

# SYMONS'S

## MONTHLY

# METEOROLOGICAL MAGAZINE.

CLXVIII.]

JANUARY, 1880.

PRICE FOURPENCE.  
[or 5s. per ann. post free.]

### LOW TEMPERATURES IN DECEMBER, 1879.

ALTHOUGH we have not received as many abstracts of low temperatures as we expected in response to the note on page 180 of our last number, we think that the following list is by no means short, and it is not as full as it might have been made, for we have not thought it worth while to reprint the temperatures given in columns 10 and 11 of the table on page 194.

Looking at the whole of the figures, one is much struck by the irregular distribution of the cold both as regards date and intensity. There is every date from the 2nd to the 7th, both inclusive; and stations close together often report very different values—*e.g.*, Beech House, Cambridge,  $+5^{\circ}0$ ; Observatory, Cambridge,  $0^{\circ}0$ ; and Merton Villa, Cambridge,  $-2^{\circ}0$ :  $7^{\circ}$  difference between two stations hardly a mile apart.

As regards the record which heads the list, there can apparently be little doubt that it is entitled to that position, but the thermometer was not a verified one, and we do not know exactly how it was placed. Mr. Coventry writes as follows—

“The thermometer I had in use was too small to admit of its registering lower than  $-6^{\circ}$ ; but another thermometer, in an exposed position, was observed by one of our gardeners to register  $-11^{\circ}$ , of the correctness of which I have no doubt. I have compared the thermometer I observed in December with Rutherford's and Phillips's, and I find both agree.”

PLACE OF OBSERVATION.	AUTHORITY.	Lowest Temp.		Stand.
		Degree.	Date.	
Ketton Hall, Stamford .....	F. Coventry, Esq. ....	$-11\cdot0$	6	S.
Hodsock Priory, Worksop .....	H. Mellish, Esq. ....	* $-5\cdot8$	7	
Lauder Grange, Corbridge-on-Tyne .....	T. Hurst, Jun., Esq. ....	$-5\cdot0$	4	
Millfield, Haddington .....	Mr. C. J. Dods .....	$-5\cdot0$	4	
Abbey Gate, Melrose .....	Mr. A. Dodds .....	$-5\cdot0$	4	
Coston Rectory, Melton Mowbray .....	Rev. A. M. Rendell .....	$-4\cdot5$	2	
Pawston, Cornhill-on-Tweed .....	B. P. Selby, Esq. ....	$-4\cdot0$	4	
Much Hadham, Ware .....	Rev. H. S. Mott .....	$-3\cdot0$	7	
Merton Villa, Cambridge .....	G. Warren, Esq. ....	$-2\cdot0$	7	
Gainford, Durham .....	A. Atkinson, Esq. ....	$-2\cdot0$	3	
Bucknall, Horncastle .....	W. Carter, Esq. ....	* $0\cdot0$	7	S.
Moor Hall, Harlow .....	Mr. H. Huntley .....	$0\cdot0$	7	

