SYMONS'S

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BAROMETRIC DEPRESSION OF DECEMBER 8TH-9TH.

The greatest barometric depression of modern times naturally claims notice in these pages. According to the Daily Weather Reports the centre passed from the N. of Ireland, across Lanark and over the Firth of Forth out to the North Sea. Therefore, obviously, the lowest readings will come from our friends in the north of England and of Ireland, and from central Scotland.

In the present article I purpose combining two separate aspects of the phenomenon—

I.—*The recent depression in London as compared with previous ones.*

My own observations have now been continuous since 1858, and happily I have been able to watch carefully every important depression. The instances in which the pressure at sea-level has fallen below 28·7 inches are as follows :—

1859	Dec. 26	6.0 a.m.	28·629	*1876	Dec. 4	11.0 a.m.	28·364
1866	Feb. 11	4.30 p.m.	·606	1877	Nov. 12	0.10 a.m.	·693
*1872	Jan. 24	4.47 a.m.	·332	1880	Nov. 16	2.30 p.m.	·695
*1873	Jan. 20	1.0 a.m.	·447	*1884	Jan. 26	7.30 p.m.	·529
*1876	Mar. 12	0.30 p.m.	·447	*1886	Dec. 9	4.45 a.m.	·295

Of these, the six instances marked with a (*) are below 28·6, and therefore may be regarded as the most important. The annexed diagram not only shows these depressions as respects the lowness of the points reached, but also as regards the time of their occurrence, the duration of the low pressure, and the details of each. Nothing could render more evident the important nature of the recent depression. Like Aaron's rod, it swallows up all the others.

If now we seek for records before my observations began, we find in a very useful table of low sea level pressures at Greenwich from 1811 to 1884 given by Mr. Marriott in the *Quar. Jour. R. Met. Soc.*, vol. x.—p. 121, only three instances of lower pressures in London or its immediate vicinity, viz. :—

1814	.....	Jan. 29	.....	5 p.m.	.....	28·233
1821	.....	Dec. 25	.....	5 a.m.	.....	28·016
1843	.....	Jan. 13	.....	0·53 p.m.	.....	28·266

These values show how rare is such a pressure as 28·295 in the vicinity of London. I am inclined to think that the values in Table II. are nearly all equally exceptional for their respective localities, for even in Scotland, where the barometric range is much greater than in England, there are very few cases of sea level pressures of less than 28 inches. But there was one altogether exceptional case on Jan. 26th, 1884, when, as stated by Mr. Buchan, "the sea level pressure at Ochtertyre, Perthshire, at 9·45 p.m., fell to 27·333 inches, being absolutely the lowest hitherto observed by man anywhere on the land surfaces of the globe.

II.—*The depression in various parts of the United Kingdom.*

It is impossible, in these pages to print one-tenth of the communications upon this subject, with which I have been favoured. I have inserted in Table I. a few of the records which I believe to be all from verified instruments, and with all corrections applied, and which, either from their lowness, their continuity, or their geographical position seemed of most importance. The lowest pressure at any exact hour is shown by heavy type, and italic type is used for a few readings not made precisely at the hour but computed by interpolation. The stations are arranged according to the absolute minimum, *i.e.*, the lowest pressure occurred at the station first named.

TABLE I.—*Sea Level Pressure for each hour, December 8th-9th*, 1886.

	Belfast.	Newton Reigny.	Leith.	Meltham.	Hull.	Neston.	Hillington	Beckford.	Camden Square.
	in.	in.	in	in.	in.	in.	in.	in.	in.
9 a.m...	*27·89*	28·166	28·081	28·297	...	28·317	28·525	28·48	28·628
10 a.m...	·83	·130	·060	·270	28·30	·298	*·444*	...	·596
11 a.m...	*·72*	·080	28·011	*·237*	...	·263	*·410*	...	·562
Noon ...	·59	28·011	27·959	*·208*	28·30	·191	*·390*	...	·530
1 p.m...	·44	27·975	·909	·155	...	·125	*·362*	...	·486
2 ...	**·39**	·860	·855	·090	28·20	*28·048*	*·335*	...	·470
3 ...	...	·756	·796	28·005	...	27·960	*·287*	28·311	·450
4 ...	...	·687	·729	27·959	28·10	·913	·259	·283	·424
5 ...	...	·625	·707	·914	...	*·864*	·237	·243	·400
6 ...	...	·597	·675	·859	28·00	·832	·201	·203	·384
7 ...	...	·578	·660	·825	...	**·829**	·143	·181	·353
8 ...	...	**·566**	**·656**	**·794**	27·89	*·877*	·103	**·157**	·333
9 ...	...	·581	·671	**·794**	...	·902	·084	·159	·323
10 ...	...	·663	27·707	·837	27·85	·944	**·062**	·163	**·313**
11 ...	...	·706	...	27·884	**27·818**	27·971	**·062**	28·183	·314
Mid. ...	...	·764	...	...	27·90	28·000	28·082	...	*·320*
1 a.m...	...	·824	...	...	...	·021	...	...	·319
2 ...	...	·870	...	...	27·95	28·059	...	...	·320
3 ...	...	·921	...	...	...	...	...	...	·316
4 ...	...	27·975	...	...	27·97	...	...	...	·313
5 ...	...	28·028	...	...	...	...	...	..	·302
6 ...	...	·069	...	...	28·05	...	...	28·280	**·298**
7 ...	...	·124	...	...	...	...	...	...	·314
8 ...	...	·166	...	...	...	28·357	28·215	28·370	·350
9 a.m...	...	28·242	...	28·230	28·30	...	28·261	...	28·416

