METEOROLOGICAL OFFICE

SYMONS'S

MONTHLY

METEOROLOGICAL MAGAZINE.

LXXXVII.] APRIL, 1873. [PRICE FOURPENCE, or5s. per ann. post free]

THE LEIPZIG CONFERENCE.*

(*Continued from page 25.*)

THE article in our last number contained an abstract of the written and spoken opinions on only six questions out of the twenty-six, and as these had taken nearly half the entire time at the disposal of the Conference, it was wisely resolved that questions 7 to 17 should be referred to a sub-committee, consisting of MM. Ebermayer, Prestel, Schoder, and M. Hann as reporter. It will therefore be understood that statements regarding questions 7 to 17, reported to be by the Committee, are upon the authority of the above-named gentlemen.

7. *What apparatus should be employed for the determination of the hygrometric condition of the air? Are the wet and dry bulb thermometers sufficient? Can the hair hygrometer be employed, and under what restrictions?*

Sr. F. DA SILVEIRA (W). Psychrometer† for continuous observations. The hair hygrometer can never be accurate when exposed to the atmosphere.

M. CARL FRITSCH (W.) Psychrometer sufficient, and preferable to hair hygrometer. Thinks observers are not sufficiently careful to see that the wet bulb is really wet.

CAPT. HOFFMEYER (W.) Knows of nothing better than dry and wet bulb.

Dr. MOHN (W.) Convenience of observers must be studied, and psychrometer is most convenient, but for low temperatures hair hygrometer must be used with it.

Prof. RAGONA (W.) Strongly recommends a psychrometer by Tecnomasio Italiano, in Milan. Calls attention to observations by Belli and Cantoni, showing that the results of thermometers with spherical bulbs covered with linen and moistened by a wetted wick, are unreliable. Believes hair hygrometer to be trustworthy if originally set by a psychrometer; recommends it to be enclosed in wire gauze.

* Report of proceedings of the Meteorological Conference at Leipzig. Published by authority of the Meteorological Committee. Stanford. 1873.

† Continental term for dry and wet bulb hygrometer.

Mr. SYMONS (W.) Does not consider dry and wet bulb perfect, but preferable to Saussure's hair hygrometer.

Dr. WOLF (W.) Psychrometer always wrong when frost and thaw alternate rapidly; hair hygrometer should therefore be used as a check.

BORDEAUX MEETING (W.) Psychrometer good in hot countries, but fails at low temperatures. Hair hygrometer as ordinarily made is bad, the hair being at too great tension. Whatever instrument is used should be compared with some standard.

The COMMITTEE (T.) The psychrometer faulty at low temperatures and in cases of extreme dryness, the hair hygrometer erroneous at the dew point, and that further experiments should be made and experience collected.

M. NEUMAYER (T.) Regnault's hygrometer, with an aspirator, should be used.

M. VON OETTINGEN (W.) Had found Regnault's fail at very low temperatures.

Mr. SCOTT described Mr. Whitehouse's sulphuric acid hygrometer.

M. WILD had directed the use of the psychrometer *and* hair hygrometer conjointly, at several Russian stations, the former failing with their low temperatures. He had found the hair hygrometer work well.

Several speakers undertook to make comparative observations, the discussion became rather discursive, and no decision is reported.

8A. *In what way can uniformity in describing the directions of the wind be attained?*

Sr. F. DA SILVEIRA (W.) 16 points, and the same letters or figures for each, should be universally adopted.

M. CARL FRITSCH (W.) 8 points, N, N.E, &c.

Dr. MOHN (W.) By the English letters, no numerals.

BORDEAUX MEETING (W.) 16 points.

The COMMITTEE (T.) That in order to remove the confusion arising from the opposite use of the letter O by the Latin and Teutonic races, the English lettering should be universally used.

Proposal accepted by the meeting.

8B. *Is the deduction of the mean direction of the wind by Lambert's formula desirable? Is it desirable or not to include very light winds (force 0) in constructing wind roses for the direction of the wind?*

Sr. F. DA SILVEIRA (W.) At first-class stations Lambert's formula might be used if velocity was taken into account. Would not altogether reject very light winds.

M. CARL FRITSCH (W.) Yes. Light winds should not be ignored.

Capt. HOFFMEYER (W.) Lambert's formula not satisfactory; force should be considered.

Dr. MOHN (W.) Lambert's formula should not be used, nor force 0 included.

Prof. RAGONA (W.) Lambert's formula useful in its original form.

Dr. WOLF (W.) Lambert's formula is valueless.

BORDEAUX MEETING (W.) Prefer wind roses, to Lambert's formula but are willing to give both if required. Slight winds are generally local, and should not be included.

The COMMITTEE (T.) Lambert's formula should not be used. Calms should be designated (C), and entered separately.

M. VON OETTINGEN spoke in favour of his new anemometer, which reduces the wind's direction and force to the four axes of a system of rectangular co-ordinates. The apparatus will be fully described in the next Dorpat report.

M. HANN, in an able speech, pointed out the weaknesses of Lambert's formula; and on a division, the proposals of the Committee were adopted by 12 to 7.

9. *What scale should be employed for the force of the wind when it is not determined by actual measurement, but only by estimation?*

Sr. F. DA SILVEIRA (W.) A numerical one, but the same in all countries. In Portugal we employ the scale 0—7.

M. CARL FRITSCH (W.) Scale of 0—10.

Capt. HOFFMEYER (W.) Scale of 0—6 is easiest to understand, but force 6 never occurs with us at Copenhagen.

Dr. MOHN (W.) Scale 0—6, being half the Beaufort. Recommends cheap and simple pressure anemometers as a check on estimations of force.

