

# Symons's Meteorological Magazine.

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## THE RAINFALL OF MAY AND OF THE FIRST FIVE MONTHS OF 1908.

FROM the point of view of rainfall, May proved a dull month, unrelieved by extremes, boasting neither of flood nor drought. The distribution of rain was normal, offering little subject for remark, and the map of the rainfall of the Thames valley and the surrounding country which we present to our readers serves mainly to show what a prodigious amount of work is required to prove that things are very much as usual. On the whole the low land has had the lighter rainfall, the high land the heavier; but only one station reported as much as 3 inches, and it is only by inserting half-inch lines that any characteristic features are produced.

When, instead of considering the actual fall, we look at the relation to the average, we find that the rainfall was above the average for the month at one or two isolated stations in the south of England, but except for these the whole country south-east of a line drawn from Swansea to Scarborough had less than the average rainfall, the least occurring in the southern midlands. The north and west of England, the central strip of Scotland, and all Ireland except the north-east, had somewhat more than the average rain for May. The month as a whole was wet, and added on to the months which had gone before it secures a quite considerable excess of rain for the country as a whole during the current year. Indeed, for the five months the only places having decidedly less than the average rainfall are the east of Scotland along the coast of Forfar, Kincardine and Aberdeen, the south of Wales, and a strip of the south-west of England from Stroud to Torquay, the extreme south-west of Kent and the south of Ireland. Over the rest of the country the rainfall has been in excess, though scarcely anywhere to a greater degree than 25 per cent. There has been during May a marked absence of heavy individual falls; the column devoted to these in the Table on p. 101 shows only one fall exceeding an inch, and that was at Seathwaite where an inch of rain is a trifle.

## THE WEATHER OF MAY, 1908.

By FRED. J. BRODIE.

THE weather experienced during the late spring afforded little ground for complaint even to the most practised of agricultural grumblers. In the early part of the season vegetation was in a very backward state—a merciful provision, designed, one may almost imagine, with the express object of warding off the effects of the bitter frosts which occurred so late in April. After that phenomenal wintry outburst the progress of vegetation was practically uninterrupted, the snaps of cold which so often put in an appearance in May, and especially about the third week, being of the mildest possible description. Grounds frosts were however not entirely absent, the principal cases occurring on the night of the 6th, between the nights of the 10th and 13th, and between those of the 21st and 23rd. The latest frost was apparently the sharpest of the three, the thermometer on the grass falling to a minimum of  $25^{\circ}$  at Crathes (Kincardineshire),  $26^{\circ}$  at Llangammarch Wells, and  $27^{\circ}$  at Balmoral, Morpeth (Cockle Park), and Greenwich. At most other times in the month an abundance of cloud checked the progress of terrestrial radiation, the general mildness of the nights being sufficiently attested by the fact that in Edinburgh the mean of all the minimum temperatures was more than  $3^{\circ}$ , and in London more than  $5^{\circ}$  above the average for May, as shown by records extending over the 35 years ending with 1905. At Leith the absolute minimum reading of  $39^{\circ}$  on the 22nd, and in London the absolute minimum of  $41^{\circ}$  on the following day, were, in each case, the highest observed in May since 1889, or, with that exception, since 1875.

Three spells of warmth occurred last month, the first at the very opening, when the thermometer rose to an unusually high level for so early a period of the season. In Ireland the maximum readings on the 1st and 2nd were above  $70^{\circ}$ , while in many parts of England and Wales they were slightly above  $75^{\circ}$ , the thermometer at Bettws-y-Coed and at St. Aubins, Jersey, reaching a maximum of  $78^{\circ}$ . Between the 17th and 19th shade readings of  $70^{\circ}$  and upwards were again recorded at several English stations, including readings of  $76^{\circ}$  at Hillington, and  $78^{\circ}$  at Barnet. The third period of warmth occurred in the last five days of the month (most commonly on the 27th and 28th) when the thermometer rose to  $75^{\circ}$  and upwards in many districts. The heat was in this case greatest in the north, the thermometer on the 28th rising to  $79^{\circ}$  at Dumfries, and to  $81^{\circ}$  at Carlisle, and on the 30th to  $80^{\circ}$  at Fort William.

Thunderstorms, accompanied in many cases by intense falls of rain or hail, were rather frequent; the most general of such visitations occurring over England on the 2nd, over North Britain on the 5th and 6th, over South-eastern England at the close of the third week, and in many parts of the country on the 30th.

## THE GLAMOUR OF THE CUMULUS.

BY L. C. W. BONACINA.

It is one of the compensatory advantages which attend our British climate as a relief from the sullen skies with which we are so familiar, and which are so inseparably associated with the wildness of northern fell and moor, that there are many days throughout the year when one may enjoy a spectacle which surely ranks among the most beautiful in nature, that of the cumulus clouds in the fulness of their development.

I do not say that in Italy, at times, when the storm-clouds with the electric forces of the air concentrated in them, press down upon the Apennine range—that range gaining in height and grandeur as it sweeps southwards through the peninsula, from whose snowy summits the soul of Italy shines forth so mightily in the radiant splendour of southern sun and sky—and lock the mountain fastnesses in their terrible darkness, striking down man and beast, and ravaging the fruits of the earth in fearful malignity of hail, the cumulus clouds may not assume an awful magnificence which is unknown here; but I do say that nowhere do they float by more majestically in all their strength and beauty than in their eastward drift, bearing with them the moisture of the Atlantic, across the green heart of England or over the venerable towers of Westminster.

At all times of the year they may be seen: in summer when the outlook is for thunder on sultry afternoons; in spring or autumn when the wind is between the south and west, and the weather showery; in winter sailing swiftly past in a north-westerly wind behind the great storm-bringing atmospheric depressions. And what veritable mountains in the air they are! Nor is their analogy to mountains confined solely to outline of form, but it extends in no small degree to the relative disposition of parts and in some sense also to structural configuration. With regard to outline of form as seen to the observer, this is, in the case of many cumulus clouds, as of many mountains, if one neglects irregularities of surface-contour, that of a scalene triangle, the summit of the cloud being unsymmetrically situated with regard to the base. In the growth of a well-developed cloud in showery or thunder weather it remains not for one minute without visible change; it may pass through all the stages of its evolution in less than an hour—wherein are effected all the changes of form and appearance which, in the case of the mountains, require the lapse of a geological age. But note the behaviour of the cloud in tending towards the precipitation of rain, as the accumulation of electricity and the increase of electric density within its mass go on apace. At first, before it has attained mature development, the summit is white and dazzling as snow, which, considering its height, 5 or 6,000 feet above sea-level, it probably is, and the whole mass exhibits a compactness of texture which shows that rain is not yet about to fall from it. Gradually the lower part

becomes steeped in inky blackness, and lurid tongues of flying scud play angrily about the body of the cloud. Surcharged now with electricity the restless mass begins to glimmer and rumble, and will, perhaps, be from time to time visibly rent by flashes of lightning. Then, as condensation proceeds, a purple haze steals over the cloud which grows watery and less compact; and finally the jagged, frozen peaks of the summit fall in, black streaks (due to falling rain-drops) appear beneath the base, and the flood-gates of heaven are opened. The structure of cumulus cloud presents, in nearly all instances, a peculiar laminated appearance, especially towards the top. The snowy summit is further marked by numerous dark curved lines which cause it to look as if it were composed of roughly globular masses. This apparent discontinuity of surface shows the presence of gulfs, chasms and ravines; sometimes when a cumulus is favourably situated with the summit tilted towards the observer, he can see right into these cloud depressions.

The phenomena exhibited in the structure of the higher portions of cumulus are akin to those in a cloud of steam escaping from an engine, and are the most puzzling in connection with this type of cloud. In both cases the internal movements of the mass causing the observed structure are due to the working of hydro-dynamic laws which affect a column of vapour when it suddenly condenses in rising through air. But we may surely inquire what compels a column of vapour, rising into the upper air, to condense into a mass consisting of semi-detached portions forming here and resolving there in seemingly so confused a manner, yet, aggregated round a central nucleus, appearing parts of some connected, as it were organic, whole.

