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CYCLONE IN BENGAL.

ALTHOUGH there is certainly no present proof of community of origin, it is at least a singular coincidence, that almost at the very same moment that Tortola was being laid low by a cyclone unequalled in destructive power for thirty years, "Calcutta was astonished at a return of wet weather," followed in a few days by a violent Cyclone.

The disasters in Bengal were far heavier than in the West Indies, but as only three years have elapsed since the former district suffered from one of the most destructive storms on record, the present catastrophe has been deemed less important than it otherwise would have been. The cyclone of October 5th, 1864, swept over Calcutta in the day-time, yet 50,000 lives were lost, and property worth upwards of two millions was destroyed. In 1867 the lives lost are computed at 3000.

The following extracts from the *Calcutta Englishman* give a vivid description of what is often deficient—namely, the premonitions of the storm.

"For weeks past the weather has been a foremost topic of conversation. The rains had apparently ceased, when Calcutta was astonished, on 26th October at a return of wet weather. During all last week rain seemed threatening, and on Thursday the threat began to be fulfilled. The sky on Friday was overcast and lowering, the pall of cloud was unusually low, and masses of scud were whirled swiftly away to leeward all day long. The gloom of the day was added to by frequent rain-squalls; the day, in fact, was just one of those for which November in England has acquired so unpleasant a reputation. As the day wore on the signs of bad weather increased. About three o'clock the barometer began to show signs of falling, and the wind came down in fiercer gusts. Matters remained in this state till dusk, when it was evident to the most careless that Calcutta was about to be visited by a storm, which would rival the now famous Cyclone of 5th October, 1864. Men went home from office to hurry through dinner and prepare for the struggle, and although some daring spirits went to the Opera, they were the exception. At ten o'clock, the fastenings of doors and windows began to be severely tasked, and the storm rushed over the city with a heavy murmurous roar, like a fierce surf beating on a shingle beach. This roar never lulled until daylight, but every few minutes it swelled up into a thunder of wind and rain, marking the approach of heavier squalls. Up to half-past one the storm was content with rattling doors and windows furiously, but now it forced its way into the well-guarded dwellings of the European portion of the city, and tore off here a sash, here a venetian, here a door. The houses shook under the force of the blows dealt them, and often and anxiously were the time-pieces consulted to see how the night wore away. Soon after two, however, there was a sensible

abatement of the storm, the gusts were as fierce as ever, but the intervals between them were longer. By half-past three the strength of the gale had greatly abated, and by four the hurricane had become a strong westerly gale, and people began to count up the damage they had sustained, and to hope for daylight, to enable them to ascertain the losses of their neighbours. Few slept last night, and there are few who could wish to pass such another night, or to battle again with a gale which has wrought the city, as much, if not more, injury than even the great cyclone."

"The following is the official report from Mr. Blandford, the Meteorological Reporter, on the storm of Friday night :—On the night of 1st and 2nd November, Calcutta was visited by a severe cyclone, the centre of which passed to the east of Saugor Point and Calcutta, in a northerly direction. Threatening indications were noticed in the telegrams, received on the morning of the 1st, from Saugor Point and Cuttack, and the probability of an approaching storm was strengthened by a report sent from the former place at 12 h. 30 m. These, with the subsequent reports from Saugor Point at 16 h., 17 h. 30 m., and 19 h. were communicated at once to the Master Attendant of the Port, but up to 19 h., the wind at Saugor Point shewed no sign of veering, and it was uncertain whether the cyclone had actually formed. At 20 h. no distinct telegraphic report could be received from Saugor, and the 19 h. telegram is the latest information received thence up to present date. At Calcutta the wind was from N.E., and shortly after dusk became fitful and threatening, the gusts gaining gradually in strength until they reached their maximum between 2 and 3 a.m. of 2nd (?). The wind was at first from the N.E. veering gradually to N. and to N.W., which was its average direction when most severe. The lowest barometric reading at the Surveyor General's office was taken at 3 a.m., *viz.*, 28.6 inches.

"The maximum force could not be recorded, owing to the destruction of the anemometer at 2 a.m. The storm abated, and the barometer rose rapidly after 3 a.m."

