

# SYMONS'S

## MONTHLY

# METEOROLOGICAL MAGAZINE.

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### THE DRY SUMMER.

WE dealt last month with the June drought. A dry June has been followed in many places by a dry July, and in London the first fourteen days of August have been rainless. It will therefore probably be well to leave the discussion of the July and August drought until it is over. Meanwhile we welcome Mr. Baldwin Latham's report on the results of his numerous well measurements, and insert a few letters on the drought; and we add a short note on the fall of rain, based upon the monthly totals only.

In the first place, however, we shall say a few words about the temperature, because there has been some very wild exaggeration with reference to that subject. We purpose dealing with only the values for Camden Square, because they are handy and because they are continuous for 30 years without any break or change of position or of instruments which could affect the records by half a degree.

*9 a.m. Shade Temperature.*—This, as is well known, is very nearly the same as the true mean temperature. Here are the values—

	June.	July.
Mean 1859-78.....	61·7	64·9
1887 .....	61·9	67·4
Excess .....	0·2	2·5
Hottest 1859-87 ..... { Temp.	66·0	70·4
{ Year	1868	1868
Number of years out of the previous {		
29 in which the temp. was equal to, {	11	3
or higher than in, 1887..... }		

Therefore, as regards average temperature, June was not at all remarkable; July, though it has been once equalled (1876) and twice exceeded (1859 and 1868), was a very hot one.

*Absolute Maximum.*—The maxima this year have been quite unimportant; the highest in June was  $85^{\circ}3$ , but only four years since it was higher ( $85^{\circ}6$  in June, 1883). There are eight out of the twenty-nine Junes with higher max., June 1870 heading the list with  $91^{\circ}2$ . July tells a similar tale; the max. in 1887 was  $88^{\circ}8$ , but even so recently as 1885 we had  $90^{\circ}4$ , and the present year's

value has been surpassed in ten out of the twenty-nine years, 1881 heading the list with  $94^{\circ}6$ .

*Frequency of High Maxima.*—A very good idea of the character of a season may be obtained by noting how often the maxima exceed certain fixed points. The following are the facts as to this—

	Instances between			Above	Above	Above
	$70^{\circ}$ & $80^{\circ}$	$80^{\circ}$ & $90^{\circ}$	$90^{\circ}$	$70^{\circ}$	$80^{\circ}$	$90^{\circ}$
Mean 1858-86 .....	38	10	1	49	11	1
1887 .....	37	16	0	53	16	0
Difference .....	-1	+6	-1	+4	+5	-1
Number of years out of the previous 29 in which the instances in 1887 have been equalled or exceeded .....	19	7	10	8	8	10

*Interval since similar Heat.*—The above will have shown that though it has been hot, it has been nothing very exceptional. Another set of investigations shows that all the phenomena have been equalled within a comparatively recent period, mostly within eight years. The rarest phenomenon seems to be the high mean temperature of the two consecutive months of June and July ( $64^{\circ}6$ ); this does not seem to have been equalled since 1872, but previous to that there are several cases—1870, 1868, 1865, 1859. In 1868 May was extremely warm,  $10\frac{1}{2}^{\circ}$  above May 1887. May to July 1868 had a mean 9 a.m. temperature of  $66^{\circ}0$ , against  $60^{\circ}2$  in 1887.

Of course, we are neither suggesting that this is a cool nor a damp summer; all that we point out is, that at present we have not proved that it is in many respects, or at all stations, unprecedented. Take July 1868; we had in London 20 days above  $80^{\circ}$ , and of them 4 were above  $90^{\circ}$  (and  $90^{\circ}$  was also reached in September); this year there were only 11 days above  $80^{\circ}$ , and  $88^{\circ}8$  is the highest point reached.

Or again, take *British Rainfall* 1868 and look at the monthly falls in May, June, and July; here are the totals for the three months at a few places—

Camden Square .....	2.81	Rotherham .....	1.28
Chichester .....	2.41	Leeds .....	1.54
Wellingborough .....	1.29	Castle Newe, Aberdeen ...	1.72
Cossey, Norwich .....	2.04	Antrim .....	2.89
Branston, Lincoln .....	1.20		

At Camden Square the total rainfall was—

	May.	June.	July.	Total.
1868.....	1.58	.78	.45	2.81
1887.....	1.45	.91	1.07	3.43

Therefore both the temperatures and the above monthly totals of rain indicate a more trying time in 1868 than in 1887.

#### END OF THE DROUGHT.—A CENTURY'S DROUGHTS.

(From the YORK HERALD of July 9th, 1887.)

The welcome rain has come at last in North-east Yorkshire, terminating the long drought which had lasted just a month. The genial showers which fell

on Monday afternoon came just in the nick of time, as the parched ground was showing disastrous proof of the extreme heat and long absence of moisture. Saturday and Sunday were the hottest days experienced in the district for a long time, and were, it seems, the culminating point of a very hot cycle. The thermometer at Messrs. Slaters', Malton, on Saturday registered 90 deg. in the shade, a record which takes us back to some of the hottest periods of the present century. We read of unusually hot summers in 1718, 1723, 1750, 1778, and the following year; and then in the present century July, 1808, was the first excessive case. Again, the whole of the summer of 1818 and July and August of 1819 were very hot. In July, 1825, both men and horses died from the heat, as they did also in 1750 and 1808. The entire summer of 1826 was notably hot and dry, and 1835 was nearly the same. August 1842, was a month of awful heat, and in 1846 the entire summer was intensely hot and dry. Next were 1857-8-9, remarkably hot, especially August, 1857; June, 1858; and July, 1859. September, 1865, was the hottest September on record. Next was 1868, from May to September, most excessive of all, with many deaths from the great heat. There was nevertheless, a very good harvest in that year, especially of wheat and barley. Then July, 1873, and July 1874, showed a temperature nearly equal to that of 1868; and in 1876 most excessive heat also prevailed, July and August of that year being respectively  $2\frac{1}{2}$  deg. and  $3\frac{1}{2}$  deg. above the average, the maximum on August 14th being 90 degrees, or exactly the same temperature as was registered at Malton on Saturday. In the last decade we have had occasional waves of heat, but as a rule our summers have been short, and generally wet and unproductive; in fact, since 1878 we have not had in Yorkshire one harvest up to average all round. It is feared that of 1887 will be no exception, as oats have already suffered almost past redemption by the long drought. Wheat, however, looks well, and given favourable weather till August we should have a good wheat and pulse harvest, as peas and beans also look well. The small rainfall of only 0.14 inch for June was the lowest ever recorded in that month; the nearest approach being in June, 1865, when 0.44 inch fell.

