

# S Y M O N S'S

## MONTHLY

# METEOROLOGICAL MAGAZINE.

CXXXV.]

APRIL, 1877.

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### GOVERNMENTAL METEOROLOGY.

*(Continued from page 25).*

RESUMING our consideration of the Report of the Treasury Committee, we have first to deal with the estimate published in our last number. The following are approximately the sums voted a year or two back for purposes of Education, Science, and Art. It is to be remembered that all these sums are irrespective of expenses for printing and stationery. Not being politicians, we do not understand why the expenditure upon publications is not charged to the several departments, so as to show the real cost of each:—

	£
Science and Art Department ... ..	296,000
British Museum ... ..	117,000
Meteorological Committee ... ..	10,000
Royal Observatory ... ..	7,000
National Gallery ... ..	6,000
Learned Societies .. ..	3,000
National Portrait Gallery .. ..	2,000

Viewed in this light we are not prepared to say that either the £10,000 hitherto voted, or the £14,500 now recommended, is too large a sum. To the distribution of the amount we, however, object most strongly. Let us, in the first place, re-arrange the items given in the report so as to show precisely what is intended—

Director's Office* and General Control	£2,500	} Direction £3,500
Remuneration of Council ... ..	1,000	
Land Meteorology, including self-recording observatories and supply of instruments ... ..	3,500	} Land Stations 5,300.
New land stations ... ..	1,500	
Inspection of stations (part due to land stations) ... ..	300?	

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\* It is rather rich to find this title retained after the Committee have recommended that no one should be called Director.

Telegraphy and Storm Warnings ...	2,500	} Telegraphy	3,200
Extension of telegraphy on Sundays	500		
Inspection of stations (part due to telegraphy) ... ..	200?		
Ocean Meteorology, excluding supply of instruments... ..	1,500	Sea Work	1,500
Special Scientific Researches ...	1,000		1,000

To the charges under the head of Direction, we see no reason to object, although we are slightly amused at the proposal of paying the Council; surely none of those who have recommended such a novelty would accept the paid office which they have proposed to create.

Deducting the charges for direction, which apply in part to all the subsequent heads, the amount left is £11,000, and this is appropriated in the following proportions:—

Land Stations.	Telegraphy.	Ocean Meteorology.	Special Researches.
£5,300.	£3,200.	£1,500.	£1,000.

Would a single reader of this magazine have expected the amounts to have been in the above order? Will anybody show why Ocean Meteorology (for the study of which the office was created) is in the future estimated to cost less than one-seventh of the entire vote? Is the subject worked out? Do the committee consider it a matter of third-rate importance? Or do they wish to imply that, as it is a large subject it had better stand over for the present, and in the interim that matters should just drift on? We cannot guess what the answer is, but we mistake the national feeling if it would approve of so paltry a mode of dealing with the subject. We used to hear tall talk about Britannia ruling the waves, but it is pretty clear that the Committee do not feel much interest in either waves or storms unless they come on the little islands in which they dwell.

Yes, that is about it, £8,500 for Great Britain and Ireland and £1,500 for our share of all the oceans of the globe.

Land stations in the British Isles, £5,300. What results have we had for the £50,000 already spent upon the land stations of the Meteorological Committee? Miles and miles of photographic curves have been produced, reduced, printed, measured, converted into figures, printed and published; but what is the use of that without discussion? There must be between three and four millions of hourly observations. Why is there nothing in the estimates for discussing and utilising them? Is that what the recipients from the Special Research fund are to do for the £1,000 per annum? Why, at a penny an observation the arrears would cost £15,000 to work up. Surely before launching into an additional expenditure of £1,500 per annum, proof should be given that past expenditure has been thoroughly utilised.

We cannot understand the item of "New land stations, £1,500." At present, the Meteorological Committee are receiving from the Meteorological Society perfect records from a number of stations for £5 per station per annum. Are the Committee of opinion that 300 more stations are necessary? or do they recognize the fact that £5 per

annum is far too little? We can give no opinion upon a proposal which is not explained, and are inclined to think the sum must have been specified without consideration, for the following reason: the amount of £1,500 is set down as the annual cost of the new land stations; but these stations have to be created; new stations must have new instruments, and yet there is no item for equipment. This omission is equally puzzling, whether it be regarded as intentional or the reverse.

The last item, "Special Scientific Researches, £1,000," if it is intended to attract to the support of the Council the unattached experts in meteorology must be dispensed with considerable discretion. Really scientific men, rarely care much about money. It is not for it that they live or work, and, therefore, if the Council desire their allegiance, they must not count upon obtaining it in return for money alone. Delicately managed, even this £1,000 a year may yield more important results than all the rest of the grant, or it may yield next to nothing. However, the Committee do not propose to incur any risk in the matter, for the total waste of £1000 of national money would never be felt, and we do not for a moment doubt that some good will result from the proposal.

Before proceeding further we must give the concluding paragraphs of the report:—

22. With reference to the Scottish Meteorological Society, the representations of which have been specially referred for our consideration, we desire to offer the following remarks:—

It seems essential that any grant of public money for the purposes that have been indicated in our recommendations, should be applied under the immediate responsibility of the Council, and that no expenditure should be incurred which those purposes do not absolutely require. There is evidence to show that a large and trustworthy amount of co-operation may be obtained in all parts of the United Kingdom, from observers who do not require remuneration for their services, and it seems very important that such co-operation should be fostered to the utmost. Any system of payment for meteorological registers which was not very strictly limited, would necessarily involve the concession of payments to all observers, and might entail a very large outlay which has hitherto been avoided, and which there is reason to believe is not at present really called for.

We are of opinion, therefore, that only such payments should be made from the grant placed at the disposal of the Meteorological Council to the Scottish Meteorological Society, as are necessary for obtaining observations at stations required for the purposes of the Council; for securing the proper inspection of stations the registers from which are required for the general purposes of the Council; for the needful compilation and check of such registers; and for meeting other charges directly arising from these services; or for special researches conducted by the Society with the approval of the Council; but that no grants should be made to ordinary observers, nor for any general purposes of the Society which lie beyond the scope of the operations to be placed under the Council.

