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WEATHER MAPS OF THE NORTH ATLANTIC.

WE assign to the work mentioned below,* a somewhat prominent notice because we are inclined to class it as the best work that the Meteorological Office has yet issued. Our readers will remember that the "City of Boston," a well known and fine vessel, left Halifax, Nova Scotia, on January 28th, 1870, and has not since been heard of. In the present monograph, Captain Toynbee, the Marine Superintendent of the Meteorological Committee, has collated a very large mass of information from every accessible source, and has given a series of charts of pressure, wind, and weather over the Atlantic of great value,—all the greater because accuracy in drawing the isobars is not sacrificed to pictorial effect. The monograph embraces the period from Jan. 28th to Feb 8th, and gives ample details of the weather in which the ill-fated vessel was lost; and when we mention that the standard barometer on board the "Tarifa" in 51°N. and 24°W. read 27·33 in. at the same time as the pressure at St. Petersburg was 30·99 in., we need probably say nothing more to induce our readers to peruse for themselves the lucid accounts laid before them.

There is one reflection which will occur to every one:—Why should we not have such charts for every day in the year?—why do the Meteorological Committee cramp their action, and dwarf their position, by coquetting with English private observers, and neglect the splendid opportunity (which is legitimately their own) of searching on the bosom of the broad Atlantic,—the birthplace of British storms, the ruler of British climate—for that knowledge of coming storms and future weather which we believe would inevitably reward researches conducted in the frank and thorough manner of the work which has led to these remarks.

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* *A Discussion of the Meteorology of the part of the Atlantic lying North of 30° N. for eleven days, ending Feb. 8th, 1870, by means of Synoptic Charts, &c.* [Published by authority of the Meteorological Committee.] London: Stanford, 4to., 164 pages, and Atlas of Charts.

PLANTS SEEN IN FLOWER 10th JANUARY, 1873, AT FERNHURST, SUSSEX.

Scarlet rhododendron, erica carnea, stock, wallflower, primrose, snowdrops, crocus, Christmas rose, violets, gorse (plentiful). Three roses: viz., Prince of Wales, monthly, Gloire de Dijon. Ragwort, daisies, buttercups. Geraniums unhurt but not in flower, calceolaria quite green.

HEAT AS INDICATED BY NATURAL *v.* ARTIFICIAL MEANS.

To the Editor of the Meteorological Magazine.

SIR,—I have heard it said that it is a characteristic of Englishmen to give everything a fair chance of success. However, no one, I imagine, will hesitate to make a fearful exception of Mr. Robson's new cereal system of measuring heat and cold. Concurring, as I heartily do, with Mr. Crallan in his view of one of the principal uses of the thermometer (p. 195), I cannot see how Mr. Robson's system will work. How are we to get at the greatest summer heat or the greatest winter cold of various localities? Take two places pretty much on the same parallel, Hereford and Ipswich. Suppose that, in a certain year, the commencement of harvest was later by a few days at Hereford than at Ipswich, are we necessarily to infer that the growing and ripening period was cooler at Hereford than at Ipswich? I do not think so. An extra week of rain at Hereford, occurring at the end of this period, might perhaps account for the difference—inferior farming at Hereford might account for it—scarcity of hands at Hereford might account for it. The maximum shade temperature of the period might be (say) five degrees higher, and the mean shade temperature thereof (say) half a degree higher at Hereford than at Ipswich, yet Mr. Robson's system would not be able to tell us so positively. Quite the reverse. But what do I know of these things, am I not a *London* correspondent? (Here I may as well inform Mr. Robson that I have passed twenty-four years of my life in the country.)

In re damp cloths. I have no doubt that if Mr. Robson would take the trouble of placing a really *good* thermometer by the side of his moist dusters, he would arrive at results by no means confirmatory of his opinion of our present instrumental system. Let him, however, beware; nature is sometimes as treacherous as art. I have seen cloths "stiffened" by *dryness* as well as by frost; and with the temperature at about 32°, and without a thermometer, will he undertake in every case to decide between the two?

Adverting to my letter of the 18th of October last, I should like to hint once more to Mr. Robson that it is not quite logical, after describing our present thermometric system as practically next to useless, to propose to employ it in support of his views. This is bad enough, but he goes a step further; as long as the instruments conduct themselves

in a becoming and gentlemanly manner, and do not rudely contradict his statements, he is satisfied, if, on the other hand, in the interests of science, they should presume to assert a different opinion, "then some further inquiry ought to be instituted!" Really, this will not do.

In conclusion, I think it would more become us, as meteorologists, to discuss the points raised in Mr. Crallan's letter, and leave the Robsonian system to its fate. Like floral horology, it may be interesting, but it certainly is not practically useful. I leave the field to Mr. Robson, not because I am beaten, but because Mr. Robson like the British at Waterloo does not know when he is defeated.

Remain, Sir, truly yours,

E. G. ALDRIDGE.

3, Bonny-street, N. W., 18th Dec. 1872.

P.S.—As to frost, see Mr. Prince's letter on p. 72 of Vol. III. of the *Meteorological Magazine*.
E. G. A.

To the Editor of the Meteorological Magazine.

