SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CCCL.] MARCH, 1895. [PRICE FOURPENCE, or 5s. per ann. post free.

THE FROST OF JANUARY AND FEBRUARY, 1895.

WE cannot speak for others, but to us one lesson which experience is teaching is that in meteorological phenomena duration is of equal importance with intensity.

Our recent work in connection with the floods of last winter has shown us that it is not merely the extreme height reached which has to be considered, but the hours during which the river was in flood.

So with the recent frost, severe as it was, the most remarkable feature seems to have been, not the low temperature reached, but the duration of the intense cold. Taking, as one is apt to do, their own records as an illustration, the absolute minimum on the Glaisher stand at Camden Square, and by far the lowest recorded there in February during the 36 years 1859-95, was 7°·3 on February 8th, and (with the exceptions of December 25th, 1860, and January 5th, 1867, when the temperature fell to 6°·7) the lowest recorded in any month.

Concerning the distribution of the intensity of the cold over the country generally, Mr. F. Campbell Bayard, LL.M., has undertaken to read a paper before the Royal Meteorological Society, and therefore we have handed over to him the information which we have received. We may, however, mention that we have heard of readings in Stevenson's screens of −17° at Braemar, Aberdeen; of −13° at Esthwaite, Lancashire; of −8° at Bromley, Kent, and at Ketton, Rutland; and of −5° at Loughborough. Other low readings will be found in the table on page 34. We think that the Loughborough record for the following ten days will not be easily beaten.

	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	Mean
Min.	10	8	2	−5	−4	−1	1	4	2	4	2·1
8 a.m.	16	11	12	−4	1	1	24	7	4	9	8·1
Max.	30	28	30	26	26	29	33	39	38	30	30·9
6 p.m.	24	18	18	20	18	25	25	26	26	23	22·3

This gives for the mean temperature of the ten days 16°·5.

The following are minima at Greenwich below 10°, and it will be noted that 1895 is the only year with two such entries, and that they are on consecutive days.

	°		°		°
1820, Jan. 15th,	0·0	1845, Feb. 11th,	7·7	1870, Dec. 25th,	9·8
1838, Jan. 20th,	—4·0	1860, Dec. 25th,	8·0	1895, Feb. 7th,	9·6
1841, Jan. 8th,	4·0	1867, Jan. 5th,	6·6	,, ,, 8th,	6·9

Therefore, as regards absolute minimum temperature, 1895 was surpassed at Camden Square by 1860 and 1867, and at Greenwich by 1820, 1838, 1841 and 1867.

The following are mean daily temperatures at Greenwich below 20° :—

	°		°		°
1814, Jan. 10th,	19·6	1830, Jan. 18th,	18·1	1841, Jan. 7th,	17·4
1815, Jan. 14th,	16·2	,, Feb. 2nd,	17·0	,, ,, 8th,	12·8
1816, Feb. 8th,	19·7	,, ,, 3rd,	19·2	,, Feb. 3rd,	19·2
,, ,, 9th,	12·6	,, ,, 5th,	19·0	1845, ,, 12th,	19·2
1820, Jan. 1st,	19·9	,, ,, 6th,	18·7	1867, Jan. 4th,	13·2
,, ,, 13th,	18·7	,, Dec. 24th,	18·4	,, ,, 14th,	19·3
,, ,, 15th,	14·6	,, ,, 25th,	18·6	1881, ,, 15th,	19·8
1823, ,, 19th,	13·4	1838, Jan. 12th,	16·8	1890, Dec. 22nd,	19·5
1826, ,, 14th,	19·5	,, ,, 15th,	6 2	1891, Jan. 10th,	18·4
,, ,, 15th,	18·4	,, ,, 19th,	17·0	1895, Feb. 6th,	19·4
,, ,, 16th,	18·9	,, ,, 20th,	10·7	,, ,, 7th,	18·3
				,, ,, 8th,	18·9
				,, ,, 9th,	18·0

In this list there are in the 81 years twelve days colder (lower mean daily temperature) than any one day in 1895, there are three cases of two consecutive days colder than any two consecutive days in 1895, and there is one case of three consecutive days each with a mean temperature below 20° ; but there is no case of four such days until we come to 1895.

We may test this question of duration in another form, *viz.*, as to the number of consecutive days on each of which the mean temperature was below 32°. No period is quoted unless it exceeded 10 days.

1814, Jan. 1st to 26th, 26	1870-1, Dec. 21st to Jan. 4th, 15
1823, Jan. 9th to 26th, 18	1881, Jan. 12th to 27th, 16
1838, Jan. 8th to 21st, 14	1890, Dec. 10th to 25th, 16
1855, Feb. 7th to 23rd, 17	1892-3, Dec. 24th to Jan. 7th, 15
1860, Dec. 18th to 29th, 12	1895, Jan. 25th to Feb. 18th, 25
1867, Jan. 12th to 22nd, 11	

As regards mean temperature, there is no case equal to 1895 with four consecutive days on each on which the mean temperature was below 20° ; the nearest approaches are—

1816	1826	1830	1838	1841	1895
°	°	°	°	°	°
Feb. 8, 19·7	Jan. 14, 19·5	Feb. 2 17·0	Jan. 12, 16·8	Jan. 7, 17·4	Feb. 6, 19·4
,, 9, 12·6	,, 15, 18·4	,, 3, 19·2	,, 15, 16·2	,, 8, 12·8	,, 7, 18·3
	,, 16, 18·9	,, 5, 19·0	,, 19, 17·0		,, 8, 18·9
		,, 6, 18·7	,, 20, 10·7		,, 9, 18·0

It may be thought strange that we have not dwelt upon the winter of 1855, January and February of which year much resembled the corresponding months of 1895. There was a great

similarity, but 1855 was not nearly so severe as 1895. The absolute minima in the two Januarys were very similar, but the minimum in February, 1855, was 11°·1 on the 19th, whereas in 1895 it was 6°·9 on the 8th; and the mean temperature of the coldest four consecutive days in 1855 (16th to 19th) was 22°·7; in 1895 the four days (6th to 9th) had a mean of only 18°·7.