Prof. RAGONA (W.) Scale unsatisfactory, because each observer attaches a different value to the maximum unit, *e.g.*, on a scale of 0—7, 7 would stand for 60 miles per hour at a sheltered, and for 70 at an exposed, station.

BORDEAUX MEETING (W.) From a telegraphic point of view, the maximum should be expressed by a single figure, and should therefore not exceed 9. The actual scale is unimportant provided there be uniformity.

The COMMITTEE recommended 0—6.

M. JELINEK (T.) 0—10 best, harmonizing with metric notation, and being generally adopted.

M. VON STERNBACH defended scale 0—10 or 0—12.

M. VON OETTINGEN (T.) Precise values must be assigned to each unit.

Mr. SCOTT (T.) 0—6 insufficient; it was very difficult to assign equivalents to each unit of any scale.

M. BRUHNS (T.) 0—10 best; suggested adjournment of discussion, and that comparative experiments be made at several observatories of the actual velocity with estimated force.

M. WILD described experiments for determining value of each unit, and pointed out that the indication of anemometers depended on their position, a remark which was confirmed by M. von Freeden and Mr. Scott.

The MEETING decided on referring the question of comparison and the selection of a scale to Messrs. Buys Ballot, Jelinek and Scott.

10. *Is it desirable to introduce simple counting instruments for determining the velocity of the wind? What units should be taken for the discussion of the velocity of the wind?*

Sr. F. DA SILVEIRA (W.) Yes, and compared with the estimated scale value.

M. CARL FRITSCH (W.) Yes, and especially if estimation could be entirely abolished. Metres per second.

Capt. HOFFMEYER. (W.) The Danish Met. Inst. contemplate using a small pressure anemometer.

Dr. MOHN (W.) Yes, in open localities. Kilometres per hour.

BORDEAUX MEETING (W.) Yes; if the same unit cannot be at once everywhere employed, it should be in all publications of an international character.

The COMMITTEE recommended the use of the simplest form of Robinson's cup anemometer, and that the velocity be expressed in metres per second.

MR. SCOTT hoped experiments would shortly be made in England, to test the accuracy of the ratio of one to three, on which deductions from these instruments have hitherto been based.

The MEETING adopted the recommendation of the Committee.

11. *What is the best form, size, and mode of exposure of rain gauges. At what hour of the day should the fall be measured?*

Sr. F. DA SILVEIRA (W.) At Lisbon observatory we have a self-recording rain gauge, also one of Babinet's gauges. At the secondary stations Babinet's gauges only. We prefer 9 a.m.

M. CARL FRITSCH (W.) Those used by the Central Anstalt in Vienna are quite satisfactory; two should be supplied to each station, and care should be taken that no water can enter except through the funnel. Would prefer midnight as hour of observation, but it is too inconvenient, therefore recommends noon.

CAPT. HOFFMEYER (W.) An original, very simple and durable gauge has been constructed at Copenhagen, by Hr. Docent Fjord, after many years' careful experiments. It only costs 9s. complete.

Dr. MOHN (W.) Not heavy (? large), for the observers will not bring masses of snow indoors to melt.

Prof. RAGONA (W.) At Royal Observatory, Modena, amount is measured at midnight.

Mr. SYMONS sent copy of rules generally adopted by British observers of rainfall. Recommends circular funnels with strong rims; square funnels, and those not made strongly are more liable to distortion and to warp with the sun's heat. With respect to the size of the orifice, very elaborate experiments have been made under his direction, and the result is to show that the variation from this cause is not more than one or two per cent. In actual practice recommends gauges whose orifice is 5 in. in diameter for ordinary stations where observations are made daily, and 8 in. gauges for stations upon mountains and in

localities only visited monthly. He finds in England that 9 a.m. is by far the most usual and convenient, (and therefore punctually adhered to) time of observation.

BORDEAUX MEETING (W.) The simplest gauge, and that most used in France, is the one recommended by the Scientific Association, circular funnel about 9 in. diameter. At the central observatory it is sunk in the ground, in a very open space, so that the rim is about 4 in. above the soil, and surrounded by grass. At the normal schools Babinet's gauge is used, the funnel of which is some 6 ft. above the ground. In winter a lamp is placed inside which melts the snow as it falls. We include in the record of each month all that falls up to 7 or 8 a.m. of the first day of the next.

The COMMITTEE recommend that a committee be appointed to draw up a complete record of past experience for presentation to the next Congress. They recommend two hours of observation, one in the morning, and if possible one in the evening.

Mr. BUCHAN (T.) The first part of the subject had been almost exhausted, by experiments and observations, reported in Symons's *British Rainfall*, and in the *Meteorological Magazine*.

M. GALLE drew attention to the influence of elevation on the amount collected.

M. BRUHNS (T.) It should be recommended that all gauges should be identical, that the receivers should be circular, 14 in. diameter, and 8 ft. 2 in. above the ground. But that at central stations comparative observations of various gauges should be made.

M. BUYS BALLOT "supported the proposal [Query.—That of M. Bruhns, or that of the Committee. Ed.] and the meeting adopted it."

M. BUYS BALLOT would desire to reverse the recommendation of the committee on the second point, as, if measured in the evening, there could be no uncertainty as to the civil day on which the amount fell. Several members pointed out that the decision on this point must be governed by that on question 18, and it was agreed to leave it undecided.

12. *Should the days of rain and snow be counted separately or together?*

Sr. F. DA SILVEIRA, Dr. Mohn, Mr. Symons, and the Bordeaux Meeting all (W.) Yes, count them separately.

M. CARL FRITSCH (W.) Should not attempt to distinguish them; if it is attempted the days with any kind of downfall should be enumerated.