Strangely mingled feelings of awe, wonderment, and fascination, cannot but be awakened in the mind that discerns in the sublime phenomena of nature the working of irrevocable laws imposed upon matter by the Causal Will of the Deity. I cannot do better than conclude with a passage on the cumulus cloud from the writings of a great and versatile genius, John Ruskin—a worshipper of the beautiful wheresoever manifested in nature, literature, or art. He writes\* :—

“The rain which flooded our fields the Sunday before last was followed, as you will remember, by bright days, of which Tuesday the 20th was, in London, notable for the splendour towards the afternoon of its white cumulus clouds. There has been so much black east wind lately, and so much fog and artificial gloom besides, that I find it is actually some two years† since I last saw a noble cumulus cloud

\* “The Eagle’s Nest,” Oxford Lectures, No. VII., delivered February 9th, 1872.

† These clouds must have struck Ruskin’s mind as exceptionally fine; for I can confidently say that as long as our climate has been in the past what it is now, two years have never elapsed without many opportunities for seeing magnificent cumulus clouds. It is indeed rare for even the dark and gloomy month of December to pass without one or two days on which noble cumulus may not be observed in the neighbourhood of London.

in full light. I chanced to be standing under the Victoria Tower at Westminster when the largest mass of them drifted past that day from the north-west ; and I was more impressed than ever yet by the awfulness of the cloud-form, and its unaccountableness in the present state of our knowledge. The Victoria Tower seen against it had no magnitude ; it was like looking at Mont Blanc over a lamp-post. The domes of cloud-snow were heaped as definitely, their broken flanks were as grey and firm as rocks ; and the whole mountain, of a compass and height in heaven which only became more and more inconceivable as the eye strove to ascend it, was passing behind the tower with a steady march, whose swiftness must in reality have been that of a tempest ; yet along all the ravines of vapour\* precipice kept pace with precipice, and not one thrust another. What is it that hews them out ? Why is the blue sky pure there—cloud solid here, and edged like marble ; why does the state of blue sky pass into the state of cloud in that calm advance ? It is true that you can more or less imitate the forms of cloud with explosive vapour or steam ; but the steam melts instantly and the explosive vapour dissipates itself. The cloud of perfect form proceeds unchanged. It is not an explosion, but an enduring and advancing presence. The more you think of it, the less explicable it will become to you."



### A HOT WIND IN NEW ZEALAND.

DR. W. E. HOYLE, of the Manchester Museum, sends us the following extract from a letter addressed to him by Mr. C. H. Tripp, of Timaru, New Zealand, under date of January 23rd, 1908.

Yesterday at 6 a.m. it was cold for summer, about  $45^{\circ}$ , at 8 a.m. it rose to  $55^{\circ}$ , and then to  $60^{\circ}$  at about 9 a.m., when my wife and children went down to bathe in the sea, at 1 p.m., thermometer stood at about  $70^{\circ}$ , at 2 p.m. a W.N.W. wind suddenly sprang up, and at 2.30 the thermometer rose to  $104^{\circ}$ , the highest ever recorded here. At 6 p.m. it stood at  $91^{\circ}$  under a verandah on the shady side of my house and against the brick wall, at 7 p.m. it stood at  $84^{\circ}$ , at 8 p.m.  $81^{\circ}$ , and stopped at that till 9.15 p.m. when a S.W. wind came up (a V-depression I think), at 9.30 it had fallen to  $63^{\circ}$ , and this morning was  $57^{\circ}$ , but  $55^{\circ}$  was the minimum registered last night. All yesterday, especially at sunset, the light was very yellow. I noticed the yellow strongly at 6 a.m. There are large bush fires to the north-east of this place from 100 to 400 miles away but I do not think the yellow was from these fires. This last week it has been intensely hot in Australia,  $114^{\circ}$  in Adelaide,  $121^{\circ}$  in some inland places, and my theory is that the heat wave we got yesterday was from Australia, and the

\* In many of his references to cloud, Ruskin employs, inaccurately, of course, so far as the modern language of physics is concerned, the term "vapour."

yellow was the smoke of Australian bush fires that are raging, though these fires must be 1,500 to 2,000 miles away, and the heat had crossed the Tasman sea about 1,000 miles wide.

The heat was a dry heat and felt like a blast from a furnace on one's face, and men motoring felt it most, strange to say. I did not find it exhausting like the heat of the Indian Ocean this side of Colombo, which seldom exceeds  $85^{\circ}$  or  $87^{\circ}$ , and the peculiar part was that, though it rose to  $104^{\circ}$  in a true shade 4 ft. from ground with a proper screen over it, it never exceeded  $110^{\circ}$  in the sun in so far as I can find out.

Last Monday we had a blow of a shorter duration. In the evening, at 9 p.m., my thermometer stood at  $69^{\circ}$ , it had been a very hot day, and everybody was complaining. At 9.30 it had commenced to blow from the W.N.W. and stood at  $84^{\circ}$ , at 11.30 p.m. it stood at  $86^{\circ}$ , at 12 midnight a S.W. came up and it fell to  $60^{\circ}$ . Yesterday was the greatest heat I ever felt in New Zealand, and last Monday night the hottest night.



### ROYAL METEOROLOGICAL SOCIETY.

THE first of the afternoon meetings of this Society for the present session was held at 70, Victoria Street, Westminster, on May 20th, Dr. H. R. Mill, President, in the chair.

Mr. B. F. E. Keeling, Director of the Helwan Observatory, gave an account of the Upper Air Observations which are being carried out in Egypt. He said that Egypt itself has comparatively little weather, and what there is has no influence commercially, except along a narrow belt on the Mediterranean coast; but, on the other hand, the whole prosperity of Egypt is wrapped up in the weather of the neighbouring country of Abyssinia. As the summer rainfall is greater or less in Abyssinia, so is the Nile flood; and in consequence the area of land cultivated and the general prosperity of the people of Egypt. In years when a bad low state of the river is to be expected, following on a poor flood, the early spring showers in Abyssinia are of very great importance. As unfortunately there is no meteorological service in Abyssinia, it is not possible to obtain information about the rainfall over that region, so steps have recently been taken to obtain observations on the upper air over Egypt by means of pilot balloons and kites. Mr. Keeling gave an account of the methods employed, and of the directions in which it was hoped in the near future to develop the work. He also stated that the observations of the anti-trade winds above the North-East Trades made by M. Teisserenc de Bort and Prof. A. L. Rotch, have been confirmed. At Helwan the anti-trade wind is reached at a height of about 6,500 feet above sea-level. The greatest height so far reached by a balloon was 54,000 feet, and on that occasion the south-west

anti-trade wind was apparently penetrated, and a north-west upper current encountered.

Mr. C. J. P. Cave said that Egypt was an interesting place for making observations, because of the clearness of the air, allowing balloons to be followed by the eye to a very great height.

Dr. W. N. Shaw remarked that a point of great interest about Mr. Keeling's results was that, although very frequently the upper air current set from the west or south-west, there were occasions when it set from the north. That must be a circumstance interesting to Egypt and other parts of the world meteorologically connected with Egypt.

Colonel H. E. Rawson said it was important to know what was going on in Egypt when the change took place from the tropical anticyclonic to the low-pressure equatorial belt, and *vice versa*.

The President and Mr. E. S. Bruce also took part in the discussion, and Mr. Keeling replied.


The Secretary read a report by Prof. J. P. d'Albuquerque on the "Balloon Experiments in Barbados, November 6th-8th, 1907," which were carried out by himself and several other gentlemen at the request of Sir D. Morris for the Royal Meteorological Society.

