

SYMONS'S MONTHLY METEOROLOGICAL MAGAZINE.

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Hervé Mangon.

BORN 31st JULY, 1821.

DIED 15th MAY, 1888.

THE *Bureau central Météorologique de France* has lost the President of its Council, meteorologists of many countries have lost an ever accessible and kind friend, while French agriculture has lost a great benefactor.

Trained in the two splendid schools—*Ecole Polytechnique* and *Ecole des Ponts et Chaussées*—Hervé Mangon commenced public life as a railway engineer, but his tastes always tended towards the development of the agricultural value of land by means of irrigation and of drainage; he was among (if he was not absolutely) the first to impress this subject on his countrymen. Of his Instructions upwards of 11,000 copies were issued, and the extra revenue derived through the adoption of his advice has been estimated at £560,000 per annum. It says little for the country which he loved that he was made Minister of Agriculture only in March, 1885, and in a very few months was turned out of office, not of course for any fault of his, but simply because the Brisson Cabinet was overthrown. Sometimes a few words will show the character of the man. The writer may therefore quote the parting words of M. Hervé Mangon while he was yet Ministre:—"My dear —,— There is no knowing how long I shall be here, but while I am I will do all that I can for my country."

We can hardly do justice to his services to meteorology, because he was so quiet and unassuming that much which he did never came before the public, but probably this will be remedied by a worthy notice in the *Annuaire de la Soc. Mét. de France*, of which society he was four times President. The iron tower which he erected at his country seat has already been illustrated in these pages (*Met. Mag.*, vol. xx., p. 65), and his name is also associated with improvements and modifications of thermometers, rain gauges, anemometers, &c. But we think that his greatest service to meteorology has been rendered in his capacity of President of the Council of the French Meteorological Office. We neither desire, nor attempt, to assign the proportion of credit due to M. Hervé Mangon and to Prof. Mascart,

but we maintain, as we have often intimated, that the publications of that office are a credit to France and most valuable to the whole meteorological world. Moreover, it was Hervé Mangon who, as President of the *Société Météorologique*, issued the invitations for the International Meteorological Congress at Paris in 1878, which was attended by such leaders as Buys Ballot, Denza, Hoffmeyer, Tacchini and others, and which helped France out of the isolated position into which (through the war) she had drifted as regarded the International Congresses.

The world is the worse for the loss of such a man, of whom Gaston Tissandier has well said—

“Le biographe qui voudrait donner l'exemple d'une belle existence, toujours dignement remplie, depuis de modestes débuts jusqu' aux plus grands honneurs, ne pourrait mieux faire que de retracer la vie de M. Hervé Mangon.”

ROYAL METEOROLOGICAL SOCIETY.

THE usual monthly meeting of this Society was held on Wednesday evening, May 16th, at the Institution of Civil Engineers, 25, Great George Street, Westminster; Dr. W. Marcet, F.R.S., President, in the chair.

Mr. T. W. Gatward and Mr. N. Simmons were elected Fellows, and Prof. D. Colladon an Honorary Member of the Society.

The following communications were read:—

1st. “Report of the Wind Force Committee on Experiments with Anemometers conducted at Hersham, Surrey,” by Mr. G. M. Whipple, B.Sc., and Mr. W. H. Dines, B.A. A whirling apparatus with arms 29 feet radius was rotated by means of a small steam engine. On the arms of this whirler four different anemometers were placed. Each experiment lasted fifteen minutes, the steam pressure remaining constant during the run. For the Kew Standard Anemometer, with arms 2 feet long, the experiments give a mean value for Robinson's factor (hitherto always taken as 3.0) of 2.15; and for two smaller instruments the factor is 2.51 and 2.96. Mr. Dines's Helicoid Anemometer gave very satisfactory results, the mean factor being 0.996.

2. “On the measurement of the increase of Humidity in rooms by the emission of Steam from the so-called Bronchitis Kettle,” by Dr. W. Marcet, F.R.S. The author described a number of experiments which he had made by filling a room with steam from a bronchitis kettle, and ascertaining the rise and fall of the relative humidity from readings of the dry and wet bulb thermometers. He found that the air in the room could not be saturated, the relative humidity not exceeding 85 per cent., and he also indicated that perhaps experiments of this kind could be made to throw light upon the rate at which the air in rooms was renewed.

MR. VELSCHOW'S REPLY TO THE REVIEW OF HIS PAMPHLET.

To the Editor of the Meteorological Magazine.

SIR,—In your issue for May I find myself challenged to “demonstrate the fallacies in one single good work on barometric measurements.”

The work by Williamson, to which I am referred, does not contain one single record of the actual measurement of any mountain. The only work on the subject I can discover, which goes to the extent of taking synchronous readings of barometers and hygrometers is Prof. S. P. Langley's “Professional Papers, Signal Service, No. XV., War Department, U.S.”

On page 191 is a table showing the results obtained by measuring the altitude between the sea-level and Lone Pine. Of these circa 40 measurements I have in the following table reproduced the 10 highest and the 10 lowest, arranged according to the height.

Table of Barometric Measurements of Altitude between Sea-level and Lone Pine, Mount Whitney.

