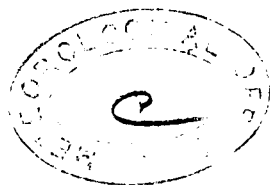


SYMONS'S

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INTRODUCTORY.

It has been the practice of the Editor of this Magazine, to preface each volume with a few words as to its aims and scope, but as times change, customs must change also, and thus it seems to us that such explanatory notices are no longer needed. Our little periodical has navigated the troublous seas of public opinion for seven years, not only without shipwreck, but if we may so express it, without the loss of a spar or a rope—or, to drop the metaphor, without missing the regular date of publication, and we believe almost without the loss (except, alas ! by death), of a single original subscriber. While, on the other hand, our correspondents, the size of the Magazine, and its circulation have largely increased. As to size we should in this, the last of our annual Introductions, like to say a word or two. We admit that it is not bulky, but (always excepting publications the printing of which is paid for out of the taxes, *i.e.*, Government papers, of which the price is utterly irrespective of cost of production), we are doubtful if there is any other meteorological publication, whether supported by the funds of societies or otherwise, which gives so much information as is afforded in our pages. We transgress no rule of propriety in stating this fact, because it is to our correspondents rather than to ourselves that it is due.

THE BAROMETRIC DEPRESSIONS OF JANUARY 19th & 20th.

We have been favoured with correspondence upon this subject sufficient in bulk to fill three numbers of this periodical. This fact alone is of more importance than appears at first sight, it proves—(I.) the wide-spread interest now taken in matters meteorological; (II.), the willingness of observers to take any reasonable or even unreasonable trouble when they think that they can thereby be doing good service,

and therefore, (III.) the large store of volunteer labour still to be utilized. (IV.) Some of the records of eye observations are so complete as to equal, if they do not surpass, those of self-recording instruments. But the correspondence shows also some unsatisfactory features to which it is equally our duty to call attention. Among these, one is, that in spite of the very moderate price at which trustworthy "Kew pattern" barometers can be bought, many to whom the cost can be no object have failed to provide themselves with a standard, and have thereby depreciated, not to say annihilated, the value of their observations. Another feature which we should like to see altered, is the fact that many sets of observations are sent to us wholly uncorrected and unreduced; that which is a small matter for each individually becomes collectively serious, and although we would do anything in our power to help our excellent correspondents, we venture to suggest that all should procure standard instruments, and send in their observations thoroughly reduced.

With these few prefatory remarks, which we are sure will be received in the spirit in which they are penned, we proceed to lay before our readers some brief extracts from this mass of correspondence.

The diagram which forms the frontispiece to this number, shows the general characteristics of the depression at several stations. The most remarkable feature is the length of time during which the pressure remained at a low point; it has been as low, has been *lower* on rare occasions, but at present we are not aware of any case in which the sea-level pressure remained in the south of England at and below $28\frac{1}{2}$ inches for more than twenty-four hours.

Several writers have called attention to the fact that this great depression was not accompanied by a heavy gale; but what was to cause a gale? it is not the absolute, but the relative height of the barometer which indicates a gale. The depression of 19th and early hours of 20th was a movement on a grand scale, and the pressure over England varied but little; for instance, at 6 p.m. on the 19th it was, in London $28\cdot61$, at Ryde $28\cdot63$, and at Hereford $28\cdot61$; at 11 p.m., when the lowest point was just touching the Welsh and Cumbrian coasts, we have a somewhat greater difference, but still nothing adequate to produce a gale. The sea-level values at 11 p.m. were:—

Cockermouth	...	$28\cdot202$.	Ross	...	$28\cdot486$.
Hinderton, Cheshire	...	$28\cdot308$.	Fairford, Gloucester	...	$28\cdot490$.
Sheffield	...	$28\cdot410$.	Berkhamstead	...	$28\cdot500$.
Bristol	...	$28\cdot462$.	Crowboro' Beacon	...	$28\cdot541$.
London	...	$28\cdot464$.	Brighton	...	$28\cdot549$.

The above statement also shows the general shape of the depression—viz., a portion of a somewhat circular figure, with its lowest point between Ireland and Scotland, whence during subsequent hours it passed N.E. ward over Scotland.

It will be seen that the following table has been divided into two portions, respectively headed "First Depression," and "Second Depression"; the meaning of this will be at once evident on referring to

the frontispiece, which shows that while there was at almost all stations a minimum about midnight between 19th and 20th, there was also especially at the western stations another superposed, if we may so express it, which passed over Haverfordwest about 2 or 3 p.m. on 20th, and thence travelled eastwards, reaching Herefordshire about 5 p.m., Bristol about 6, London about 8, and finally Suffolk at 10.15 p.m., by which time it had almost died out.

What then did this depression imply,—We know not,—but this we do know, that after that mighty atmospheric movement had passed away to the N.E., the remarkably mild weather of January, 1873, passed away too, not amid the roar of wind and the uprooting of trees, but amid lightning and thunder, hail and snow, the latter of which has prevailed more or less ever since.

Station.	County.	1st Depression.			2nd Depression.		
		Pressure.	Hour.	Day.	Pressure.	Hour.	Date.
		in			in.		
Haverfordwest..	Pembroke .....	...	...	...	28·365	2.0 p.m.	20
Cockermouth ...	Cumberland ...	28·165	0 a.m.	20	...	...	...
Wrexham	Denbigh	28·372	11.30 p.m.	19	...	...	...
Hinderton	Cheshire	28·286*	0.10 a.m.	20	...	...	...
Warrington ...	Lancashire (1)	28·275*	0.15 a.m.	20	...	...	...
Hereford	Hereford	28·443	10.0 p.m.	19	...	...	...
Ross	,,	28·486	11.0 p.m.	19	28·407	6.0 p.m.	20
Bristol	Gloucester	28·436*	11.55 p.m.	19	28·366	5.50 p.m.	20
Bath	Somerset .....	...	...	...	28·347	4.0 p.m.	20
Fairford	Gloucester.. (3)	28·490	11.0 p.m.	19	28·411	7.0 p.m.	20
Gainford	Durham .....	...	1.40 a.m.	20	...	...	...
Sheffield	York	28·410	11.0 p.m.	19	...	...	...
Chesterfield ...	Derby	28·317	3.0 a.m.	20	28·420	7.0 p.m.	20
Ryde	Hants .....	...	...	...	28·548	See Note.	...
Berkhampstead	Herts .....	...	...	...	28·470	8.45 p.m.	20
Camden Square	Middlesex	28·447*	1.0 a.m.	20	28·474*	8.0 p.m.	20
Brighton	Sussex	28·528*	1.15 a.m.	20	...	...	...
Beckenham	Kent	28·486	11.30 p.m.	19	...	...	...
Crowboro'	Sussex	28·541	11.0 p.m.	19	28·557	8.0 p.m.	20
Cambridge	Cambridge (5)	28·44	2.15 a.m.	20	28·49	8.0 p.m.	20
Beccles	Suffolk	28·33 *	2.0 a.m.	20	28·44 *	10.15 p.m.	20