Mr. Spencer C. Russell read a paper on "Observations on the Colour of Lightning made at Epsom, 1903 to 1907." He had for the past five years kept a record of the colours or series of colours noted during each thunderstorm or display of sheet lightning, and tabulated them under their respective colour. He had thus results of observations of fork lightning made during 57 thunderstorms, and 78 observations of sheet lightning. He found that in fork lightning red is the colour of most frequent occurrence, and this is followed closely by blue, the least frequent colours being orange and green. White is of greatest frequency in sheet lightning, red and yellow coming next. It seems that the presence of hail, when occurring in association with a thunderstorm, is intimately connected with blue lightning.

Mr. W. Marriott referred to the Report by the late Mr. G. J. Symons on the Thunderstorms in the years 1857-59. From this it appeared that in sheet lightning the most common colour was white, then yellow, blue and red; in fork lightning, however, the order was nearly reversed, blue being more than twice as frequent as any other colour, then red, white, and most rarely yellow. Blue (or violet) was by far the most frequently recorded colour.

Mr. J. A. Curtis, Mr. W. W. Bryant, Colonel H. E. Rawson, and the President also spoke in the discussion.

The following gentlemen were elected Fellows of the Society:—Mr. R. V. Gower, Mr. D. Hanson, Mr. W. F. Keates, Mr. A. L. Lang, Mr. W. R. F. Lukis, Mr. S. J. A. Mills, Mr. B. Ronalds and Capt. H. Williams.



## Correspondence.

*To the Editor of Symons's Meteorological Magazine.*

## THE COLD SPRING.

THE spring of 1908 has been distinctly cold at Greenwich. Could this be foreseen? Was there anything in previous experience to render a cold spring probable? Such inquiries are, I think, useful; and I would offer the following for consideration.

Put down for each year from 1841 to 1907 the number of warm months in spring at Greenwich. Smooth this series with sums of five ('41—'45, '42—'46, &c.); then smooth this second series in the same way.

The values of the third series may be represented by dots in 11 columns, showing the distribution in the sunspot cycle. I enclose the diagram, which is not essential to this.

I will here, for clearness, give the concluding members of those three series:—

	1898.	'99.	1900.	'01.	'02.	'03.	'04.	'05.	'06.	'07.	'08.
(a) .....	1	0	1	2	1	2	2	3	2	3	(?)
(b) .....	6	5	5	6	8	10	10	12	(?)	—	—
(c) .....	34	30	30	34	39	46	(?)	—	—	—	—

Now, for 1908, the abstractly possible numbers are, of course, 0, 1, 2 or 3, and the corresponding numbers in (c) 50, 51, 52 or 53. But it so happens that in (c) 51 is the extreme upper limit previously reached in the first and second columns after max. (in diagram). It seemed unlikely that this would be exceeded in the present case. Thus, we are limited to 50 or 51; meaning in either case a cold spring with warm months 0 or 1.

Is there any fallacy here?

A. B. M.

## SUNSHINE CARDS.

It may perhaps be serviceable to draw attention to the increasing darkness of the blue cards supplied in recent years for measuring the sunshine by the Campbell-Stokes Recorder. The latest cards in use are of so deep a tint that much additional care and time are required (if measured at the close of the day by artificial light) to compute exactly the trace if it is at all complicated.

If there is no reason to the contrary one would suggest a return to the pale blue tint previously adopted—on which the burnt record stood out very clearly—also that a different or thinner line be employed for the half-hours, distinct from that of the hours. When *measuring* one is not always able to notice the difference in the *length* of the half-hour line.

RICHARD BENTLEY.

*Upton, Slough.*



## APRIL SNOWS.

THE most severe snowstorms which I remember as having occurred during a period of 50 years in the fourth week of April were experienced here on April 23rd, 24th and 25th. Falling, however, on sodden ground the snow disappeared almost as quickly as it alighted, with the exception of the last storm on the night of the 24th and morning of 25th, after which it lay on the ground to the average depth of about  $3\frac{1}{2}$  inches. The evergreens were bent down and some broken with the weight. Had all the snow which descended during the various storms on 23rd—25th remained on the surface, it would probably have been about 14 inches deep. People who looked out of their windows on the early morning of the 25th viewed a very wintry but picturesque scene, and one which though commonly associated with Christmas-time, is very rarely displayed near the close of April ; yet May 1st and 2nd proved ideal summer days, with max. shade temperatures of  $73^{\circ}$  and  $79^{\circ}$ .

While writing, I may mention that the greatest depth of snow that I have ever measured here was 16 inches on the evening of March 15th, 1887.

W. F. DENNING.

*Bishopston, Bristol, May 9th, 1908.*

## WHAT DO METEOROLOGISTS MEASURE?

IN your introduction to the reports relating to "The Easter Snow-storm of 1908" (pp. 65-74) you state that at Oxford, in 1888, 24 inches of snow *was* measured. Confusion follows. Speaking of the quantity of snow, the Rev. B. P. Oakes states that there *were* 4 inches, and there *was* a good 6 inches. Mr. Blair also informs us that there *was*  $2\frac{1}{2}$  inches ; 4 inches *were* lying ; there *was* but 4 inches ; and 14 inches *was* measured ; while  $4^{\circ}$  of frost *was* registered, and also  $6^{\circ}$  *was*. Miss Tawney informed us there *were* 3 or 4 inches, and Major Gambier Parry likewise that there *were* 2 inches ; whereas Mr. Horner asserts that there *was* from 4 to 6 inches, and the Rev. H. A. Boys that there *was* 7 inches ; then, passing on to page 75, Mr. Brodie will have it that the minimum temperature was as *many* as  $6^{\circ}$  lower !

The situation is really comical ! Where is the British Institute to determine this knotty problem ? What is it we measure—the snow (or rain), or the inches ? the temperature, or the degrees ? the sunshine, or the hours ? If we are at liberty to play ducks and drakes with the language, then I can enter on my register that "the *temperature* this morning fell to  $10^{\circ}$ , which *were* registered at 6 a.m." ; that "the *rainfall* was 2 inches, which *were* measured at 9 p.m." ; and that "the *sunshine* was 10 hours, which *were* registered up to 4 p.m." The expressions are extremely ugly, and I venture to say they are not English ; but some of your readers may take quiet the opposite view.

F.R.MET.SOC.

*May 30th, 1908.*

[We have got into trouble by attempting—though, alas! not achieving—uniformity of diction; but we dare not tamper with “F.R.Met.Soc.’s” phrases, and are prepared with all humility to “take quiet” his rebuke. The fault is ours alone, for many of the letters and remarks we quote were dashed off hurriedly to catch the post, and never intended for the cruel pillory of cold print. We dress them for publication, and sometimes we do it carelessly. The fault, it seems to us, is a venial one; if we cared to delay publication by a day or two we could very easily trim the sentences of our correspondents into prim correctness, but is it worth the delay? Our impression is that rainfall, temperature or depth *is* or *was*; but that inches, degrees and hours *are* or *were*:—three hours of sunshine *were* recorded; the duration of sunshine *was* three hours; there *were* three inches of rain; there *was* a rainfall of three inches. Clumsy phrases at the best, and, writing for ourselves, we try to avoid them by periphrasis; but time is short and space is small in this office and in these pages. We are glad, however, to find a reader who reads so carefully, and we hope he will forgive us for holding our editorial hand which instinctively was drawing the sign of transposition round the two last letters of his last word but three, as a small token of our appreciation of his demonstration of the difficulty of being always correct.—ED. *S.M.M.*]

### THE ROYAL METEOROLOGICAL SOCIETY.

RECEIVING in an idle hour lately the new List of Fellows, it occurred to me to ask where, outside of England, our modest light is shining, or, at least, our Fellows are located. The following rough classification does not include the “Honoraries”: Indian Region 35, Africa 34, Scotland 15, Australia and New Zealand 13, Ireland 12, Wales 12, South America 10, China 10, U.S.A. 7, France 3, Channel Islands 3, Canada 2, Japan 2; leaving nine cases of one each. Total, 167; or about 23 per cent. of the entire number.