Another striking proof of the severity of the 1895 frost is afforded by the temperature of the earth. The thermometer with its bulb 1 foot below the surface was first read at Camden Square on January 1st, 1871. Prior to 1895 it was never below 32°, and it reached that point in only 1880, when the 9 a.m. readings were—

January.			February.					
29th	30th	31st.	1st	2nd	3rd	4th	5th.	
32·0	32·1	32·0	32·0	32·0	32·0	32·0	32·0	

But in February, 1895, we have—

10th	11th	12th	13th	14th	15th	16th	17th	18th	19th
32·0	32·1	31·9	31·8	31·2	31·1	31·1	31·0	30·9	31·1

20th	21st	22nd	23rd	24th
31·6	31·8	31·9	31·9	32·0

There are therefore twelve consecutive days every one of which was cold beyond precedent since the observations began in 1871. This excess is, however, due to two causes—(1) the duration of the low air temperature, (2) the fact that there was very little snow—for a layer of snow 6 inches thick keeps the earth several degrees warmer than it would be without it.

Respecting earth temperatures and water pipes, we hope to be able to say something next month.

To the Editor of the Meteorological Magazine.

SIR,—In this district the great feature of the frost has been the very low depth of water in the wells. Some, never dry before, have been dry this year, and others, where there is generally an abundance of water, exhausted after a short pumping. The pits and streams are now full, but the wells are filling very slowly.—Yours truly,

S. W. JONES.

Salt Vicarage, Stafford, February 18th, 1895.

[This strikes us as extremely interesting. Apparently the surface of the ground was sealed by frost, and thereby the subsoil water was maintained at a constant level, being unable to run out of the soil, as the frozen surface prevented the entrance of air to take its place.—ED.]

To the Editor of the Meteorological Magazine.

SIR,—The great frost seems now to have broken up, but it will long be remembered. From December 30th to February 27th (60 days) the thermometer fell below 32° every night except four, which I think is a record. The mean temperature for the month was 28°·5, the lowest mean for February during the 23 years in which I have kept an account of the weather. The maximum on February 6th was only 22°, the lowest maximum I ever recorded.

The frost of 1881 was more severe, viz., —4°·0 (or —3°·0), according to different thermometers. My figures are from instruments in a Stevenson's screen at 4 feet from the ground, which I believe to be correct. I have tested them recently at freezing point. The rainfall for February was only ·26 in., including snow.—Yours truly,

S. KING.

Elswick Lodge, Garstang, March 1st, 1895.

P.S.—The 4 nights when the temp. was not below 32° were :—

January 14th	32°	January 19th	34°
,, 15th	32°	February 23rd	34°

Max. temp. in February	44°	Lowest max. in February	22°
Min. ,, ,, ...	7°	Highest min. ,, ...	36°*
Mean ,, ,, ...	28°·5	Nights of frost ,, ...	26

* Feb. 28th, not included in the 60 days.

To the Editor of the Meteorological Magazine.

SIR,—I send you a few particulars of the frost, which to-day seems to be at an end. – Yours truly,

CHARLES L. BROOK.

Harewood Lodge, March 6th, 1895.

FROST OF JANUARY—FEBRUARY, 1895.

(1.) This frost commenced December 27th, 1894, and ended March 6th, 1895, a period of 70 days.

(2.) During this time the minimum temperature on the ground was below 32°, except on March 1st, 33°·7, and January 15th, when it was exactly 32°.

(3.) The minimum temperature in a Stevenson's stand was *below* 32° on 59 nights out of 70, with a continuous period of 32 days from January 22nd to February 22nd inclusive.

(4.) From December 29th, 1894, to February 19th, 1895 (53 days) the maximum temperature in Stevenson's screen did not reach 40° (see Mr. Ryves' letter in your February number), the highest being 39°·2 on January 18th.

(5.) The thermometer at one foot below the surface was below the freezing point from February 11th–23rd (13 days).

(6.) The ground was frozen to the depth of 17 inches.

(7.) The ice on a large reservoir attained a maximum thickness of $13\frac{3}{4}$ inches.

The average temperatures for the months January and February were :—

	Max.	Min.	Mean.	Grass Ther.
January	34°·3	25°·1	29°·7	20°·0
February	33°·9	21°·7	27°·8	14°·9

The four coldest months I have registered in 16 years are :—

1.	February, 1895	27°·8
2.	January, 1881	29°·2
3. }	January, 1895	29°·7 }
4. }	December, 1890	29°·7 }

To the Editor of the Meteorological Magazine.

SIR,—The following may be of interest :—

TEMPERATURE OF FEBRUARY.

Mean of 13 years (1882-94)	39°·4	
Mean of 1895	26°·9	
Deficiency	12°·5	
Lowest temp. registered February 8th—		
In screen	—3°·0	a record.
On grass	5°·0	
Mean temp. of 8th	—9°·0	a record.
Mean temp. Feb. 6th–10th, inclusive	14°·9	

Rain fell on 3 days—max., 1st, ·13 in.; total ·17 in. Absolute drought, 2nd to 23rd inclusive; partial drought, whole month. February is the month in which I generally record minima of rainfall :—

	Rain fell on	Total.
1887	10 days	·51 in.
1888	13 ,,	·44 ,,
1890	9 ,,	·58 ,,
1891	1 ,,	·02 ,,
1895	3 ,,	·17 ,,

Yours faithfully,

R. J. ROBERTS.

Pool Quay Vicarage, Welshpool, March 1st, 1895.

To the Editor of the Meteorological Magazine.

SIR,—Referring to the absence, as far as I have seen in the profuse literature upon the late weather, of any reference to the curious variation of minimum temperature indicated by thermometers placed at different local elevations, though comparatively close, I append a record of such readings here for the week ending 12th February, No. 1 Thermometer being placed in the screen, No. 2 on the surface of the snow close by, and No. 3 about 200 yards off and in a hollow of the ground, at a lower elevation of about 50 feet (about 250 ft. above sea level) :—

	No. 1.	No. 2.	No. 3.		No. 1.	No. 2.	No. 3.
Feb. 6th.....	5°	2°	—12°	Feb. 10th.....	17°	12°	—1°
,, 7th.....	13	8	— 6	,, 11th.....	7	4	—8
,, 8th.....	12	5	— 8	,, 12th.....	14	10	5
,, 9th.....	16	14	9				

These instruments have Kew certificates, and have lately been thoroughly tested.—Yours very truly,

L. M. BUCHANAN
(Colonel).

Edenfel, Omagh, Tyrone, March 3rd, 1895.