The COMMITTEE recommend that they be separately entered in three columns, headed respectively, rain, snow and mixed days (snow and rain).

M. VON STERNBACH (T.) This would greatly increase the duty of observers, as they must be constantly on the watch.

M. WILD (T.) It would not; it was impossible to obtain perfect

records, as observers could only in a general way report what fell at night.

The MEETING adopted the recommendation of the Committee.

13. *Is it desirable in giving the falls of hail to draw a distinction between "graupel"* and true hail?*

Sr. F. DA SILVEIRA (W.) If possible, but too many details must not be expected from second-class stations.

M. CARL FRITSCH (W.) Such separation is extremely difficult.

Mr. SYMONS (W.) Undesirable.

BORDEAUX MEETING (W.) Yes, because they indicate different atmospheric conditions.

The COMMITTEE recommended that it be carried out as far as possible in the interests of agriculture and practical life.

M. BRUHNS approved of the proposal of the Committee.

M. SOHNKE opposed; it was an impossibility.

M. WILD said that according to the Russian instructions it was done; hail was only given with thunderstorms.

M. PRESTEL (T.) it was quite possible.

No decision reported.

We have much pleasure in announcing that M. Buys Ballot has published another pamphlet (in English), stating his views upon many of the points raised at the Conference, and being, in fact, a sequel to his "*Suggestions on a Uniform System of Meteorological Observations*," Utrecht, 1872.

As it is necessary to condense the remarks in these pages as much as possible, we have asked Dr. Ballot to send copies to our publishers, and shall, therefore, assume that those who are interested in the subject will provide themselves with copies. Had it been in Dr. Ballot's own language, we should not have adopted this course, but as he has been kind enough to use our language, it would be waste of space to reprint that which can be obtained at the price we have ourselves paid for the copies.

THUNDERSTORM AT STROUD.

To the Editor of the Meteorological Magazine.

SIR,—A slight thunderstorm passed over here at about 7 a.m. this morning, (Sunday), from the S.S.E., with four or five vivid forked flashes of lightning. It apparently spent itself in this neighbourhood. It lasted about half-an-hour. Rainfall ·15; greatest heat, Saturday, March 29th, 60°; greatest cold 40°.

R. E. STANTON.

Upfield, Stroud, March 30th.

---

* Mr. Scott remarks, "There is no special term for 'graupel' in English; it differs from hail, in that the stones are small pellets of snow, and are not coated with ice." We presume it is the "form of water" often referred to in these pages (in connection with a supposed periodicity of fall, on or about March 8th), as "soft hail," "hail balls," and "snow balls."

SNOW-BALL SHOWER IN SUSSEX.

To the Editor of the Meteorological Magazine.

SIR,—A very remarkable snow-ball shower fell here yesterday afternoon, between 3.45 and 4 p.m.; the balls were about the size of ordinary marbles, but widely scattered, certainly more than two feet apart; they were very light, and broke into fragments upon the slightest touch. Two sharp flashes of lightning occurred, and very loud thunder. I observed these storms passing over the whole of the S.E. of England during the afternoon. Thunder in all directions.

C. L. PRINCE.

Observatory, Crowboro' Beacon, April 7th.

"CLIMATE AS INDICATED BY NATURAL MEANS."

To the Editor of the Meteorological Magazine.

SIR,—After having lately been to no little trouble and expense in providing myself with a new set of Meteorological instruments of the most approved patterns, it is rather discouraging to be told by those competent to form a correct opinion on the subject, that any observations I may make with these instruments, will, for all practical purposes, be little short of worthless.

On the other hand, however, I am somewhat consoled by the following considerations—1. That the words of some at least of those who express these opinions are contradicted by their actions.—2. That they also remain unsupported by the practice of our leading Meteorologists.—3. That plants, insects, and birds have been in existence from time immemorial, while meteorological instruments of assured accuracy are but of yesterday; yet few will doubt which have done most towards advancing our knowledge of the Earth's atmosphere.—4. That at present no tangible system has been proposed, likely to prove equally trustworthy at all points.

I wish to think, and I cannot help thinking, this proposal to trust entirely to vegetable and animal life for our knowledge of climate, to be an unwise one; although, like most other fallacies, it is supported by a certain substratum of truth,—which substratum, as I understand it, is this, that a correct knowledge of what I may term the cumulative effect of a variety of influences, can only be obtained direct from Nature herself; although I do not myself see why much, even of this knowledge, should not reasonably be inferred from our ordinary observations with instruments.

This naturally brings me to what I can but consider the most important point of the subject, and that is *the cause* of this reactionary feeling against our present mode of observing the weather, in which hitherto we have placed the greatest confidence. This appears to me to be, the mechanical and unreasoning way in which meteorological registers are often used—the abuse, and not the intelligent use, of our instruments. The same may be said of averages of all kinds, against the employment of which there is now such a sudden outcry.

To desert our present system of observation would be very like

casting off tried armour for that which is untried,—like endeavouring to ascertain the value of an unknown quantity by means of one equally unknown.

Having thus succeeded in persuading myself that there is little to fear from this new proposal, I shall return to my new toys with reviving confidence; not forgetting, however, to supplement their indications, as I have hitherto done those of their predecessors, by some slight record of my own feelings, (Sir Humphry Davy's "body-ometer,") and occasional botanical and other notes. Trusting you will excuse the undue length of this communication,

I remain Sir, yours truly,

EDWARD MAWLEY.

Addiscombe, February 22, 1873.