PLACE OF OBSERVATION.	AUTHORITIES.	Lowest Temp.		Stand.
		Degrees.	Date.	
Dunmow, Essex .....	H. E. Cockayne, Esq. ....	0·0	...	
Stanley Vicarage, Wakefield .....	Rev. R. Burrell .....	0·0	6	
Cambridge Observatory .....	H. Todd, Esq. ....	0·0	6, 7	
Sheering Rectory, Harlow .....	Rev. E. Hill .....	1·0	7	
Victoria Street, Loughborough .....	W. Berridge, Esq. F.M.S. ....	*1·5	2, 7	
Cossey, Norwich .....	H. Culley, Esq. ....	4·0	2	
Elswick Lodge, Garstang .....	S. King, Esq. ....	*5·0	4	S.
Addington, Winslow, Bucks. ....	Mr. J. Mathison .....	5·0	7	S.
Grammar School, Burton-on-Trent .....	C. U. Tripp, Esq. ....	5·0	7	
Old Ballikinrain, Stirling .....	Miss Anstruther .....	*5·0	4	
Beech House, Cambridge .....	J. Nutter, Esq. ....	5·0	7	
Priory Row, Coventry .....	J. Gulson, Esq. ....	5·0	7	
Abinger Hall, Dorking .....	Mr. G. Payne .....	5·0	...	
Colney Hatch, Middlesex .....	J. Thrustans, Esq. ....	6·8	7	
Kembach, Fife .....	J. Makgill, Esq. ....	7·0	4, 5	
Bushy Hill, Cambuslang, N.B. ....	Dr. Muirhead .....	7·0	4	P.
Berkhampstead .....	W. Squire, Esq. ....	7·0	7	G.
Broughton, Banbury .....	E. C. Morrell, Esq. ....	*7·6	7	P.
Eltham Green, Kent .....	E. J. C. Smith, Esq. ....	7·7	2	
Wansford House, Watford .....	J. Hopkinson, Esq. F.M.S. ....	7·8	7	
The Chase, Enfield .....	T. Paulin, Esq., F.M.S. ....	7·9	7	
Magdalen College, Oxford .....	E. Chapman, Esq. ....	9·0	7	
Bickenhill Vicarage, Warwick .....	Rev. W. R. Capel .....	9·0	...	
Altarnum Vicarage, Launceston .....	Rev. J. Power .....	10·0	2	
Stonor Park, Oxford .....	Mr. T. Spring .....	11·0	7	
St. Giles Street, Northampton .....	H. Terry, Esq. ....	11·0	6	
Leaton, Shrewsbury .....	Rev. E. V. Pigott, F.M.S. ....	*11·9	2, 4	S.
Twyford, Athlone .....	J. Hodson, Esq. ....	12·0	5	
Ballinasloe, Galway .....	W. H. Kempster, Esq. ....	12·0	5	
Holt, Trowbridge .....	Major Gritton, F.M.S. ....	12·2	2	
Achonachie Lodge, Beauley .....	W. C. Preston, Esq. ....	13·0	1	
Compton Bassett, Caine .....	Mr. J. Allen .....	13·0	7	
Woolston Lodge, Southampton .....	F. Ekless, Esq. ....	13·5	7	
Addiscombe, Croydon .....	E. Mawley, Esq., F.M.S. ....	13·6	7	
Lowestoft .....	S. H. Miller, Esq., F.M.S. ....	13·8	7	
St. John's Wood, London .....	H. S. Wallis, Esq., F.M.S. ....	*14·2	7	S.
Breeze Hill, Liverpool .....	A.R. Andersson, Esq. F.M.S. ....	15·0	3	
Beaminster .....	Rev. A. Codd .....	15·0	4	
Farley, near Cheadle .....	C. L. Wragge, Esq., F.M.S. ....	17·0	5	S.
Tenterden, Kent .....	J. Ellis Mace, Jun., Esq. ....	18·0	7, 17	W.
Langton Herring, Weymouth .....	Rev. C. H. Gosset .....	18·0	5	
Sansaw Hall, Shrewsbury .....	F.G. Tippinge, Esq. F.M.S. ....	18·0	5	
The Heath House, Cheadle .....	J. C. Philips, Esq., F.M.S. ....	18·0	5, 7	
Cosgarne, St. Austell .....	J. Truscott, Jun., Esq. ....	18·4	5	
Hinderton, Neston .....	R. Bushell, Esq., F.M.S. ....	19·5	4	S.
Llanfrehfa Grange .....	F. J. Mitchell, Esq. ....	20·0	7	
Buncrana, London .....	T. Colquhoun, Esq. ....	20·0	3	
Woodway, Teignmouth .....	G.W. Ormerod, Esq., F.M.S. ....	21·3	...	
Sidmouth .....	Dr. Radford, F.M.S. ....	*21·0	5	S.
St. Lawrence, Isle of Wight .....	Rev. C. Malden .....	22·0	5	
St. Aubin's, Jersey .....	J. E. Vibert, Esq. ....	22·7	3	
Babbacombe, Torquay .....	E. E. Glyde, Esq., F.M.S. ....	*22·8	...	S.

The Readings marked with an (\*) were registered by thermometers verified at Kew Observatory.

References respecting Thermometer Stands—S., Stevenson's; P., Pastorelli's; G., Glaisher's; W., Wall.

## THE SANITARY INSTITUTE AT CROYDON.

*(Continued from page 179).*

In 1870 (the chart for which year was shown in contrast with that of 1879) a very similar state of things took place, the temperature of the summer being high and the rainfall very deficient, quite a drought having prevailed, with occasional heavy rains. In that year the zymotic death-rate was high from scarlet fever and diarrhœa. The years which had the greatest number of rainy days were found to have the lowest zymotic death-rate, as in the present year, the rainfall to the end of September having been 28·03 inches, or 10 inches more than the average, and the number of days 156, or 53 more. During the past summer almost continuous rain has fallen, and temperature has been low, the zymotic death-rate has consequently been low, diarrhœa has been conspicuous by its absence, the low temperature and moist atmosphere having been alone responsible for the generally high death-rate, which was caused by the great mortality from respiratory diseases. This year was the third instance since 1865 of continuous rain having brought with it a low zymotic death-rate. One point more was alluded to, viz., the great difference between the nature of the rainfall of the last four or five years, and that of previous years, the falls being much heavier, and the opinion was expressed that much of the unusual prevalence of fever since 1874 has been caused by the frequent exceptionally heavy rains, especially those which occur at night, when, unless there is a distinct and ample provision for storm-water, it must enter with great force and volume into the sewers, the lower parts of which become flooded, at the same time that the ventilators in the streets become choked, and forcing the sewer gas to make its escape to the higher levels, it enters the houses placed ready to receive it. Heavy rains in the day time do not so much matter, for the houses are open, and it is very seldom that a heavy rain occurs at night which might be called sufficient to produce an epidemic of fever, and which should be at the rate of at least an inch in an hour. An instance was given of such a rain having occurred soon after midnight on the 24th of September, 1875, during a violent thunderstorm, when 1·13 of an inch of rain fell in an hour, and as that time the storm-water was not cut off from the sewers, and the main sewer itself was in an unsatisfactory condition, the opinion was expressed that to some extent it was answerable for the second outbreak of fever that year which occurred two or three weeks afterwards. This seemed all the more probable, seeing that there were two distinct periods of great activity, as though there were some disturbing causes at work which only require to be removed that the results might cease. In conclusion, he was aware that great efforts had been made by the local authorities since 1875 to cut off all direct communications between the sewers and the interior of houses, and also to divert the surface and storm water from the sewers; but still, much remains to be done, and until done, and that thoroughly, if the present abnormal condition of rainfall is to continue, so zymotic diseases might rear their ugly heads amongst us. At the same time there was much to be thankful for in the fact that zymotic diseases were occasional visitors only, and the general death-rate of the district was very much below that of large towns generally, and frequently below the average of all England.