"A native correspondent at Jessore, writing on the 3rd November. sends us the following :—

"'Jessore has been swept by the terrible cyclone, unprecedented in the history of this little station. From the evening of the 29th October to 11 p.m. of 1st November, it rained heavily. At half-past eleven, a burning brilliant cloud was first observed in the north-east corner of the station. All thought at first that it was a fire, but it was not so ; for the storm soon began, and changed its direction as the sky-flame changed its position, *i.e.*, from north to east, to south, to west—to north-west, whence in the morning it disappeared. It was not a cloud, for clouds were distinctly seen running fast below it. When it was in the north-east several houses at Jhoonjhoonpoor (a small village north-east of the station) were burnt ; when it was in the north-west fire set into some of the houses at Poorono Kuslea (a village north-west of this station) ; similarly to some houses in another village in the east. I have yet received no news from south and west. The fires may have been accidental, but the brilliant flame, which guided the course and direction of the great cyclone, deserves enquiry. The spiritualists here attribute it to supernatural agency, but let the materialists, or the so-called scientific world explain the phenomenon ! It was not a delusion, for it was observed by the majority of the residents. I write you to know this, for you have many literary and scientific readers, who, I hope, will kindly come forward and explain to us (ignorant men) the mystery of this mysterious flame !!!

"'Except a few *pucca* houses, all gone down ! Rice crop at once ruined, prospect of winter crop very gloomy, and the people know not what to do. They attribute all these to the sins of their rulers. I am glad, however, to inform you that our magistrates are doing all that humanity could wish, or energy act.'

"This letter mentions a phenomenon preceding the storm which we do not remember to have heard of before, in connection with cyclones. Several correspondents have, however, spoken of a peculiar luminous appearance in the atmosphere at the height of the storm. The subject is one well worthy of investigation."

The following barometric returns show that the rate and amount of depression was much less in the Calcutta than in the Tortola Cyclone—

and (though the anemometer broke down) there is no doubt that the wind force was proportional to the depression, and far greater at Tortola than at Calcutta; yet the loss of life was greatest at Calcutta, the reason being perhaps that the houses in the West Indies are better adapted to resist the hurricanes which are there of such frequent occurrence.

Reading of Marine Barometer at Calcutta, October 29th to Nov. 2nd.

	Inches.	Fall per hour.	Rise per hour.	Wind.
Oct. 29th— 6 a.m.	30·08	...	...	...
noon.	·08	·000	·000	...
8 p.m.	·06	·003	...	...
30th— 6 a.m.	·04	·002	...	...
noon.	·02	·003	...	...
8 p.m.	30·00	·003	...	...
31st— 3 a.m.	29·99	·001	...	...
7 a.m.	·98	·003	...	...
noon.	·97	·002	...	...
4 p.m.	·97	·000	·000	..
8 p.m.*	·98	...	·003	..
midnight	·96	·005	...	N.E.
Nov. 1st— 4 a.m.	·96	·000	·000	...
6 a.m.	·97	...	·005	...
9 a.m.	·97	·000	·000	...
noon.	·90	·023	...	...
2 p.m.	·84	·030	...	...
4	·82	·010	...	...
6	·78	·020	...	...
7	·74	·040	...	...
9	·70	·020	...	N.E.
10	·58	·120	...	N.E.
11	·38	·200	...	N.N.E.
12 p.m.	29·16	·220	...	N.
2nd— 1 a.m.	28·96	·200	...	N.W.
2	28·90	·060	...	W.N.W.
3	29·10	...	·200	W.
4	29·26	...	·160	W.
5 a.m.	29·50	...	·240	W.S.W.

* At sunset remarked an unusual lurid red haze.

Reading of Barometer at Different Stations.

Stations.	November 1st.				November 2nd		Min. of Barometer.	
	3 p.m.	6 p.m.	9 p.m.	Midngt	3 a.m.	6 a.m.	Reading.	Hour.
Contai, Hidgelle .....	...	...	29·25	29·25	29·50	29·65	29·18	11.15
Fort Gloucester (Aner.)	29·90	29·86	·72	·30	·40	·76	29·14	1.15
" " (Symp.)	·60	·57	·48	·20	·28	·51	28·90	1.15
" " (Marine)	·68	·63	·51	·08	29·16	·51	·91	1.15
Calcutta (Aner.) .....	...	...	·54	·00	28·96	...	·70	1.30
" St. Xavier's Coll.	29·68	29·64	·52	·00	29·00	29·62	·69	1.30
" " (Aner.)	...	·72	·62	·17	·13	·65	·85	1.35
" Durham .....	...	·75	·45	·00	·00	·60	·70	1.40
" " (Marine)	29·83	·78	·70	·16	·10	·60	·90	2.0
Cossipore.....	...	·86	·73	·38	·07	·58	·95	2.0
Dum Dum .....	...	...	·78	·42	·07	·63	·94	2.15
Ooterparah	29·84	29·82	·68	·24	·01	...	·85	2.30

From the above it will be seen that the maximum rate of depression was about .25 in. per hour, and that only for a short time; this is about double the rate of fall in this country, but it is only one-third the rate in the West India Cyclones, where the barometer falls *three-quarters of an inch per hour*.