F.R.MET.SOC.\*

### STORM OF 4th JUNE.

WE have just had a wild storm of thunder and lightning, hail and rain in torrents, and I have just measured the rainfall—44 in. in about a quarter-of-an-hour, 5.40 to 5.55 p.m. This storm came from the N.N.W., but it has been thundering in the east nearly all day. We had a great deal of thunder and vivid lightning in the night, from about 10.45 to nearly 2 o'clock, but it was not near us as this short storm has been. The hail was as large as small marbles.

The appearance of the clouds before the storm broke was awfully grand.

JULIANA FOSTER.

*The Mount, Witley, Surrey, 4th June, 1908.*

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\* But not the F.R.Met.Soc. of the foregoing letter.—ED. *S.M.M.*

### PARHELIA.

It may interest your readers to know that there was visible yesterday at Ifield, near Crawley, Sussex, a solar halo with two parhelia. The mock suns were on a level with the sun on the north and south sides; that on the north side was bright, and had had a bright bar of light extending from it for some distance outside the halo. That on the south side was less bright and had no bar. There was no supernumary circle. The halo was bright, but there were no prismatic colours. The mock suns were first noticed at 5.55 p.m., and lasted about 20 minutes.

A lunar halo was visible in the evening.

F. DRUCE.

65, Cadogan Square, S. W., June 9th, 1908.

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### A SIMPLE METHOD OF FORECASTING STORMS.

I AM much surprised that the official warnings are often given very late, while they are also usually insufficient and inaccurate. I, therefore, desire to draw attention to a simple method which every subscriber to the official "Weather Reports" may use. For over 18 years I have used the official charts in a special manner, as follows:—The isobars given on the last chart are drawn on tracing paper. This tracing is then superposed upon the isobaric chart of the day before. The outline of the land having been previously drawn on the tracing paper, it is easy to secure the correct superposition. The places where the isobars of the two charts cross each other are thus readily marked upon the tracing paper, the differences, positive or negative, at these points, being also carefully noted. By drawing lines through those points which have the same difference, a new series of "isobars" is obtained, as well as new "centres" of high and low pressure. In fact, a new chart is the result, to which I give the name "Differential Chart," and by comparing it with the last official charts it is not very difficult to trace the coming changes in position of the centres of high or low pressure.

It has been long known from experiments with balloons that such centres of high and low barometric pressure are to be regarded as self-subsisting or separate "bodies," which may lie one over the other, as well as side by side. This, perhaps, accounts for the striking difference that is sometimes found to exist in respect to the positions of barometric maxima and minima, as indicated by the official and "differential" charts, respectively. In fact, the one may show a high centre where the other has a low, and so on. But the important point to notice is, that in such cases, great atmospheric disturbances usually follow in the course of the next few days. It is merely a question of increased meteorological skill to find out the actual districts likely to be affected, and where, therefore storm-warnings should be issued.

It must be pointed out, however, that the method does not lay claim to mathematical accuracy. It cannot, under the circumstances, give more than approximate results, but, nevertheless, these may be capable of being put to great practical use, especially by all who are in any way connected with seafaring. The storms of the past week, for example, were well indicated by this method. The matter is therefore, I think, one that is worthy deeper enquiry, so that practical application may be made of it. But for such an enquiry I have not myself time at present. I therefore send you these notes now so that others who have more leisure may devote their attention to a further investigation of the whole question.

For my own studies I find it very convenient to colour high centres blue and low red, and to arrange (say) 40 charts of each kind together on a board. The latest chart is every day inserted in place of the oldest, so that the series is always up to date.

J. F. NOWACK.

6, *De Crespigny Park, Denmark Hill, S.E.*

### METEOROLOGICAL NEWS AND NOTES.

THE METEOROLOGICAL OFFICE has issued its usual notice with respect to telegraphic weather forecasts for the harvest season. It cannot be too widely known that anyone may obtain by telegram a forecast of the probable weather for the following day, sent out by the Meteorological Office at 2.30 p.m., or at certain other hours. On Saturdays a forecast for the two following days will be issued, so that some clue may be had to the probable weather of Monday, and for a slightly larger fee the Meteorological Office will send a notification by telegram whenever conditions favourable for a spell of fine weather set in. Application should be made to The Director, Meteorological Office, 63, Victoria Street, London, S.W.

THE ROYAL METEOROLOGICAL SOCIETY is arranging at the forthcoming Show of the Royal Agricultural Society, to be held at Newcastle-on-Tyne from June 30th to July 4th, a Meteorological Section in connection with the Agricultural Education and Forestry Exhibition. This will include various patterns of self-recording and other instruments, as well as diagrams relating to rainfall, temperature, sunshine, the influence of weather on crops, health, &c. A collection of photographs illustrating meteorological phenomena will also be exhibited. A fully equipped climatological station, with the various instruments in position, will be arranged in a railed-off enclosure outside the Exhibition building; and an address on "Meteorology in relation to Agriculture" will be given each day by Mr. W. Marriott. We hope that all rainfall observers who may visit the Show will make a point of inspecting the Meteorological Section, and of making themselves known to Mr. Marriott or his assistants, who will be happy to explain in detail any matters of special interest to observers.

THE CORPORATION OF DOUGLAS, Isle of Man, has accepted from Mr. A. W. Moore, C.V.O., Speaker of the House of Keys, the generous gift of the meteorological station which he has maintained for many years, and we hope that it will be carried on for all time to the benefit of science and the demonstration of the enlightened public spirit of that attractive town.

THE RAIN GAUGE ON SCAFELI, which Miss Marshall of Ambleside had erected in 1906, and which has been read regularly once a month, has been damaged again and again by the light-hearted idiots who bring the name of tourist into disrepute. Miss Marshall has written to the *Yorkshire Post* in the hope of bringing public opinion to bear. One would imagine that anyone who had sufficient intelligence to climb a mountain for pleasure might have sense enough to understand that even so unassuming a piece of apparatus as a rain gauge was placed there with no little trouble and for some useful purpose. Experience in many parts of the country shows that this is not the case.

LOCAL RAINFALL RECORDS are frequently lost through the absence of interest in such matters on the part of the community, and we are anxious to ascertain how many provincial newspapers are sufficiently alive to the importance of these statistics to publish, like the *Norfolk Chronicle*, monthly records of daily rainfall from a number of stations near the place of publication. We have long held the Norfolk paper in the highest esteem because of its care for scientific matters, and we rather think it is unique in this particular respect.

APRIL SNOW, says a frivolous correspondent, caused a newspaper reporter to remark that "on April 26th the sun rose at its earliest, and soon the roofs of all the houses were in a flood of dripping." What a chance for the cooks! adds our correspondent.

## REVIEWS.

*Scottish National Antarctic Expedition.* Report on the scientific results of the voyage of S.Y. *Scotia* during the years 1902, 1903 and 1904, under the leadership of William S. Bruce, LL.D., F.R.S.E. Volume II., Physics. Part I., Meteorology, by R. C. MOSSMAN, F.R.S.E. Part II., Magnetism, by CHARLES CHREE, Sc.D., F.R.S., and R. C. MOSSMAN, F.R.S.E. Part III., Tides, by Sir GEORGE H. DARWIN, K.C.B., F.R.S. Edinburgh, the Scottish Oceanographical Laboratory, 1907. Price, one guinea. Size  $12\frac{1}{2} \times 10$ . Pp. vi. + 324. Plates.

IN this notice we confine our attention to the first memoir, which occupies 308 out of the 324 pages of the volume, and constitutes a very important contribution to knowledge. Meteorology has suffered on many expeditions from the careless belief that anyone can take meteorological observations with the slightest possible training, and it has not infrequently been a trying task for the meteorologist in whose hands the records have been placed on the return of the expedition, to make effective use of the data before

him, without any personal knowledge of the way in which they were collected.