23. We think that the same principle should be applied to all similar local bodies interested in the study of Meteorology; so that, in fact, no payments should be made to them except for results sought for by the Council.

24. We have indicated above in very general terms the functions of the proposed Council, and we do not think it desirable to fetter their discretion by further details. We append, however, to this report a paper by a member of the present Committee of the Royal Society, who is also a member of our Committee, stating what, according to present experience, are, in his opinion, likely to be their duties.

25. The later stages of the inquiry in relation to the transfer of Oceanic Meteorology to the Admiralty have raised some serious questions of expense, which the Government will, doubtless, require time to consider. We think it only just to the Committee which has heretofore had the administration of the annual grant to report our opinion that very good and valuable work is being done by it, and that if funds were provided to admit of the more responsible and more extended action of the Council, as suggested in paragraphs 9 and 22 of our Report, and if, at least provisionally, some assistance were given to the Scottish Meteorological Society, the more immediate objects referred to our Committee would be met, and there need be no interruption of the Committee's operations pending the delay, if any, which may occur, whilst the feasibility of transferring Oceanic Meteorology to the Admiralty is being maturely considered by Her Majesty's Government.

It is important in connexion with this part of the subject, to bear in mind the strong claims which the Superintendent and other members of the existing staff have to continued employment.

26. In recommending the above changes, we feel bound to express our sense of the great value of the disinterested services which, at the cost of much time and labour, have been rendered during so many years by the Committee appointed by the Royal Society.

27. We are aware that what we are proposing is still tentative only, and we recommend, in conclusion, that there shall be a further inquiry and report at the end of (say) five years.

WILLM. STIRLING MAXWELL, *Chairman*.  
T. BRASSEY.  
T. H. FARRER.  
FRANCIS GALTON.  
DAVD. MILNE HOME.  
JOSH. D. HOOKER.  
R. R. W. LINGEN.  
RD. STRACHEY.

These paragraphs, especially § 22 and § 25, are very involved, and leave but one distinct impression upon our mind, viz., that the Scottish Meteorological Society closely represent the woman mentioned in the New Testament, who, by her continual coming, obtained that which she wished, and that the Committee have been divided, some desiring, like the unjust judge, to avoid weariness, and others being unmoved by the repeated applications. We may instance as proofs of this the recommendation "at least provisionally, some assistance were given to the Scottish Meteorological Society," and, on the other hand, that no such item appears in the estimate. We think that § 23 is obviously the just summation of the whole matter, provided that the Council is not allowed to become a clique. Two things are, however, evident—(1) that the Scottish Meteorological Society must be treated, as the

Committee say, in the same way as "all similar local bodies," whether it be the Chartered Meteorological Society, Mr. Glaisher's staff, Mr. Symons's rainfall system, or, in fact, any single worker like Mr. Ley, all should be treated with on the terms quoted in § 23. (2) We do not see where the money is to come from—are all such payments also to come out of the special researches, £1,000? If so, the shares would be too small to be worthy of acceptance. It is a pity that the Committee, even if divided, did not give the decision of the majority, instead of contradictory statements which are too indefinite to be criticized.

### SYNCHRONOUS OBSERVATIONS, AND WASTED LABOUR.

WE cut the following paragraph from a weekly periodical. Very probably we have the original statement upon our own shelves, but the extract will suffice for our present purpose:—

*Weather Observations.*—Every day, at precisely 7.35 o'clock a.m., Washington mean time, simultaneous weather observations are taken from 106 stations in the United States, from the deck of every United States naval vessel, no matter in what part of the world she may be, from 8 stations in the West Indies, 28 in Canada, 58 in Great Britain, 6 in Algeria, 13 in Austria, 1 in Belgium, 6 in Denmark, 48 in France, 23 in Germany, 1 in Greece, 30 in Italy, 1 in Japan, 4 in the Netherlands, 4 in Norway, 4 in Portugal, 27 in Russia, 2 in Spain, 6 in Sweden, 2 in Switzerland, and 6 in Turkey. There is now needed only the organised aid of the mercantile marine, which can be given without loss of time, to place the entire northern hemisphere under a system of daily observation."

In case this article may come under the notice of any person who has not been a regular reader of this magazine, we think it may be well to state (1) that from the first we have warmly supported General Myers' scheme of collecting synchronous observations, (2) that we do so still, and (3) that we do not hold him responsible for the absurdity we are going to point out.

The total superficial area of this earth is nearly 200,000,000 square miles, the "entire northern hemisphere" therefore contains nearly a hundred million square miles. The British Isles contain 122,518 square miles, or about one-thousandth ( $\frac{1}{1000}$ th) part of the northern hemisphere. We are told above that 58 sets of observations are made daily in Great Britain (meaning, we suppose, the British Isles, for if Ireland be excluded the absurdity is still greater). If all these returns are required, it necessarily follows that something over fifty thousand sets of such daily observations would be needed to render the system complete. Is there any living man or any existing office competent to deal with such a mass of statistics? and if not, why ask observers to supply what cannot be utilised.

Again, the avowed object of the synchronous system is the very excellent one of advancing chartographic meteorology, of teaching us how storms are produced, what courses they take, why they take

different courses at different times, and, in fact generally, by studying the past to learn to interpret the future. No more worthy aim could be set before any office. We wish the United States Government triumphant success in its great undertaking, but we do not wish its office crammed with piles of useless observations.

We suppose that it is intended to publish these synchronous observations on charts like those issued by Captain Hoffmeyer; but whether published or not, the object for which they are collected involves their graphic representation. Now suppose a map is used 5 feet by 3 feet, and as it will often be necessary to compare several days it is obvious that no larger size would be at all convenient. Such a map would contain 2160 square inches, or rather more than two square inches for each thousand miles, and at that rate the British Isles would occupy less than three square inches, and twenty sets of British observations must be entered on one square inch! Even this is by no means the limit of the absurdity. We do not know where these 58 stations are, but we believe that two of them are Kew Observatory and the Royal Observatory, Greenwich—they are not 20 miles apart, a distance represented on such a map as we have suggested by considerably less than a tenth of an inch. In other words, it would be impossible to insert the observations of both. Why, then, should they be sent? Why should the observations be taken?