Readings to which * is affixed are known to be absolute minima.

- (1) Pressure increasing all the evening of 20th.
- (2) Probably 28·367 at 5 p.m.
- (3) The bar. fell 0.016 between 6 and 7 p.m.
- (4) Pressure stationary from 10.30 a.m. to 10 p.m. on 20th, at 28·548.
- (5) Pressure stationary between 11.15 p.m. 19th, and 6.15 a.m. 20th.

REMARKS.

HAVERFORDWEST.—On Sunday, the 19th, the morning was cold, clear, and chilly; the bar. at 9 a.m. stood at 28·70, with a decided downward tendency; a deceptive calmness prevailed, and about 1 p.m. a sudden storm of hail, thunder, and lightning, with heavy squalls, occurred; about 2 p.m. the sky became black as night, and another and heavier storm took place, the bar. still falling; the night was very stormy, and the squalls at times were very violent. On the morning of the 20th, the Precelly Hills were covered with snow, the sky very wintry and bar. still falling; about noon a blinding snow storm (with very little wind)

occurred; about 2 p.m. it ceased, the sky darkened, and a grand storm of the loudest thunder, accompanied by vivid lightning, and enormous hail, took place; the rest of the day precarious.—*E. P. Phillips.*

COCKERMOUTH.—No gale or high wind, although the barometer has not been so low for eleven years.—*H. Dodgson, M.D.*

TREVALYN HALL, WREXHAM.—Jan. 19th, flashes of lightning were seen, and one peal of thunder was heard soon after 8 p.m., when the bar. was approaching its lowest point; some snow fell in the morning; wind light to moderate.—*B. T. Griffith.*

DARTMOOR PRISON.—Forked lightning and thunder at 6 p.m. on 19th, and lightning without thunder at 9 p.m. on 20th.—*R. E. Power, M.D.*

HINDERTON, NESTON.—No very unusual condition of the weather accompanied this remarkable depression. On Saturday night (Jan. 18th) there was a stiff breeze from S.W., with driving rain (·40 in.). The morning of the 19th was very bright and fine; wind W.S.W., gentle breeze. The wind freshened very much about noon, and veered to W. and W.N.W.; at 2.30 it backed to W.S.W., and blew pretty hard, but it never amounted to a gale. Dense masses of cloud (cumulus) were heaped up, but there was no downfall until 8 p.m., when some hail fell. This occurred several times during the night, to a sufficient extent to make the ground white. During the night the wind was unsteady, about W.S.W., and swept on in fitful gusts. Temperature fell rapidly about midnight, and this morning (Jan. 20) the grass thermometer fell to 26°·9. Occasionally I experienced some difficulty in obtaining correct barometrical readings owing to the marked oscillation of the mercury. I took all the observations myself.—*Reginald Bushell.*

HEREFORD.—Snow both on 19th and 20th, lightning on 19th at 8 p.m., and lightning, with loud thunder and snow on 20th at 7.30 p.m.; very little wind, mostly S.W. Absolute min. believed to have occurred at 5 p.m.—*E. J. Isbell.*

THE CRAIG, ROSS.—One or two flashes of lightning at 8 p.m., 19th; and thick snow storms on 20th.—*H. Southall.*

FRENCHAY, BRISTOL.—On Jan. 19th, from 5.30 to 6.30 p.m., light breeze, occasional moderate gusts; to 7.15 nearly calm; 7.30 dead calm, light breeze to 8; wind high and rainy until 8.30, afterwards a lull to 9.15; at 9.45, heavy rain and high gusts; a lull to 10.15, when there was heavy rain and wind, with a loud clap of thunder; afterwards wind fresh, but variable. At 11.45 wind again high and gusty; 11.55 lowest reading of barometer; a lull till 0.30 a.m. on 20th, after which hail and sleet, with occasional squalls. 8.30 a.m., fine, calm, hail and snow on ground. From 4.50 to 5.15 p.m. four or five very vivid flashes of lightning, with loud thunder. 6 p.m., hail, and wind gusty, at times blowing hard till 7 p.m.—*F. F. Trickett.*

HATHEROP RECTORY, FAIRFORD.—During most of the night of the 18th, there were gusts of wind, but afterwards the atmosphere was comparatively calm, and that not only while the great depression lasted but also during the subsequent rise. About 10 a.m. on 19th, there was a vivid flash of lightning, followed instantly by a loud crash of thunder. The mercury was stationary almost the whole of the day on the 20th, but began to fall still lower in the afternoon, reaching the lowest point 27·971 in. about 7 p.m.—*R. P. Davies.*

MYRTLE HOUSE, SHEFFIELD.—Hail storms at intervals during the 18th; vivid lightning from 7 p.m. until 11 p.m. Sharp frost in night, light west wind.—*S. Richards.*

BRAMPTON ST. THOMAS, CHESTERFIELD.—No special atmospheric disturbance, merely a few hours' high wind on 18th; the 19th and 20th calm, with light air from S.W.—*J. M. Mello.*

RYDE.—Jan. 19th, stormy, overcast and rain, vivid lightning in evening. 20th, fresh, cloudy, hail and rain in the afternoon; vivid lightning and strong winds in the evening. 21st, fresh, and overcast; rain in the night.—*R. Taylor.*

CROWBOROUGH BEACON OBSERVATORY.—On the 19th the sky was overcast with very heavy clouds in all directions; the small patches of visible sky looked particularly green, and distant terrestrial objects very near; the day proved, for the most part, overcast, and the evening rainy. Soon after midnight we had a sharp thunderstorm, which was followed, before daylight, by a reduction of

temperature to $27^{\circ}6$; hard ground frost. The 20th was much colder; heavy masses of cloud were visible over the channel and west coast of France; hail showers just before sunset; vivid lightning and loud crashes of thunder from 7 to 9 p.m., and hail showers; vivid lightning in the east, lighting up the landscape for miles.—*C. L. Prince.*

GELDESTON, BECCLES.—We had a gale on 18th and 19th, but generally calm weather; lightning in evening of 19th and 20th; snow on 21st.—*E. T. Dowson.*

Additional data respecting this depression and the accompanying weather, will be found in the notes of our regular correspondents.