In the discussion that followed this paper, Dr. Black and Dr. Carpenter took part, and a paper was read on the subject of meteorology by Mr. Mawley, of Addiscombe.

## TEMPERATURE AT NANCY AND STRASBURG.

*To the Editor of the Meteorological Magazine.*

SIR,—The enclosed account of the weather at Nancy during the late frost is perfectly reliable, and it is so interesting that I send it

you, in case you would like to insert it in the *Meteorological Magazine*.—Yours truly,

P. P. PENNANT.

Nantlys, St. Asaph, 3 Jan., 1880.

REGISTER OF TEMPERATURE AT NANCY AND STRASBURG,  
For the Frost of November and December, 1879.

DATE.	NANCY.		Meteorological Station at Belle Fontaine.	At Enzheim, Rhine Valley, nr. Strasburg.	REMARKS.
	Min.	Max.			
Nov. 25...	+30	+37	+28	...	Wind generally N.E., varying by E. to S.E. all the time.
" 26...	+23	+31	+26	...	
" 27...	+26	+28	+21	...	
" 28...	+16	+29	+14	...	
" 29...	+18	+30	+12	...	
" 30...	+26	+31	+17	...	
Dec. 1...	+25	+31	+19	...	A bitter cold day, with wind; the first [really cold day.
" 2...	+20	+22	+12	...	
" 3...	+2	+17	+9	...	Heavy snow.
" 4...	+10	+32	+3	...	Ditto continued.
" 5...	+20	+22	+16	...	Ditto, with much wind, fearful storm
" 6...	+16	+24	+16	...	Bright, fine, and cold. [at times.
" 7...	-5	+10	-17	+10	Ditto very cold.
" 8...	-12	+4	-22	-9	Ditto fine, and cold.
" 9...	-7	+13	-18	+1	Bitter cold, overcast.
" 10...	-11	+12	-19	-16	Much warmer, slight snow.
" 11...	+17	+22	-5	+12	Ditto.
" 12...	+24	+26	-17	+17	Ditto.
" 13...	+20	+26	-15	+22	Ditto.
" 14...	+2	+17	-8	+10	From 14th to 19th inclusive the sun shone bright all day from sunrise to sunset, without a cloud in the sky, and hardly a breath of wind. I have never seen more lovely winter weather, though very cold.
" 15...	+7	+19	-5	+1	
" 16...	zero.	+16	-12	-5	
" 17...	-3	+16	-11	-16	
" 18...	+6	+23	+1	-5	Wind nearly north; a dull, cold day.
" 19...	+12	+30	zero.	+8	{ Very heavy hoar frost; moisture in air.
" 20...	+18	+25	+15	+8	
" 21...	zero.	+13	-3	+12	A bright, cold day.
" 22...	-3	+15	-8	...	Hoar frost.
" 23...	zero.	+26	-7	...	Ditto.
" 24...	-3	+15	-8	...	Cold wind, inclined to shift to south.
" 25...	-3	+16	-5	...	Ditto ditto ditto.
" 26...	+8	+26	-1	...	{ Very heavy hoar frost. Thermometer stood as low as 12° Faht. at noon, when it began to rise, and continued to do so all through the night, standing at 28° at 7 a.m. on the 29th, the rise continuing all through the day. Wind about S.S.W.
" 27...	+17	+24	+14	...	
" 28...	+1	+26	-8	...	
" 29...	+28	+35	+25	...	

+ means above zero Fahrenheit; — means below zero Fahrenheit.

NOTE.—The frost lasted just thirty-five days (from 25th November to the

29th December), during which time the thermometer never rose above freezing point. On eleven days the mercury fell to zero Faht., or below it, at Nancy. On the 8th December it fell to 12° below zero F., and never rose higher than 4° above it. The 8th was a bright fine day notwithstanding.

Nancy is 650 feet above sea level. The temperatures are recorded from a thermometer by Steward (Strand), marking both min. and max., one of his best instruments. It was fixed at about 40 feet from the ground, north aspect.

The meteorological station of the Belle Fontaine is in the forest of Haye, five miles N.W. from Nancy, and about 200 feet above it. The situation is a very exposed one, chosen specially to obtain the probably lowest temperatures in the neighbourhood of Nancy, for comparison with other stations in the forest. The thermometers have since been tested to ascertain that the temperatures recorded were quite correct.

I obtained also the min. temp. in the Rhine Valley for comparison from 7th to 21st December inclusive. The instrument not marking a min., they were taken at 8 a.m. each day. Enzheim is about eight miles west of Strasburg, and probably from 500 to 600 feet above sea level.

The mean min. temp. of the 35 days is between 9° and 10° Faht.; the mean max. temp. is between 22° and 23°.

G. F. PEARSON,  
Colonel.

Nancy, 30th Dec., 1879.

### THE TAY BRIDGE STORM.

JUST as the gale of October 25th, 1859, is known as the Royal Charter storm, and that of March 24th, 1878, as the Eurydice squall, so will that of December 28th, 1879, go down to posterity as the Tay Bridge storm. We offer no opinion upon the disaster, that would be too great a responsibility to be lightly assumed, but we give a few reports from widely distributed stations. There are two points which may perhaps merit attention—(1) that the evidence of broken trees appears to indicate that the gale was as strong in Argyllshire and in Aberdeenshire as on the banks of the Tay, but (2) we have not heard of any material structural damage to any other erection than the unfortunate bridge.

