SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

XXIII.] DECEMBER, 1867. [PRICE FOURPENCE. or5s. per ann. post free.

ANEMOMETERS.

(Continued from page 113.)

OUR survey of pressure anemometers will terminate with the latest, and in some respects the best—Cator's Lever Anemometer—which will be readily understood from the following description.

The outline sketch (Fig. 1) shows the only portions of the instrument exposed to the weather to consist of, a stout hollow pillar, containing a tube (*c*), which is attached to the vane and conveys its motion to the recording apparatus below; above the vane a horizontal bar will be noticed, terminating at one end in a cone, whereof the base (*a*) has an area of one square foot, and which is kept constantly face to wind by the vane; this plate receives the full force of the wind, and by it is driven towards (*b*), but in so doing it draws up the chain, which (part of *c* being cut away) is seen passing inside it, and continuing its downward course at (*d*). A string (*b*) will be noticed passing over a pulley at the back, and dropping through a pipe in the middle of the vane; this is arranged for affording extreme facility for testing at any time the accuracy and sensibility of the instrument, since it is only necessary to attach various weights to the string (*b*) accurately to imitate force acting on (*a*); and it is obvious that 3 lbs. attached to (*b*) should be so recorded on the register below.

We will now, referring to the shaded sketch, fig. 1, consider the arrangements indoors; these consist of three parts:—the clock (*l*), the sole duty of which is to turn the paper-covered cylinder (*n*) on its axis once in 24 hours. There is the tube (*c*), which as already explained revolves with the vane, and therefore conveys the direction of the wind through the mitred wheels at its base, and one or two cogs, to the drum (*g*), round which a single spiral will be noticed, which is formed of brass and presses gently upon the prepared recording paper (*n*). Therefore every variation in the direction of the wind causes a different part of the spiral to press upon the paper, and as the cylinder (*n*) is continually revolving, the exact time and nature of every change is infallibly recorded.

The special recommendation of this instrument is its record of pressure, which is obtained in the following manner:—It has been

explained that the force of the wind pressing on (*a*) drives it back, and in so doing raises the thin wire (*d*), this brings into play the double levers (*i*, *j*), shown also separately in fig. 2, the upper lever (*j*), when raised, passing between two guiders (*e*), the special recommendation of these levers being that, owing to their peculiar curvature, the point of contact travels farther and farther from the weight (*h*), the greater the pressure exerted; by this means great sensibility is obtained in light winds, and yet strong ones are recorded accurately and compactly.

Having thus shown how the force is counterpoised, it remains to explain that it is made to record itself by two cords fastened to the end of the lower lever (*i*), near the lower extremity of the wire (*d*)—one of which passes behind the clock (*m*), over two pulleys, and draws the recording pencil (*f*) more or less away from the edge of the paper, according to the amount of the pressure at each instant; the other string passes under the pulley (*k*) and into the clock (*m*)—called the gaining clock—to the regulator of which it is attached This is a clock of superior quality, arranged to go exactly 24 hours in 24 hours *if the regulator is at zero*, but the string only allows it to be there in a perfect calm, and at all other times it is pulled more or less towards '*fast*;' therefore, this clock always gains more or less, and the amount of gain is a direct measure of the mean force. This clock is figured in the usual manner, but of course is *not* an indicator of time. By repeated and varied experiment the exact gain corresponding to various *constant* pressures was determined, and therefrom an outer scale marked on the clock face, which gives therefore by simple inspection the exact mean force of each 24 hours—an element never before truly determined.

The advantages of the instrument are very fairly summed up by the inventor in the *Proceedings of the Meteorological Society*; we therefore quote the paragraph in its entirety:—

Advantages.—It remains to consider the peculiar advantages of this instrument. The *advantages* which this instrument has over other anemometers *in general* now in use, are the combination of pressure and velocity, the wind acting on *one* surface only; and over other *pressure*-anemometers, that the only parts out-of-doors and exposed to the weather are the pressure-plate and vane, all the rest of the instrument comprising all the working apparatus, and the levers, which are the resistance to the force of the wind, being inside the building, and protected from the weather; whereas the springs which are the resistance to the force of the wind in other pressure-instruments are out-of-doors behind the pressure-plate, and therefore very much exposed to the action of the weather, liable to rust, &c.; now a lever is preferable to springs for this purpose in *any* position, because springs cannot keep their original strength for ever, but must get weaker from age and constant use, and besides are liable to be too stiff from rust and accumulated dust and dirt; and springs indoors are preferable to springs out-of-doors, therefore, *a fortiori*, a lever indoors is preferable to springs out-of-doors. We now com to one of the peculiar features of this instrument, in that, while it is capable of the greatest susceptibility, it also exhibits, without being impaired, the greatest pressure of wind that has yet been brought to bear upon it. A pressure of wind of