TABLE II.—*Absolute Minimum Sea Level Pressures.*

Belfast	F. M. Moore, Esq.	8th	1·30 p.m.	27·38
Aghalee, Lurgan	Lancelot Turtle, Esq.	8th	0·30 p.m.	27·436
Cronkbourne, I. of Man	A. W. Moore, Esq.	8th	3·30 p m.	27·555
Newton Reigny, Penrith	T. G. Benn, Esq.	8th	8 p.m.	27·566
Whitehaven	T. Gordon, Esq.	8th	5·25 p.m.	27·567
Leith	Messrs. Bolam & Redpath	8th	7·30 p.m.	27·651
Heaton, Bolton	J. Watkins, Esq.	8th	8 p.m.	27·74
Meltham, Yorks	C. L. Brook, Esq.	8th	8–9 p.m.	27·794
Larden Hall, Much Wenlock	Miss F. H. Rouse-Boughton	8th	8 p.m.	27·99
Hull	Harold Smith, Esq.	8th	11 p.m.	27·818
Thelwall, Warrington	T. G. Rylands, Esq.	8th	6·45 p.m.	27·820
Neston, Cheshire	Reginald Bushell, Esq.	8th	6·28 p.m.	27·821
Hillington, Norfolk	Rev. H. Ffolkes	9th	10–11 p.m.	28·062
Beckford	F. Slade, Esq.	8th	8–8½ p.m.	28·157
Haverfordwest	E. P. Phillips, Esq.	8th	5·30 p.m.	28·209
Berkhampstead	E. Mawley, Esq.	8th	6 a.m.	28·275
Camden Square	G. J. Symons, Esq.	8th	10 p.m.	28·313
		9th	4.45 a.m.	28·295

The velocity of the wind around a barometric depression is proportional not to the lowness of the pressure, but to the gradient (the steepness of its sides) *i.e.*, to the difference of pressure between places comparatively near. This is the reason for that which has puzzled many persons, viz., the not exceptional force of the gale on the 8th. Of course we all know that there was a very heavy gale, but it was certainly not the strongest for 40 years, not strong proportionately to the depression which made such fun of many "domestic" barometers, the wheel ones going round the wrong way till they read "Set Fair 31·0" and in some of the upright ones the mercury disappeared entirely, while in the majority the verniers became useless except where (as was done by some ingenious persons) they were used from the wrong end.

It will be noticed that there was a double minimum in London, which extended across the S. of England. I append a few extracts from letters. A later one will be found on page 172.—G. J. SYMONS.

At 11.40 on the night of the 7th, the mercury stood at 29·304. By 11.45 a.m. it had fallen to 28·207, showing a fall of 1·097 in. in 12 hours.

The wind did not amount to more than a fresh breeze until noon, when it strengthened, and in the afternoon there was a gale, with frequent squalls and rain. The direction was the same throughout the day, about W.S.W.

The minimum pressure (27·821 in.) was recorded during a heavy squall at 6.28 p.m., after which time the mercury rose very slowly.

At 1·58 a.m. on the following morning (December 9th) there was a remarkably vivid flash of lightning, followed immediately by thunder.

The Barometrical readings were taken from a large verified Standard Barometer, by Hicks, of Hatton Garden; they are all corrected, and reduced to 32° Fahr. at mean sea-level. Barometer cistern, 144 ft. above mean sea level.

REGINALD BUSHELL.

Hinderton Lodge, Neston, Cheshire, December 9th, 1886.

Tuesday, the 7th Dec., the weather was fine at times, but at 6 p.m. a heavy squall of hail and wind occurred, the sky clearing for a short time. As night advanced the, weather became worse and heavy rain fell. Barometer, 9 p.m., 29·444. Rainfall, 9 a.m. December 8th, ·83 in.; blowing very fresh, at times very squally, with hail. The weather became worse and more serious every hour; a terrible squall of hail and rain occurred about noon, with very low temperature. About 4 p.m. the wind was awful; at this time a large brick chimney, 14 feet in height, above, the roof of a house in Market-street fell, and demolished the plate glass front of Greenish and Dawkins's, Market-street. Sad havoc took place with the roofs of houses, ten fine elms of 150 years growth succumbed, hedge and all, during the succeeding hours of the evening. A very fine old elm, believed to be more than two centuries old, fell with a fearful crash, (8 p.m.) narrowly escaping demolishing a house just opposite it. The damage done in the country is immense; 1000 trees are estimated to have fallen at Picton, 300 at Withybush, and lesser numbers at numerous other places. Without doubt this is one of the greatest storms in living memory; it is thought that no such gale has visited Milford during the last 70 years!

Barometric readings during the storm, 8th December, corrected for temp., reduced to M. S. L. :—

9.30 a.m.	28·462
1.30 p.m.	28·356
2.30 p.m.	28·288
4.25 p.m.	28·215
5.30 p.m.	28·209
9.15 p.m.	28·265

No considerable variation took place from this last reading for several hours; about 3 a.m. (9th) an aneroid by my bedside registered 28·430; in the morning it still blew with terrific violence at times.

EDWARD PICTON PHILLIPS.

Haverfordwest.

The storm swept across the Isle of Wight with terrible fury. Near Freshwater a toll-gate was blown down, and at Rookley the "Checkers Arms" public-house shared a like fate. The booking office of Merston railway station was literally swept off the platform, tickets and papers being carried over fields to the village.

Early on Wednesday morning I found that at this altitude pressure was lower than the range of Richard's Barograph and it became necessary to start hourly readings of the Kew Barometer, which I kept up till 9 p.m. on the 9th, thus making 40 consecutive hourly readings. There was certainly only *one min.* here, which occurred *exactly at 8 p.m.* on December 8th. Of this I can speak with confidence, for when it became evident that the min. was to be unusually low I set the vernier *every 10 minutes* between 4 p.m. December 8th and 1 a.m. December 9th. When once the rise began it continued without interruption.

We certainly had a fair amount of wind, but not at all serious, indeed quite insignificant beside the great storm of January 26, 1884.

Robinson's Anemometer gave 550 miles between 9 a.m. December 8th and the same hour on the 9th.

THOS. G. BENN.

Newton Reigny, Penrith.

THE CAUSE OF THE VEERING OF THE WIND.

To the Editor of the Meteorological Magazine.

