·33 in., at 2 p.m. H. STORY.

Riddell, Lilliesleaf, N.B.—Min. bar. 28·05 in., in afternoon. No gale. J. SPROT (Gen.)

Blacket Place, Edinburgh.—Min. pressure 28·456 in., at 9 p.m. R. C. MOSSMAN.

Longraigue, New Ross, Wexford.—Min. at 6 p.m., 27·96 in. [S.L. = ? 28·10 in.], 0·22 in. lower than previously observed. J. W. DEANE.

Ban-aboo, Ardcolm, Wexford.—Min. bar. 28·18 in. [S.L. = ? 28·11 in.] J. MAGRATH (Col.).

Fitzwilliam Square, Dublin.—Min. of bar. 28·33 in. J. W. MOORE, M.D.

The above notes appear to agree very well with the remarkable path of the depression shown on the *Daily Weather Report* of the Met. Office—viz.: first an easterly track along the south of Ireland, and then a sudden change to a northerly one over the Isle of Man. The min. seems to have been about 28·1 inches, and the time of progress that shown by the D.W.R.,—some of the record times are inconsistent, because the curve was so flat that it was difficult to determine precisely when the min. occurred.

ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, December 20th, at the Institution of Civil Engineers, Mr. F. C. Bayard, LL.M., President, in the chair. The following candidates were duly elected Fellows:—A. F. Beaufort, c/o W. M.

Beaufort, 18, Piccadilly, W.; H. S. Burbery, Trent House, Cowes, Isle of Wight; C. J. P. Cave, Binsted, Cambridge; R. Cheyne, D.P.H., Edgefield, York Road, West Norwood; E. Henshall, Assoc.M.Inst. C.E., Woolacombe, N. Devon; H. Heywood, J.P., Witla Court, Cardiff; D. McDouall, Logan, Stranraer, Wigtonshire; H. C. L. Morris, M.D., Gothic Cottage, Bognor; H. V. Prigg, Assoc.M.Inst. C.E., 63, Craven Avenue, Plymouth; Lt.-General J. Sprot, Riddell, Lilliesleaf, Roxburghshire; F. Taylor, J.P., Ash Lawn, Heaton, Bolton; W. K. Wilkinson, jun., Middlewood, Clitheroe; A. Wilson, 4, Eaton Road, Ilkley.

The Climatic Conditions necessary for the Propagation and Spread of Plague.

By Mr. Baldwin Latham, C.E.

The author said that the bubonic plague was primarily due to a specific organism or microbe of infinitesimal size, so small that probably 250 millions of them would be required to cover a square inch of surface. Plague was infectious and contagious, and was greatly influenced by pestilential emanations from polluted and waterlogged soils. Plague was undoubtedly a disease of the poor, and most readily attacked those living on a low diet. The conditions which were conducive to the spread of plague were identical with those which gave rise to the escape of malaria from the ground. That the ground itself exercised an enormous influence upon plague was shown by the fact that, in all the epidemics, persons living on the ground floors suffered much more than those who lived in the higher storeys. If the temperature of the air increased beyond the temperature of the ground, so that its dew point was above the temperature of the ground, condensation instead of evaporation took place. To this increased high temperature might be due the sudden stoppage of plague after a certain high temperature had been reached. A sudden fall of temperature caused plague to arise; for, a fall of temperature meant that the temperature of the dew point must fall, and the tensional difference between a low dew point and a high ground temperature would at once lead to exhalations escaping in large quantities from the ground, leading to the liberation of the plague bacillus from the ground, accompanied with the exhalations necessary for its development.

Another paper on a remarkable dust haze which was experienced at Teneriffe, Canary Islands, on February 16th to 19th, 1898, was communicated by Dr. R. H. Scott, F.R.S. The haze during this period was so exceptionally dense that a steamer was two days and three nights on a voyage from Teneriffe to Las Palmas, a distance she usually covered in five hours. The Tintagel Castle, of the Donald Currie Line, was delayed for 30 hours, and the Roslin Castle, homeward bound, had the dust so thick that for 900 miles the sun and stars were obscured, and the ship was delayed two days.

REVIEWS.

Sur les ascensions dans l'atmosphère d'enregistreurs météorologiques portés par des cerfs-volants.

Sur la température et ses variations dans l'atmosphère libre, d'aprés les observations de quatre-vingt-dix ballons-sondes. Par M. LÉON TEISSERENC DE BORT. Excerpts Comptes Rendus de l'Académie des Sciences. Paris, Gauthier-Villars, 1899. 4to, 4 and 2 pp.

M. L. TEISSERENC DE BORT is doing splendid work at his observatory at Trappes, and showing for the old world, as Mr. Rotch is showing for the new world, that in original research amateurs can beat State-subsidized establishments.

These two short papers indicate an amount of work and of expenditure, of which the author says nothing, but for which he ought to receive the hearty thanks of meteorologists of all countries.