SIR,—Mr. Robson has again (in your last number), made several mistakes and misrepresentations. Permit me to call attention to some of them. (1.) Sarcasm uttered at the expense of accuracy is never effective. In the sneer with which Mr. Robson opens fire on me this is exemplified. He represents that I waited till the summer was over before speaking of the time of its commencement. This is by no means strictly correct. In your magazine for December, 1871, I specified June to August inclusive, as the Greenwich period of my predicted high summer mean temperature. The mean of that period at Greenwich was as much as 1°·6 hotter than the average of 101 years. I think all your candid readers will admit that this was a sufficiently striking fulfilment of a sufficiently explicit forecast. Even Mr. Robson will not venture to say that December, 1871, occurred *after* June, 1872. My laws now foretell a warm or cold summer or winter, with absolute certainty to within a week or so. I think these are steps in the right direction. The refinement of calculation Mr. Robson recommends is beyond my ambition. Forecasting the commencement of a hot summer to "the precise day, hour, and minute" is nearer perfection than I ever hope to reach. I have, however, the fullest confidence, (as I stated in the *Gardeners' Chronicle* in April last), that whenever the Greenwich mean temperature of the period from the middle of February to the middle of March is above 44½ degrees, we shall have, *as we always have had*, a very hot summer. It may begin before June, as in 1846 and 1868, about the 7th or 10th of June as in 1826 and 1859, or a few days later as in 1872, that is of little consequence, but a remarkably hot summer we certainly shall have in these parts; and here let me remark that my predictions were never intended to apply to a mountainous country like Wales. They apply to England only, and to the south-east of England especially. (2.) Mr. Robson says, "In a former number of the *Meteorological Magazine* Mr. Brumham tells us it has been a hot summer and a wet

one, by which I comprehend he means a greater amount of solar heat and greater rainfall in the 97 days than is usually the case." What I really did say about the wet was almost precisely what he suggests as an explanation of my meaning. It was:—"At your station the rainfall has been somewhat in excess of the average, and at very many stations the summer rainfall has been excessively large." So the effort to "comprehend" was wholly unnecessary. With regard to "solar heat" I trust Mr. Robson will pardon me for suggesting that his comprehension still appears somewhat confused. I did not allude to solar heat at all, because I was not sure that we had very much of it last summer. In my letters I wrote exclusively about "shade heat" and the "true mean temperature of the whole 24 hours." This obviously includes night as well as day temperature. Now as we do not expect to be favoured with sunshine in the middle of the night, your correspondent ought to perceive that I could not have referred to solar heat. (3.) With regard to the rainfall of last summer Mr. Robson appears to be similarly confused. Because I predicted excessive rains for that season, he strives to make more than three months of it appear dry. He really seems to spare no means, fair or unfair, to depreciate a hard-working labourer in the field of predictive Meteorology. He appears, however, to get sadly bewildered in the effort. For instance, at lines 7 and 8 from the bottom of page 192, he admits that the rainfall of my summer period was greater than the average as a "rule," and confirms this admission in the line below by stating that Linton was an "exception" to that rule, but at lines 11, 12, and 13 from the end of his letter he seems to consider weather "prophecies" additionally discredited because my summer forecast (as he states) did not apply to his exceptional station. In fact, because it only agreed as a rule, but did not apply to the exception. This is rather peculiar logic. (4) In your magazine for October last, page 160, Mr. Robson shows that his rainfall table extends as far back as 1855. In your last number, page 193, he tells us that his mean of the 97 (summer) days referred to in the 16 years from 1856 to 1871 inclusive, was 6.66 inches, and the rainfall for the same period last summer 6.34 inches. This shows a difference of about three-tenths of an inch,—not enough, one would think, to constitute last summer a dry one at Linton. Your readers will perceive that Mr. Robson includes the year 1855 in your October number, but "adroitly" suppresses it in his last letter. It is not necessary to go far for a reason. The months of June, August, and September were remarkably dry in 1855. By excluding that one summer the mean rainfall is made to appear about one-tenth of an inch greater than the true mean of Linton. This doubtless appeared an important difference to Mr. Robson. If he had in a fair and honest way taken his real mean—the mean of 17 years—instead of "adroitly" leaving out just the first year of his series, it would have shown the rainfall to be too near the actual mean, (as it really is) for last summer to be considered a dry one at Linton. His elaborate arguments to prove that the 97 days were dry, would then have seemed (as they certainly are) value-

less. It is possible that a "discerning public" to whom Mr. Robson appeals, may consider a treatment of figures, which among accountants would be designated "cooking," as somewhat unworthy of one who professes to give reliable reports of the weather. They may also think that even a predictive meteorologist (who has literally used millions of figures in deducing certain weather laws), is entitled to a little fair play. Your correspondent will perhaps complain because I have made the above statements, or possibly he will find it convenient to dismiss the subject with a sneering commendation of my "guessing," but he will not be able to deny that the "adroit" exclusion of 1855 made an appreciable difference in his Linton mean to my disadvantage. Complaint, however, is not argument, neither is a sneer equivalent to a proof. A complete and accurate statement of facts is far preferable. Even if his only desire is to depreciate weather prophecy, the latter course is more likely to be successful than the former.

Plants cannot inform us of the maximum, minimum, or mean temperature of the day, and the commencement of wheat harvest is affected by so many retarding influences as to be practically worthless for indicating the heat of a season.

In my last letter I expressed a belief that the mean temperature of July, 1872, at Linton, was about one degree above the 17 year average, and asked Mr. Robson to kindly furnish us with those means for the purpose of comparison. I prefer figures to "guessing," but as I had not the former, I tried the latter, and think a "discerning public" will see that I must have guessed correctly. Mr. Robson declines to oblige by producing the figures asked for. A desire to avoid still further exposure of his error with regard to the heat of July last, is doubtless the only reason why he has deviated from that obliging courtesy, for which I believe he is ordinarily so distinguished. As his present discourtesy is probably the result of this very excusable weakness, I suppose we must not say much against it.

GEORGE D. BRUMHAM.

[This correspondence must be less discursive, more meteorological, and more condensed, or we shall be obliged to terminate it. We fully recognize the ability of the writers, and the importance of many of their remarks, but we are also aware that much space would have been saved had plain answers been given to plain questions, and all fencing been avoided. Moreover, two distinct subjects have been mixed up together, to the prejudice and injury of both. We venture to suggest that should any further communications be forwarded they should be separate letters on "The Summer of 1872," or on "Heat as Indicated by Natural Means."—ED.]

SUN SPOTS AND CYCLONES.

To the Editor of the Meteorological Magazine.

SIR,—I mentioned to you that I am strongly of opinion that the solar spots surpass the photosphere as much in "heat-radiation" as they are deficient in luminosity. Brewster ("Astronomy," in *Edin-*

burgh Encyclopædia) held a somewhat similar view. I forget his reasons, but it is obvious that great increase of rainfall in temperate climates indicates more than ordinary evaporation in tropical waters, which it may be possible to connect with "spot-radiation."