IS THE ROYAL CHARTER GALE PERIODIC?

WE anticipate an immediate negative reply to the above query, but that will not deter us from examining the facts, at least such as are readily within our reach.

NOTES ON WEATHER IN OCTOBER.

- 1820. *London*.—Lowest barometer in the year on the 25th.
- 1845. *Birmingham*.—Greatest wind force 9 lbs. on 20th at 11.15 a.m.
- 1846. *Nottingham*.—Greatest rainfall in the year on 19th.
- 1847. *Uckfield*.—Gale from S.W. on 23rd; showers of rain and hail on 24th.
- „ *Cambridge*.—Only once has the bar. fallen suddenly—on 22nd.
- 1848. *Uckfield*.—Strong gale on 9th; none mentioned afterwards.
- 1849. „ Dull month, no gales.
- 1850. „ Gale on 6th; on 23rd continuous rain and heavy S.W. gale.
- 1851. „ Mostly fair and mild; no gales.
- 1852. *Helston*.—Barometer lowest on 26th.
- 1853. *Uckfield*.—Severe thunderstorm, with heavy rain and hail, on 27th.
- 1854. *Hull*.—Lowest barometer in month on 22nd.
- 1855. *Uckfield*.—Barometer very low during the last week. Very stormy 4th to 6th, and about 26th.
- 1856. „ Remarkably fine throughout.
- 1857. No particulars at hand.
- 1858. *Norwich*.—High wind on 7th and 19th; stormy on 29th.
- „ *Nottingham*.—Gale on 18th and 19th; barometer high at the end of the month.
- 1859. Royal Charter Gale on 25th.
- 1860. *St. Kilda*.—Hurricane on 3rd.
- „ *Dublin, Sheffield, Glasgow*.—Lowest barometer on 18th.
- „ *Helston*.—Lowest barometer on 11th.
- „ *Manchester*.—Lowest barometer on 13th.
- 1861. *All Stations*.—Lowest barometer on 11th; no gales, and high barometer at the end of the month.
- 1862. *Bedford, Retford, Sandwich, &c.*—Very stormy from 19th to 27th.
- „ *Silloth*.—On 19th barometer fell an inch in 8½ hours.
- „ *Birmingham*.—On 19th barometer “lower than since Royal Charter storm.”
- 1863. *Penzance*.—Gale on 13th.

1863. *Haverfordwest*.—From 24th to 31st very stormy, with hail.
 „ *Markree*.—Gales from 28th to 30th.
 „ *Calne, Leckpatrick, Killaloe, Dumfries, &c.*—A series of gales, with hail and thunder, on 29th, 30th, and 31st.
 „ *Sandwick*.—Gale blowing 74 miles per hour on 30th.
 1864. *Truro*.—Minimum barometer on 22nd.
 „ *Boston*.— „ „ „ 23rd.
 „ *Retford*.— „ „ of the year on 23rd.
 „ *Penzance*.—Gales from 21st to 27th.
 „ *Aldershot*.—Gales from 1st to 5th, and 19th to 24th.
 „ *Dumfries*.—Violent gale on 20th.
 „ *Scotland and Ireland*.—Excessive, if not unprecedented, rains from 19th to 24th.
 1865. *London*.—Lightning on 29th.
 „ *Selborne*.—Splendid aurora on 19th ; thunder on 29th.
 „ *Banbury*.—Lightning on 7th, 26th and 29th.
 „ *Wisbech*.—Gale (12lbs.) on 25th ; squally at end of month ; auroræ on 19th and 26th.
 „ *Culford*.—High wind on 25th.
 „ *Taunton*.—Thunderstorm at 4.30 a.m. 25th.
 „ *Arnccliffe*.—Violent storm on 24th, with snow and hail.
 „ *Haverfordwest*.—Heavy gale 29th to 31st ; much damage to shipping.
 „ *Portree*.—Gale on 24th from S.W. ; 25th, N.W. and N. ; 27th, heavy gale from N.
 [For further details see *British Rainfall*, 1865, pages xxxiii.-iv.]
 1866. *Linton*.—No high winds.
 „ *Wisbech*.—Strong wind only on one day, 30th.
 „ *Seathwaite*.—Tremendous rain on 29th.
 „ *Haverfordwest*.—First fortnight calm, afterwards stormy, especially 28th and 29th, when it blew a heavy gale.
 „ *Deanston*.—Little or no wind except on 29th.
 „ *Ballater*.—Blew hard on 29th.
 1867. [See meteorological notes, *Meteorological Magazine*, pp. 121 and 122.]