SIR,—I suppose no one doubts that the reason why, in stormy weather in these islands, the wind more frequently veers than backs is that the paths of cyclonic centres lie more frequently in the north than in the south. The difference between Mr. Backhouse and myself is as to whether the same explanation can be applied to the prevalence of veering over backing which we both believe is observable in settled weather. I think it can be so applied. But in applying it to the case of the alternation of land and sea breezes, it is not necessary to suppose that a distant centre in the north is able of itself to cause the wind to veer through half the compass. If it should operate to the extent of a few points only, it would, as it seems to me, be sufficient to bring about the result that an easterly wind in becoming westerly would change more frequently through the south than through the north, and that a westerly wind in becoming easterly would change more frequently through the north than through the south.

My own observations, with a study of the published charts, have led me to believe that the influence of cyclonic systems in determining

the direction of the wind extends far beyond the region of unsettled weather, and I am inclined to think that the so-called anti-cyclones are best regarded as but inter-spaces between cyclones, the supposed *direct* circulation of the air within an anti-cyclone being, in my view, nothing more than the combined result of the *retrograde* circulations belonging to the surrounding cyclones.

Possibly it might be more philosophical to explain the veering of the wind in every case directly by the rotation of the earth, which doubtless lies at the root of the whole matter; but if this be granted, it need not on that account be incorrect to refer each individual instance to some particular cyclonic system.

In the foregoing remarks I have used the term "cyclone" in its most comprehensive sense. Originally the word conveyed the idea of a destructive West Indian hurricane, but the progress of meteorology has made it convenient to include under the same name all systems of circulation of air about a centre of barometric depression. When words change their meaning it is well to take note of the fact.

GEORGE F. BURDER, M.D.

Clifton, 1st Dec., 1886.

ROYAL METEOROLOGICAL SOCIETY.

The first meeting of this Society for the present session was held on Wednesday evening, Nov. 17th, at the Institution of Civil Engineers, 25, Great George-street. Mr. W. Ellis, F.R.A.S., President, in the chair.

The following gentlemen were elected Fellows, viz:—Messrs. B. A. Dobson, T. Gordon, H. Mantle, F. Wright, and the Rev. J. Watson.

The papers read were:—

(1) "The Gale of October 15th-16th, 1886, over the British Islands," by Mr. C. Harding, F.R.Met.Soc. The storm was of very exceptional strength in the west, south-west, and south of the British Islands, but the principal violence of the wind was limited to these parts, although the force of a gale was experienced generally over the whole kingdom. The storm appears to have been formed about 250 miles to the south-east of Newfoundland on the 12th, and was experienced by many ocean steamers on the 13th. When the first indication of approaching bad weather was shewn by the barometer and wind at our western outposts, the storm was about 500 miles to the west-south-west of the Irish coast, and was advancing at the rate of nearly 50 miles an hour. The centre of the disturbance struck the coast of Ireland at about 1 a.m. on the 15th, and by 8 a.m. was central over Ireland. The storm traversed the Irish Sea and turned to the south-east over the Western Midlands and the Southern Counties of England, and its centre remained over the British Isles about 34

hours, having traversed about 500 miles. The storm afterwards crossed the English Channel into France. It subsequently again took a course to the north-eastwards, and finally broke up over Holland. In the centre of the storm the barometer fell to 28·5 in., but, as far as the action of the barometer was concerned, the feature of principal importance was the length of time that the readings remained low. At Geldeston, not far from Lowestoft, the mercury was below 29 in. for 50 hours, and at Greenwich it was similarly low for 40 hours. The highest recorded hourly velocity of the wind was 78 miles from N.W. at Scilly on the morning of the 16th, but on due allowance being made for the squally character of the gale, it is estimated that in the squalls the velocity reached for a minute or so the hourly rate of about 120 miles, which is equivalent to a pressure of about 70 lbs. on the square foot. On the mainland the wind maintained a velocity of about 60 miles an hour for a considerable time, but without question this velocity would be greatly exceeded in the squalls. In the eastern parts of England the velocity scarcely reached 30 miles in the hour. The gale was very prolonged. At Scilly the velocity was above 30 miles an hour for 61 hours, and it was above 60 miles for 19 hours, and at Falmouth it was above 30 miles an hour for 52 hours. The erratic course of the storm and its slow rate of travel whilst over the British Islands was attributed to the presence of a barrier of high pressure over northern Europe. The rainfall in Ireland, Wales, and the south-west of England was exceptionally heavy. In the neighbourhood of Aberystwith the fall on the 15th was 3·83 in., and at several stations the amount exceeded 2·00 in. Serious floods occurred in many parts of the country. A most terrific sea was also experienced on the western coasts, and in the English Channel, and the number of vessels to which casualties occurred on the British coasts during the gale, proves its violence. The total number of casualties to sailing vessels and steamships was 158, and among these were 5 sailing and 1 steam ship abandoned, 5 sailing and 1 steam ship foundered, and 42 sailing and 2 steam ships stranded.

(2.) "The Climate of Carlisle," by Mr. T. G. Benn, F.R.Met.Soc. This is a discussion of the observations made at the Carlisle Cemetery. The mean temperature for the 23 years 1863—85 was 47°·5 ; the absolute highest was 95°·0 on July 22nd, 1873, and the lowest —5°·5 on January 16th, 1881. The mean annual rainfall was 29·80 in. ; the greatest monthly fall was 7·84 in. in July, 1884, and the least 0·30 in. in January, 1881. The average number of rainy days was 174.

(3.) "Results of Hourly Readings derived from a Redier Barograph at Geldeston, Norfolk, during the four years ending February, 1886," by Mr. E. T. Dowson, F.R.Met.Soc.

(4.) "Results of Observations taken at Delanasau, Bua, Fiji, during the five years ending December 31st, 1885, with a summary of results for ten years previous," by Mr. R. L. Holmes, F.R.Met.Soc.

THE RECENT SUMMER AND THE WEATHER CYCLISTS.

To the Editor of the Meteorological Magazine.

SIR,—With reference to Mr. Ryves's letter, p. 148 in the last issue of the *Meteorological Magazine*, I beg leave to remark that although the recent summer cannot be said to have been hot all over the country, it has been considerably warmer than the average in and near London.