The first paper opens with a recognition of Mr. Rotch's work at Blue Hill, it then states that similar work was started at Trappes in 1897, that 2,000 metres (6,562 ft.) was reached several times in 1898, and that in 1899 the following heights were reached :—

1899.	June 14th,	3,940 metres,	or 19,927 ft.,	or 3¾ miles.
,,	,, 15th,	3,590 ,,	,, 11,778 ft.,	,, 2½ ,,
,,	July 3rd,	+3,300 ,,	,, over 10,827 ft.,	or 2 miles.

Experiments at Trappes on more than 100 days show that the decrease of temperature with height is very different in cyclones and in anti-cyclones. In the former the decrease is rapid; in the latter, soon after reaching 500 or 1,000 ft., the decrease becomes slow, and sometimes even an increase takes place.

As regards wind systems it appears—

(i.) With low pressure and an overcast sky, the velocity of the wind increases with height, especially in the neighbourhood of the lower cloud stratum.

(ii.) On the contrary, in fine weather, with high barometric pressure, the velocity of the wind decreases with height up to an altitude of between 1,500 and 2,000 metres (4,921 to 6,562 ft.).

The second paper deals with the results obtained by *ballons-sondes*, *i.e.*, small balloons carrying self-recording instruments but no passengers.

These are expensive, because there is not only risk of loss of the balloon, but also of breakage of the beautiful recording instruments. Our readers will therefore realize what M. L. Teisserenc de Bort is doing, when we mention that this paper contains the results of more than 100 such ascents.

We had not thought of it, but are glad to state upon the author's authority that *ballons-sondes* were started first by the French, in 1894.

In these pages we have always urged that kite work and balloon work should go on side by side, and we are glad to find that

experimenters are adopting our view, and using kites for the first mile or two of vertical height, and *ballons-sondes* for greater heights. One of the Trappes balloons reached 13,000 metres, or about 8 miles.

Systematic balloon work began at Trappes in April, 1898, and has been continued monthly (sometimes repeated at short intervals) ever since. In the present note M. Teisserenc de Bort epitomizes the results of the temperature observations in the following two paragraphs :—

(i.) The temperature at various altitudes at various seasons varies much more than old observations with passenger balloons had led us to expect.

(ii.) Apparently, even up to the altitude of 10 kilometres (6 miles) there is a tendency to a marked seasonal variation of temperature, with a maximum at the end of summer, and a minimum at the end of winter.

SEVERE FROST IN DECEMBER, 1899.

Two letters appeared in the *Hereford Times*, and one supported the other so remarkably that we have had to examine the facts. The following are the letters :—

A RECORD IN TEMPERATURE.

To the Editor of the Hereford Times.

SIR,—It may interest your readers to know the thermometer readings—constituting a record almost, I should think—outside this house, 750 feet above sea, and in a place sheltered from the North and East.

15th December, 1899, at 9.30 a.m. temperature was five degrees above zero.

FULLARTON JAMES.

Chief Constable's House, Pen-y-bont, Radnorshire, Dec. 20th, 1899.

LOW TEMPERATURE IN THE WYE VALLEY.

SIR,—The sudden falling of the temperature during the past week has been unusual indeed. On the morning of the 15th inst. Negretti and Zambra's thermometer, enclosed in a meteorological screen (Stevenson's pattern), and then put above the ground registered nearly 34° of frost.

As far as I can recollect this is the lowest reading we have had since the 16th January, 1879, when the instrument referred to indicated 36° of frost, or 4° below zero.

P. MACCABE.

Rotherwas Gardens, Hereford, December 21st, 1899.

As regards these stations there is nothing to show that the thermometers were perfect and in good order; and inspectors alone know how often spirit minimum thermometers read too low, because of the evaporation of the spirit and its condensation as a colourless liquid at the top of the tube. At Pen-y-bont it was apparently a wall exposure, and at Rotherwas the expression respecting the Stevenson hardly suggests that it was, at it should be, 4 ft. above the ground. However, the figures are +5° F. and —2° F., whereas in other parts of the country there are many stations at which the temperature did not fall so low by 20°.

We have taken out all the December shade minima which we have received, and which were below 15°, and give them in the following table :—

Shade Minima below 15° *in December*, 1899.