[We are sorry to find that even a single observer should have attached to the letters which have appeared on this subject so much weight as Mr. Mawley *seems* to have done—if indeed his letter is not, as we rather suspect, a covert satire. At any rate, while, as stated on the cover of every copy of this Magazine, we decline all responsibility for the statements in the letters which it contains, we cannot refrain from saying that had we supposed that anyone would have drawn from the previous letters the inference implied by Mr. Mawley's, we should either have rejected them, or taken them as texts for a note shewing the impracticable and fallacious character of any such scheme.—ED.]

THE FEBRUARY SNOW-STORMS.

To the Editor of the Meteorological Magazine.

SIR,—I am not sure that your correspondents' notes quite do justice to the severity of the snow storms of February much nearer the metropolis. That of the 2nd and 3rd of February was the severest I ever saw in the south of England. Early on the 2nd the wind reached a velocity of 33 miles an hour, from the E., and on the 3rd one of 35 miles an hour from N. was registered. Drifted by these high winds the snow completely blocked up our country lanes, some not being open for traffic for several weeks. The best measurements I could obtain in a sheltered position, by inverting the gauge funnel, was 0·66 in., the depth on the level being about 6 in. But every particle blew out of most exposed gauges, only those with high rims being able to retain it. Drifts, 4 to 6 ft. deep, were to be found behind every hedge, and here and there the depth reached 8 ft. or 10 ft. Some traces of the snow still remained in the middle of March.

The snow of the 23rd February was not accompanied by wind; it was principally remarkable for the rapidity and thickness of the fall. In about 8 hours it had attained a depth of 8 in. The temperature being only 27°, it was excessively dry and light. It 'balled' on the feet and made walking difficult and even dangerous. It gauged only 0·43 in.

The mean of the daily maxima and minima in February was 33°·3, and that of the 9 a.m. and 9 p.m. observations 33°·2. Not one night

was clear throughout, and there was very little sun. Consequently the daily range was very small, only 8°·6; and at my anemometer station (416 ft.), 65 ft. higher than this, as small as 7° at 4 ft., and 6°·8 at 18 ft., the means of maxima and minima in these positions being 33°·8 and 33°·6 respectively. Frost occurred every night but two, but it frequently thawed during the day. The frost was continuous from January 27th to February 4th, and nearly so from January 25th to February 14th, when the ice was 2 inches thick, but very rotten.

What a contrast is the present weather! Cloudless day and night, (though sometimes foggy in the morning), range 30°, minima 29° to 32°, and maxima 59° to 61°.

F. W. STOW.

Harpenden, March 29, 1873.

TYPHOON AND RAINFALL IN JAPAN.

[We have been favoured by Mr. H. St. John Joyner with the following extract from a letter from Mr. H. B. Joyner, C.E., of Yedo, Japan, who has also obliged us with the annexed table of rainfall from a gauge presented by ourselves.—Ed.]

"During the past year there has been nothing peculiar in the weather. You will see, by the rainfall return, that we had rain throughout October, November, and December, which is not generally the case, especially in November and December; those months usually are like May and June at home. We only had one real typhoon, and that was very slight (comparatively); it was on 10th October, with 4·73 rain. There was very little damage done as compared with the year before. The barometer readings were as follows, but were only taken with a small pocket aneroid—

October 10th,	9.0	a.m.	...	29·83	
	1.0	p.m.	...	·45	
	2.0	,,	...	·40	
	3.10	,,	...	·35	
	3.20	,,	...	·31	
	4.0	,,	...	·25	
	4.20	,,	...	·20	
	4·55	,,	...	·15	Wind E.S.E.
	5.10	,,	...	·10	,, ,,
	5.25	,,	...	·05	,, ,,
	5.50	,,	...	29·00	,, S.E.
	6.20	,,	...	28·90	,, ,,
	6.40	,,	...	·80	
	7.0	,,	...	·65	
	7.30	,,	..	·40	
	7.45	,,	...	28·25	No Wind
	8.30	,,	...	...	,,
	8.45	,,	...	28·50	N.E.
	9.20	,,	...	·70	,,
	9.40	,,	...	·75	,,
	10.0	,,	...	28·90	,,

When the *lull* came at 7.45 p.m., I put on my waterproof (not that it rained, but I knew it would begin again as suddenly as it had left off),

and went on to the railway embankment to see what mischief the first part of the typhoon had done to it—it runs through part of the bay just below our house. The damage was but slight,—the ballast washed away in many parts, and some small portions of the bank; it had taken the fronts off about eighteen little Japanese houses, facing the sea, and many pieces of junks were being washed ashore. I lost no time, but hurried back with my lamp, before the wind rose again. I saw hardly any one except some wreckers looking out for anything they could find."

Register of Rainfall in 1872 *at Cho-oji, Takanawa, Yedo, by Henry B. Joyner.*

Latitude, 35° 43′ N. Longitude, 139° 43′ E. Time of Observation, 7.30 a.m.
Diameter of gauge, 5 inches.
Height above ground, 4 in.; above sea level, 50 ft.