So much for the evidence ; to what does it amount ? Apparently to this—that in two Octobers out of three, there will be a gale on or about the 25th, and that it is frequently accompanied by electrical phenomena, thunder, lightning, and hail, also by snow. It would seem that gales in the middle of October are rare, and that they generally occur in the first or the last week. We have thrown out the suggestion, and, so far as time permits, attempted to test it ; we leave it with the hope that some one will find leisure to confirm it or to contradict it.

[The above article was in type before we had heard of the cyclones of Tortola and Bengal ; far be it from us to suggest that in their dates and almost simultaneous occurrence there is either proof of common origin, or confirmation of the *possibility* shadowed forth above.]—ED.

REVIEWS.

The Life Boat, No. 66, October, 1867.—Published at the Office of the National Life Boat Institution. 24 pages and map.

THIS ably conducted quarterly is as interesting as usual. It begins with a very impartial article on "The salvors of property on the English coasts," discussing the questionable demands on foreigners often made by the 'long shore men of the Suffolk coast, and which is most appropriately introduced by the lines of Burns—

"Oh ! wad some power the giftie gie us,
To see oursel as others see us,
It wad frae mony a blunder free us."

Then follow notices of additional life boat stations, and a capital map, showing the localities and number of wrecks in 1866, and various tables. One of these raises a question which merits examination ; it is this : during the six years 1859-64, the average number of casualties with the wind blowing a strong gale was 15, and the greatest, 16 per cent. of the wrecks in all weathers. In 1865 the number was doubled, being 33 per cent., and in 1866, 32 per cent. Does this bear any connection with the stoppage of the FitzRoy storm signals ?

Report of the Sanitary Committee of the Town of Nottingham.—
Nottingham : J. N. Dunn, 1867 ; 25 pages.

Shows that they look sharply after their business, and are conscious of the important bearings of meteorology on sanitary matters.

Proceedings of the Manchester Literary and Philosophical Society
Vol. VII. No. 4.

THIS is meteorologically a most interesting and important number, almost every article bearing on radiation in one or other of its many branches. The first communication is by Dr. J. P. Joule, F.R.S., "On a Thermometer unaffected by Radiation," which consists of a double cylinder, in the inner of which hangs a spiral of fine wire suspended by a filament of silk, and carrying a mirror ; this instrument is so delicate that 1° Fahrenheit produces an entire revolution of the mirror. The second paper is an elaborate discussion of the Oxford solar radiation observations, by Mr. Baxendell, F.R.A.S. ; the conclusions arrived at being—

1st. That the calorific intensity of the sun's light is subject to periodical changes, the maxima and minima of which correspond respectively with those of solar spot frequency.

2nd. That the intensity of a ray of direct sunlight on its arrival at the earth's surface, in the latitude of Oxford, is greater in April and September than in June, when the sun's meridian altitude is greatest.

3rd. That the curve representing the mean monthly values of solar radiation on cloudless days has its times of maxima and minima corres

ponding with those of the curve representing the mean monthly diurnal ranges of the magnetometer.

4th. It seems probable that the heating rays of the sun consist of two kinds, differing considerably in intensity, and being subject to periodical changes, the times of maximum of one kind and those of minimum of the other corresponding respectively to the maximum frequency of solar spots.

5th. That the oscillations of mean daily temperature are intimately connected with the changes which take place in the earth's horizontal magnetic intensity.

In these deductions Mr. Baxendell has opened new paths of investigation, which we hope will soon be well trodden. But we trust he and his followers therein will look well to the data they employ, and if they elect to proceed upon black bulb thermometers without jackets, we would advise them to clear away as far as may be the uncertainties inseparable from those instruments. We press this point strongly, because Mr. Baxendell terms the Greenwich observations "anomalous and unsatisfactory," which may be the case, but is not to our mind at all proved by the evidence quoted.

"Take, for instance, any winter month—say, December, 1857. The mean difference for the month between the maximum in sun and the maximum in shade was only $1^{\circ}7$; at Oxford it was $6^{\circ}1$. The highest value during the month was $4^{\circ}5$ at Greenwich: at Oxford it was $19^{\circ}0$. At Greenwich there were only seven days on which the difference exceeded $3^{\circ}0$: at Oxford there were seventeen. And yet at Greenwich the month was unusually fine and dry, only 0.36 of an inch of rain fell, and several days appear to have been nearly if not quite cloudless. Under these circumstances, it is difficult to understand why the black bulb thermometer, if properly exposed, did not register much greater differences."