RECENT ANTI-CYCLONES IN WESTERN EUROPE.

To the Editor of the Meteorological Magazine.

SIR,—The last three quarters of the past year were characterized by the relative frequency of anti-cyclonic systems in the extreme north and east of Europe, and by their remarkable paucity and want of permanence upon the Atlantic and Mediterranean coasts.

I send a few notes of those anti-cyclones which have been of importance or have exhibited any stability from the end of September to the end of January in Western Europe; (premising that I define an "anti-cyclone" simply as a circular, or approximately circular area, bounded by isobars, and having higher pressures, and a "cyclone" as a similar area having lower pressures than those of surrounding districts.)

During October no anti-cyclones of any stability existed west of longitude 20° E. A feeble system, which hung over North Italy, at the commencement of the month, a second which appeared in the north of Ireland on the 5th, and a third, which was developed in Sweden about the 18th, gave way almost immediately before depressions advancing from the Atlantic.

November, though inequalities of pressure were very much higher than in the preceding month, was characterized by a somewhat greater firmness and persistency in the systems of currents. During the first week, depressions passing rapidly across north-western Europe, an anti-cyclone hung over Spain, shifting to N.E. on the 8th, and then disappearing. On the 11th an anti-cyclone began to develop itself in Northern Scandinavia. Its central pressures soon rose to $30\cdot7$ in., and the system, coinciding with areas of depression in Southern and Central Europe, was remarkable for the extreme steepness or intensity of its southern portion. It gave way a great deal before a cyclone in Great Britain on the 16th, but then recovered somewhat, shifting slowly north-eastwards, and finally disappearing under the influence of Atlantic depressions about the 21st. A slight anti-cyclone now showed itself for some days over the Alps, but retired southwards, and subsequently hung over the Mediterranean.

During the first half of December the cyclonic currents were again prevalent throughout Western Europe; depressions followed one another with rapidity, the Portugal coast receiving the smallest share. On the 15th, however, an anti-cyclone appeared on the Baltic, with

frost ; and though oscillations were felt as depressions passed on its south during the third week, the system was steadily maintained until the 23rd, when it broke down under the influence of great Atlantic cyclones. An anti-cyclone again immediately showed itself over Austria and the North of Italy, which though subject to considerable oscillations, proved of rather persistent type.

This system migrated slowly westwards, and in the first week of January its centre was established over the Maritime Alps ; in this district it continued, with only slight and temporary shifts of position, during the second and part of the third weeks. The system closely resembled others which commonly hang over Northern Italy, Switzerland, or the south of France during periods when the north-west of Europe is visited by great Atlantic depressions. On the 18th it gave way under the approach of the very extensive cyclone in the north-west. In the third week an anti-cyclone established itself on the Baltic, with increasing frost. This system proved stationary and persistent. It was most extensive on the 27th, when isobarics had anti-cyclonic curves over all Western Europe, reached its climax on the 31st, and partially gave way before the cyclonic system which passed up the English Channel on the 2nd of February.—Yours truly,

W. CLEMENT LEY.

ATMOSPHERIC WAVES.

To the Editor of the Meteorological Magazine.

SIR,—For upwards of a quarter of a century the subject of atmospheric waves has received but little attention from Meteorologists. Requiring no little amount of labour in analysing the barometric curves at several stations far apart, and also for analysing the isobars or lines of equal pressure over a large portion of the earth's surface, it has obtained but a passing notice now and again as a succession of high readings of the barometer has been registered, or some disastrous gale has swept over our seas, accompanied by a more than ordinary depression of the barometer, the result of a reduction of pressure but seldom experienced.

The weather maps of our own Government, of the continent of Europe, issued at the observatory of Montsouris, and of America, issued three times daily at Washington, are registers, more or less available, of the elements of "atmospheric waves." How far a correct conception of an atmospheric wave really exists in the collective meteorological mind it is difficult to define. A succession of high barometers over a large tract of country is quoted as "a wave of high pressure," and an extraordinary depression of the barometer is, in like manner, quoted as "a wave of low pressure," but so far as I am aware no attempts have been made within the period above-named to characterize such waves by giving the numerical values of their amplitudes and altitudes, their rates of progress, &c.,—elements that must be of the last importance in the formation of any reliable probabilities of coming weather.

One of the earliest results of the enquiry was the establishment of a series of barometric movements in the month of November, the barometric curves of which in some localities assumed a very decided symmetrical character. There is reason to believe that some time about the middle of November these movements *return* annually in more or less the same order. In November, 1872, the crest, or highest of these movements, passed London about the 9th. On the 15th of November, 1872, 7.35 a.m., Washington time, the chief signal officer, Brigadier-General Albert J. Myer, announced that "the great atmospheric wave of high barometric range moving across the continent from west to east, and averaging nearly thirty and a half inches of pressure, now extends from Oregon to the mid Mississippi valley and the Gulf coasts, propagated in continuous bands of north-westerly winds," and the map of November 15, 4.35 p.m., shows a high pressure of 30.60 in. in the extreme north-west, and a low pressure of 29.60 in. in the north-east, thus from Fort Benton, latitude about 47° N., longitude about 110° W. to Quebec, latitude 47° N., longitude 71° W., a difference of one inch of mercury existed. At New Orleans, latitude 30° N., longitude 90° W., the pressure was 30.33 in. In accordance with these pressures the isobaric bands had a N.W.—S.E. direction; one direction at right angles to this being that of the anterior slope of the wave with its characteristic north-west wind blowing parallel to the isobars.

