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ON THE DIRECTION OF THE WIND IN VIOLENT STORMS.

IF meteorologists can claim credit for nothing else they can at any rate maintain that they keep theory in its proper place, viz., simply as a help to the grouping of facts, and that they are always ready to abandon even the most cherished hypothesis if facts prove that it is incorrect. Nothing more startling, and, both as regards human life and property, more serious has occurred for many years than the discussion now in progress as to the "Form of Cyclones."* We do not feel justified in expressing even the faintest opinion whether the form of a cyclone is that hitherto assumed of winds blowing *round* a centre as in Fig. I., or that assumed by Mr. Meldrum, viz., that they are of the incurving form shown in Fig. II.

FIG. I.

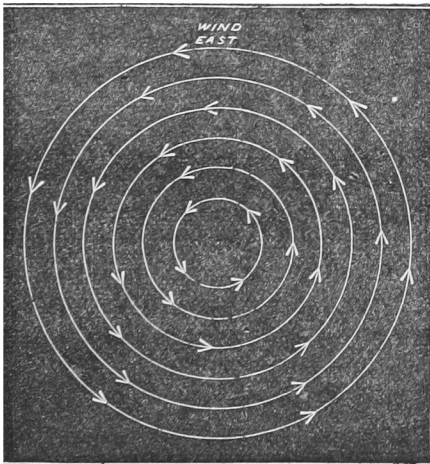
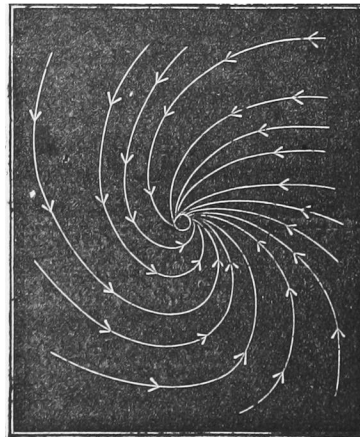


FIG. II.



* Mr. Meldrum's paper on this subject ("Notes on the form of Cyclones"), has been reprinted by the Meteorological Committee, and can be had of our publisher.

We pronounce no opinion whatever on the question, but as it has been raised we have a few very serious remarks to offer.

Meteorology cannot perhaps show a very glittering array of benefits conferred upon mankind, but one of its gems has certainly been the rules whereby the captains of ships could know the bearing of the centres of violent storms and how to avoid them—thereby saving innumerable lives and untold millions of property.

All at once, however, we are told that these rules are incorrect, that by obeying them a captain may actually steer into destruction, and, in fact, that our supposed gem is but an imitation.

We have in this country a meteorological office with a princely if not regal income, and a department of it under an able naval man. Is it possible to imagine any better application of the entire strength and resources of that office than to the immediate and thorough investigation of the rival theories, and the prompt and authoritative announcement of the result?

It appears to us that in the interests both of humanity and science it is the bounden duty of the authorities to put aside all other work and concentrate their strength on this question.

Delay may mean destruction, and there is no necessity for delay because ample materials exist, and it is merely necessary to examine with which theory the facts most frequently harmonize.

Moreover, it ought to be done quickly, for few things can do more to discredit meteorological work than for naval men to find even the leaders of meteorological research in doubt on so vital a point.

REVIEWS.

Observatoire d'Alger—Ire Partie. Panorama Météorologique du Climat d'Alger—Observations Météorologiques, Janvier, 1872. 33 Tableaux—1 Tableau graphique.

WE are indebted to M. Bulard, the Director of the Observatory of Algiers, for the remarkably elaborate work above noted, a work which we may as well mention, occupies for the record of a single month 33 folio sheets of tables, 16 folio pages of introduction, and a lithograph more than 12 feet long by about 2 feet wide.

We do not object to the size which M. Bulard has adopted for his diagram; it does not err so much in excess as the plates of the Meteorological Committee do in defect; but we do protest against the excessive size of page adopted for the daily record and the letter-press.

Amid such a mass of facts as those which M. Bulard has set before us, there are of necessity a great number of points upon which we should like to express our opinion, which would be sometimes favourable, sometimes the reverse. Before proceeding, we are, however, bound to record our sense of M. Bulard's enthusiastic zeal in his work, and the importance of the maintenance of the Observatory, and the publication, either in detail or in abstract, of the results, not only for

Algiers itself but also for the subordinate stations of Biskra, Batna, Constantine, &c. With this general commendation, and with best wishes for M. Bulard's success, we must proceed to remark upon a few of the points which seem worthy of notice.

It appears to us a mistake to make observations (except in order to catch special phenomena) at irregular times, *e.g.*, on January 1st the observations were made at 0.16 p.m., 0.54 p.m., 2.2 p.m., 3.18 p.m., 4.3 p.m., 5.0 p.m., &c. We are unaware of the reason *for* selecting such times, and there are certainly many reasons *against* such a course.

In the next place, we are certain that it is a needless refinement to give the sea level pressure to four decimals of a millimetre, the first entry 768.4188^{mm} can only be represented with equal precision by some such portentous entry as 30.253255 in. There are few observers whose reading is reliable to the third decimal ($\frac{1}{1000}$ th) of an inch, none to the fourth, and therefore *à fortiori*, none to the fifth or sixth, which alone represents the fourth decimal of a millimetre.

The method of separating, and yet grouping, the clouds is the best we have seen, but there is one curious mistake in this matter. The columns are headed 0-10, meaning, of course, as usual, that the sky is hypothetically divided into ten portions, whereas all the entries are made as decimals: thus a sky which is entered in the remarks as "Couvert" has the cloud entry 1.0 instead of 10, and a partially clear sky as 0.7 instead of 7. These prefixed cyphers and decimal points should all be struck out.