The rainfall in a limited region (as in the British Isles) would, I suspect, be wholly inadequate to prove anything, but when, as in this year, great floods have prevailed not merely in our own islands, but in Belgium, France, Denmark, Switzerland, and Italy also, the question of the cause of such uncommon evaporation can no longer be neglected by meteorologists.

To such increase of evaporation I have no doubt we owe also the prevalence of cyclonic storms, which are, I think, easily accounted for. Let us imagine a rapid current of air (say a 1000 ft. in depth), at a temperature of 80° Fahr., and loaded with moisture, moving from the tropics, and meeting with a cold current (at 30° Fahr.) proceeding from the Pole towards the Equator, and we may assume the medium temperature (55°) to be that of any condensed vapour. But 1000 cubic feet of vapour at 80° weighs 11,000 grains, while the same volume at 55° weighs only 4,900 grains, consequently the difference, (6,100 grains of vapour) must be condensed in the mixed column of 2,000 cubic feet, or 3,050 grains of vapour in 1,000 cubic feet. When we multiply this quantity of vapour by 1,075 (its latent heat at 55°), we obtain (as an equivalent) 3,278,750 grains of water, and dividing this by 540,864 (the weight of 1,000 cubic feet of air), we obtain 25½ as the number of degrees (above 55°) by which the temperature of the column of air must be increased on the condensation of the vapour due to the intermixture of the two currents.

The air, thus heated, must *ascend* rapidly, and produce a comparative vacuum, towards which the external air must of course press in everywhere, and as the vacuity is, generally, a "large moving *area*" (not a *centre*), the in-rushing streams must clash, and (in connection with the effect of the earth's rotation) produce the vortex which, combined with excessive rainfall, is especially characteristic of cyclones. I fear this year will be found, like 1830-31, to be very disastrous to sheep-farmers, especially in low lands, from liver disease (rot), consequent on the excess of rain. In seeking for sun-spot influence, the *EXTENT* of spot surface, rather than number or frequency of new spots, ought to be kept in view.

Yours faithfully,

HENRY HUDSON.

Glenville, Fermoy, 24th Dec., 1872.

SHOWER OF METEORS.

SIR,—Since writing you under date November 30th, I have ascertained from two independent witnesses, whose accounts agree, that at about 6.0 p.m., there appeared in the west, but not far from the zenith, a large bright meteor, which continued for half a minute, and left behind it a luminous track, which one of my informants compared to "a shower of fine white sand, which finally took the shape of a

triangle, in which form it remained fully eight minutes." At about 7 p.m. the shower of meteors began, and according to the same informant, "at about 7.40, the whole heaven appeared illuminated; the stars were shooting in all directions, it was quite impossible to count them." The shower after this continued, though perhaps less brilliantly, far into the night. My own observations from 10.30 you have already received.

Yours truly,

H. A. BOYS.

Patras, Greece, Dec. 7th, 1872.

[The following letter to Mr. J. F. Bateman, C.E., F.R.S., has been by him kindly placed at our disposal, and will we are sure, be read with pleasure and profit.]

SIR,—I beg to send you a few notes on the shower of aerolites I witnessed on the night of Wednesday, 27th inst., thinking it possible they may be of some interest to you and to your astronomical friends.

I arrived at La Puebla about 6.30 p.m., from Palma, and up to this hour the heavens presented their usual aspect, the night being extraordinarily serene and not a cloud visible, but on leaving my house about 8.30 to visit a sick friend, my attention was immediately arrested by the multitude of falling stars. I hastened to a somewhat open space, where the view south and east reached nearly to the horizon, and was also pretty fair due east, and for half-an-hour watched this phenomenon with much attention, the result of my observations being as follows:—

Number and frequency.—Greater number falling both in N.E. and S.W., looking due S. with eyes fixed at an angle of about 40° with horizon, no three seconds passed without an appearance, and frequently five or six aerolites were falling simultaneously in the field of view. I should say that at least fifty were occasionally visible at the same moment throughout the heavens.

Brilliance.—Very variable; some were brighter than any fixed star, and others so faint as to be scarcely perceptible.

The light of all appeared quite white, and many were followed by a faint train of light, others, towards the end of their course, carried a small bright cloud or tail after them of considerable width, which was momentarily visible after the extinction of the nucleus.

The brightest generally seemed to be those which came into view at a vertical angle of from 40° to 50° , those which made their appearance very high or low being the faintest.

Direction of fall.—In whatever direction I looked their fall appeared quite perpendicular to the horizon, with one exception. In this case the aerolite appeared at an elevation of about 25° nearly due east, and pursued a course towards south, forming an angle of about 10° with the horizon through an arc of about 25° or 30° .

Three similar exceptions, pursuing the same direction, were seen by my inspector, Niclos, in Alcudia.

Vertical position of visible course.—They came into view at all elevations, from 20° upwards, but my impression was that the greater

number appeared at an elevation of from 45° to 60° , and that the length of illuminated course varied from 5° to 15° .

Duration of illuminated course.—My impression was that no aerolite was visible during more than one and a half second, and the majority not more than one second.

Duration of shower.—At 9.40 p.m. the aerolites were far less frequent, but even at 5.30 a.m. on Thursday, a considerable number were still falling. On the succeeding night I watched for some time and saw none.

The master of a vessel belonging to Alcudia was becalmed just off the harbour of Barcelona on the evening of the 27th, and he watched the shower until 12.0 p.m.; he describes it as a rainfall ("lluvia") of stars. It began at 6 p.m., the first appearing in the north, and by 6.30 p.m. they were falling all around the horizon; he observed that their fall was quite perpendicular. He called up his father, a very old sailor, to see the sight, and the latter observed that he had never seen such a multitude of falling stars.