The following notes are arranged from south to north. Arthurstone is about as much north of Tay Bridge as Kemback is south of it :—

BUSHY HILL, CAMBUSLANG.—Aneroid read as follows :—9 a.m., 29·64 ; noon, 29·45 ; 2 p.m., 29·30 ; 4 p.m., 29·25 ; 6 p.m., 29·10 ; 7 p.m., 29·125 ; 8 p.m., 29·17 ; 9½ p.m., 29·30.—*H. Muirhead, M.D.*

EALLABUS, ISLAY, ARGYLL.—The anemometer here is indexed to register up to 20 lbs. on the square foot, but between 5 and 7 p.m. on 28th it was sent past the index and stood at what I should say was 30 lbs. per square foot.—*J. B. Ballingall.*

ARDDARROCH, DUMBARTONSHIRE.—I have been here upwards of 20 years, but never saw or heard of so fearful and destructive a storm as that of 28th, about 6.30 p.m. Some beautiful Scotch firs, upwards of 120 years old, were blown down, and much damage was done in this locality.—*W. McAllister, gardener to J. White, Esq., of Arddarroch.*

KEMBACK, FIFE.—Heavy gale in afternoon, with mercury about

29·3 in., wind S.S.W., heaviest between 7 and 8 p.m., nearly W. in the squalls. Kemback is about 10 miles south of Tay Bridge.—*J. Makgill.*

ARTHURSTONE MEIGLE, PERTHSHIRE.—Great gale which was at its height at a little past 7 p.m., the moment when the Tay Bridge was blown over. The noise of the wind was like the sound of a great waterfall with a bump at intervals like a heavy thud of a solid substance. Forty-three trees in these grounds were blown down or snapped off above the roots.—*Peter Carmichael.*

BRAEMAR.—Violent hurricane from 6 p.m. to 9 p.m., thousands of trees uprooted.—*J. Aitken.*

ELCHIES, CRAIG ELLACHIE, MORAY.—Hurricane damaging houses and uprooting trees.—*J. Milne.*

KEITH.—Terrific gale from 6 p.m. to midnight.—*J. Masson.*

ACHONACHIE LODGE, BEAULY.—Barometer fell 0·80 in. between 11 a.m. and 8 p.m., great gale from S.W.—*W. Conway Preston.*

SANDWICK.—At 9 p.m. the barometer had fallen to 28·602 in. from 29·400 at 9 a.m., the wind was then quite moderate, but this great fall warned us of the storm which broke out here at 9:30 p.m. Maximum velocity 11 p.m. to midnight, 52 miles.—*C. Clouston, LL.D.*

ROCKFORT, BUNCRANA, LONDONDERRY.—Strong gale from S. in morning, increasing in violence and veering to S.W. and W. until it reached a climax at from 4 to 6 p.m., after which it moderated.—*T. Colquhoun.*

## THE SIZE OF FOG PARTICLES.

*To the Editor of the Meteorological Magazine.*

SIR,—The dense fogs prevalent for some time past have induced me to attempt the measurement of the small particles or drops of water of which they are composed. The size of these particles is by no means uniform even in the same fog, varying from 0·00062 to 0·005 inches, but the larger particles are only to be found in very dense fogs, and at a time when they may be felt like rain upon the face. In cases of mist with a clear sky above, nothing larger than 0·0013 inches has been observed. In Kamtz's meteorology the size of "vesicles of fogs" is said to differ in the different months, and to vary from 0·014 to 0·035 mm., or from 0·00055 to 0·00137 inches. The difference between 0·00055 and 0·00062 inches for the measurement of the smallest particles is not great, when the difficult nature of the subject is taken into consideration, and there can be no doubt that smaller particles exist in fogs than have at present come under my observation, but I am not likely to be mistaken in the size of the larger particles. I am ignorant as to the method by which Kamtz obtained his measurements, but the one I have used appears to me extremely simple, and not liable to any great error. The dull surface which brass acquires by use seems well fitted to shew up

small drops of water upon its surface. A small vessel of this metal, through which water can be made to circulate, is placed under a microscope, fitted with a micrometer eye-piece, and the fog particles are measured as they fall; or the small vessel may be gently moved through the air, in order to catch a greater number. The surface of the brass must be kept near to the temperature of the dew point; if too high the smaller drops will evaporate before there is time to take their measurement; on the other hand, if too low, dew is formed upon the surface, but there is no danger of any error from this cause, the appearances are totally distinct, the dew covers the entire surface, and the drops are too small to be measured; the fog particles, on the contrary, can be seen to fall separately, and are surrounded by a vacant space, like to that which is seen on a dry pavement at the commencement of a shower. Some of the fog particles are flattened by the fall; these give an irregular outline; others appear, under the microscope, as perfectly globular, and unaltered in shape. It follows from this, that when fog and mist are prevalent, *part* of the moisture which is seen upon the earth is caused by rain, pure and simple, and not by the condensation of the vapour in the air. These observations, when combined with others which I have for some years past been making upon dew, lead me to think it highly probable that the annual deposit of real dew upon the surface of the earth does not exceed one inch in depth.