The temperature of the "summer" quarter (July—September) at the Royal Observatory, Greenwich, was 61°·2, and 1°·5 and 0°·7 warmer than the averages of the last 115 years and 45 years respectively, each month being above its average. The mean daily maximum temperature was also higher than the average in each month of the quarter.

Although at Greenwich the highest "shade" temperature did not reach 90°·0, it rose above 89°·0 on three days, viz :—

On July	6, max. was	89°·8
,, July	7, ,,	89 ·5
,, Aug.	31, ,,	89 ·1

Temperatures exceeding 87°·0 (the maximum given by Mr. Ryves) occurred on several days.

I consider, therefore, that in London and the neighbourhood Mr. Brumham's predictions of "spells of excessive heat" have been fully verified.—I am, Sir, yours truly,

G. T. GWILLIAM.

35, *Lansdowne-crescent, W., Nov.* 23.

SIR,—I have just read Mr. Ryves's letter in your Magazine, and find his remarks as to the temperature of the past summer at variance with my own observations, supposing that he includes this district in the "North-West of England." I send a statement of the mean temperature of every month of this year, to the end of October, and also the means for the last 14 years.

I entirely agree with the remarks in his last paragraph as to cyclist predictions, and also with his statement that we have had few or no days of exceptional heat this year.—Yours, &c.,

S. KING.

Elswick Lodge, near Poulton-in-the-Fylde.

	Mean of 14 years.	1886.	Difference.
January	36°·9	34°·3	−2·6
February	38 ·4	34 ·3	−4·1
March	40 ·0	38 ·2	−1·8
April	45 ·3	45 ·6	+ ·3
May	49 ·4	49 ·9	+ ·5
June	55 ·2	55 ·9	+ ·7
July	58 ·2	59 ·0	+ ·8
August	57 ·8	59 ·5	+1·7
September	53 ·3	55 ·0	+1·7
October	46 ·3	50 ·4	+4·1

To the Editor of the Meteorological Magazine.

SIR,—In my letter published in your June number, I predicted that "the summer of this year" should resemble that of "17 years ago;" that it ought, for that reason, among others, "to give us some periods of excessive heat;" and, that the summer should be "a warm one of long duration like that of 1869" (when the hot weather continued until the 13th October, and the summer lasted, according to the Greenwich report, until the 16th of that month, as it did this year). I said, too, that "the summer of 1801 was very hot in August and September" (Mr. Ryves, in his letter to you, omits any allusion to September and limits the summer to the usual "thirteen weeks"), and that, excessive heat returned, "after an interval of 17 years—in 1818, 1835, and 1852." I may here remind your readers that the cycles of 68, 136, and 425 years, to which I referred in my letter, are all multiples of 17. I also said that "we ought to have some waves of very great heat during the summer" (I did not say, as Mr. Ryves seems to infer, that the heat waves would be frequent) "notwithstanding the adverse influence of the late severe winter." (Mr. Ryves is, I think, unfair, and omits to notice my reference to this qualifying influence.) The truth is, a cold March, such as we had in 1869 and in the present year, almost always prevents the summer being more than a "warm" one for a long time, with "some periods of excessive heat."

All my predictions were fulfilled. In July the shade heat at Greenwich rose to 89°·8, which is practically 90°·0 (not 87°·0 as erroneously stated by Mr. Ryves), and, according to your Boston observer, the maximum air temperature was as high as 95°·0. On another day in July, the max. temp. at Greenwich was 89°·5. In August, too, a wave of great heat occurred, and the highest shade reading of the thermometer at Greenwich was 89°·1; and on the 1st September the shade temp. there rose to nearly 88°·0. In October we had another wave of excessive heat recorded at Greenwich, when the max. temp. and extreme daily mean temperatures were higher than in any October for, at least, 72 years past.

Now, as the late summer has been a repetition of that of 1869, it follows that, if Mr. Ryves still denies that it was a warm one, he must, at the same time, dispute the assertion of meteorologists, that "a warm summer of long duration" occurred in 1869. Anyhow, the 17 years' cycle theory is vindicated.

"Perhaps the best comment" on Mr. Ryves' criticism is the following statements in parallel columns :—

WEATHER AT GREENWICH,
MARCH TO OCTOBER, 1869.

The summer of 1869 did not terminate until the 16th October.

March was remarkably cold.

In March and April rain fell on 27 days to the amount of 2·4 in.

May was remarkably wet and cold.

June was a very cold month, especially about the 17th and 21st. On two days, however, the max. temp. was over 80°·0. It was also dry.

Total rainfall in May and June, 4·5 in.

Total rainfall in August, 1·21 in.

Total rainfall in July, August, and September, 4·9 in.

In July the max. shade temp. was 90°·9.

In August the highest temp. of the air was 89°·0.

On five days the max. shade readings were above 87·0 during the ordinary summer period (June to August inclusive).

There were 15 days when the max. shade temp. was almost exactly 80°·0 or above during the protracted summer, which lasted up to the 16th October.

There were 42 days when the max. shade temp. was as much as 75°·0 or above, in the period from April to October inclusive.

Mean. temp. of June to September inclusive, about 60°·0.

Mean temp. of July to September inclusive, 61°·5.

Mean temp. of period from June 1st to 13th October, 60°·9.

Mean temp. of period from June 1st to October 16th, 60°·6.

The mean temp. of the first 13 days of October was slightly over 57°·0.

WEATHER AT GREENWICH,
MARCH TO OCTOBER, 1886.

The summer of 1886 did not terminate until the 16th October.

March was remarkably cold to the 19th.

In March and April rain fell on 27 days to the amount of 2·4 in.

May was remarkably wet.

June was a very cold month, especially about the 18th and 21st. On two days, however, the max. temp. was over 80°·0. It was also very dry.

Total rainfall in May and June, 4·7 in.

Total rainfall in August, 1·12 in.

Total rainfall in July, August, and September, 4·9 in.

In July the max. shade temp. was about 90°·0 (89°·8).

In August the highest temp. of the air was 89°·1.