I am unable to say whether the temperature was altered during this phenomenon, as there is often a great difference between Palma and Alcudia, but it certainly was very chilly on this night. A breeze from the south set in during the night, and continued slightly increasing until Saturday morning, when it blew half a gale. The barometer commenced falling also on Wednesday night, and up to Saturday morning had fallen 0.47 in., and now at 9 p.m., it is a tempestuous night.

Yours faithfully,

HENRY R. WARING.

La Puella, Majorca, 30th Nov., 1872.

DAILY VARIATION IN THE PREVALENCE OF RAIN DURING DECEMBER.

THE depression whose advance on our coasts had produced so much rain on the 30th November, lay over the S.E. of Ireland, at 8 a.m. on the 1st. The winds circulating round it were light, but a slight further fall occurred in most places, followed by the total break-up of the system. A change now occurred. At 8 a.m. on the 3rd, a complex depression appeared over the W. and N. of France and while the S.W. winds on its southern borders brought heavy rains to the south of France, the northerly breezes felt over our islands produced showery weather in the south of England, and some rain in Scotland. During the 4th, however, the mercury rose very rapidly over the Bay of Biscay, so that on the 5th high pressures were found there, producing variable winds and fine weather in the greater part of our Island, but restoring the southerly current with heavy rain in Ireland. This was only the forerunner of a very serious disturbance, which thrust itself over the N. of Scotland on the 6th, and after producing more or less rain on all parts of our Islands travelled towards Scandinavia. The temporary cessation of rain which apparently would have been experienced in the S. as the storm passed off was prevented; for during the

night of the 6th, a local disturbance rapidly passed up the English Channel, and lay over Belgium, at 8 a.m. on 7th heavy rainfall was thus experienced. The morning of the 8th found the weather finer generally, but night brought a new depression of small extent to us, which crossed directly over the country from the W. S. westward, accompanied by severe gales and heavy rain. This was followed on the 10th by a fresh storm, whose centre crossed France, and while heavy rains were experienced in that country, N. westerly breezes with snow and hail were reported from most of our stations. All passed off on the 11th, and the morning of the 12th found pressure uniform in the British Isles. The western barometers were, however, again falling, and rain once more set in, except in the north-east of the country. In the night of the 13th, a new small depression advanced to the position of the Scilly Isles, bringing south-westerly winds to the Bay of Biscay, and south-easterly breezes to our coasts. In the north the weather improved, but both on the 13th and 14th, (during which time the central area travelled very little), rain again fell in the southern districts and over France. On the morning of the 16th, the mercury had descended suddenly at our N.W. stations, while it rose in France. In the night a well defined depression travelled over our N.W. coasts, and continuing its journey was found over Norfolk next day. To the northward of its track very heavy snow storms occurred, completely interrupting telegraphic communications with many parts of Yorkshire, while heavy rains occurred in its southern parts. During the 18th, the system broke up, and from the 19th till the end of the month, a series of disturbances passed along our western coasts, and (except some few intervals of finer weather at our southern and eastern stations), rain was the prevailing feature of the weather everywhere.

F. G.

THE GALE OF SUNDAY, DEC. 8TH, 1872.

SEA LEVEL PRESSURES AT CAMDEN SQUARE.

Time.	Pressure. Inches.	Time.	Pressure. Inches.
Dec. 8th 5 0 p.m.	.. 29·041	Dec. 8th 9 30 p.m.	... 28·734
— 6 0 „	.. 28·926	— 9 45 „	... 28·732
— 6 15 „	... 28·899	— 10 0 „	... 28·734
— 6 30 „	... 28·866	— 10 15 „	... 28·733
— 6 45 „	... 28·871	— 10 30 „	... 28·742
— 7 0 „	... 28·859	— 10 45 „	... 28·742
— 7 15 „	... 28·841	— 11 0 „	... 28·750
— 7 30 „	... 28·821	— 11 15 „	... 28·740
— 7 45 „	... 28·816	— 11 30 „	... 28·745
— 8 0 „	... 28·794	Dec. 9th 0 0 a.m.	... 28·738
— 8 15 „	.. 28·786	— 1 45 „	... 28·734
— 8 30 „	... 28·774	— 6 15 „	... 28·790
— 8 45 „	... 28·754	— 7 15 „	... 28·820
— 9 0 „	... 28·750	— 9 15 a.m.	... 28·907
— 9 15 „	... 28·740	— 9 15 p.m.	... 29·023

G. J. S.

Readings of Barometer, corrected and reduced to 32° and sea level, at Merton Villa, Cambridge.

1872.	Inches	1872.	Inches
Dec. 8. 9 0 a.m.	... 29·51	Dec. 9. 8 10 „	... 28·86
— „ 8 15 p.m.	... 28·86	— „ 9 15 „	... 28·91
— „ 9 30 „	... 28·79	— „ 2 0 p.m.	... 29·07
— „ 11 0 „	... 28·78	— „ 6 0 „	... 29·11
— 9 0 0 a.m.	... 28·74	— „ 8 30 „	... 29·13
— „ 0 45 „	... 28·73	— 10 0 30 a.m.	... 29·14
— „ 1 15 „	... 28·72	— „ 9 0 „	... 29·14
— „ 2 30 „	... 28·72	— „ 3 0 p.m.	... 28·94
— „ 3 45 „	... 28·72	— „ 6 0 „	... 28·87
— „ 4 45 „	... 28·72	— „ 9 45 „	... 28·89
— „ 6 0 „	... 28·79	— 11 0 30 a.m.	... 28·98
— „ 7 15 „	... 28·83	— „ 9 0 „	... 29·34

REMARKS.—Dec. 8. Sky clear, moderate air from W.S.W., at 1 p.m. Cloudy by 3 p.m. Heavy rain, wind rising fast from S. at 5.30 p.m. till 7 p.m., heavy squalls from 7 till 9.30., violent gale with heavy showers at intervals from 9.30 p.m. till 4 a.m. (9th), gale continued till 8 a.m.—Dec. 9. Evening and night clear, calm and frosty.—Dec. 10. Rain with brisk wind from N.N.E. from 4 p.m. to 10 p.m.—G. WARREN.