Surely the smoke of the millions of London chimneys is ample reason for diminished intensity of solar action, was our first impression on reading this; but surely a Manchester man would never forget *smoke*. We have therefore investigated the question, and although not so thoroughly as we hope to do on a future occasion, believe the results are sufficiently interesting to merit notice.

In order that *all* may be able clearly to understand the points at issue, we must premise a few definitions.

Max. in air = Highest temperature of air in perfect shade.

Max. in sun = Indifferently applied to black bulb thermometer, whether in a vacuum jacket or not.

Amount of solar radiation = Excess of reading of either form of black bulb thermometer above temperature in shade.

Black bulb max. = A maximum thermometer with the bulb blackened so as to retain the heat which falls upon it.

Vacuum black bulb = Similar to the above, but enclosed in a glass jacket, and with the bulb in the centre of a glass sphere about 2 inches in diameter, whereby the wind is prevented from carrying off the heat imparted to the bulb.

Let us first see how the Greenwich returns agree with the other metropolitan stations; and as there were in 1857 only two others pro-

vided with black bulb max. thermometers, and as moreover January, 1857, is recorded at Greenwich to have had the same solar radiation as December, 1857, we will take both cases :—

STATIONS.	Amount of Solar Radiation. Ordinary Black Bulb.	
	Jan. 1857.	Dec. 1857.
Whitehall	1°3	2°9
Paddington.....	1·8	1·1
Mean	1·55	2·0
Observed at Greenwich...	1·7	1·7
Difference	+ 0·15	— 0·3

From this it is abundantly clear that if Greenwich was wrong, so were the other metropolitan stations.

We will now adopt another mode of examination—viz., by tabulating a few results from other stations :—

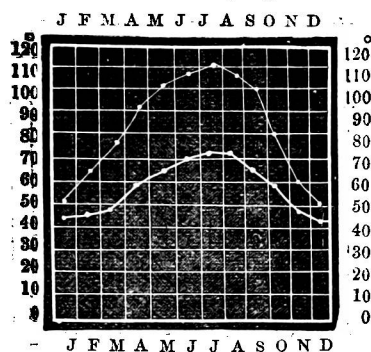
	OXFORD (6 years).		CAMDEN TOWN (7 years).	
	Amount of Solar Radiation, Ordinary Black Bulb.		Amount of Solar Radiation, Vacuum Black Bulb.	
	Degrees.	Per Cent. of Monthly Mean.	Degrees.	Per Cent. of Monthly Mean.
January ..	5·51	52	9·4	38
February..	9·16	86	17·2	68
March	10·08	95	25·9	103
April	13·23	124	33·1	131
May.....	12·90	121	35·9	142
June.....	12·93	122	37·5	149
July.....	13·81	130	37·8	150
August ...	14·03	132	35·9	143
September.	13·71	129	31·8	126
October ...	9·66	92	20·1	79
November..	8·00	75	11·8	47
December..	4·50	42	6·0	24
Mean ...	10·6		25·2	

From this it appears that the amount of radiation indicated by vacuum thermometers is twice that by unprotected ones, and if so, we at once establish the necessity of clearly discriminating between the two classes of instruments. We also see that even in the mean of seven years, and with a thermometer in vacuo, the radiation in December in London is not one-sixth of what it is in the summer; hence again we see that it is no proof of the Greenwich observations being wrong to quote a month wherein the solar radiation was 1°7; why one-sixth of the *mean* Oxford summer value is 2°·2.

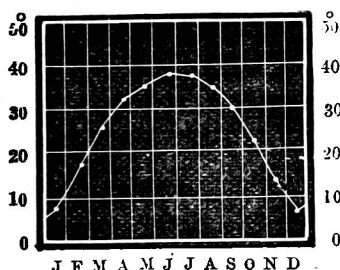
The subject is further elucidated by the following diagrams. Fig. 1 shows the monthly march of the sun and shade temperature during

seven years as observed with a Vacuum Black Bulb Thermometer at Camden Town. Fig. 2 shows on a more open scale the curve of solar radiation from the same observations, and fig. 3 shows the remarkably flat Oxford curve.