Date.	Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
1...	...	...	...	·84	·06	...	·16	...	·13	...	·03	...
2...	...	...	...	...	...	...	...	...	·05	·11	·53	·07
3 ..	...	...	...	...	·10	...	...	...	1·68	·05	·83	·19
4...	...	...	S ·48	...	·30	...	...	·52	·04	..	...	·08
5...	...	S ·11	...	...	..	...	...	·04	...	·08	...	...
6...	...	..	...	...	...	·10	·40	·01	...	·25	·06	2·20
7...	...	...	·10	·30	...	...	...	...	...	...	...	...
8...	...	...	...	...	...	...	...	·39	...	·30	..	·32
9...	...	...	...	.	...	·68	...	...	...	1·37	...	...
10...	...	...	...	...	...	·26	·01	..	·48	4·73	·13	...
11...	...	...	·23	·26	..	·72	...	·38	·57	...	1·22	...
12...	...	...	...	...	·17	·82	·06	·12	·13	...	·17	...
13...	...	...	...	·03	·03	·01	...	...	·02	1·12	...	...
14...	S ·50	...	·58	·02	...	...	...	...	...	...	...	..
15...	...	...	...	·76	..	...	·01	·03	...	...	·67	...
16...	...	...	...	·56	·72	·52	...	...	...	...	...	...
17...	S ·19	...	...	...	...	·20	·01	...	...	...	...	S ·60
18...	...	...	·55	...	...	...	...	...	..	...	...	...
19...	...	...	·09	...	...	...	..	...	·45	...	...	...
20...	...	...	...	...	...	...	1·21	..	...	1·30	...	...
21...	...	...	...	...	·01	...	·30	...	...	...	...	...
22...	...	...	·72	...	...	...	·25	1·90	...	·05	3·01	...
23...	...	...	...	·25	...	·80	·12	..	..	...	·04	...
24...	...	...	..	1·12	...	·48	...	·42	...	...	...	...
25...	...	...	...	·52	·18	·28	..	3·14	·79	·73	...	..
26...	...	·15	.	3·30	...	·75	...	..	·55	·39	...	...
27...	...	·06	...	·34	...	·01	...	·01	·03	...	...	...
28...	...	...	...	...	...	...	...	·05	...	...	·18	·27
29...	...	...	·35	·27	1·12	·53	...	·01	...	·19	2·03	...
30 .	...	...	...	...	·01	·37	...	·01	·60	·01	·01	...
31..	...	...	...	...	...	...	...	..	...	...	...	...
Totals	S ·69	·32	3·10	8·57	2·70	6·53	2·53	7·01	5·52	10·68	8·91	3·73

Total from January 1st to December 31st, 60·29 in.

H. B. JOYNER, C.E.

THE METEOROLOGICAL COMMITTEE AND THE SCOTTISH METEOROLOGICAL SOCIETY.

In common, doubtless, with many of our readers, we have received a copy of certain correspondence respecting the difference which has arisen between the above bodies, whom it will be remembered Prof. Piazzi Smyth recently amusingly described as the "the richly endowed office in London," and "a poor voluntary society in the Provinces." The subject has also been brought prominently forward by leading articles in the principal Scotch newspapers, and in other ways, and we are, therefore, reluctantly obliged to refer to it. Our unwillingness arises from a conviction of the truth of the many proverbs, as to what should and should not be done in public; and the consciousness that these pages will carry throughout Europe, and across the Atlantic the information that two bodies who ought to be working in the closest harmony are in strong opposition. The documents having been laid before the Board of Trade, we regard the public discussion of the subject as premature, and we therefore enter into no details, and confine ourselves to expressing the hope that for the credit of one of the parties, of their countrymen, and of science itself, the present antagonism will be removed before our next issue.

CYCLONES AND ANTI-CYCLONES.

To the Editor of the Meteorological Magazine.

Sir,—Ill-chosen terms have much to answer for in propagating and perpetuating error, and it is on this ground alone, and not in a spirit of hyper-criticism that I would ask meteorologists to reconsider the propriety of the term "anti-cyclone" now coming into general use.

The facts of the case I take to be these. An isobaric chart of the atmosphere—at least in temperate latitudes—for any given moment of time would exhibit a number of systems of irregularly concentric rings, some of which systems would represent areas of elevation and others areas of depression. And if the way of the wind were denoted by arrows, it would be found that while the general movement of the air about the centres of depression was rotary in a certain direction, the movement about the centres of elevation was (although less distinctly) rotary in the opposite direction. Hence the centres and areas of depression, with their accompanying winds, having been called cyclones, the centres and areas of elevation, with their accompanying winds, have come to be called anti-cyclones.

Now to the term "cyclone" I do not know that any valid objection can be raised, although in extending the application of this word to all barometric depressions, whether attended with strong winds or not, it ought to be remembered that its original use was limited to such depressions as were accompanied by hurricanes.

The case is different with the term "anti-cyclone." Certainly, it may be alleged that nothing more is intended by this expression than that the movement of air about a centre of elevation is of an opposite kind

to that which prevails about a centre of depression. But something more than this *seems* to be meant, and a student of meteorology, justly impressed with the idea of a causal relation between each centre of depression and the rotation of the winds about it, would naturally conclude from the terms employed that a similar causal relation obtained between each centre of elevation and the rotation of the winds about it.

Yet this I believe would be an error. Let the reader draw or imagine a circle representing an area of barometric elevation, and let him surround this with any number of other circles touching it circumferentially, these latter representing each an area of depression. Then let him insert in each depression-circle, at its point of contact with the elevation-circle, an arrow indicating the retrograde rotation of the wind about the centre of depression, and he will find that he has at the same time represented the direct rotation of the wind about the centre of elevation. Now, as every area of elevation must in nature, no less than in the diagram suggested, be surrounded by areas of depression, it seems to follow that the direct circulation of the air about a centre of elevation is only a varied aspect of its retrograde circulation about a centre of depression, and the term "anti-cyclone" is misleading as appearing to imply a relation which does not exist.

GEORGE F. BURDER, M.D.

Clifton, 1st March, 1873.

INCREASE OF WINTER TEMPERATURE.

To the Editor of the Meteorological Magazine.

SIR,—I should much like, with your permission, to call the attention of your readers to a circumstance of great scientific and practical interest, viz., the increasing mildness of our winters. The following are the average winter temperatures, taking the months of December, January, and February as the winter, for each decennial period for the last century, compiled from Mr. Glaisher's tables.