If it be a fact that these movements return with the seasons, the sun—to use a graphical expression of the late Sir John Herschel—producing in his annual course the same kind of wash-wave at each season in the shallow basin of our atmosphere, every addition to our knowledge of them must be valuable. During the last five years a remarkable depression of the barometer has been recorded in the publications of the Meteorological Committee. In 1869, it was registered, at the self-recording stations, between 6 p.m., of January 14, and 7 a.m. of the 15th, lowest reading 28.85 in. In 1870, between 7.0 a.m., and 7.30 p.m. of the 14th, lowest reading 28.75 in. In 1871, between 10 p.m. of January 15, and 2 p.m. of January 16, lowest reading 28.176. In 1872, between 6.30 p.m. of the 17th, and 8.0 a.m. of the 18th, lowest reading 28.06; and in 1873, on the 20th, 8 a.m., the reading at Thurso was 28.11. At present it is impracticable to give a closer approximation to the elements of this trough or wave of depression, nevertheless the evidence appears to be sufficiently conclusive to establish the existence of three seasonal barometric waves—the European November wave, the American November wave, and the European trough of January.

Yours very truly, W. R. BIRT.

DAILY VARIATIONS IN THE PREVALENCE OF RAIN, JANUARY, 1873.

THE new year opened with an improvement in the weather, as the disturbance, which marked the closing day of September, was passing

off; but the change was very temporary. Before noon the mercury was again descending rapidly at Valencia, and a series of depressions continued to pass over us in a northerly to a north-easterly direction, their centres being generally outside the Atlantic Borders of the British Islands. This continued uninterruptedly until the 5th, and in some instances, slight local oscillations occurred, in addition to those of the more general storms. Distinct baric minima occurred on the night of 1st, morning of the 3rd, and on the 4th, their advent being marked by strong southerly winds or gales and very general rains, with some hail and much lightning and thunder at the western stations. The recovery of pressure on the 4th was, however, rather more marked in the west than that on the preceding days, and at 8 a.m., 5th, the isobars lay more west and east than of late. The early hours of the 6th brought a fresh but slight disturbance to the north-western districts, which was felt, in a less degree, even in the south and south-east, and the rainfall was temporarily renewed in all parts of the Kingdom. This passed off, and, except over the outlying western and northern counties, the weather became finer. On the 7th broken weather returned; for with the advancing day we find the western and northern barometers again falling, and at night south-westerly gales and rain occurred in the north-west and north. Scarcely had this *bourrasque* passed than the barometer again fell in the south-west, and this time (on the 9th) the storm passed more completely over us, so that all parts of the country felt the rain. Through the 10th pressure rose generally, though southerly winds and some rain continued; and on the 11th the weather was more favourable in the north and east. The 12th and 13th, however, were marked by an extensive depression, whose centre travelled from west to east some distance to the northward of our Islands, but whose influence spread to our most southerly coasts, bringing a renewal of south-westerly winds and rain. As this passed away, thunderstorms occurred in the north of Scotland (on the 13th), and while the weather cleared for a time in the north of England, the morning of the 14th found a new diminution in Ireland, with rain at the western stations. Pressure now became more uniform in France and the south of England, accompanied by clearer weather; but on the 16th these improved conditions were broken into by a shallow disturbance, which advanced over St. George's Channel, and was itself succeeded by several very irregular changes of pressure and wind in the north and west, accompanied by heavy rains. On January 18th the south-eastern portion of an unusually extensive and deep depression showed itself at our north-western stations, and advancing in a south-easterly direction, extended gradually over the whole of western Europe. At 8 a.m. on the 20th the barometer (at 32° F., and mean sea level) was as low as 28·11 in. in the north of Scotland, and throughout our Islands, Norway, Denmark, Holland, and the north of France readings were below 29 in. Considerable rain accompanied the barometric fall, and on the 19th, snow, hail, thunder and lightning occurred in addition. A partial recovery of pressure during the 20th

was accompanied by a great reduction of temperature, so that in the night the thermometer in the shade at York fell to 16° , and on the whole the weather improved slightly. The next day brought a renewal of the fall in the west, and in addition to the generally low condition of pressure a small *bourrasque* crossed Ireland and England, and lay over Holland at 8 a.m. 23rd. Its passage was marked by general precipitation, but was followed by a temporary improvement. At 8 a.m. 24th, a new and deep depression had advanced to the north-west of France. Copious rainfall had occurred at the south western stations, and a less quantity in all but the north-eastern districts. During the day, however, the disturbance became suddenly filled up, the rain ceased, and the 25th found a region of high barometer lying precisely where the low barometer had been 24 hours earlier, extending northwards to central England, and southwards over the Bay of Biscay. A marked improvement in the weather now took place, first in England and then in Scotland. The barometer rose over all the eastern regions during the remainder of the month, the area of high pressure so formed extending slowly westwards. Thus, though southerly winds prevailed, they were light, as a rule, and in England the weather was fine. In Ireland, however, some barometrical oscillations were recorded, which point to the disturbed weather still prevailing over the Atlantic; and as the various depressions swept over that country, rain fell there rather copiously, and occasionally extended to Scotland also.

Thus we see that all the early part of the month was wet *generally*, but while in the latter part, the region of precipitation lay to the westward of England, Ireland was almost constantly within its limits; and so it comes to pass that a great excess of rain in the latter country occurred simultaneously with a deficit in the former.

In future notices it is proposed to dispense with so minute a *résumé* as the above; but after glancing briefly at the general conditions which prevailed, to substitute some account of the proportion of the monthly fall which may be ascribed to the various *meteorological periods* into which the month seems to have been divided. These values will be, necessarily, somewhat rough at times; but such an analysis seems to offer the best method at present available for making further progress in the discovery of the laws which govern the distribution of rain over our Islands.

F. G.

A CONFERENCE.

To the Editor of the Meteorological Magazine.