We regret having to write in this style, for it is scarcely appropriate to such a periodical as we wish ours to be. We, however, are not responsible for the inconsistency pointed out, though if we entered no protest we might perhaps be regarded as participators. We do protest, and we maintain that the proper course is (1) to ascertain from Gen. Myers what is the minimum distance within which he can represent and utilize individual records, and (2) to select for the British Isles those records which—regard being had to (a) the position of the station, (b) its exposure, (c) the quality of the observations—would represent as fully as required the phenomena of which Gen. Myers requires details. We hold that it is not fair to Gen. Myers to burden him with more than he requires, and that it is not fair to observers to allow them to make observations of which not 1 in 100 will ever be used.

### POPULAR NOTIONS OF THE WEATHER.

*To the Editor of the Meteorological Magazine.*

SIR,—I am very glad to see that, amongst the many learned subjects discussed in your magazine, now and then an occasional trite country saying and axiom bearing on the weather is being introduced. Such remarks are a great relief to the ordinary reader, to whom technical terms and high-flown disquisitions on meteorological subjects are not much better known than if they appeared in a foreign language. At the same time, the learned are too apt to treat with contempt the sayings and ideas that most likely had their origin in the unlettered times; but a little consideration ought to produce a more tolerant state of things. The notions of the poor husbandman, ignorant of his A, B, C,

may nevertheless be more really correct as to the weather past, present, and to come, than those of the greatest F.M.S., notwithstanding the advantages the latter possesses, and to whom I fear a certain amount of blame is due for not taking advantage of the information which the ideas of the other convey. A too rigid adherence to the rules propounded by some great authority, not, perhaps, on the case in question, but on something else, would seem to warp the mind of the learned, as much as adherence to old notions does that of the unlettered, and perhaps this state of things is nowhere more clearly shown than in what relates to the weather. The aged ploughman repeats to his younger brethren the axiom he himself learned from his elders, and the saying is perpetuated. How many of these are erroneous it is not easy to say, but the remarks of your able correspondent at page 26 on the temporary outburst of water from a chalky hill which occurs only after very wet periods, shows that our forefathers noticed the phenomenon and made very just conclusions on it long before our day. Other trite sayings relating to other features of the weather we are visited with, will often show an equally correct observance of such things on the part of those long since gone from us. For instance, the saying that "Drought never yet brought dearth" is usually true as regards the most important crops of the earth, cereals, while in some minor ones it is open to question; and there are many who doubt the notion that each spring has its blackthorn winter, and each autumn has its Michaelmas summer. A period of a few days of rough weather, snow, sleet, and frost, usually prevails while the blackthorn and plum are in blossom, to which the term is usually applied, which is not at any particular date, but, as the legend will have it, is sure to come; and the same may be said of a few fine days in October, which are designated the Michaelmas summer. This latter was very marked in 1876, and there was more than one period to which the term, "blackthorn winter," might have been very properly attached last year. The widespread area in which these axioms are regarded, and the general acceptance of them by men who have very little faith in weather predictions in general, prove that such periods are often forthcoming at the appropriate time. Some sayings have also an application to the state of the public health as well as that of the weather: as, "A mild autumn makes a fat churchyard," alluding to the many deaths likely to occur, while a more direct allusion to the weather for the time being is, "An evening red and morning grey is a sure sign of a fine day." Many other sayings and notions having only a local import cannot well be given in a paper on general matters, but one relating to the second month in the year is certainly not borne out by facts, as "February fills the dyke either with black or white" which was not verified by a 20 years' observation of the rainfall which I took from 1855 to 1875, both inclusive, the average rainfall of that period being less in February than in any other month except April; but there are many other observations made by people in humble life which the learned ought to pause ere they condemn as fallacies; however I only give the above as occurring to me at the moment, and hope what I have said

will be supplemented by others better qualified to give a more extended list of such sayings, and not to limit the papers contributed to the magazine to matters of the technical science of which it professes to take notice, but occasionally to descend to those of a more humble nature in which so many are interested.—I am, yours, &c.,

JOHN ROBSON.

*Stone House, Linton, Maidstone, 27th March, 1877.*

[We are often asked for a specimen of the sort of remarks which observers should make. We could scarcely give a better one than the following ; if it errs it is on the side of being too full, *i.e.*, fuller than we or any existing authority can thoroughly utilize.—Ed.]

### RAINFALL, &c., AT ADDISCOMBE DURING MARCH, 1877.

1st.—Hoar frost early morning. Borders in garden frozen from 2½ to 4 in. deep. The min. temps. were lower than any registered during the three previous winter months, being 24°·2 (Stevenson), 23°·0 (Glaisher), 18°·0 and 16°·2 over grass, and 36°·0 as temp. of soil (9 a.m.) 1 ft. below surface. Highest observed bar. of month, 30·409, at 9 a.m. A bright day, with light westerly and south-westerly airs. Temp. rising to 40°·0 in shade and 81°·1 and 51°·8 in sun. Beginning to rain at 10.30 p.m. Light rain between 6 and 8 a.m. of 2nd. Peach-apricot on south wall in blossom.

2nd.—Quite a sudden change in temp., ther. at 9 a.m. registering 14°·0 higher than yesterday at the same hour. Mild, damp, and dull, with rapid thaw. Very light sprinkling of rain after 5.30 p.m., and again early morning of 3rd.

3rd.—Drizzling rain at intervals during the day ; continued drizzling rain during early morning of 4th.

4th.—Smoky fog in morning ; quite thick about noon, cleared by 2 p.m. Light rain after about 10.30 a.m. ; steady rain after 12.30 p.m. ; light and intermittent after 3.30 p.m. ; falling steadily again at 6.30 p.m. ; scarcely raining at all at 8.15 p.m. ; light rain falling at 9 p.m.

5th.—Slight fog early morning. Dark clouds rising in W. at 4.30 p.m., and afterwards passing overhead. Nearly dark between 5.15 and 5.30 p.m. ; at 5.30 p.m. could not read newspaper print at W. window ; immediately afterwards a sharp shower fell, lasting 8 minutes, and then the sky began to clear, and it was cloudless overhead at 7.30 p.m.

6th.—Slight fog early morning. Light, misty rain at 10.30 a.m. for a few minutes. Light rain early morning of 7th, with a little snow between 6.45 a.m. and about 7.30 a.m.