only $\frac{1}{10}$th of a pound will cause the pencil to move through an appreciable space (*i.e.* about $\frac{1}{20}$th of an inch), while at the same time the instrument will bear a pressure of even 56 lbs. or more if required, and the pencil will show it, the whole scale being comprised in a space of $5\frac{3}{4}$ inches; a large portion of the scale being devoted to the lower pressures, *i.e.* about 1 inch to the first 2 lbs., which allows space enough for small fractions of a pound to be measured, and the spaces gradually diminishing for each pound as the numbers rise, where indications of integral pounds only are wanted, and fractions not required; whereas springs, which are strong enough to bear a pressure of 20 or 30 lbs., will not show any pressures generally under $\frac{1}{2}$ lb. In some instruments the spaces allotted throughout the scale are nearly equal for high and low numbers, which makes it impossible to record the small pressures, even if the instrument were sensitive enough otherwise to indicate it. Again, strong gusts of wind will be plainly indicated by this and other pressure-instruments, but are hardly discernible in the velocity-curve of a cup anemometer. Again, a pressure-plate, with a conical back to it, is preferable to one without it, as it will be more easily moved through the air with a very slight pressure of wind, as being pointed, it will cut through the air more easily than the ordinary plate, which, having a flat surface, must take a greater pressure to do so; and the consequence is that in very light pressures the ordinary plate will either not be moved at all, or will not be pushed through far enough, and therefore the pencil will show either no pressure at all or too small a pressure. And when we come to strong winds, a plate with a conical back to it is not subject (or at any rate it is much less subject) to the errors arising from, and false results given by, a partial vacuum being created behind the plate by gusts, which would be so in the case of a plate without a conical back; for when a strong gust comes, a partial vacuum is created behind the plate, and the consequence is that the plate is pushed through too far, and therefore too great a pressure is shown by the pencil. The error arising from this must, it should seem, be considerable. Again, the "gaining-clock," independently of the velocity, is designed to show the *exact* mean pressure, or the mean of an *infinite* number of observations, instead of only an *adopted* mean pressure, or the mean of twenty-four or any other certain or *finite* number of observations, as in other pressure-anemometers. In addition to the above advantages, the combination in this instrument of pressure and velocity dispenses with the necessity of using, at the time of making observations, a book of tables for their conversion; for the "gaining-clock" itself gives the results of the claculations which would have to be made for converting pressure into velocity.

We have only to add, that the instrument was tried at the Royal Observatory, Greenwich, with the most satisfactory results, and that the one represented in the engraving is now working most admirably at Mr. Cator's residence, at Beckenham. The instrument is made by Mr. Adie, but we have no exact knowledge as to cost

---

THE TORTOLA CYCLONE OF OCTOBER 29TH, 1867.

NOT having any correspondent in the district which has lately suffered so severely, we have been obliged, in preparing the following short narrative, to rely upon a series of extracts from the daily and weekly journals. We have, of course, no information as to the quality of the barometers of which the readings have been forwarded, but they appear to have been good, as the indications are very accordant, excepting only the barometer on shore at Tortola, which evidently has the common fault of insufficient cistern space, whereby it ceases to act just when it is most important that it should be correct. Another difficulty is that arising from the effect of the phenomena on those who are in their midst. In the present case there is a singular illustration

of the mental effect of such catastrophes, in that several writers have spoken of so many hours, quarter hours, &c., as to amount in the aggregate to nearly double the real duration of the hurricane even as given by themselves. We all know how "minutes seem like hours" under certain circumstances, and it is no wonder that errors of this kind have occurred. It is deeply to be regretted that there was neither observatory nor anemometer at either of the isles; known as they are to lie in the stereotyped track of West India hurricanes, it seems strange no instruments have ever been provided. However, if they had, they might have shared the fate of the instruments at Calcutta, in the storm of October, 1864, when the native in charge became possessed of the idea that the world was coming to an end, and therefore, that it was superfluous to take any more observations.

We propose to epitomize the history of the storm at Tortola, and at St. Thomas, and to conclude with a few general remarks.

Tortola.

"Tortola was submerged for eight hours. All living things perished." So said the telegram, but happily it was an outrageous exaggeration. The meteorological details from Tortola are very meagre, and the only shore observations evidently worthless, since the barometer only fell to 29 inches, while two others in the neighbourhood were below 28 inches, and a third in the harbour 28·10 in. The wind freshened from N. by W. soon after 9 a.m. on 29th, at which time the barometer was nearly 30·0 inches. By noon it had fallen to 28·70, and the wind was blowing a hurricane from N. by W. At 12.30 it had fallen to 28·10, and the wind fell calm. In twenty minutes the wind rose again from S. by E., and blew very hard—the barometer rising all the time. At 3 p.m. the wind moderated, and by 5 p.m. the barometer had risen to 29·45. There was very heavy thunder throughout, and intense darkness. In less than three hours, two-thirds of the houses, including the Governor's, Doctor's, and Clergyman's, the gaol, church, hospital, &c., and all the crops, were destroyed.