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*To the Editor of the Meteorological Magazine.*

SIR,—The present drought seems worthy of special notice. An absolute drought reigned here for 28 days in June, and 5 in July, making a total period of 33 days. On the 5th inst. 0.11 in. fell, and on the 10th, 0.05 in.; total, 0.16 in. This is all the rain we have had for 52 days. This long spell of dry weather was broken this morning by 0.15 in. only, up to 9.30 a.m. On Saturday, the 16th inst., a violent TS occurred in the neighbourhood, when nearly an inch of rain was measured at Ifield, a station only four miles from here. We did not have a drop here. I have no record to compare with the above. The nearest approach to it being from June 25th to August 4th, 1885, with 0.24 in. giving a partial drought of 40 days. Our rainfall for the 6 months ending June this year is 8.30 inch.—Yours faithfully,

A. F. PARBURY.

*Rusper, Horsham, Sussex, July 25th, 1887.*

*To the Editor of the Meteorological Magazine.*

SIR,—The rainfall for this year having been exceptional, I send you herewith fuller particulars.

	1887.	Average 29 years.
January.....	1·57	1·85
February .....	·41	1·69
March .....	1·52	1·88
April .....	1·37	1·64
May .....	1·61	1·79
June .....	·04	2·01
1st half year...	6·52	10·86
July .....	1·10	2·27
	<u>7·62</u>	<u>13·13</u>

On the 3rd June '03 in. fell, and no more till July 4th, being 30 days absolutely without rain. The month of June was the driest since April, 1852.

The half-year is, however, by no means the driest six months we have had. In the six months, October, 1857, to March, 1858, only 3·58 inches fell. In the first half of 1874, 6·70 inches.

One feature of the year is the remarkable absence of thunderstorms, of which there have been very few and very slight. Is it only a coincidence that this should happen at the minimum period of sunspots?—I remain, Sir, yours very truly,

HAROLD SMITH.

*Fulford House, Hull, 6th August, 1887.*

*To the Editor of the Meteorological Magazine.*

SIR,—the rainfall for the first half of this year, measured here, was 0·43 inch *less* than I have ever before recorded for the corresponding period of the year since 1860 (inclusive) ; but to the end of July it was 0·44 inch *more* than for 1870.

The amounts up to the ends of months June and July were :—

	1887.	1870.
To end of June	6·61 inches.	7·04 inches.
„ July	7·87 „	7·43 „

T. W. BACKHOUSE.

*West Hendon House, Sunderland.  
Aug. 8th, 1887.*

*To the Editor of the Meteorological Magazine.*

SIR,—So much has been said and written about the drought of this year, that I have ventured to send a comparison with former years.

We had a glorious rain last night (0·76), with intense T & L. If it had not been for last night's rain, 1868 and 1887 would have been nearly equal.—Very truly yours.

HENRY FFOLKES.

*Hillington Rectory, King's Lynn, August 1st, 1887.*

	1887.	1868.	+ or — mean 1866-86.	Max. Min. in 21 years.			
January .....	2·52	2·06	0·59 +	1867	3·97	1880	0·21
February .....	0·73	1·76	1·13—	1866	3·10	1886	0·50
March .....	1·68	1·75	0·17 +	1869	3·31	1875	0·57
April .....	1·15	2·07	0·73—	1876	4·18	1875	0·58
May .....	1·81	0·32	0·04—	1878	3·94	1868	0·32
June .....	0·20	0·47	2·05—	1883	4·79	1868	0·47
July .....	*1·36	0·07	1·42—	1875	6·90	1868	0·07
	9·45	8·50					

\* Of which 0·76 on 31st.

Total for first seven months 1887 ..... 9 45  
1868 ..... 8·50  
Mean 1866-86 ..... 14·08

*To the Editor of the Meteorological Magazine.*

SIR,—I am again keeping a correct register of the rainfall, which I hope to forward you at the proper time. I may add that so far I believe this to be the driest year on record—that is in this immediate neighbourhood. The dry years remembered around here are 1826, 1842, 1859, 1868, 1869, and so far the present one. My rainfall to the end of July has been 12·90 in., and only ·15 in. more up to the present date, or total up to August 11th 13·05 in.; in 1886 up to that date the fall was 24·24 in.—Yours faithfully,

JOHN CHARLTON.

*Denton House, Low Row, Carlisle.  
Aug. 11th, 1887.*

## UNDERGROUND WATER.

*To the Editor of the Meteorological Magazine.*

SIR,—It is over eleven years since I began to observe, and collect statistics with reference to, the stores of underground water in this country.

The almost general deficiency of the rainfall since the commencement of the present year naturally leads to an enquiry as to what is the present state of the water supply in the underground stores which furnish the perennial flow to our rivers?

Now, although there has been a very marked deficiency in the rainfall of the present year, it should be observed that the quantities of water in store in the ground generally, throughout the country, were larger than usual in the spring of the present year—hence we have had in the Croydon district a bourne-flow, a phenomena connected with abundance of rainfall.