7th.—Light snow shower at 10.5 a.m. Snow at intervals till 12.15 p.m., when it began to fall freely in large flakes till 1 p.m., and continued in small flakes between 1 and 1.30, and again for a few minutes at 2 p.m. Small angular pieces of transparent ice fell for one minute at 3 p.m. Driving rain on and off between 3.45 and 4.30 p.m. ; began again at 8.30 p.m. Light driving rain falling at 10.30 p.m. Total velocity of wind for 24 hours, 423 miles ; maximum, 27, at 9 p.m. N.

8th.—Light snow shower at 1.25 p.m. and also at 2 p.m., and again for about 15 minutes at 4.45 p.m. Cloudless at 7 p.m.

9th.—Black frost early morning ; only surface of borders hardened by frost. A sprinkling of fine snow on lawn at 9 a.m.

10th.—Slight frost early morning. Atmosphere particularly clear at 1 p.m.

11th.—Hoar frost. Ice ½ in. thick on pond in our neighbourhood. Absolutely cloudless all day ; lowest temp. of month, 22°·4 (Stevenson), 20°·6 (Glaisher), and 14°·3 and 11°·1 over grass.

12th.—A few drops of rain about 11 a.m., and another light shower at 3.35 p.m.

13th.—More or less light rain after 2.15 p.m. till about 7.30 p.m. ; short shower at 10.15 p.m. ; beginning to rain again at 12.45 a.m. of 14th. Wallflower in blossom.



- 14th.—A few drops of rain at 8.15 p.m.  
 15th.—Light rain falling after 8 p.m.; sharp shower at 10 p.m. for about five minutes.  
 16th.—A few flakes of snow fell about 4 p.m.  
 17th.—Slight hoar frost. A little snow fell about 12.30 p.m. A shower of mixed snow and hail fell about 7 p.m., followed by another of hail about 7.30 p.m.  
 18th.—Hoar frost. Shower lasting about 10 minutes at 2.10 p.m.  
 19th.—Hoar frost. Thick fog early morning, which began gradually to clear off after 8.45 a.m. Apricot trees in blossom on S. wall.  
 20th.—Light snow between 1.45 p.m. and 2.30 p.m., followed by light snow and rain, snow falling freely at 11 p.m.; light snow again early morning of 21st till about 7.30 a.m., and occasionally afterwards. Total velocity of wind for 24 hours, 488 miles; maximum, 26 at 1 p.m. N.E.  
 21st.—A little snow falling occasionally during the day.  
 22nd.—Hoar frost. Cloudless till 2 p.m. Calm, bright, warm morning, cold, dull, wintry afternoon. Light rain after 3 p.m., followed by light snow shower at 3.25 p.m.; sprinkling of rain at 6.30; rain and snow between 7.15 and 7.35 p.m., afterwards cloudless. Glazed frost at 9 p.m.; rain gauge funnel then lined with ice.  
 23rd.—Hoar frost early morning. Cloudless till 1 p.m. Light misty rain at 8.30 p.m.; a sprinkling of rain at 9 p.m.; continued rain at 11 p.m.; light rain early morning of 24th, which ceased about 7 a.m. During the night of this day occurred the heaviest fall of rain during 12 and also 24 hours. Lunar halo just visible at 7.30 p.m.; moderately distinct at 7.50 p.m. Bar. fell .365 between 9 a.m. and 9 p.m., and continued to fall rather rapidly until about midnight.  
 24th.—Bar. falling but slowly after midnight, at 9 a.m. 29.282, 3 p.m. 29.206, 9 p.m. 29.043. Short hail shower at 2.15 p.m.; shower at 3.15 p.m.; continued light rain from 5.30 p.m.; still raining at 11 p.m.; light rain early morning of 25th, which ceased about 7 a.m.  
 25th.—Bar. at 4 a.m., 28.876; pressure decreased but slightly after this as shown by self-registering aneroid, the indices of which were then set and reading compared with standard, corrected minimum reading 28.871. This low pressure was accompanied here by no particular atmospheric disturbance. Heavy shower for about 15 minutes at 6 p.m.  
 26th.—Bar. at 9 a.m. 29.158, 9 p.m. 29.171. Light fog, which cleared at 7.30 a.m. A few drops of rain at 10 a.m.; more or less drizzling rain between 11.5 a.m. and 4.30 p.m., followed by light rain till about 6 p.m.; ceased raining by 7 p.m. Indistinct lunar halo at 10.30 p.m. Jefferson plum in blossom on W. wall.  
 27th.—Continued steady rain between 2 p.m. and 6.15 p.m.  
 28th.—Light rain for about 2 minutes at 6 p.m. Indistinct lunar halo at 8.50 p.m. Continued rain early morning of 29th.  
 29th.—Rain ceased about 10 a.m.; light shower at 4.15 p.m., and a few drops of rain again at 6 p.m.  
 30th.—Highest temp. of month, 55°·2 (Stevenson), 56°·3 (Glaisher), in sun 111°·8 and 72°·7.

#### SUMMARY.

A rather cold month, with rainfall frequent and somewhat above the average. Noticeable for the few days on which easterly winds prevailed.

*Wind.*—Generally of moderate strength. Maximum velocities for 24 hours, 423 miles on the 7th, and 488 miles on the 20th. During only 62 hours did the wind take any direction between N. and E.

*Temperature.*—On the early morning of the 11th was registered the lowest temperature of the month, 22°·4, and over grass 11°·2. On the 1st the minima were 24°·2 and 16°·2. The lowest temperature of the winter was recorded on the previous day (February 28th), 25°·2, and over grass 17°·4. On 10 nights the temperature of the air fell below 32° and on 19° over grass. The highest temperature of the air in the shade was 55°·2 (30th), and the highest in the sun 111°·8 and 72°·7 (30th). The average temperature of the month was also lower than

that of any of the preceding winter months. There were three mild and two distinct cold periods during the month.

*Barometer.*—Pressure generally high, but very unsteady, within moderate limits, on one night (4 a.m., 5th), however, descending as low as 28·876.