Mr. Mossman is a born meteorologist, and from his boyhood he has taken pleasure in meteorological observations for their own sake, acquiring extraordinary skill as an observer in most difficult conditions, while a volunteer in the Ben Nevis Observatory, and no less facility as a computer and compiler from his long and laborious researches into the climate of Edinburgh and London, from more than a century of records. Consequently when Dr. Bruce secured the services of Mr. Mossman as his companion on the Antarctic voyage of the *Scotia* he made the meteorological side of his expedition an assured success from the outset.

In describing the instruments used, Mr. Mossman reports that very few thermometers were broken, an unusual and gratifying circumstance when observations were made, as in this case, every hour while the ship was south of  $30^{\circ}$  S. The thermometers were exposed in the ordinary small single-louvred screen usually employed at sea, but two of these were fitted, one on each side of the ship, projecting over the water. Both sets of thermometers were read on each occasion, but only the reading on the weather side was recorded; that on the lee side was affected by hot air from the engines or cabins, and sometimes was as much as  $5^{\circ}$  above the other. The muslin of the wet bulbs was changed monthly, and syringed with distilled water daily to obviate any accumulation of salt.

The observations taken at sea are printed *in extenso*, occupying 103 pp.; those taken at Laurie Island, South Orkneys, from April, 1903, to February, 1904, occupy 78 pp. The Meteorological Log of the *Scotia* from 1st January, 1903, to 5th May, 1904, by Mr. Mossman when on board and by Dr. Bruce during Mr. Mossman's land-work, extends to 23 pages of small type in double column. Detailed observations taken every four hours during 1903 and 1904 at Cape Pembroke, Falkland Islands, by the Lighthouse Staff for the Meteorological Office, occupy 26 pp.; and, finally, Mr. Mossman discusses all the results in 60 pages of text, illustrated by many photographs, diagrams, and charts.

In a region like the portion of the Antarctic including Weddell Sea where there were practically no observations prior to the expedition of the *Scotia*, the records obtained cannot go very far towards the determination of normal seasonal conditions; but they may throw extremely valuable light on the diurnal variations of the various elements observed. Diurnal variations have accordingly been discussed at considerable length. It is interesting to note that during the period spent near the farthest south point attained, off the coast of the newly-discovered Coats Land, the diurnal range of temperature showed a marked increase, which obviously suggested the proximity of continental land, or an unbroken ice-sheet of great extent.

The climate of the station on Laurie Island, in the South Orkneys, is discussed from a complete year's observations, the Argentine Meteorological Office having placed the results obtained during part

of their period of observations at the disposal of the author. It appears that, while the usual diurnal range of temperature is clearly marked in spring and summer, there is a double maximum and minimum in autumn and winter, which is probably due to the disturbing effects of cyclones; and in many instances the nights were notably warmer than the days. The observations showed that at no period of the year did the South Orkneys (in  $60^{\circ} 43' \text{ S.}$ ) come within the system of prevailing easterly winds, which was so marked a feature of the climate at the wintering stations of other expedition, south of  $63^{\circ} \text{ S.}$ , and of Weddell Sea when visited by the *Scotia*.

The measurement of precipitation where so much of the annual fall took the form of snow during the prevalence of high wind proved too much even for Mr. Mossman, and though the actual measurements only indicated 10.50 in. per annum for the station on Laurie Island, he is inclined to believe that the annual fall is equivalent to between 15 and 17 inches. Rainfall observations do not seem to have been made systematically on board ship, nor do the kite observations appear to have met with success.

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*Philips' Meteorological Calendar for recording daily observations regarding the barometer, thermometer, rainfall, direction of wind, weather, etc., consisting of 52 weekly sheets. London: George Philips & Sons. Price 2s., net.*

To meet the requirements of pamphlets on Rural Education and Nature Study recently issued by the Board of Education and Scottish Educational Department, Messrs. Philips have issued a calendar consisting of 52 weekly sheets upon which are ruled diagrams for recording graphically the variations of the barometer, thermometer and rainfall, together with a circular diagram marked with the points of the compass and concentric circles, one for every day of the week, so that the direction of the wind may also be noted.

We regret that we cannot approve this form of calendar for educational purposes. No space is provided for recording the actual readings of the observations, and, of course, from the educational point of view, the most important fact to impress upon the young mind is the absolute necessity of accurately reading and conscientiously recording the indications of each instrument. Again, the scale of temperature given in the diagram is absurdly long, from  $10^{\circ}$  to  $100^{\circ} \text{ F.}$ , with the result that the portion between  $40^{\circ}$  and  $60^{\circ}$ , in which the greatest frequency of temperature occurs, is much too contracted. The rainfall scale, on the other hand, is far too short, as it only allows for a fall of .60 in. on any one day, so that the interest of a very heavy fall would be entirely lost as far as the diagram is concerned. If the sheets had been submitted to the revision of a practical meteorologist before publication, they could have been made more practical, and in any record having the week as its unit reference should be made to the *Weekly Weather Report*, which would prove very helpful to the teacher.

## RAINFALL TABLE FOR MAY, 1908.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	RAINFALL OF MONTH.	
					Aver. 1870-99. in.	1908. in.
Camden Square.....	London.....	51 32	0 8	111	1'72	1'95
Tenterden.....	Kent.....	51 4	*0 41	190	1'72	1'45
West Dean.....	Hampshire.....	51 3	1 38	137	1'86	2'84
Hartley Wintney.....	".....	51 18	0 53	222	1'79	1'58
Hitchin.....	Hertfordshire.....	51 57	0 17	238	1'87	1'40
Winslow (Addington).....	Buckinghamsh..	51 58	0 53	309	2'06	1'49
Bury St. Edmunds (Westley).....	Suffolk.....	52 15	*0 40	226	1'85	1'49
Brundall.....	Norfolk.....	52 37	*1 26	66	1'74	2'02
Winterbourne Steepleton.....	Dorset.....	50 42	2 31	316	2'02	1'88
Torquay (Cary Green).....	Devon.....	50 28	3 32	12	1'96	1'75
Polapit Tamar [Launceston].....	".....	50 40	4 22	315	1'98	1'70
Bath.....	Somerset.....	51 23	2 21	67	2'09	1'15
Stroud (Upfield).....	Gloucestershire..	51 44	2 13	226	2'10	1'48
Church Stretton (Wolstaston).....	Shropshire.....	52 35	2 48	800	2'62	2'83
Coventry (Kingswood).....	Warwickshire.....	52 24	1 30	340	2'11	2'01
Boston.....	Lincolnshire.....	52 58	0 1	25	1'73	1'70
Workshop (Hodsock Priory).....	Nottinghamshire.....	53 22	1 5	56	2'01	1'99
Derby (Midland Railway).....	Derbyshire.....	52 55	1 28	156	1'96	2'40
Bolton (Queen's Park).....	Lancashire.....	53 35	2 28	390	2'46	2'91
Wetherby (Ribston Hall).....	Yorkshire, W.R.....	53 59	1 24	130	1'90	2'84
Arncliffe Vicarage.....	".....	54 8	2 6	732	3'36	4'53
Hull (Pearson Park).....	"..... E.R.....	53 45	0 20	6	1'95	1'10
Newcastle (Town Moor).....	Northumberland.....	54 59	1 38	201	1'89	1'83
Borrowdale (Seathwaite).....	Cumberland.....	54 30	3 10	423	7'26	7'98
Cardiff (Ely).....	Glamorgan.....	51 29	3 13	53	2'55	1'93
Haverfordwest (High Street).....	Pembroke.....	51 48	4 58	95	2'53	2'67
Aberystwyth (Gogerddan).....	Cardigan.....	52 26	4 1	83	2'44	2'83
Llandudno.....	Carnarvon.....	53 20	3 50	72	1'85	2'06
Cargen [Dumfries].....	Kirkcudbright.....	55 2	3 37	80	2'60	3'93
Hawick (Branksholm).....	Roxburgh.....	55 24	2 51	457	2'17	2'42
Edinburgh (Royal Observatory).....	Midlothian.....	55 55	3 11	442	...	1'92
Girvan (Pinmore).....	Ayr.....	55 10	4 49	207	2'73	2'55
Glasgow (Queen's Park).....	Renfrew.....	55 53	4 18	144	2'36	...
Tighnabruich.....	Argyll.....	55 55	5 14	50	3'21	3'25
Mull (Quinish).....	".....	56 36	6 13	35	2'91	2'77
Dundee (Eastern Necropolis).....	Forfar.....	56 28	2 57	199	1'88	1'82
Braemar.....	Aberdeen.....	57 0	3 24	1114	2'29	1'44
Aberdeen (Cranford).....	".....	57 8	2 7	120	2'20	1'53
Cawdor.....	Nairn.....	57 31	3 57	250	2'03	1'43
Fort Augustus (S. Benedict's).....	E. Inverness.....	57 9	4 41	68	2'32	2'36
Loch Torridon (Bendamph).....	W. Ross.....	57 32	5 32	20	5'05	3'27
Dunrobin Castle.....	Sutherland.....	57 59	3 56	14	2'02	2'33
Castletown.....	Caithness.....	58 35	3 23	100	...	2'69
Killarney (District Asylum).....	Kerry.....	52 4	9 31	178	2'95	3'52
Waterford (Brook Lodge).....	Waterford.....	52 15	7 7	104	2'11	2'27
Broadford (Hurdlestown).....	Clare.....	52 48	8 38	167	2'09	3'36
Abbey Leix (Blandsfort).....	Queen's County..	52 56	7 17	532	2'27	2'58
Dublin (Fitz William Square).....	Dublin.....	53 21	6 14	54	1'94	1'37
Ballinasloe.....	Galway.....	53 20	8 15	160	2'49	3'43
Clifden (Kylemore House).....	".....	53 32	9 52	105	4'61	5'47
Crossmolina (Enniscoe).....	Mayo.....	54 4	9 18	74	2'93	3'45
Collooney (Markree Obsy.).....	Sligo.....	54 11	8 27	127	2'61	3'62
Seaforde.....	Down.....	54 19	5 50	180	2'45	2'23
Londonderry (Creggan Res.).....	Londonderry.....	54 59	7 19	320	2'48	2'09