St. Thomas.

The season had been wet and very sickly. Seven inches of rain fell at Barbadoes on the night of October 7th, and 5·00 on another night. At St. Thomas there was a fresh wind on the evening of the 28th, and it increased till 1 a.m. on 29th, when it fell calm, remaining so until about 6 a.m. of 29th, when it blew in puffs accompanied by rain. This continued till 9.30 a.m., when it blew very strong. The hurricane began at noon from N.W. A lull of thirteen minutes' duration occurred about 1.30 p.m., then the wind chopped round to S.E., blowing even harder than it had previously done from N.W., and by 3.45 p.m. it passed away, though the sea continued high, and it rained heavily until the morning of the 30th.

The barometer at St. Thomas was about 30 inches until noon, and fell rapidly until about 2.30 p.m, when it was only 27·9. It will therefore be seen, that the minimum reading occurred *after* the centre of the storm had passed. Several shocks of earthquake were felt, and

the atmosphere was so strongly electrical, that the ships' compasses were useless.

Measures of Wind Force.

This element is far too easily supplied. Disasters which in the West Indies are spoken of as unparalleled, and which even English liberality cannot repair, are but too abundant. Harbours strewn with wrecks, houses unroofed, sheds carried away, these are common results—but happily it is rare to find in a lane "tons of broken wood, an anchor. several cart wheels, a pianoforte and slabs of marble, which, when the storm was at its height, had been seen whirling round in the air like sheets of paper;" yet stranger is it to read, that the "dining room of the house belonging to the Royal Mail Company's superintendent was hurled into a neighbouring garden, where it was discovered with the furniture, lamps, and decanters uninjured."

Probable Track of the Storm.

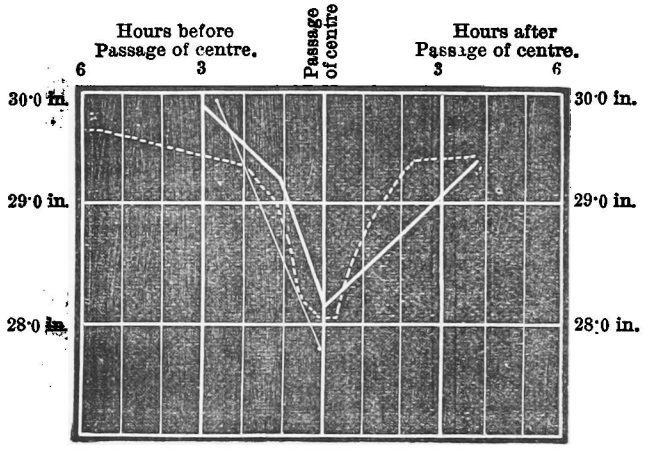
Up to the date of writing, we have only heard of the storm at Anguila, the Virgin Isles, Calebra, and Porto Rico. It did not reach St. Croix, 25 miles South of St. Thomas. When last heard of, it was "going direct for Turk's Island and the Bahamas." But another account says that it did much damage at St. Domingo. There is evidence in support of both statements; for the former, in that the mean axial path of hurricanes passing over the Virgin Isles is about W. 25° N, which would take the storm "direct to Turk's Island." On the other hand, the entire escape of St. Croix, and the directions of the wind as recorded at Tortola and St. Thomas', indicate a W.S.W. path rather than the usual W.N.W., and then St. Domingo would suffer.

Collating eleven hurricanes in N. lat 10° to 20°, and W. lon. 60° to 70°, we find that their paths were mostly from E.S.E. to W.N.W., and that the centres of five passed over St. Thomas, four were at a mean distance of 3° S.W. of the island, and two passed about $1\frac{1}{2}$ N.E. of it, thus showing how completely St. Thomas lies in the storm path of the West Atlantic.

Singular Parallelism between the Damage at St. Thomas and Tortola, in 1837 and 1867.