SIR,—I annex barometrical readings, corrected, but not reduced to sea level :—

Dec. 8th	.. 9 a.m.	... 29·300
„	... 7.30 p.m.	... 28·456
„	... 8 p.m.	... 28·415
„	... 9 55 p.m.	... 28·425
Dec. 9th	... 9 a.m.	... 28·830

The gale went on increasing in fury as the barometer rose. The weight of the storm was felt at Hereford chiefly from 10 p.m. to 3 a.m. My vane, which has weathered many heavy gales, was blown away. The strong mast, firmly fixed and supported by stays of galvanized iron wire, was thrown down on the roof, and kept from falling to the ground only by the lightning conductor; the vane, however, a tolerably heavy one, came to the ground.

Yours, &c. E. J. ISBELL.

SIR,—I thought you might like to hear a short account of a most fearful gale which raged over our town for 6 hours yesterday, 4 to 10 p.m., and I think it was a heavier gale than I ever knew before, much heavier than the gale of the 23rd November. Yesterday (the 8th) the morning broke fair with rather a rough wind, barometer (Fitzroy's) at 29·60 at 9 a.m. At 1 the wind began rising and at 3.30 p.m. blowing a strong gale. At 4.30 one loud peal of thunder accompanied with vivid lightning, barometer at 29·15. The gale increasing in violence, blowing in furious gusts. It continued blowing about every 5 minutes with the force of a hurricane till 9 p.m., barometer at 29·00 the lowest reading. I think the hardest part of the gale was at between 7 and 8.30, when it made the houses shake; slates blew about in all directions. At 10 p.m. the wind abated (or rather from 9·30) barometer having risen to 29·10. Several large trees were blown down in the outskirts of the town, one in the field adjoining my house. A chim-

ney stack fell through the roof on a bed in one of the houses in the town, and at my mother's house, close on the outskirts of the town, the whole chimney stack was blown down, and one complete frame in the green-house was whirled out and blown about 30 yards on the lawn. Maximum temperature of the day 51°, rainfall 0·29 inch. No doubt I shall hear of great damage in the neighbourhood.—Yours, &c.,

ALFRED STEPHENS.

Bridport, December 9, 1872.

SIR,—A very sudden fall of the barometer occurred yesterday, amounting to ·58 in. between 2 p.m., and 6·45 p.m. From the sub-joined tables it will be seen that the fluctuations were very remarkable, especially between 6·45 and 9 p.m.

8th, 9	a.m. ...	...	...	29·43 in.
2	p.m. ...	...	..	29·36 „
4	„ ...	...	...	29·19 „
5	„ ...	...	...	29·07 „
6	„ ...	...	...	28·95 „
6·20	„ ...	...	...	28·90 „
6·45	„ ...	...	...	28·78 „
7	„ ...	...	...	28·80 „
7·45	„ ...	...	...	28·72 „
9	„ ...	..	...	28·80 „
10·30	„ ...	...	...	28·75 „
11	„ ...	...	...	28·74 „

At 7 a.m. on 9th the barometer had risen to 28·81 in.—Yours truly,
THOMAS PAULIN.

Winchmore Hill, Dec. 9th, 1872.

SIR,—We had a very sharp short storm here yesterday afternoon, with lightning. Barometer fell rapidly, till about 6·45, when it stood at 28·915 *reduced*. Rain ·29 in.—Yours truly,

W. T. RADFORD.

Sidmouth, Dec. 9th.

SIR,—This storm does not seem to have been of so violent a nature here as elsewhere in Ireland, but especially in England. Yet, although not destructive in its effects it was most interesting in its phenomena. The weather was moderate, yet threatening, in the morning, but the wind freshened gradually, and came on to blow hard, with rain from S.S.E. about 11 o'clock, increasing in violence up to about twenty minutes before two, when, with a furious squall, almost amounting to a hurricane, but of short duration, and accompanied by a heavy hail shower, it fell suddenly calm. After a calm interval of about an hour, when the sun came out, the sky became overcast again (the wind blowing from N.N.W.), and gradually freshening into a gale, which blew with great violence from the same quarter, accompanied by heavy rain, up to 9 p.m., when it moderated.

The barometer ranged from 29·20 at 9 a.m., to 28·31 at 1·40 p.m., when it began to recover itself, and rose to 28·90 next day. The maximum and minimum range of the thermometer in the twenty-four

hours ending 9 a.m. on the 9th, were 40 and 28. The rainfall in the same period was .73. From the above data it would appear that the storm was a cyclone, and that its centre passed over the county of Kilkenny about 2 p.m., on the 8th, travelling from N.N.W. to S.S.E.

Yours, &c.

JAMES GRAVES.

Inisnag Glebe, Stonyford, Co. Kilkenny.

N.B.—Neither the barometric nor thermometric data are corrected.

READINGS (CORRECTED) OF BAROMETER AT HAVERFORDWEST.

Dec.		Inches.	
8th....	9 a.m. ...	29.461	Showery, heavy squalls with rain.
— ...	2 p.m. ...	28.996	Fearful squall of hail and rain, wind rising to full gale.
— ...	3 „ ...	28.889	Sheets of water descending from 2 p.m.
— ...	4 „ ...	28.771	to 4 p.m. .82 in rain fell.
— ...	5 „ ...	28.687	Force of gale increasing heavy squalls.
— ...	6 „ ...	28.590	Storm tremendous, houses unroofed.
— ...	7.30 „ ...	28.562	Large trees uprooted, rain ceased.
— ...	8.30 „ ...	28.631	Wind shifting, squalls terrific.
— ...	9.30 „ ...	28.685	Wind suddenly shifted from S.S.E. to W.
— ...	10.30 „ ...	28.784	Blowing fearfully from W.N.W. the night.
— ...	11 „ ...	28.820	Terrible storm, less violent after midnight.
9th....	9 a.m. ...	29.061	Blowing very fresh.

This gale is supposed to have been the heaviest that has occurred here since October 1859, when the “Royal Charter” was lost.