SIR,—From the letters which appear in your Magazine, and in other scientific journals, I gather that there is a very wide-spread dissatisfaction with things Meteorological, and the question is, how are matters to be put right? Observers have not yet decided what a shade is, or whether four feet above the ground, or any other number of feet, is the best point at which to obtain the mean temperature of the air. There are other knotty questions to be set at rest before observers can feel full

confidence in their work, and, therefore, I suggest that there should be a *Conference of British Observers*, whose views might be thereby efficiently represented, at the Vienna General Congress of Meteorologists.

Yours very truly,

SAMUEL H. MILLER.

[We cheerfully give to the above proposal our cordial support, so far as relates to a British Conference, but we are not sure that its decisions could be "efficiently represented at the Vienna General Congress of Meteorologists." Subject to correction by those who possess fuller information, we understand the present state of affairs to be as follows: The Leipzig Conference was summoned by the State Meteorologists of Austria, Russia, and the Netherlands, *not* in their official but in their private capacities, and the invitations were widely spread, including all those who possessed the requisite meteorological knowledge, including, in short, the representatives of governments, of societies, and amateurs. This conference met on August 14, 15, and 16, and was well attended. A report of its proceedings has already been published in Dr. Jelinek's *Zeitschrift*, and the Meteorological Committee of the Royal Society are preparing an English translation. At the meeting of the Meteorological Society in December last, Mr. Scott gave a brief *résumé* of the proceedings of the conference, and at its conclusion Mr. Symons suggested that after the translation had been published and circulated, it might be desirable for the Society to devote an evening to a discussion of the views enunciated. The proposal was very favourably received, and we believe it is the intention of the Council to adopt it. The only difficulties which we see in the matter (and virtually this proposal and Mr. Miller's are identical), are two: first whether it will be possible to consider such a variety of subjects in one evening, and do justice to them all.—Secondly, We understand that the Vienna meeting is to be a purely State affair, to which none but the representatives of Government departments will be invited. If our information on this point is incorrect, it will not be difficult to find an efficient representative of non-official British meteorologists, but as there is some uncertainty on the subject, and there is an old adage as to the value of proffered services, we should prefer Mr. Miller's proposal to terminate with the word "observers" in the last line but one. We believe that British amateurs are both able to assist and willing to do so in any way that they can, but that they have no desire to obtrude their advice where it is not requested.—ED.]

REVIEWS.

The Ruinfall in Devonshire in 1871, and in the six years ending December 31st, 1871. By W. PENGELLY, F.R.S. [From Trans. Devon Assoc. for the Advancement of Science.] 8vo., 21 pp., and folding tables.

As this paper is identical in principle with others by the same author which have been noticed in these pages, it is only necessary to state that Mr. Pengelly continues his exhaustive analyses of the Devonshire

Returns, given in Mr. Symons' "British Rainfall," and supplements them with abstracts of the returns for other counties. There are two columns in one of the tables which supply suggestive information not given in "British Rainfall," viz., the number of gauges in each county, and the average number of acres represented by each gauge, in other

words $\frac{\text{Area of County.}}{\text{Number of gauges in it.}}$ "this value" varies from "6,743 acres in Middlesex to 138,884 in Anglesea, and averages 33,475 for the whole country." That is to say, supposing it were possible that the Middlesex gauges could be all placed in the most suitable positions, each would be in the centre of an area of 6,743 acres, or about 10 square miles; would be in fact between 3 and 4 miles apart,—while in Anglesea each gauge represents 217 square miles, which would make the stations nearly 17 miles apart. The average for all England and Wales is 33,745 acres, or 53 square miles or 8 miles apart. Now for drainage and engineering purposes this distance is too great, and unfortunately the real state of matters is worse than that shown above, because the stations are not, as is above assumed, distributed in the spots where theoretically they *should* be, but where practically they *can* be. Devonshire for instance has one gauge to each 22,216, or 35 square miles, and yet we believe there are seven distinct areas in Devonshire of 100 square miles each, in not one of which is there a single rain gauge. We think the Devonshire Association and the able author of the work under notice, might advantageously take steps to fill up these *lacunæ*.

Reduction of the Meteorological Observations made at the Royal Horticultural Gardens, Chiswick, in the years 1826-69. By JAMES GLAISHER, F.R.S. [Supplement to Vol. II of the Journal of the Royal Horticultural Society of London. New Series.] London: Printed by Spottiswoode and Co., 8vo., 66 pages, and many folding tables.

THE Council of the Royal Horticultural Society acted wisely when they resolved that the observations made at their Chiswick gardens during forty-four consecutive years, should be discussed and printed, and in entrusting them to Mr. Glaisher, they placed them in the hands of one who has done more work of that class than any other three men in the United Kingdom.

It is self evidently impossible in the limits of a review, to discuss a work which must contain close upon 100,000 entries, but we may state that the more important series of tables give the mean temperature, range of temperature, and rainfall on every day from January 1, 1826 to December 31, 1869, also the difference between the mean temperature of each day and of the corresponding day for the whole forty-four years.

We can quite understand that considerations of the expense may have compelled some omissions, such as tables of the absolute maximum and minimum temperature of each day, of the hygrometric results

and of the direction and force of the wind. A list of the erroneous readings detected by Mr. Glaisher, by comparison with the Greenwich records, would have scarcely increased the cost perceptibly, and would have been very useful.

As the maxima and minima are not given, Mr. Glaisher's valuable emendations are to a great extent lost. Another source of regret is the absence of any plan or sketch of the instruments in position, or any note of the errors of those last in use, even the height of the place of observation above sea level, and the description and size of the rain gauge, and its elevation above the ground are omitted.

While we cordially welcome a valuable contribution to our knowledge of the climate of London and its suburbs, and thank the Royal Horticultural Society for their public spirit in bearing the expense, we have not hesitated to point out the data which we should be glad to see in a supplementary volume.

Scottish Meteorology, 1856—71, computed at the Royal Observatory, Edinburgh. [Excerpt from Vol. XIII. of the "Edinburgh Astronomical Observations."] Oblong 4to, 106 pp., 1 plate.