Can any of your correspondents give a good definition of dry fogs, and of their component parts? Are they caused by smoke—by some combination of the temperature of the air with vapour, which causes haziness—or do they only differ in degree from other fogs?

G. DINES.

*Walton-on-Thames, Jun., 1880.*

## THE WEATHER IN DECEMBER.

THIS month began with that cold and wintry weather which occupied so large a portion of it. During the 30th November and December 1st an area of low pressure lay over the North Sea, and moderate to fresh N. winds prevailed with low temperatures in the east, with occasional snow, and milder, fair weather in the west. By the 2nd this depression had travelled southwards over France, the bar. had risen briskly in the south-east, while it had fallen in the west and north, so that pressure had become very uniform, the wind decreased in strength and temp. fell rapidly and was very low. On the evening of the same day pressure was still giving way in the south-west, a brisk S.E. breeze sprang up and temp. began to increase. Next day the conditions were rather complicated, an anticyclone lying over northern England with a large area of low pressure over the Bay of Biscay, and a small depression over Holland, so that S.E. to E. winds prevailed on our and the French western coasts, and variable airs in the east; temperature at the same time rising. The depression over the Bay of Biscay proved to be of considerable consequence, and as it passed in an E.N.E. direction across France caused a brisk fall of the bar. over France, and an E. to N.E. gale in the north and the Channel. On the 5th the lowest pressures were shewn over the northern part of the North Sea, and W. winds and a slight thaw began in the evening with snow, but by the following day the bar. was high and rising over these Islands, the wind being very light from N. with a very hard frost at night.

During the whole of the following week the weather of the British Isles and neighbourhood was governed by a large area of high readings which was formed over the north-east of France and the south of these Islands on the 7th, and soon enveloped the whole of these Islands. In consequence very dry weather was experienced, though in many parts of the country (and especially in London) a great deal of fog or mist prevailed, the densest fog of the week being on the morning of the 13th. The wind generally was light or moderate, being E. over France, S. in the south-west, and W. to N.W. in the north and east. Intense frost prevailed on the 7th over England. A very rapid rise took place on the 8th, but on the 9th the frost was re-established and lasted till the 12th, when the thermometer rose and continued to do so till the close of the week.

The general distribution of pressure during the next week, though subject to slight modification from day to day, differed little on the whole. A large anticyclone (in which readings were very high) was shown in the south, while the lowest pressure was reported from the north of Scandinavia. At first the anticyclone was over the north of France and the Channel, so that E. winds prevailed over France, with hard frost, S.W. winds, and comparatively mild weather over the British Isles and the North Sea.

These conditions continued on the 15th, but on the 16th the anticyclone had shifted somewhat and was shewn over the North Sea, so that the E. wind had spread to our southern coasts, temp. falling generally. On the 17th and 18th the area of high pressure lay over the British Islands, light breezes prevailed, with sharp frost over England on the former day, which, however, gave way to a quick rise of the ther. on the following morning. On the 19th there was scarcely any change, but on the 20th the bar. fell quickly in the south-west, and a rather important depression was found off the south of Ireland, causing strong S.E. winds. This depression apparently moved northwards, and the wind shifted more to the southward. The weather was for the most part dry and moderately fine, but a good deal of fog was reported.

Weather towards the end of the month underwent a gradual, but very decided, change. Throughout the week (21st-27th) an anticyclone lay over France, and an influence extended over south-east England, but in the west and north weather was controlled by cyclones over the Atlantic, so that light airs, fogs and frost prevailed in France and in the south-east of this kingdom, while S.W. to W. winds and high temperature prevailed in Ireland, Scotland, and Norway. On the evening of the 27th, however, the bar. fell very briskly in the north-west, a disturbance (which was succeeded by a still deeper one on the following day) appeared off our north-west coasts, and warm weather became general, with a very severe S. to W. gale. From this time till the close of the year important depressions passed over these Islands, and S.W. to W. gales with rain, hail, thunder and lightning were general: the frost, of course, being entirely broken up.

*Lowestoft.*

H. E. M.

### A WHITE FOG BOW.

*To the Editor of the Meteorological Magazine.*

SIR,—A white fog-bow was noticed here between 11 and 12 o'clock on the morning of December 23rd. A low white fog of varying density was driving before a moderate E.S.E. wind, with sunlight occasionally gleaming through it. In these lighter intervals a distinct white bow appeared on the fog in the N.N.W., at a short distance from the observer.

This bow varied in clearness, generally in proportion to the amount of sunlight, and in its various parts according to the definiteness of the fog on which it was projected. It was perfectly white, but similar in other respects to a rainbow. The weather was frosty.—