"At Tortola the town was destroyed; at St. Thomas the hurricane of August 2nd concentrated all its fury, the state of the harbour and town baffles description. The harbour is so choked with wrecks and sunken vessels, that it is difficult to pick out a berth for a ship to anchor. Some houses were turned regularly bottom up. One large well-built house was carried by the force of the wind from off its foundation, and now stands upright in the middle of the street. In the midst of the hurricane shocks of earthquake were felt. Calm period lasted ten minutes. Every vessel but two, wrecked or ashore. No barometer observations at Tortola or St. Thomas, but at Porto Rico, it began to fall slightly at 4 p.m., at 8 p.m. was 29·6, at 9 p.m. 29·5, 10 p.m. 29·4, 11 p.m. 29·3, midnight 28·0, then turned to rise, and at 4 a.m. next morning was 29·5."—*Col. Reid's Law of Storms.*

The foregoing is an abstract of the log of H. M. Packet, *Spey*, giving an account of the effects of the cyclone of August, 1837, which so closely agrees with the present disasters, that it would describe *them* better than any single account yet published. An equally remarkable agreement exists between the barometer depressions, in 1837, at St. Thomas', as given by Piddington, and the readings (correcting an obvious error) transmitted in 1867. The following diagram shows this very clearly. The dotted curve is 1837, from Piddington's Horn Book.



The thick curve from ship observations at Tortola in 1867, and the single faint line shows the fall recorded at St. Thomas in 1867. In each it will be seen the barometer was previously at about 29·8 or 30·0, that it began to fall more than 0·10 per hour, some three hours before the height of the storm, and that during the two hours immediately before the passage of the centre, the fall was at the rate of *three quarters of an inch per hour*; and lastly, all the readings concur in giving the minimum as between 27·9 and 28·1 inches.

It will be noticed that in both 1837 and in 1867, shocks of earthquake are mentioned. We need hardly point out that when the wind force is so furious, it must be very difficult to distinguish between vibrations resulting from it, and from subterranean disturbances. We may notice, moreover, that the West Indian Isles are mostly volcanic, and reference to Mallet's Seismographic Map of the World (British Association Report, 1858) confirms the commonly received opinion that earthquakes are of especial frequency in these islands. In fact another occurred within three weeks after—on 19th of November. A writer in the *Standard* has renewed the suggestion that real earthquakes may be caused by the extremely sudden removal of the consolidating atmospheric pressure—say 2 inches in three hours, which is more than 1,500,000 tons per square mile. We doubt this altogether, and think a slight consideration will render its absurdity obvious.

The specific gravity of mercury is 13·5; that of the surface of the earth may be taken at 2·1; therefore a fall of 2 inches in the barometer equals a removal of a layer of earth 13 inches thick. If such a removal is sufficient to cause a disturbance of the earth's crust, one would

think that there must be great danger at St. Thomas in sinking wells, lest instead of drawing water, they tap a volcano, and draw up melted lava.

Postscript, December 12th.—In the *Times* of the 10th is a letter from Mr. R. H. Twigg, at present engaged in erecting a lighthouse on the Island of Sombrero, of which the following is an epitome :—

"The hurricane began gently from N.E. about 1 a m. 29th, and at 5 a.m. it blew hard from N.W., and the barometer had fallen half an inch ; by 8 a.m. it had fallen to 28·65 in. (a decrease of 1½ inches), and the wind veered to N., increasing in force. From 8 to 9 the storm greatly increased, and a large portion of the wooden buildings were carried away. Then there was a lull for half an hour. The barometer by 9 o'clock read 29·95 [? Ed.], but the storm continued with even greater than its previous violence from E. till 11 a.m., when it abated sufficiently to allow a few persons to venture out. After that the wind went round to S.E. for about two hours longer. The anemometer had three of its arms broken, and the other twisted."

In the *Express* of the 11th is the following abstract of the account sent home by "the scientific authorities" at St. Thomas :—

"At 6 a.m. on the 29th the weather was squally, but the aneroid was at its usual height, viz., 29·95. Soon afterwards the barometer fell slightly, the wind freshened into squalls from the N., and much rain fell. At 9 the barometer was at 29·84. It continued to fall after this, and the wind veered to the east. At 10 the aneroid was at 29·80, and it then began to alter rapidly ; in fact, the hand could be observed moving. Precisely at noon the wind increased to a hurricane, blowing steadily from N.N.W. ½ W., and the aneroid was at 27·95 deg., indicating a fall of two inches of the mercurial column in six hours. At 12.15 there was a dead calm, which lasted 25 minutes. At 12.40 it was pitch dark, and there was a rush of wind from S.S.E ½ E. After 1 p.m. the barometer rose, and at 1.30 the weather improved. At 2 the barometer rose rapidly, the wind continuing steady at S.S.E. ½ E. A remarkable peculiarity of the cyclone was that it commenced blowing from an opposite point of the compass from ordinary West India cyclones.

These confirm the views above expressed, and accord with the narratives from other places. We may, therefore, say that so far as present information enables us to judge, the disasters were produced by a true cyclone, revolving in the usual manner (against watch hands), and travelling in a more southerly direction than is usual in the district whence alone we have yet heard of it.