	°			°	
Chiddingfold, Surrey ...	13	on 14th	Hemingby, Lincoln	6·8	on 12th
Fair Hall, Lewes	13	,, 16th	Hodsock Priory, Worksop	6·4	,, 14th
Hartley Wintney, Hants	12	,, 14th	Hesley Hall, Notts	10	,, 14th
Welford Park, Newbury	9	,, 16th	Goldsborough Hall, York	4	,, 16th
Compton, Berks.....	3	,, 14th	Driffield, ,,	10	,, 16th
Addington, Bucks.....	11	,, 16th	Malton, Yorks	10°	on 12th & 15th
Swerford, Oxford	12	,, 16th	Thirsk, ,, ...	14	on 15th
Castle Ashby, Northants	13	,, 16th	Unthank Hall, Northumbd	12	,, 14th
Sedgebrook, ,,	12	,, 16th	Appleby, Westmoreland.	9·8	,, 15th
Rendlesham Hall, Suffolk	9	,, 12th	Llanvihangel Court, Mon.	10	,, 15th
Brundall, Norwich	13	,, 16th	Llandovery, Carmarthen.	13	,, 15th
North Cadbury, Somerset	14·5	,, 15th	Gogerddan, Aberystwith	11	,, 14th
Further Barton, Cirenc'st'r	10	,, 16th	Llandefaelog-fach, Brecon	10	,, 15th
The Graig, Ross, Hereford	9·4	,, 15th	Abergwesyn, ,,	3	,, 14th
Leominster, ,,	4	,, 15th	Riddell, Lilliesleaf, N.B.	9	,, 13th
Clunbury, Shropshire ...	0	,, 15th	Leith, Edinburgh	12	,, 14th
Woolstaston, ,, ...	14·5	,, 14th	Stronvar, Perth	7	,, 14th
The Clive Vic. ,, ...	7·5	,, 14th	Cupar Angus, Perth	3	,, 15th
Wrottesley, Wolverhmptn	13·8		E. Necropolis, Dundee...	14·9	,, 15th
Priory Row, Coventry ...	10	,, 16th	Braemar, Aberdeen	8·2	,, 15th
Loughborough	8	,, 14th	Cranford, ,, ...	10	,, 14th

From these we conclude (1) that there is no proof that the record of —2° F. near Hereford is wrong, although it seems improbable; (2) that the cold was felt in patches; (3) that it would be well when the next snow comes, to fill flower pots with it, and to bury all the thermometers in the snow packed closely round their bulbs, and to notice what they read. When the snow is just melting and running through the hole at the bottom of the pot, they ought to show 32°. It will be interesting to hear how many of them do so.

To the Editor of the Meteorological Magazine.

SIR,—The following phenomenon may be considered interesting enough for insertion in the *Met. Mag.*

During the recent cold weather some of us on the golf links opened for lunch two or three soda water bottles which had been kept in a cold place. To our astonishment they all *instantly* froze, so that we could only get out a small quantity of the water. Previous to being opened they were perfectly fluid and free from ice. Evidently the temperature was such that, though when closed the pressure of the gas kept them from freezing, on the removal of the pressure they congealed at once. The effect was very startling and curious. No doubt anyone wishing to perform the experiment could do so by leaving a bottle out in the shade on a very cold day till it was some degrees below freezing and then suddenly opening it. The instantaneousness of the result is, of course, the most noticeable feature.—Yours truly,

T. B. BLATHWAYT.

Lyme Regis, Dorset, Dec. 18th, 1899.

RESULTS OF METEOROLOGICAL OBSERVATIONS AT CAMDEN SQUARE FOR 40 YEARS, 1858–97.

DECEMBER.