RECENT DRY FEBRUARIES.

To the Editor of the Meteorological Magazine.

SIR,—The extremely small rainfall of the February just past, coming only four years after an absolutely rainless February in 1891; led me to take out the average of February for the 10 years 1886–1895 the result is remarkable, being 1·23 in. only, or about two-thirds of the *true* average, by which I mean an average of 20 years or more. In these 10 years, which is the extent of the record of rainfall here, there have been five years in which the total of February has been less than one inch, viz. :—

1886.....	0·68 in.	1890.....	1·05 in.	both below the true average.
1887.....	0·62 ,,	1892.....	1·62 ,,	
1888.....	0·93 ,,	1894.....	1·82 ,,	about the true average or slightly under.
1891.....	0·00 ,,	1889.....	2·34 ,,	both above the true average.
1895.....	0·12 ,,	1893.....	3·12 ,,	

Thus we have seven, if not eight years, with a deficient rainfall in February, and only two years with an excess. Though the gauge has been kept here only 10 years, at Muswell Hill, two miles S.E. of this place, we have a record for 23 years, 1872–1894; the average of February for that period is 1·91 in., while the 10 years average there (1886–95) is 1·22 in., differing only ·01 in. from the average for the same period here; thus the 10 years' average is 0 69 in., or 36 per cent. less than the 23 years' average. On examining the preceding 10 years, 1876–1885, we find the average is 2·61 in., or 0·70 in. above the 23 years' average, showing that we may expect that any great departure from the true average in one decade will be rectified by a corresponding difference the other way in the following one; it also seems to show that 10 years is not a sufficiently long period to take as an average for the month, though it may be so for the year. The following are the totals of February at Muswell Hill for the 20 years, 1876-1895 :—

10 years, 1876-1885.	in.
1876.....	2·14
1877.....	1·80
1878.....	1·64
1879.....	3·97
1880..	2·36
1881.....	4·03
1882.....	1·44
1883.....	3·95
1884.....	1·52
1885.....	3·27
	26·12
Average ...	2·61

10 years, 1886-95.	in.
1886.....	0·65
1887.....	0·69
1888.....	0·97
1889.....	2·25
1890.....	1·15
1891.....	0·00
1892.....	1·47
1893.....	3·05
1894.....	1·81
1895.....	0·14
	12·18
Average ...	1·22

Yours truly,

J. W. SCOTT.

Elleray, Etchingham Park, Finchley, Middlesex, March 7th, 1895.

SNOW FROM A CLOUDLESS SKY.

To the Editor of the Meteorological Magazine.

SIR,—On the 6th February, at 9 a.m., light snow began to fall, sparkling in sunshine from a cloudless sky. Thinking that the snow might be blown off a roof, I went out on the common, clear of houses, and made no doubt that the fall was from the sky. Gradually it clouded over, and at 10 a.m. was quite overcast, the snow continuing as a natural shower for a short time longer.

J. P. MACLEAR.

Cranleigh, Surrey, 21st February, 1895.

UNUSUAL SNOW CRYSTALS.

To the Editor of the Meteorological Magazine.

SIR,—On February 14th, between 8 a.m. and 8.30 a.m., snow fell in single crystals of large size, the shade temp. at the time being 21° or 22°. I devoted half an hour to measuring the largest, and succeeded in beating my previous record, the two largest measuring $\frac{11}{24}$ in. and three others $\frac{10}{24}$ in.—Truly yours,

H. SOWERBY WALLIS.

25, *Northwood Road, Highgate, February* 21*st*, 1895.

ROYAL METEOROLOGICAL SOCIETY.

THE usual monthly meeting of this Society, was held on Wednesday evening, February 20th, at the Institution of Civil Engineers, 25, Great George-street, S.W., Mr. R. Inwards, F.R.A.S., President, in the chair.

After the transaction of formal business, Captain Wilson Barker exhibited some lantern photographs taken from the ship *Worcester* at Greenhithe, showing the ice on the Thames, some blocks being 10 ft. thick. It was necessary to rig up rocket apparatus to maintain communication with the shore, as it was impossible during the greater part of each day for boats to navigate the water. Mr. W. Marriott also had taken photographs from Westminster bridge, which showed the water completely covered with ice.

Mr. E. Mawley presented his report on the phenological observations for 1894. Between the third week in March and the third week in May, plants generally came into blossom in advance of their usual time, and towards the end of April the dates of first flowering differed but little from those recorded at the same period in the very forward spring of 1893. The cuckoo was heard even earlier than in the previous year. The year 1894 was a very productive one, and both the hay and corn crops proved unusually heavy, but much of the latter was harvested under very trying conditions as regards weather. The frosts of May 21st and 22nd entirely destroyed the

previous prospect of a glorious fruit season. Indeed, the only really good crop was that of pears, which were singularly abundant throughout nearly the whole of England.

The paper was illustrated by a diagram showing the mean dates of flowering of certain plants in 1894, in different parts of the British Isles, compared with the average.

Dr. Buchan spoke of the great value of the records, and mentioned that in 1894 Shetland was the earliest district of the British Isles in which grain ripened, the harvest having been the earliest ever known. The damage done by the May frost was extremely irregular; he believed that a very few days difference in the state of the blossom greatly affected the result.

Mr. Symons appreciated the manner in which Mr. Mawley marshalled his statistics, and thought that the table of averages proved the excellence of the observations. The President and Mr. Bayard also took part in the discussion. Admiral Maclear said that many gardeners attributed the damage in the May frost to the sun shining on the vegetation before it thawed, and considered that watering would have mitigated the injury, instancing the parallel case of rapidly thawing a frost-bitten member in man.