## RAINFALL TABLE FOR MAY, 1908—continued.

RAINFALL OF MONTH (con.)					RAINFALL FROM JAN. 1.				Mean Annual 1870-1899.	STATION.
Diff. from Av. in.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99. in.	1908. in.	Diff. from Aver. in.	% of Av.		
		in.	Date.						in.	
+ .23	113	.60	29	11	8.54	10.31	+1.77	121	25.16	Camden Square
— .27	84	.44	29	12	9.59	8.35	—1.24	87	28.36	Tenterden
+ .98	153	.65	11	14	10.59	11.40	+ .81	108	29.93	West Dean
— .21	88	.36	14	15	9.70	11.70	+2.00	121	27.10	Hartley Wintney
— .47	75	.28	12	12	8.37	9.85	+1.48	118	24.66	Hitchin
— .57	72	.43	2	13	9.29	11.56	+2.27	124	26.75	Addington
— .36	80	.31	6	10	8.28	9.45	+1.17	114	25.39	Westley
+ .28	116	.37	6	13	8.23	10.22	+1.99	124	25.40	Brundall
— .14	93	.38	14	15	14.04	12.25	—1.79	87	39.00	Winterbourne Stpltn
— .21	89	.41	14	16	12.92	10.40	—2.52	81	35.00	Torquay
— .28	86	.40	14	16	13.33	15.07	+1.74	113	38.85	Polapit Tamar
— .94	55	.20	2	15	10.72	9.42	—1.30	88	30.75	Bath
— .62	70	.24	14	18	10.60	10.06	— .54	95	29.85	Stroud
+ .21	108	.87	2	17	11.85	13.14	+1.29	111	33.04	Wolstaston
— .10	95	.46	2	11	10.15	10.26	+ .11	101	29.21	Coventry
— .03	98	.55	13	10	7.82	8.84	+1.02	113	23.30	Boston
— .02	99	.60	3	16	8.57	9.17	+ .60	107	24.70	Hodsock Priory
+ .44	122	.64	2	16	8.78	10.01	+1.23	114	26.18	Derby
+ .45	118	.61	2	18	13.54	17.70	+4.16	131	42.43	Bolton
+ .94	150	.60	6	17	9.25	12.58	+3.33	136	26.96	Ribston Hall
+1.17	135	.71	5	23	22.78	27.87	+5.09	122	60.96	Arncliffe Vic.
— .85	56	.25	7	14	9.12	9.39	+ .27	103	27.02	Hull
— .06	97	.30	3	18	9.32	11.36	+2.04	122	27.99	Newcastle
+ .72	110	1.60	8	21	50.39	50.28	— .11	100	132.68	Seathwaite
— .62	76	.29	4	21	14.66	13.00	—1.66	89	42.81	Cardiff
+ .14	106	.50	14	15	17.06	15.78	—1.28	93	47.88	Haverfordwest.
+ .39	116	.78	7	15	14.66	18.17	+3.51	124	45.41	Gogerddan
+ .21	111	.68	2	19	10.18	13.02	+2.84	128	30.98	Llandudno
+1.33	151	.54	8	18	16.07	19.98	+3.91	124	43.43	Cargen
+ .25	112	.40	5	20	12.45	14.04	+1.59	113	34.80	Branxholm
...	...	.43	30	16	...	9.99	...	...	...	Edinburgh
— .18	93	.34	8, 16	23	17.57	20.00	+2.43	114	48.87	Girvan
...	...	...	...	...	12.24	...	...	...	35.80	Glasgow
+ .04	101	.53	16	20	20.89	26.04	+5.15	125	57.90	Tighnabruaich
— .14	95	.57	24	19	20.29	20.81	+ .52	103	57.53	Quinish
— .06	97	.45	8	20	9.94	8.73	—1.21	88	28.95	Dundee
— .85	63	...	...	...	12.50	16.11	+3.61	129	36.07	Braemar
— .67	70	.32	4	14	11.60	10.51	—1.09	91	33.01	Aberdeen
— .60	70	.27	8	10	9.68	10.88	+1.20	112	29.37	Cawdor
+ .04	102	.70	8	17	17.02	19.33	+2.31	114	43.71	Fort Augustus
—1.78	65	.63	24	21	31.26	41.78	+10.52	134	86.50	Bendampf
+ .31	115	.65	8	14	11.31	17.40	+6.09	154	31.60	Dunrobin Castle
...	...	.52	8	18	...	15.30	...	...	...	Castletown
+ .57	119	.64	22	21	22.70	19.87	—2.83	88	58.11	Killarney
+ .16	108	.53	7	18	14.58	13.03	—1.55	89	39.30	Waterford
+1.27	161	.42	2	23	11.60	13.60	+2.00	117	33.47	Hurdlestown
+ .31	114	.38	12	20	12.77	13.34	+ .57	104	35.19	Abbey Leix
— .57	71	.23	14	21	9.93	10.08	+ .15	102	27.75	Dublin
+ .94	138	.55	7	25	13.23	15.04	+1.81	114	37.04	Ballinasloe
+ .86	119	.94	7	16	28.96	30.60	+1.64	106	80.23	Kylemore House
+ .52	118	.40	23	19	18.79	23.79	+5.00	127	50.50	Enniscoe
+1.01	139	.75	2	21	14.35	21.12	+6.77	147	41.83	Markree Obsy.
— .22	91	.28	21	19	14.20	16.58	+2.38	117	38.61	Seaforde
— .39	84	.30	24	24	14.15	17.10	+2.95	121	41.20	Londonderry

