

AURORA OF FEBRUARY 4TH, AS SEEN AT F'ILTON PARSONAGE, BAENSTAPLE.

SYMONS'S

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INTRODUCTORY-

It has been our practice to address a few words to our readers at the commencement of each volume. They have seldom if ever been words of promise, because we prefer deeds to words, and on the present occasion we have the less reason for departing from precedent, since the six completed volumes are the best indication of what the seventh is likely to be. That much of our success is due to our able correspondents, is patent to everyone, and fully appreciated by ourselves. Long may it remain so, and largely may their number increase. We may, perhaps, be permitted to draw our readers' attention to one fact—our first object in the conduct of this Magazine, is not as with many to make money, but to advance the science to which we are devoted; and proof of this is afforded by our having made no increase in the price, while we have more than doubled the contents. Our readers and correspondents have only by their recommendation to continue to increase the circulation, and they will secure still further enlargement.

A SOUTHERN AURORA.

To the Editor of the Meteorological Magazine.

SIR,—A southern aurora in these latitudes is an occurrence of so unusual a nature, that I hasten to send you a few hurried notes made last evening.

About 6 p.m., while it was still twilight, a patch of red diffused light was observed near Orion's belt. At 6.15, several intermittent white streaks suddenly made their appearance in the south, radiating downwards from the zenith, instead of upwards from the horizon; and before five minutes had elapsed, the whole of the southern half of the heaven was a mass of brilliant light—a broad red band stretching along the horizon, and numberless radii above it, which all converged

to a point high above our heads, and situated about 10° E. of the Pleiades.

Up to 6.55, no auroral light was distinguishable in the northern portion of the sky; but at that moment there was a sudden outburst of rays from the central point, covering the entire heaven in every quarter, several of the rays in the E. and E.N.E. being, however, especially remarkable for their width and colour.

The sky remained absolutely without a cloud until nearly 8 o'clock, when there were only the remains of a few white streaks visible, and an hour later rain clouds, with a thick mist, obscured even the brightest of the stars.

The following are my notes taken at the time:—

Sunday Night, February 4th, 1872.

- 6. 0 p.m. Diffused red light near Orion's belt, in S.E.
- 6.15 „ Several white rays in the South, diverging from near the Pleiades.
- 6.20 „ Streaks cover the whole of the southern sky.
- 6.35 „ Brightness diminishes for three minutes.
- 6.45 „ A combination of bright rays in the E. and S.E.
- 6.55 „ Outburst of rays in every part of the sky, all diverging from a point 10° E. of the Pleiades, where the ends of the rays are very distinctly seen to interlace each other for a length of about 4° , producing a great intensity of light. (See Frontispiece.)
- 7. 0 „ Maximum brightness. Several broad streaks in the E.N.E. are of a brilliant red colour. The appearance of the sky at this moment was remarkable in the extreme, every portion of it being equally lighted up by the innumerable rays, which all diverged from the central point above mentioned, and reached down to the horizon, in shape and arrangement not unlike the ribs of an open umbrella.
- 7.30 „ A visible diminution in intensity.
- 8. 0 „ Up to the present time the sky has been cloudless. Now a bank of heavy cumuli are rapidly drifting up from the south. A few white rays still point towards the Pleiades.
- 9. 0 „ Thick clouds above, and mist below, rain falling. No stars visible.

The barometer corrected to sea level stood at 29.82 during the two hours the aurora was visible. At 10 p.m., when the rain had increased, it fell .04 inch.

The above observations were taken from the grounds of Pilton Parsonage, on the top of the hill, which rises to the north of the town of Barnstaple.

TOWNSHEND M. HALL, F.G.S.

Pilton, Barnstaple, Feb. 5th, 1872.

To the Editor of the Meteorological Magazine.

SIR,—On Sunday evening, 4th inst., a beautiful display of aurora was observed here. My attention was first directed to it at 6.4 p.m. (G.M.T.), at which time there was a fiery glow over a considerable portion of the southern sky, much resembling the reflection of a distant conflagration. Shortly after, an almost complete auroral arch of faint orange red light, similar to that at first observed, was noticed, extending from E. above, and partly embracing δ , ϵ , and ζ Orionis, to W., its altitude (by estimation) at the centre being about 40° , and its extent something like 120° . For a short time this glow was most intense in S.S.E. at a great altitude; but the display attained its greatest intensity about 6.15., when a number of rays or streamers of whitish blue and orange red light appeared, as if radiating from a point near ζ , α , and κ Persei. At 6.20 nothing was observed but a widely-diffused fiery glow, which must have continued more or less during the whole evening, as it was again observed by me at 8.25.

I am, Sir, faithfully yours,

JOHN JAMES HALL, F.M.S.

Fulwell, near Twickenham.

To the Editor of the Meteorological Magazine.

SIR,—A magnificent display of aurora was observed here last evening.

It was first observed about 5.30 p.m., when the clouds became tinged with red; about 6 p.m. the sky cleared, and the horizon from E. to S.S.W. was lit up with a brilliant white light, with streamers rising to about 30° ; the rest of the sky, with the exception of the N. horizon, which was perfectly free from aurora, was covered with waves of a deep blood-red colour; this continued till 9 p.m., when the sky again became cloudy. About 8.40 there were a few streamers in the N.W., but the focus of the display was about S.S.E., and it would seem to have been the southern aurora, the northern sky, to about 20° from the horizon, with the exception just mentioned, being entirely free from light.—Yours truly,

THOMAS PAULIN.

Winchmore Hill, Feb. 5th, 1872.

To the Editor of the Meteorological Magazine.

SIR,—It may interest you to know that the rainfall of the past month has been 5.36 inches at Uckfield Observatory, and no less than 7.46 inches at Crowborough Beacon Observatory. At the latter station 2.99 inches fell during the first eight days, and 4.47 inches during the remainder of the month. On 23rd and 24th an immense quantity of water passed along the Uckfield brooks, for which I was quite unable to account, until I had measured the rainfall at Crowborough.

The rain was described to me as being *extraordinarily heavy* during the afternoon and night of 23rd, with a great quantity of hail.

Last evening (Sunday) we had a brilliant aurora borealis; it stretched across the sky from E. to W. horizon, at 6.10 p.m., and at an *apparently* very low elevation. It was only clearly seen for about 20 minutes, when some heavy clouds passed over, and for the time hid

the phenomenon. They became somewhat thinner about 7.30, when the whole sky appeared of a carmine tint, and tinged the clouds with the same hue, presenting a very remarkable appearance. The sky became nearly clear of clouds about 11 p.m., when there appeared a strong auroral light over the whole of the northern sky, with a large patch in the N.E. by E.; it was of a dark greenish hue. I did not observe any positive streamers.—Yours very truly,

C. L. PRINCE.

Uckfield, February 5th, 1872.

To the Editor of the Meteorological Magazine.

SIR,—On going out of doors yesterday (Sunday) evening, a little before 7 o'clock, when twilight was entirely gone and there was no moon, I was struck with a general diffusion of light all over, notwithstanding that the sky was clouded. It seemed as light as it would be if the moon had been at least a quarter old. At first the light seemed strongest in the south. Soon afterwards I noticed a blush of red through the clouds overhead, which led me to suspect that the light must have been caused by aurora borealis. I again noticed this general diffusion of light several times, till 10.30, and also evident streams of auroral light, of a crimson colour, in different parts of the sky, which became less covered with clouds about 9 o'clock. I should imagine that, had the sky been clear all the evening, a very fine display of aurora would have been visible. I heard to-day that a labouring man had remarked, respecting this light, that "it began in the S. at a quarter before 7, and went round by W. to the N."