The daily sheets contain several columns new to Meteorological Tables, but which are certainly entitled to claim the consideration of those who may be drafting new forms, we may specially mention "Intensité des Montagnes à l'Horizon," also "Brumes" sub-divided into three columns, "Seches," "Humides," and "Position."

The description of the position of the locality where the observations are made is praiseworthy complete, as is also that of the instruments and their mounting, added to which the author promises in his next publication a photograph, showing them all in position. The only instrument respecting which the details are insufficient is the black bulb in sun.

As the author takes the precaution of verifying every year the zeros of all his thermometers and applying the necessary corrections, we are bound to assume that his hygrometer (a dry and wet, by Salleron, of Paris) is also correct. We mention this as a prelude, because without it sufficient weight might not be given to M. Bulard's remarks upon his hygrometrical results, which appear to us of sufficient general interest to justify translation *in extenso*.

"In order to calculate the relative humidity, we have used the hygrometrical tables published in France and other countries, but they are not sufficiently extended for our climate. We give here, simply as curious facts, the greatest differences between the dry and wet bulb thermometers during the most remarkable sirocos of the last 12 years.

INSTANCES OF EXTREME DRYNESS.					
Date.			Dry Bulb.	Wet Bulb.	Difference.
1860, Sept.	14	...	101°·1	...	36°·5
1865, Aug.	25	...	113°·0	...	45°·0
1869, Sept.	10	...	94°·3	...	35°·3
" Oct.	8	...	77°·0	...	25°·2
1871, July	22	...	99°·5	...	21°·1
1872, July	29	...	98°·6	...	25°·2

"With these extreme ranges we may already judge of the variations of which we shall have to speak when we come to treat of the Climate of Algiers."

"We may add that these extreme degrees of dryness might appear improbable if care had not been taken to observe under the best possible conditions, and if they had not recurred many times and at irregular intervals."

"It is also to be noted that M. Regnault's tables are not strictly applicable far beyond the limits in which the co-efficients of the formula have been determined. Such conditions as those we have quoted above never occur at Paris, and it would be both useful and interesting to determine by experiments, analogous to those of M. Regnault, the proper co-efficients for such extreme dryness, and this we intend to do."

M. Bulard has four rain gauges at the Observatory, but he only gives the record of a large one (20 in. in diameter); in fact, he evidently has no more respect for small rain gauges than the reviewer who called 5 inch gauges "pipkins."

M. Bulard does not seem to have heard of the Cyanometer*, though the desirability of such an instrument is evidently realized as fully by him as by ourselves, for he devotes a column to "L'intensité du ciel," "0 being the palest blue, and 10 the deepest azure which it is possible to see in each locality, for it will still be necessary to make a relative scale for the purest azure of Biskra for example, which is purer than that of Algiers, as is that of Algiers purer than that of Paris, &c."

It is probably worth while to endeavour to devise some form of cyanometer available for general use.

Our notice has run to such a length that we must defer to another opportunity comment upon the note on the Climate of Algeria, with which the memoir concludes.

Seventeenth Report of the Marlborough College Natural History Society, 8vo, PERKINS, Marlborough, 1873.

THESE School Societies are progressing with a vengeance, the only point in which we think there is room for improvement, is that we fancy the boys do not fully realise the advantage to themselves in after life which vigorous co-operation in the work of these School Societies would afford. We do not know that that is the case at Marlborough, on the contrary we are glad to see a famous list of workers in several of the sections.

Another matter in which, perhaps, an alteration would be an improvement is the question whether it would not be well to include other branches than come under the term "Natural History." Even

* Meteorological Magazine, vol. iv., p. 81.

of microscopic work we see no trace. A friend of ours has found his pupils really first-rate hands at the microscope, and in their leisure hours they have mounted some thousands of objects which would be an acquisition to any cabinet. Take again the whole realm of physics. We believe that there are few boys who would not take five times as much interest in an electrical machine which they had made "all by themselves" as in the most costly one which an Apps or a Ladd could supply—and this applies equally to chemistry, to glass blowing, model making, &c. Perhaps a vivid recollection of the success of some of our own efforts in such matters in schoolboy days, induces our special advocacy, and such presidents as Mr. Kitchener, of Rugby, and Mr. Preston, of Marlborough, are more able to appreciate the suggestion at its true value than those who, like ourselves, are unaccustomed to public school work.

In the present report there is a remarkable piece of concentrated hard work in what may, perhaps, be termed the department of Climatological Botany or Botanical Climatology. It is in fact a Botanical Calendar supplemented by Meteorological details. The best plan will, however, be to let it speak for itself by reprinting the table for one plant, merely supplementing it by mentioning that precisely similar information is given respecting one hundred and twenty-three others. Well may the writer describe the figures requisite to obtain the data given in these tables as "numerous," for he elsewhere says that they are the result of nearly twenty million figures. Truly meteorologists are a hard-working race.

1. *Anemone Nemorosa.* *Wood Anemone.*

	1865	1866	1867	1868	1869	1870	1871	1872	1873
	Ap	Mch	Mch	Mch	Feb	Mch	Mch	Feb	Mch
First flower	6	18	11	2	27	20	12	29	9
Mean Temperature of previous 6 wks.	37.3	37.0	41.1	40.8	42.4	36.0	42.1	42.9	35.4
Mean daily Rainfall of ditto	0.04	0.09	0.09	0.10	0.10	0.06	0.06	0.13	0.07
No. of Rainy days in ditto	19	25	30	19	24	19	23	33	21

Average date for 9 years	...	Mch 12	Earliest flowering	...	Feb. 27/69
Mean Temp. of previous 6 wks. for 9 yrs.	...	39.7	Latest flowering	...	Ap. 6/65
Mean daily rainfall ditto	ditto	0.08 in.	Difference	...	39 days.
Mean no. of Rainy days ditto	ditto	25			

Variations of the above from means.