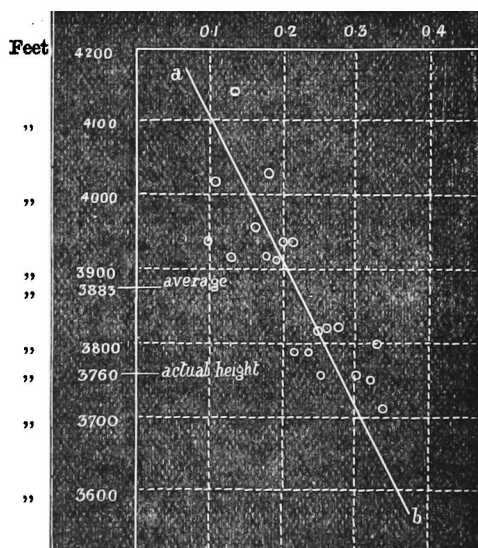
Time of Observation. 1881.	Results in feet.	Weight of vapour in inches of mercury.	At Lone Pine.		
			Relative Humidity per cent.	Temperature °Fah.	
Aug. 26, noon.	10 highest results.	4140	0·1354	10·3	87·8
Aug. 26, 9 p.m.		4030	0·1823	28·8	65·7
Sept. 3, noon.		4020	0·1060	8·7	85·4
Aug. 29, noon.		3960	0·1627	15·6	80·6
Aug. 25, noon.		3940	0·2081	18·1	83·6
Sept. 3, 9 p.m.		3940	0·0960	13·5	69·1
Aug. 24, noon.		3940	0·2158	16·0	88·6
Aug. 17, noon.		3920	0·1782	14·9	84·6
Sept. 2, noon.		3920	0·1302	9·9	87·8
Aug. 24, 9 p.m.		3915	0·1931	29·0	67·2
Aug. 20, 9 p.m.	10 lowest results.	3820	0·2787	35·5	72·0
Aug. 19, noon.		3820	0·2615	17·8	91·3
Aug. 23, 9 p.m.		3815	0·2508	38·3	66·7
Aug. 18, 9 p.m.		3800	0·3314	78·0	54·7
Aug. 31, 9 p.m.		3790	0·2190	45·7	57·6
Aug. 30, 9 p.m.		3790	0·2352	53·1	55·6
Aug. 27, 9 p.m.		3760	0·2543	68·0	51·0
Aug. 21, 9 p.m.		3760	0·3034	38·4	72·2
Aug. 22, 9 p.m.		3750	0·3232	70·1	56·7
Aug. 19, 9 p.m.		3710	0·3405	71·5	57·6
Sept. 7, 9 p.m.	3625	no record.			
Sept. 6, 9 p.m.	3620				

Alongside of each of these figures will be found a number representing the weight of the vapour contained in the atmosphere at

the time of observation. These latter numbers are obtained by multiplying the relative humidity at Lone Pine (see table in Langley, page 177) with the elastic force of vapour (Glaisher's tables).

The difference between max. and min. result is $4,140 - 3,620 = 520$ feet, or 14 per cent. of the trigonometrically surveyed height, 3,760 feet, and so long as the quicksilver cannot be guaranteed to give a more reliable result, I believe I may safely repeat that "barometric measurements have hitherto been more or less a failure." As to the likely cause of the variability, it will be noticed that the amount of vapour in the atmosphere was much less when the 10 highest results were obtained than when the 10 lowest were obtained, and, as the following diagram may illustrate, the results seem to be

Inches of mercury.



pretty nearly in reverse proportion to the amount of vapour in the atmosphere. The line a—b shows the general tendency of the figures. That these do not follow this line more closely just shows that it is not sufficient to measure the humidity only at one end of the air-column. Besides, there seem to be other causes of error; it will thus be noticed that the 10 highest results are generally from observations taken at noontide, when the thermometers showed a high temperature, while the 10 lowest results are all, except one, from observations taken at 9 p.m. This may, for instance, indicate that it is unsafe to judge of the temperature of the air-column after sunset from thermometers placed near the earth's surface owing to the radiation of heat.

Having hereby, as I hope, given a satisfactory answer to your question regarding a subject which has only been mentioned casually in my little pamphlet, may I now have removed your objection to deal seriously with the main subject of the same, namely, the law of circulation of the atmosphere, and I shall conclude

by challenging you, without provocation, but by way of returning a compliment, to demonstrate a single fallacy in my theory, as I think you have treated it somewhat lightly by simply stating that you cannot accept it.—Yours very respectfully,

FRANZ A. VELSCHOW, C.E.

London, June, 1888.

[We are not going to allow anyone to say that he does not have fair play in these pages, and therefore we insert Mr. Velschow's letter and engrave his diagram; but we have some facts to mention which seem to contradict his statement and argument.

We are sorry to seem hard on any author, but we cannot without protest allow anyone to pronounce "a failure," work which from the time of Pascal downwards has occupied some of the finest intellects that the world has produced. And surely he should bring some evidence worthy of consideration in support of his statements. De Luc, Shuckburgh, La Place, Gay Lussac, Gauss, Ramond, Bailly, Bessel, Ritter, Baeyer, Humboldt, Oltmanns, Delcros, Guyot, Loomis, Benzenberg, Williamson, Airy, A. J. Ellis, Neumeyer, Rühlmann—is it likely that they have all been working upon "a failure?"

Mr. Velschow states that Williamson's book "does not contain one single record of the actual measurement of any mountain." We reprint on p. 70 the very first table which we turned up in Williamson (1) because it appears hard to reconcile its existence with Mr. Velschow's statement; (2) because it shows that good barometric observations properly reduced give results subject to an uncertainty of only about 51 ft. in 3,636 or 1 foot in 70, *i.e.*, 1.4 per cent. instead of 14 per cent., as shown by Mr. Velschow's extract from Langley. And that this accuracy is not exceptional could be proved over and over again. Here is another case (*American Meteorological Journal*, June, 1887). Prof. Hazen gives the synchronous readings at Mount Washington (6,279 ft.) and at sea level for every day in September, 1885. The greatest variations in the computed pressure are +.10 and -.05 in., say 160 ft. in 6,279, or about 2½ per cent. instead of 14. Mr. Velschow states that the "only work on the subject which I can discover, which goes to the extent of taking synchronous readings of barometers and hygrometers, is Langley's." We have casually given him two; we have only time to give one more, but it will provide him with ample materials. It is *Annales du Bureau Central Météor. de France*, 1884, part II. He will find there every three hours throughout the year (that is 2,920 times repeated) the readings of barometer, and for more than 2,000 of these times the temperature, relative humidity, wind and cloud also at the stations at the foot (1,273 ft.) and on the summit (4,813 ft.) of the Puy de Dôme.

One would have thought that before attaching the word failure to barometric measurements any writer would have been careful that

HYPSONOMETRICAL TABLE. (From Williamson "On the use of the Barometer," p. 167.)

From Simultaneous Observations taken at the Base and on the Summit of Monte Diablo, California, May and June, 1859.