I may take this opportunity of mentioning, respecting the weather in January, that it was here a mild and wet month. On no day did the maximum temperature fall below 38°. On three days the minimum was as high as 39°. The extremes were 51° on January 4th, and 28° on the 15th and 16th. The rainfall amounted to 3.56 inches, the greatest fall on one day being on the 23rd, viz., 0.58 inch, when, also, the barometer made such a remarkable descent. I cannot be sure of the lowest point reached, as the turn seems to have taken place very early in the morning of the 24th. But before midnight of the 23rd, my cottage barometer (256 feet above the sea), stood at 28.53 inches, and at 8 the next morning it was at 28.55 inches. At the same time my aneroid, which had been cleaned and set by Casella in September last, pointed to 28.17, but had been lower before I set it, though I cannot say how much.

I have often observed that in a long fall of the barometer, there occurs an occasional stoppage, and even a brief rise. It was notably so in the afternoon of January 23rd, when a rise of at least 0.04 inch took place before the final rapid descent of nearly half an inch in two or three hours.

I heard one clap of thunder on January 6th at 1.22 p.m.

Yours truly,

EDWARD MAXWELL.

High Roding Rectory, Dunmow, Essex, Feb. 5th, 1872.

To the Editor of the Meteorological Magazine.

SIR,—There was a brilliant display of aurora here on Sunday evening last, Feb. 4th. It was first observed in the E., at about 6 p.m., and moved gradually towards the S. At 7.30 it was moving back again through the E. to N.—the whole heaven from S.E. to N. being brilliantly lighted up. The appearance was chiefly that of a deep rose colour, overspreading the sky, through which the stars could be faintly seen. The phenomena rapidly faded away after 8 p.m.

BOSCAWEN T. GRIFFITH.

Trevalyn Hall, near Wrexham, Denbighshire, Feb. 7th, 1872.

To the Editor of the Meteorological Magazine.

SIR,—At 6.40 this evening my attention was called to an extraordinary state of the sky, which I perceived to be a deep red aurora, extending from S.W. round by S. and E. to N.E., radiating from a point midway between the Pleiades and Capella. In the N.E. it was a deep blood-red colour, forming a band some 10° or 15° wide, the red apparently crossing the primary radiation. In the S. there was sufficient white light to enable me to see the hands of a watch.

The following is the substance of a few rough notes, which were taken down. At first there was nothing visible in the N.W., which is very unusual :—

- 6.48 p.m. Radiation commenced towards N.W.
- 6.50 „ Red tint spreading to W. Deep red in N.E., approaching horizon.
- 6.54 „ White light rapidly spreading over N.W. Red growing faint.
- 6.59 „ A band of yellow through the red at N.E. Aurora growing faint generally.
- 7. 5 „ Band of bright red from the radiant point through Gemini, and towards the W. in an opposite direction.
- 7.10 „ Dark clouds from S. obscuring aurora, which thus appeared to be *beyond* these clouds.
- 7.25 „ Slight red to N.E., and faint to W.
- 7.50 „ Aurora almost vanished.
- 8.30 „ Rays of blue, red, and white to W. and N.W. and N.E.
Radiant point now near γ Aurigæ.

Nearly the whole time there was a clear space of 3° or 4° in diameter round the point from which the rays seemed to radiate. Although the changes in form, &c., were rapid, there was no visible motion. The time mentioned is Dublin time.—Yours sincerely,

G. PIM, JUNR.

Easton Lodge, Monkstown, Co. Dublin, Feb. 4th, 1872.

There was nothing unusual in pressure or temperature, barometer standing 29.67, temperature 43°.

9.25. A broad band of red light in E. and N.E. radiating from Pollux.

THE BAROMETRIC DEPRESSION OF JANUARY 24TH, 1872.

Low barometric pressure in the West of Ireland and in Scotland is not unusual, and several instances are on record of pressure decreasing to less than 28 inches. But in the south and south-east of England the pressure seldom falls below $28\frac{1}{2}$ inches; one of these rare cases occurred on the date above-mentioned, when during several hours in the early morning the pressure over the whole of Southern England was below 28.50. Unfortunately the data at present in our possession are not sufficient to enable us to thoroughly explain the phenomena which occurred, and this deficiency arises from three causes. (1) Many of our correspondents are not aware that we desire copies of *all the barometric readings* which they took between 1 a.m. on January 23rd and 1 a.m. on January 25th. (2) Scarcely any observers seem to have been sufficiently enthusiastic to "sit up" with their barometers. (3) Very few self-recording barographs are yet established in the area principally concerned, and of these two (if not more) were undergoing repairs.

We append a few of the letters with which we have been favoured, a table of the lowest observed readings, distinguishing those which are merely the lowest observed, and those which by observations, both shortly before and after, are known to be true minima—a letter upon the subject, which appeared in the *Times*, and a table of baric minima at Greenwich for 30 years.

Even from the following data some hints as to the outline and path of the depression may be gleaned—such as that it seems (1) to have travelled in a north-easterly direction, (2) at a rate of some 30 or 40 miles an hour (3) along a track somewhat east of a line joining the Severn and the Wash. The lowest pressure yet reported to us is from Tweed, near Lymington, viz., 28.07 at 2.0 a.m.; but we are not yet informed as to this being corrected for temperature. At Upwey, near Dorchester, it was falling at, and after 2 a.m., and, from the evidence before us, we think it cannot have been at its lowest at Tweed so early as 2 a.m. Doubtless, we shall be favoured with further particulars. Meanwhile we may remark, that at Upwey the true minimum fully corrected was 28.208 at 2.40 a.m.

To the Editor of the Meteorological Magazine.

During a furious gale from midnight to 9 a.m. on Wednesday last, the pressure recorded by Osler's anemometer at 2 a.m. was 28 to 35 lbs. on the square foot, a velocity of 75 to 85 miles an hour, the wind veering from S.E. to S.S.W. At this hour the barometer corrected and reduced to 32° Fahr., sea level, read as low as 28.400 inches. The barometer still continues very low, reading this morning at 9 a.m. 28.920 sea level.

T. L. M.

Guernsey, January 25th, 1872.

The greatest pressure and lowest barometer reading occurred at 2 a.m.; at 9 a.m. on the 24th, barometer read 28.847 sea level—32° corrected.

To the Editor of the Meteorological Magazine.

SIR,—As I suppose you will be publishing the excessively low barometer readings during the past month, I beg to enclose those taken during the late storm.—Truly yours,

J. INGLEBY-MACKENZIE, M.B., Cantab, F.M.S., M.S.M.S.

Highest reading of maximum temperature, January 4th, 53°·3.

Lowest reading of minimum, January 15th, 30°·0.

Frost registered on 2 days, 10th and 15th.

Rain fell on 30 days ; quantity 5·21 inches.

Average rainfall in January, 1865—1871, = 3·91.

Average number of rainy days, = 18.