	1865	1866	1867	1868	1869	1870	1871	1872	1873
First flowering	+25	+6	-1	-10	-14	+8	a	-13	-3
Mean Temp.	-2.4	-2.7	+1.4	+1.1	+2.7	-3.7	+2.4	+3.2	-4.3
Mean dy. Rainfall	-0.04	+0.01	+0.01	+0.02	+0.02	-0.02	-0.02	+0.05	-0.01
No. of Rainy days	-6	a	+5	-6	-1	-6	-2	+8	-4

Duration of flowering.

	Feb.	Mar.	April	May	June
1869	27	.....	.....	22	
1870		20	.....	28	
1871		12	.....	12	
1872	29	.....	.....	24	
1873		9	.....	31	

Results of Meteorological Observations made at the Radcliffe Observatory, Oxford, 1870, under the superintendence of the Rev. R. MAIN, M.A., F.R.S.

THE principal feature in which this work differs from previous issues is in its containing a series of comparisons of a barometer at the top of a tower (about 100 ft. above) with the standard which is on the ground floor. It will be obvious to those conversant with barometric formulæ, that the difference between the corrected readings of these two instruments will vary according (1) to the temperature of the stratum of air between them, and (2) according to the total pressure at the time of observation. It appears to us, from the facts stated, that Mr. Main has hardly realised the care necessary to obtain results worthy of publication—for his upper barometer seems only to be one with a floating index, and, therefore, presumably a wooden one. No reference is made to the tables used for reducing the readings of the barometers to 32°, and as the ordinary corrections are only applicable to barometers with brass scales, if the upper one is of wood, nearly all the anomalies are probably explained by the proper corrections not having been applied. But in days like these, when accurate standards can be bought for five guineas or less, it appears to us waste of time to make experiments with any others.

The idea is an excellent one and worth prosecuting for a few years, but we trust Mr. Main will insist upon being provided with suitable instruments.

METEOR ON JANUARY 10TH.

To the Editor of the Meteorological Magazine.

SIR,—Perhaps a brief account of a brilliant meteor which I observed on Saturday the 10th of January may be acceptable for your valuable pages.

While returning from Beckermeth on the evening of the above date my attention was arrested at about 11.45 by a somewhat brilliant meteor, which shot downwards from an elevation of about 45° in the N.W. part of the sky.

The sky, generally, during the evening was very clear, and the air rather frosty; but near to where the meteor was seen there was a slight haziness or fog. Some little inference may be drawn as to the brilliancy from the mention that at the time, although I was looking in a directly opposite direction, my attention was immediately drawn to it.

Had I not seen the meteor *itself* I should have considered the flash to be one of *sheet* lightning.

The meteor totally disappeared, no sparks or other remains, as is sometimes the case, being seen.—Faithfully yours,

WILLIAM HENRY WATSON.

Braystones, near Whitehaven, January 16th, 1874.

THE WINTER.

To the Editor of the Meteorological Magazine.

SIR,—I shall have much pleasure in replying to Mr. Stow in your next number, if you will kindly allow me a page or so in which to do it.

GEORGE D. BRUMHAM.

February 7th, 1874.

To the Editor of the Meteorological Magazine.

SIR,—In your magazine for December last, page 179, the following prediction is made:—"I expect that the minimum temperatures of January and February at Greenwich will be considerably lower in 1874, although the mean of February may not be so low as last winter." (Lower than in 1873 is carefully pointed out).

January, 1873, at Greenwich, had a temperature of $42^{\circ}1$, which was $4^{\circ}1$ above the average of thirty-two years, and $5^{\circ}8$ above the average of 102 years.

Here the mean temperature of January, 1873, was $41^{\circ}3$, or $3^{\circ}5$ above the average of twenty years.

The mean temperature of January here this year has been $41^{\circ}2$, or just $0^{\circ}1$ below the temperature of last year. Any one looking at the excess of temperature in January at Greenwich this year as compared with the average of the last fifty years given in the weekly returns of the Registrar-General will see at once the utter failure of the prediction alluded to. There is no ground for a prediction of a colder February than last year, which, at Greenwich, was $4^{\circ}3$ below the average of 102 years, and examination of Mr. Glaisher's table, page 65 of No. 97 of the Quarterly Returns of the Registrar-General—shows that since 1771 there is no case of two successive February's greatly below the mean. The February of 1873 was the coldest since February, 1855, which was only $29^{\circ}4$, or $4^{\circ}9$ below February, 1873. I remember the February of 1855 well; since, to look at my thermometers here, I had to wade through snow two and a half feet deep, and on one road near here it was drifted over five feet deep, and a road had to be made through it like a railway cutting. Whether the present month will be colder or warmer than last year is mere guess work, and there is no reliable data whatever to base a prediction upon, and it is one of the very worst features of meteorology that there are continually persons who, as soon as they begin to acquire a few facts, boldly put out predictions of coming weather, and if they only predict long enough *invariably* fail.

Some little time back weather prophets seemed to centre in Birmingham, but recently they have removed to fields and pastures new, and apparently with Birmingham success.

If prediction was such a promising field one would expect that we should find some of the leading European meteorologists taking part in the glorious reputation to be obtained, but "mirabile dictu" they all carefully shun it as they might do a pestilence.