WE do not share Prof. Smyth's estimate of the value of the mean results quoted in the earlier portion of this work; without altogether declaring it useless to take the mean of meteorological elements of a batch of places selected merely because they happen to be those in which a large number of human beings reside, we certainly hold it of small utility. It is one thing to note the diseases, mortality, and climate of Greenock and of Aberdeen, and to note the special features of each; *that* might, should, and doubtless would, lead to useful inferences; but if the diseases, mortality, and meteorology of all the towns are averaged, we believe almost all the instructive features would be obliterated, and we are certain that this is the case with their meteorology as quoted in the first part of the work before us.

The second article is quite different; it is a monograph of the Hyperborean storm of October 2nd and 3rd, 1860, which is treated in a most able and complete manner. Some of the incidental remarks in the introduction are quite in Prof. Smyth's happiest vein, as, for instance, where he contrasts the liberality of all other national bodies, and even of private individuals, in supplying meteorological information with the demands for payment and recognition made by the Meteorological Committee; and when he recounts the history of the storm signals instituted by Admiral FitzRoy, and their stoppage by the Meteorological Committee when they took charge, or became as Prof. Smyth puts it, "the new tenants of Admiral FitzRoy's rooms." Another most amusing chapter which is headed, "Of a Bill sent in by the Richly Endowed office in London, to a Poor Voluntary Society in the Provinces," contains many plain truths put in a manner which may be inferred from its title.

JANUARY, 1873.

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.		In shade	On grass.
				Dpth	Date.		Deg.	Date.	Deg.	Date.		
inches	inches.	in.	Dpth	Date.	Deg.	Date.	Deg.	Date.	In shade	On grass.		
I.	Camden Town	2.44	+	.49	.44	4	18	53.9	4	28.4	25	10 11
II.	Maidstone (Linton Park)	2.69	+	.63	.55	19	21	56.0	11	28.0	28	11 ...
III.	Selborne (The Wakes)	5.39	+	2.12	1.01	9	20	55.0	11	20.0	20	10 12
IV.	Hitchin	2.80	+	.66	.65	3	17	51.0	4†	24.0	27	13 ...
V.	Banbury	2.45	+	.36	.58	18	17	55.0	18	24.5	25	12 ...
VI.	Bury St. Edmunds (Culford)	1.91	+	.04	.46	4	17	54.0	14	24.0	24	12 15
VII.	Bridport	3.88	+	.69	.45	4	22	54.0	10	25.0	25	9 ...
VIII.	Barnstaple	5.43	+	1.91	.93	18	23	55.0	9	30.0	25	... ..
IX.	Bodmin	8.52	+	3.33	1.08	25	23	53.0	4, 10	31.0	21	3 8
X.	Cirencester	3.72	+	.72	.77	18	18	...	...	...	...	... ..
XI.	Shiffnal (Haughton Hall)	2.37	+	.47	.41	18	18	52.5	13*	23.0	25	15 ...
XII.	Tenbury (Orleton)	3.29	+	.76	.64	4	20	56.3	14	22.5	29	11 13
XIII.	Leicester (Wigston)	1.61	—	.37	.37	21	14	54.0	10†	22.0	20	14 ...
XIV.	Boston	1.90	+	.19	.57	18	15	55.0	14	22.0	21	11 ...
XV.	Grimsby (Killingholme)	2.11	...	...	.48	4	13	53.0	4†	26.0	21**	7 ...
XVI.	Derby	2.04	+	.25	.56	4	14	55.0	14	24.0	21	10 ...
XVII.	Manchester	3.14	+	.62	.50	3	21	...	...	...	...	... ..
XVIII.	York	2.12	+	.54	.39	4	13	51.5	10	17.0	21	11 ...
XIX.	Skipton (Arncliffe)	8.90	+	3.26	.82	13	22	50.0	14	16.0	24	11 ...
XX.	North Shields	1.02	—	1.09	.18	15	21	54.6	13	26.3	21	8 11
XXI.	Borrowdale (Seathwaite)	28.64	+	12.28	3.85	13	21	...	...	...	...	... ..
XXII.	Cardiff (Ely)	5.35	+	1.61	.83	18	22	...	...	...	...	... ..
XXIII.	Haverfordwest	7.88	+	2.83	1.03	27	25	52.2	8	32.0	20††	2 11
XXIV.	Rhayader (Cefnfaes)	5.64	+	1.12	.79	8	19	51.0	...	20.0	...	... ..
XXV.	Llandudno	5.81	+	3.27	.51	2	22	54.9	14	28.4	29	4 ...
XXVI.	Dumfries	6.44	+	1.84	.70	18	22	53.0	13*	22.5	25	9 5
XXVII.	Hawick (Silverbut Hall)	5.62	...	...	1.02	18	24	...	...	...	...	... ..
XXVIII.	Kilmarnock (Annanhill)	5.41	...	...	.85	16	23	52.0	7††	13.0	21	9 ...
XXIX.	Castle Toward	7.77	+	1.48	1.25	14	24	53.0	6§	...	...	8 ...
XXX.	Leven (Nookton)	3.69	+	.82	.84	16	21	52.0	6§	21.0	29	11 27
XXXI.	Stirling (Deanston)	6.67	+	1.95	.92	13	24	51.0	8	15.2	25	13 22
XXXII.	Logierait	5.44	...	...	.70	26	21	50.0	15	17.0	24	14 ...
XXXIII.	Braemar	4.48	+	1.35	.76	18	23	51.1	14	18.0	22	14 23
XXXIV.	Aberdeen	2.70	...	...	.59	16	20	54.2	14	28.3	25	8 23
XXXV.	Inverness (Culloden)	1.52	—	.76	.44	13	19	50.0	8	28.8	25	4 26
XXXVI.	Portree	12.73	—	.36	1.62	6	27	...	...	...	...	... ..
XXXVII.	Loch Broom	6.81	...	...	1.14	10	21	...	...	...	...	... ..
XXXVIII.	Helmsdale	2.07	...	...	.42	6	19	...	...	...	...	... ..
XXXIX.	Sandwick	3.52	+	.23	.45	4	25	51.1	14	29.3	20	4 15
XL.	Caherciveen Darrynane Abbey	7.79	...	...	.94	23	30	...	...	...	...	... ..
XLI.	Cork	9.70	...	...	1.58	15	20	...	...	...	...	... ..
XLII.	Waterford	8.02	+	3.16	1.60	16	28	52.0	13	26.0	21	6 ...
XLIII.	Killaloe	7.72	+	2.86	1.02	15	26	53.0	12†	16.0	21	10 19
XLIV.	Portarlinton	4.32	+	.31	1.02	16	31	52.0	7	23.0	20	8 ...
XLV.	Monkstown	3.37	—	.02	1.00	15	21	54.0	13	23.0	24	9 ...
XLVI.	Galway	7.13	...	...	.84	4	26	53.0	8, 12	15.0	21	7 ...
XLVII.	Bunninadden (Doo Castle)	5.01	...	...	...	...	...	...	...	...	...	... ..
XLVIII.	Waringstown	3.93	...	...	.53	18	22	54.0	14	23.0	20	10 21
XLIX.	Edenfell (Omagh)	4.69	...	...	.51	25	23	51.0	13	17.0	20	18 ...