January 21st, 9 a.m.	.....	29·668	.....	46·0
„ „ 3 p.m.	.....	29·630	.....	49·0
„ 22nd, 9 a.m.	.....	29·433	.....	48·0
„ „ 3 p.m.	.....	29·251	.....	49·0
„ „ 11.30 p.m.	.....	29·100	.....	51·0
„ 23rd, 9 a.m.	.....	28·729	.....	50·0
„ „ 3 p.m.	.....	28·779	.....	50·0
„ „ 12 p.m.	.....	28·489	.....	51·0
„ 24th, 9 a.m.	.....	28·717	.....	50·0
„ „ 3 p.m.	.....	28·787	.....	51·0
„ „ 12 p.m.	.....	28·790	.....	51·0
„ 25th, 9 a.m.	.....	28·879	.....	50·0
„ „ 3 p.m.	.....	28·947	.....	50·0

Sidmouth, February 1st, 1872.

Readings of the Barometer at Upwey, Dorchester, Dorset, 1872.

70 feet above mean sea level, corrected and reduced to 32°.

Date and Hour.	Reading reduced to 32°	Sea level pressure.	Temp. on Ther. stand.	Remarks.
Jan. 23rd, 9 a.m.	28·681	28·754	46·3	S.W. strong.
„ 9 p.m.	·676	·749	47·5	S.E. moderate, and heavy rain.
„ 11.45 „	·446	·519	...	„ „
24th, 0.15 a.m.	·394	·467	...	
„ 0.45 „	·328	·401	46·3	
„ 1.20 „	·254	·327	...	S. rising.
„ 2.20 „	·161	·234	...	S. increasing, rain ceased.
„ 2.40 „	·135	·208	...	
„ 3.15 „	·146	·219	...	{ S.W. a furious gale (which moderated between 5 and 6 a.m.)
„ 3.30 „	·191	·264	...	
„ 7.15 „	·486	·559	...	
„ 9.0 „	·665	·738	47·0	N.W. strong.
„ 11.30 „	·719	·792	...	S.W. strong.
„ 6.0 p.m.	·777	·850	...	
„ 9.0 „	·783	·856	46·7	S.W. strong.
25th, 9.0 a.m.	·841	·914	48·5	S.E. brisk.
„ 9.0 p.m.	·959	29·032	42·0	E. gentle.

Barometer, a standard by Negretti and Zambra, number 589, compared at the Kew Observatory, and has a platinum ring to the tube.

Highest reading of barometer in the month, 9 p.m., 12th ... 30·152
 Lowest " " " 2.40 a.m., 24th ... 28·135

Range 2·017

JOHN MILLER, M.R.C.S.L.

To the Editor of the Meteorological Magazine.

SIR,—I beg to forward you the readings of my barometer during the last few days, as well as the memoranda I made on the state of the weather. The barometrical readings are all corrected for index error, temperature, and sea level.

January 22,	3 p.m.	.....	29·396	
" "	9 "	.....	29·308	
" "	12 mid.	.....	29·218	
" 23	9 a.m.	.....	28·913	
" "	3 p.m.	.....	28·884	
" "	9 p.m.	.....	28·866	
" 24	3 a.m.	.....	28·432	Lowest observed by me.
" "	9 a.m.	.....	28·746	
" "	3 p.m.	.....	28·885	
" "	9 p.m.	.....	28·974	
" 25	9 a.m.	.....	28·993	
" "	3 p.m.	.....	29·015	

January 22nd. The barometer fell all day, and towards midnight the wind began to blow strong from S.E., which developed into a very heavy S.S.E. gale during the early hours of the 23rd, accompanied with a driving rain. Shortly after noon, a sharp hailstorm occurred, and during the rest of the day, the wind having veered to S.W., it blew very strong from that quarter. The barometer remained very low all day, and was still falling after 9 p.m. After midnight the force of the wind increased, and between 2 and 3 a.m. of the 24th, a heavy and strong gale from the S.S.W. was blowing, increasing in power every minute. I recorded the lowest reading at 3 a.m. The gale still increased in violence, and appeared to reach its maximum about 4 a.m., when the wind veered somewhat W. It is reported that the barometer stood at 28·30 about 4 a.m., but as it is an uncorrected reading, and not from a standard instrument, I will not authenticate it. Heavy squalls of rain prevailed throughout the morning and early afternoon, and about 11.30 a.m. a very severe hailstorm occurred, lasting for some 10 or 12 minutes. During these three days 1·32 inches of rain fell, viz., 0·28 on 22nd, 0·82 23rd, and 0·22 on 24th.

I am, yours obediently,

W. J. HARRIS, F.M.S.

Worthing, Jan. 25th, 1872.

To the Editor of the Meteorological Magazine.

SIR,—Your account of the extraordinarily low barometric pressure of yesterday in to-day's *Times*, induces me to send my observations,

which will interest the meteorological world, if you like to insert them in the *Meteorological Magazine*. A first-class standard barometer, corrected and verified by Glaisher, gives every weight to all observations, which were by myself, in person.

Yours very truly,

R. BURLINGHAM.

Lansdowne, Evesham, Jan. 25, 1872.

NOTES.—All observations corrected for capillarity, index error, and reduced to 32° at sea level (124 ft. assumed height).

At greatest depression steady rain and gusty wind from S.S.W., shifting to W.N.W., at barometer rising; but wind could not be called fresh at any time; a fine sunny dry day succeeded. Total rain, 0·850 in.

Much rain must have fallen about the neighbourhood, as the river Avon rose 8 ft. 8 in. above its normal level.

1872, January 24th.

a.m.	Sea level pressure.	
2.30	28·443	
3.0	28·376	Falling at the rate of ·134 per hour.
4.20	28·230	„ „ ·100 „
4.35	28·216	
4.50	28·196	
5.5	28·185	„ „ ·051 „
5.20 lowest read,	28·179	
Absent $\frac{3}{4}$ hour; <i>in all probability</i> it fell at the same rate another $\frac{1}{4}$ hour.		
6.5	28·223	} Rising ·168 per hour !!
6.20	28·263	
6.35	28·307	
6.50	28·347	
7.5	28·386	} „ ·091 „
7.20	28·418	
7.35	28·449	
8.35	28·540	
10.5 p.m.	28·821	

January 25th.

2.0 a.m.	28·818	Slow rising 18 hours.
2.35 p.m.	28·970	
6.0 p.m., bar. still under 29·000, being nearly 48 hours in such a depressed state.		

Mr. G. J. Symons writes under date, 62, Camden-square, Jan. 24 :—

“The barometric depression which passed over the metropolis in the early hours of this morning having not only been unparalleled during my own period of observation (16 years), but with, I believe, only two exceptions during the present century, I beg to forward notes of some of the observations made here, together with a few remarks on analogous cases during the present and preceding centuries.