YEAR.	RAINFALL.				TEMPERATURE.										CLOUD.
	Total.		Max. Fall.	Falls of 1 in. or +	Dry. Mean, 9a.&9p.	Wet. Mean, 9a.&9p.	Shade Max		Shade Min		Sun Max. Black.		Grass Min.		
	Depth	Days					Abs.	Aver	Abs.	Aver	Abs.	Aver	Abs.	Aver	Aver
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	in.		in.		°	°	°	°	°	°	°	°	°	°	0-10
1858..	1·75	16	·60	0	40·7	39·4	52·5	44·5	24·4	34·6	..	..	..	..	7·2
1859..	2·24	18	·40	0	36·7	35·6	56·4	40·8	14·4	31·6	..	..	..	..	6·5
1860..	2·51	18	·64	0	36·1	35·1	53·5	40·5	6·7	32·1	..	..	1·8	27·7	6·5
1861..	1·45	11	·58	0	40·0	38·8	53·2	45·7	21·6	35·1	..	..	16·1	30·7	6·1
1862..	1·71	14	·33	0	43·4	41·6	54·6	47·0	30·3	38·5	..	..	24·2	34·9	6·2
1863..	1·31	10	·65	0	42·8	41·2	53·9	48·7	26·4	36·9	..	..	22·6	33·2	6·2
1864..	·36	8	·12	0	38·5	37·4	51·5	42·3	17·8	34·4	..	..	14·7	30·4	7·2
1865..	1·35	14	·42	0	42·8	41·2	52·5	46·5	30·8	38·5	..	..	26·7	35·4	6·8
1866..	2·63	16	·53	0	43·4	42·0	56·5	48·1	27·3	37·9	..	..	20·2	34·7	6·3
1867..	1·59	13	·52	0	38·2	37·0	54·9	42·3	22·5	32·5	..	..	14·8	28·7	6·5
1868..	5·12	27	·52	0	46·2	44·9	58·2	50·7	31·5	41·0	..	..	28·4	38·3	7·6
1869..	2·94	14	·65	0	38·2	36·9	57·7	43·3	20·8	33·3	..	..	17·2	29·5	6·4
1870..	3·07	18	·55	0	34·2	33·2	57·2	38·3	14·0	29·9	78·2	50·5	10·4	28·0	7·6
1871..	1·13	16	·41	0	38·3	37·4	49·0	42·7	20·1	34·2	71·3	55·3	19·1	30·6	6·9
1872..	4·35	22	·81	0	42·7	41·4	54·6	47·0	26·6	38·2	77·2	57·1	22·8	35·4	6·5
1873..	·48	8	·17	0	40·5	39·3	56·7	45·8	22·9	35·8	82·0	53·9	19·4	33·6	7·2
1874..	1·58	14	·52	0	33·3	32·6	53·8	38·1	18·4	28·7	74·4	49·8	15·8	27·4	6·7
1875..	·94	15	·26	0	39·0	38·1	54·8	42·9	23·2	34·8	71·9	53·4	20·7	32·6	7·7
1876..	6·25	23	1·61	1	44·2	43·0	56·6	47·8	28·0	40·4	77·0	53·7	25·4	37·4	8·1
1877..	1·51	17	·57	0	40·1	39·0	54·2	45·6	28·3	35·5	76·8	56·4	23·2	31·2	5·8
1878..	1·46	15	·26	0	33·7	33·0	55·2	38·2	18·7	29·5	72·4	46·7	12·2	26·6	7·1
1879..	·86	9	·32	0	32·6	31·9	53·4	37·7	16·1	26·9	68·2	45·0	7·8	23·4	7·3
1880..	3·17	18	·53	0	42·7	41·3	56·5	48·2	28·2	38·0	87·0	59·1	24·7	34·8	7·0
1881..	2·47	15	·71	0	39·9	38·7	53·6	44·7	28·1	35·1	72·3	52·7	21·2	30·2	6·7
1882..	2·51	16	·52	0	40·3	39·4	57·2	44·3	24·5	35·5	73·6	49·9	21·4	33·8	8·0
1883..	·75	14	·45	0	40·3	38·8	54·9	44·9	28·3	36·4	72·3	54·5	23·7	33·7	7·4
1884..	2·57	17	·41	0	40·8	39·2	55·7	45·9	28·5	36·6	66·7	51·5	22·2	33·0	7·2
1885..	1·05	11	·35	0	38·4	37·2	50·8	44·0	22·3	33·8	72·2	52·5	15·4	28·8	6·2
1886..	4·34	18	1·82	1	36·2	34·9	53·9	41·3	19·7	31·3	66·4	52·1	12·2	26·0	5·2
1887..	1·38	13	·30	0	37·8	36·4	53·8	42·8	24·3	33·2	74·7	52·8	19·2	28·7	6·7
1888..	1·29	9	·43	0	40·6	39·8	58·9	46·2	25·9	36·2	69·9	53·3	19·2	31·1	5·6
1889..	1·23	15	·29	0	37·8	37·0	53·2	43·0	22·8	33·2	59·2	47·1	17·1	28·7	6·9
1890..	·68	9	·21	0	30·3	29·6	43·7	34·0	14·9	25·5	49·3	36·9	5·5	22·0	8·1
1891..	3·24	18	·70	0	40·9	39·7	57·2	46·3	16·8	35·3	71·1	54·3	12·6	30·2	6·7
1892..	1·37	11	·44	0	36·2	35·2	54·5	41·4	16·7	31·4	66·2	48·8	12·1	26·8	5·9
1893..	2·23	14	·44	0	40·2	38·8	57·8	45·8	20·1	34·4	68·9	54·2	20·5	30·7	5·4
1894..	2·28	16	·93	0	41·8	40·2	52·1	46·7	26·3	36·4	69·6	54·2	24·6	33·1	6·1
1895..	2·19	16	·34	0	40·0	38·8	56·4	44·9	26·1	35·2	78·7	51·0	25·9	32·1	7·0
1896..	3·61	21	·75	0	40·1	38·9	51·8	44·5	26·6	34·3	61·1	49·9	20·8	28·8	7·4
1897..	2·20	17	·64	0	40·9	39·6	55·9	45·5	23·7	35·7	66·9	52·6	21·2	31·7	6·3
Mean ...	2·13	15	·54	0·1	39·3	38·1	54·5	44·0	22·9	34·4	71·3	51·8	18·5	30·9	6·8
Extremes	6·25	27	1·82	1	46·2	44·9	58·9	50·7	31·5	41·0	87·0	59·1	28·4	38·3	8·1
	·36	8	·12	0	30·3	29·6	43·7	34·0	6·7	25·5	49·3	36·9	1·8	22·0	5·2