DATE.	AT BASE.				ON SUMMIT.				$\frac{1}{2} \log \frac{H}{H'}$	Wandering from the Mean.		T. + Parts 3, 4 & 5.	Wandering from the Mean.		Diff. of Alt.	Wandering from the Mean.		$\frac{1}{2}$ Sum of Temp.	$\frac{1}{2}$ Sum of Rel. Hum.	Cor. for Hum.
	Bar.	Ther.	Force of Vapor	Rel. Hum.	Bar.	Ther.	Force of Vapor	Rel. Hum.		+	—		+	—		+	—			
1859 May 22	29.740	54.3	.365	86.5	26.038	49.8	.243	70.0	3473.0		52.6	166.8	49.1		3639.8	3.5	52.0	78.2	15.9	
23	.881	54.3	.351	83.4	.161	50.9	.280	74.9	3473.6		53.2	171.1	44.8		3644.7	8.4	52.6	79.2	16.4	
24	.815	63.4	.337	59.8	.150	54.7	.226	51.3	3426.8		6.4	218.1		2.2	3644.9	8.6	59.1	55.5	14.3	
25	.834	65.8	.258	43.8	.213	58.3	.242	49.2	3380.6	39.8		237.8		21.9	3618.4	17.9	62.0	46.5	13.3	
26	.799	70.9	.327	46.1	.227	67.1	.320	47.5	3336.0	84.4		286.4		70.5	3622.4	13.9	69.0	46.8	16.7	
27	.782	63.7	.335	61.2	.126	61.1	.260	45.9	3421.9		1.9	243.3		27.4	3665.2	28.9	62.4	53.6	15.3	
28	.866	57.3	.362	77.5	.145	48.2	.229	71.8	3476.6		56.2	172.4	43.5		3649.0	12.7	52.8	74.6	15.7	
29	.815	60.1	.378	73.0	.145	53.7	.249	59.4	3431.9		11.5	202.0	13.9		3633.9	2.4	56.9	66.2	15.9	
30	.813	59.5	.339	66.7	.141	53.5	.183	45.1	3434.0		13.6	199.1	16.8		3633.1	3.2	56.5	55.9	13.3	
31 June 1	.733	63.1	.315	56.3	.115	57.2	.174	36.9	3389.9	30.5		224.2		8.3	3614.1	22.2	60.2	46.6	12.5	
2	.621	71.2	.359	48.9	.072	65.0	.235	37.5	3334.3	86.1		279.6		63.7	3613.9	22.4	68.1	43.2	15.0	
3	.756	58.3	.360	77.5	.101	60.5	.197	37.5	3424.0		3.6	220.6		4.7	3644.6	8.5	59.4	57.5	14.9	
	.891	56.6	.355	77.5	.181	52.4	.236	64.6	3462.4		42.0	185.2	30.7		3647.6	11.3	54.5	71.0	15.7	
Mean	29.796	61.4	.339	66.0	26.140	56.3	.160	53.2	3420.4	37.1		215.9	30.6		3636.3	12.6	58.9	59.2	15.0	

the data upon which he relied were unexceptionable—instead of that, here are the facts as to Prof. Langley's observations to which Mr. Velschow has devoted so much space.

On the very page to which the author refers us, and which therefore he surely has read, Prof. Langley enumerates the data employed—" (1.) Summaries of barometric, thermometric, and relative humidity readings at San Diego and San Francisco; (2) the same for Lone Pine; (3) the same for Mountain Camp; (4) the same for Peak of Whitney."

Now San Francisco is 230 miles N.W. of Lone Pine, San Diego is 270 miles S.S.E. of it! Why England alone is not large enough to give the equivalent of these distances, but by taking the British Isles we can nearly find it. The barometric measurement of heights is pronounced "a failure," because (taking corresponding British localities) observations on the top of Snowdon do not give constant differences as compared with sea level values determined from observations made at Guernsey, and at Malin Head, the northernmost point of Ireland.* Who would have expected that they should?

Having been obliged to deal at such length with the author's facts, we owe it to our readers not to occupy space with consideration of his theory. It will be time enough to do that when the heads of the various meteorological offices in Australia and New Zealand find, by its compelling the weather forecasters of our antipodes to recognise its presence, that the "air cushion" really exists.]—ED.

THUNDERSTORMS—BRONTOLOGY.

[WE have much pleasure in inserting the following letter from Dr. Hellmann. There seem to be few things that our German friends have not done; they were clearly the first as to thunderstorm, or rather Brontological research, though they let the subject slumber for a long while (half a century); and now it also turns out that they were the first to use derivatives of *Bporros* for designating thunderstorms. Dr. Hellmann's invaluable *Repertorium* shows that Prof. Peter Ahlwardt, in 1745, published a work entitled "Bronto-Theologie oder vernünfft u. theol. Betrachtungen über den Blitz u. Donner." Now that the observation of thunderstorms is being actively pursued, we certainly think that Brontology would be a useful word. We have yet to learn that our friends have made a Brontometer.—ED.]

To the Editor of the Meteorological Magazine.

SIR,—Your interesting remarks on systematical observations of thunderstorms induce me to put you in mind of a German Society especially created for the study of thunderstorms so early as 1820.

* On the Continent the equivalent would be to compare the Puy de Dome with stations at about the distances of Paris on the one side and Barcelona in Spain on the other.

Some particulars about this "Gesellschaft zur Beobachtung der Gewitter" may be found in my "Repertorium," p. 917-18. The blank forms for record, I am sorry to say, I have never seen, but I will endeavour to get one from old archives at Halle, supposing that any one is still remaining. I am very curious to read a full description of your brontometer* to be constructed by Richard Brothers.—I am, Sir, yours most truly,

GUSTAV HELLMANN.

Berlin, Margarethenstrasse 2, May 21st, 1888.

We append for the convenience of those who have not Dr. Hellmann's "Repertorium" a free translation of the paragraph referred to in his letter.

SOCIETY FOR THE OBSERVATION OF THUNDERSTORMS, 1820-25.

"The initiation of this Society was undertaken by J. S. C. Schweigger, shortly before he removed from Erlangen to assume his duties as Professor of Physics at the University of Halle. On March 25th, 1820, he read a paper before the Philosophical Society, at Halle, "On thunder clouds and storms, and on a Society for observing their formation and precise path," so as to obtain from that old-established Society its authority and support. This he obtained, and a resolution inviting the co-operation of the members of all German scientific societies, and especially of such as were interested in Meteorology, was signed the same day.

"This is, as far as I know, the first society exclusively devoted to the study of thunderstorms, and this was followed 45 years afterwards by the organization in France, under Le Verrier, of the *Commissions météorologiques départementales*. The Scandinavian, Belgian, and Italian systems soon followed, but in Germany there was nothing until the establishment of the Bavarian system in 1879.