On five days the max. shade readings were above 87°·0 during the ordinary summer period (June to August inclusive). This year, however, the max. temp. was almost 88°·0 on the 1st September.

There were 15 days when the max. shade temp. was above 80°·0 during the protracted summer, which lasted up to the 16th October.

There were 42 days when the max. shade temp. was as much as 75°·0 or above, in the period from April to October inclusive.

Mean temp. of June to September inclusive, 60°·4.

Mean temp. of July to September inclusive, 61°·3.

Mean temp. of period from June 1st to 13th October, 60°·8.

Mean temp. of period from June 1st to October 16th, 60°·5.

The mean temp. of the first 13 days of October was slightly over 57°·0.

Can any rational man really believe that the above-mentioned statements refer only to "mere coincidences"? To me they reveal a recurrence quite as remarkable as I had dared to anticipate, and more convincing than I suppose my critical friend will like to admit.

Is it to be supposed that, as there are lunar-cycles, planetary-cycles, sun-spot-cycles, in fact, cycles almost wherever we look, that there are no weather-cycles? It cannot be so supposed, with any show of reason. If Mr. Ryves could imitate certain ecclesiastical obstructers of science, and could torture me into confessing, on my knees, that the weather did not move in cycles, when I rose to my feet, I should say like poor Galileo, "*E pur se muove.*" For all this, it does move! or, rather: For all this, it does move so!—Yours truly,

GEORGE D. BRUMHAM.

Barnsbury, Nov. 30, 1886.

REVIEW.

Negretti and Zambra's Encyclopœdic, Illustrated and Descriptive Reference Catalogue of Optical, Mathematical, Physical, Photographic, and Standard Meteorological Instruments. Revised and Corrected Edition. Roy. 8vo. London, 1886. X—602 pages.

THIS is in some respects a wonderful book, for it justifies all the adjectives heaped together in the title. We must, however, deal only with the first 175 pages devoted to meteorological instruments, and of course we must say nothing as to either quality or price. Our duty, in fact, is to consider the catalogue from two points—its utility to meteorologists, and its accuracy as a literary and scientific work.

In our opinion, it is a book decidedly useful to meteorologists, and we think that the firm would render a service both to themselves and to meteorologists, if they issued the meteorological part of the catalogue separately, at a low price.

As regards accuracy there is little to complain of, except that the author, following bad precedents, seems sometimes to forget by whom instruments were invented, and claims for the firm designs generally believed to belong to other persons. For instance, on page ii., among the "Inventions and Improvements" claimed for the firm are—

14. Improved Self-recording Barographs, Thermographs, Hygrometers. (See pages 30, 53 to 56, 130.)

But p. 30 is devoted to the Jordan-Ronalds-Beckley Barograph, and we do not know what Negretti & Zambra had to do with its invention; nor can we find any invention of theirs either under *number* 130 or on *page* 130.

Again, on p. 27, under the heading "Negretti and Zambra's Self-Recording Aneroid Barometers," we have an engraving of Richard Frères' portable barograph.

A firm with so grand a record as Negretti & Zambra loses rather than gains by statements like these, and he was no true friend to the firm who put its name on Fig. 28.

The printing is generally both clear and accurate—in fact, the volume is almost an *edition de luxe*, and there are some charming new instruments, *e.g.*, the "turnover" thermometer engraved on p. 78

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, MAY, 1886.

STATIONS. *(Those in italics are South of the Equator.)*	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	TotalRain. Depth.	TotalRain. Days.	Aver. Cloud.
	°		°		°	°	°	0–100	°	°	inches		0-10
England, London	75·3	7	31·6	1	62·9	44·6	43·9	72	115·8	23·7	4·79	19	6·0
Malta	87·0	29	48·0	7	71·9	56·9	55·6	75	140·5	42·7	·55	3	3·4
Cape of Good Hope	84·0	2	37·2	17	68·4	47·8	50·2	86	...	...	2·40	9	4·0
Mauritius	80·3	6	63·0	8	77·3	67·4	61·5	71	129·3	53·8	1·88	19	5·2
Calcutta	100·5	11	68·4	13	93·6	76·9	76·2	77	158·5	66·1	7·93	13	4·1
Bombay	93·5	26	79·0	4	90·7	81·2	76·7	75	148·7	68·9	·96	6	4·3
Ceylon, Colombo	90·8	13	74·8	5, 20	87·0	78·4	75·7	79	147·6	59·7	22·28	21	8·1
Melbourne	76·6	8	32·7	29	61·0	45·0	43·6	72	120·1	23·6	·80	10	6·7
Adelaide	73·5	16	37·7	31	64·8	49·5	44·6	63	131·1	29·3	1·09	16	6·1
Wellington	63·0	12	39·5	26	56·5	47·2	46·8	84	116·0	37·0	10·83	16	6·0
Auckland	67·0	12*a*	46·0	30	62·5	50·8	49·2	76	125·0	35·0	2·39	13	5·5
Jamaica, Kingston	...	...	...	...	...	...	...	...	...	...	...	...	...
Barbados	84·0	var.	69·0	10	83·0	72·0	70·4	75	145·0	...	3·14	18	5·0
Toronto	78·5	22	35·1	17	62·4	43·5	43·1	69	...	25·5	2·44	8	5·0
New Brunswick, Fredericton	74·8	23	30·0	11	62·0	39·6	42·5	73	...	...	3·65	14	5·7
Manitoba, Winnipeg	84·8	27	19·0	6	68·0	38·7	40·4	62	...	...	1·19	15	5·1
British Columbia, Victoria	74·0	25	36·0	1, 4	61·7	44·0	...	...	...	...	·45	6	...

a And 13.

Remarks, May, 1886.

Malta.—Mean temp. 63°·4; mean hourly velocity of wind 8·5 miles; velocity averaged 24 miles per hour from 8 a.m. to noon on 3rd. TS on 1st. J. Scoles.

Mauritius.—Rainfall 3·00 in. and mean temp. 1°·1 below average; pressure ·036 in above average. Mean hourly velocity of wind 13 miles; extremes 26·8 miles on 12th and 2·2 miles on 18th; prevailing direction S.E. by E. C. Meldrum, F.R.S.