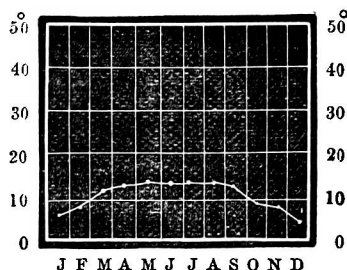
Mean monthly max. temp. in shade and in sun (Vacuum Max.) at Camden Town, 7 years.



Mean Monthly Amount of Solar Radiation at Camden Town, 7 years Vacuum Max.



Mean Monthly Amount of Solar Radiation at Oxford, 6 years Ordinary Black Bulb.



The third paper is by Mr. Vernon, on the results of Solar Radiation Observations made at Old Trafford, Manchester, during eleven years. They were made with an ordinary black bulb thermometer, but the results accord better with the vacuum Camden Town observations than with the Oxford ones, which seem remarkably uniform (flattened) in the summer months.

The last paper is by Mr. Mackereth, of Eccles, on "A Comparison of Solar Radiation on the Grass and at Six Feet from the Ground." They only extend through October, 1867, but show that the means were—

Black bulb on grass.....	59.0
" " 6 ft. above.....	62.9
Vacuum " on grass.....	64.6

Mr. Mackereth wisely concludes in the following words :—

"These results show how important it is that some definite principle should be adopted in the placing of solar thermometers, as certainly no comparison can be made between the amount of solar radiation at any two or more places, unless some common plan of placing the instruments be adopted."

DECEMBER, 1867.

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.
		Total Fall.	Differ- ence from average 1860-5	Greatest Fall in 24 hours.		Deg.	Date.		Deg.	Date.			
				Inches.	In.						Dpth.	Date.	
I.	Camden Town	1.59	+ .10	.52	1	13	54.9	1	22.5	10			
II.	Staplehurst (Linton Park) ...	2.42	+ .59	.62	1	18	53.0	1	19.0	10			
	Selborne (The Wakes).....	1.49	+ 1.26	.79	1	9	50.0	1	12.0	10			
III.	Hitchen	1.56	+ .25	.49	1	16	54.0	1	13.0	8			
"	Banbury	1.56	+ .11	.63	1	19	54.0	1	23.0	4			
"	Wisbech	2.43	...	.67	1	14	56.8	16	20.1	10	
IV.	Bury St. Edmunds (Culford).	2.66	+ 1.17	.70	1	12	55.0	1	14.0	9			
V.	Calne	1.65	...	.69	1	12	56.5	1	18.4	4	
"	Plymouth (Goodamoor)	4.02	- 1.91	...	...	...	45.0	...	28.0	...	
"	Barnstaple	3.16	+ .05	.58	6	21	...	...	...	...
"	Taunton (Fulland's School)	1.48	- 1.04	.46	2	8	...	...	22.5	4	
VI.	Shrewsbury (Highfield)	1.89	+ .21	.65	2	12	...	...	...	...
"	Tenbury (Orleton)	1.60	- .86	.44	20	19	56.8	15	20.0	4			
VII.	Leicester (Wigston)	2.09	+ .57	.42	21	10	56.0	1	18.0	8			
"	West Retford .....	...	...	...	...	...	...	...	...	...
"	Derby	1.65	+ .10	.50	2	15	55.0	1	22.0	20			
VIII.	Manchester	3.98	+ 1.64	.80	15	20	55.0	16	22.0	4			
IX.	York	1.72	- .08	.38	1	13	52.0	1, 16	22.5	3			
"	Skipton (Arncliffe) ...	2.94	- 1.61	1.00	14	13	...	...	...	...
X.	North Shields	2.34	+ .14	.39	7	19	55.0	16	26.0	3, 4			
"	Borrowdale (Seathwaite).....	13.04	- 3.91	1.60	15	16	...	...	...	...
XI.	Abercarn	2.76	...	.91	1	7	54.0	16	25.0	29	
"	Haverfordwest	3.73	- 1.10	.75	21	13	55.0	1	22.0	28†			
"	Rhayader (Cefnfaes).....	2.95	- .34	.50	14	18	52.0	...	19.0	...			
"	Llanberis (R. Victoria Hotel)	...	...	...	...	...	...	...	...	...
XII.	Dumfries	2.05	- 1.41	.48	20	16	52.0	11	22.5	31			
"	Hawick (Silverbut Hall)....	1.48	...	.28	21	16	...	...	...	...
XIV.	Ayr (Auchendrane House) ...	3.80	- .22	.94	4	12	56.0	9	20.0	20			
XV.	Otter House .....	...	...	...	...	...	...	...	...	...
XVI.	Leven (Nookton)	1.44	- 1.34	.33	23	13	54.0	16	24.0	2			
"	Stirling (Deanston)	3.25	- .95	.64	14	18	53.8	16	22.0	19			
"	Logierait	1.76	...	.38	14	13	...	...	...	...
XVII.	Ballater	2.21	...	.38	6	16	53.8	16	18.0	3||			
"	Aberdeen	2.52	...	.34	2	20	52.3	11	25.2	2	
XVIII.	Inverness (Culloden)	1.88	...	.54	16	...	51.4	11	22.5	2	
"	Fort William	7.03	...	.97	16	21	...	...	...	...
"	Portree	10.36	- 5.27	2.20	4	21	35.0	6	25.0	2, 3			
"	Loch Broom	7.91	...	1.07	16	27	...	...	...	...
XIX.	Helmsdale	4.21	...	.61	5	18	...	...	...	...
"	Sandwick	3.87	- .10	.59	21	27	49.5	26	23.5	2			
XX.	Cork	1.50	...	1.04	24	9	...	...	...	...
"	Waterford	1.33	- 3.09	.44	23	18	59.0	15	23.0	8			
"	Killaloe	1.90	- 1.59	.28	4	14	53.0	23	20.5	7			
XXI.	Portarlinton	1.98	- 1.21	.72	1	23	53.0	14	21.5	7			
"	Monkstown	1.06	- 1.56	.26	14	13	55.3	15	26.0	7			
XXII.	Galway	2.23	...	.37	4	18	52.0	13	25.0	31	
"	Bunninadden (Doo Castle) ...	2.97	...	.38	1, 14	18	53.0	16	19.0	7	
XXIII.	Bawnboy (Owendoon)	2.74	...	.60	4	20	54.0	15	26.5	6	
"	Waringstown	1.98	...	.33	18*	18	53.0	15†	24.0	6, 30	
"	Strabane (Leckpatrick)	2.51	...	.47	4	18	54.0	17	24.0	7	