"The appeal of the Halle society seems to have been well met. Many volunteer observers came forward, especially in South Germany, so that, in 1823, more than 500 blank forms were issued. However, the direct result of these observations was only trifling; the observations were edited by Messrs. K. L. G. Winckler and J. K. Bullmann.†

"For the first year they received reports from 52 stations, but the number decreased to 23 in 1825, which is the last I have seen. Indirectly the organization was very useful as leading to the firm establishment of meteorological observations in Thuringia and Wurtemberg."

* Perhaps we may revive the old, short, and characteristic word, "Brontology" (German, Brontologie) for all relating to thunderstorms.

† Tabellar. Zusammenstellg. v. Gewitterbeobb, i. J. 1821-25, by J. K. Bullmann. Jahresb. naturf. Ges. Halle, 1821-26.

ADDITIONAL RAINFALL OBSERVERS.

FOR so exceptional a year as 1887 it is imperative to use every effort to render the account as nearly perfect as possible. Therefore, before printing off *British Rainfall*, 1887, I have issued the following letter to a considerable number of country newspapers, and a somewhat similar one was sent to *The Times*. The result has been to obtain about twenty records of which I was previously unaware. I have no doubt that some readers of this Magazine can tell me of others, and I shall be much obliged by their so doing.

G. J. SYMONS.

To the Editor of _____

SIR,

Twenty-three years since, you allowed me through your columns to invite the co-operation of your readers in developing the organization for the collection, preservation, and publication of records of the amount of rain falling annually in different parts of the country. Thanks to the help then received, our organization is now a powerful one, with nearly three thousand correspondents in almost all parts of the British Islands from Shetland to Jersey, and from Lowestoft to Valentia, off the coast of Kerry.

The year 1887 was quite an exceptional one, dry at many places beyond all modern precedent, and we are consequently anxious to collect every trustworthy record which was kept. I therefore ask your permission to invite any of your readers who have not yet communicated with me on the subject to do so at once, when blank forms, instructions, &c., will be sent by return, and post free.

I append a list of the returns from _____

_____ as, if you can find room for it, much unnecessary correspondence will probably be saved, and it will be of general interest not only as showing who are now helping us, but also as giving the relative rainfall during last year at the various localities.

I venture to press for promptitude, as we are anxious to print the Annual volume very shortly.

Your obedient Servant,

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

62, Camden Square, London, N. W., May, 1888.

EARTHQUAKE IN NORTH WALES.

To the Editor of the Meteorological Magazine.

SIR,—I have been surprised that so little has appeared in the papers, respecting the earthquake of April 11th, in North Wales and in Shropshire. I did not experience the movement myself, but a tradesman residing within about a quarter of a mile from my house, told me that he very distinctly felt the tremor, and also heard the rumbling sound which preceded it. I give the account as nearly as I can in his own words:—

“I was sitting (he said) at work, by myself in my workshop” (a

small building close to his own house), between 6 and 7 o'clock in the evening "I first heard (he said) a distant rumbling sound coming from the direction of Chirk (North East), I thought it was distant thunder, but all at once the ground was shaken, and the window glass rattled. I then (he continued) got up and looked out of doors, and could see no sign of thunder clouds about. A little while after I entered my own house, and asked my family if they had heard the thunder, but they had not, nor felt any shock. When (he stated) I went to Oswestry on Saturday, the 14th, I was told that there had been an earthquake in the neighbourhood."

Trusting that the above account may prove interesting to the readers of your *Meteorological Magazine*.

I remain, Sir, yours faithfully,

A. R. LLOYD.

Walden House, near Oswestry, May 18, 1888.

DROUGHT IN 1888.

To the Editor of the Meteorological Magazine.

SIR,—I send herewith a statement of the rainfall at this place for the last five months. 1887 was a remarkably dry year, but the deficiency in the rainfall this year has been much greater.

Average of previous 16 years	12·02 in.
Last year (1887)	9·19 „
Driest previous season (1880)	8·50 „
This year (1888)	7·29 „

I may add that the amount given above for 1888 is corrected by the addition of ·30 in. for snow, which was not caught in the gauge in consequence of its sheltered position and the strong, driving wind. I arrived at the result by comparing it with two other gauges in an open situation. This is in the March amount.

Yours truly,

SAML. KING.

Elswick Lodge, near Poulton-in-the-Fylde, June 2nd, 1888.

ERRATUM IN *MET. MAG.*, MAY.

A very curious and vexatious error in our last number escaped the notice of editor and of printer—what should have been the top line of page 57 was inserted at the top of page 58.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, NOV., 1887.

STATIONS. (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain.		Aver. Cloud.
	Maximum.		Minimum		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
	°		°		°	°	°	0-100	°	°	inches		0-10
England, London	55·4	4	22·1	17	45·7	36·4	37·6	93	89·9	18·7	3·40	18	7·4
Malta.....	74·8	8	49·6	21	68·0	57·3	55·2	83	125·2	41·9	1·21	9	5·4
Cape of Good Hope ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mauritius.....	82·3	25	65·2	7, 24	79·5	68·9	63·0	71	137·5	55·6	·60	13	5·6
Calcutta.....	85·0	10	59·8	25	81·1	64·7	62·5	63	142·0	49·4	·24	1	2·4
Bombay.....	91·1	3	68·0	30	87·6	73·8	69·0	69	145·2	55·2	1·02	1	2·4
Ceylon, Colombo	88·7	21	71·3	22	86·2	73·5	71·9	80	147·0	66·8	6·54	19	5·1
Melbourne.....	89·3	25	41·5	17	66·9	49·7	48·8	71	141·8	32·9	3·66	14	5·6
Adelaide	100·5	24	45·0	8, 14	75·6	53·9	47·0	52	159·2	33·6	·94	8	4·4
Wellington	67·0	26a	39·0	10	61·9	47·3	48·1	80	136·0	35·0	5·14	16	4·3
Auckland	70·0	1	46·0	17	64·8	52·6	49·1	71	140·0	40·0	2·45	18	7·7
Falkland Isles.....	69·4	22	32·8	20	54·6	40·0	42·5	79	123·0	28·6	1·05	12	7·0
Jamaica, Kingston.....	91·1	13	64·0	29	88·6	70·3	71·0	78	...	...	1·89	...	...
Barbados	83·0	4, 5b	69·0	1	81·0	73·0	72·4	85	...	...	7·79	17	6·0
Toronto	57·6	7	6·4	29	41·1	28·5	29·4	77	...	5·0	2·80	15	6·8
New Brunswick, Fredericton	60·2	28	— 2·5	30	40·4	23·0	25·5	72	...	...	3·60	13	6·2
Manitoba, Winnipeg }	58·6	1	— 31·4	27	28·4	6·3	17·2	84	...	...	1·01	8	5·0
British Columbia, Victoria	60·0	9	22·0	23c	48·2	36·9	...	...	...	...	5·57	13	...

a And 27, 28. b And 6. c And 24, 25.