The large amount of water in store at the commencement of the year was due to the fact that there was really no low water of any consequence last year, so that we started the year with a surplus store. At the present time, if we compare the stores of water throughout the country with the past records, it will be found that in many parts the stores of water in the ground on the last day of July of the present year are absolutely greater than at the same period in the low water year of 1885. In other parts of the country there is a marked deficiency in the store of underground water as compared with the same period.

The waters are generally very much lower throughout the country than they were at the corresponding period last year, with the exception of some parts of the Midland district, in which the store of water in the new red sandstone is greater than in the corresponding period of last year, and vastly greater than in the low water period of 1885.

The greatest deficiency of water in store, as compared with the low water year of 1885, is in Herefordshire, a large part of Devonshire, the chalk districts of Yorkshire and Sussex, and parts of Cumberland.

In the chalk districts of Wiltshire, one of the principal sources of the Thames, the waters at the present time are about equal in volume to what they were at the corresponding period of 1881, 1883, and 1885.

In the chalk districts of Surrey, Kent, Berks, Bucks, and Hertfordshire, there is rather more water in store than in the corresponding period of 1885.

In the oolite districts of Northamptonshire the waters are lower than at the corresponding period of 1885; but in a similar district in Gloucestershire, there is now a greater quantity in store than in 1885.

The present state of underground waters does not indicate such a marked deficiency as occurred in the corresponding periods of 1844, 1845, 1847, 1854, 1855, 1865, and 1875. Still, the present indication clearly points to the fact that we may anticipate very low water this autumn.

It has been curious to observe that during the past hot weather the ground has received a very considerable amount of moisture from the atmosphere. This is clearly indicated by my new earth hygrometer, and also from the fact that a measurable quantity of water has passed through the gravel percolation gauges every day during July, and water is still passing through these gauges—the total quantity passed in July being small, .035 inch in depth.

I am, Sir, yours faithfully,

BALDWIN LATHAM.

7, Westminster Chambers, Westminster, S. W.  
6th August, 1887.

## BLACK RAIN.

*To the Editor of the Meteorological Magazine.*

SIR,—I see in *Symons's Monthly Meteorological Magazine* for the present month, July, 1887, that mention is made on page 90 of a shower of *Black Rain* which fell at Castlecomer, in Ireland, on *April 30th* of this year. We had a similar Shower of *Black Rain* on the *same day*—April 30th—here at Newport, in Monmouthshire, according to the meteorological journal which I keep. It fell on the same day, about 4 o'clock (wind N.E.) in the afternoon, which made it so dark that it was necessary to have candles and lamps. The black rain fell heavily for some time, staining the yellow gravel walks and leaving a black deposit in the hollows where it rested, some of which is visible at this day, and the rain water that persons caught in tubs and pans and cisterns could not be used. The description in the Magazine described exactly what happened here. Newport is a large town of some 40,000 inhabitants, with various manufactories, railways and docks on a large scale. There was a very dark, heavy cloud over the town, and it seemed to me as if the falling rain had become charged with the fine particles of soot from the chimneys of the town, which it held in suspension as a thick dark London fog does the London smoke which gave it its peculiar dark colour. I have lived here for the last 40 years. My house is on the outskirts of the town, about 150 feet above it, and I have never seen anything of the kind before; the air was highly electric and there was thunder. It was a fine but cold day till this storm came on. Barometer stood at 29·93, having slightly risen from 29·75, and the wind N.E., and it was stormy and unsettled. The water in the rain gauge was quite black, and I send you in a paper some of the deposit which settled from it. What seems curious to me is that similar showers or storms should have fallen in Ireland on the same day, only a few hours later. It is a phenomenon I never saw or heard of before, and it is curious that it should have occurred at the same time at two places so distant from each other. It could hardly be a travelling storm, but the concurring circumstances are very curious. No one seems to have noticed it, but those persons who caught the rain water in tubs and cisterns could not use it. I enclose some of the black deposit from the water which dried up and was not evaporated by heat.

I remain, Sir, yours faithfully.

OCTAVIUS MORGAN, F.R.S., F.S.A.

*The Friars, Newport, Monmouth.*

[This is a very curious coincidence. An anticyclone appears at the time to have covered both localities, its centre being over the Isle of Man, and the winds were light or calm. There does not appear to have been any connection between the two cases, but similar causes produced similar results. We forwarded the deposit which Mr. Morgan was so kind as to send us to Prof. Meldola, F.R.S., and he

reports "Nothing but the deposit from coal smoke." Mr. Morgan had already anticipated this verdict in the above letter, one which we think most persons who know Newport would have anticipated. We have never been at Castlecomer, but on turning to the excellent *Gazetteer of the British Isles*, recently published by A. and C. Black, we find, among other details respecting Castlecomer, "Coal is worked in the district." Given two towns with coal industries, given similar anticyclonic conditions, given a thunderstorm at each place, the similarity of the result is not very surprising. Possibly there may be a hint as to the formation of rain around smoke particles or of thunderstorms which may be worthy of Mr. Aitken's attention.]  
—ED. M.M.

### REVIEWS.

*Results of the Meteorological Observations made at the Blue Hill Meteorological Observatory, Massachusetts, U.S.A., in the year 1886, under the direction of A. LAWRENCE ROTCH, S.B.* 4to ix.—45 pages, 8 plates, Mudge and Sons, Boston, 1887.