“The present depression may be considered to date from 9 p.m. on the 21st inst., when the pressure was 29·691 (all readings quoted are thoroughly corrected and reduced to sea level), decreasing gradually until the afternoon of the 22nd, and then more rapidly, passing below 29 inches in the early morning hours of the 23rd, and reaching the low point of 28·832 at 1 p.m. yesterday; it then turned to rise, and was 28·848 at 9 p.m. From this low starting-point the second fall commenced, the details of which are given in the following table :—

Time.	Pressure.	Time.	Pressure.
	Inches.		Inches.
Jan. 23. 9 0 p.m.	... 28·848	Jan. 24, 3 45 a.m.	... 28·382
— 11 15 „	... 28·785	— 4 0 „	... 28·365
— 11 30 „	... 28·775	— 4 15 „	... 28·354
— 11 45 „	... 28·743	— 4 30 „	... 28·344
— Midnight	... 28·730	— 4 45 „	... 28·338
Jan. 24. 0 15 a.m.	.. 28·716	— 4 47 „	... 28·332*
— 0 30 „	... 28·695	— 5 0 „	... 28·345
— 0 45 „	... 28·675	— 5 15 „	... 28·348
— 1 0 „	... 28·645	— 5 30 „	... 28·350
— 1 15 „	... 28·618	— 5 45 „	... 28·355
— 1 30 „	... 28·593	— 6 0 „	... 28·360
— 1 45 „	... 28·574	— 6 15 „	... 28·372
— 2 0 „	... 28·541	— 6 30 „	... 28·386
— 2 15 „	... 28·506	— 6 45 „	... 28·414
— 2 30 „	... 28·482	— 7 0 „	... 28·420
— 2 45 „	... 28·455	— 8 0 „	... 28·538
— 3 0 „	... 28·432	— 9 0 „	... 28·616
— 3 15 „	... 28·414	— 11 0 „	... 28·756
— 3 30 „	... 28·391		

* Lowest pressure.

“I am not aware that the point to which the barometric pressure at sea level in the neighbourhood of London may be expected to diminish once in each year has ever been computed or stated; I believe it to be within a few hundredths of 28 $\frac{3}{4}$ inches (say 28·70 to 28·80). Unless, therefore, the pressure falls below this point, it is simply a normal state of things, but when, as this morning, it falls nearly half an inch below its probable *minimum* point, it becomes a special phenomenon worthy of careful notice. In my own observations, dating from 1857, there is nothing that at all approaches 28·332, the lowest reading being on February 11, 1866, at 4.30 p.m., 28·606, and December 26, 1859, at 6 a.m., 28·629. In the Royal Charter gale the lowest reading here was on October 26, 1859, at 0.35 a.m., 29·068 inches.

“It is, therefore, evident that for parallel instances we must go much further back, and then we come upon observations of a less complete character, uncorrected for instrumental errors, for temperature, and for elevation. Singularly enough, the only instances, which I can convince myself have exceeded the present are at intervals somewhat tending towards equidistance—viz., 1791, 1821, 1843, 1872. Before proceeding to state the facts which I have been able to collect respecting these instances I desire to state that for the Sea Level pressures given in parentheses I alone am responsible, and that while on the one hand I have endeavoured to approximate as closely as possible to the truth, and am quite ready in a proper place to give my reasons for the corrections applied, I, on the other hand, maintain that uncorrected readings never ought to be published:—

“1791.—Of this depression I have only two notices. One is, that at Sion House on January 20 (at 8 a.m. ?) the barometer fell to 28·10 (=28·15 at sea level), and the other, that on the same day, but probably an hour or two later, it was 28·20 in Paternoster-row (=28·28 at sea level). The *minimum* in this instance probably lay between 28·15 and 28 inches.

“1821.—Much more copious details of this depression have been preserved. Professor Daniell (residing near Russell-square) recorded 28·12 on the night of December 24, (=28·20 at sea level), but from other evidence we know the barometer continued to fall until about 5 a.m., on December 25, at which hour it was recorded as 27·83 (=27·93 at sea level), at Tottenham by Luke Howard, and 27·89 (=28 at sea level) at the Royal Observatory, Greenwich. At 6 a.m. on the same day, Mr. Squire recorded 27·73 (=28·10 at sea level) at Epping, and at 8 a.m. 28·20 (=28·25 at sea level) was recorded at Sion House. We may, therefore, look upon that depression as greater than, but not so sudden as, that which passed over us this morning.

"1843.—This depression was carefully observed by Mr. Glaisher, at the Royal Observatory, and a very interesting note was written by him and published in the Greenwich volume for that year. The lowest pressure on January 13, at 0.53 p.m. reduced to sea level, was 28.266, or about one-sixteenth of an inch lower than that recorded here this morning. One feature in the gale of 1843 seems to have been so exactly repeated this year that it may be desirable to call attention to the coincidence. Thunder and lightning are infrequent in January, but in 1843 two "very vivid" flashes of lightning, with "very long crashing" peals of thunder, occurred during the storm, and a correspondent at Hastings reports a single "vivid flash of lightning followed instantly by a heavy peal of thunder" at 4.5 p.m. yesterday.

"I sincerely hope that a similar parallel will not prevail with respect to shipping casualties, which in 1843 amounted to at least 240 vessels, 450 lives, and ships and cargoes of an aggregate value of £825,000."

Lowest observed reading of Barometer on January 24th, Corrected and Reduced to Sea Level.

Station.	Time.	Reading.	Instrument.	Minima.
Old Berwick, Alnwick	8 a.m.	28.51	Not a standard.	.....
Newcastle-on-Tyne ...	9 "	28.393	Verified standard.	.....
Gainford, Darlington..	9 "	28.335	" "	Lowest observed
Killingholme, Ulceby..	9.40 "	28.17	Compared Aneroid.	True minimum
Ripley, Derbyshire ...	9 "	28.301	Verified standard.	Lowest observed
Derby	9 "	28.460	Standard.	" "
Wolverhampton.....	6 "	28.248	Compared aneroid.	" "
Geldeston, Beccles.....	7.50 "	28.38	" "	True minimum
Lansdowne, Evesham..	5.20 "	28.179	Verified standard.	Lowest observed
Haverfordwest	3 p.m.	28.588	" "	" "
Berkhampstead	3 a.m.	28.433	.....	" "
Winchmore Hill	4.15 "	28.35	.....	" "
Camden Square	4.47 "	28.332	Verified standard.	True minimum
Finsbury	5 "	28.34	Aneroid.	Lowest observed
Clifton	4.30 "	28.18	" "	" "
Forest Hill	4.10 "	28.38	.....	.....
Chiselhurst	3 "	28.458	Verified standard.	Lowest observed
Beckenham (Parkside)	4.55 "	28.395	" "	" "
Bath, Paragon	5 "	28.403	.....	" "
Haywards Heath, Sussex	4 "	28.40	Not a standard.	" "
Westward Ho! Devon	3.45 "	28.38	" "	" "
Lymington	4 "	28.355	Verified standard.	" "
" (Tweedside)	2 "	28.07	Standard.	" "
Worthing	4 "	28.432	Verified standard.	" "
Sidmouth (Belgrave)...	0.0 "	28.489	" "	" "
Upwey, Dorchester ...	2.40 "	28.135	" "	True minimum
Bodmin	1 "	28.30	Aneroid.	Lowest observed
Guernsey.....	2 "	28.40	Standard.	True minimum

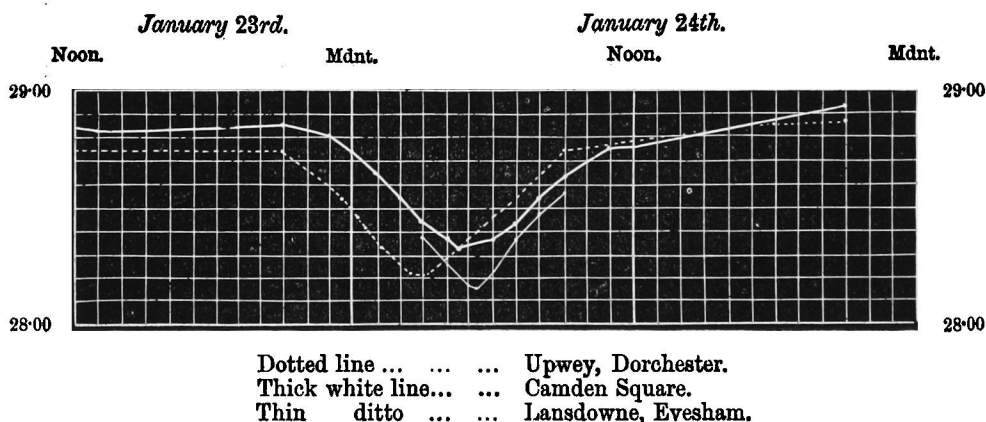
Lowest Reading of Barometer at the Royal Observatory, Greenwich, during thirty years, 1840-1869.