REMARKS, NOVEMBER, 1887.

MALTA.—Mean temp. 61°·7; mean hourly velocity of wind 10·4 miles. Sea temp. fell from 69°·0 to 64°·3. TS on 28th. Mists on 24th and 25th. J. SCOLES.

Mauritius.—Mean temp. of air 0°·4, and of dew point 0°·4, and rainfall ·71 in. below average. Mean pressure (30·089 in.) ·007 in. above average. Mean hourly velocity of wind 10·8 miles, 0·5 mile below average; extremes 25·3 miles on 27th and 1·9 miles on 24th; prevailing direction E.S.E. C. MELDRUM, F.R.S.

COLOMBO.—TSS on 9 days; L on 10 other days. J. C. H. CLARKE, LT.-COL. R.A.

Melbourne.—Mean temp. of air 1°·4, and mean amount of cloud 0°·4 below average. Mean temp. of dew point 0°·3, mean pressure ·085 in., humidity 4, and rainfall, 1·15 in. above average. Prevailing winds S. and S.E.; strong on 6 days. Heavy squalls on 11th and 12th. T on 4 days; L on 3 days; H on 11th. R. L. J. ELLERY, F.R.S.

Adelaide.—The first half of the month was unusually cool. Mean temp. 2° below the average of 31 years. Mean pressure 30·024 in., ·028 in. above average. Rainfall about the average. C. TODD.

WELLINGTON.—On the whole an unpleasant month and showery, especially in the first half. Prevailing wind N.W.; frequently strong. Sharp shock of earthquake on 11th. Mean temp. (54°·6) 1°·9 below average. Rainfall ·97 in. above average. R. B. GORE.

AUCKLAND.—A cold, cloudy month, with an unusual preponderance of S.W. winds. Pressure slightly, mean temp. quite 2°, and rainfall ·25 in. below average. T. F. CHEESEMAN.

BARBADOS.—Pressure rather unsteady. Mean temp. (76°·8) the same as the average of 30 years; mean hourly velocity of wind 1·1 miles above the average of 15 years. N.E. winds on 24 days and S.E. on 6 days. Rainfall somewhat below average. R. BOWIE WALCOTT.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, DEC., 1887.

STATIONS. <i>(Those in italics are South of the Equator.)</i>	Absolute.				Average.				Absolute.		Total Rain.		Aver. Cloud.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
	°		°		°	°	°	0-100	°	°	inches		0-10
England, London	53·8	8	24·3	27	42·8	33·2	34·7	87	74·7	19·2	1·38	13	6·8
Malta	68·0	3	45·2	31	63·1	53·3	49·8	79	119·0	43·1	1·04	11	5·2
<i>Cape of Good Hope.</i> ...	...	...	...	...	...	...	...	...	...	...	...	...	...
<i>Mauritius</i>	84·0	31	68·2	3	81·4	71·8	65·5	71	137·7	58·5	2·41	20	5·6
Calcutta	78·8	1	51·3	30	76·1	56·1	53·2	58	132·5	39·4	·00	0	1·6
Bombay	88·9	8	66·0	22	85·1	70·1	64·5	66	144·0	53·0	·16	3	1·8
Ceylon, Colombo	89·8	2	70·8	10 ^a	85·2	72·3	71·2	82	151·2	67·5	6·98	22	7·7
Melbourne	94·5	13	46·1	5	76·3	56·3	54·7	67	146·2	41·1	5·13	13	5·0
Adelaide	98·1	13	48·1	4	83·0	61·2	52·0	50	151·6	39·2	1·86	10	4·0
Wellington	75·0	24	44·0	4 ^b	64·7	51·2	51·7	84	150·0	36·0	3·12	11	4·3
Auckland	79·5	24	49·0	6	69·6	55·6	51·4	67	145·0	38·0	1·77	8	6·5
<i>Falkland Isles</i>	66·0	12	33·0	15	55·9	39·8	42·2	75	129·0	26·7	3·37	19	6·6
Jamaica, Kingston	91·3	23	56·7	4	88·0	65·7	67·0	74	...	...	·08	...	...
Barbados	84·0	2, 3	67·0	16	80·0	71·0	71·0	83	...	...	8·69	12	6·0
Toronto	47·1	4	0·0	30	33·2	22·5	25·3	83	...	—10·6	3·40	19	8·4
New Brunswick, Fredericton	47·8	11	—12·7	31	26·6	12·0	17·3	80	...	...	4·14	16	5·3
Manitoba, Winnipeg ...	38·0	16	—41·7	29	8·5	—10·4	3·5	93	...	...	1·35	·	5·2
British Columbia, Victoria	51·0	17	29·0	27	45·6	37·6	...	...	...	...	9·18	·	..

^a And 31. ^b And 14, 28.

REMARKS, DECEMBER, 1887.

MALTA.—Mean temp. 57°·3; mean hourly velocity of wind 12·9 miles. Sea temp. fell from 64°·3 to 59°·0. L on 5th, H on 24th. J. SCOLES.

Mauritius.—Mean temp. of air 0°·9, of dew point 2°·0, and rainfall 2·72 in. below average. Mean pressure 30·023 in., ·017 in. above average. Mean hourly velocity of wind 13·4 miles, 1·9 miles above average; extremes 24·8 miles on 22nd and 30th, and 1·8 mile on 28th. Prevailing direction E. TS on 13th. C. MELDRUM, F.R.S.