THE METEOR SHOWER OF NOVEMBER 14TH, 1867.

We regret to state that our own report of the total eclipse of the meteors, applies to all parts of the British Isles of which we have yet heard, with three exceptions—Greenwich, the North Foreland, and Aberdeen. At Greenwich ten were seen through breaks in the clouds between 5 and 7.30 a m, At the North Foreland several meteors were seen about 6 a.m. ; and at Aberdeen there were a few breaks in the clouds between 5 and 6 a.m., and ten meteors were seen, one of which was so bright as to be visible through a thin cloud.

From Paris, the reports are contradictory. *Galignani* says:—"Between 1 and 3 in the morning the number of aerolites was so great that they could not be counted." On the other hand, the Observatory authorities have not published any observations, and we have been told that "the Paris correspondent of the *Daily Telegraph* reported that he had looked out at all sorts of unearthly hours, seen nothing, and got a cold for his pains." Another *on dit* is, that a party went up from Paris in a balloon (to be nearer the meteors?) but came down crest-fallen, having seen nothing!

At Toronto, Mr. Kingston reports:—"Overcast until 1 a.m. 14th, after which in consecutive hours until 6 a.m. the numbers were—44, 123, 560, 1345, 195—total, 2267—many of which were very bright; maximum frequency at 4.10 a.m., the *rate* being 2500 per hour."

At New York, most frequent at 4 a.m., at the rate of 1500 per hour.

At Washington Observatory, the display is said to have been the most brilliant in that country since 1833. Maximum frequency at 4 25 a.m., the rate being nearly 6000 per hour. Many of the meteors were remarkable for their brilliancy, and for having a brilliant greenish train, which usually vanished in a few seconds, but in one or two cases lasted several minutes.

THREE STRANGE STORIES.

FALL OF AN AEROLITE.—On Monday afternoon, the attention of the inhabitants was suddenly drawn seaward by what sounded like a signal gun. Those persons who happened to be upon the parades were startled by perceiving an aerolite descend into the sea at some distance. Thunder was subsequently heard, and evidences of strong atmospherical disturbance were plentiful.—*Margate, October 14th*, 1867.

SHOWER OF SULPHUR.—The inhabitants of the village of Thames Ditton, Surrey, were, on Friday night, October 18th, 1867, a good deal startled at witnessing a very strange phenomenon, which had the appearance of a shower of fire. The shower lasted about ten minutes, and during its continuance afforded a brilliant light. Next morning it was found that the waterbutts and puddles in the upper part of the village were thickly covered with a deposit of sulphur. Some of the water has been preserved in bottles.

AN EXTRAORDINARY PHENOMENON.—*(To the Editor of the Chatham News.)*—SIR,—On the afternoon of Monday the 4th, between the hours of three and four, I witnessed a very extraordinary sight in the heavens. I have not heard of any one hereabout having seen it. The facts are as follow:—At the time above mentioned I was passing the Mill by the Water-works Reservoir. On the gallery I observed the miller uttering exclamations of surprise, and looking earnestly towards the west. On inquiring what took his attention so much, he said, "Look, sir, I never saw such a sight in my life!" On turning in the direction towards which he was looking, the west, I also was astounded—numberless black discs in groups and scattered were passing rapidly through the air. He said his attention was directed to them by his little girl, who called to him in the Mill, saying, "Look, father, here are a lot of balloons coming!" They continued for more than twenty minutes, the time I stayed. In passing in front of the sun they appeared like large cannon shot. Several groups passed over my head, disappearing suddenly, and leaving puffs of greyish brown vapour very much like smoke. I am, Sir, yours truly,

JAMES E. BEVERIDGE, *Darland, Chatham, Nov. 13th*, 1867.

[Concerning the last of this marvellous trio, we are told that several persons saw this extraordinary phenomenon, and concur in Captain Beveridge's letter.]

REVIEW.

Results of the Magnetical and Meteorological Observations made at the Royal Observatory, Greenwich, 1865.—(Extracted from the Greenwich Observations, 1865.) 378 pages, quarto.

THIS volume contains the first set of magnetic observations since the instruments have been fairly at work in their new position in the magnetic basement, the various elements being given as read off from the photographic sheets. We cannot help thinking it is a pity that a somewhat similar course is not adopted with respect to the meteorological records, and we should also be glad to see one set of absolute values daily, in addition to the *means* as now given. There would surely be no difficulty in giving the pressure, temperature, &c, at some one hour daily, and we know that if given it would be highly valued.

The approximate mean declination was 20° 32′ 43″ W., and the mean dip 68° 2′ 40″.

Some of the most interesting meteorological elements are given in the following table :—

Meteorological Elements, Greenwich, 1865.