*Rainfall.*—Rather more than one-third of an inch in excess of the average) (Of this total fall rather more than one-half fell during the six days ending 28th. The heaviest fall occurred on the night of the 23rd, and amounted to 0·324. On 18 days ·01 or more was registered, and on four others smaller quantities. Snow (in all but one instance melting on reaching the ground) fell on nine days, hail on two days, and ice crystals on one day (7th).

EDWD. MAWLEY.

*Addiscombe, 4th April, 1877.*

*Rainfall and Extreme Temperatures at Addiscombe during March, 1877.*

Date.	Temperatures.			Rainfall.		
	Stevenson Max.	Screen. Min.	Over grass.	Day 9 a.m. to 9 p.m.	Night 9 p.m. to 9 a.m.	24 hours, ending 9 a.m.
1	40·0	24·2	18·0	...	0·150	0·150
2	52·0	35·5	34·2	0·001	0·013	0·014
3	51·9	45·1	43·0	0·023	0·124	0·147
4	46·0	40·5	38·6	0·245	0·003	0·248
5	44·3	34·5	30·3	0·028	...	0·028
6	40·3	32·8	26·1	...	0·037RS	0·037RS
7	39·8	33·0	30·3	0·040SR	0·025	0·065
8	38·0	31·8	25·5	0·001s	...	0·001s
9	39·0	29·5	23·2	...	...	...
10	38·0	28·6	22·0	...	...	...
11	42·1	22·4	14·3	...	...	...
12	47·7	30·8	27·2	...	...	...
13	48·0	42·7	38·7	0·042	0·003	0·045
14	53·5	45·7	42·0	...	...	...
15	50·8	38·4	33·7	0·012	0·023	0·035
16	46·9	36·1	31·1	...	...	...
17	45·8	31·3	26·0	0·003SH	...	0·003SH
18	49·3	32·0	26·4	0·001	...	0·001
19	47·0	28·7	19·9	...	...	...
20	38·8	32·4	31·0	0·060SR	0·068SR	0·128SR
21	39·3	32·7	26·0	0·002	...	0·002
22	46·9	27·0	19·9	0·048RS	0·005	0·053RS
23	46·2	27·1	22·0	...	0·324	0·324
24	50·7	33·9	31·9	0·051RH	0·201	0·252RH
25	52·2	40·1	35·9	0·026	...	0·026
26	52·0	36·8	30·8	0·069	...	0·069
27	52·9	40·2	35·5	0·190	0·042	0·232
28	53·1	39·4	35·0	...	0·213	0·213
29	52·2	43·0	37·8	0·042	...	0·042
30	55·2	43·6	38·8	...	...	...
31	53·6	40·1	35·0	...	...	...
Totals ...	...	...	...	0·884	1·231	2·115*
Means .....	46·9	34·8	30·0	...	...	...
Highest ...	55·2	45·7	43·0	0·245	0·324	0·324
Lowest ...	38·0	22·4	14·3	...	...	2·219†

\* Total of gauge read twice daily. † Total of gauge read monthly.

# THUNDERSTORM AND SQUALL, APRIL 4TH.

*To the Editor of the Meteorological Magazine.*

SIR,—A thunderstorm of unprecedented violence, at this season of the year, passed over this neighbourhood this afternoon. Thunder was first heard in S. at 2 p.m. ; at 3 p.m. the thunder was heavy and almost incessant. From 3.30 to 4.30 the storm was terrific, the lightning being very vivid, and from 3.45 to 4.15 nearly overhead. Very heavy rain fell from 3.45 to 4.20 ; the amount being .64 in. In Enfield town there was a tremendous fall of hail from 4 to 4.20 p.m., the stones being from a quarter to three-quarters of an inch in diameter ; the fall was so heavy that the hail had to be shovelled off the footpaths, &c., and several windows were broken. No hail fell here, little more than a mile from the town. The rain appears to have been very heavy at Edmonton and Tottenham, where a great deal of land was flooded.

The worst of the storm seems to have passed over the town, where it was worse than anything since the great storm of Aug. 7th, 1875.

Yours truly,

THOS. PAULIN.

*Enfield Chase, 4th April, 1877.*

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*To the Editor of the Meteorological Magazine.*

SIR,—I have just received a letter from a member of our Society—Lieut. R. B. Croft, F.L.S.—giving the following account of a storm which passed over Ware yesterday, the 4th inst. :—

“A very remarkable and destructive storm passed over a part of this town (Ware) yesterday afternoon, destroying everything in its track. It appears to have come from E.S.E. Large trees are uprooted, stone walls blown down, and houses unroofed. Within a quarter of a mile of this (Gt. Cozens) people were hardly aware of there being any wind. It missed my house by about a quarter of a mile, but the house is high and exposed, so I was aware of a violent storm, with much lightning.”

This morning, Lieut. Croft says, he found the track of the storm about a mile N.W., tracing it by uprooted trees and broken branches.

Here (at Watford) it was scarcely felt. At 9 a.m. my barometer (corrected and reduced) stood at 29.163, wind being S.E., and at 9 p.m. 29.101, wind being W.S.W. It has been lower each day from the 31st March, when it was 30.155 at 9 a.m. This morning it was 29.307 (9 a.m.), and now (9 p.m.) it is 29.454. The wind is still bringing heavy clouds from S.W.

Yours truly,

JOHN HOPKINSON.

*Watford Natural History Society and Hertfordshire  
Field Club, Watford, 5th April, 1877.*

P.S.—11 p.m. Rain is now falling heavily, with strong wind, and barometer is falling again.