THIS the first complete annual report on the highest, and probably the best private meteorological observatory in the United States, is both interesting and instructive. As already mentioned in this magazine, Mr. Rotch came to Europe, and personally visited many of the high mountain stations, thus obtaining many hints for his own guidance. Therefore, when his report comes before us, we have to see not merely that there are the usual climatic data, but what are the special facts brought out by a high level station. We have been promised much from Ben Nevis, but we have as yet seen little. Perhaps Mr. Rotch's report may help us because though not at all lofty (only 635 ft. above the sea) it is stated to be the highest point within 10 miles of the Atlantic, from Maine to Florida, that is to say for somewhere about 2,000 miles or practically along the whole Eastern coast of the United States.

In one respect it may be urged that nothing like criticism should be passed on Mr. Rotch's work, because it is entirely honorary—nay more it is wholly at his cost. He does not tell us the cost of the freehold, but that of the building alone was about £730, and that of maintenance is over £500 a year.

We are, however, not in the habit of paying empty compliments, no one recognizes more heartily than we do Mr. Rotch's devotion of time, and of money to meteorology and we believe that no one would be more ready than he to profit by straightforward criticism should such be needed.

We are glad to see that he has successfully transported a fine Fortin barometer, Kew verified, to his observatory—we infer that the correction for scale error has been applied to all the readings on pages 2 to 7 inclusive, but the head line runs "Barom. Red. to 32°," we prefer "Barom. Corr. and Red. to 32°."

It seems that the Signal office standard, and the Kew standard differ by 0.006 in. the Kew being the lower. We are becoming convinced that thousandths of an inch of mercury are of little if any importance in meteorology, but if they were, we should consider this difference too large.

Mr. Rotch is both liberal and wise in having duplicates, or rather duplicate methods, for recording most of the elements, *e.g.*, he has a Draper Mercurial, and a Richard Aneroid, barograph. We see no intimation respecting the instruments used to supply the figures on on pages 2 to 7 under the headings of "Dew Point" and "Relative humidity." In the introduction we are told that. "In cold weather a Koppe hair hygrometer made by Hottinger of Zurich has been used to determine the relative humidity and the dew point. In winter the mean relative humidity given by the hair hygrometer is about 6 % lower than that calculated from the readings of the wet and dry bulb thermometers, which are known to give erroneous results at low temperatures." Just so, but why not give the two values side by side, then the Blue Hill observations would contribute their quota towards that modification of the hygrometric tables which everybody admits to be necessary.

As regards anemometers, Mr. Rotch seems to have achieved some remarkable results, he has several, but two of them a Draper and a Robinson "differ less than one per cent."

Mr. Rotch is rather tantalising in the following paragraph :—

"The self-recording rain and snow gauge constructed, after the writer's design, by Richard Brothers, of Paris, has been in use since March, 1886. The receiver of this gauge rests upon a platform balance, and when rain falls its weight causes the balance to record the amount and time of occurrence of the rain upon a revolving drum, as in the other Richard instruments. . . . To adapt it to snow another receiver is used, which is deeper, with an inner shield to prevent clogging by sleet. The author believes this to be the first successful attempt to record snow automatically without first melting it. The records of the registering gauge agree fairly well with those of the standard with which they are compared. The former gauge has been surrounded by a flaring wire screen on the Nipher system to protect it from the wind, and more snow has thereby been caught in windy weather than before."

We called this paragraph tantalising because it seems to describe a most useful and valuable pattern of gauge, and yet does not enter sufficiently into details for one to form an opinion, and though Mr. Rotch is an expert photographer he has not given either a photograph or an engraving of it. We hope to hear more of this gauge in the future.

Mr. Rotch and his assistant, Mr. Clayton, seem to manage the Jordan sunlight recorder better than most persons, for Mr. Rotch says, "This generally records more sunshine than the burning

instrument, whose action is stopped when the sun is partly observed by cirrus clouds or light haze." That is exactly what it ought always to do, and we think that when it does not, the inference is irresistible that either the papers are deficient in sensitiveness or the observer is not a good manipulator.

The tables do not seem to call for much comment, values for one year are of little use as climatic constants, as years roll on their importance will gradually rise.

We note a few points which strike us. The hourly readings of the Draper Anemoscope give a great preponderance to W. winds. In fact S.W., W. and N.W. give 4483 hours against 2257 hours for S.E., E. and N.E.—or, practically, two of W. to one of E. The velocity of the wind seems to have less diurnal variation than usual; it only varies 10 per cent. being 18.1 miles from 7 to 8 a.m., and 19.9 miles from 3 to 4 p.m.—which by-the-by is later than usual, possibly 1887, may relegate the maximum nearer to 2 p.m.

In an appendix are given reproductions of the indications of some of the sheets from the recording instruments and explanatory notes by Mr. H. Helm Clayton. Here alone we find a trace of what we call true high-level-station work; we, therefore, quote the paragraph.

"Plate No. 3 shows some inversions of temperature between the summit and base of the hill. Curve 1 shows the tracing of the thermograph at the summit from noon of Aug. 22 to noon of Aug. 23. Curve 2 (dotted) shows the tracing of a Draper thermograph at the base, or rather on the slope of the hill, four hundred feet beneath [*sic. i.e.*, lower than] the summit. The time scale of this latter tracing is enlarged to make it correspond with the tracing at the summit. It is seen that the temperature was higher at the base during the day, and decidedly lower at night. The temperature at the base continued to fall until sunrise of the 23rd, while at the summit it rose after 11 p.m. of the 22nd. This inversion occurred on an unusually clear, quiet night, and is a marked example of what almost invariably occurs on such nights."

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*Le Climat de la Belgique en 1886.* Par A. LANCASTER, Météorologiste-Inspecteur à l'Observatoire Royal de Bruxelles [Extrait de l'*Annuaire*]. 12mo, 74 pages and 2 plates. Bruxelles, Hayez, 1887.