	Barometer at 159ft.			Thermometer.			Humid	Rain.	
YEAR.	Max.	Min.	Mean.	Max.	Min.	Mean.	Mean.	Days.	Amnt.
	in.	in.	in.	o	o	o	Sat: 100		in.
January	30·207	28·390	29·404	50·2	19·6	36·3	86	16	3·32
February	·432	·718	·722	52·7	15·5	36·6	83	19	1·75
March	·204	29·042	·722	58·7	23·7	36·6	79	10	·85
April	·170	·680	·954	81·5	31·9	52·3	73	7	·40
May	·225	·343	29·769	78·5	31·4	56·1	73	13	4·37
June	·358	·120	30·031	87·6	41·2	60·2	70	5	2·45
July	·202	·416	29·797	85·0	47·0	63·8	72	11	2·27
August	·172	·300	·711	78·0	43·2	59·9	80	17	3·97
September.....	·323	·750	30·071	86·0	40·2	63·9	76	1	·16
October	·081	28·824	29·440	71·7	33·5	50·9	87	19	5·90
November	·325	·794	·720	56·4	31·0	44·8	88	18	2·39
December	30·610	29·005	30·055	52·7	29·2	42·7	88	10	·87
Means	...	...	29·783	69·9	32·3	50·3	80	...	...
Extremes ...	30·610	28·390	...	87·6	15·5	...	...	...	...
Totals	...	...	...	...	...	...	...	146	28·70

The records of the thermometers sunk in the ground are somewhat incomplete, the spirit occasionally running out of scale, but the usual results are nevertheless manifest in the retardation of the date of maximum temperature, which at 3 ft. occurred on September 13th, at 6 ft. on September 20th, at 12 ft. on October 11th, and at 24 ft. not till December 6th.

Though last, not least important, is the catalogue of luminous meteors observed during the year, giving full particulars of the paths, size, colour, &c., of 300 or 400 meteors.

NOVEMBER, 1867.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1860–5	Greatest Fall in 24 hours. Dpth	Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date.	Min. Deg.	Date.	No. of nights below 32°.
			inches	inches.	in.							
I.	ENGLAND.	Camden Town	·86	— 1·55	·73	30	4	62·6	1	26·4	28	6
II.		Staplehurst (Linton Park)	1·26	— 1·93	·40	16	8	60·0	1	26·0	29	10
,,		Selborne (The Wakes)	1·06	— 2·48	·55	30	4	58·0	1	20·0	28	19
III.		Hitchen	·61	— 1·53	·39	30	5	55·0	15	26·0	27	9
,,		Banbury	·57	— 1·63	·23	30	9	58·0	1	23·5	28*	15
,,		Wisbech	·73	...	·24	30	8	58·2	1	24·0	28	5
IV.		Bury St. Edmunds (Culford)	·95	— 1·44	·45	30	7	60·0	1	22·0	27	7
V.		Calne	1·15	...	·95	30	3	61·0	15	19·3	28	16
,,		Plymouth (Goodamoor)	2·16	— 3·44	...	...	...	59·0	...	27·0	...	...
,,		Barnstaple	1·08	— 3·06	·58	30	10	...	...	...	...	...
,,		Taunton (Fulland's School)	·81	— 2·29	·76	15	3	...	...	...	...	...
VI.		Shrewsbury (Highfield)	1·04	— ·94	·47	14	8	...	...	...	...	...
,,		Tenbury (Orleton)	1·19	— 1·28	·45	14	10	57·2	1	21·6	29	16
VII.		Leicester (Wigston)	·61	— 1·55	·25	30	5	59·0	15	22·5	27	13
,,		West Retford	...	...	..	...	..	...	...	...	...	...
,,		Derby	·95	— ·68	·47	14	8	55·0	19	25·0	28	7
VIII.		Manchester	2·43	— ·34	1·50	30	7	53·8	15	24·0	28	12
IX.		York	1·16	— ·82	·45	14	7	58·0	5, 9	26·5	28	1
,,		Skipton (Arncliffe)	1·99	— 4·46	·77	16	6	50·0	1	24·0	24	3
X.		North Shields	·99	— 1·71	·45	14	6	55·8	8	31·0	27†	2
,,		Borrowdale (Seathwaite)	2·55	—14·12	·57	27	10	...	...	...	...	...
XI.	WALES.	Abercarn	1·12	...	·67	15	4	55·0	1	29·0	29	3
,,		Haverfordwest	2·21	— 3·46	1·60	30	4	53·0	4, 15	24·5	28	...
,,		Rhayader (Cefnfaes)	1·49	— 3·09	·50	30	9	59·0	...	26·0	..	...
,,		Llanberis (R. Victoria Hotel)	·39	...	·14	30	5	...	...	...	...	...
XII.	SCOTLAND.	Dumfries	·71	— 2·51	·39	30	7	59·0	4	26·5	24	12
,,		Hawick (Silverbut Hall)	·33	...	·13	15	8	...	...	...	...	..
XIV.		Ayr (Auchendrane House)	1·35	— 2·72	·31	13	10	72·0	4	17·0	21	12
XV.		Otter House	...	...	...	...	...	...	...	...	...	...
XVI.		Leven (Nookton)	·43	— 2·61	·21	30	5	56·0	8	31·0	27	10
,,		Stirling (Deanston)	1·23	— 2·29	·48	30	7	56·8	4	22·9	18	16
,,		Logierait	·52	...	·21	30	6	...	...	...	...	..
XVII.		Ballater	·82	...	·35	1	9	54·0	9	23·0	12	10
,,		Aberdeen	·94	...	·42	14	10	51·5	4, 9	28·7	13	2
XVIII.		Inverness (Culloden)	·91	...	·20	29	7	52·8	9	33·5	17	0
,,		Fort William	2·06	...	·49	25	13	...	...	...	...	...
,,		Portree	3·57	— 6·91	·78	24	12	58·5	6	29·0	5	2
,,		Loch Broom	3·27	...	·50	30	20	...	...	...	...	...
XIX.		Helmsdale	2·28	...	·59	1, 30	15	...	...	...	...	...
,,		Sandwick	2·93	— 1·07	·74	30	22	52·2	7	34·7	27	0
XX.	IRELAND.	Cork	1·75	...	·63	29	6	...	...	...	...	...
,,		Waterford	2·20	— 1·75	·95	14	9	59·0	4	29·0	28‡	2
,,		Killaloe	1·57	— 3·32	·58	13	6	59·0	1	23·0	28	8
XXI.		Portarlington	·86	— 3·06	·40	14	12	49·5	14	23·0	28	13
,,		Monkstown	1·29	— 1·59	·84	30	8	55·0	14	23·5	29	8
XXII.		Galway	·74	...	·28	13	5	59·0	8	31·0	17‖	3
,,		Bunninadden (Doo Castle)	·72	...	·31	30	9	54·0	4	23·0	29	11
XXIII.		Bawnboy (Owendoon)	·80	...	·28	13	11	55·0	4	25·5	27	6
,,		Waringstown	1·09	...	·28	13	10	54·0	4	28·0	8, 28	11
,,		Strabane (Leckpatrick)	1·10	...	·30	13	15	57·0	4	26·0	18	11