COLOMBO.—TSS on 6 days; L on 2 other days. J. C. H. CLARKE, LT.-COL. R.A.
Melbourne.—Mean temp. of air 3°·2, of dew point 4°·3, humidity 3, pressure ·136 in., and rainfall 2·73 in. above average; mean amount of cloud 0·6 below average. Prevailing winds S. and N.; strong on 5 days. Heavy TSS on 18th, 23rd, and 30th. Incessant L and distant T on the evening of 12th; L on 10th, 11th, and 22nd. Hot and oppressive on 7 days. R. L. J. ELLERY, F.R.S.

Adelaide.—Mean pressure 30·022 in., ·083 in. above the average of 31 years. Mean temp. a degree, and rainfall an inch above average. The rainfall for the year (25·70 in.) was 5·63 in. above the average of 30 years and was exceeded only twice during that period. C. TODD.

Wellington.—The early part of the month was showery, with prevailing S.E. wind; the middle was fine, with generally N.W. wind; the latter part showery. T on 11th. Rainfall ·81 in., and mean temp. (57°·9) 2°·9 below average. R. B. GORE.

Auckland.—An unusually dry and fine month. Rainfall not half the average of 20 years. Mean temp. 2° below the average. T. F. CHEESEMAN.

KINGSTON.—The rainfall was remarkably deficient, only one-eighth of the average for the island falling. On the 4th the min. temp. at Kingston (56°·7) was the lowest recorded during the eight years observed here. R. JOHNSTONE.

BARBADOS.—Pressure unsteady. Mean temp. (75°·5) the same as the 30 years average. Rainfall considerably above the average. Prevailing winds N.E. on 24 days, S.E. on 7 days. R. BOWIE WALCOTT.

SUPPLEMENTARY TABLE OF RAINFALL,
MAY, 1888.

[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.
II.	Dorking, Abinger	1·70	XI.	Castle Malgwyn	1·71
„	Margate, Birchington....	·66	„	Rhayader, Nantgwillt..	2·34
„	Littlehampton	1·84	„	Carno, Tybrith	1·37
„	Hailsham	1·27	„	Corwen, Rhug	1·22
„	Ryde, Thornbrough	2·04	„	Port Madoc	1·90
„	Alton, Ashdell.....	2·70	„	I. of Man, Douglas	2·09
III.	Oxford, Magdalen Col....	1·18	XII.	Stoneykirk, Ardwell Ho.	3·55
„	Banbury, Bloxham	1·42	„	New Galloway, Glenlee	5·32
„	Northampton	·92	„	Melrose, Abbey Gate...	1·23
„	Cambridge, Beech Ho....	·59	XIII.	N. Esk Res. [Penicuik]	1·35
„	Wisbech, Bank House..	·83	XIV.	Ballantrae, Glendrishaig	3·42
IV.	Southend	·42	„	Glasgow, Queen's Park.	2·43
„	Harlow, Sheering	·99	XV.	Islay, Gruinart School..	2·74
„	Rendlesham Hall	·99	XVI.	St. Andrews, Pilmour Cot	1·74
„	Diss	·80	„	Balquhiddel, Stronvar..	8·45
„	Swaffham	·95	„	Dunkeld, Inver Braan..	4·98
V.	Salisbury, Alderbury ...	2·09	„	Dalnaspidal H.R.S. ...	5·71
„	Warminster	2·21	XVII.	Keith H.R.S.	1·49
„	Bishop's Cannings	1·15	„	Forres H.R.S.	·97
„	Ashburton, Holne Vic....	4·65	XVIII.	Strome Ferry H.R.S....	3·85
„	Hatherleigh, Winsford.	1·76	„	Fearn, Lower Pitkerrie.	1·30
„	Lynmouth, Glenthorne.	1·70	„	Loch Shiel, Glenaladale	...
„	Probus, Lamellyn	1·63	„	S. Uist. Ardkenneth ...	...
„	Launceston, S. Petherwin	1·83	„	Invergarry	4·84
„	Wincanton, Stowell Rec.	1·42	XIX.	Lairg H.R.S. ....	...
„	Taunton, Lydeard Ho....	1·52	„	Forsnard H.R.S.	2·84
„	Wells, Westbury	1·13	„	Watten H.R.S.	2·51
VI.	Bristol, Clifton	1·40	XX.	Dunmanway, Coolkelure	3·56
„	Ross	1·34	„	Fermoy, Gas Works ...	3·51
„	Wem, Clive Vicarage ...	·48	„	Tipperary, Henry Street	2·85
„	Cheadle, The Heath Ho.	·77	„	Limerick, Kilcornan ...	2·52
„	Worcester, Diglis Lock	1·01	„	Miltown Malbay.....	3·57
„	Coventry, Coundon	1·05	XXI.	Gorey, Courtown House	2·13
VII.	Melton, Coston	1·13	„	Navan, Balrath	2·24
„	Ketton Hall [Stamford]	·92	„	Mullingar, Belvedere...	2·30
„	Horncastle, Bucknall ...	·90	„	Athlone, Twyford	2·20
„	Mansfield, St. John's St.	1·05	„	Longford, Currygrane...	2·72
VIII.	Knutsford, Heathside ...	·64	XXII.	Galway, Queen's Coll...	2·87
„	Walton-on-the-Hill.....	·92	„	Clifden, Kylesmore	6·14
„	Lancaster, South Road.	1·60	„	Crossmolina, Enniscoe..	3·42
„	Broughton-in-Furness ..	2·26	„	Collooney, Markree Obs.	2·79
IX.	Shipley, Esholt Vic. ...	·65	XXIII.	Rockcorry	2·35
„	Ripon, Mickley	1·05	„	Warrenpoint	1·79
„	Scarborough, West Bank	·77	„	Seaforde	3·47
„	East Layton [Darlington]	1·32	„	Belfast, New Barnsley..	...
„	Middleton, Mickleton ..	1·50	„	Cushendun	3·45
X.	Haltwhistle, Unthank..	1·29	„	Bushmills	2·45
„	Shap, Copy Hill	3·45	„	Stewartstown	3·04
XI.	Llanfrechfa Grange	2·33	„	Buncrana	2·93
„	Llandovery	1·80			