Mr. Mawley in replying considered that variations of soil were of great importance in frost in winter, but not in spring frosts; that there was no doubt as to the efficacy of slowly thawing, and that it was a recognised practice with rosarians in case of frost to syringe their roses before sunrise. Blossom once fertilized was much less susceptible to injury.

Mr. W. Marriott gave an account of the thunderstorm and squall which burst over London suddenly on the morning of January 23rd. He considers that this storm passed across England in a south south-easterly direction at the rate of about 47 miles an hour, being over Northumberland at 4 a.m., and reaching the English Channel by 11 a.m. Thunder was first heard in the vicinity of Leeds, and accompanied the storm in its progress across the country. One of the most remarkable features of the storm was the sudden increase in the force of the wind; for in London it rose almost at one bound from nearly a calm to a velocity of 36 miles an hour. This sudden increase of wind caused considerable damage, and at Bramley, near Guildford, twenty-eight trees were blown down along a track 1860 yards in length.

Dr. Preller spoke of the growing importance of records of atmospheric discharges in connection with the increased commercial use of electricity, and said that he knew of no country in which records were kept in such a form as to be of use to the electrician. He believed that thunderstorms showed a maximum frequency in the areas of maximum magnetic force mapped out by Prof. Rücker.

Mr. Bayard asked if in winter, thunderstorms similar to that described the path of the storm bore a constant relation to the position of the areas of low pressure.

Dr. Buchan spoke of the nearness of the lightning, and referred to the great darkness in spite of the absence of fog; he attributed the darkness to two currents of air differing greatly in temperature and humidity. With reference to the relation to cyclones the secondary was always on the right of the primary, and the thunderstorm was connected with the secondary.

Mr. Symons said that he believed that injury by lightning was very frequent in Northamptonshire, and that Devon and Cornwall were comparatively exempt from injury. He was inclined to think that the character of the soil played some part in inducing areas of thunderstorm injury. The short time-interval between the lightning and thunder appeared to be a feature of the storm under discussion.

Mr. H. S. Eaton saw the storm approaching, and noticed the cumulo-stratus which is so good an indication of an approaching thunderstorm.

Mr. Sowerby Wallis said that nearly everyone who described this storm spoke of the nearness of the lightning, and it appeared that lightning was not seen or thunder heard at distances much exceeding a mile; he thought that the two strata of air of very different temperature and humidity mentioned by Dr. Buchan as the cause of the darkness would account for this also.

Mr. W. Marriott said that winter thunderstorms travel with the wind, and are therefore controlled by the position of the cyclone, that under discussion being clearly of the tornado type. Summer thunderstorms generally travel along the lowest ground.

Mr. A. B. MacDowall's paper on "Some gradual weather changes in certain months at Greenwich and Geneva," was read by the Secretary.

BAROMETRIC UNDULATIONS.

To the Editor of the Meteorological Magazine.

SIR,—Barometric undulations such as those represented by Mr. Backhouse on p. 179, are of very frequent occurence at the Blue Hill Meteorological Observatory, and occur both during quiet and windy weather. Marked examples are reproduced, and described in the "Results of the Meteorological Observations made at the Blue Hill Meteorological Observatory, Mass,. U.S.A., in the year 1886," and in the "Observations made at the Blue Hill Meteorological Observatory, Mass., U.S.A., in the year 1887;—Annals of the Astronomical Observatory of Harvard College, Vol. XX, Part I." A detailed discussion of these undulations is made in the volume of Blue Hill Observations for 1893,—"Annals of the Astronomical Observatory of Harvard College Vol. XL. Part III" pp 195 to 202. The conclusion arrived at there is that the observations fully sustain Helmholtz's conclusion that the barometric undulations are the result

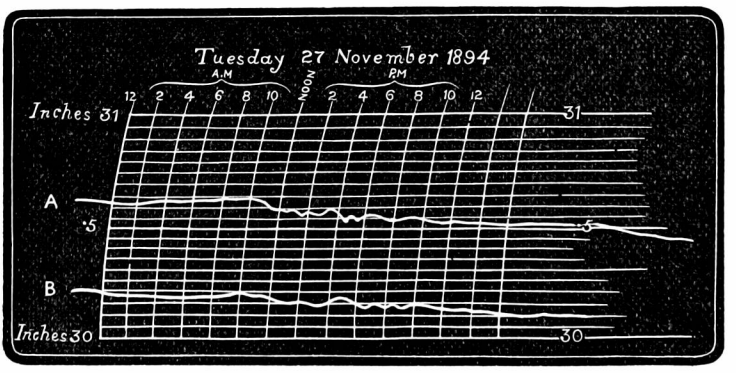
of real gigantic waves in the atmosphere like the waves in the ocean which are brought about by friction between atmospheric strata of different densities moving in different directions and with different velocities. These atmospheric waves are of all sizes, from the minutest ripple to the gigantic billows which affect the barometer, and have a very much greater influence in determining the conditions of the sky and weather than has heretofore been supposed. The parallel rows of clouds, the cloud furrows and striations, the rhythmic clearing and clouding at short intervals sometimes observed are all indications of the frequent existence of these waves. Their influence is felt in the precipitation, in the wind, and in the temperature oscillations of short periods, all of which at times show undoubted wave-like fluctuations.

In New England the barometric waves were all found to move from west to east, which is probably the general direction of motion of these waves north of the tropics, because the upper currents, which drive across and kick up waves in the lower currents, usually move from the west.

H. HELM CLAYTON.

Blue Hill Meteorological Observatory, February 7th, 1895.

[Mr. Clayton has conferred a benefit upon our readers by referring them to his paper upon the subject in the publication quoted. It seems to us that he has dealt chiefly with storm phenomena, for out of 78 occurrences on only one was the velocity of the wind below ten miles an hour. We had not previously read the explanation by Von Helmholtz, and it is not for us to question the *dicta* of so great a man, however difficult we may find it to understand them. We have been favoured with the tracing of the barograph at Skelwith Fold, Ambleside, for the same calm day, so reproduce the block with the extra curve, drawn however (for the sake of clearness) half-an-inch too low.]