If we were asked to name the writer who was the best able to pick out from a meteorological register the salient features, and to render them interesting and agreeable reading, we should treat M. Lancaster as the classical examiners at Cambridge have lately treated Miss Ramsay, put him in the first class by himself, and put all other writers in second, third, or other inferior classes.

The first page of this pamphlet, though not in any way exceptional, will serve to illustrate our meaning.

"The meteorological year 1885-86 commenced with a rigorous

and prolonged winter, especially noteworthy for the frequency and persistency of its frosts rather than for their intensity. From December to March there were, at Brussels, 71 days on which the temperature fell below freezing point, instead of 41, the usual number; on the high lands of the Ardennes, at Bastogne among other places, there were, from December to May, 132.

"These low temperatures marked the close of a long, cold period which had commenced in July, 1885. From that month up to March, 1886 inclusive, that is to say during nine consecutive months, the monthly mean temperature was always below the average, and by considerable amounts in August, October and February. The following table gives these differences [converted into Fahrenheit.—ED.] :—

1885.						1886.		
July.	Aug.	Sept.	Oct	Nov.	Dec.	Jan.	Feb.	March.
—0·4	—3·2	—1·6	—3·6	—2·0	—1·3	—1·4	—6·5	—2·0

But there is one subject upon which we feel bound to protest, and we hope that we shall not protest in vain. What is the use of holding International Congresses if, after all, only those decisions which please everybody are to be obeyed? We have nothing to do with Governmental work, have, therefore, no right to attend these gatherings, and therefore, of course, equally have no obligation to obey the instructions they issue. But there is nothing so essential to meteorological progress as uniformity, therefore, in our own little way, we obey the rules in the making of which we have no right to have a word. With Government establishments it is otherwise, and we must own to great regret at finding this pamphlet drawn up for what is called "the Meteorological year." We could say much against this plan of beginning with December 1st, but we prefer to rest on the ground that the question was discussed and the civil year was adopted. We think that this decision should be loyally observed by all—especially in Brussels, the city in which, first of any in the world, a meteorological congress was held.

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*Report of the Marlborough College Nat. Hist. Soc. for the year ending Christmas, 1886.* 8vo., 144 pages, 2 plates. Perkins: Marlborough, 1887.

FROM a strictly meteorological point of view this is the worst of the thirty-five reports that the Society has issued because it tells of a break of six months in the Marlborough record. We know not, and do not wish to know, on whose shoulders the blame for this interregnum is to rest, but *somebody* ought to have come to the rescue.

It is, however, useless to complain now, except as a warning to others, and it is far more pleasant to call attention to what is certainly a good feature in the report—viz., the printing of extracts from the Society's record-book under the title of "Notes and obser-

vations." We reprint three of them, which are of special meteorological interest.

*White Mist-bow.*

Poulton Downs, Feb. 10th.

During the frost a low layer of mist was blowing over the Downs, and during frequent breaks in the fog, the sun shining on it produced a white mist-bow. The width of the arc about equalled that between the primary and secondary ordinary rain-bow, but the colour was pure white.

It was seen on turning the back to the sun.

Time, 4—4.30 p.m. Altitude of sun,  $15^{\circ}$ — $20^{\circ}$ .—Altitude of top of bow,  $35^{\circ}$ — $45^{\circ}$ .

This phenomenon is probably due to the super-position of coloured bows : or to the reflection of sunlight from vapour semicrystalline by frost.

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LIEUT.-COL. SYKES, Poonah, *Philosophical Transactions*, 1855, writes—  
 ".....I emerged from the fog which terminated abruptly in a wall some hundred feet high. Shortly after sunrise I turned homewards and discovered in the mural termination of the fog, a perfect rain-bow, defined in its outline, but destitute of prismatic colours."

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The altitude of the sun, height of the mist, and wall-like termination of the fog are approximately similar in the two cases.—A.S.F.

*Electricity on Glow-worm.*

In the holidays when coming home from a party there happened to be a thunderstorm and as I was walking along a road I noticed and tried to catch several glow-worms, but while thus engaged I noticed that at every flash of lightning the light of the glow-worms so to speak went out and continued so for about quarter of a minute when they again gave forth their usual light. To test the truth of this I took up a couple in my hand when the same peculiar occurrence happened at each flash. I do not know if this has ever been noticed.—H. A. SLACK, Sep. 28th, 1886.

[Did the light diminish, or was it that Mr. Slack's retina was so affected by the blaze of the lightning as not to be sensitive to the feeble glow ?—ED. M.M.]

*Fog on the Hills.*

On Monday, Nov. 22nd, 1886, the curious effects of the masses of fog were worth observing. Early in the day the fog was very dense, but at 9 a.m. it lay like a vapour bath in the valley, while by ascending to the Common or Granham Hill the view over it was clear. As the sun grew powerful the fog left the valley, and at 3 p.m. was clinging like a wet blanket to all the hills on the downs. They seemed from a distance as if covered with soft wool a few feet thick. Towards evening the fog again descended into the valleys. I noticed the curious afternoon effect from near Rabley.—T.N.H.S.

SUPPLEMENTARY TABLE OF RAINFALL,  
JULY, 1887.