MAY, 1888.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					Days on which -01 or more fell.	TEMPERATURE				No. of Nights below 32°	
		Total Fall.	Differ- ence from average. 1870-9	Greatest Fall in 24 hours.		Max.		Min.					
				Dpth	Date.				Deg.	Date	Deg		Date.
		inches	inches.	in.				Deg.	Date	Deg	Date.	Inshade.	On grass
I.	London (Camden Square) ...	1·18	— ·74	·33	16	7	77·2	19	35·3	11	0	3	
II.	Maidstone (Hunton Court)...	·81	— 1·21	·42	16	5	...	...	...	...	...	...	...
	Strathfield Turgiss	1·67	— ·01	·58	17	8	75·1	19	31·9	11	1	18	
III.	Hitchin	1·15	— ·84	·40	2	7	73·0	19	32·0	10	1	...	
	Winslow (Addington)	1·32	— ·91	·44	17	8	74·0	19	34·0	9 ^e	0	6	
IV.	Bury St. Edmunds (Culford)	·80	— 1·10	·30	17	4	78 0	18	28·0	27	5	...	
	Norwich (Cossey)	·69	— 1·12	·23	29	6	...	...	...	...	...	...
V.	Weymouth (Langton Herring)	1·58	...	·45	17	7	68·0	24	38·0	11 ^f	0	...	
"	Barnstaple	1·16	— ·94	·24	16	11	72·5	25	36·0	5	0	...	
"	Bodmin	2·07	— ·77	·49	3	14	69·0	24	35·0	5	0	...	
VI.	Stroud (Upfield)	2·00	— ·30	·45	17	11	76·0	19	38·0	3, 4	0	...	
"	Churchstretton (Woolstaston)	·90	— 1·49	·26	29	11	74·0	19	36·0	4, 11	0	5	
"	Tenbury (Orleton)	·77	— 1·66	·26	9	7	74·8	19	31·3	4	2	8	
VII.	Leicester (Barkby)	·86	— 1·02	·30	29	7	80·0	20	29·0	11 ^f	4	...	
"	Boston	·72	— 1·05	·22	29	9	79·0	18	31·0	11	1	...	
"	Hesley Hall [Tickhill]	·54	...	·26	29	7	80·0	19	33·0	16	0	...	
VIII.	Manchester (Ardwick)	·72	— 1·51	·33	3	8	77·0	19	38·0	3	0	...	
IX.	Wetherby (Ribston Hall) ...	·90	— ·92	·34	29	7	...	...	...	...	...	...
"	Skipton (Arncliffe)	2·93	— ·19	·93	2	12	...	...	...	...	...	...
"	Hull (People's Park)	·67	— 1·21	·28	29	9	...	...	...	...	...	...
X.	North Shields	·38	— 1·47	·24	29	4	70·5	20	30·5	10	1	2	
	Borrowdale (Seathwaite)	8·17	+ 1·19	2·22	29	14	...	...	...	...	...	...
XI.	Cardiff (Ely)	1·99	— ·61	·41	2	14	...	...	...	...	...	...
"	Haverfordwest	2·16	— ·53	·62	29	13	72·8	24	34·0	14	0	5	
"	Plinlimmon (Cwmsymlog) ...	1·54	...	·32	16	10	...	...	...	...	...	...
"	Llandudno	·74	— ·88	·20	16	11	76·9	19	37·8	12	0	...	
XII.	Cargen [Dumfries]	2·91	+ ·38	·88	29	12	78·8	19	30·0	10	1	...	
	Jedburgh (Sunnyside)	·98	— ·81	·26	29	10	76·0	19	29·0	29	2	...	
XIV.	Old Cumnock	2·68	+ ·28	·67	29	13	79·0	19	27·0	9	6	...	
XV.	Lochgilphead (Kilmory)	5·78	+ 3·02	1·52	29	19	...	...	...	...	...	...
"	Oban (Craigvarren)	5·34	...	·98	29	19	72·8	19	35·0	10	0	...	
"	Mull (Quinish)	4·18	...	·81	29	18	...	...	...	...	...	...
XVI.	Loch Leven Sluices	2·50	+ ·21	·40	13 ^a	9	...	...	...	...	...	...
	Dundee (Eastern Necropolis)	1·75	— ·19	·55	29	9	65·5	21	34·2	11	0	...	
XVII.	Braemar	3·39	+ ·97	1·02	29	16	71·7	19	27·3	29	4	14	
	Aberdeen	1·20	...	·37	29	12	70·0	7	30·0	27	2	...	
XVIII.	Lochbroom	4·46	...	1·40	31	17	...	...	...	...	...	...
	Culloden	·99	— ·79	...	...	...	77·0	19	30·0	29	1	12	
XIX.	Dunrobin	2·62	...	·42	16	18	64·5	7	31·5	10	2	...	
	Kirkwall (Swanbister) .....	...	...	...	...	...	...	...	...	...	...	...
XX.	Cork (Blackrock)	3·24	+ 1·08	·53	18	14	73·0	22 ^b	36·0	4	0	...	
"	Dromore Castle	3·80	...	·77	18	11	...	...	...	...	...	...
"	Waterford (Brook Lodge) ...	2·42	...	·75	29	11	70·5	24	34·0	12	0	...	
"	O'Briensbridge (Ross)	2·55	...	·67	19	16	73·0	24 ^c	42·0	13 ^g	0	...	
XXI.	Carlow (Browne's Hill)	2·48	+ ·36	·75	29	12	...	...	...	...	...	...
	Dublin (FitzWilliam Square)	·98	— ·74	·25	29	11	68·7	7	36·9	4	0	7	
XXII.	Ballinasloe	2·53	+ ·12	·46	29	18	68·0	22 ^d	33·0	4	0	...	
XXIII.	Waringstown	2·83	+ ·72	1·30	29	11	77·0	23	31·0	8	3	4	
"	Londonderry (Creggan Res.) ..	2·12	...	·55	29	18	...	...	...	...	...	...
"	Omagh (Edenfel)	2·24	— ·11	·68	29	16	72·0	23	31·0	8	1	...	

^a And 20, 30. ^b And 23, 24. ^c And 27. ^d And 25, 26. ^e And 11, 12. ^f And 12. ^g And 14.

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

METEOROLOGICAL NOTES ON MAY, 1888.

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

ENGLAND.

STRATHFIELD TURGISS.—Vegetation made progress, which, though steady, was by no means rapid, owing to cold nights and blasting easterly winds. The rains of the 16th and 17th produced most wonderful plant-development. There was abundant sunlight, but R and a warmer atmosphere were much required at the close. Ash in flower on 5th; beech in leaf on 7th; elm in leaf on 13th; oak in leaf on 19th. Wasp first seen on 8th; meadow brown butterfly on 26th.