## SUPPLEMENTARY RAINFALL, MAY, 1908.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Warlingham, Redvers Road	2.24	XI.	Rhayader, Tyrmynydd .....	4.18
„	Ramsgate .....	1.85	„	Lake Vyrnwy .....	3.56
„	Steyning.....	1.93	„	Llangyhanfal, Plâs Draw....	2.35
„	Hailsham .....	1.34	„	Criccieth, Talarvor .....	2.60
„	Totland Bay, Aston House.	1.49	„	Llanberis, Pen-y-pass .....	12.42
„	Emsworth, Redlands.....	1.57	„	Lligwy .....	1.79
„	Stockbridge, Ashley .....	2.08	„	Douglas, Woodville .....	2.13
„	Reading, Calcot Place.....	2.00	XII.	Stoneykirk, Ardwell House	1.78
III.	Harrow Weald, Hill House.	1.55	„	Dalry, The Old Garroch ...	3.55
„	Oxford, Magdalen College..	1.25	„	Langholm, Drove Road.....	3.85
„	Pitsford, Sedgebrook.....	1.90	„	Moniaive, Maxwellton House	3.19
„	Huntingdon, Brampton.....	1.41	XIII.	N. Esk Reservoir[Penicuik]	2.65
„	Woburn, Milton Bryant.....	1.69	XIV.	Monbole, Knockdon Farm..	2.42
„	Wisbech, Bank House .....	1.15	XV.	Campbeltown, Witchburn...	1.86
IV.	Southend Water Works.....	1.61	„	Inveraray, Newtown .....	4.28
„	Colchester, Lexden.....	1.19	„	Ballachulish House.....	5.59
„	Newport, The Vicarage.....	1.03	„	Islay, Eallabus .....	2.58
„	Rendlesham .....	1.00	XVI.	Dollar Academy .....	2.97
„	Swaffham .....	1.62	„	Loch Leven Sluice .....	1.60
„	Blakeney .....	1.17	„	Balquhiddier, Stronvar .....	3.38
V.	Bishops Cannings .....	1.92	„	Perth, The Museum .....	1.86
„	Ashburton, Druid House ...	2.88	„	Coupar Angus Station .....	2.01
„	Honiton, Combe Raleigh ...	2.77	„	Blair Atholl.....	2.09
„	Okehampton, Oaklands.....	2.87	„	Montrose, Sunnyside Asylum	1.54
„	Hartland Abbey .....	1.55	XVII.	Alford, Lynturk Manse ...	1.29
„	Lynmouth, Rock House ...	1.53	„	Keith Station .....	2.50
„	Probus, Lamellyn .....	1.98	XVIII.	N. Uist, Lochmaddy .....	3.63
„	North Cadbury Rectory ..	1.94	„	Alvey Manse .....	1.45
VI.	Clifton, Pembroke Road ...	1.87	„	Loch Ness, Drumnadrochit.	1.39
„	Ross, The Graig .....	1.54	„	Glencarron Lodge .....	3.84
„	Shifnal, Hatton Grange.....	2.75	„	Fearn, Lower Pitkerrie.....	2.02
„	Blockley, Upton Wold .....	1.66	XIX.	Invershin .....	2.23
„	Worcester, Boughton Park.	1.74	„	Altnaharra .....	2.23
VII.	Market Overton .....	2.01	„	Bettyhill .....	1.57
„	Market Rasen .....	2.56	XX.	Dunmanway, The Rectory..	3.15
„	Bawtry, Hesley Hall .....	2.14	„	Cork .....	2.28
„	Buxton, Lismore House .....	4.12	„	Darrynane Abbey .....	2.69
VIII.	Neston, Hinderton Lodge...	2.56	„	Glenam [Clonmel] .....	3.02
„	Southport, Hesketh Park...	2.72	„	Ballingarry, Gurteen .....	3.28
„	Chatburn, Middlewood .....	3.68	„	Miltown Malbay.....	3.77
„	Cartmel, Flookburgh .....	3.92	XXI.	Gorey, Courtown House ...	1.93
IX.	Langsett Moor, Up. Midhope	3.48	„	Moyalty, Westland .....	2.86
„	Scarborough, Scalby .....	1.53	„	Athlone, Twyford .....	2.67
„	Ingleby Greenhow .....	2.41	„	Mullingar, Belvedere.....	2.52
„	Mickleton.....	2.33	XXII.	Woodlawn .....	4.32
X.	Bardon Mill, Beltingham ...	2.34	„	Westport, St. Helens .....	3.52
„	Ewesley, Fallowlees .....	2.55	„	Mohill .....	3.70
„	Ilderton, Lilburn Cottage..	1.43	XXIII.	Enniskillen, Portora .....	2.96
„	Keswick, York Bank.....	3.14	„	Dartrey [Cootehill].....	2.36
XI.	Llanfrechfa Grange.....	2.12	„	Warrenpoint, Manor House	2.36
„	Treherbert, Tyn-y-waun ...	6.74	„	Banbridge, Milltown .....	1.55
„	Carmarthen, The Friary.....	5.82	„	Belfast, Springfield .....	2.48
„	Castle Malgwyn [Llechryd].	3.36	„	Bushmills, Dundarave .....	2.45
„	Plynlimon.....	6.90	„	Stewartstown, Ballyclog....	2.83
„	Crickhowell, Ffordlas.....	2.10	„	Killybegs .....	4.26
„	New Radnor, Ednol .....	2.85	„	Horn Head ... ..	2.26

## METEOROLOGICAL NOTES ON MAY, 1908.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow; F for number of days Frost in Screen; f on Grass.

LONDON, CAMDEN SQUARE.—Sunny and very warm, the mean temp. being  $57^{\circ} 4$  or  $3^{\circ} 4$  above the average. On 3rd, at 8.40 a.m., .24 in of R fell in 7 minutes. Duration of sunshine, 173.7\* hours and of R 29.8 hours. Shade max.  $77^{\circ} 9$  on 27th; min.  $42^{\circ} 2$  on 23rd. F 0, f 0.

TENTERDEN.—Duration of sunshine, 211† hours. Max. temp.  $75^{\circ} 0$  on 31st; min.  $39^{\circ} 0$  on 22nd. F 0, f 0.

TOTLAND BAY.—Max. temp.  $70^{\circ} 6$  on 29th; min.  $43^{\circ} 2$  on 11th. The mean min. was  $47^{\circ} 9$ , the highest in May during 12 years. Duration of sunshine 221.5\* hours.

PITSFORD.—Mean temp.  $55^{\circ} 2$ . Max.  $77^{\circ} 5$  on 31st; min.  $34^{\circ} 6$  on 11th.

TORQUAY.—Duration of sunshine 213.4\* hours, or 11.5 hours below the average. Mean temp.  $55^{\circ} 0$  or  $2^{\circ} 0$  above the average. Max.  $71^{\circ} 7$  on 29th; min.  $41^{\circ} 9$  on 7th. F 0, f 0. Mean amount of ozone 5.4.

NORTH CADBURY.—The warmest May in 12 years, following the coldest April. Max. temp.  $81^{\circ} 0$  on 1st; min.  $38^{\circ} 0$  on 11th. F 0, f 0.

BATH.—Max. temp.  $74^{\circ} 5$  on 2nd and 31st; min.  $35^{\circ} 8$  on 11th. F 0.

ROSS.—Mean temp.  $56^{\circ} 0$  or  $2^{\circ} 8$  above the average. Max.  $78^{\circ} 8$  on 31st; min.  $36^{\circ} 6$  on 11th.

WOLSTASTON.—The first half was exceedingly wet and bad for tilling, but the latter half dry and warm so that vegetation made great progress.

HODSOCK.—Max. temp.  $76^{\circ} 5$  on 27th; min.  $35^{\circ} 4$  on 24th. F 0, f 4.

BUXTON.—Mean temp.  $52^{\circ} 3$  or  $4^{\circ} 3$  above the average of 35 years. Max.  $73^{\circ} 2$  on 31st; min.  $37^{\circ} 2$  on 24th. F 0, f 1. Duration of sunshine 198\* hours, or 40.9 hours above the average.

BOLTON. The mean temp.,  $52^{\circ} 1$ , was  $2^{\circ} 6$  above the average. Max.  $72^{\circ} 1$  on 31st; min.  $39^{\circ} 4$  on 11th. F 0, f 0. Duration of sunshine 146.8\* hours, being equal to the average.