*And 14. †And 11, 14. ‡And 13, 14. §And 7, 14. ||And 31. ¶And 29. **And 25. ††And 24. ‡‡And 8, 15.

+ 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 PARK.—First 20 days mild and often wet, then slight frost set in, getting sharper towards the end, but no S. Bar. very low on 19th, 20th, 21st, and 22nd, with T and L on night of 20th. The highest winds on 4th and 19th, but not very high. It is, however, singular that no frost occurred from Dec. 13th to Jan. 21st, a period of 38 days! Winds mostly S.S.W. and W. to 23rd, after which they were mostly E. Very little sun during the month, and still less fog.

SELBORNE.—Tempestuous night on 1st, wind from N.W.; H and L in evening of 2nd. Violent hailstorm at 2 p.m., L in morning, T in evening of 3rd. Prevailing winds after the 1st, S.W. to the 22nd, afterwards variable, but inclined to S.; on 17th it changed for about an hour to N. Bar. fell on 19th in evening to 28·53 (corrected), and so continued all day on the 20th, a lower reading than I ever remember; S in early morning, L at night, and white frost on the following morning; fog on 4 days during the last week. On the whole a tempestuous month.

HITCHEN.—L on 3rd and 19th. 19th the lowest reading of the bar. since I first kept a record in 1849.

BANBURY.—High wind on 1st, 2nd, 4th, 9th, 18th, 19th, and 26th; S, T and R on 20th. Bar. at 8 p.m., 27·974 at 32°; heavy fog on 25th.

CULFORD.—Mild weather until the 20th, when a change took place, the weather becoming colder, and so continuing until the end of the month. S fell slightly on the 20th, and at night T was heard and L seen.

BRIDPORT.—South-westerly gale on the first five days of the month; south-westerly gale on the evening of the 18th. The bar. fell from 9 a.m. on 19th to 9 a.m. on 20th 14 in.; lowest reading 28·50 at 8 p.m. on 20th; sleet on the 29th. slight S here on the 30th, six miles distant it was 1 foot deep; a little L on 3rd and 19th.

BODMIN.—A heavy southerly gale on 18th; R, H, and S on the 19th, and a severe TS, with hail-squalls at 4.55 a.m. on 20th. Bar. 28·48 on 20th; mean temp. 43° or ·5 above the average.

CIRENCESTER.—The bar. (Aneroid) on the 19th lower than seen for several years, 27·8 (uncorrected); although the weather improved, the bar. remained stationary, indicating something unusual; on a previous occasion this continued lowness of the bar. was a forerunner of snow, and such was also the case this year.

HAUGHTON HALL.—The new year began (as the old one finished) with persistent rain, which fell every day with two exceptions (6th and 10th) till the 14th. On the 18th it set in again for five days, mixed with sleet on the 19th and 20th, and accompanied by the lowest bar. for years (28·08). On 23rd a drier change took place, which lasted (except on 26th) till the close. To the 18th the temp. was mild, max. ranging from 45° up to 53°, from which day it never exceeded 41°, and frost took place nightly; on those of 24th and 28th; temp. fell to 23°. TS at 8 a.m. and another at 2 p.m. on the 3rd; prevailing winds N.W. to S. till 26th, when it changed to E. and S.E., till the close. Aconite in flower on 9th, snow-drops white on 10th, hazel catkins fully out on 13th, nettles showing on 14th, snowdrops open on 17th; throstle sings daily till 18th.

ORLETON.—A very stormy and rainy month, rivers very full, and floods on the 5th; land very wet, very little sun; T heard on 2nd, 3rd, and 20th; L seen on 2nd, 3rd, and 19th; great winds on the 3rd, 9th, 13th, 18th, and 19th. On the morning of the 20th the bar. fell to 28·26, and remained stationary for many hours. Temp. of first 16 days much above the average, that of the last 15 days much below. Mean of the month 33° above the average.

WIGSON.—The first fortnight temperature much above the mean for the month, the last ten days much cooler and frosty. 18th, very stormy, with L and H. 19th, much L in the evening. Bar. unusually depressed, 19th to 22nd inclusive.

BOSTON.—Temp. 3°·3 above the average; from the 21st Dec. to 19th Jan. mean temp. 44·7 or 8°·3 above mean of previous 9 years; during the whole of this

time the wind blew from the S.W., it then changed to N., bringing with it a sharp frost, the ther. falling on 21st to 22°; it remained cold to the end of the month, this being more sensible owing to a sharp E. wind. Bar. on the whole steady, but on the 19th a very remarkable depression without apparent cause. 16th, 30·00; 17th, 29·95; 18th, 9 a.m., 29·80, during the night it fell to 28·70 (1·10 in. fall), at the time strong gale of wind from S.W., with heavy rain. 19th, mercury remained steadily at 28·70; day very fine, with sunshine, and moderate wind from S.W., during the night it again fell, and on the morning of 20th stood at 28·44, the day being fine, frosty, with S.W. wind; about 11 a.m., it began gradually to rise again. This is the lowest reading for some years, except on 24th January, 1872, when the reading fell to 28·20. Tides very high at the latter part of the month, and springs held up much longer than usual.