	Deg.		Deg.
1772-81	37·0	1822-31	37·8
1782-91	36·6	1832-41	38·3
1792-1801	36·9	1842-51	39·3
1802-11	38·1	1852-61	38·7
1812-21	37·3	1862-71	39·7

Taking periods of twenty-five years, the averages were—

	Deg.		Deg.
1772-96	37·0	1822-46	38·3
1797-1821	37·4	1847-71	39·3

It thus appears that with certain temporary fluctuations our winter temperature has gone on steadily increasing for the last seventy or eighty years, and would seem to be still proceeding at an accelerated rate. It is remarkable, too, how the standard of the coldest winters to

which we seem to be liable is rising. Formerly we had winters averaging only 32 deg, but since 1814 there has been no winter under 33, since 1830 none under 34, since 1847 none under 35, and since 1855 none under 36.

Now the question is, whether this change is to be regarded as permanent or temporary, and to answer this, can any light be thrown on the character of the winters during the century preceding 1770?

If it can be shown that during this period we had a long run, say 30 to 50 years, of winters of equal mildness to our present ones, we may then, I presume, expect a recurrence of the rigorous period 1770—1800; but if, as I myself believe, no such a run of winters as we have had since 1847 was ever known to our ancestors, then we must refer the change to some permanent cause, and must expect it still to continue. My own theory on the subject is, that the enormous increase of coals and gas burnt in factories, steam engines, streets and private houses, has a certain effect in raising the temperature of the whole air, and the great development of this seems to coincide with the increased mildness of the winters. There would seem to have been no particular change in our climate until about the year 1800, since when it has been steadily rising, and more especially the last thirty years. The summer temperatures have risen only slightly, and this I think might be expected, as there is not only much less gas and coal burnt, in the summer, but it would naturally have much less effect to increase the heats of summer than to mitigate the cold of winter.

Hoping that some of your readers may throw more light on this subject,—I am, Sir, yours faithfully,

F. TAYLOR.

19, *Canonbury Park Square, N., February 23rd*, 1873.

BOOKS RECEIVED.

Reduction of the Meteorological Observations, made at the Royal Horticultural Gardens, Chiswick, in the years 1826-1869. By JAMES GLAISHER, F.R.S., London: Spottiswoode & Co. 8vo.

On the Agricultural Geology of the Weald. By W. TOPLEY, F.G.S. [Extract from Journal Roy. Agricultural Soc.] 8vo.

Rainfall at Torquay during eight years ending Dec. 31, 1871. By W. PENGELLY, F.R.S. [Ext. from Trans. Devonshire Association.] 8vo.

Rainfall in Devonshire in 1871, *and in six years ending Dec.* 31, 1871. By W. PENGELLY, F.R.S. [Ext. from Trans. Devonshire Ass.] 8vo.

Tyneside Meteorological Report, 1871. Edited by Rev. R. F. WHEELER and Rev. Dr. HOOPPELL. [Ext. from Natural Hist. Trans. of Northumberland and Durham.] 8vo.

Seven years Meteorology of Sidmouth. By J. I. MACKENZIE, M.B., Cantab, &c. [Ext. from Trans. Devonshire Association.] 8vo.

Address to Meeting of South Wales Branch of Brit. Med. Assoc., held July 1872, *at Merthyr Tydfil.* By T. J. DYKE, F.R.C.S. Eng., President. Merthyr: Farrant and Frost. 8vo.

Determination of heights by the thermo-barometer. By F. F. TUCKETT. [Ext. from the *Alpine Journal.*] 8vo.

Femaarsberetning fra det Kongelige Landhusholdningsfelfkabs Meteorologiske Comitee for 1866-1870. Bed Poul la Cour.

Quarterly Weather Report, Jan. to Mar. 1872. London: Stanford. 4to.