Yours faithfully,

H. GEORGE FORDHAM.

*Odsey Grange, Royston, Jan. 7th, 1880.*



SUPPLEMENTARY TABLE OF RAINFALL IN DEC., 1879.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Margate, Acol .....	·81	XI.	Port Madoc .....	2·43
„	Littlehampton .....	·87	„	Douglas, .....	2·39
„	Dorking, Abinger .....	·81	XII.	Carsphairn .....	4·40
„	Hastings, Manor House .....	·96	„	Melrose, Abbey Gate .....	2·35
„	Hailsham .....	1·20	XIV.	Douglas Cas., Newmains .....	2·65
„	I. of W., St. Lawrence. ....	·91	XV.	Islay, Gruinart School. ....	3·26
„	Strathfield Turgiss .....	1·13	XVI.	St. Andrew's, Cambo .....	...
III.	Great Missenden .....	·56	„	Aberfeldy H.R.S. ....	1·04
„	Winslow, Addington .....	·81	XVII.	Tomintoul .....	·70
„	Oxford, Magdalen Col. ....	1·08	„	Keith H.R.S. ....	1·21
„	Northampton .....	·42	„	Forres H.R.S. ....	·69
„	Cambridge, Merton Vil. ....	·57	XVIII.	Strome Ferry H.R.S. ....	5·92
IV.	Harlow, Sheering .....	·89	„	Lochbroom .....	5·32
„	Diss .....	·69	„	Auchnasheen H.R.S. ....	...
„	Swaffham .....	·81	„	Tain, Springfield .....	1·54
„	Hindringham .....	·95	„	Loch Shiel, Glenfinnan. ....	9·32
V.	Salisbury, Alderbury .....	·85	„	Dalwhinnie H.R.S. ....	...
„	Calne, Compton Bassett .....	1·02	XIX.	Lairg H.R.S. ....	2·61
„	Beaminster Vicarage .....	1·45	„	Altnabreac H.R.S. ....	1·33
„	Dartmoor Prison .....	...	„	Watten H.R.S. ....	1·50
„	Langtree Wick .....	...	XX.	Fermoy, Glenville .....	2·55
„	Lynmouth, Glenthorne. ....	2·65	„	Tralee, Castlemorris .....	2·84
„	St. Austell, Cosgarne .....	1·58	„	Cahir, Tubrid .....	2·04
„	Taunton .....	1·15	„	Tipperary, Henry St. ....	2·35
VI.	Bristol, Ashleydown .....	1·25	„	Newcastle West .....	3·36
„	Wem, Sansaw Hall. ....	1·02	„	Kilrush .....	2·51
„	Cheadle, The Heath Ho. ....	1·34	„	Corofin .....	3·33
„	Bickenhill Vicarage .....	·82	XXI.	Kilkenny, Butler House .....	1·87
VII.	Coston Rectory .....	1·33	„	Carlow, Browne's Hill. ....	2·20
„	Horncastle, Bucknall .....	·83	„	Kilsallaghan .....	1·22
VIII.	Walton-on-the-Hill .....	1·75	„	Navan, Balrath .....	1·20
„	Broughton-in-Furness .....	3·78	„	Athlone, Twyford .....	2·24
IX.	Wakefield, Stanley Vic. ....	1·28	„	Mullingar, Belvedere .....	2·05
„	Ripon, Mickley .....	1·48	XXII.	Ballinasloe .....	3·02
X.	Gainford .....	·90	„	Clifden, Kylemore .....	6·14
„	Haltwhistle, Unthank. ....	2·33	„	Crossmolina, Enniscoe. ....	4·35
„	Shap, Copy Hill .....	5·30	„	Carrick-on-Shannon .....	2·87
XI.	Llanfrechfa Grange .....	1·99	„	Dowra .....	2·36
„	Llandovery .....	4·40	XXIII.	Rockcorry .....	2·28
„	Solva .....	1·40	„	Warrenpoint .....	2·29
„	Castle Malgwyn .....	2·02	„	Newtownards .....	1·20
„	Rhayader, Nantgwillt. ....	4·97	„	Larne, Carnlough .....	2·60
„	Carno, Tybrite .....	4·40	„	Bushmills .....	2·30
„	Corwen, Rhug .....	1·52	„	Buncrana, Rockfort .....	1·74

ERRATUM.

In Mr. Percy Bicknell's letter on page 180, line 3, for "thunderstorm" read "snowstorm."