E. P. PHILLIPS.

SIR,—My anemometer, on a pole 20 ft. above the surface of the earth (as represented in the frontispiece to *British Rainfall*, 1868) indicated a horizontal motion of 433 miles between 9 a.m. on Dec. 8th and 9 a.m. on 9th.

Yours, &c.

C. H. GRIFFITH.

Strathfield Turgiss Rectory.

SIR,—It may interest you to know that we have had an extraordinary fall in the barometer, yesterday morning the corrected reading at 9 a.m. was 29.185, wind W. by N., with a clear bright sky. Dry bulb 41°·4, wet 38°·8. Between 4 and 5 p.m. the clouds began to gather, wind S., barometer falling,—the lowest observed point being at 11 p.m. 28.42, (corrected),—it was the same at 5.45 this morning and had recovered at 9 a.m. to 28.521, wind W. by N., it blew pretty fresh during the evening, but nothing like a gale. Rain commenced about 7 p.m. yesterday and this morning I measured 0.50. Dry bulb 37.3, wet 36.2. Rainfall this month 1st to 8th inclusive, 0.75.

Yours truly,

A. ATKINSON.

Gainford, Dec. 9, 1872.

SIR,—After an exceedingly rapid fall yesterday evening, the barometer at 11 p.m. was only 28.503, reduced to 32° at sea level, one of the lowest readings I have ever recorded here. The wind rose to a gale from S.E. last night, veering this morning to W.N.W., with heavy showers.—Yours truly,

BOSCAWEN T. GRIFFITH.

Trevalyn Hall, Wrexham, Dec. 9, 1872.

DECEMBER, 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.		Max.		Min.		In shade	On grass.		
				Dpth	Date.			Deg.	Date.			Deg.	Date.
I.	Camden Town	4.35	+ 2.85	.81	16	22	54.6	22	26.6	12	5	6	
II.	Maidstone (Linton Park)	5.26	+ 3.43	.65	17	25	56.0	22	26.0	5	5	...	
III.	Selborne (The Wakes)	6.63	+ 3.88	.94	16	25	53.5	22	23.0	12	6	11	
IV.	Hitchin	3.78	+ 2.47	.90	16	25	50.0	22*	24.0	11	9	...	
V.	Banbury	4.00	+ 2.33	.93	16	25	51.0	22†	24.5	12	8	...	
VI.	Bury St. Edmunds (Culford)	3.83	+ 2.34	.75	10	23	51.0	25	25.0	11	6	13	
VII.	Bridport	5.04	+ 1.67	.56	6	25	54.0	22	24.0	5, 12	4	...	
VIII.	Barnstaple	5.71	+ 2.59	.60	27	25	56.0	23	27.0	12	...	...
IX.	Bodmin	9.49	+ 4.25	1.91	27	25	53.0	22	32.0	5††	3	4	
X.	Cirencester	4.04	+ 1.75	1.13	16	25	...	...	...	...	...	...
XI.	Shiffnal (Haughton Hall)	3.71	+ 2.03	.94	16	21	50.0	23‡	23.0	5	14	...	
XII.	Tenbury (Orleton)	4.86	+ 2.40	1.27	16	26	53.8	23	23.0	5, 12	10	11	
XIII.	Leicester (Wigston)	3.13	+ 1.61	.80	16	23	51.0	22§	23.0	4	6	...	
XIV.	Boston	3.28	+ 1.79	.80	16	22	51.0	25	28.0	5	9	...	
XV.	Grimsby (Killingholme)	3.38	...	.87	16	23	51.0	22§	27.0	14	3	...
XVI.	Derby	3.78	+ 2.23	.92	16	22	52.0	23	26.0	5	8	...	
XVII.	Manchester	2.97	+ .64	.59	8	20	52.0	27	24.0	5	7	11	
XVIII.	York	...	...	...	...	...	...	...	...	...	...	...
XIX.	Skipton (Arncliffe)	6.01	+ 1.46	.85	28	23	47.0	27	20.0	12	10	...	
XX.	North Shields	4.46	+ 2.26	1.03	8	25	50.2	27	26.2	12	4	7	
XXI.	Borrowdale (Seathwaite)	20.37	+ 3.42	2.70	27	21	...	...	...	...	...	...
XXII.	Cardiff (Ely)	7.57	+ 4.97	.99	17	22	...	...	...	...	...	...
XXIII.	Haverfordwest	9.99	+ 5.16	1.47	27	22	54.0	22	24.0	11	6	10	
XXIV.	Rhayader (Cefnfaes)	9.66	+ 6.37	1.10	8, 16	25	51.0	...	21.0	...	...	...
XXV.	Llandudno	4.23	+ 2.03	.84	16	20	56.0	23	30.6	5	1	...	
XXVI.	Dumfries	5.25	+ 1.79	1.05	8	17	52.0	22	20.5	12	9	...	
XXVII.	Hawick (Silverbut Hall)	4.29	...	.90	8	25	...	...	...	...	...	...
XXVIII.	Ayr (Auchendrane House)	5.19	+ 1.17	.70	7	18	52.0	5, 20	20.0	12	12	17	
XXIX.	Castle Toward	6.32	...	.95	6	17	52.0	23	...	...	7	...
XXX.	Leven (Nookton)	3.04	+ .26	.79	22	19	53.0	27	21.0	5	14	23	
XXXI.	Stirling (Deanston)	5.48	+ 1.28	.81	22	19	50.8	27||	18.0	14	14	20	
XXXII.	Logierait	5.56	...	.71	22	20	50.0	29	19.0	14	...	...
XXXIII.	Ballater	...	...	...	...	...	...	...	...	...	...	...
XXXIV.	Aberdeen	3.86	...	.42	20	24	48.6	27	25.3	5	11	20
XXXV.	Inverness (Culloden)	1.44	— .49	.59	19	17	52.0	27	28.9	5, 12	8	24	
XXXVI.	Portree	8.81	— 6.82	1.16	22	22	...	...	...	...	...	...
XXXVII.	Loch Broom	3.35	...	.32	23	25	...	...	...	...	...	...
XXXVIII.	Helmsdale	2.85	...	.46	12	23	...	...	...	...	...	...
XXXIX.	Sandwick	4.41	+ .45	.55	22	20	49.0	27||	28.4	12	3	...	
XL.	Cork	10.57	...	1.56	26	19	...	...	...	...	...	...
XLI.	Waterford	11.08	+ 6.66	1.24	1	25	53.0	22	29.0	30	3	17	
XLII.	Killaloe	6.79	+ 3.30	1.00	8	28	54.0	21	28.0	12	12	20	
XLIII.	Portarlinton	5.64	+ 1.44	1.06	9	31	53.0	23	27.0	11	9	...	
XLIV.	Monkstown	6.20	+ 3.58	.89	16	23	...	...	...	...	...	...
XLV.	Galway	5.83	...	.97	24	25	54.0	1¶	28.0	4††	13	...
XLVI.	Bunninadden (Doo Castle)	5.03	...	...	...	...	...	...	...	...	...	...
XLVII.	Bawnboy (Owendoon)	...	...	...	...	...	...	...	...	...	...	...
XLVIII.	Waringstown	5.75	...	1.10	8	22	54.0	23**	24.0	13	14	22	
XLIX.	Strabane (Leckpatrick)	...	...	...	...	...	...	...	...	...	...	...