MARCH, 1873.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1860–5	Greatest Fall in 24 hours. Dpth	Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date.	Min. Deg.	Date.	No. of Nights below 32° In shade	On grass.
			inches	inches.	in.								
I.	ENGLAND.	Camden Town	1·46	— ·62	·24	9	17	63·7	27	29·2	14	4	8
II.		Maidstone (Linton Park)	1·66	— ·83	·42	31	15	74·0	30	26·0	13	9	...
,,		Selborne (The Wakes)	2·95	+ ·35	·51	9	18	64·0	30	27·1	22	11	16
III.		Hitchen	1·52	— ·65	·25	6	18	60·0	30	23·0	13	17	...
,,		Banbury	2·22	+ ·02	·51	16	18	61·0	30	25·5	13	12	...
IV.		Bury St. Edmunds (Culford)	1·66	— ·54	·21	20	15	60·0	30	24·0	13	18	24
V.		Bridport	3·04	+ ·17	·87	16	14	63·0	27	26·0	13	5	...
,,		Barnstaple	3·77	+ ·62	·48	1	17	67·0	28	28·5	25	...	...
,,		Bodmin	4·47	+ ·72	·57	4	18	64·0	25*	29·0	13	2	6
VI.		Cirencester	3·06	+ ·46	·93	16	15	...	...	...	...	...	...
,,		Shiffnal (Haughton Hall)	3·20	+ 1·26	·86	16	17	56·0	30	22·0	13	14	...
,,		Tenbury (Orleton)	3·38	+ ·96	·92	16	17	60·5	28	23·0	13	9	21
VII.		Leicester (Wigston)	2·07	— ·04	·33	16	14	65·0	28	25·0	12	...	...
,,		Boston	1·50	— ·29	·41	11	15	59·0	30	28·0	14	9	...
,,		Grimsby (Killingholme)	1·84	..	·55	11	20	54·0	4	28·0	13†	5	...
,,		Derby	2·15	— ·09	·71	16	15	61·0	30	27·0	13	8	...
VIII.		Manchester	1·79	— ·90	·35	9	16	66·3	28	...	..	...	...
IX.		York	2·16	+ ·17	·47	7	15	57·0	28	27·5	13	10	...
,,		Skipton (Arncliffe)	3·85	— ·96	1·00	7	15	...	...	...	...	...	...
X.		North Shields	1·86	— ·49	·39	16	24	51·0	4	27·5	13	5	9
,,		Borrowdale (Seathwaite)	7·30	— 6·10	3·52	5	12	...	...	...	..	...	...
XI.	WALES.	Cardiff (Ely)	4·46	+ 1·51	·60	6	17	...	...	...	...	...	...
,,		Haverfordwest	4·17	+ ·72	...	...	...	60·0	27	26·0	12	6	...
,,		Rhayader (Cefnfaes)	3·30	— ·54	·85	10	8	62·0	...	23·0	...	.	...
,,		Llandudno	2·09	— ·17	·42	16	12	68·7	26	30·6	14	3	...
XII.	SCOTLAND.	Dumfries	3·12	+ ·14	·84	6	15	65·0	27	25·0	1	10	17
,,		Hawick (Silverbut Hall)	1·61	...	·41	6	18	...	...	...	...	...	...
XIV.		Kilmarnock (Annanhill)	2·08	...	·36	25	17	63·0	29	27·0	1	7	...
XV.		Castle Toward	1·79	— 2·08	·43	9	10	58·5	28	...	...	...	...
XVI.		Leven (Nookton)	1·70	— ·37	·41	6	19	54·0	4	29·0	6	10	23
,,		Stirling (Deanston)	1·45	— 2·08	·40	11	13	60·0	27	24·7	20	14	19
,,		Logierait	1·98	...	·39	3, 9	14	54·0	27	21·0	20	17	...
XVII.		Braemar	·69	— 1·52	·30	14	7	55·0	30	27·6	7	10	29
,,		Aberdeen	2·57	...	·87	7	22	50·1	4	27·2	1	3	19
XVIII		Inverness (Culloden)	...	...	...	...	...	...	...	...	...	...	...
,,		Portree	3·91	— 5·13	·75	10	16	...	...	...	...	...	...
,,		Loch Broom	1·43	...	·36	12	14	...	...	...	...	...	...
XIX.		Helmsdale	2·11	...	·55	10	15	...	...	...	...	...	...
,,		Sandwick	2·20	— ·13	·40	8	12	48·1	27	29·9	1	4	17
XX.	IRELAND.	Caherciveen Darrynane Abbey	4·65	...	·53	27	19	...	...	...	...	..	..
,,		Cork	4·85	...	1·46	1	15	...	...	...	...	...	...
,,		Waterford	3·87	+ ·98	1·00	30	17	59·0	3	30·0	1, 13	3	...
XXI.		Killaloe	3·98	— ·34	·74	30	17	67·0	26	27·0	13	5	16
,,		Portarlington	3·24	— ·07	·51	31	26	59·0	27	27·5	13	8	...
XXII.		Monkstown	2·54	— ·04	·54	6	15	...	...	...	...	...	...
,,		Galway	3·13	...	·55	8	17	64·0	26	31·0	14‡	3	...
XXIII		Bunninadden (Doo Castle)	2·83	...	...	...	...	...	...	...	...	...	...
,,		Waringstown	2·37	...	·42	1	17	62·0	29	28·0	19	10	20
,,		Edenfell (Omagh)	2·01	..	·32	9	18	61·0	29	28·0	12	13	...

*And 26. †And 14. ‡And 15.

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

METEOROLOGICAL NOTES ON MARCH.

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

ENGLAND.

LINTON.—Mostly dull, but not severe up to the 22nd, when a week of very fine bright, sunny weather, followed with T and L on 29th and 30th, and R on 31st, the most wintry day being the 21st, S and sleet falling on the 1st and 16th; dense fog on 18th, 27th, and 29th; winds mostly N. and E., but never very high; dust flying on the roads on 15th, 25th, 26th, and up to the 30th, but the early part of the month was dull and dirty.

SELBORNE.—Remarkable storm of H, R and S, with fog at 8.30 a.m. on 1st, S in very large flakes; violent wind and H at 10 p.m. on 9th, tempestuous night; fog on 15 days; prevailing winds W. and S.W. during first week, from 18th to 24th N.E.; a very bleak yet wet month till near its close, then warm and genial; all garden work in abeyance till near the end.

BANBURY.—S on 1st, 10th, 13th and 14th; R ·02 only different from the average.

CULFORD.—Cold and sunless up to 24th, with foggy mornings, and days of bright sunshine from that day to end, including the 29th; thermometer in shade rose for the first time this year to 60° on 30th; S fell to a considerable extent on 1st; T on 10th, accompanied by H, S and R; H also fell on 11th, and S on 12th and 13th, H on the 19th, and S on 20th and 21st; westerly winds during 15 days, and easterly winds during 16 days; mean temperature of the month 41°.

BRIDPORT.—Fine month on the whole; heavy floods on the 1st from the melting of the S; south-westerly gale on 10th, easterly gale on 15th.

BODMIN.—Mean temperature of the month 46·1; rainfall ·90 above the average of 24 years.