*And 29th. †And 28th. ‡And 29th. ‖And 21st & 28th.

+ 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.—Northerly winds, high bar. and less R than for many years. Dense fog on morning of 9th.

SELBORNE.—Bar. fell an inch in the four days preceding the 14th, and high winds blew throughout 15th, 16th, and 17th. Fog daily from 3rd to 11th, and on 24th and 25th; it was dense on 9th.

HITCHIN.—The driest November for 20 years.

BANBURY.—A cold dry month; mean temp. 2°·0 below the average. Fog on 8th, 28th, and 29th, and thick fog on 9th and 11th.

WISBECH.—Bar. high throughout, the mean being 30·261 in. Sycamore divested of leaves on 23rd, common poplar on 25th, and walnut on 17th. Constant fog from 9th to 12th.

CULFORD.—A very mild month. High wind on 16th; slight S on 20th.

CALNE.—Very high bar.; northerly winds, and remarkably dry month. Very high wind on 16th, gale on 17th.

ORLETON.—A dry month with an even temp., about 3° below the average, and a high bar. throughout. Max. 30·43 at 9 a.m. 9th. Wind generally from the N. and the air dry. Frequent frosts. Much fog 9th to 15th, followed on 16th and 17th by rough wind from N. and N.E.

WIGSTON.—Temp. below the average. An unusually dry fine month, which has proved most favourable for agricultural purposes. The rainfall, as far as my record serves, is unprecedentedly small, not being one-third of the average fall during the last 12 years.

DERBY.—A month of remarkable beauty, more resembling October than November. No fogs and only two days of decided R. Seed time all that agriculturalists could desire. It was unfortunately cloudy on the night of the 14th, but enough shooting stars were seen to verify the prediction.

MANCHESTER.—This month has been unusually dry here, more especially looking at the very small number of days upon which R fell.

ARNCLIFFE.—R only on 6 days, the smallest number I have ever registered; a very fine month.

NORTH SHIELDS.—Fog on 14th; H on 16th.

SEATHWAITE.—A singularly fine and dry month. R remarkably small, only one-seventh of the average. So fine a month never remembered.

WALES.