No one would rejoice more than myself to see any theory established by which the meteorological elements could be computed, and then compared with the actual observations, as in the case of astronomical observations, and until something of this kind can be done, prediction is mere moonshine, and the sooner it is put an end to for the reputation of all concerned the better.

It is by no means a pleasant office to take pen in hand on this question, but weather wisdom seems so much the pet object for foolish people to deal in that now and then they require to be put on their guard, the more especially as I note that some of your chief correspondents are given to dealing in this matter.—Very truly yours,

G. V. VERNON, F.R.A.S.

Old Trafford, Manchester, February 3rd, 1874.

OBSERVATIONS ON THE WEATHER AT CAMBRIDGE.

To the Editor of the Meteorological Magazine.

SIR,—I am inclined to believe that there is an error in date in Mr. Nutter's tables of the weather at Cambridge.

The minimum temperature of 1871 must have been on December 8th or 9th, not 19th. Mr. Pain, of Cambridge, has sent me his readings, and I find the minima of the 9th and 19th to be—

December 9th, 16°		December 19th, 43°
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The 19th had a notably high minimum temperature, and the *Meteorological Magazine* of January, 1872, confirms this statement.

Your obedient Servant,

F. R. HAWKES-MASON.

THE ORTHOGRAPHY OF THE WORD EQUATORIAL.

To the Editor of the Meteorological Magazine.

SIR,—It seems that my note on this subject in your December number was not sufficiently explicit. I intended to convey my belief that the use of the termination *eal* for adjectives derived from substantives ending in *or* is without precedent. Of the seven adjectives which make up the second list in Mr. Moon's letter in last month's magazine, six are derived from Latin adjectives ending in *eus*, and the seventh is derived from a Latin substantive ending in *ea*, therefore *eal* is their natural termination. After further consideration I do not think that the number of words with this termination is sufficiently large to disprove my statement that it is an uncommon one for adjectives, and I see no reason why we should go out of our way to adopt it in the case of the word under discussion. Inasmuch as Mr. Moon's opinion in a matter of this kind is worth knowing, perhaps he will be good enough to tell us what that opinion is.

I am, Sir, yours faithfully,

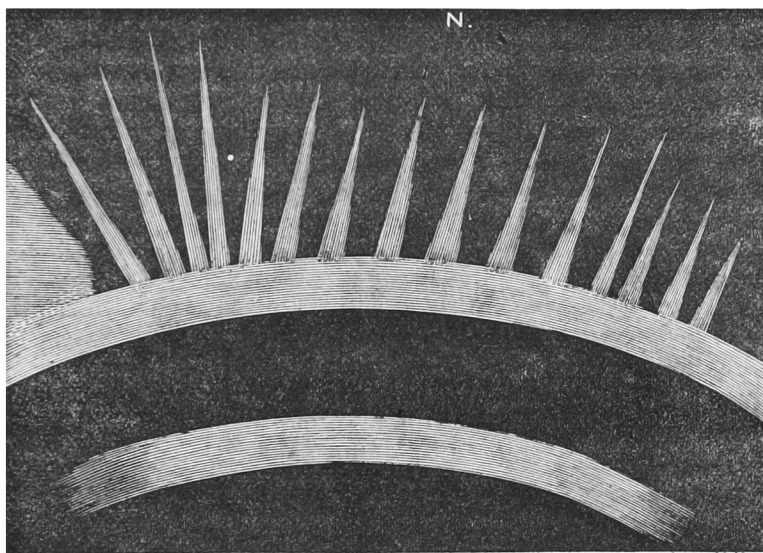
REGINALD BUSHELL.

Hinderton, Cheshire, February 6th, 1874.

THE AURORA BOREALIS OF FEB. 4, 1874.

To the Editor of the Meteorological Magazine.

SIR,—I have forwarded the enclosed rough sketch, and notes, of the Aurora Borealis, which I saw to great perfection on Wednesday evening last. About 7h. 45m. I noticed a strong auroral light north-



The white dot among the streamers is Alpha Cygni.

wards, and two or three minutes afterwards, a well defined arch, about 5° in diameter, stretched across the sky from E.N.E. to W.S.W. The upper convexity of the arch was at least fourteen degrees above the horizon. A few seconds afterwards some magnificent streamers, tinged with white, pink and greenish hues, suddenly ascended from the entire length of the arch, those to the westward ascending nearly to the zenith and certainly passed through the constellation Cassiopeia. These were very transitory and not repeated, to an equal height, during the continuance of the phenomenon. At the western end of the arch there was a very conspicuous patch of white aurora, about twice its diameter. At 7h. 54m. more streamers appeared, but less brilliant. At 7h. 57m. the arch descended several degrees towards the horizon, and soon afterwards some more short streamers ascended. At 8h. some splendid patches of pink aurora ascended from above W.N.W. nearly as high as Cassiopeia. At 8h. 7m. the arch was much broken up into scattered patches of white aurora, the light from which was sufficiently strong to cast a well marked shadow of the hand against the Observatory wall. At 8h. 9m. the more westward of these assumed a decidedly pinkish hue. At 8h. 10m. some fine streamers ascended from W.N.W. nearly to Cassiopeia. At 8h. 17m.

light much diminished along the entire length of the arch, which could still be traced from the original points. At 8h. 22m. a large patch suddenly overspread Andromeda, but its intensity was much lessened by the light of the rising moon. At 8h. 33m. the light was much fainter. At 8h. 35m. the arch was again well defined, but contracted to half its original diameter. At 8h. 40m. a second arch appeared just midway between the first and the horizon. At 9 p.m. both arches remained distinctly visible; but I did not observe any streamers after about 8h. 15m. At 9h. 10m., and afterwards, the arches gradually disappeared. On Thursday evening, at 8h. 30m., I noticed a faint arch, low down on the horizon, and a few short streamers were occasionally visible during the subsequent half-hour.