Colombo.—TSS on 5 days; T on 6th; L on 12th.
F. H. Clarke, Lt.-Col. R.A.

Melbourne.—Mean temp. of air 0°·5, of dew point 2°·4; rainfall 1 32 in. and humidity 6 below average; mean amount of cloud 0·2 and pressure ·045 in. above average. Prevailing winds N. and W., strong on 7 days; heavy dew on 6 days, hoar frost on 5, L on 1. R. L. J. Ellery, F.R.S.

Adelaide.—Mean pressure considerably above and mean temp. slightly below average; mean amount of cloud about average; rainfall very small, the fall from January 1st to May 31st being the smallest since 1839. C. Todd.

Wellington.—Very showery, unpleasant weather from 1st to 20th; 3·40 in. of R on 14th; strong wind on 15th and 16th, 19th and 20th; remainder of month fine, with wind usually light. Rainfall 6·12 in. and pressure ·079 in. above average; mean temp. 1°·1 below. T and H on 3rd; fog on 9th, 10th, and 11th; slight earthquake on 16th. R. B. Gore.

Auckland.—Early part of the month showery and unsettled; remainder fine, clear, and bright. R considerably below average; mean temp. about average; pressure above it. T. F. Cheeseman.

Barbados.—The month was fine throughout. Mean temp. (76°·6) same as the average Prevailing wind N.E.; mean hourly velocity 11·3 miles; R much below average. T on 15th, 16th, and 17th; L on 31st. R. Bowie Walcott.

SUPPLEMENTARY TABLE OF RAINFALL, NOVEMBER, 1886.

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

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger	3·97	XI.	Castle Malgwyn	6·30
,,	Margate, Birchington...	3·17	,,	Rhayader, Nantgwillt..	7·68
,,	Littlehampton	3·90	,,	Carno, Tybrith	5·50
,,	Hailsham	5·18	,,	Corwen, Rhug	2·35
,,	I. of W., St. Lawrence.	...	,,	Port Madoc	7·41
,,	Alton, Ashdell.....	3·57	,,	I. of Man, Douglas	4·72
III.	Winslow, Addington ...	2·56	XII.	Stoneykirk, Ardwell Ho.	3·85
,,	Oxford, Magdalen Col...	2·50	,,	Melrose, Abbey Gate ...	4·44
,,	Northampton	1·67	XIII.	N. Esk Res. [Penicuick]	3·50
,,	Cambridge, Beech Ho...	2·32	XIV.	Ballantrae, Glendrishaig	4·46
,,	Wisbech, Bank House..	2·76	,,	Glasgow, Queen's Park.	3·42
IV.	Southend	...	XV.	Islay, Gruinart School..	3·52
,,	Harlow, Sheering	2·97	XVI.	St. Andrews, Pilmour Cot	2·08
,,	Rendlesham Hall	2·86	,,	Balquhidder, Stronvar..	7·75
,,	Diss	2·57	,,	Dunkeld, Inver Braan..	3·62
,,	Swaffham	2·55	,,	Dalnaspidal H.R.S. ...	6·46
V.	Salisbury, Alderbury ...	3·32	XVII.	Keith H.R.S.	3·89
,,	Warminster	3·71	,,	Forres H.R.S.	2·53
,,	Calne, Compton Bassett	3·48	XVIII.	Strome Ferry H.R.S....	8·67
,,	Ashburton, Holne Vic..	5·71	,,	Tain, Springfield.....	2·63
,,	Holsworthy, Clawton...	4·39	,,	Loch Shiel, Glenaladale	11·77
,,	Hatherleigh, Winsford.	...	,,	S. Uist. Ardkenneth ...	5·34
,,	Lynmouth, Glenthorne.	4·86	,,	Invergarry	8·66
,,	Probus, Lamellyn	4·56	XIX.	Lairg H.R.S.	...
,,	Wincanton, Stowell Rec.	4·19	,,	Forsinard H.R.S.	2·80
,,	Taunton, Lydeard Ho ...	3·48	,,	Watten H.R.S.	2·48
,,	Wells, Westbury.....	5·48	XX.	Dunmanway, Coolkelure	6·41
VI.	Bristol, Clifton	4·08	,,	Fermoy, Gas Works ...	3·94
,,	Ross	2·51	,,	Tralee, Castlemorris ...	4·83
,,	Wem, Sansaw Hall.....	...	,,	Tipperary, Henry Street	1·82
,,	Cheadle, The Heath Ho.	2·35	,,	Newcastle West	...
,,	Worcester, Diglis Lock	1·83	,,	Miltown Malbay.....	5·46
,,	Coventry, Coundon	2·44	XXI.	Gorey, Courtown House	2·59
VII.	Melton, Coston	2·25	,,	Navan, Balrath	1·96
,,	Ketton Hall [Stamford]	2·82	,,	Mullingar, Belvedere ...	2·29
,,	Horncastle, Bucknall ...	2·35	,,	Athlone, Twyford	2·81
,,	Mansfield, St. John's St.	1·87	XXII.	Galway, Queen's Coll...	4·37
VIII.	Macclesfield, The Park.	2·73	,,	Clifden, Kylemore	7·64
,,	Walton-on-the-Hill.....	3·04	,,	Crossmolina, Enniscoe..	7·08
,,	Lancaster, South Road.	...	,,	Collooney, Markree Obs.	4·14
,,	Broughton-in-Furness ..	7·14	,,	Carrick-on-Shannon ...	3·99
IX.	Wakefield, Stanley Vic.	1·20	XXIII.	Rockcorry.....	3·37
,,	Ripon, Mickley	3·21	,,	Warrenpoint	2·88
,,	Scarborough.....	2·25	,,	Newtownards	2·86
,,	East Layton [Darlington]	3·24	,,	Belfast, New Barnsley..	4·85
,,	Middleton, Mickleton ..	4·25	,,	Cushendun	5·01
X.	Haltwhistle, Unthank..	4·64	,,	Bushmills	3·55
,,	Shap, Copy Hill	6·38	,,	Stewartstown	2·86
XI.	Llanfrechfa Grange	4·17	,,	Buncrana	4·17
,,	Llandovery	6·33			