*And 26. †And 23. ‡And 27. §And 23. ||And 28. ¶And 25, 27. **And 24. ††And 11, 12, ‡‡And 12, 15.

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

METEOROLOGICAL NOTES ON DECEMBER.

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 very wet but mild month, the ther. never falling below 41° the last eleven days. The total rainfall (5·26 being 3·43+the average), following the two preceding wet months has raised our yearly total beyond all previous years I have on record. High winds (mostly at night) on 9th, 11th, and 17th. L on the evening of the 8th; bar. very low at 7.30 p.m. on 11th, without much rain, but it was very unsteady the whole month; winds mostly S. and S.W. Frosts on 4th, 5th, 10th, 12th, and 13th, but not severe, so that geraniums and similar plants are still alive on dry and elevated positions out of doors.

SELBORNE.—8th, very tempestuous evening and night, with R, T, and L; terrific gale, a tree blown down. Frost nearly all day on 12th, but R at night. Fog on 14th, 15th, 19th, 20th, 21st, and 22nd, that on 20th very dense; tempestuous wind on 17th. T at night on 23rd; high wind and L at night on 25th. Prevailing winds during the month S.W., excepting from 3rd to 7th and from 11th to 14th. The wet season continues to interfere with agricultural and horticultural work. Much boisterous wind, and great electrical disturbance.

HIRCHEN.—On the 8th the most violent gale since my record commenced in 1849. 16th, '90 fell; the heaviest fall of the year. On 26th sulphur butterflies seen.

BANBURY.—High wind at 10 p.m. on 8th, and following morning, also on the 16th and 30th; fog on 12th, 14th, and 16th.

CULFORD.—Up to the 25th the weather was a continuance of the same wet dreary weather which has distinguished the two preceding months; the 25th day, however, was fine for the season, and the 26th remarkably so. H on the 4th; high winds on the 5th and 8th, also on 16th, when it was accompanied with sleet as well as R. Heavy fog on 15th, 17th, 18th, and 19th. Mean temperature of the month 40°·3. Equatorial winds on 19 days, Polar winds on 12 days.

BRIDPORT.—A very wet month; S. and S.W. gales on 20th, 24th, 30th, and 31st. On the 8th a gale of terrific force sprung up about 4 p.m., and lasting till 11 p.m., blowing with the force of a hurricane, doing much damage to trees, roofs, &c.

BODMIN.—A most terrific gale blew on the afternoon and evening of the 8th, but it happily was a brief one. Mean. temp. 45°, being no less than 3° + the average. The rainfall during this year has been 71·93 in., exceeding by 12·29 in. the heaviest fall during the last 23 years; it has been 25·01 in. in excess of the average fall of that period.

HAUGHTON HALL.—Another rainy month, varied by fog, frost, and wind; it opened with better symptoms, frost appearing to be setting in gradually, the nights at or below freezing point up to the 16th, and on that of the 5th, the temp. fell to 23°, when the geraniums were at length cut down; latter part of the month milder than the first; from 21st to end never below 45°. From 16th, inclusive, to end, R fell daily, except on 22nd, 23rd, and 26th. On 16th, from 2.30 p.m. to 9 a.m. on 17th, '94 in. fell, with S for an hour at 2 p.m. Fog on 2nd, 10th, 14th, 15th, 16th, 21st and 22nd. Nothing remarkable followed the sudden fall of bar. to 28·33 on November 30th, it was calm and fine. Violent storm from S.W. on nights of 8th and 24th. Unusually mild Christmas Day, not a holly berry to be seen.

ORLETON.—Great hurricane at night on the 8th; Clee Hills covered with S on 9th; violent wind on evening of 24th; rainy till noon on 25th, then fine till 7 p.m., then showery. In the whole month only five days without measureable rain; the river nearly full all the month, and greatly flooded on the 17th. The clay soil too wet to bear the horses, and no more wheat has been planted. Temp. below the average till the 21st, then much above it till the end of the month. Mean of month about 14½° in excess. Frequent gales, very strong on 8th and 9th, and 23rd and 24th. Bar. at 9 p.m. on 8th, 28·40.

WIGSTON.—Very damp relaxing atmosphere, and the ground so saturated with wet that every considerable fall of rain produced a flood. Agricultural work quite at a stand still.

BOSTON.—Temp. 4·6 above the average of the last seven years at Boston; general condition, mild, wet, and stormy. The gale on the 8th and 9th lasted longer than any known before. The total rainfall of the year is 32·69, is the greatest recorded since 1826, the earliest period from which the observations extend. The small streams in the higher districts are running fuller than they have ever been known to do before, and all the land is saturated with water. A great deal of the low sea lands (except where drained by steam power), was inundated for some days in the middle of the month.