GRIMSBY.—Some very mild and spring-like weather at the beginning of the month, much colder from the 18th to the end. Several gales (especially during the night) in the early part of the month; some very beneficial frosts succeeded. Gale, with T and L on 3rd. Aconite in flower, and blackbird whistling on the 8th, snowdrop in flower on 14th, many blackbirds whistling on 17th. Bar. fell to 28·35 at 10.25 p.m. on 19th.

DERBY.—This month has been remarkable for its varied barometric pressure; on the 20th it fell to 28·25, not merely the lowest of the month, but on two occasions only during the last 20 years has it fallen below this point. Temp. 3°·5 above the average.

ARNcliffe.—TS on 19th; aneroid fell to 27·00.

NORTH SHIELDS.—T on 4th, aurora on 5th, S and L on the 19th.

SEATHWAITE.—TS on 5th, and again on 19th, T on 7th.

W A L E S.

HAVERFORDWEST.—Up to the 20th not one fine day; a very wet month. Mild for January, although about the 18th the weather was very wintry, the hills covered with S, and there was a heavy TS with H. From the 27th to the end of the month was dry, cold, and very wintry, with a bitter E. wind; the month was also characterized by constantly recurring heavy gales, and great depression of barometer.

CEFNFAES.—The early part of the month wet, damp, and cloudy, with heavy fogs; the last nine days S, with frost. Prevailing wind S.E.

LLANDUDNO.—Gale in night of 2nd, and TS with H between 10 and 11 a.m. on 3rd; stormy, with hail showers, on 18th; TS, with S on 19th, H also on 20th, and 24th; snowdrops in flower on 13th, mezureum on 24th, and primroses on the 25th.

S C O T L A N D.

DUMFRIES.—Rain every day to the 20th, with frequent storms and heavy floods; the latter end of the month frosty; S on the 5th, 19th, and 20th. Both rainfall and temp. above the average for January.

HAWICK.—A very wet month; terribly stormy on the 18th, when the hills got covered with a thick sheeting of S, which they retained till the 29th.

ANNANHILL.—L on 2nd, T on 4th, H and S on 19th and 20th. Several fogs occurred in the month, and on the 20th a curious white vapour arose from the snow, evidently an exhalation caused by the excessive saturation of the ground from the heavy rainfall of 1872. Generally calm, but strong S.S.W. gale on 2nd and 3rd (66 miles miles per hour). Parish unusually healthy.

CASTLE TOWARD.—A cloudy and showery month, not one day without rain from the 1st to the 21st. Extremely high tides on the 3rd along canal shores; Prevailing winds S.W. to 21st; the latter part of the month rather frosty, with a few sunshiny days. On 19th a heavy fall of S, but the previous moist state of the ground prevented it from accumulating to any great depth. On Sunday evening, 19th, there were a number of fire flashes seen in the sky. [? Ed.] Cattle and sheep healthy; snowdrops in full bloom, and rhododendrons in the open air.

DEANSTON.—The first half of the month very wet, stormy, gloomy, and unfit for out-door work. Fall of four inches of S on 20th, which lay on the ground about a week, during which we had some hard frosts. Wind since generally easterly, and the weather more settled and dry, but very cold, and little sunshine.

ABERDEEN.—Mean bar. and rainfall below the mean of last 16 years; temp. above the mean; min. bar. 28·185 in. (corrected for temp. and sea level) on 19th; max. temp. in sun 70° on 24th, and min. on grass on 25th only 20°. L on 1st, 19th, 20th, and 29th; frequent frost and aurora. Except January, 1869, the past month was the mildest January for 17 years. A fine and comparatively dry month.

CULLODEN.—Min. bar., at midnight of 19th, 28·012, corrected to 32°.

LOCHBROOM.—A singular month of frost, floods, snow, and storms of hail, rain drift, T and L, with intense cold.

PORTREE.—Stormy and wet month, frequent gales. Very severe black frost on 29th, on to the end of the month. Sheep and cattle healthy.

SANDWICK.—January has been drier and 0°·8 warmer than the mean of the previous 46 years. On 19th the bar. stood lower than it has done for a number of years, 28·042, corrected for index error, but the weather during that and the following days was calm and fine; here, however, there were evident symptoms of a storm on the Atlantic, as it was in great fury on the two following days; gales on 8th, 14th, 15th, 26th, and 28th; T and L on 13th, and aurora on 10 nights.

I R E L A N D.

WATERFORD.—A very vivid flash of L and long and loud T on 11th; sheet L on 18th, S on 20th and 21st.

KILLALOE.—The wettest January in 27 years.

MONKSTOWN.—Bar. very low on 19th, weather moderate.

DOO CASTLE.—Wet month, unfit for outside employment; great scarcity of fuel, which is beginning to be felt most severely.

WARINGSTOWN.—Continuously wet until the last week, when easterly winds setting in we had some dry days.

OMAGH.—Up to 19th weather mild, at times unnaturally so; last ten days seasonable; ground so saturated as to cause a suspension of all tillage operations.

FREEZING RAIN.

To the Editor of the Meteorological Magazine.

SIR,—We had a remarkable instance of freezing rain on Sunday afternoon (Feb. 2nd); during the previous night and early morning a deep snow-fall took place (·64 in. when melted), with a bitter easterly gale (min. temp. 28°·3); during Sunday temperature ranging from half a degree above to half a degree below 32°, wind strong, varying E.N.E. to E.S.E., then N.E., snow ceased towards noon, then small hail fell, resolving into a dribbling thin rain, which froze on the trees to the very tops till they were covered most beautifully in a coat of ice. I never saw such a beautiful sight before. There was a thaw and yet not a thaw, if you can understand; it seemed thawing on ground but freezing above, yet the temperature was just *above* the freezing point at 4 feet. The noise produced by the tree branches rubbing together in the gusty wind was most peculiar, like gaunt skeletons rattling together, or a hail-storm just commenced, a crackling rattle. The barometer fell very low, rose again by Tuesday to a point a little above what it read when the fall began, and yet a thaw immediately followed; since then travelling has been in slush. Lowest temperatures registered here, January 25th, min. air, 26°, grass 15°·2.

Yours truly,

F. EKLESS.

Woolston Lodge, Southampton, Feb. 6, 1873.