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JULY, 1899.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	TotalRain. Depth.	TotalRain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	89·2	20	50·9	5	79·2	57·3	54·8	66	134·4	47·5	1·45	10	4·8
Malta	94·6	25	59·0	3	84·4	68·1	63·2	67	147·5	57·7	·00	0	0·6
Cape of Good Hope	81·1	27	42·5	25	65·5	48·2	46·6	78	...	...	4·25	9	2·7
Mauritius	75·5	23	59·4	23	73·6	63·9	59·0	73	144·4	51·9	2·93	24	5·3
Calcutta	93·2	1	75·6	27	88·5	78·3	78·3	87	154·2	75·8	21·47	26	8·8
Bombay	87·0	31	76·0	9	85·3	78·7	75·9	81	134·5	74·2	4·72	22	8·5
Ceylon, Colombo	89·2	22	76·2	2	87·4	77·9	73·5	79	148·0	72·5	1·11	7	5·2
Melbourne	61·0	12	30·6	20	55·5	38·8	41·3	82	118·8	25·2	1·29	8	5·1
Adelaide	68·1	29	35·6	27	58·0	39·9	39·4	74	126·4	25·4	·37	7	3·6
Sydney	61·7	15	39·8	2	57·7	46·3	42·9	80	106·0	32·0	3·96	20	4·4
Wellington	57·3	18	31·0	15*a*	50·5	39·6	36·4	72	105·0	23·0	6·45	21	4·7
Auckland	61·0	20	37·0	26	55·7	43·2	39·3	60	107·0	31·0	5·32	17	5·0
Trinidad	91·0	31	69·0	25	88·8	70·5	72·5	82	165·0	67·0	4·44	17	...
Grenada	86·4	26	71·2	1	83·9	74·7	71·2	78	154·2	...	6·67	29	2·8
Toronto	87·2	21	50·2	31	79·8	57·7	58·8	71	107·5	46·2	1·02	11	3·9
New Brunswick, Fredericton	87·7	2	42·3	1	74·6	54·4	55·5	67	...	...	6·28	16	6·0
Manitoba, Winnipeg	89·4	22	43·0	29	79·1	54·2	...	76	...	...	1·96	10	5·2
British Columbia, Esquimalt	...	...	...	...	...	...	...	...	...	...	...	...	...

a—and 26.

REMARKS.

MALTA.—Adopted mean temp. 75°·2, or 2°·2 below the average. Mean hourly velocity of wind 9·3 miles, or 1·7 above the average. Mean temp. of sea 77°·0. TS on 14th. L on 15th. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·1, and of dew point 0°·4 below, rainfall ·66 in. above, the average. Mean hourly velocity of wind 13·9 miles, or 2·0 above average; extremes, 29·6 on 8th and 2·7 on 3rd; prevailing direction, E.S.E. A. WALTER.

CEYLON, COLOMBO.—Mean temp. of air 81°·7, or 1°·1 above, of dew point 0°·1 above, and rainfall 3·38 in. below, the average. Mean hourly velocity of wind 9·8 miles; prevailing direction S.W. TS on 4th. H. O. BARNARD.

Adelaide.—Mean temp. 2°·6 below, and rainfall 2·27 in. below, the average of 42 years. The coldest, sunniest, driest, and calmest July on record. C. TODD, F.R.S.

Sydney.—Mean temp 0°·4 below; humidity 3·2 above; and rainfall ·32 in. below, the average. H. C. RUSSELL, F.R.S.

Wellington.—Generally wet, with a few fine days at intervals. Prevailing S. and N.W. winds, generally moderate: some cold weather and frosty nights; light snow on 25th, and snow on the near hills. H on 5 days; fog on 4 days. Temp. 2°·6 below, and rainfall ·11 in. above, the average. R. B. GORE.

Auckland.—Cold and stormy most of the month. Mean temp. quite 2°·0 below the average. Rainfall slightly above the average. T. F. CHEESEMAN.

SUPPLEMENTARY TABLE OF RAINFALL, DECEMBER, 1899.