REVIEW.

The Climatology and Physical Features of Maryland. First Biennial Report of the Maryland State Weather Service, for the years 1892 and 1893. Baltimore: 1894. Royal 8vo, 140 pages, six plates.

THIS well-printed modern American book is peculiar in several respects. It is an unusual size—a full page measuring 7·20 in. by 4·66 in.—but it has no signatures. Have our American friends discovered that they are superfluities? Then it has no publisher, unless we are to infer from its second title that it is issued from the Weather Service Office, in the Johns Hopkins University in Baltimore. We infer from the reports of the Director and of the Treasurer that the volume is not intended for sale but for free distribution as one means of "setting forth the advantages of the State from a climatic standpoint." We see further that no portion of the appropriation of two thousand dollars (say £400) granted by the State is to be paid for editorial work, and that there is a heading in small type, "U.S. Department of Agriculture, Weather Bureau." So we take it that the volume is really a local record of Maryland Weather prepared at the joint cost of the Weather Bureau and of the State of Maryland.

We have had to investigate this, because while we in no way whatever impugn the absolute impartiality of the writers of this report, we have had painful experience of the weakness of human nature when persons interested have written accounts of the localities in which they reside. A pamphlet which we recently received but have not noticed has shown us that this evil has followed civilization across the Atlantic, and we trust that Prof. Harrington will be on guard against its finding any home in the publications of his Bureau. Confidence once destroyed can never be repaired.

The first three chapters, devoted respectively to Topography, Geology, and Agriculture, seem to us good and practical. But we cannot say much for the one devoted to Climate. There are extremely pretty maps, and there are sundry tables, like those on pages 57 and 58, which look as if they represented the result of long and well organised work, but when closely examined it seems (though we hope that it is not really so) as if all these maps and tables, and the generalizations made with much positiveness, rest on the observations made during *the year* 1892 and part of 1893. There are, on pages 65 and 66, two lines of figures exempt from this criticism, but as far as we can see there are no others.

Isotherms and hyetographic shading based upon less than two years observations may look pretty, but they are not worthy of being printed, not worthy of being criticized, not worthy of the country which has given to Meteorology Loomis and Ferrel.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, AUGUST, 1894.

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.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	79·3	14	63·1	21	69·2	53·3	52·7	78	124·9	41·9	2·85	18	7·1
Malta	95·2	30	65·2	23	86·4	70·1	66·3	69	147·5	60·2	·00	0	0·6
Cape of Good Hope	...	...	...	...	...	...	...	...	...	...	...	...	...
Mauritius	78·4	27	58·2	1	74·8	64·8	60·3	74	127·6	49·3	2·09	22	5·8
Calcutta	90·6	29	75·2	20	86·2	77·9	78·4	88	157·2	74·7	4·82	16	8·0
Bombay	87·2	27	74·0	30	84·7	77·3	75·5	84	140·3	72·2	8·40	28	8·9
Ceylon, Colombo	85·6	18	70·0	29	84·3	77·0	70·6	75	146·0	66·0	·86	12	6·6
Melbourne	69·7	21	34·1	4	58·1	44·2	44·3	78	120·2	27·0	1·96	17	7·3
Adelaide	68·4	19	39·2	14	60·9	47·5	45·7	75	132·3	33·0	2·92	17	6·3
Sydney	71·3	26	41·6	9	62·1	47·8	43·6	73	118·7	28·3	1·14	10	3·7
Wellington	65·0	25	33·3	6	54·9	43·8	42·8	79	109·0	21·0	5·61	15	5·3
Auckland	63·0	27	40·0	6	58·5	46·1	45·3	77	125·0	35·0	5·95	23	6·0
Jamaica, Kingston	92·5	20	70·2	12	89·8	72·9	70·6	72	...	...	1·31	5	5·1
Grenada	87·2	13	71·8	1	33·6	75·4	72·5	80	156·5	...	6·78	25	4·0
Trinidad	91·0	*	67·0	6	87·5	71·1	71·3	83	171·0	67·0	12·06	22	...
Toronto	85·1	8	46·3	21	75·5	55·7	52·8	66	...	45·9	·38	5	5·7
New Brunswick, Fredericton	...	...	...	...	...	...	...	...	...	...	...	...	...
Manitoba, Winnipeg	92·1	22	37·5	14	80·3	50·8	...	...	...	...	·77	12	4·1
British Columbia, Esquimalt	80·2	28	47·7	9	69·3	50·8	53·7	83	...	...	·25	4	3·3

*Various.

REMARKS.

MALTA.—Adopted mean temp. 77°·4, 1°·0 below the averoge. Mean hourly velocity of wind 7·9 miles. Sea temp. ranged between 78°·5 and 79°·5. Lightning seen on 26th and 27th. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·4 above, of dew point 1°·1 above, and rainfall ·07 in. below, their respective averages. Mean hourly velocity of wind 13·4 miles or 1·1 above average; prevailing direction, E.S.E. C. MELDRUM, F.R.S.

Adelaide.—Mean temp. 0°·2 above average. Over the Southern parts of the Colony good rains fell, exceeding the average at most stations, and the Northern areas, where it has been so dry since the beginning of the year, during the latter part of the month received moderate and welcome rains. C. TODD, F.R.S.

Sydney.—Temp. 0°·1 below, and rainfall 1·78 in. below, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—The first half of the month was generally showery, with moderate winds from S.E. and N.W.; then fine up to the 27th, but strong N.W. winds on 24th, 25th, 27th and 28th; showery for the remainder of the month. Thunder on 29th; fog on 1st and 2nd; hail on 4th; brilliant aurora on 20th. Mean temp. 1°·3 above, and rainfall ·41 in. above, the average. R. B. GORE.

Auckland.—Stormy, showery and unpleasant through the greater part of the month. Mean temp. slightly below the average; rainfall largely in excess, being 1·68 in. above the average. T. F. CHEESEMAN.