[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 .....	1'01	XI.	Castle Malgwyn .....	2'44
"	Margate, Birchington...	'27	"	Rhayader, Nantgwillt..	2'92
"	Littlehampton .....	1'07	"	Carno, Tybrith .....	1'99
"	Hailsham .....	'42	"	Corwen, Rhug .....	2'01
"	Ryde, Thornbrough .....	'97	"	Port Madoc .....	4'21
"	Alton, Ashdell .....	'92	"	I. of Man, Douglas .....	2'33
III.	Oxford, Magdalen Col...	'71	XII.	Stoneykirk, Ardwell Ho.	3'43
"	Banbury, Bloxham .....	'50	"	New Galloway, Glenlee	6'16
"	Northampton .....	'71	"	Melrose, Abbey Gate ..	2'83
"	Cambridge, Beech Ho...	'59	XIII.	N. Esk Res. [Penicuik]	3'00
"	Wisbech, Bank House..	'88	XIV.	Ballantrae, Glendrishaig	3'53
IV.	Southend .....	1'35	"	Glasgow, Queen's Park.	2'33
"	Harlow, Sheering .....	'86	XV.	Islay, Gruinart School..	3'96
"	Rendlesham Hall .....	2'41	XVI.	St. Andrews, PilmourCot	2'38
"	Diss .....	1'25	"	Balquhiddel, Stronvar..	4'60
"	Swaffham .....	1'15	"	Dunkeld, Inver Braan..	2'08
V.	Salisbury, Alderbury...	'67	"	Dalnaspidal H.R.S. ....	3'61
"	Warminster .....	'88	XVII.	Keith H.R.S. ....	1'97
"	Calne, Compton Bassett	..	"	Forres H.R.S. ....	1'95
"	Ashburton, Holne Vic..	2'55	XVIII.	Strome Ferry H.R.S....	4'75
"	Holsworthy, Clawton...	..	"	Tain, Springfield .....	2'76
"	Hatherleigh, Winsford.	..	"	Loch Shiel, Glenaladale	10'34
"	Lynmouth, Glenthorne.	1'63	"	S. Uist. Ardkenneth ...	2'95
"	Probus, Lamellyn .....	1'70	"	Invergarry .....	6'03
"	Wincanton, Stowell Rec.	'93	XIX.	Lairg H.R.S. ....	1'85
"	Taunton, Lydeard Ho...	'91	"	Forsinard H.R.S. ....	2'25
"	Wells, Westbury .....	1'22	"	Watten H.R.S. ....	2'54
VI.	Bristol, Clifton .....	1'13	XX.	Dunmanway, Coolkelure	3'71
"	Ross .....	1'68	"	Fermoy, Gas Works ...	1'74
"	Wem, Clive Vicarage ...	1'15	"	Tralee, Castlemorris ...	..
"	Cheadle, The Heath Ho.	1'87	"	Tipperary, Henry Street	1'61
"	Worcester, Diglis Lock	'98	"	Newcastle West .....	1'32
"	Coventry, Coundon .....	'80	"	Miltown Malbay .....	3'43
VII.	Melton, Coston .....	1'06	XXI.	Gorey, Courtown House	..
"	Ketton Hall [Stamford	'77	"	Navan, Balrath .....	1'75
"	Horncastle, Bucknall ...	1'35	"	Mullingar, Belvedere ...	3'21
"	Mansfield, St. John's St.	1'59	"	Athlone, Twyford .....	3'72
VIII.	Macclesfield, The Park.	1'16	"	Longford, Currygrane...	3'06
"	Walton-on-the-Hill .....	'99	XXII.	Galway, Queen's Coll...	4'10
"	Lancaster, South Road.	..	"	Clifden, Kylemore .....	6'45
"	Broughton-in-Furness ..	2'65	"	Crossmolina, Enniscoe..	3'83
IX.	Wakefield, Stanley Vic.	'73	"	Collooney, Markree Obs.	3'48
"	Ripon, Mickley .....	1'22	XXIII.	Rockcorry .....	2'46
"	Scarborough, West Bank	'96	"	Warrenpoint .....	2'84
"	East Layton [Darlington]	1'46	"	Newtownards .....	..
"	Middleton, Mickleton..	1'24	"	Belfast, New Barnsley..	3'65
X.	Haltwhistle, Unthank..	1'78	"	Cushendun .....	3'34
"	Shap, Copy Hill .....	2'96	"	Bushmills .....	2'26
XI.	Llanfrechfa Grange .....	2'00	"	Stewartstown .....	3'18
"	Llandovery .....	3'26	"	Buncrana .....	3'56

JULY, 1887.