## GREENWICH EXTREME TEMPERATURES.

*The extreme Shade Temperatures of the month of March at the Royal Observatory, Greenwich, during the past 36 years.*

Year.	Maximum.		Minimum.		Year.	Maximum.		Minimum.	
	deg.	date.	deg.	date.		deg.	date.	deg.	date.
1841	66·9	26	29·5	1	1859	63·5	5	28·9	31
1842	60·5	28	29·9	23	1860	59·5	28	23·5	10
1843	63·7	18	26·5	4	1861	61·8	24	29·1	14
1844	60·2	29	24·1	5	1862	63·6	24	22·5	4
1845	59·4	27	13·1	13	1863	64·0	3	28·1	18
1846	58·0	31	26·5	20	1864	58·0	4	25·1	26
1847	64·2	17	16·9	10	1865	50·7	31	23·7	21
1848	71·5	31	28·0	4	1866	64·0	30	22·5	1
1849	60·7	17	27·7	25	1867	58·0	26	24·5	16
1850	58·0	31	20·0	26	1868	57·8	21	28·1	30
1851	58·4	20	29·8	9	1869	53·6	5	27·3	8
1852	68·4	23	21·3	5	1870	61·1	2	23·1	14
1853	60·5	13	20·8	25	1871	70·9	24	28·9	15
1854	64·8	27	24·6	3	1872	60·8	7	26·2	21
1855	57·8	20	24·5	10 11	1873	64·6	29	27·2	14
1856	58·0	31	24·7	30 31	1874	65·4	23	22·6	11
1857	66·2	18	27·7	22	1875	57·4	8	25·5	5
1858	68·7	24	23·6	11	1876	64·7	31	25·5	19

Extremes in 1877, Max. : 59°·4 on 29th ; Min. : 23°·5 on 1st.

	Year.	Max.	Date.	Min.	Date.	Year.
Means of 36 years	...	61·8	21	25·0	15	...
Highest .....	1848	71·5	31	29·9	23	1842
Lowest.....	1865	50·7	31	13·1	13	1845
Range .....	...	20·8	...	16·8	...	...

## ZODIACAL LIGHT, HALOS, &amp;c.

*To the Editor of the Meteorological Magazine.*

SIR,—This light has been seen 11 times since February 1st, 1877, viz., on the 2nd, 4th, 12th, 16th, 18th, 19th, 26th, 27th, 28th of February, and on the 14th and 19th of this month.

JOSEPH GLEDHILL, F.R.A.S., &c.

*Mr. Edward Crossley's Observatory.*

*Bermerside, Halifax, March 20th, 1877.*

## Number of Solar Halos, &amp;c., seen in 1876.

	Solar halos.	Lunar halos.	Aurora.	Lightning.		Solar halos.	Lunar halos.	Aurora.	Lightning.
Jan. ...	1	...	1	...	—	...	...	...	...
Feb. ...	0	...	1	...	1	...	...	...	...
March ...	8	...	3	...	—	...	...	...	...
April ...	5	...	2	...	—	...	...	...	...
May ...	10	...	0	...	—	...	...	...	...
June ...	7	...	1	...	1	...	...	...	...
July ...	10	...	1	...	—	...	...	...	...
Aug. ...	4	...	0	...	—	...	...	...	...
Sept. ...	3	...	0	...	—	...	...	...	...
Oct. ...	1	...	—	...	—	...	...	...	...
Nov. ...	0	...	2	...	—	...	...	...	...
Dec. ...	0	...	1	...	—	...	...	...	...

Zodiacal Light not seen during the months of February and March,

LONG WET PERIOD.

*To the Editor of the Meteorological Magazine.*

SIR,—Yesterday was the first time since November 9th that I have entered a third dry day in succession, *i.e.*, without a fall of 0·01 in.; and only three times have there been two following in these four months and over. A thing, I suppose, almost unprecedented.

Yours truly,

W. H. GAMLEN.

*Brampford Speke, Exeter, March 15th, 1877.*

SUPPLEMENTARY TABLE OF RAINFALL IN MARCH, 1877.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XI., p. 28., but the list is under revision and further details will be given in a month or two.]

Div.	Station.	Total Rain.	Div.	Station.	Total Rain.
		in.			in.
II.	Acol .....	2·91	XI.	Llanfrechfa .....	3·51
„	Hailsham .....	1·99	„	Castle Malgwyn .....	...
„	St. Lawrence, I. of W....	2·48	„	Heyope .....	...
„	Andover.....	2·07	„	Carno .....	...
„	Strathfield Turgiss .....	1·68	„	Rhug, Corwen .....	3·49
III.	Addington Manor.....	2·20	„	Port Madoc .....	4·58
„	Oxford .....	1·73	XII.	Melrose .....	2·82
„	Northampton .....	2·00	XIV.	Cessnock, Glasgow .....	2·14
„	Cambridge.....	1·71	XV.	Gruinart .....	2·76
IV.	Sheering .....	2·54	XVII.	Keith ...	1·98
„	Ipswich .....	2·64	XVIII.	Dalwhinnie .....	·79
„	Diss .....	2·54	„	Auchnasheen .....	5·88
„	Swaffham .....	2·38	„	Springfield, Tain .....	1·93
V.	Compton Bassett .....	2·61	XX.	Skibbereen .....	...
„	Dartmoor .....	5·58	„	Glenville, Fermoy .....	3·67
„	Teignmouth .....	2·82	„	Tralee.....	3·35
„	Langtree, Torrington ..	4·59	„	Newcastle W., Limerick	2·22
„	Cosgarne, St. Austell ...	4·16	„	Kilrush .....	1·88
„	Taunton.....	1·83	XXI.	Kilkenny .....	...
VI.	Bristol .....	2·45	„	Kilsallaghan .....	3·49
„	Sansaw .....	1·46	„	Twyford, Athlone .....	2·71
„	Cheadle .....	3·22	XXII.	Ballinasloe .....	2·13
VII.	Coston, Melton Mowbray	1·58	„	Kylemore .....	6·72
„	Bucknall .....	2·23	„	Carrick on Shannon.....	2·86
V III.	Walton, Liverpool .....	2·57	XXIII.	Rockcorry .....	2·74
„	Broughton-in-Furness ..	4·81	„	Warrenpoint .....	...
IX.	Stanley, Wakefield . ...	2·78	„	Carnlough, Larne .....	3·21
X.	Gainford .....	2·55	„	Bushmills .....	5·05
„	Shap .....	1·98	„	Buncrana .....	3·28