## DECEMBER, 1879.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					Days on which ·01 or more fell.	TEMPERATURE.				No. of Nights below 32°	
		Total Fall.	Difference from average 1860-5	Greatest Fall in 24 hours.		Max.		Min.					
				Dpth.	Date.			Deg.	Date.	Deg.	Date.	In shade.	On grass.
		inches	inches.	in.									
I.	Camden Square .....	·86	— ·64	·32	30	9	52·8	28	16·1	7	24	29	
II.	Maidstone (Hunton Court)...	·71	— ·91	·16	5	12	...	...	...	...	...	...	
III.	Selborne (The Wakes).....	·79	— 1·96	·26	31	7	47·0	28	8·0	7	28	30	
III.	Hitchen .....	·51	— ·80	·16	5	13	49·0	28+	8·0	6	28	...	
IV.	Banbury .....	·65	— 1·02	·17	31	12	52·0	28	8·0	7	26	...	
IV.	Bury St. Edmunds (Culford)...	·52	— ·97	·17	5	7	52·0	31	1·0	6	26	28	
"	Norwich (Cossey).....	·69	— ·77	·23	31	11	54·0	28	3·5	7	27	27	
V.	Bridport .....	·97	— 2·40	·34	31	8	...	...	...	...	...	...	
"	Barnstaple .....	1·54	— 1·58	·56	30	10	56·0	29	21·0	5	...	...	
"	Bodmin .....	1·94	— 3·30	·49	30	12	54·0	28	20·0	5	16	23	
VI.	Cirencester .....	·88	— 1·41	·28	30	8	...	...	...	...	...	...	
"	Shifnal (Haughton Hall) ...	·85	— ·83	·34	6	7	53·0	28	11·0	7	23	26	
"	Tenbury (Orleton) .....	1·16	— 1·30	·32	29	7	57·0	28	13·0	7	25	25	
VII.	Leicester (Town Museum) ...	·95	...	·34	31	11	54·9	29	3·0	2	24	30	
"	Boston .....	·65	— ·84	·21	5	7	53·0	31	0·0	7	26	...	
"	Grimsby (Killingholme) .....	1·05	...	·21	31	13	53·5	28	10·5	7	19	...	
"	Mansfield .....	1·15	...	·24	30	10	52·7	29	3·7	7	25	23	
VIII.	Manchester (Ardwick).....	1·46	— ·70	·54	31	5	48·0	27	10·0	7	6	...	
IX.	York .....	1·24	— ·56	·50	21	7	...	...	—4·5	7	...	...	
"	Skipton (Arnccliffe) .....	3·68	— ·87	1·22	31	10	48·0	13	9·0	6	...	...	
X.	North Shields .....	·68	— 1·52	·18	1,5	11	54·3	1	8·5	4	17	20	
"	Borrowdale (Seathwaite).....	12·77	— 4·18	4·02	27	15	...	...	...	...	...	...	
XI.	Cardiff .....	2·11	...	·79	31	9	52·8	28	19·2	7	22	...	
"	Haverfordwest .....	2·46	— 2·37	·57	27	10	52·2	31	11·0	5	19	24	
"	Lampeter (St. David's Coll.)...	2·12	...	·45	21	17	...	...	...	...	...	...	
"	Llandudno .....	1·48	— ·72	·35	31	11	56·0	28	23·0	4,5	10	...	
XII.	Cargen .....	3·70	— 1·01	1·62	27	9	53·6	28	9·0	4	18	...	
"	Hawick (Silverbut Hall) ...	1·75	...	·76	27	11	...	...	...	...	...	...	
XIV.	Annanhill .....	2·06	...	·53	31	15	55·4	29	10·0	4	17	21	
XVI.	Kilmory .....	5·05	...	1·23	31	16	...	...	12·0	4	14	...	
"	Mull (Quinish) .....	4·53	...	1·25	27	18	...	...	...	...	...	...	
"	Loch Leven .....	1·60	— 2·12	·50	29	8	...	...	...	...	...	...	
"	Loch Long (Arddaroch) .....	5·41	...	...	...	...	...	...	...	...	...	...	
XVII.	Arbroath .....	·94	— 1·80	·36	2	5	47·0	14	12·0	4	20	...	
"	Braemar .....	1·51	— 2·26	·65	27	10	51·7	28	—1·0	3,4	21	31	
XVIII.	Aberdeen .....	·96	...	·23	27	16	53·4	23	14·6	3	19	27	
"	Portree .....	10·19	— 5·44	2·24	27	22	...	...	...	...	...	...	
"	Inverness (Culloden) .....	1·31	— ·62	·48	29	6	51·0	15	16·5	3	13	26	
XIX.	Dunrobin .....	1·96	— ·44	·62	29	16	54·0	23+	19·8	2	21	...	
"	Sandwick .....	3·19	— ·78	·49	3	23	52·0	23	21·8	4	8	15	
XX.	Caherciveen Darrynane Abbey	1·96	...	·43	27	14	...	...	...	...	...	...	
"	Cork .....	...	...	...	...	...	...	...	...	...	...	...	
"	Waterford .....	1·28	— 3·14	·37	28	11	55·0	31	14·5	5	16	...	
"	Killaloe .....	3·43	— ·06	·95	30	10	55·0	31	5·0	5	20	...	
XXI.	Portarlington .....	1·81	— 1·38	·42	27	16	55·0	28	12·0	4	16	...	
"	Monkstown, Dublin .....	1·02	— 1·60	·25	31	13	...	...	...	...	...	...	
XXII.	Galway .....	3·13	...	1·10	31	11	58·0	28	19·0	5	11	...	
XXIII.	Waringstown .....	1·64	...	·38	27*	10	55·0	28	12·0	4	17	25	
"	Edenfel (Omagh) .....	2·46	...	·75	30	13	54·0	27§	6·0	1	13	...	
"	Ballinful .....	...	...	...	...	...	...	...	...	...	...	...	

\* And 30.

+ And 31.

‡ And 24.

§ And 28.

+ 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.

CAMDEN SQUARE.—A month of fogs.

SELBORNE.—Barometric pressure very high, having been above 30·46 in. every day from 7th to 28th inclusive; max., 30·61 in. Prevailing wind, N. Heavy S on 5th.

HITCHEN.—The driest December but one for 30 years, the coldest but one for 30 years, and the highest barometric pressure since 1873.

BANBURY.—Mean temp. 32°. Bar. at 9 a.m. on 13th corrected and reduced, 30·78 in., and at 11 a.m. on 23rd, 30·785 in.

CULFORD.—A remarkably cold month (mean temp. only 30°·4), with much hoar frost and fog; only five nights on which the temp. did not fall below 32°, and ten days on which the max. did not exceed 32°. On the 6th the ther. registered 1°, and on the surface of the S —6°. Sudden change of weather during the night of the 27th, with great increase of temp. and high wind, which continued to the end of the month.

COSSEY.—A dry, cold month. Min. in air on 2nd 4°, and on S —8°; and on 7th 3°·5 in air, and —4°·5 on S.

BODMIN.—Mean temp. of month 37°·9, 5° below the average. Springs lower than they have been known for several years. The rainfall during October, November, and December, usually the wettest months, has been no less than 10·66 in. below the average of the previous 29 years. Heavy TS at 7 a.m. on 29th, with tremendous H squalls.