JAMAICA.—Mean hourly velocity of wind 3·8 miles. Kingston rainfall about one-fourth, Island rainfall about one-half, of the average. Lunar rainbow seen at Kingston on 18th. R. JOHNSTONE.

TRINIDAD.—Rainfall 1·74 in. above the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, FEBRUARY, 1895.

[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.			
II.	Dorking, Abinger Hall.	·20	XI.	Lake Vyrnwy	1·01
,,	Birchington, Thor	·68	,,	Corwen, Rhug	·20
,,	Hailsham	·22	,,	Carnarvon, Cocksidia ...	·24
,,	Ryde, Thornbrough	·11	,,	I. of Man, Douglas	1·74
,,	Emsworth, Redlands ...	·06	XII.	Stoneykirk, Ardwell Ho.	1·75
,,	Alton, Ashdell.....	·11	,,	New Galloway, Glenlee	2·39
III.	Oxford, Magdalen Col...	·08	,,	Melrose, Abbey Gate ..	·71
,,	Banbury, Bloxham	·11	XIII.	N. Esk Res. [Penicuick]	·80
,,	Northampton, Sedgebrook	·11	,,	Edinburgh, Blacket Pl..	·56
,,	Alconbury	·11	XIV.	Glasgow, Queen's Park.	·14
,,	Wisbech, Bank House..	·32	XV.	Inverary, Newtown	·97
IV.	Southend	·58	,,	Islay, Gruinart School..	1·56
,,	Harlow, Sheering	·18	XVI.	Dollar.....	1·45
,,	Colchester, Lexden.....	·33	,,	Balquhidder, Stronvar..	·99
,.	Rendlesham Hall	·58	,,	Ballinluig	·94
,,	Diss	1·07	,,	Dalnaspidal H.R.S. ...	1·31
,,	Swaffham	·30	XVII.	Keith H.R.S.	·75
V.	Salisbury, Alderbury...	·10	,,	Forres H.R.S.	·83
,,	Bishop's Cannings	·26	XVIII.	Fearn, Lower Pitkerrie.	·83
,,	Blandford, Whatcombe.	·11	,,	Loch Shiel, Glenaladale	1·84
,,	Ashburton, Holne Vic....	·05	,,	N. Uist. Loch Maddy ...	·74
,,	Okehampton, Oaklands.	·14	,,	Invergarry	·45
,,	Hartland Abbey	·59	,,	Aviemore H.R.S.	·93
,,	Lynmouth, Glenthorne.	·12	,,	Loch Ness, Drumnadrochit	·83
,,	Probus, Lamellyn	·15	XIX.	Invershin	·24
,,	Wellington, Sunnyside..	·14	,,	Scourie	2·63
,,	Wincanton, Stowell Rec.	·18	,,	Watten H.R.S.	1·06
VI.	Clifton, Pembroke Road	·11	XX.	Dunmanway, Coolkelure	3·20
,,	Ross, The Graig	·04	,,	Fermoy, Gas Works ...	...
,,	Wem, Clive Vicarage ...	·36	,,	Killarney, Woodlawn ...	2·37
,,	Cheadle, The Heath Ho.	·19	,,	Caher, Duneske	·46
,,	Worcester, Diglis Lock	·18	,,	Ballingarry, Hazelfort...	·73
,,	Coventry, Coundon	·14	,,	Limerick, Kilcornan ...	·50
VII.	Ketton Hall [Stamford]	·25	,,	Ennis	...
,,	Grantham, Stainby	·30	,,	Miltown Malbay.....	1·24
,,	Horncastle, Bucknall ...	·30	XXI.	Gorey, Courtown House	·26
,,	Worksop, Hodsck Priory	·13	,,	Athlone, Twyford	·52
VIII.	Neston, Hinderton	·24	,,	Mullingar, Belvedere ...	·92
,,	Preston, Haighton	...	,,	Longford, Currygrane...	2·07
,,	Broughton-in-Furness..	1·24	XXII.	Woodlawn.....	·73
IX.	Ripon, Mickley	·43	,,	Crossmolina, Enniscoe..	·63
,,	Melmerly, Baldersby ...	·56	,,	Collooney, Markree Obs.	·49
,,	Scarborough, South Cliff	...	,,	Ballinamore, Lawderdale	·44
,,	Middleton, Mickleton..	1·78	XXIII.	Lough Sheelin, Arley ..	·35
X.	Haltwhistle, Unthank..	·71	,,	Warrenpoint	·54
,,	Bamburgh.....	1·74	,,	Seaforde	·69
,,	Keswick, The Beeches...	2·17	,,	Belfast, Springfield	1·40
XI.	Llanfrechfa Grange	·05	,,	Bushmills, Dundarave...	1·37
,,	Llandovery	·28	,,	Stewartstown	·43
,,	Castle Malgwyn	·15	,,	Buncrana	·80
,,	Builth, Abergwessin Vic.	·72	,,	Lough Swilly, Carrablagh	1·26
,,	Rhayader, Nantgwillt..	·47			