## MARCH, 1877.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					TEMPERATURE.				No. of Nights below 32°
		Total Fall.	Difference from average 1860-5	Greatest Fall in 24 hours.		Days on which 40 or more fell.	Max.		Min.		In shade On grass
				Dpth.	Date.		Deg.	Date.	Deg.	Date.	
		inches	inches.	in.							
I.	Camden Town .....	2.38	+ .30	.34	23	20	59.4	29	23.5	1	12 17
II.	Maidstone (Hunton Court)...	3.23	+ 1.07	.55	20	16	...	...	...	...	...
III.	Selborne (The Wakes).....	2.94	+ .34	.78	24	22	56.0	29	18.0	1	14 18
IV.	Hitchin .....	1.99	- .18	.27	7	17	50.0	2*	22.0	10	18
V.	Banbury .....	2.12	- .08	.26	24	21	54.0	14†	23.0	1	17
VI.	Bury St. Edmunds (Culford)...	2.62	+ .42	.49	3	23	56.0	27	22.0	10	16 20
VII.	Norwich (Sprowston).....	2.36	...	.34	23	20	...	...	...	...	...
VIII.	Bridport .....	1.84	- 1.03	.49	23	14	58.0	30	21.0	1	12
IX.	Barnstable .....	2.88	- .27	1.03	24	21	59.0	31	23.0	9	...
X.	Bodmin .....	3.56	- .19	.96	24	24	57.0	29	29.0	1	5 9
XI.	Cirencester .....	2.49	- .11	.47	23	17	...	...	...	...	...
XII.	Shifnal (Houghton Hall) ...	2.56	+ .62	.56	24	16	55.0	14	19.0	1	16 20
XIII.	Tenbury (Orleton) .....	2.10	- .32	.54	24	24	60.2	30	20.4	1	12 18
XIV.	Leicester (Belmont Villas) ...	1.84	...	.50	3	20	59.5	29	22.0	1	11
XV.	Boston .....	1.45	- .34	.24	3	16	56.0	29	22.0	1	12
XVI.	Grimsby (Killingholme) .....	2.35	...	.53	29	21	54.0	14	24.0	1	9
XVII.	Mansfield .....	2.57	...	.76	24	23	61.3	30	15.0	1	14 17
XVIII.	Manchester .....	2.43	- .26	.33	29	21	59.0	30†	21.0	1	14 20
XIX.	York .....	2.93	+ .94	.92	29	17	55.0	31	25.0	2	12
XX.	Skipton (Arnccliffe) .....	4.80	- .01	.60	24	20	...	...	...	...	...
XXI.	North Shields .....	1.70	- .65	.52	25	20	55.0	30	22.0	1	17 23
XXII.	Borrowdale (Seathwaite) ...	7.74	- 5.66	1.27	11	23	...	...	...	...	...
XXIII.	Cardiff (Crockherbtown).....	2.66	...	.55	23	21	58.9	29	23.6	2	7
XXIV.	Haverfordwest .....	4.06	+ .61	1.10	24	16	56.0	29	25.5	20	7 13
XXV.	Aberdovey .....	3.01	...	...	...	...	65.0	28	27.0	1	10
XXVI.	Llandudno .....	2.62	+ .36	.37	9	21	54.5	29	26.3	1	3
XXVII.	Dumfries (Crichton Asylum)...	2.21	- .39	.36	9	14	57.3	3	19.0	1	18 19
XXVIII.	Hawick (Silverbut Hall).....	1.98	...	.35	25	19	...	...	...	...	...
XXIX.	Kilmarnock (Annanhill).....	2.51	...	.35	15	20	54.0	3	24.6	1	14 17
XXX.	Castle Toward .....	2.92	- 1.67	.45	28	19	55.0	3	22.0	18	19
XXXI.	Mull (Quinish) .....	2.73	...	.53	3	17	...	...	...	...	...
XXXII.	St. Andrews (Cambo Ho.) ...	1.87	...	1.60	31	...	...	...	...	...	...
XXXIII.	Grandtully .....	2.33	...	.63	6	11	...	...	...	...	...
XXXIV.	Braemar .....	2.19	- .02	.44	27	16	48.0	2	12.0	1	24 23
XXXV.	Aberdeen .....	2.24	...	.63	26	23	53.2	2	20.7	1	12 22
XXXVI.	Gairloch .....	3.12	...	.31	15	24	...	...	...	...	...
XXXVII.	Portree .....	4.18	- 4.86	.52	11	24	...	...	...	...	...
XXXVIII.	Inverness (Culloden) .....	1.66	- .30	.47	26	21	53.4	2	24.1	1	12 24
XXXIX.	Helmsdale .....	2.82	...	.36	29	25*	...	...	...	...	...
XL.	Sandwick .....	2.81	- .52	.36	11	27	47.6	10	20.9	19	8 19
XLI.	Caherciveen Darrynane Abbey	4.81	...	.69	2	22	...	...	...	...	...
XLII.	Cork .....	2.99	...	.77	2	12	...	...	...	...	...
XLIII.	Waterford .....	2.99	+ .10	.70	24	10	...	...	...	...	...
XLIV.	Killaloe .....	...	...	...	...	...	...	...	...	...	...
XLV.	Portarlinton .....	3.27	- .04	.91	25	23	57.0	13	27.0	19	11
XLVI.	Monkstown, Dublin .....	2.64	+ .06	.89	24	15	58.0	11†	21.5	20	10 13
XLVII.	Galway .....	2.50	...	.37	24	22	58.0	15	28.0	19	12
XLVIII.	Ballyshannon .....	3.04	...	.48	23	26	...	...	...	...	...
XLIX.	Waringstown .....	3.58	...	.75	25	26	56.0	2	24.0	18	16 23
L.	Edenfel (Omagh) .....	2.43	...	.43	25	27	52.0	29	24.0	16**	15

\* And 14, 29. † 30. ‡ 31. || 20. § 19. ¶ 21. \*\* 18  
 † Shows that the fall was above the average; —that it was below it.



# METEOROLOGICAL NOTES ON MARCH.

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

## ENGLAND.

**SELBORNE.**—A very retarding month for garden cultivation; frequent white frosts and fogs. S on 7th, 8th, 10th, 16th, and 20th. The max. temp. on 20th only 37°. T at 3 p.m. on 22nd.

**BANBURY.**—Fine meteor seen at 9.55 p.m. on 17th. S on 7th, 9th, 10th, 17th, and 22nd; soft H on 18th.

**CULFORD.**—A very wintry month; mean temp. 2° lower than that of February and slightly below that of January. S or H fell more or less on 8 days. T was frequently heard on 22nd and 29th.