Yours truly, C. L. PRINCE.

The Observatory, Crowborough Beacon, Feb. 7th, 1874.

SIR,—An Aurora Borealis was seen here between 7 and 9 p.m. on Wednesday evening, the 4th inst. Pale yellow and white streamers shot up from the N., forming a low irregular arc, reaching from W.N.W. to N.E. and about 8 p.m. flashes of light exactly like sheet lightning, and quite as rapid, were seen in the dark blue sky above the arc. These lasted for nearly half-an-hour; then broad horizontal bands of faint light rolled up for a few minutes from the N.E., like waves across the streamers, and the aurora soon afterwards disappeared. I should like to know if any of the readers of your magazine observed the rapid lightning-like flashes, as I have never seen them before.

I am, Sir, yours truly,

W. C. HUGHES.

Grammar School, Sutton Valence, Staplehurst, Kent, February 7th, 1874.

SIR,—A beautiful display of Aurora Borealis was observed here last evening. It was first observed shortly before 6 p.m.; at 6.10 p.m. a broad band of bright white light extended from W. to N.N.E., rising to an altitude of about 45°, from which frequent streamers passed nearly to the zenith. The light was brightest in the N.N.E., and resembled that given by a large fire. The display continued with great brilliancy till 8.30 p.m., after which it faded away considerably, and at 9.30 p.m. nothing remained but a few bright streamers low down on the horizon in N.N.W. The evening was beautifully fine and clear, with a sharp frost; the barometer, which is again very high, standing at 30.44 in.

Yours truly,

THOS. PAULIN.

Winchmore Hill, 5th February, 1874.

[In connection with the above, the following extract from a letter from Mr. W. H. Watson, of Braystones, Whitehaven, Cumberland, is interesting and suggestive:—"Did you notice an aurora chiefly in the S.E., W., and S.W. on the 4th instant?" Braystones and Winchmore Hill are not 250 miles apart. Can the aurora have been between them?—ED.]

THE METEOROLOGICAL SOCIETY.

THE annual general meeting of the Meteorological Society was held January 21st, at 25, Great George-street; Dr. R. J. Mann, president, in the chair.

The date of the annual meeting having been altered in June last to January, the report of the Council was shorter than usual. The earlier portion of the report dealt principally with the various alterations made at the society's library at 30, Great George-street, and with the efforts which the Council have been making to render the operations of the society more extended, and rest upon a broader basis than heretofore. The Council took advantage of the presence of their foreign secretary, Mr. Scott, as one of the delegates from this country at the Meteorological Congress at Vienna, to request him to represent the society. The Congress was duly held from the 1st to the 16th of September, when Mr. Scott presented a report on the replies received in answer to a series of questions which the Council issued to the Fellows on several important points in connexion with the hours of observation, instruments, &c., and which has been printed in the report of the Congress. The report concluded by stating that the Council have to mark with some measure of satisfaction the maintenance of the numbers of the Fellows during a somewhat critical and transitional period in the society's history, when changes of detail have been entered upon with a view to increased energy of action, and when the beneficial results of the alterations have not had time to be practically felt. The President then delivered his address. After alluding to the loss which the society had recently sustained in the death of Mr. Beardmore, and marking the place that gentleman had filled as President as the transition era of the society's history, the President drew attention to a misconception that is largely entertained of the primary aims of meteorological science, and pointed out that, desirable as a comprehensive and reliable theory is, the immediate object of observational work is none the less certainly the determination of climate in different regions of the earth, and the investigation of the method by which the action of the great natural forces that determine temperature, direction and force of wind, and rainfall is influenced by physical conditions. This argument was supported by evidence of the valuable practical results that are secured in these particulars by the labours of meteorologists. The address then proceeded to note briefly the chief landmarks that had marked the yearly progress of meteorological science since the period of Mr. Beardmore's presidency, when the society, in its remodelled form, had just reached the half-way stage of its history. From this review it appeared that the photographic method of record has been largely extended, that the discussion of the Greenwich observations from 1848 to 1863 is being steadily pursued; that the influence of meteorological conditions upon the public health is carefully investigated in the metropolitan district; that telegraphic intercommunication of meteorological aspects is now

regularly made throughout the United States of America, and from the Meteorological Office of London through England, and through France to the shores of the North Sea and Baltic in one direction, and to Corunna in the other; and that storm warnings are displayed and fishermen's barometers maintained at 129 coast stations. The methodical investigation of the connexion of sun-spot periods with atmospheric phenomena, such as rainfall, aurora, and magnetic storms and earth currents, was also alluded to. Among other topics of special interest connected with the recent progress of meteorological science, the President dwelt, with especial favour, upon the discovery and establishment of Buys Ballot's Law, and Mr. T. Stevenson's Barometric Gradient; the extension of the influence which indicates this law to the great vertical circulation of the oceans, traced out by Dr. Carpenter and Professor Wyville Thomson, the marine charts, and especially the mapping out of the mid-Atlantic area of the Doldrum calms by Captain Toynbee; Mr. Meldrum's Mauritius investigations of the movements of cyclones of the Indian Ocean, the daily weather-charts of the Meteorological Office; Mr. Symons's examination of the rainfall of the British Islands, with a volunteer staff of nearly 1,700 observers systematically distributed; Mr. Draper's deductions as to the invariability of the climate of the United States, and to the orderly progress of storms across the entire breadth of the Atlantic; the establishment and work of International Meteorological Conferences, and the barometric compensation of clock rates for altering pressures and resistance of the atmosphere. The following gentlemen were elected officers and council for the ensuing year:—

President.