HAUGHTON HALL, SHIFNAL.—The month came in with R, sleet and mist, which continued almost daily to the 16th, when a fall of ·86 brought it to a climax, from that day there was a cessation (except *slight* falls on 21st, 22nd and 23rd), till 30th, when ·38 fell; the wind varied from N.W. to S.W. to 14th, when it became easterly, varying from N.E. to S.E. to the close; with fog on most mornings from 23rd; severe frost on 13th, temp. 22°; the month although cold went out "like a lamb." Stock dove first heard on 2nd; rooks building on 5th; peewits pairing on 24th; cushat first coos 26th; chiff-chaff first heard on 27th; yellow crocus began to open on 4th, and was full out and filled with bees on 25th; celandine flowers on 26th, and hawthorn begins to swell on 28th.

ORLETON.—The weather continued cloudy, cold and gloomy, with frequent falls of R and S and very little sun till 25th, when it became fine, dry and sunny to 30th; on 16th a large fall of S mixed with R occurred, which covered the valleys about 3 in. deep, and the hills 6 or 7 in.; to the east of us there was not any S, but steady R, 15 miles distant; the wind was frequently very rough and cold; temperature about 1°·2 below the average of the month; chiff-chaff first seen on 31st.

WIGSTON.—The weather during the last 10 days has been beautiful and dry; vegetation and agricultural work backward.

BOSTON.—Dull and cold to 11th, on which there was H, R, S, T and L, and sunshine; sharp frost on 12th; bitterly cold on 16th; stormy and cold, with S and R on 21st, thence to the end fine.

KILLINGHOLME, GRIMSBY.—The old saw proved, true as it did in 1868, about the month "coming in like a lion, and going out like a lamb;" several fogs: will the other saw be verified? "as many fogs as in March you see, so many frosts in May will be;" no high winds; vegetation very backward, and the ground very wet; rooks building on 2nd; frogs beginning to spawn on 25th, unusually late; apricot beginning to blossom on 8th; peach on 12th; yews shedding pollen on 29th.

NORTH SHIELDS.—S on 1st, 10th, 12th, 13th, 14th, 15th and 16th; lunar halos on 8th, 9th and 13th; frequent fogs, though weather was fine towards the end of the month.

SEATHWAITE.—Three inches and a half of R fell on 5th, and yet the total of the month was 6 in. below the average for March.

WALES.

HAVERFORDWEST.—The weather hos been generally cold, with many falls of S heavy gales in the beginning of the month, but very mild and calm towards the end.

CEFNFAES.—The month has been dry and cold ; much S and frequent N.E. winds ; great mortality among the sheep and lambs.

LLANDUONO.—A fine month, particularly the latter part, though the S was on the distant hills from the 1st to 31st ; foggy till 3.40 p.m. on 14th, and a sudden darkness ending in a S shower ; beautiful lunar halo on 10th ; last week fine, but with fogs over the hills.

SCOTLAND.

DUMFRIES.—During the first half of the month the weather was variable and inclement ; the third week dry but ungenial, with very cold N.E. winds ; the latter part of the month mild and very fine ; the seed-time being most favourable ; S fell on seven days ; rainfall very slightly above the average ; mean temperature 41°·4 or 2° below the mean for March.

SILVERBUT HALL, HAWICK.—A month of cold, unhealthy, easterly winds, except during between 22nd and 28th, when it changed to W., changing again to E. on the latter day.

ANNANHILL.—Winds principally E. or its compounds, the force but light ; ozone fairly developed, the highest test colour being during southerly wind ; winter sown wheat has suffered from alternate frost and sunshine ; oats were well got in, the seed-time being favourable ; vegetation is now advancing rapidly, several of the forest trees being well in bud ; S fell on three days, but did not lie.

CASTLE TOWARD.—A mild and fine month for out-of-door labour, having a few frosty mornings followed by sunshine ; this month being favourable for farmers, they have taken full advantage of it ; a good breadth of spring wheat having been got in, and lea ploughing is all but finished : potato planting for the Glasgow market farmers got in large fields in good order ; sowing oats going on rapidly ; in this locality vegetation advancing rapidly ; gooseberries in flower, as well as pears and apples all in full bloom, (earlier here than in the south.)

DEANSTON.—First half of the month cold, with occasional showers of S and sleet ; N. and N.E. winds prevailing ; the latter half more genial, and very favourable for operating on the soil, and getting in the seed of all sorts.

ABERDEEN.—A month of dull, ungenial weather, with low temperature during the day, and comparatively high during the night ; rainfall very little above the average ; winds generally light, those from S.E. and S. being most prevalent ; fogs daily from 24th to 31st (inclusive).

PORTREE.—A much drier month than usual for March, but much more frost.

LOCHBROOM.—This has been a glorious month for agriculturists, the land has been in splendid condition for cultivation, and the sowing of seeds and field labour, in consequence, is in an unusually advanced state ; the latter half of the month passed without a drop of R falling, and the total for the month is the smallest but one since I began to observe ; R is even prayed for now.

SANDWICK.—From 1st to 13th wet ; the S of the previous month was thawed by the 3rd, sprinklings of S fell on 12th and 13th, which quickly thawed ; after the 13th it was fine and dry only 4-100ths of an inch having fallen during that time, so the soil is dry, and spring work progressing ; there was a gale of about 50 miles an hour on the morning of the 12th ; an auroræ on three nights.

IRELAND.

MONKSTOWN.—A cold, dull month, with N. and E. winds.

DOO CASTLE.—Fine month, two-thirds of it free from R ; farming operations not so forward notwithstanding as we could wish ; ground cold, and but little vegetation.

EDENFELL, OMAGH.—Beginning of month generally raw and unsettled, but from 12th to the end (with the exception of two or three days), highly favourable for farming operations, which (notwithstanding the unfavourable winter), are now fully as forward as usual at this period.