Year.	Date.	Hour.	Reading.	Approximate sea level pressure.	Year.	Date.	Hour.	Reading.	Approximate sea level pressure.
1840	Nov. 13	4.40 p.m.	28.477	28.647	1855	March 22	noon.	28.756	28.926
1841	Oct. 6	10.57 a.m.	28.697	28.867	1856	Sept. 28	10.50 a.m.	28.688	28.858
1842	Oct. 23	11.40 "	28.681	28.851	1857	Oct. 8	3.0 p.m.	28.669	28.839
1843	Jan. 13	0.53 p.m.	28.096	28.266	1858	Nov. 27	3.0 "	28.844	29.014
1844	Feb. 26	2.0 "	28.525	28.695	1859	Dec. 26	6.38 a.m.	28.490	28.660
1845	Dec. 20	6.0 a.m.	28.659	28.829	1860	Jan. 24	1.50 p.m.	28.555	28.725
1846	" 23	8.0 "	28.536	28.706	1861	Nov. 13	9.30 "	28.790	28.960
1847	" 7	2.30 "	28.380	28.550	1862	Oct. 19	9.0 "	28.958	29.128
1848	Feb. 26	9.45 "	28.299	28.469	1863	Nov. 2	9.0 a.m.	28.768	28.938
1849	Jan. 10	noon.	28.829	28.999	1864	Nov. 14	2.20 p.m.	28.606	28.776
1850	Nov. 20	noon.	28.592	28.762	1865	Jan. 14	11.55 a.m.	28.390	28.560
1851	March 23	10.30 a.m.	28.839	29.009	1866	Feb. 11	4.34 p.m.	28.450	28.620
1852	Oct. 27	9.0 "	28.748	28.918	1867	Jan. 8	7.21 a.m.	28.535	28.705
1853	" 19	3.0 p.m.	28.831	29.001	1868	Dec. 24	2.10 p.m.	28.520	28.690
1854	Jan. 7	9.0 "	28.809	28.979	1869	Sept. 12	5.30 a.m.	28.580	28.750

1872, January 24th, 5.20 a.m., 28.21 = 28.38.

The following diagram is based on the observations at three stations where the minimum was accurately observed. It will be noticed that the lowest pressure was at Evesham, and that it also occurred later there than at either of the other stations.

Diagram of Sea Level Pressure.



In conclusion, we are desirous of completing the investigation, first fruits of which are alone sketched above, and we want more data, we care not how fragmentary; even the ordinary 9 a.m. readings on the 23rd and 24th will be useful—afternoon and night observations still more so, and hourly observations, or the records of self-recording instruments during those two days most valuable of all. Details as to the form of instrument and the corrections applied, should be sent with every return.

LUNAR INFLUENCE ON THE BAROMETER.

To the Editor of the Meteorological Magazine.

SIR,—During the autumn and winter (say, during the period from Oct. to March, inclusive) a considerable barometric depression, almost always occurs when the moon reaches full north declination between 4 and 5 p.m., Greenwich mean time. Since 1833, this rule has proved correct, eleven times in twelve. How far it was verified before that date it seems impossible to say, the lunar tables in the *Nautical Almanack* being (up to 1833) too limited to admit of the investigation being carried further back. In the following table *all* the instances that have occurred during nearly 40 years are given. And your readers can judge whether the very frequent apparent connexion of the low barometric readings with the moon's position in declination, ought to be ascribed to a mere coincidence. I should here state that, as the Greenwich mean daily value for the 23rd January, 1842, does not appear to have been recorded, I have substituted the barometric reading taken on that day at 9 a.m. at the apartments of the Royal Society. I may also state that from 1834 to 1841, inclusive, there was no instance of the moon's reaching full north declination between 4 and 5 p.m., during the period referred to in the following table:—

All the instances since 1833 of the moon's reaching full north declination between 4 and 5 p.m. in the period from October to March.	Greenwich mean reading of the barometer on the days in question.	Difference of mean reading from average of 24 years.
	inches.	inches.
23rd Jan., 1842, 4.15 p.m.	29.240 ?	—0.540 ?
13th „ 1843, 4.45 „	28.460	—1.350
25th March, 1844, 4.25 „	29.460	—0.250
4th Nov., 1849, 4.45 „	29.027	—0.773
6th Dec., 1854, 4.45 „	29.415	—0.322
25th March, 1855, 4.36 „	29.391	—0.316
2nd Oct., 1855, 4.10 „	29.520	—0.240
12th Dec., 1856, 4.15 „	29.067	—0.785
19th Feb., 1861, 4.15 „	29.523	—0.271
8th Oct., 1868, 4.45 „	30.024	+0.349
29th Dec., 1868, 4.20 „	29.061	—0.734
23rd Jan., 1872, 4.48 „	28.719	—1.061

The greatest barometric depressions at Greenwich (since 1833) were on the 13th January, 1843, and a few hours after midnight of the 23rd January, 1872, both of which dates occur in the above table. It will, however, be seen that the converse of the rule does not invariably hold good, for, although we almost always have a low reading of the barometer when full north declination of the moon occurs, at a time in accordance with the rule, we sometimes have a low reading without that accordance.—I am, &c.

GEORGE D. BRUMHAM.

Barnsbury, February 9th, 1872.