[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..	1·34	XI.	Builth, Abergwesyn Vic.	5·03
II.	Dorking, Abinger Hall .	1·61	,,	Rhayader, Nantgwillt ...	5·04
,,	Birchington, Thor	2·09	,,	Lake Vyrnwy	4·09
,,	Hailsham	2·40	,,	Corwen, Rhug	2·77
,,	Ryde, Thornbrough	1·68	,,	Criccieth, Talarvor	2·37
,,	Emsworth, Redlands ...	1·84	,,	I. of Anglesey, Lligwy..	3·08
,,	Alton, Ashdell	1·89	,,	I. of Man, Douglas	4·96
III.	Oxford, Magdalen Coll..	1·21	XII.	Stoneykirk, Ardwell Ho.	4·71
,,	Banbury, Bloxham	1·68	,,	New Galloway, Glenlee	5·31
,,	Northampton, Sedgebrook	1·53	,,	Moniaive, Maxwelton Ho.	4·12
,,	Stamford, Duddington..	...	,,	Lilliesleaf, Riddell	2·60
,,	Alconbury	1·47	XIII.	N. Esk Res. [Penicuick]	3·35
,,	Wisbech, Bank House...	1·34	XIV.	Glasgow, Queen's Park..	2·69
IV.	Southend	1·47	XV.	Inverary, Newtown	6·06
,,	Harlow, Sheering..... ...	...	,,	Ballachulish, Ardsheal...	6·77
,,	Colchester, Lexden	1·37	,,	Islay, Gruinart School ...	2·00
,,	Rendlesham Hall	1·63	XVI.	Dollar.....	5·20
,,	Scole Rectory	1·38	,,	Balquhidder, Stronvar...	5·53
,,	Swaffham	1·66	,,	Coupar Angus Station...	4·10
V.	Salisbury, Alderbury ...	1·49	,,	Dalnaspidal H.R.S.....	...
,,	Bishop's Cannings	2·12	XVII.	Keith H.R.S.....	5·66
,,	Blandford, Whatcombe .	2·80	,,	Forres H.R.S.	4·59
,,	Ashburton, Holne Vic...	4·37	XVIII.	Fearn, Lower Pitkerrie..	2·81
,,	Okehampton, Oaklands.	5·37	,,	S. Uist, Askernish	7·03
,,	Hartland Abbey	3·67	,,	Invergarry.....	2·96
,,	Lynton, Glenthorne ...	4·89	,,	Aviemore H.R.S.	1·20
,,	Probus, Lamellyn	4·24	,,	Loch Ness, Drumnadrochit	3·15
,,	Wellington, The Avenue	3·95	XIX.	Invershin	3·65
,,	North Cadbury Rectory	2·80	,,	Durness.....	4·15
VI.	Clifton, Pembroke Road	3·41	,,	Watten H.R.S.....	3·86
,,	Ross, The Graig	2·62	XX.	Dunmanway, Coolkelure	16·36
,,	Wem, Clive Vicarage ...	2·01	,,	Cork, Wellesley Terrace	...
,,	Wolverhampton, Tettenhall	2·31	,,	Killarney, Woodlawn ..	9·72
,,	Cheadle, The Heath Ho.	2·78	,,	Caher, Duneske	7·03
,,	Coventry, Priory Row...	2·03	,,	Ballingarry, Hazelfort...	4·22
VII.	Grantham, Stainby	1·65	,,	Limerick, Kilcornan ...	4·36
,,	Horncastle, Bucknall ...	1·89	,,	Miltown Malbay	6·63
,,	Worksop, Hodsck Priory	2·33	XXI.	Gorey, Courtown House	3·97
VIII.	Neston, Hinderton	2·58	,,	Moynalty, Westland ...	5·39
,,	Southport, Hesketh Park	2·71	,,	Athlone, Twyford	5·28
,,	Chatburn, Middlewood.	3·38	,,	Mullingar, Belvedere ...	5·86
,,	Duddon Val., Seathwaite Vic.	8·15	XXII.	Woodlawn	5·55
IX.	Melmerby, Baldersby ...	2·93	,,	Crossmolina, Enniscoe ..	7·87
,,	Scarborough, Observat'y	...	,,	Collooney, Markree Obs.	6·18
,,	Middleton, Mickleton ...	3·52	,,	Ballinamore, Lawderdale	...
X.	Haltwhistle, Unthank H.	2·71	XXIII.	Warrenpoint.....	7·40
,,	Bamburgh	3·61	,,	Seaforde.....	6·05
,,	Keswick, The Bank.....	3·12	,,	Belfast, Springfield	5·40
XI.	Llanfrechfa Grange	3·15	,,	Bushmills, Dundarave..	7·35
,,	Llandovery	3·05	,,	Stewartstown	5·32
,,	Castle Malgwyn	3·85	,,	Killybegs	6·68
,,	Brecknock, The Barracks	3·31	,,	Horn Head	5·80