SOUTHPORT.—Exceptionally warm throughout, especially towards the close. Mean temp.  $54^{\circ} 0$  or  $3^{\circ} 5$  above the average. Max.  $74^{\circ} 6$  on 28th; min.  $37^{\circ} 1$  on 24th. F 0, f 1. Duration of sunshine 226\* hours or 13 hours above the average; duration of R 44.0 hours.

HULL. Max. temp.  $71^{\circ} 0$  on 19th and 27th; min.  $38^{\circ} 0$  on 23rd. F 0, f 1. Duration of sunshine 123.1\* hours.

HAVERFORDWEST.—Max. temp.  $73^{\circ} 4$  on 31st; min.  $40^{\circ} 2$  on 23rd. F 0, f 0. Duration of sunshine 164.3\* hours.

LLANDUDNO.—Max. temp.  $73^{\circ} 8$  on 28th, min.  $43^{\circ} 2$  on 7th. F 0, f 0.

DOUGLAS.—A wonderful contrast to the Arctic weather of April, as well as to the Mays in 1906 and 1907, of evil memory. The last week was brilliantly fine and warm. The backward vegetation responded as if by magic.

DUMFRIES.—Max. temp.  $78^{\circ} 0$  on 28th; min.  $39^{\circ} 0$  on 16th and 23rd. F 0. Cold and unpleasant till 26th, but sudden rise of temp. on 27th.

EDINBURGH. Max. temp.  $74^{\circ} 3$  on 28th; min.  $38^{\circ} 6$  on 22nd. F 0, f 0.

DUNDEE.—Max. temp.  $75^{\circ} 4$  on 27th; min.  $38^{\circ} 0$  on 22nd. F 0.

FORT AUGUSTUS. Max. temp.  $65^{\circ} 9$  on 30th; min.  $31^{\circ} 0$  on 22nd. F 1.

WATERFORD.—Max. temp.  $71^{\circ} 5$  on 28th; min.  $36^{\circ} 0$  on 7th. F 0.

HURDLESTOWN.—Max. temp.  $76^{\circ} 0$  on 16th and 17th; min.  $36^{\circ} 0$  on 9th.

MILTOWN MALBAY.—The first week was mild with a spurt of vegetation, the second week stormy, rainy and cold, the third very cold with mist, H and B, and the last changing from fog to sunshine and heat.

DUBLIN.—Mean temp.  $55^{\circ} 2$ , being  $3^{\circ} 0$  above the average and as much as  $10^{\circ} 5$  above the mean temp. of April, 1908. Max.  $68^{\circ} 0$  on 17th; min.  $41^{\circ} 0$  on 7th. F 0, f 0.

WARRENPOINT.—Max. temp.  $72^{\circ} 0$  on 31st; min.  $35^{\circ} 0$  on 23rd. F 0, f 0.

MARKREE.—Max. temp.  $75^{\circ} 4$  on 28th; min.  $35^{\circ} 3$  on 25th. F 0, f 0.

\* Campbell-Stokes.

† Jordan.

## Climatological Table for the British Empire, December, 1907.

STATIONS.  (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain		Aver.		
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.			
	Temp.	Date.	Temp.	Date.											
London, Camden Square	57°0	8	29°9	16	46°0	37°6	39°6	0-100	90	66·1	27·3	inches	3·79	16	7·8
Malta ... ..	70·5	2	47°0	19	63·2	54·7	52°0	76	133·0	...	...	·51	7	5·8	
Lagos ... ..	94°0	19	71°0	29	88·6	73·9	74·8	76	143·0	68·0	1·03	2	7·3		
Cape Town ... ..	90°1	22	51°1	7	75·6	58°0	53·7	64	...	...	1·43	7	3·2		
Durban, Natal ... ..	89°3	7	59°6	9	80°0	65·8	...	...	150°0	...	3·97	18	6·7		
Johannesburg ... ..	79°3	21	45°8	9	72°6	54·1	56·8	82	158°0	45·1	4·24	14	5·6		
Mauritius ... ..	90°3	12	69°2	5	86°3	72·8	71·1	78	151·6	64·3	12·08	23	6·8		
Calcutta... ..	82°8	10	48°2	26	77·5	55·8	53·8	67	143·7	41·3	·53	2	2·1		
Bombay ... ..	90°2	18	67°2	21	85·6	69·8	62°6	62	137°0	55·4	·00	0	0·4		
Madras ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...		
Kodaikanal ... ..	67·7	29	40·8	25	61·6	46·9	42·8	68	129·6	26·5	1·97	8	4·9		
Colombo, Ceylon ... ..	90°4	14	67·6	7	86·8	71·8	69·7	74	153·9	60·6	1·29	5	3·7		
Hongkong ... ..	76°4	14	49°5	20	67°0	57·2	49·3	63	128·4	...	1·46	10	5·9		
Melbourne ... ..	105°3	25	45°5	20	73·2	53·1	47·3	67	160°0	36·7	5·10	8	5·1		
Adelaide ... ..	104°5	25	46°7	17	80°9	55·3	49·9	51	151°0	39·8	·80	7	3·5		
Coolgardie ... ..	106°6	24	45°0	16	87°4	56·6	45·4	40	174°0	42°0	·43	2	1·9		
Sydney ... ..	91°3	16	55°3	6	78·8	63·1	59·8	68	137°0	45°0	1·80	16	5·3		
Wellington ... ..	74·8	24	51°0	21, 27	68·4	57·3	54°0	74	125°0	40°0	1·38	5	5·8		
Auckland ... ..	79°0	19	53°0	1	72·7	60·8	57·6	74	138°0	45°0	5·15	11	5·5		
Jamaica, Negril Point.	83°0	21	66°2	28	86°4	69·8	70°2	86	...	...	6·37	11	4·1		
Trinidad ... ..	91°0	27	65°0	17	86·5	68·9	74°4	88	156°0	62°0	4·10	13	...		
Grenada ... ..	89°2	9	71°0	9	83·4	73·5	76·6	85	138·4	...	5·37	26	5°0		
Toronto ... ..	47°1	10	7°0	4	34·8	24·8	...	...	72°0	4°4	5°01	16	...		
Fredericton ... ..	53°0	11	2°6	4	33·8	16·9	...	84	...	...	4·13	6	7°0		
St. John's, N.B. ... ..	50°8	10	10°0	14	36·8	24·3	...	...	...	...	4·66	12	6·7		
Victoria, B.C. ... ..	56°1	4	30°4	16	46°0	39°1	...	...	...	...	4·78	21	9°0		
Dawson ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...		

MALTA.—Mean temp. of air 58°·0. Average hours of bright sunshine 5·7.

Natal.—R 77 in. below 30 years average.

Johannesburg.—Bright sunshine 257·3 hours.

Mauritius.—Mean temp. of air 0°·7, of dew point 3°·5, relative humidity 6·9 per cent., and R 6·90 in., above averages. Mean hourly velocity of wind 7·6 miles, or 3·2 above average.

KODAIKANAL.—Bright sunshine 219 hours. Hoar frost on 10 days.

COLOMBO.—Mean temp. of air 79°·7 or 0°·5 above, of dew point 1°·1 below, and R 4·36 in. below, averages. Mean hourly velocity of wind 7·9 miles. TSS on 2 days.

HONGKONG.—Mean temp. of air 61°·9. Bright sunshine 165·5 hours. Mean hourly velocity of wind 12·4 miles.

Adelaide.—Mean temp. of air 3°·3 below average.

Sydney.—Mean temp. of air 1°·0 above, and R 68 in. below, averages.

Wellington.—Mean temp. of air 2°·3 above, and R 1·88 in. below, averages. Bright sunshine 232·2 hours.

Auckland.—R nearly double 40 years' average.

TRINIDAD.—R 63 in. below 43 years' average.



RAINFALL OF THAMES VALLEY, JUNE, 1908.