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.	Differ- ence from average 1870-9	Greatest Fall in 24 hours.		Max.		Min.		On grass In shade.			
				Dpth	Date.			Deg	Date.		Deg		Date.
		inches.	inches.	in.				Deg	Date	Deg	Date.		
I.	London (Camden Square) ...	1·07	— 1·40	·29	24	9	88·8	3	45·6	18	0	0	
II.	Maidstone (Hunton Court) ...	·73	— 1·31	·41	25	7	...	...	...	...	...	...	
III.	Strathfield Turgiss .....	·80	— 1·50	·22	24	9	88·3	4	40·2	18	0	0	
	Hitchin .....	·93	— 1·77	·28	14	7	84·0	3	45·0	17 <sup>a</sup>	0	0	
IV.	Winslow (Addington) .....	·74	— 1·86	·21	15	8	87·0	3	40·0	18	0	0	
	Bury St. Edmunds (Culford) ...	1·00	— 1·97	·44	31	11	87·0	3, 13	35·0	18	0	...	
V.	Norwich (Cossey) .....	1·95	— ·80	1·25	31	8	...	...	...	...	...	...	
	Weymouth (Langton Herring) ...	·97	...	·37	17	7	79·0	20	48·0	18	0	...	
"	Barnstaple .....	1·86	— 1·69	·43	24	11	86·0	9	52·0	6 <sup>b</sup>	0	...	
	Bodmin .....	1·61	— 1·83	·66	27	12	76·0	3, 21	48·0	31	0	0	
VI.	Stroud (Upfield) .....	·88	— 1·96	·34	26	8	87·0	4	51·0	31	0	0	
"	Church Stretton (Woolstaston) ...	1·29	— 1·74	·36	26	11	83·0	3	47·0	6, 18	0	0	
	Tenbury (Orleton) .....	1·53	— 1·38	·50	26	9	87·3	3	39·0	18	0	0	
VII.	Leicester .....	·77	...	·25	4	9	87·5	3	42·5	18	0	2	
"	Boston .....	1·11	— 1·42	·56	31	9	95·0	3, 4	40·0	6, 18	0	...	
"	Hesley Hall (Tickhill) .....	1·83	...	1·11	16	7	89·0	3	39·0	6	0	...	
VIII.	Manchester (Ardwick) .....	...	...	...	...	...	...	...	...	...	...	...	
IX.	Wetherby (Ribston Hall) ..	1·04	— 1·57	·48	27	5	...	...	...	...	...	...	
"	Skipton (Arncliffe) .....	2·27	— 2·68	1·12	26	15	88·0	3	35·0	·5	0	...	
"	Hull (Beverley Road) .....	1·10	— 1·52	·36	31	11	84·0	6	43·0	4	0	0	
X.	North Shields .....	·80	— 1·75	·22	15	12	84·0	3	39·5	6	0	0	
	Borrowdale (Seathwaite) .....	10·04	+ 1·27	2·48	9	20	...	...	...	...	...	...	
XI.	Cardiff (Ely) .....	...	...	...	...	...	...	...	...	...	...	...	
"	Haverfordwest .....	2·99	— ·94	1·14	26	12	81·2	8	43·4	30	0	...	
"	Plinlimmon (Cwmsymlog) ...	3·54	...	1·25	26	11	...	...	...	...	...	...	
	Llandudno .....	1·18	— 1·53	·28	24	10	84·0	8	45·8	6	0	...	
XII.	Cargen [Dumfries] .....	4·28	+ 1·15	·95	9	19	79·0	20	38·0	6	0	...	
	Jedburgh (Sunnyside) .....	2·67	— ·26	·47	9	18	79·0	1, 9	37·0	6	0	...	
XIV.	Old Cumnock .....	4·00	+ ·90	·55	12	20	81·0	8	37·0	5	0	...	
XV.	Lochgilphed (Kilmory) .....	3·72	— ·82	·76	26	26	...	...	...	...	...	...	
"	Oban (Craigvarren) .....	4·85	...	·95	26	25	76·0	8	46·0	17	0	...	
"	Mull (Quinish) .....	4·99	...	·92	13	24	...	...	...	...	...	...	
XVI.	Loch Leven Sluices .....	2·60	— ·45	·70	27	13	...	...	...	...	...	...	
	Arbroath .....	1·68	— ·96	·30	4	12	74·0	3, 22	41·0	6	0	...	
XVII.	Braemar .....	1·70	— 1·16	·22	4	20	75·8	1	36·3	6, 31	0	2	
	Aberdeen .....	1·94	...	·46	10	17	76·0	1, 9	39·0	5	0	...	
XVIII.	Lochbroom .....	3·40	...	·40	24	22	...	...	...	...	...	...	
	Culloden .....	2·29	— ·49	...	...	...	76·0	1	39·0	6	0	1	
XIX.	Dunrobin .....	1·80	...	·31	7	15	77·0	1	37·0	6	0	...	
	Kirkwall (Swanbister) .....	3·07	...	·46	8	27	66·1	27	35·8	7	0	...	
XX.	Cork (Blackrock) .....	1·45	— 1·39	·41	12	13	82·0	2, 3	44·0	31	0	0	
"	Dromore Castle .....	2·79	...	·56	9	17	81·0	19	45·0	24	0	...	
"	Waterford (Brook Lodge) ...	2·40	...	·82	12	12	81·0	3	42·0	18	0	...	
	O'Briensbridge (Ross) .....	2·10	...	·65	9	16	80·0	1, 3	31·0	27	1	0	
XXI.	Carlow (Browne's Hill) .....	1·69	— ·87	·37	12	17	...	...	...	...	...	...	
	Dublin (Fitz William Square) ...	1·19	— 1·23	·53	31	13	77·0	7	50·3	18	0	0	
XXII.	Ballinasloe .....	2·60	— ·28	·77	9	18	72·0	2	46·0	9, 16	0	...	
XXIII.	Waringstown .....	2·85	— ·73	·58	9	16	83·0	1	45·0	25	0	...	
"	Londonderry (Creggan Res.) ..	3·88	...	·67	26	26	...	...	...	...	...	...	
"	Omagh (Edenfel) .....	3·16	— ·09	·50	26	22	75·0	1	42·0	31	0	...	

a And 18. b and 16, 19.

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

# METEOROLOGICAL NOTES ON JULY, 1887.

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.

**STRATHFIELD TURGISS.**—Another dry month, with continued drought. There were a few slight and essentially local showers, but practically no rain. The ground is like iron, the skies like brass. From being a late season, it has become an early one; wheat, peas, winter oats and barley were being cut at the end of the month, and the country was "waiting for rain." TS on 4th and 15th.

**HITCHEN.**—The longest drought since 1868, only .70 in. of R in 8 weeks and 1 day; and the highest mean daily temp. (65°) since 1859.

**ADDINGTON.**—A month of splendid weather. The dry period which set in on June 4th, terminated with a slight shower on July 4th, giving an absolute drought of 30 days, and as very little R fell till the 15th, we had a partial drought of 41 days; in fact, the R of the month has done very little to help vegetation. The temp. rose above 80° on 11 days, a rather unusual occurrence. T on 15th and 31st; L on 16th.

**CULFORD.**—The small amount of R recorded was of little help to the root crops; wheat and barley good. T on 31st.

**LANGTON HERRING.**—Another very dry month, the R being 1.34 in. below the average, and making the total from the beginning of the year only 9.18 in. on 66 days, the average being 16.72 in. on 99 days; the fourth month of the year with less than an inch of R. The mean temp. at 9 a.m. (65°·8) is 2°·5 above the average. Fogs and mist occurred on many days. TS on 17th.