JANUARY, 1872.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.						Days on which fall or more fell.	TEMPERATURE.				No. of Nights below 32°	
		Total Fall.	Difference from average 1860-5	Greatest Fall in 24 hours.		Deg.	Date.		Deg.	Date.				
				inches.	in.						Max.	Min.		
													Dpth	Date.
I.	Camden Town	inches	inches.	in.										
II.	Maidstone (Linton Park).....	3.46	+ 1.51	.47	6	22	52.8	31	27.4	13	5	12		
III.	Selborne (The Wakes).....	4.68	+ 2.62	.78	24	26	54.0	31	23.0	10	10	...		
IV.	Hitchen	7.87	+ 4.60	.98	17	24	49.5	13	23.5	15	8	15		
V.	Banbury	3.74	+ 1.60	.65	23	25	50.0	4, 31	26.0	14	10	...		
VI.	Bury St. Edmunds (Culford).....	4.27	+ 2.18	.67	23	24	52.0	31	25.5	15	14	...		
VII.	Bridport	2.83	+ .96	.58	23	18	51.0	4*	25.0	14	8	18		
VIII.	Barnstaple	5.92	+ 2.73	.72	4	24	53.0	4	26.0	15	9	...		
IX.	Bodmin	6.59	+ 3.07	.77	23	28	54.0	13†	31.0	21	...	...
X.	Cirencester	10.18	+ 4.99	.98	4	28	53.0	13	29.0	20	2	8		
XI.	Shiffnal (Haughton Hall)	5.04	+ 2.04	.67	23	23	...	...	...	...	...	...
XII.	Tenbury (Orleton)	4.63	+ 2.73	1.14	23	20	53.0	30	24.0	15	19	...		
XIII.	Leicester (Wigston)	5.49	+ 2.96	1.20	23	25	54.5	31	25.5	15	9	14		
XIV.	Boston	3.43	+ 1.45	.78	24	20	52.0	31	26.0	14	...	...
XV.	Grimsby (Killingholme)	2.78	+ 1.07	.47	23	21	52.0	30	30.0	9†	7	15		
XVI.	Derby	3.34	...	.48	23	23	53.0	30	29.0	4	4	...	
XVII.	Manchester	3.72	+ 1.93	.68	23	25	54.0	30‡	28.0	10§	8	...		
XVIII.	York	4.26	+ 1.74	.42	2	22	51.0	17	24.0	13	11	18		
XIX.	Skipton (Arncliffe)	2.89	+ 1.31	.48	3	17	58.0	30	24.0	10	10	...		
XX.	North Shields	9.18	+ 3.54	1.40	4	24	...	...	...	...	...	...
XXI.	Borrowdale (Seathwaite).....	2.78	+ .67	.44	24	21	56.0	30	28.2	21	11	13		
XXII.	Cardiff (Ely).....	32.14	+ 15.78	5.82	17	27	...	...	...	...	...	...
XXIII.	Haverfordwest	7.51	+ 3.77	1.03	24	25	...	...	...	...	...	...
XXIV.	Rhayader (Cefnfaes).....	8.90	+ 3.85	1.10	17	25	53.0	28	26.0	19	4	4		
XXV.	Llandudno.....	7.51	+ 2.99	.90	4	22	54.0	...	26.0	...	...	...
XXVI.	Dumfries	3.33	+ .79	.52	4	20	56.6	29	33.5	22	0	...		
XXVII.	Hawick (Silverbut Hall)	6.35	+ 1.75	.96	10	26	53.0	30	25.0	10||	8	...		
XXVIII.	Ayr (Auchendrane House)	3.97	...	.57	17	23	...	...	...	...	...	...
XXIX.	Castle Toward	7.93	+ 3.41	1.12	16	24	53.0	30	25.0	10	11	20		
XXX.	Leven (Nookton) .....	...	...	...	...	...	...	...	...	...	...	...
XXXI.	Stirling (Deanston)	4.15	+ 1.28	.59	5	19	51.0	30‡	25.0	8	12	21		
XXXII.	Logierait	5.53	+ .81	.64	13	27	52.5	31	23.0	9	10	17		
XXXIII.	Ballater	4.23	...	.68	23	20	...	...	...	...	...	...
XXXIV.	Aberdeen	5.86	...	1.35	23	14	50.5	31	22.0	10**	16	...		
XXXV.	Inverness (Culloden)	3.09	...	.32	24	21	50.3	30	29.8	22	4	22	
XXXVI.	Portree .....	...	...	...	...	...	...	...	...	...	...	...
XXXVII.	Loch Broom	14.31	+ 1.22	1.89	31	26	...	...	...	...	...	...
XXXVIII.	Helmsdale	5.90	...	.80	26	26	...	...	...	...	...	...
XXXIX.	Sandwick	3.02	...	1.23	13	20	...	...	...	...	...	...
XL.	Cork	4.44	+ .52	.74	13	28	49.6	30	30.8	10	3	15		
XLI.	Waterford	7.26	...	.97	31	25	...	...	...	...	...	...
XLII.	Killaloe	6.94	+ 2.08	.91	31	24	52.0	31	28.0	21	7	...		
XLIII.	Portarlington	6.44	+ 1.58	1.08	24	26	54.5	12	25.0	21	14	22		
XLIV.	Monkstown	2.63	+ 1.38	.26	6	29	52.5	13	25.5	20	14	...		
XLV.	Galway	3.45	+ .06	.79	4	22	58.5	30	22.5	21	10	12		
XLVI.	Bunninadden (Doo Castle)	6.63	...	.92	31	29	54.0	30	26.0	21	2	...	
XLVII.	Bawnboy (Owendoon)	6.44	...	.74	28	...	51.0	13	23.0	21	6	...	
XLVIII.	Waringstown .....	...	...	...	...	...	...	...	...	...	...	...
XLIX.	Strabane (Leckpatrick)	4.09	...	.36	28	22	54.0	31	26.0	21¶	17	25	
L.		6.06	...	.65	28	28	...	...	...	...	...	...

* And 30, 31. † And 14, 30, 31. ‡ And 31. § And 15. || And 21. ** And 22. ¶ And 27.

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

METEOROLOGICAL NOTES ON JANUARY.

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.—A mild but wet month; high winds on 4th, 5th, and 24th; fogs frequent; T and L on 6th and 24th; a little S on the 9th only. Winds mostly S. and W., bar. very unsteady, and remarkably low on the 24th, being 28·03 at 7 a.m., and only 28·33 at noon, when we had loud T with heavy rainfall the preceding day and night, amounting to 1·24 in. Very little sunshine the whole month till the 31st, which was fine and bright throughout. A high flood followed the rain of the 24th, higher than on any occasion during the last five years.

SELBORNE.—The wettest month in the last ten years, excepting October, 1865, and December, 1868. Violent wind and aurora on 4th and 5th; H on 4th; H, R, and S at noon on 6th; a few flakes of S in early morning of 9th. White frost on six mornings, fog on five days; tempestuous on night of 23rd and morning of 24th. Bar. lower than for several years; H, T, and L at noon on 24th; wonderful sunset on 26th.

BANBURY.—Remarkable for high winds. T, L, and H at 7·15 p.m. on 5th; high wind on 3rd, 4th, 7th, 10th, 16th, 17th, 22nd, and 23rd.

CULFORD.—As regards temperature this has been a month of very mild weather, the mean being 39°·8. S has not fallen during the month, and the lowest temp. was 25° on the night of the 14th. A fearful TS occurred soon after 1 p.m. on Saturday, the 6th, preceded by a period of almost total darkness, so much so as to render gas-light necessary. A dreadful gale was also experienced on the 23rd and 24th, uprooting trees and doing much damage. Easterly winds during 10 days, and westerly on 21.

BRIDPORT.—Very heavy S.W. gales on 1st, 4th, 23rd and 24th; large lunar halo on 20th. The fall of rain is the heaviest I have registered in January (in 15 years), and in that period has only been exceeded four times, viz., October, 1863, October, 1865, September, 1866, and December, 1868. Heavy floods at 5 a.m. on 24th. Violets, crocuses, and snowdrops well out in the garden before the end of the month, and primroses in the hedges. L on 3rd; T on 5th.

BODMIN.—Average bar. 29·62, average temp. 43°·5. The rainfall (10·18) is the largest but one I have ever registered in one month during 23 years.