CIRENCESTER.—The third month with rainfall below the average. Very cold, with great prevalence of E. and N.E. winds.

SHIFNAL.—Less severe than Dec., 1878 (which was the coldest for 44 years or more). The ice was three inches thick on the 1st, and four inches by the 7th. Very little S; much fog, especially from 16th to 19th. Milder weather set in on 28th, with strong wind.

ORLETON.—Mean temp. of month about 8° below the average, and 0°·5 below that of Dec., 1878. Sky generally cloudy and fogs prevalent, and only a few fine days. Frost steady, with only an occasional thaw, till 27th, when warm weather with high wind set in. Very distant T was heard on 29th and 30th, and L was seen on the latter day. The rivers were all frozen over by the 3rd.

BOSTON.—Mean temp. of month 8°·5 below the average. During the first two weeks the weather was intensely cold, the mean temp. of that period being 24°, or 16° below the average. The mean min. temp. 17°, and the lowest reached was zero, on the 7th, which killed the leaves of laurels, privets, &c. The wind was generally very calm till the last few days. In Dec., 1878, the temp. fell to 14°; in Jan., 1871, to 5°; and in Dec., 1874, to 8°.

GRINSBY.—The month was cold and dry till towards the close, when it became mild and moist.

MANSFIELD.—The six days from the 2nd to 7th were remarkable for their extremely low temperature; the max. on the 2nd was 25°, and on the four succeeding days only slightly higher; the ther. fell to 6°·5 on the 2nd, 6°·3 on the 3rd, 4°·4 on the 4th, 10° on the 5th, 4° on the 6th, and 3°·7 on the 8th. For the first half of the month the sky was generally free from clouds both day and night, but the air was misty. The latter half had a good deal of cloudy weather.

MANCHESTER.—On the whole dry and cold; fog more prevalent than usual, and on the 12th most intense, causing great inconvenience to traffic. The cold on the 7th was also very intense, and the temp. recorded was exactly the same as on Christmas Day, 1878, viz., 10°; at Alexandra Park, to the west of the city, 4°·5 was recorded. About 4 in. of S on 6th, the only heavy fall. Towards the end of the month the temp. rose considerably, and there was a heavy fall of R on the 31st.

NORTH SHIELDS.—Temp. —2°·0 on the S on 4th.

## WALES.

**HAVERFORDWEST.**—The frost during the first five days very intense, the river Cleddy more or less completely frozen ; with one or two slight thaws the frost continued till the 24th, and skating was enjoyed almost the whole of that time. The frost was a much drier and finer one than that of Dec., 1878, although it did not last so long, nor the temp. fall so low. Bar. exceptionally high throughout the month, highest reading 30·714 in. at 9 p.m. on 12th. Dense fog on 23rd and 24th. Terrific squalls, with T and L, from 0 a.m. to 6 a.m. on 30th.

## SCOTLAND.

**CARGEN.**—For the first 13 days hard frost prevailed ; last five days stormy and unsettled weather. The bar. for the first 26 days was unprecedentedly high.

**HAWICK.**—Thermometers at zero on 3rd, and 2° below zero on 11th, and many of the more tender shrubs are much injured—Aucubas, Japonicas, and Laurustinus completely blackened. The frost came somewhat unexpectedly, and neither gardeners nor husbandmen were prepared for it. Terrible wind and R on 27th.

**ABERDEEN.**—Mean temp. 35°·0, 3°·2 below the average of 22 years. Rainfall 2·46 in. below the mean of 22 years. A very changeable month, but on the whole dry and cold. The first fortnight was very cold.

**PORTREE.**—A cold stormy month, the first week very frosty, with a heavy fall of S on 4th. A strong gale from S. all day on 27th, with T, L, H, and R ; a young woman killed on her way home from the hills ; the month continued very stormy to the end.

**CULLODEN.**—Very severe frost during the first part of the month ; snowfall slight ; rainfall less than usual ; heavy gale from S.W. on 29th, and weather boisterous till the close of the year.

**SANDWICK.**—The snowstorm which commenced on Nov. 29th continued with partial thaws till the 7th, when a continued thaw began, and the plains were clear of S by the 9th. After that the weather was remarkably fine and mild for the season till 27th, when it became wet and boisterous.

## IRELAND.

**KILLALOE.**—Severe frost every night till 14th ; very wild and stormy weather from 27th to close of month. Heavy T on 29th.

**MONKSTOWN.**—The driest December for 16 years, with the exception of 1871 and 1873. Frost of variable intensity, accompanied by slight S, prevailed till about the 20th, when a thaw set in. From 27th to end of month high westerly wind and great variation of temp.

**WARINGSTOWN.**—Hard frost from 1st till 13th, afterwards a very mild thaw. No R to speak of till 27th.

## CLIMATOLOGICAL STATIONS.

SEVERAL correspondents have enquired whether returns from localities other than health resorts of established repute are desired. We cannot, of course, speak on behalf of the Meteorological Society, but we believe that the intention of the Council was to establish a series of stations which should give absolutely identical facts from all parts of the country, and that the reference to health resorts was mentioned to a great extent incidentally, and as one of the most obvious applications of the data when obtained. But similar data are equally required for agricultural purposes, and we, therefore, consider that no locality is excluded.