* And 20th. † And 16th, & 22nd. ‡ And 31st. || And 19th & 31st.

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

METEOROLOGICAL NOTES ON THE MONTH.

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.

LINTON PARK.—The first 11 days wintry, afterwards chiefly dull, raw, and cold. High winds on 1st, with bar. 28·65. Dark nights and dirty roads the prevailing features of the latter part of the month.

SELBORNE.—Fog on 25th and 30th, and on the 27th a very dense one; diffused aurora on night of 22nd. Bar. 28·48 on 1st; the fluctuations both of the thermometer and barometer, as well as the wind, have been most remarkable.

BANBURY.—Dense fog on 26th and 27th.

WISBECH.—Gale on morning of 2nd, 14 lbs.; lunar halo on 9th and 10th; fog on 25th and 26th.

CULFORD.—High wind on 1st; S on 2nd, 3rd, 6th, 7th, 8th, 18th, and 20th; dense fog on 26th.

ORLETON.—Very warm on the 1st, then cold and frosty till the 11th, warm and pleasant till the 18th; the remainder of the month cold and frosty, with much fog, especially on 26th and 27th; frequent falls of fine R with S occasionally, but not remaining on the ground. Temp. more than 2° below the average of the month; very cloudy, violent winds, &c.; low bar. on 1st and 2nd.

WIGSTON.—Great and sudden changes in the weather during this month; frequent S showers, and more than the usual number of frosty nights.

MANCHESTER.—Fine lunar halo on 10th in evening.

ARNCLIFFE.—A very fine month, dry and clear.

NORTH SHIELDS.—Lunar halos on 6th, 8th, 9th, and 14th; fog on 1st & 27th.

SEATHWAITE.—Nearly 4 inches below the average, though having eight days on which the fall exceeded an inch. A moist, damp month, with but little frost; last week remarkably fine.

WALES.

ABERCARN.—Heavy rain storm on 1st, bar. 28·6; on the 2nd a great and sudden change of temperature, the max. being 51° in the day and 31° at night. A dry, calm month, generally fine and genial weather, but cold.

HAYERFORDWEST.—December commenced cold, wet, and stormy; heavy fall of S, with severe gale from N.N.W., followed by sharp frosts; the month generally was about the average of cold, wet, and frost, there having been eleven frosty nights; the year ended with intense frost, clear sky, and N.E. wind.

CEFNFAES.—A month of variable weather; nights frosty, rain in the afternoons; prevailing winds, N.W. and N.E.

SCOTLAND.

DUMFRIES.—The weather has been variable, but on the whole favourable for the season; a few days' keen frost in the first week; the second week fine and mild; in the third week some frost, followed by several foggy days; the month closed fine and frosty. Temp. 3°·5 below that of corresponding months; S on 2nd, 5th, 18th, and 20th.