ORLETON.—The wettest month of January recorded in 41 years; during that period 4·00 in. of R never fell in the month till 1869, when 4·525 in. fell. Great fall of R and S in the night of 23rd and 24th, causing high floods upon the brooks and rivers. Temp. very variable, but generally warm; average of the month about 3°·5 above the mean. T and L on 4th and 5th; fogs frequent; violent wind on 4th and 17th.

WIGSTON.—The rainfall much above the mean of the month, and the humidity of the air altogether remarkable. The mean temp. also considerably above that of January, which has stimulated vegetation unseasonably.

GRIMSBY.—The month very wet and mild, with many southerly gales. Much sickness prevalent. The ground too saturated to allow of any garden-work being done. Thrush first heard on 12th, blackbird warbling on 30th, aconites in flower on 26th.

MANCHESTER.—T and L early on 4th; large lunar halo at 11 p.m. on 23rd.

YORK.—Lunar halos on 15th and 19th; fog on 20th and 21st.

ARNCLIFFE.—Violent TS at 5 p.m. on 18th.

SEATHWAITE.—S on the tops of the hills on 3rd, 15th, and 20th; H, T, or L on every day during the first week.

W A L E S.

CEFNFAES, RHAYADER.—The month has been unusually rainy and damp; high winds from S.W. on 1st, 17th, and 24th.; T and L occasionally; rivers high and full, but not to flood; great losses of sheep from the constant and continued rains. Snowdrops in fine flower, also crocuses, violets, and daisies.

SCOTLAND.

DUMFRIES.—Only five days during the month on which no rain fell ; weather extremely variable ; frost, *B.*, and violent gales in the course of a few hours ; *S* on the 4th, 5th, and 7th. Rainfall 3·77 in. above that of corresponding month of last year. The temp. at night was 8°·1 higher, and the mean of the month 5°·8 higher (? than January, 1871). Snowdrops in flower on 21st, and at the end of the month the missal, thrush, and blackbird were singing.

SILVERBUT HALL.—A very wet and windy month.

AUCHENDRANE.—Compared with January, 1871, the lazy elements have been well scourged this January, with persistent equatorial winds moving northwards, generally at a rapid rate, and frequently with the force of gales. The mean temp. of the month is more than 2° above our January mean ; the atmosphere has been vapour-laden, with the high mean humidity of 92° ; the rainfall very large—the evaporation small. Estimating the mean temp. of day and night separately, the former is 45°·6, and the latter 35°·7. The result of such temp. movements is found in the low bar., and in the limited range of low pressure. The month began and ended with violent equatorial gales. Our heaviest gale was on the 17th and 18th, with heavy rain, with a bar. at 28·35. During the great gale in the *S.* on the 24th, there was a calm here, with only 0·020 of rain. With a rainfall of nearly 8 in. the river has been in constant high flood, particularly during the week 14th to 20th. It is feared that the trees may have suffered severely.

DEANSTON.—Only five dry days during the month. Gale of wind commenced on evening of 31st.

LOGIERAIT.—A rainy month, with some mild days ; as far as the winter has gone it has been remarkably open. Snowdrops in flower on 31st. A very severe gale on the night of the 31st.

BALLATER.—Remarkably open month ; occasional sharp frosts, though, in general, mild for the season ; no snow, but an excess of rainfall.

ABERDEEN.—A month of dull, mild, damp weather, with frequent gales, heavy hoar frosts, and no *S.*

PORTREE.—The month has been wet and stormy throughout. *T* and *L* on 2nd, with heavy gale at night, and *H* showers ; gale from *S.* on 31st. Ground covered with *S* on 3rd, 4th, 5th, and 6th.

LOCHBROOM.—Wonderfully open month, very little frost, no snow, every day damp and rainy but five ; it was, on the whole, a fine January, though for slush and wind it was remarkable.

IRELAND.

MONKSTOWN.—A large number of days with some rain, though with one or two exceptions, the quantities were small. Temp. low, mean 39°·4 ; dense fog on 21st, which was scarcely perceptible at Bray. *S* on 5th.

DOO CASTLE.—A wet cold month ; no farming operations, the ground is so saturated with rain.

WARINGSTOWN.—Heavy rainfall, many stormy wet days, with lovely pets between.

LECKPATRICK.—Very wet month ; little frost. Primroses in flower on the banks in the last week. More rain this month than in any January this last ten years, except in 1866 (7·34).

ON THE RAINFALL OF JANUARY.

THE total fall (as will be seen by the table on page 14) was above the average at almost every station, and there are several cases in which twice the usual amount fell. At Pen-y-gwyrd, near Snowdon, the amount reached 37·50, and as Seathwaite had 32·14, the fall on the Styne must have been nearly, or quite, equal to that at Pen-y-gwyrd.

DECREASE OF RAINFALL WITH ELEVATION.

To the Editor of the Meteorological Magazine.

SIR,—May I ask the favour of a small space in your next number, to remark with reference to a paragraph on page 231, that I do *not* hold as a fact, “that the horizontal distances of drops of rain at all elevations of a shower are equal,” a statement of which the correctness can probably alone be tested by observations from a balloon : the clause quoted had reference only to the horizontal distances of the drops, in showers of like density, *as they fall into the gauge*, at different angles with the vertical, no allusion being made to the drops at *different elevations* from the ground.—Yours truly,

G. WARREN.

Merton Villa, Cambridge, Jan. 18, 1872.

To the Editor of the Meteorological Magazine.

SIR,—If Mr. Franklen Evans can adduce any instance in which a gauge perched on the very top of an isolated hill catches more than a similar gauge in the plain below, I shall be glad to hear of it. The instance I gave of Ling Hill is to the point. The gauge on the top (315 ft.) caught in 1870 23·95 in., whereas one in the level garden of the lighthouse (198 ft.) caught 26·63 in., and another gauge on level ground at Whitby, at about the same elevation, caught 26·08 in., although insufficiently exposed. The latter was more than a mile distant, and quite “out of the attraction” of so small and isolated a hill. How far attraction causes rainfall is another question.

I believe also that he will find that in balloon ascents moisture has been found to increase up to what I may call the cloud-strata, and to diminish rapidly beyond that, and that I am perfectly correct in my statement. For the increase of moisture observed during an ascent of Snowdon, I can refer him to Vol. IV. of the “Proceedings of the Meteorological Society.” p. 272.—I am, Sir, your obedient servant,

FENWICK W. STOW.

P.S.—I need hardly explain that in my recent letters I have not used the word “diverge” in its strict mathematical sense. As my definition of it involves a supposition of momentary parallelism, I would substitute for it “an increase in the shortest distance between the paths of the drops.”

To the Editor of the Meteorological Magazine.

SIR,—Will you allow me to say, that however acute and accurate the calculations of your correspondents may be on this subject, and however valuable their figures and diagrams may be to science, their calculations are of little use to ordinary thinkers if their data are wrong. I find that the same process of rainfall takes place here as in India, and as no two clouds are of the same density, or of the same equality in moisture, and as no two rainfalls take place under exactly similar conditions of wind, so no diagram can convey a correct impression of the subject. On Monday last I left my house at 10 a.m., for Henley-on-Thames, distant four miles, and about 400 feet below me.