DECEMBER, 1899.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Greatest Fall in 24 hours. Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	No. of Nights below 32°. On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	1·05	— 1·02	·22	1	17	55·3	6	21·8	14	13	23
II.		Tenterden	2·22	— ·41	·67	29	19	54·0	6	16·0	16	19	23
,,		Hartley Wintney	1·52	...	·29	29	20	55·0	6	12·0	14	19	25
III.		Hitchin	1·59	— ·44	·25	28	18	53·0	1, 6	15·0	13	21	...
,,		Winslow (Addington)	1·51	— ·94	·20	1, 29	16	55·0	6	11·0	16	20	22
IV.		Bury St. Edmunds (Westley)	1·48	— ·76	·34	5	12	52·0	1, 6	21·0	16	...	...
,,		Norwich (Brundall)	1·76	...	·33	5	19	53·2	1	13·0	16	13	21
V.		Winterbourne Steepleton ...	4·20	...	1·10	28	20	55·0	6	19·0	15	16	21
,,		Torquay (Cary Green)	4·16	...	1·15	28	21	55·8	6, 7	25·2	15	7	14
,,		Polapit Tamar [Launceston]..	3·57	— ·66	·81	28	20	56·9	6	17·7	15	14	18
VI.		Stroud (Upfield)	2·43	— ·02	·60	28	18	54·0	6	19·0	14	20	...
,,		ChurchStretton(Woolstaston)	2·10	— ·95	·51	29	19	53·0	1, 6	14·5	14	21	26
,,		Worcester (Diglis Lock)	2·73	+ ·75	·70	29	15	...	...	...	...	...	...
VII.		Boston	1·48	— ·37	·37	28	12	50·0	1,4,6	19·0	16	17	...
,,		Hesley Hall [Tickhill].....	2·23	+ ·25	·48	28	17	55·0	4	10·0	14	21	...
,,		Breadsall Priory	2·49	...	·51	28	12	...	...	...	...	...	...
VIII.		Manchester(PlymouthGrove)	2·68	— ·76	·35	29	15	54·0	4	18·0	13	21	24
IX.		Wetherby (Ribston Hall) ...	3·57	+ 1·13	1·05	28	18	...	...	...	...	...	...
,,		Skipton (Arncliffe)	4·91	— 1·90	·86	30	16	...	...	...	...	...	...
,,		Hull (Pearson Park).	2·52	+ ·25	·52	28	18	53·0	4, 5	19·0	15*a*	19	24
X.		Newcastle (Town Moor)	3·50	+ 1·20	·95	28	17	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	8·76	— 6·05	1·89	3	16	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	3·43	— 1·12	·93	28	21	...	...	...	...	...	...
,,		Haverfordwest	4·42	— ·57	·82	28	21	56·0	6	23·8	15	9	22
,,		Aberystwith (Gogerddan) ...	3·58	— 1·30	1·18	4	15	55·0	6	...	...	...	...
,,		Llandudno.....	2·61	— ·35	·42	4	17	56·5	6	24·5	11*b*	11	...
XII.	SCOTLAND.	Cargen [Dumfries]	3·37	— ·65	·56	3	12	53·0	4	12·0	15	15	...
XIII.		Edinburgh (Blacket Place)...	2·13	...	·41	5	16	53·3	4	18·3	15	14	18
XIV.		Colmonell	5·30	...	·67	3	21	53·0	5	16·0	27	...	...
XV.		Tighnabruaich	6·88	...	1·20	19	17	48·0	3, 5	22·0	27	16	...
,,		Mull (Quinish).....	...	...	...	...	...	...	...	...	...	...	...
XVI.		Loch Leven Sluices	4·10	+ ·79	1·20	7	9	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	4·60	+ 2·52	·90	6	19	55·7	4	14·9	15	16	...
XVII.		Braemar	3·06	+ ·59	·55	5	20	50·7	4	8·2	15	22	31
,,		Aberdeen (Cranford)	5·65	...	·95	6	27	55·0	3, 4	10·0	14	20	...
,,		Cawdor (Budgate)	4·14	+ 1·68	·78	4	19	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	4·03	— 1·74	...	...	...	...	...	...	...	...	...
,,		Glencarron Lodge.....	6·33	...	1·71	3	20	52·0	4	17·5	27	20	...
XIX.		Dunrobin	3·68	+ ·31	·74	30	18	...	...	...	...	...	...
,,		S. Ronaldshay (Roeberry) ...	4·83	+ 1·17	·88	15	24	52·0	3	26·0	25	14	...
XX.	IRELAND.	Darrynane Abbey.....	8·16	...	1·35	19	28	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	8·64	+ 5·00	1·66	28	22	55·0	6	21·5	27	6	...
,,		Broadford (Hurdlestown) ...	6·10	...	·86	13	28	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	4·78	+ 1·66	·97	28	26	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	3·29	+ 1·13	1·13	28	24	61·0	6	25·5	27	6	16
XXII.		Ballinasloe	3·59	+ ·17	·57	11	26	52·0	5, 6	23·0	28	14	...
,,		Clifden (Kylemore)	13·64	...	1·42	16	23	...	...	...	...	...	...
XXIII		Waringstown	4·94	+ 1·90	1·20	28	12	52·0	1	19·0	26	...	...
,,		Londonderry (Creggan Res.).	5·91	+ 1·70	·80	3	26	...	...	...	...	...	...
,,		Omagh (Edenfel)	4·99	+ 1·31	·75	19	18	53·0	5, 6	17·0	27	15	24

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

a—and 28. *b*—and 15.

METEOROLOGICAL NOTES ON DECEMBER, 1899.

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 first week was showery, followed by 13 days of hard frost. One-and-a-half inches of S fell on the 11th. The water in the well was nearly as low as at the end of 1898, there being only 10 inches of water on 19th. The 25th and 31st were lovely days, but it was showery between, with a gale from S. on 29th. Fog on 4 days. Duration of sunshine 56 hours.

HARTLEY WINTNEY.—A cold, wintry month. The grass min. fell to 6° on the nights of 14th, 15th and 16th, and dense fogs occurred each day. From 20th to the end there were slight frosts nightly, with R during the days. S.W. gale on 29th and 30th. S on 11th and 12th. Ozone on 4 days, with a mean of 5. Duration of sunshine on 25th, 5 hours.