**BODMIN.**—Mean temp. of the month 45°·5, being 0°·9 above the average. The rainfall of the month exactly the average of 28 years.

**SHIFNAL.**—March came in with R as February had gone out. R fell daily till the 7th, when it changed to storms of S and sleet with bitter cold for 5 days. On the 11th the sun (quite a stranger) re-appeared, and it was fair till the 14th, when a storm (telegraphed from America on the 10th) came on at noon, lasting all the afternoon. From that time till the 24th bitterly cold N.W. and N.E. winds, ending with a fall of R from S.E. (·56) on the night of 24th; temp. then rose, with distant T at 2.30 p.m. on 26th and again at 6.30 p.m., with copious R on the 29th. Rooks building on 6th; colts-foot and dog rose in flower on the 7th; ribes sanguinea and dog-tooth violet in flower on 25th.

**ORLETON.**—There were no heavy falls of R, the max. being ·54 on 24th, but small falls occurred on a great number of days. The sky was generally cloudy and the air damp and cold. On the 20th there was a solar halo all the morning, and the weather was dry and cold, with frost and strong N. wind. T was heard on 26th, and there was a storm of T and L on the 29th.

**LEICESTER.**—Total fall 1·84, nearly the whole of which fell in the first and last weeks; there were only 5 days on which the fall exceeded ·10 of an inch. More frost than in either of the three preceding months. Mean temp. 39°·7; average min. temp. 4° below that of February and 3° below that of January.

**BOSTON.**—T on 18th and 22nd; S on the 7th.

**GRIMSBY.**—Few days without either R or S. March dust only seen on one day (21st). Farm work backward. Frogs spawning and rooks building on 4th; pied wagtail arrived on 26th. T at 1 p.m. and L at 10 p.m. on 16th; T S in the evening of the 27th. Peach began flowering on 2nd, March marigold on 19th, wych elm on 28th, and cowslip on 29th. Very distinct lunar halo on 23rd.

**MANSFIELD.**—Mean temp. at 9 a.m. 1°·4 below the average of the preceding five years. This cold kept back vegetation, which has progressed but very slowly during the month.

**MANCHESTER.**—S on 9th and 17th.

**YORK.**—S on 5th, 7th, 16th, 17th, and 21st; H on 15th (16th with T), 17th and 21st.

**NORTH SHIELDS.**—S on 11 days, between 5th and 22nd, on the latter day with a T S.

## WALES.

**ABERDOVEY.**—Prevailing winds N. and N.W., with few exceptions, from the 1st to 17th, after that time S. or E. more frequent. A calm month on the whole; generally cold, though with some warm days.

**LLANDUDNO.**—Notwithstanding some very fine days, March was rather a stormy and changeable month. There was a heavy gale from the E. on 24th and 25th. R frequent rather than heavy (the greatest fall being only ·37), though the fall during the month was above the average. The mean temp. was 2° above the average, and there were only three nights of slight frost, consequently vegetation is very forward. Hawthorn in leaf in the hedges on 21st; pear tree in bloom on 28th; Harry long legs seen on 30th.

## SCOTLAND.

**DUMFRIES.**—March has been rather damp, though the total fall of **R** is rather less than the average. Frost very frequent during the first half of the month. **S** in considerable quantities fell on 9th and 16th. Mean temp.  $38^{\circ}7$ , being  $1^{\circ}$  lower than last year. Winds generally light, except on 7th and 14th, when there were strong gales from N.W.

**HAWICK.**—A very cold month, with keen, frosty nights. Hurricane on 14th, and very high winds on 6th, 11th, 12th, and 24th. The pied and yellow wagtail first seen on the 20th; green linnets heard and seen in the shrubbery on the 21st. The cold and wet weather have kept the birds from building; not a nest has been found belonging to the thrush or blackbird.

**ANNANHILL.**—Bar. pressure, temp., ozone, and sunlight all below the average. Winds principally westerly and usually light, average rate 12 miles an hour. Day sky generally cloudy, but several cloudless evenings. **S** on 8th, 9th, 15th, 16th, and 18th. Brilliant sunset over Arran on 19th—the island dark purple, the sea silver, and the sunset gold.

**CASTLE TOWARD.**—In the first week of the month the weather was very favourable for getting the soil wrought and seeds put into the ground, but from the 10th to 17th we had some stormy and wet weather. On the 18th the ground covered with **S** with rather hard frost, the ther. falling to  $23^{\circ}$ , and on to the end of the month we had very few fine days. The spring will be late; there seems little or no growth, and the grass looks quite brown.

**BRAEMAR.**—An unusually severe March.

**PORTREE.**—A cold, wet month, **S**, **H**, and **R** alternately through it. Lunar halos on 19th and 22nd; solar halo on 23rd. Strong gale all night of 12th from N.W., and all day of 14th from W.

**CULLODEN.**—**S** and boisterous weather from 12th to 24th. Solar halo and mock sun seen between 1 and 2 p.m. on 23rd, and lunar halo at night.

**SANDWICK.**—March has been cold and stormy. None of the valuable March dust to be had, so I have not heard of farmers getting any seeds sown yet. Wind 40 miles an hour from 4 a.m. to noon on 12th, at times 50 miles; wind 40, 50, and 55 miles an hour from 1 a.m. to midnight on 14th. Ground covered with **S** on 23rd.

## IRELAND.

**DARRYNANE.**—**S** on the night of 20th and 21st, the heaviest fall this winter. Farm work very backward from the saturated state of the soil, but progress being made during the last ten days.

**MONKSTOWN.**—This has been much the coldest month of the winter, the temp. ( $21^{\circ}5$ ) on 20th being the min. since November. There were also an unusual number of frosty mornings. Rainfall, except during the last week, small. Strong easterly gale on 24th and 25th, causing a heavy sea on the coast.

**BALLYSHANNON.**—The month has been unusually wet for the time of year, and has been remarkable for the entire absence of "March winds;" as a consequence, the ground in many places is so charged with moisture as to retard farming operations.

**EDENFEL, OMAGH.**—A very harsh and inclement month, with a lower mean temp. than any month in the winter.