NOVEMBER, 1886.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1870–9	Greatest Fall in 24 hours. Dpth	Greatest Fall in 24 hours. Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32° In shade.	No. of Nights below 32° On grass.
			inches	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	2·71	+ ·27	·54	5	14	58·8	1	30·0	23	3	17
II.		Maidstone (Hunton Court)...	2·94	+ ·04	·40	10	17	...	...	...	...	...	...
,,		Strathfield Turgiss	3·25	+ ·50	·98	5	15	59·3	1	25·0	23	6	15
III.		Hitchin	3·21	+ ·60	·84	11	18	57·0	1	26·0	23	5	...
,,		Banbury	2·15	— ·56	·59	11	15	56·0	1	26·5	8, 19	8	...
IV.		Bury St. Edmunds (Culford)	2·70	— ·13	·49	10	17	59·0	1, 9	24·0	30	8	...
,,		Norwich (Cossey)	2·74	— ·57	·57	12	13	...	...	...	...	...	...
V.		Weymouth(LangtonHerring)	3·13	...	·74	8	20	59·0	2	33·0	24	0	...
,,		Barnstaple	5·06	+ ·91	·72	5	24	58·0	1, 2*a*	35·0	8	0	...
,,		Bodmin	3·73	— 1·59	·52	5	20	54·0	1	32·0	9	1	6
VI.		Stroud (Upfield)	2·89	— ·05	·45	5	16	58·0	1, 16	28·0	30	3	...
,,		ChurchStretton(Woolstaston)	2·42	— 1·02	·54	9	21	54·0	2	32·0	8	1	7
,,		Tenbury (Orleton)	2·29	— ·57	·57	5	19	58·0	1	24·7	8	...	...
VII.		Leicester	1·99	...	·43	10	19	58·6	1	28·5	22	4	19
,,		Boston	2·84	+ ·47	·94	10	13	60·0	14	28·0	19*d*	5	...
,,		Hesley Hall [Tickhill].....	1·26	...	·43	5	15	57·0	1	29·0	22*e*	6	...
VIII.		Manchester (Ardwick).....	2·15	— ·82	·94	5	19	...	...	...	...	...	...
IX.		Wetherby (Ribston Hall) ...	1·96	— ·80	·69	5	10	...	...	...	...	...	...
,,		Skipton (Arncliffe)	5·14	— ·61	1·26	5	26	54·0	4	29·0	7	...	...
,,		Hull (Beverley Road)	1·57	— 1·45	·57	5	15	56·0	1	31·0	19*f*	5	8
X.		North Shields	2·86	— ·59	1·23	5	11	56·0	20	29·8	19	6	10
,,		Borrowdale (Seathwaite).....	14·78	+ 2·96	2·23	3	24	53·9	3	31·0	25	1	...
XI.	WALES.	Cardiff (Ely).....	5·59	+ 1·39	1·11	8	23	...	...	...	...	...	...
,,		Haverfordwest	6·98	+ 1·64	1·29	5	28	57·0	2	32·0	7	1	4
,,		Plinlimmon (Cwmsymlog) ...	6·53	...	1·20	5	20	...	...	...	...	...	...
,,		Llandudno.....	3·83	— ·08	1·22	5	21	57·1	3	39·0	29	0	...
XII.	SCOTLAND.	Cargen [Dumfries]	3·67	— ·24	·53	1	20	54·0	20	31·0	22	3	...
,,		Jedburgh (Sunnyside).....	3·11	+ ·10	1·32	5	18	54·0	24	28·0	22	3	...
XIV.		Douglas Castle (Newmains)	...	...	...	...	...	...	...	...	..	...	...
XV.		Lochgilphead (Kilmory)	8·34	+ 2·98	1·38	18	21	...	...	31·0	6	8	...
,,		Oban (Craigvarren)	5·57	...	·75	2	24	55·9	19	36·0	16*g*	0	...
,,		Mull (Quinish).....	7·17	...	·69	2	27	...	...	...	...	...	...
XVI.		Loch Leven Sluices	2·20	— 1·35	·30	4, 12	14	...	...	...	...	...	...
,,		Arbroath	2·26	— ·89	·75	5	12	55·0	20	31·0	22	1	...
XVII.		Braemar	4·17	+ ·40	·71	10	17	53·0	20	28·8	22	7	19
,,		Aberdeen	2·14	...	·38	6	19	55·0	20*b*	31·0	30	2	...
XVIII		Lochbroom	5·89	...	·84	29	22	...	...	...	...	...	...
,,		Culloden	2·31	— ·39	...	...	...	54·0	3*h*	31·0	22	1	16
XIX.		Dunrobin	...	...	...	...	...	...	...	...	...	...	...
,,		Kirkwall (Swanbister)..... ..	...	...	...	...	...	...	...	...	...	...	...
XX.	IRELAND.	Cork (Blackrock)	2·23	— 2·38	·44	11	18	58·0	23	27·0	8	3	...
,,		Dromore Castle	4·64	...	·64	11	17	59·0	24	30·0	8	...	...
,,		Waterford (Brook Lodge) ...	2·95	...	·53	8	16	56·0	3	29·0	8	5	13
,,		Killaloe	3·40	...	·44	3	22	64·0	22	28·0	9	3	...
XXI.		Carlow (Browne's Hill)	2·94	+ ·02	·52	8	23	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	2·18	— ·10	·45	5	18	58·5	3	3·1	7	0	6
XXII.		Ballinasloe	3·55	+ ·55	·73	14	22	53·0	19*c*	2 0	9	8	...
XXIII		Waringstown	3·18	+ ·47	·58	8	16	56·0	23	2·0	25	5	13
,,		Londonderry (Creggan Res.).	4·73	...	·62	14	23	...	...	...	...	...	...
,,		Omagh (Edenfel)	3·28	+ ·23	·53	11	22	54·0	19	31·0	20	3	9

a And 20. *b* And 25. *c* And 20, 29. *d* And 23. *e* And 26. *f* And 22, 26. *g* And 10, 20, 30. *h* And 15, 23.