Robert James Mann, M.D., F.R.A.S.

Vice-Presidents.

Charles Brooke, M.A., F.R.S.

George Dines.

Henry Storks Eaton, M.A.

Lieutenant-Colonel Alexander Strange, F.R.S.

Treasurer.

Henry Perigal, F.R.A.S.

Trustees.

Sir Antonio Brady, F.G.S.

Stephen W. Silver, F.R.G.S.

Secretaries.

George James Symons.

John W. Tripe, M.D.

Foreign Secretary.

Robert H. Scott, M.A., F.R.S.

Council.

Percy Bicknell.

Arthur Brewin, F.R.A.S.

Charles O. F. Cator, M.A.

Rogers Field, B.A.

Frederic Gaster.

John K. Laughton, M.A., F.R.A.S.

Robert J. Lecky, F.R.A.S.

William C. Nash.

Rev. S. J. Perry, M.A., F.R.A.S.

Capt. Henry Toynbee, F.R.A.S.

Charles V. Walker, F.R.S.

E. O. W. Whitehouse, F.R.A.S.

JANUARY, 1874.

iv.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.				Days on which ≥ 1 or more fell.	TEMPERATURE.				No. of Nights below 32°				
		Total Fall.	Differ- ence from average 1860-5	Greatest Fall in 24 hours.			Max.		Min.						
				Dpth	Date.		Deg.	Date.	Deg.	Date.					
I.	Camden Town	inches	inches.	in.											
II.	Maidstone (Linton Park).....	1.18	— .77	.33	19	17	55.4	20	28.0	6	9	14			
III.	Selborne (The Wakes).....	1.27	— .79	.33	19	11	53.0	21	26.0	6	12	...			
IV.	Banbury	2.36	— .91	.46	19	15	50.6	20	28.0	13**	10	12			
V.	Hitchin	1.52	— .62	.28	9	17	51.0	20	26.0	24	16	...			
VI.	Bury St. Edmunds (Culford).....	2.15	+ .06	.33	9	17	52.0	20	28.5	12	15	...			
VII.	Bridport	1.24	— .63	.20	9	12	54.0	20	23.0	24	15	17			
VIII.	Barnstaple.....	2.29	— .90	.52	7	14	62.0?	4	24.0	6	6	...			
IX.	Bodmin	4.06	+ .54	.60	8	24	55.0	20	30.0	11	...	...	
X.	Cirencester	6.12	+ .93	1.35	7	25	52.0	8	34.0	6	0	8			
XI.	Shifnal (Haughton Hall)	3.28	+ .28	.40	16	17	...	...	...	...	...	...
XII.	Tenbury (Orleton)	1.81	— .09	.27	3	19	52.0	18	24.0	11	12	17			
XIII.	Leicester (Wigston)	2.51	— .02	.50	8	17	56.0	23	25.3	6, 11	10	16			
XIV.	Boston	2.10	+ .12	.32	9	15	52.0	18*	27.0	24	...	...	
XV.	Grimsby (Killingholme)	1.19	— .52	.21	8	13	53.0	20	28.0	11	9	...			
XVI.	Derby .....	.98	...	.14	3	12	51.0	18+	28.0	25	12	...			
XVII.	Manchester	1.95	+ .16	.47	17	14	57.0	8	28.0	11	9	...			
XVIII.	York	3.53	+ 1.01	.65	1	18	52.7	20	29.0	6	12	17			
XIX.	Skipton (Arnccliffe)	1.09	— .49	.33	8	10	...	...	...	...	...	...
XX.	North Shields	8.20	+ 2.56	1.51	8	23	...	...	...	...	...	...
XXI.	Borowdale (Seathwaite).....	1.50	— .61	.72	3	11	52.0	18	28.0	5	6	10			
XXII.	Cardiff (Ely)	20.82	+ 4.46	2.78	11	27	...	...	...	...	...	...
XXIII.	Haverfordwest .....	...	...	...	...	...	...	...	...	...	...	...
XXIV.	Rhayader (Cefnfaes).....	5.62	+ .57	1.00	19	18	52.2	19*	27.0	5, 10	2	8			
XXV.	Llandudno	6.67	+ 2.15	1.30	1	14	53.0	...	...	...	...	...
XXVI.	Dumfries	2.88	+ .34	.71	16	13	55.0	18	34.2	18	...	...	
XXVII.	Hawick (Silverbut Hall).....	3.79	— .81	.75	7	23	52.5	18	25.0	18	7	9			
XXVIII.	Kilmarnock (Annanhill).....	2.11	...	.55	1	15	...	...	...	...	...	...
XXIX.	Castle Toward	3.60	...	.93	15	25	52.6	19	30.0	17+	7	7			
XXX.	Leven (Nookton)	4.87	— 1.42	.80	16	23	51.0	15	27.5	...	6	...			
XXXI.	Stirling (Deanston)	2.39	— .48	.52	1	16	54.0	26	25.0	20	11	26			
XXXII.	Logierait	4.69	— .03	.63	18	22	51.7	26	24.0	18	11	19			
XXXIII.	Braemar	3.16	...	.73	2	17	53.0	25+	21.0	19	...	...	
XXXIV.	Aberdeen	2.91	— .22	.71	18	15	50.0	28	15.3	4	15	26			
XXXV.	Inverness (Culloden)	1.25	...	.25	16	13	53.2	15§	26.2	25	13	23			
XXXVI.	Portree	2.45	+ .17	.47	14	11	52.1	25	27.5	25	6	18			
XXXVII.	Loch Broom	12.23	— .86	1.75	1	31	...	...	...	...	...	...
XXXVIII.	Helmsdale	7.97	...	1.24	17	28	...	...	...	...	...	...
XXXIX.	Sandwick	4.57	...	...	...	...	...	...	...	...	...	...
XL.	Caherciveen Darrynane Abbey .....	...	...	.85	15	27	...	...	...	...	...	...
XLI.	Cork	5.27	...	.59	16	19	...	...	...	...	...	...
XLII.	Waterford	2.77	...	.53	7	18	55.0	18	29.0	5	7	...			
XLIII.	Killaloe	2.64	— 2.22	.81	17	24	54.0	18	28.0	6	10	14			
XLIV.	Portarlinton	4.35	— .51	.56	16	25	54.0	18	30.0	4	8	...			
XLV.	Monkstown, Dublin	2.31	— 1.70	.60	15	15	54.0	19	25.0	11	11	...			
XLVI.	Galway	2.19	— 1.20	.54	15	27	...	...	...	...	...	...
XLVII.	Ballyshannon	5.16	...	.52	15	13	56.0	19	29.0	4, 5	15	21			
XLVIII.	Waringstown	4.38	...	.41	15	21	50.0	17¶	26.0	5	12	...			
XLIX.	Edenfell (Omagh).....	1.98	...	...	...	...	...	...	...	...	...	...