GRIMSBY.—TS at 5·30 p.m. on the 1st; wheatstack fired by the L. at Cleethorpes T. at night on 3rd; gale in evening of 4th. 8th, a pleasant day, but the wind backed from W. to S.S.E. and blew a heavy gale at night, and till 11 a.m. on the 9th. Fine lunar corona, with prismatic colours, on 11th. Large lunar halo on 13th. Heavy R, with gale at night, on 16th. Gale on 24th at night, and high wind on 25th. The rainfall this year is a fourth above the average of the last six years; not one week in the whole year without R. The month very mild, with several gales, especially at night, such weather as we usually have at this period in the absence of frost. Thrushes sang on many days towards the end of the month. Much wheat land not sown, and much of the wheat sown has not germinated.

DERBY.—A mild and genial month, temp. varying but a few degrees throughout. Ther. only on seven nights fell below freezing point. Bar. pressure has been much below the mean. Rainfall two inches in excess.

MANCHESTER.—H, R and storm on 8th, and again with T and L on 9th. S on 5th and 12th.

NORTH SHIELDS.—Heavy R. and wind on night of 8th. Lunar halos on the 9th, 13th, and 14th.

SEATHWAITE.—Heavy fall of S on 16th.

HAVERFORDWEST.—The month commenced fine and rather cold, the weather changed on the 5th; after a sharp night's frost between 9 a.m. 7 p.m., '95 in. of R fell. Terrible storm on the 8th, of R, H and wind, after which several frosty nights occurred; from that period to the end it was a constant succession of R, with storms more or less violent. General health of the community very good, a total absence of zymotic diseases and typhoid, the constant succession of gales and floods appearing to blow and wash away every impurity. From the observations of 23 years I find the present year exceeds the wettest of them by 12·88 in., the total fall for the year being 69·78.

CEFNFAES.—The month damp; much R, with T and L frequent at night, wind generally N.W. Sheep beginning to suffer from the great moisture everywhere.

SCOTLAND.

DUMFRIES.—The closing month has been variable, frequent storms and heavy rain. The violence of the gales have not been felt so much in this district as in other parts of the country. The R has been above the average of five years. Mean temp. 39°·2. Very stormy and much S on the 8th.

HAWICK.—Gloomy December has shown itself true to its poetic reputation this year, and an Italian would have seen as much mud in a minute here as he could see in a month under his own blue skies. A very curious lunar rainbow was seen near the north-eastern horizon about 5 p.m. on the 12th, the lines of the crescent were very distinctly defined, and the rays of color were rich and brilliant, the pretty effect of the division of light was visible for some time.

AUCHENDRANE.—Gales on 17th, 24th, 26th, and 27th; river in high flood on 26th and 27th. Hoar frost on seven mornings and evenings.

CASTLE TOWARD.—The month, on the whole, has been a dull, cloudy, and showery one, scarce any sunshine; prevailing wind fore part of the month E. and N.E., latter part S. to S.W. Rhododendrons in full flower on the 13th.

DEANSTON.—Month wet and for the most part gloomy, with very little sunshine, some smart frosts, which were but of short continuance. Very little

progress made in operations connected with the tillage of the soil. Strong gales and almost continued floods in the rivers. Very little S. in the low country, but considerable falls on the high hills.

LOGIERAIT.—This month has kept up the character of the year; there were a few frosty nights at the commencement, but there were several returns to rain. The rainfall of the year is 15·66 in. in excess of the average for the preceding five years.

ABERDEEN.—A month of very damp dull weather, with low and unsteady bar. and frequent gales.

CULLODEN.—Hive bees out in the garden on Christmas day.

PORTREE.—Very changeable weather during the month, frost, S, and R, alternately. Fine lunar halos on 9th and 14th. S. 6 inches deep on 11th and 12th. Cattle and sheep quite healthy and thriving well on pasture.

LOCHBROOM.—This has been a much better month than the last three or four.

SANDWICK.—Aurora on six nights, one on the 4th followed by a gale of 45 miles an hour, from 3 till 10 p.m., and of 50 miles an hour from 5 to 6. December has had a greater rainfall than the mean, and there being little sunshine or evaporation the ground is very wet, but no floods, as in many other places, and little rain has fallen since the 24th. Frost from 10th to 13th.

I R E L A N D.

WATERFORD.—Storm from S.W. on 8th, and from S.E. on 20th.

MONKSTOWN.—Thrushes singing almost every day at the close of the month, the weather being very mild.

DOO CASTLE.—Very wet month, and few frosty days.

WARINGTOWN.—Incessant storm and rain. The soil thoroughly saturated and no agricultural work possible.

ATMOSPHERIC WAVES.

To the Editor of the Meteorological Magazine.

SIR,—On the authority of the United States Signal Office, the press is now noticing a great wave of storm, which has passed over a width of some 1500 miles on that continent. It is supposed that these storms have passed on to the Atlantic, and that they have possibly caused the late disturbances in these islands. I believe that the storms of America and the hurricanes of the Gulf of Mexico are often felt here, at intervals of about fourteen or ten days respectively. In a similar manner, the northerly storms, which reach Strasburg, visit us within a few days, while parts travel down the Danube through the Black Sea, and part travel into the Rhone valley, both forming easterly gales, in the Mediterranean within a week. Since Strasburg was taken off the Meteorological list, I have left off studying the subject; but as I have frequently stated, it seems, that nearly a precise knowledge of coming storms could be gained by increasing our Meteorological electric stations. The increasing demands of increasing populations will do this in time, but the question now is, would it pay to make them, merely for the doubtful good of calculating the arrival of storms a week or a fortnight before hand?

H. P. MALET.

December.

P.S.—I consider that the frost in England on New Year's Day, and the stormy weather which prevailed at the end of last and beginning of this year, were connected with the storms and cold of America, alluded to in the *Times* of January 9th.

H. P. M.