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

METEOROLOGICAL NOTES ON NOVEMBER, 1886.

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.

STRATHFIELD TURGISS.—The early and middle portions of the month were wet, with few intervals of fine weather. Serious floods occurred in places, and everywhere wheat sowing was in arrear. The close of the month was on the whole much drier, with one or two sharp frosts at night. Wheat was well out of the ground at the close and looking very strong and healthy.

CULFORD.—The early part of the month was generally unsettled and stormy, with high winds.

LANGTON HERRING.—Rainfall ·51 in. below the average of 11 years. In the six weeks from October 8th to November 19th there were only three days on which R did not fall. The mean temp. at 9 a.m. was 1°·9, the mean max. 1°·6, and the mean min. 0°·7 above the average. A steady N.E. wind blew from 22nd to 27th inclusive.

BODMIN.—A most genial November, with happily no fog; mean temp. 45°·4.

WOOLSTASTON.—A mild and pleasant month; mean temp. 43°·4.

ORLETON.—The first half of the month was very stormy and unsettled, with R almost every day and a few frosty nights, but the temperature was generally high. The latter half of the month was generally cloudy, foggy, dark, and sunless, with very little R and high pressure. Mean temp. about 2°·5 above the average of 25 years; S on 30th.

HULL.—On the whole a fine bright month, but very foggy from 22nd to 28th.

WALES.

HAVERFORDWEST.—A month of excessive rainfall, extreme humidity and gloom, and much milder than the average November; at times very stormy and wet, especially on 5th and 8th. Towards the close the air became colder, with strong N.W. gales, accompanied by R and H; S covered the Precelly Hills at the close.

LLANDUDNO.—The month was mild and the temperature unusually equable. The mean temp. (47°·4) was 2°·3 above the average. The mean daily range (6°·7) was 2°·4 and the total range (18°·1) no less than 9°·2 below the average. I believe I never recorded such a degree of equality at this or any other season of the year since observations were commenced in 1861. The min. temp. ranged high till the 20th, when the lowest was reached. The mildness of the weather was further shown by the condition of the flora. Up to the very end of the month tender plants were growing and in full flower in the open air. The first two days excepted, which were very fine, wind and rain were rather prevalent up to the 10th. There was a strong gale from the S.W. on the 3rd, followed by R, and another of about equal strength and longer duration beginning on the afternoon of the 5th and lasting till the evening of the 6th; this was accompanied by very heavy R, the greater part of which fell during the night of the 5th. Fog on 25th; H on 30th.

SCOTLAND.

CARGEN.—A very dull, gloomy month. Mean temp. (43°·1) 1°·7 above the average. There was great want of sunshine. Of the first 20 days of the month, R fell on 17. Grass and turnips made great growth throughout the month, and so many plants have seldom been seen in flower so late in the season.

OBAN.—The month came and went in tempestuous weather. A period of cold at the commencement was succeeded by unnatural warmth from 18th to 28th, when a large depression broke up the weather. During this period spring flowers came into bloom and grass freshened into bright green. A good potato crop was secured. H on 3rd, 4th, 16th, and 30th; T and L on 3rd.

QUINISH.—Stormy, unsettled weather prevailed until the 20th, after which it was warm and calm with much fog.

BRAEMAR.—A very wet, dull month; harvest secured in bad order.

ABERDEEN.—Rainfall about one inch below the average. T and L on 9th; S on 30th; aurora on 5 nights.

LOCHBROOM.—There could scarcely be greater variety of weather than was experienced during this month, though on the whole it was fine and open. Vegetation was as green and fresh at the close as at Midsummer, the trees and bushes not being all stripped of their leaves. From 20th to 28th was as fine as June, but the last three days were very rough and wintry.

CULLODEN.—The weather was favourable for out-door work during the greater part of the month. R in any quantity fell only at intervals, and there was but little frost. L was seen on several nights.

IRELAND.

BLACKROCK.—With the exception of 9 fine days, the month was very damp and dull, and often misty. Mean temp. (45°·6) 2°·2 above the average.

WATERFORD.—The latter part of the month was most favourable for farm work, and very mild. Rainfall ·85 in. below the average.

KILLALOE.—The rainfall was moderate for November, and pressure from 17th to 23rd was unusually high.

DUBLIN.—A mild, open month, but generally dull and damp. R fell frequently but the amounts were on no occasion very large. Temperature was singularly high during the fourth week. The mean temperature was two degrees above the average. Pressure was ·020 in. above the average, and higher on the 24th than it had been since March 5th, 1883. The rainfall and number of rainy days were both somewhat below the average. Solar halo on 1st; S and sleet on 9th; H on 10th and 11th. Fog on 7 days; high wind on 8 days; gales on 2 days. A TS with heavy R and H passed a few miles S.E. of Dublin on the 10th. Mean humidity 88; mean amount of cloud 6·5; prevailing winds S.W., W. and N.W.

EDENFEL.—The month throughout was abnormally mild and quiet, with many summerlike days, especially during its latter half.

BAROMETRIC DEPRESSION OF DECEMBER 8TH-9TH.

(Continued from p. 161.)

To the Editor of the Meteorological Magazine.

SIR,—I enclose chart of my Barometric observations, November 15th to December 14th, showing during 14 days the highest and lowest readings registered here during 23 years. I consider the Barometer a first-rate instrument, though without a Kew certificate, and the readings (extraordinary as they seem) were corroborated by those of an excellent aneroid placed beside the Mercurial instrument. They are uncorrected for altitude, 285 ft. or temp. 41°. [The sea level pressures are approximately, December 8th, 9 a.m. 27·80; 1 p.m. 27·24]. During the period of greatest depression 1 p.m. on 8th, an almost dead calm prevailed here, and continued till about 1 a.m. next morning, when there followed violent intermittent gales from the North West to which point the wind had backed from S.E. at a former period.

L. M. BUCHANAN.

Edenfel, Omagh, Tyrone.