FEBRUARY, 1895.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	·12	— 1·76	·06	1	4	46·2	23	7·3	8	25	28
II.		Maidstone (Hunton Court)...	·76	— 1·04	·35	5	6	...	...	...	...	...	...
,,		Strathfield Turgiss	·18	— 1·82	·10	24	2	47·5	23	1·8	7	25	28
III.		Hitchin	·21	— 1·54	·11	1	3	43·0	23	2·0	7	26	...
,,		Winslow (Addington)	·16	— 2·00	·09	24	3	45·0	28	1·0	9	26	28
IV.		Bury St. Edmunds (Westley)	·23	— 1·33	·09	24	3	43·0	23	—2·0	7	...	...
,,		Norwich (Brundall)	·88	...	·17	24	18	45·8	23	4·0	7	26	27
V.		Weymouth(LangtonHerring)	·02	— 2·58	·02	24	1	43·0	23	13·0	6	27	...
,,		Torquay (Cary Green)	·01	...	·01	24	1	48·3	28	21·6	13	22	27
,,		Polapit Tamar [Launceston]..	·12	— 3·15	·08	24	4	48·0	28	11·5	13	26	28
VI.		Stroud (Upfield)	·12	— 2·44	·10	24	2	44·0	28	11·0	7, 8	27	...
,,		ChurchStretton(Woolstaston)	·27	— 2·18	·15	1	4	45·5	24	8·0	8	27	28
,,		Tenbury (Orleton)	·17	— 2·31	·11	24	2	46·3	28	—0·3	6	26	28
VII.		Leicester (Barkby)	·15	— 1·66	·08	24	7	45·0	23*b*	-10·0	7	27	28
,,		Boston	·53	— 1·15	·23	24	8	46·0	19	0·0	8, 10	27	...
,,		Hesley Hall [Tickhill].....	·14	— 1·36	·04	24	7	48·0	24	—1·0	8	26	...
VIII.		Manchester(PlymouthGrove)	·36	— 1·69	·17	28	4	42·0	25*c*	12·0	9	25	27
IX.		Wetherby (Ribston Hall) ..	·24	— 1·34	·15	1	3	...	...	...	...	...	...
,,		Skipton (Arncliffe)	1·11	— 3·58	·36	28	6	...	...	...	...	...	...
,,		Hull (PearsonPark)	·61	— 1·19	·25	24	15	45·0	22*d*	5·0	8	27	28
X.		Newcastle (Town Moor)	1·12	— ·28	·34	1	12	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	2·18	—10·46	1·10	6	7	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	·19	— 3·00	·09	28	4	..	...	...	...	...	...
,,		Haverfordwest	·12	— 4·00	·07	24	5	45·0	28	12·9	13	27	28
,,		Aberystwith (Gogerddan) ...	·23	— 3·03	·12	24	3	44·0	21	6·0	11	28	...
,,		Llandudno.....	·46	— 1·46	·21	28	6	44·0	28	17·5	9	...	...
XII.	SCOTLAND.	Cargen [Dumfries]	1·08	— 2·57	1·08	7	1	46·4	21	—2·0	11	26	...
,,		Jedburgh (Sunnyside).....	·97	— ·54	·38	2	3	46·0	20*e*	—2·0	8, 10	25	...
XIV.		Colmonell	1·93	...	1·00	6	4	51·0	21	—1·0	11	24	...
XV.		Lochgilphead (Kilmory).....	1·12	— 4·07	·75	23	2	...	...	12·0	10*g*	28	...
,,		Mull (Quinish).....	·43	— 5·04	·40	24	2	...	...	...	...	...	...
XVI.		Loch Leven Sluices	1·00	— 1·75	·20	1*a*	5	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	·75	— 1·35	·25	6	11	48·2	28	4·0	10	25	...
XVII.		Braemar	·93	— 2·43	·22	28	13	41·0	28	-17·0	11	26	28
,,		Aberdeen (Cranford)	1·78	...	·60	5	15	48·0	28	0·0	7	23	...
XVIII		Strathconan [Beauly]	3·37	— 1·34	·94	28	9	...	...	...	...	...	..
,,		Glencarron Lodge.....	2·32	...	·94	28	13	43·7	21	8·6	11	22	...
,,		Cawdor [Nairn]	1·17	— 1·06	·33	28	10	...	...	...	...	...	...
XIX.		Dunrobin	1·09	— 1·00	·35	28	7	46·0	28	16·5	18	16	...
,,		S. Ronaldsay (Roeberry).....	·97	— 1·67	·25	23	18	44·0	20*f*	19·0	6	18	...
XX.	IRELAND.	Darrynane Abbey.....	3·88	...	1·00	6	9	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	1·15	— 2·93	·70	6	6	48·5	28	16·0	12	26	...
,,		O'Briensbridge (Ross)	·69	...	·48	6	6	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	·52	— 2·56	·20	1	6	...	..	9·0	12	...	...
,,		Dublin (FitzWilliam Square)	·62	— 1·73	·31	6	9	48·6	28	19·0	7	18	28
XXII.		Ballinasloe	·87	— 1·91	·50	6	6	48·0	28	—5·0	6	28	...
,,		Clifden (Kylemore)	1·51	...	·39	14	9	...	...	...	...	...	...
XXIII		Waringstown	·63	— 1·82	·28	5	6	47·0	28	—1·0	6	26	27
,,		Londonderry (Creggan Res.).	·80	— 2·23	·20	28	10	...	...	...	...	..	...
,,		Omagh (Edenfel)	·51	— 2·18	·20	7	7	45·0	23	5·0	6	25	28

a And 2, 3, 6, 28. *b* And 28. *c* And 26, 28. *d* And 23, 28. *e* And 21, 23. *f* And 22, 28. *g* And 11.

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

METEOROLOGICAL NOTES ON FEBRUARY, 1895.

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 driest and coldest February ever recorded at this station. All growth at an utter standstill, and no insects or birds moving.

HITCHIN.—Mean temp. 26°·5. The lowest ever recorded here during 45 years; 27°·0 has been twice recorded.

BURY ST. EDMUNDS.—This month and February 1886, which are both alike, have the smallest rainfall in February since observations first commenced in 1857. This is also the coldest month: the min. of the exposed ther. (1 foot above ground) not having been once above 30°. If it had not been for the heavy snow of January, and very little wind, much more damage would have been done to vegetation, which is not so much hurt as in 1860.

NORWICH, BRUNDALL.—A severely cold month; mean of max. and min. temp. 30°·3; which is only 0°·1 warmer than Decembr 1890. S on the ground on 25 days; in fact, with 8 days exception, the earth was continuously covered with a white mantle from December 30th to February 28th, a period of 61 days. The mean of the shade max. and. min. for the week ending 12th was 22°·4. 22°·4.

LANGTON HERRING.—On one day only did any R fall this month, which has broken many records. It has been by far the coldest month since observations began in 1872; the mean temp. at 9 a.m. (26°·9) being as much as 12°·3 below the average for February. Compared with the next coldest month in 23 years, viz., January 1881, and with the average for February for the 23 years we have:—

	Mean at 9 a.m.	Min.	Max.
February, 1895 ...	27°·0 ...	23°·7 ...	33°·8
January, 1881 ...	29°·9 ...	27°·8 ...	36°·0
February average ...	39°·3 ...	36°·0 ...	44°·8

Frost occurred on every night but one, 21st–22nd, when temp. was 34°. It was freezing on 22 days at 9 a.m. The highest temp. at 9 a.m. was 37°; in 23 years it had not been lower in February than 45°; highest max. 43°; previous lowest max. in February, 48° in 1873.