* And 20. + 20 & 26. † 28. § 26. || 28 & 29. ¶ 18, 19, 26 & 27.

** 25. †† 18 & 25. ‡ 5 & 17.

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

METEOROLOGICAL NOTES ON JANUARY.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail S for Snow.

ENGLAND.

LINTON.—A mild, fine month, with less than the average rainfall. Wind mostly S., S.W. and W.; the first 23 days changed to N.; the last week high only on 16th. Atmosphere often dull; but, on the whole, there were more bright days than usual in a mild season. Birds singing everywhere, but vegetation not so forward in a general way as might be expected in so mild a season.

SELBORNE.—A remarkably mild and damp month; the total rainfall, however, less than half the average of January in the previous 12 years, although some fell on 15 days. A little hail and a few flakes of snow on the 4th; dense fog on the 11th and 22nd. A sudden fall in temp. on 17th after 8 a.m.

BANBURY.—Fog on 9th, 11th, 22nd and 23rd; snow on 4th; high wind on 1st, 14th, 17th and 20th.

CULFORD.—Mild weather throughout the month; snow never having been seen; the mean temp. of the month, 39·7. Westerly winds prevailed during 29 days out of the 31. Apricot trees actually in bloom, and the thrush and black-bird singing as in April or May.

BODMIN.—This month, like the last, has been remarkable for its extreme mildness and absence of high winds.

SHIFNAL.—First half of the month rain daily, with two exceptions (5th and 6th), till 12th, and again from 15th to 20th, both inclusive. Although there were 12 frosty nights the max. temp. was high, averaging 45°·5, and very equable throughout. Slight S on one night only (4th); the wind varied from N.W. to S.W. A gale from S.W. on 3rd, and again on the 20th; fog with fine rime on 11th; fog again on the 22nd; bar. high through this month. Snow-drops showing on the 19th, and full out on the 30th. Aconites up on the 28th. Stock-dove cooing on 3rd; throistles singing from 23rd.

ORLETON.—Frequent R with a few fine days and occasional frosty mornings till the 24th; then fine and dry, with a high bar., to the end of the month; 30·39 on 28th. Great darkness till noon on 10th, with misty R and change of wind to N. Dense wet fog all day on the 22nd. The mean temp. of the month rather more than 4° above the average.

WIGSTON.—Snow on the 4th and 16th.

BOSTON.—Prevailing wind S.W. on 29 days. Temp. 3°·1 above the average of previous 10 years. Slight S on 5th; fog all day on the 10th.

GRIMSBY.—No real winter; roads dry almost all the month. Bats flew about in the evenings of several days; many very pleasant days; 3rd was the only day in the month on which the wind was easterly. Aconites in flower on the 12th. High wind in after part of 18th.

MANCHESTER.—S, H and R on 4th; snow also on 16th and 17th.

ARNcliffe.—S on 16th and 17th.

N. SHIELDS.—Lunar halos on 3rd, 4th and 6th; S on 3rd and 17th. Plants in flower on January 1st—White Alyssum, Lithospermum, Polianthus, Christmas rose, yellow jasmine (*Jasminum nudiflorum*), Chrysanthemum and stock. Plants in flower on the 31st—all the above but Chrysanthemum, and, in addition, auricula, snow-drops, flowering currant, pansy, yellow aconite, and blue periwinkle. Wonderfully fine, dry and mild month.

SEATHWAITE.—Thick S on 3rd; S on hill-tops on 15th and 24th. Total fall of R 20·82, being 4·46 above the average; hail showers on the 16th.

WALES.

HAVERFORDWEST.—The general character of the month, fine, mild, at times very wet, no heavy gales, only two frosty nights, very high bar. from 24th to the end, with constant fog or drizzling R. The weather of this month would have

been all that could be wished for in April. Birds singing ; crocuses and several other spring flowers in bloom. Hills capped with S on 17th.

CEFNFAES.—The month has been generally damp and wet ; the temp. mild. Violets and primroses in blossom, and vegetation forward. Prevailing winds N.W.

LLANDUDNO.—The general character of the month has been dry and mild ; though there has been more or less S on the distant hills since the 16th. Vegetation very forward ; strawberries in bloom.

SCOTLAND.