As we started there was a haze, which I called a cloud ; as we drove on, we became sensible of a cold moisture striking our faces, though there was no wind ; the sensation was due to our own motion (seven miles an hour), and showed that the moisture was stationary. The cloud extended above us, perhaps 300 feet ; we could see the glare of the sun through it, an occasional bit of blue sky, and a stratum of fleecy clouds far above us. We gradually got down into rain, and my conclusions were, that at 400 feet above the valley there was imperceptible moisture, ; at 300 feet the moisture was felt, but not seen ; at 200 feet it was a visible wet mist driving with a very gentle breeze ; at 100 feet we reached a drizzle ; and on the Henley level it was rain, with a little more wind, and no mist, but the glare of the sun could not be seen. The thickness of the cloud that we passed through in about 20 minutes, was a little over 300 feet, and the total thickness about 600 feet ; it moved with the wind below, but no motion could be detected above. A gauge at 50 feet of elevation above the level of the valley would have registered nothing, the umbrella scarcely showed the effects of the drizzle, but directly we got on the level I had to avoid the dripping as I drove. I have no doubt but this cumulative process may come under the head of "*Electric Polarization*," as there is electricity in the rain-drops, and in the earth ; but as the condition of the latter is perpetually changing, and as the moisture of the atmosphere varies constantly, I do not think that the latter by itself is a "regulator of rainfall," as Mr. Hugh Ingram supposes, but I have long considered that the atmosphere and earth combined regulate and arrange the rainfall phenomena.—I am, yours faithfully,

H. P. MALET.

Nettlebed, Jan. 25th, 1872.

To the Editor of the Meteorological Magazine.

SIR,—A simple experiment will decide the truth of Mr. Malet's theory in your December number.

In a letter to me he writes, "The gauge on the hill top fills more than that on the level, because the hill top condenses more clouds ; but if a gauge on the hill top were placed as high for it as the gauge on the pole, the relative quantities of the two elevated gauges would be the same."

Will not some of our rainfall registrars put this statement to the proof?—Your obedient servant,

F. R. HAWKES-MASON.

Wreham, Norfolk.

To the Editor of the Meteorological Magazine.

SIR,—On page 231 Mr. Cator says that "the point in dispute hinges on the question whether the horizontal distance between rain-drops is the same at all heights." I agree with him entirely ; and now I ask, what can possibly alter the horizontal distances of the rain-drops ? They are subject to no horizontal force but that of the wind ; I suppose no one is going to deny the second law of motion, and maintain that

the force of gravity can have anything to do with horizontal distances. Since, then, they are subject to the force of the wind alone, if at some height, it blows hard, all the drops are driven through a considerable horizontal space, but all the drops at that height are driven through the *same* horizontal space, and if, when they come to a lower level, it blows less hard, they are driven through a smaller space, but they are all driven through the *same* space: the wind has no predilection for one drop over another, it treats them all with perfect impartiality. It follows, therefore, that their relative horizontal distances must always remain the same, whatever the height through which they have fallen, and whatever may be the variations in the force of the wind; and, therefore, as Mr. Cator says, "*cadet quæstio*."—Yours truly,

J. M. DUPORT.

Mattishall, Feb. 9th, 1872.

DEW POINT AND OTHER HYGROMETERS.

To the Editor of the Meteorological Magazine.

SIR,—I freely accept Mr. Dines' amendment in the wording of my first proposition (p. 191), though I think its meaning (in connexion with Nos. 2 and 3), could not be misunderstood.

A complete *limit* to evaporation, no doubt, exists "when any liquid is at the same temperature as the superincumbent atmosphere, and the elasticity of liquid's vapour in the air is its 'maximum tension' for that temperature." But this limit to evaporation does *not* exist (as I believe Mr. Dines thinks), when the temperature of the air is *higher* than that of the liquid, although the elasticity of the vapour existing in the air be equal to (or even somewhat greater than) the maximum elasticity at the temperature of the liquid.

The facts, in the case of the wet bulb thermometer appear to me to afford a complete refutation of what I conceive to be Mr. Dines' opinion.

Thus taking his own experiment, to which I referred (Nov. 1871, p. 167), let us suppose dry bulb at 59° Faht.; wet bulb at 53°·8; I consider 49°·69 as the dewpoint, and let us suppose water to be present at this latter temperature: although the air (at 59°) contains vapour at the maximum density corresponding to 49°·69; yet (*unless* the atmospheric temperature should fall *altogether* to this temperature) it still retains—from its surplus heat—the power of taking up vapour from the liquid, not only when the latter is at 49°·69, but several degrees below it. That this is the case is proved most distinctly, in my mind, by the experiment here referred to.

Mr. Dines' experiments, I consider of the greatest interest as regards this one point, viz.:—"At what temperature of water, below the dew-point, does condensation cease, and evaporation commence?" This, I am certain, is a *fixed temperature*, whenever wet and dry bulbs are respectively at any given temperatures, with the same atmospheric pressure.

The tables I have made for calculating the dewpoint from the indications of the dry and wet thermometers enable me to *infer* the tem-

perature of water at which this event should occur. But a collection of accurate "experimental temperatures" I should look on as a great boon to science, as well as a valuable check on my own calculations of the dewpoint.

The "amount of evaporation" depends on so many circumstances (viz., on temperature and dryness of air, the velocity of its currents, the temperature, extent of surface, and quantity of liquid, &c.) that I think little progress can be made with regard to its laws without a *separate* investigation of the influence of each circumstance, and I attach the greatest interest to Mr. Dines' researches into the "initial temperature of evaporation from water acted on by air at a given temperature and degree of humidity." If he could furnish to your magazine a table with the following particulars, I feel convinced it would be received by all meteorologists as a treasure:—Yours faithfully,

HENRY HUDSON, M.D., M.R.I.A.

Temp. of Dry Bulb.	Temp. of Wet Bulb.	Temp. of Water when evaporation commenced.	Height of Barometer.

DISCORDANT MAXIMUM TEMPERATURES.

To the Editor of the Meteorological Magazine.

SIR,—Mr. Mackenzie's difficulty in connection with the discordant readings of his two maximum thermometers, admits of a very simple explanation.

It is a well-known fact that, *cæteris paribus*, the smaller the bulb of a thermometer the greater is its sensitiveness to slight variations of temperature.

Hence, the thermometer marked B, having the smaller bulb of the two, would naturally outstrip A whenever a sudden rise of temperature occurred, and if the rise of temperature were very transient,—the result, for instance, of a temporary lull of the wind, or of a momentary gleam of sunshine—would seize and register the increase of temperature before its more sluggish companion had had time to rise to the occasion.

This being the case, the results of the readings of the two thermometers are just what might have been expected, and Mr. Mackenzie may congratulate himself on their perfectly consistent performance, as shown in the table which he appends to his letter.

It is scarcely necessary to add, that the reading given by B should be adopted in preference to that of A, as being, if not the absolute maximum, at any rate the nearer of the two.

For the rest, until that uniformity in the instruments and methods of observation, which the *Meteorological Magazine* has so consistently advocated, is realized, discrepancies of this nature are unavoidable, and we should have great reason to congratulate ourselves if there were none more serious than those indicated by Mr. Mackenzie.

Yours faithfully,

GEORGE T. RYVES.

Buildwas, Salop, Feb. 7th, 1872.