TORQUAY, CARY GREEN.—Rainfall 2·73 in., and wet days 14, below the average; mean temp. 33°·4, or 9°·0 below the average. Amount of sunshine, 83 h. 55 min., being 1 h. 25 min. above the average; 5 sunless days.

POLAPIT TAMAR.—Exceptionally small rainfall. Except June 1887, this has been the driest month since January 1881, before which date there is no record here. The wind for 25 days was more or less from the E., but there was more than the average amount of sunshine. A very cold month; the mean min. on the grass being 20°·6, and mean min. in the shade, 24°·1.

WOOLSTASTON.—The frost continued with great severity till the 23rd, when there was a partial thaw for two days; the frost then returned, though with less severity than before. Several undoubted readings of the ther. below zero were recorded in the neighbourhood on the 8th. Mean temp. of the month, 28°·3. The mortality amongst the wild birds has been very great.

TENBURY, ORLETON.—The coldest month ever recorded here; the mean temp., 24°·1, being nearly 2°·5 below that of January 1881, and nearly 15°·5 below the average temp. of February. The min. on the 6th, —0°·3 in the screen, and —5°·0 on the grass—is the lowest on record, and the ther. on the grass fell below zero on 4 nights, while on 11 days the temp. did not reach 32°. S and R fell on only two days, and the total fall is, with two exceptions (Sep. 1865 and Feb. 1891), the smallest recorded in any month for 64 years. The rivers were frozen over about the 8th and continued so until the 25th, when the ice broke up. Until the 6th of this month, the lowest temp. recorded here was 0°·0 in screen and —2°·0 on grass, in January 1865.

LEICESTER, BARKBY.—Very cold, as the following min. readings show:—

4th, 4°	7th, —10°	10th, 23°	13th, 0°	16th, 7°
5th, 0°	8th, — 4°	11th, 0°	14th, 10°	17th, 6°
6th, —4°	9th, — 2°	12th, 1°	15th, 23°	—

MANCHESTER, PLYMOUTH GROVE.—Not only the coldest February, but the coldest month experienced since observations commenced 29 years ago. Also the driest month. Mean temp. 29°·5. Fog on six days.

WALES.

HAVERFORDWEST.—The driest February during the last 50 years, and perhaps the coldest. The ice on many ponds varied from 12 to 18 inches in thickness, and on still reaches of the river Cleddau from 10 to 12 inches, while navigation was impeded. On 8 nights the shade temp. fell to between 12° and 20°. and on 14 nights to between 20° and 25°. The only February to compare with it was 1855, when, on the 10th, the shade temp. fell to 8°, and there were 11 nights with the min. ranging from 8° to 20°.

SCOTLAND.

JEDBURGH, SUNNYSIDE.—The temp. of the month was very low, more so than it has been since 1860. There was much sunshine during the day, but the nights were very cold. All outdoor work was suspended; gas and water pipes generally were frozen, and birds suffered much.

COLMONELL.—On 6th and 7th a violent storm of S occurred, lasting for 32 hours, the average depth is estimated at about 2 feet; but the ground was bare in places, and the drifts varied up to 15 feet. Rainfall half the average. Mean temp. 28°·9, 9°·3 below the average. The lowest minimum previously recorded was 6° in 1888.

BRAEMAR.—By far the most severe month on record; the min. being below zero on the following nights:—

7th,	— 1°·5	9th,	—11°·0	11th,	—17°·0	17th,	—9°·0	19th,	—8°·0
8th,	—12°·0	10th,	—14°·0	13th,	— 7°·5	18th,	—7°·5	20th,	—5°·0

GLENCARRON.—S and frost up to the 20th, when a thaw set in.

ROEBERRY.—A very cold month; the coldest recorded; mean temp. 33°·5.

IRELAND.

DARRYNANE ABBEY.—The first few days were very cold with S.E. wind, which backed to S.W. on the 6th, when, about 6 p.m., S began and continued all night, covering the ground to a depth of about 13 inches. On the high grounds and in exposed places the drifts were very heavy, and all postal communication was stopped till the 10th. Wet S and sleet fell on 8th, and R on 10th, 13th and 14th. The rest of the month was very fine but rather cold.

WATERFORD, BROOK LODGE.—A very cold month; prevailing wind easterly. The wind was S. on the 6th when heavy S fell, and the drifts after the blizzard on the 10th had not melted at the close. Thrushes were singing at the close.

O'BRIENSBRIDGE, ROSS—The actual R falling was only ·09 in., the balance of the total being melted snow. Since the memorable year, 1855, there has been nothing to compare with the frost and polar wind of this month, in duration and intensity. S began to fall in the afternoon of 6th and, lasting only two hours, effectually blocked the country for a week after.

DUBLIN.—The coldest February that is since 1855. The mean temp. (34°.2) was 8°·6 below the average, 10°·7 below that of February 1894, and 1°·4 below that of January 1895. There was an overwhelming prevalence of strong E. and S.E. winds. The rainfall was scanty and consisted principally of S and H. Absolute drought held from the 7th to the 20th inclusive. Fogs on six days.

CLIFDEN, KYLEMORE.—On the 9th a snow blizzard raged all day, such as has not been known in the West for many years.

WARINGSTOWN.—Continuous frost, S covering the ground all the month. On the morning of the 7th the min. temp. was —1°, a reading only equalled once since observations began in 1860; though zero was touched on Jan 7th, 1894.

EDENFEL.—The month was remarkable here, as elsewhere, for its intense and protracted severity. Both in January 1867, and in January 1881, even lower temperatures were reached in the screen, but in those years there was no such persistence of low temperature even in January, nor can I find any February record at all approaching that of this year.