ABERCARN.—A very fine month, generally calm and cold. Fog on 13th and 14th. Windy on 16th.

HAVERFORDWEST.—Finest November for 20 years, chiefly characterised by bright frosts and cloudless sky. Bar. very high throughout, max. 30·615 on 9th. Had it not been for the storm of R and wind, which was very severe from S.E. on the last day, it would have been the driest month of this year, as it was certainly the finest.

RHAYADER.—A remarkably fine month.

SCOTLAND.

DUMFRIES.—Unusually fine for November. On 26th, at 5.44 or 5.45 p.m. a large and very luminous meteor passed from E. to W; it was pear-shaped, and appeared about one-eighth the size of the moon.

HAWICK.—The driest, mildest, and pleasantest November recollected. Windy on 15th.

AYR.—Most seasonable weather throughout; high bar., small rainfall.

NOOKTON.—A month of singularly fine weather, with a minimum of rain; quite unlike November weather.

DEANSTON.—Some S on the hills at the beginning of the month, and frequent frosts at night during it; generally very dry and bright, and very favourable for agriculture. Very little wind. The 14th very cloudy, and no meteors seen.

LOGIERAIT.—Finest November recorded; cloudy on 14th, and no meteors seen.

BALLATER.—An unusually fine month; bar. on 21st, 30·706 in.

ABERDEEN.—Auroræ on 1st, 2nd, 6th, 21st to 24th, 26th and 27th. A month of remarkably fine, mild, dry weather. H on 2nd, L on 6th, lunar halo on 7th, dense fog on 12th and 29th. On 14th a few meteors were seen between 5 and 6 a.m., but the sky was generally cloudy all night. Very fine meteors were seen en 20th at 7 p.m., and 26th at 6 p.m.—[See also Dumfries.]

CULLODEN.—H on 1st; aurora on 27th; fog on 29th.

FORT WILLIAM.—Very fine in the middle of the month, and the total rainfall only a quarter of the corresponding month of 1866. Cloudy at night on 13th; no meteors to be seen.

PORTREE.—Although October this year did not favour the Highlander's harvest, November has been very fine, and all is stacked in excellent condition. December is setting in very wild.

LOCHBROOM.—Beginning and end of month rainy; the middle very favourable for the herring fishery, which has been more successful than for 17 years. TS on 1st.

HELMSDALE.—Harvest was late in this quarter, but finally secured in good condition during the beginning of this month, when the weather was all that could be wished. Dec. 1, violent storm of wind and S.

SANDWICK.—Rain on 22 days, but not heavy; in fact, the amount is an inch below the average; very high bar. which, even when above 30·5 was accompanied by R and scud. H on 1st, auroræ on 20th, 23rd, and 28th; lunar halos on 12th and 13th.

IRELAND.

KILLALOE.—The driest Nov. in 22 years, except 1856, 1·51 in., and 1858, 1·22.

MONKSTOWN.—Colder and more foggy than usual; temp. on grass below 32° on 19 nights; min. 16° on 29th. Gale on 16th, and severe storm on night of 29th.

DOO CASTLE.—One of the finest Novembers on record. Potatoe digging, which was prevented by the weather in October, was pushed on in November with fair results.

OWENDOON.—Very fine and dry. H on 1st; fog on 5th, 6th, 8th, 9th, 10th, and 14th. Night of 13th rainy and overcast, could not see meteors.

WARINGSTOWN.—Very fine month; small rainfall; favourable to farming operations; large breadth of wheat sown in consequence. Tremendous H shower at 2 p.m. on 1st. Dahlias, &c., killed on 5th.

LECKPATRICK.—Very fine month; high bar., light winds, and warm sun for the time of year. Rapid fall of bar. on 30th, preparatory to gale and S of December 1st.

HEIGHT ABOVE SEA LEVEL.

IN a former number* we submitted a proposal relative to the determination of the heights of any number of localities above the mean sea level by means of the publications of the Ordnance Survey, and also by simultaneous barometric observations, which we undertook to reduce, and also to "publish the results" as soon as the discussion was completed. This promise, we think, the majority of our readers would rather see unfulfilled, since it seems to us rather a matter for settlement between ourselves and the observers than for publication, especially as the corrected values will be adopted in *British Rainfall*, 1867. The results will therefore be communicated to the observers very shortly. It may be well to add that the period selected, proved well suited for the purpose, the barometer being steady, and the results generally singularly accordant. In conclusion, we can only say that any of our readers who are uncertain of their altitude, and will send us the position of their house, in the following form—

"The Limes, Johnstone, Derbyshire,
Quarter of a mile South of Johnstone Church,"

shall be assisted to the best of our power.

* *Meteorological Magazine*, No. XVI., May, 1867.