**BODMIN.**—The showers of this month were most welcome after the disastrous drought. In 38 years, I have recorded no other year with so small a rainfall in the first 7 months.

**STROUD, UPFIELD.**—A very dry month, R much wanted. T on 14th, 15th and 17th; L on 31st.

**WOOLSTASTON.**—The continued drought was severely felt, pastures are burnt up, and water supplies very low. The heat at times was most oppressive.

**ORLETON.**—A very brilliant hot and dry month. The max. temps. were high and steady, averaging 76°·2; but the nights were cool, as the sky was generally clear. The mean temp. at 9 a.m. was 4°·4 above the average of 26 years, and was exceeded only by 0°·4 in 1868. A light shower with L and T passed from S. to N. on 14th; very distant T was heard on 15th, 16th and 31st, and very distant L seen on 31st. The bar. was high and steady; but the wind was frequently rough, and generally from N.W. to N.E. Hay crep below the average, but secured without R.

**LEICESTER.**—Another very dry and hot month, with the exception of two or three nights.

**HULL.**—A very fine month, with occasional gentle showers.

**NORTH SHIELDS.**—Thunder on 13th, 15th, 28th and 31st.

**SEATHWAITE.**—Besides the max. R of 2.48 in. on 9th, there were four days on which more than one inch fell.

## WALES.

**HAVERFORDWEST.**—The magnificent weather of June, with its bright sunshine and great heat, continued into this month; but on the 8th the much wished for R came, too late to revive the grass, which in many places was completely burnt up. On 19 days the temp. rose above 70°, and on one day above 80°; and the night temp. was much higher than that of June. From the 24th to the end high wind prevailed, with considerably lower temperature, and a strong gale blew on 26th. Prevailing winds W.S.W. and N.N.W. Corn crops looking well.

**LLANDUDNO.**—The fine weather of June continued with little interruption throughout July. The mean temp. (62°·0) was 1°·0 above the average; the max. temp. was singularly steady, except on the 8th, when it bounded up to 84°, the readings for the preceding and following days being 71°·2 and 70°·0 respectively. The mean daily range was 2°·0 below, and the total range

7°·3 above the average. The greatest daily R barely reached a quarter of an inch, and the wet days being few, the air was very dry, and the mean humidity (72) was 7 below the average. From January to June inclusive, the R of each month was more or less below the average; the aggregate showing a deficiency of over four inches. Pressure was high the greater part of the month, with few and moderate fluctuations. On 12th and 13th strong westerly winds prevailed, and again from 26th to 28th. T on 17th and 31st. The atmosphere was at times remarkable for its transparency, and on the 24th, the Isle of Man, 60 miles distant, was distinctly seen from the Great Orme. The amount of bright sunshine (205 hours) was large, and the month was altogether a most enjoyable one. The public health was exceptionally good.

#### SCOTLAND.

**CARGEN.**—Although the R was considerably above the average, and the number of days on which it fell was 19, the heaviest falls took place during the night, and on most other occasions there were only passing showers. The duration of sunshine was 47 hours above the average. The mean temp. was nearly 1° above the average; and the atmospheric conditions were highly favourable for vegetation. Harvest commenced before the close of the month; green crops (turnips, &c) have seldom presented a more promising appearance. T on 5th, 8th and 31st; L on 31st.

**JEDBURGH.**—Warm and genial throughout. Vegetation made great progress. The hay crop, though below the average, was got in well; turnips a very good crop; corn matured rapidly, and several fields were cut before the close of the month, which has only occurred once before within living memory.

**ABERDEEN.**—As a whole the month was dry and warm. Rainfall considerably below the average. T and L on 10th.

**LOCHBROOM.**—A great contrast to the preceding month; wet and cold alternately, with very little sunshine, but on the whole very favourable after the heat and drought of June. H on 24th.

**CULLODEN.**—Very windy on many days, drying up the R which fell at intervals; dry between 15th and 27th.

#### IRELAND.

**BLACKROCK.**—From 1st to 14th fine between misty showers; from 15th to 23rd very fine, and hot at times; thence fine to the end between some misty showers. Harvest began in the middle of the month, which is much earlier than usual. Rainfall to the end of July less than half the average of 22 years. Mean temp. (64°·0) 1°·5 above the average of 11 years.

**DROMORE.**—Rain, which was much wanted, brought on the crops well, though the hay crop was exceptionally light, and potatoes were very backward.

**O'BRIENSBRIDGE.**—The R was irregularly distributed in this locality. With a sufficient though moderate fall here and in the district beyond Killaloe, in other parts the amount recorded was very insufficient, with consequent loss in grass and root crops. Like the preceding two months, the weather was lovely, and without precedent for many years back.

**DUBLIN.**—Although not so dry or settled or sunny as the previous month, July was comparable with it in respect of warmth, the mean temp. (63°·7) being 3°·0 above the average. In the preceding 22 years, July was warmest in 1868, the mean temp. (63°·5) being almost identical with this month. Atmospheric pressure was lower than in June, and easterly air currents gave way completely to westerly. Up to the 31st only '66 in. of R fell, but that small quantity was distributed over as many as 12 days. On the 31st a TS occurred, accompanied by very heavy R and H; no other electrical disturbances were experienced in the city or its vicinity. Solar halos on 14th and 24th. High winds on 14 days; a gale on 27th. Temperature reached or exceeded 70° on 17 days. Mean humidity, 71; mean amount of cloud, 6·0; prevailing winds, S.W., W. and N.W.

**EDENFEL.**—Although the rainfall almost reached the average it did not interrupt the hay harvest, and proved of great benefit to green crops and vegetation generally. As to temperature, the month was a warm one without any of the "fierce heat" of June.