DUMFRIES.—The first three weeks wet, with frequent storms, but the weather mild ; from the 21st to the close extremely fine for the season. S on 2nd, 4th, 16th, 17th, 19th, and 23rd. Temp. at night $1^{\circ}2$ above the average, and by day $0^{\circ}3$ lower, mean temp. $41^{\circ}6$; rainfall below the average. Snow-drops, Hepatica and other flowers in bloom ; roses have young shoots 6 inches in length ; early pear blossoms bursting ; farm labour unusually forward. Whins, or furze, in bloom by the road-side.

HAWICK.—The people here say that this is the mildest January ever known. Both skaters and curlers are sadly disappointed at the loss of the favourite amusement from the absence of frost.

KILMARNOCK.—Mean temp. $41^{\circ}9$; winds principally W. or S.W., and light. A gale blew up from S.W. on 18th with a velocity of 70 miles per hour, and a pressure of $24\cdot2$ lbs. ; this was the greatest pressure during the month. There was some frost and S at the beginning of the month, and on the 17th and 24th H showers. The evenings were generally fine. Ozone well developed. Small pox still very bad in this parish.

CASTLE TOWARD.—A very damp month ; R, more or less, on every day, but sometimes not measurable ; weather stormy ; high winds from W. and N.W. On the 4th a heavy fall of S, and again on 17th, followed by gales from the W. In consequence of the R and S but little has been done in digging, and agricultural work is getting behind ; the pastures scanty, but sheep are healthy. Bar. high and steady towards the end of the month.

NOOKTON.—S on the 4th and 20th.

DEANSTON.—An exceedingly unseasonable month ; temp. mild and vegetation too active.

LOGIERAIT.—A remarkably fine January ; the ther. stood at or below 32° on 16 nights ; but there was no continuous frost, and only one slight fall of S, which disappeared on the following day. Since the 23rd the weather has been more like March ; the birds are singing and have begun building their nests.

BRAEMAR.—Aurora on 19th ; S 8 inches deep on 2nd. Finest January on record ; but frequent gales of wind.

ABERDEEN.—An exceptionally fine January ; mild and dry, frequent high wind, chiefly N.W., W. and S.W. ; bar. pressure and rainfall below the average, but mean temp. $3^{\circ}4$ above it. Terrible gale, 3 to 8 p.m., on 18th. Aurora every night but 17th and 18th from the 12th to the 20th, inclusive ; several slight falls of snow, but the ground only white on the 24th.

CULLODEN.—3rd, imperfect solar halo ; lunar halo on 9th ; auroræ on 10th, and 11th, and a faint one on 15th ; snow on 19th ; stormy on the previous night.

PORTREE.—Stormy, wet month ; fearful hurricane on 18th from S. to W., by which two young men were drowned in the harbour here, their boat being capsized and no help could be rendered. Lead, chimney cans and slates were stripped from roofs of houses, and spread in all directions. Notwithstanding the wet, cattle and sheep are healthy, and thriving on the pastures.

LOCHBROOM.—This month will equal any of its predecessors for the last six months for rain and wind, with all that tends to make disagreeable weather. A winter so stormy, rainy and changeable cannot be remembered ; but it has been remarkably open for grazing purposes. Gooseberry bushes are budding fast, and some of the softer ornamental bushes are partially leafing—an unprecedented fact on the 2nd of February.

I R E L A N D .

DARRYNANE.—Prevalent wind N.W., a comparatively dry and very mild month, so much so that some aurecarias in my garden in the open air are coming into flower, and vegetation is very forward.

MONKSTOWN.—A remarkably mild and dry month. Vegetation in a most advanced condition; many roses, pear trees, &c., coming into flower. Max. and min. unusually high.

BALLYSHANNON.—The month has been unusually mild for the season, feeling often more like May than January. The spring promises to be an *early one*, if not cut short by frost; fruit trees are budding. During the month the temp. seldom went below 40° in the shade. Strong gale from S.W. with T and L on the 18th.

EDENFELL, OMAGH.—The finest and mildest January ever remembered here. Farming operations unusually advanced,

A FOG BOW.

To the Editor of the Meteorological Magazine.

SIR,—Having but recently become a careful observer of meteorological phenomena I do not know whether a fog-bow is one of sufficiently rare occurrence to be worth recording. The only authoritative work on such subjects within my reach this moment is very old; it, however, states that a Fog-bow is of very rare occurrence. Here is that account at all events.

On the 10th of the present month about 9.30 a.m. I first saw it. The sun had not risen much more than an hour, and was in S.E.; it could be seen through the fog to be brightly shining; the bow appeared, of course, in the N.W. It was obvious that the fog was a superficial one, not extending any great distance up in the air, and while dense and thick on the earth's surface got rapidly thinner as it extended upwards; in fact, it was quickly melting away under the warm rays of the sun in an unusually mild winter's day. As you looked at objects on a level with your eye, such as trees, buildings, &c., they were seen as is usual in a thick rural fog; as you looked at the sky the clouds, few and fleecy, were distinctly discernible. The bow was perfectly white, absolutely free from colour, a thick, dense, white, three quarters semicircle; above it was fairly sharp and well defined in its outline, less clear as it entered into the thicker strata of the fog, and when its limbs approached the surface of the earth they were gradually and imperceptibly merged and lost in the lowest and densest layers of the fog itself. The bow was as clearly as possible distinguishable from the surrounding mist; I mean that it was, beyond doubt, no accidentally formed condensation of the fog; it was quite white, the fog was murky, and the bow lasted fully fifteen minutes, from the time I saw it, without material alteration; it may have lasted longer, for it was fully formed when I saw it first. I could not detect any play of prismatic colours, though I carefully looked for such.—I am, Sir, your obedient servant,

THOMAS PALMER.

Cahir, Ireland, January 28th 1874.