HAWICK.—December, except at the beginning of the month, has been mild, moist, and misty. All kinds of farm out-door works have been prosecuted with vigour, and ploughing is much farther advanced than it usually is at this season of the year; fortunately, also, for out-door labourers, the openness of the weather has allowed all sorts of work to go on without interruption.

AUCHENDRANE.—The amount of cloud and the temperature are below the average (for December) of 11 years; as is also the velocity of the wind, but there was a very severe storm of the rotating kind on the 1st and 2nd. The rainfall, though considerable, is below the average; the temperatures have been variable, indicating the alternating influence of the Polar and Equatorial currents. The weather throughout December may be stated as very fine for the season of the year, and very superior to that of December, 1866.

NOOKTON.—Month variable—mild and fine, again cold and stormy.

DEANSTON.—Gale on evening and night of 1st from N.N.E. ; also on the night of 6th from N.W. ; weather very dry till the 14th ; no S during the month, except about three-quarters of an inch on the evening of the 20th, and no severe frosts, 22° being the lowest temp.

LOGIERAIT.—A continuance of strong easterly gales from 1st to 8th ; considerable rainfall on 14th and two following days. On the whole a very fine month, many of the days quite spring-like.

BALLATER.—Sharp S storms in early part of the month ; latter part fine for the season, with a steady high bar. Bat seen flying on the evening of the 26th. Fresh S storm commenced on the 31st ; it has come on about the same time for the last four years.

ABERDEEN.—Bar. and Ther. a little above the average, and rainfall a little below it. N.W. and S.W. winds rather more frequent than usual ; but the pressure rather less. The month, with the exception of the short sharp storm at the commencement, was mild, quiet and dry for the season. Auroræ on 3rd, 18th, 24th, and 27th. L on evening of 7th, 12th, 13th, 14th, 16th, 17th, 19th, 25th, and 27th ! H on 2nd and 20th ; fog on 21st ; lunar halo on 9th.

CULLODEN.—S on the 1st, 2nd, 3rd, 5th, and 6th ; H on 13th ; and L on 14th.

ROSSE PARSONAGE.—Nothing special to say of the month of December, and the year ended seasonably with hard frost. Much S with N.E. wind on the 1st ; S low on the hills on 17th ; L on 16th.

PORTREE.—A tremendous gale from 2 a.m. on the 1st till 4 p.m. on the 2nd with H and S showers ; afterwards the month was very mild and open, but, as usual, very wet. T L on the evening of 16th, and bar. only 28·955 corrected ; falling stars on the evening of the 17th.

LOCHBROOM.—As November ended so December began, very stormy, and continued of the same unchangeable character, only varying in form and intensity, until the 20th, when it began to abate, by the 23rd it had become beautiful weather, which continued to the end of the month. During the month we had an inch of R on three days, two in succession, and R on every day except the last three.

SANDWICK.—December has been rather drier and colder than the mean ; the first part of the month was cold and stormy, while the last nine days were dry, mild, and moderate, and the last three unprecedentedly calm. Ground covered with S on the 1st ; gale from 6.45 a.m. on 1st to 7 p.m. on 2nd, wind from 50 to 60 miles an hour. It will be noticed that the gale of the 1st commenced much earlier than in England, as is generally the case with a gale from the N. ; it was also very sudden. Auroræ on the 1st and 31st. Large lunar halo on 4th. Gale on 22nd from noon till 8 p.m., 45 miles an hour.

I R E L A N D.

MONKSTOWN.—Severe gale commenced suddenly at 1 p.m. on the 1st. Very dense fog on the 27th. Commencement of month cold, but the latter half was at times mild and warm, accompanied by a good deal of fog and damp. Lunar halo 8 p.m. on 3rd.

DOO CASTLE.—1st and 2nd were most tempestuous, H showers very fierce ; from 7th to 25th mild and open, from which time to close of the month we have had pretty severe frosts.

OWENDOON.—More than an inch of S fell on the 1st, some of which remained for three or four days.

WARINGSTOWN.—Heavy squalls and S showers on the 1st and 2nd ; a fine month on the whole, very favourable to winter work ; rainfall under the average ; very little frost.

LECKPATRICK.—First week S with northerly winds ; on 1st bar. 29·165, wind N., S all day ; on 2nd, bar. 29·969 ; latter part of month mild and fine. Laurels throwing out their flower buds, wild primrose and Christmas rose in flower.