WINSLOW, ADDINGTON.—A dull, cold month, with several sharp frosts and very dense fogs. The least R in December since 1893. The 15th was intensely cold, the temp. not rising above 25°. Fog on 7th, 15th, 18th and 27th.

BURY ST. EDMUNDS, WESTLEY.—A cold month with very little S. S on 11th.

NORWICH, BRUNDALL.—The coldest December since 1892, but the absolute min. temp. was the same as in 1890, and the lowest since then. Mean 35°·9. Fog on 3 days. S on 10th, 11th and 14th.

WINTERBOURNE STEEPLETON.—A cold month, the mean temp. being only 37°·8, while for December, 1898, it was 45°·6. The greatest cold occurred in the week ending 16th, the mean for the week being only 31°·4. The last part of the month was squally, with very low pressure. Fog on 6th. T and L on 29th at 9 a.m. S on 11th.

TORQUAY, CARY GREEN.—R ·15 in. above the average. Mean temp. 42°·3, being 1°·0 below the average. Duration of sunshine 47 hours, being 8 hours 10 mins. below the average; 14 sunless days. Ozone, mean at 9 a.m., 4·9; greatest 8·5 on 26th, 29th and 30th; with S. and W. winds; least 0·5 on 19th and 20th, with N. and E. winds.

POLAPIT TAMAR [LAUNCESTON].—The first three weeks were comparatively dry and calm; the last ten days wet and stormy. S on 8th and 11th. T and L at 5.30 p.m. on 28th. S. gale on 29th.

CHURCH STRETTON, WOOLSTASTON.—A very cold month, with continued frost. S fell on 5 days. Mean temp. 34°·9.

WORCESTER, DIGLIS LOCK.—Four-and-a-half inches of S fell on 11th. Heavy S.E. gale on 29th.

HULL, PEARSON PARK.—Fog on 11 days. S on 8 days. H on 2 days.

SEATHWAITE.—S two-and-a-half inches deep on 12th; two inches on 26th.

WALES.

HAVERFORDWEST.—Generally mild and wet; the rainfall, though not large, being continuous. S on the ground only on 9th. The bar. (corr. and red.) read 28·263 in. at 2 p.m. on 29th, but was unaccompanied by any special feature except a distant peal of T and some L in the forenoon, with heavy R during the day and some soft H; on 28th the wind reached the force of a fresh gale. No lower reading of the bar. has occurred since 1886, when it fell to 28·209 in.

ABERYSTWITH, GOGERDDAN.—Low temp. throughout, and very little sunshine.

SCOTLAND.

CARGEN [DUMFRIES].—S five inches deep on 12th, four inches deep on 22nd.

EDINBURGH, BLACKET PLACE.—Mean temp. 2°·4 below, and R 22 per cent. below the average. S on 10th, 11th, 22nd and 28th ; about six inches deep on 11th. Bar. (cor. and red.) fell to 28·456 in. at 9 p.m. on 29th.

COLMONELL.—R ·17 in. above, and mean temp. 1°·2 below, the average of 23 years. S on 8th, 11th, 13th and 21st.

TIGHNABRUAICH, CRAIGANDARAICH.—A month of extremes. Very wet, windy, calm, frosty and snowy in rotation. Great thickness of cloud and darkness on 19th.

ABERDEEN, CRANFORD.—The month was cold and wet, with some light S showers from 11th to 15th, and wet S on 22nd and 23rd.

S. RONALDSHAY, ROEBERRY.—A cold, wet and windy month. Mean temp. 39°·9, being 1°·9 below the average of 9 years.

IRELAND.

DARRYNANE ABBEY.—The wettest month (except two, August and November, 1892) since January, 1890. A very heavy gale occurred on the night of 27th and morning of 28th, numbers of trees were blown down ; wind N.E. and cold R mixed with wet S or sleet.

WATERFORD, BROOK LODGE.—The wettest December since 1876. T on 7th ; T and L on 28th ; S on 27th.

BROADFORD, HURDLESTOWN.—A very wet and severe month, being the wettest December, and (with the exception of August, 1891) the wettest month on record. R 2·73 in., and rainy days 6, above the average of 15 years. S.E. gale with S on 27th and 28th.

DUBLIN, FITZWILLIAM SQUARE.—An unsettled, dull and wet month, of medium temp. but presenting sharp and sudden extremes of warmth and cold. Mean temp. 42°·0 or 0°·7 above the average. Lunar halos on 10th and 15th. Solar halos on 2nd and 13th. High winds occurred on 7 days attaining the force of a gale on 3. Fog on 11 days. S and sleet on 28th, 30th and 31st.

BALLINASLOE.—Heavy S all day on 28th and S on 31st. L on 3rd. Thick fog on 9th.

EDENFEL [OMAGH].—The mild and wet weather with which the month commenced, gave way on the 12th to a week of fine, generally dry, weather with frosty nights. The next week was again humid, followed from Christmas to the end by some very sharp frost and heavy though temporary S, all of which disappeared in the gale of 30th.

END OF VOL. XXXIV.