ADDINGTON.—A dry month, with very high wind and showers on the first three days. R much needed at the close to help on the hay crop, which promised to be both light and late. The nights were generally very cold, the min. temp. exceeding 50° only twice. H on 3rd; much L in N.W. on the evening of 18th. Nightingale heard on 9th.

LANGTON HERRING.—On the whole a very fine month. Mean temp. at 9 a.m. (52°·9) 0°·7 below the average of 16 years. From 17th to 28th the weather was very fine. Fog on 6th, 7th, 8th, 17th and 18th; distant T on 18th. Owing to the long winter, the season was very backward. Hawthorn not in bloom till 26th; blackthorn still in bloom at the close.

BODMIN.—A remarkably fine month. Mean temp. 54°·1.

WOOLSTASTON.—The first fortnight was very cold and backward, but the latter part of the month was more genial. Springs were quite exceptionally low, and in some cases altogether ceased running. Swallows were very late in arriving, and very few in number. Very vivid L on 18th; T and L on 19th.

ORLETON.—The weather was generally fine, with more than the average number of clear days and cold nights, and a prevalence of N. and E. winds. Mean temp. 0°·4 above the average of 27 years. R not one-third of the average. Pressure generally high and steady, but very rough winds on 1st, 3rd, 19th and 30th. Solar halo on the 9th. Damson and cherry trees generally in blossom about the 8th, and apple trees about the 23rd.

BOSTON.—The mean temp. was not below the average, although the nights were cold and the weather of part of the month was very ungenial. All vegetation was backward. R 1·07 in. below the average of 20 years. Cuckoo heard on 5th.

MANCHESTER.—On the whole a very fine month, but cold winds prevailed through the greater part; towards the middle, the temperature rose somewhat, but, after reaching 77° on the 19th, it fell off again. Vegetation, however, made rapid progress from that time. T on 19th.

HULL.—Generally fine, with light clouds and frequent strong cold winds.

WALES.

HAVERFORDWEST.—A fine May, with an absence of frost, except very slight white frosts. From the 17th to 25th, it was warm, with bright sunshine; then three rather cold nights, from 25th to 27th, checked vegetation somewhat. The last three days were cold and stormy, and the wind injured the young leaves a good deal, especially those of the horse chestnut in exposed situations. The whitethorn blossomed on the 28th; the ash and the oak were in leaf nearly contemporaneously—if there was any difference, it was rather in favour of the ash. All crops, and the country generally, were looking extremely well at the close. The R from January 1st was 1·22 in. less than that of the corresponding period in 1887, but the different distribution produced very different results.

SCOTLAND.

CARGEN.—Great fluctuations of temperature occurred on several occasions. Vegetation was very backward, lilac and laburnum being ten days or a fortnight later than usual. Several horses and some cattle were killed in the district by a severe TS on the 19th; TSS on 16th and 18th also; H on 4th.

JEDBURGH.—Remarkably dry, with cold E. and N.E. winds generally. On several days the temperature was high, but the night temperature was always low. The dry state of the ground allowed it to be well prepared for the turnip and potato crop. Pressure high throughout. Cuckoo heard on 11th; corn-crake on 18th.

OBAN.—The early portion of the month was cold, and was succeeded by heat from the 17th to the 26th, when growth rapidly started; at the end, however, the temp. was even lower than at the beginning. In connection with the severe TS in Glasgow and Edinburgh on the 19th, which was but slightly felt here, we experienced an extraordinary heat wave throughout the whole of the day, which exhibited a temperature previously quite unknown at the time of year within my experience of eight years. At 10 p.m. on that day, the wind suddenly shifted from a perfect calm in S.S.E. to S.W., and blew a whole gale (force 9) for about 15 minutes, accompanied by R. The total rainfall was the heaviest in May for many years, but everything was backward at the close for want of continued heat. H on 4th, 19th and 31st. T on 17th, 18th and 19th.

LOCHERROOM.—The first third of the month was really wintry, the next third was beautiful. On the 19th there passed over the country one of the most terrific thunderstorms remembered. Thence the weather continued fine till the 30th, when it again changed to severe cold, and the last day was one of the wildest ever seen at the time of year. T on 4th and 19th; H on 3rd and 8th; S on 2nd, 3rd and 8th.

CULLODEN.—A month of low temperature, with continued frost at night. T on 19th, with a beautiful display of L for several hours at night.

IRELAND.

BLACKROCK.—Just the variable, moist and warm weather required to bring vegetation to its normal state. The total rainfall to the end of May was 8.17 in. below the average of 23 years.

DROMORE.—A fine month, with good growth; all crops promising at the close.

WATERFORD.—Mean temp. $50^{\circ}9$; rainfall 15 in. above the average. H on 2nd; fog on 7th and 22nd; S.W. gale on 30th. Corn-crake heard on 6th.

O'BRIENSBRIDGE.—The mean temp. ($57^{\circ}6$) was above the average of 10 years. With sufficient R, and many dry, warm days; vegetation was in a forward state at the close, and orchards and hedgerows were in finest bloom.

DUBLIN.—Very stormy, rough and unsettled, both at the beginning and at the end. May was, nevertheless, a bright, dry, pleasant month. The rainfall was scanty, and in an anticyclonic period, lasting from 20th to 26th, the sky was for the most part cloudless. As in May, 1887, there was a preponderance of polar winds. The gales of 1st, 2nd, 3rd, 30th and 31st, were very severe for the season. Mean temp. ($52^{\circ}5$) $0^{\circ}6$ above the average. T on 2nd; H on 2nd and 3rd; solar halo on 15th; fog on 10th, 11th and 27th. Mean humidity 74; mean amount of cloud 4.4.

EDENFEL.—The month commenced with stormy backward weather, with considerable falls of H and R, succeeded on the 6th by a fine, bright, growing period, during which the advance of vegetation was magical. The third week was again inclement and rainy, but from the 20th to the 28th there followed a brilliant spell of early summer, warm and clear, changing a season which in the beginning of the month was a full fortnight late with the hawthorn hardly in leaf, into one earlier by a week than the average, with oak and ash in leaf and blossom, and a most luxuriant general vegetation. The last three days were very wet.