

# Symons's Meteorological Magazine.

---

No. 512.      SEPTEMBER, 1908.      VOL. XLIII.

---

## THE BRITISH ASSOCIATION AT DUBLIN.

THE British Association met at Dublin from September 2nd to 9th ; and though the weather was uncertain there is no doubt that the meeting was the most successful of recent years. From the point of view of Meteorology it was certainly the best since the Southport meeting in 1903 ; but even so it was none the less clear that the position of Meteorology is far from satisfactory in the framework of the Sections. With Dr. W. N. Shaw as President of Section A. our science was more favourably circumstanced than in any previous year ; but despite the efforts of the President, ably seconded as they were by the Secretaries, no meeting ever showed more plainly the inferior position of Meteorology, even as compared with other observational sciences. Section A., on this occasion, was divided into three sub-sections—Mathematics, General Physics, and Cosmical Physics ; but there were also general meetings of the whole section, of indeterminate length, so that it was sometimes impossible to know at what hour the sub-sections would meet. Again, in the sub-section of Cosmical Physics, Meteorology and Astronomy were mixed together in a way that was satisfactory neither to the astronomer nor to the meteorologist. We have long felt that many physicists and more mathematicians view meteorology with scant respect and less affection ; yet every effort that has been made to secure for the humble observational science a position of independence, has resulted in a hardening of their hearts, and a determination not to let it go. We regret this the more, because we are of opinion that meteorological observers require to have their efforts reinforced by the sympathetic assistance of physicists trained in the more rigid discipline of the laboratory, and that these in turn are in need of being brought to a realizing sense of the manner in which physical problems are presented in Nature, subject to the play of interacting forces, which cannot always be disentangled and dealt with in detail. The British Association, of all the scientific bodies in this country, is the one least suited for bringing the observer and the theoretical investigator into touch, and enabling each to understand the standpoint and the aims of the other. We regret to be obliged to record the opinion that this is not the result of the actual arrangement, and we do not

believe that meteorology will ever be properly respected, or its true position understood in the British Association, unless it is made a separate section, or at least a sub-section, meeting, it may be, only on two or three days, but with a chairman of its own, and meetings, the hour of commencement of which can be definitely announced.

No doubt the same thing may be said for several other branches of science, and indeed the experience of nearly a quarter of a century of unbroken attendance at the annual meetings of the Association has convinced us that a radical reform is necessary in the constitution of the British Association if it is to regain the high place it formerly held, or retain the prestige which still remains as a tradition of earlier and healthier years.

In a later issue we hope to present a summary of Dr. Shaw's brilliant and characteristic address, and abstracts of some of the papers which were read. Meanwhile we have pleasure in reporting that the annual meteorological breakfast, founded by Mr. Symons and revived in 1901, took place in exceptionally favourable surroundings. Thanks to the initiative of Sir John Moore, the leading meteorologist in Ireland, the Royal College of Physicians of Ireland placed their fine hall at the disposal of the meteorologists and rainfall observers present at the meeting, and no less than 48 sat down to breakfast at 9 a.m. on Tuesday, 8th September. Sir John Moore presided, and in addition to the meteorologists and observers noted below a number of their friends joined the party.

J. S. Amery, Ashburton, Devon.  
 Dr. J. R. Ashworth, Rochdale.  
 R. M. Barrington, Bray.  
 C. O. Bartrum, London.  
 L. C. Bernacchi, London.  
 J. Bolton, London.  
 Dr. W. S. Bruce, Edinburgh.  
 C. J. P. Cave, Ditcham Pk., Sussex.  
 J. E. Cullum, Cahirciveen.  
 J. S. Dines, London.  
 W. H. Dines, F.R.S., Pyrton Hill, Oxon.  
 Paul Durandin, Paris.  
 R. O'B. Furlong, C.B., Killiney.  
 E. Gold, Cambridge.  
 A. P. Jenkin, Redruth.  
 Capt. Campbell Hepworth, C.B.  
 Dr. A. J. Herbertson, Oxford.  
 John Hopkinson, Watford.  
 R. G. K. Lempfert, London.

Dr. W. J. Lockyer, London.  
 Capt. H. G. Lyons, F.R.S., Cairo.  
 Mrs. D. D. MacKinnon, Speldhurst, Kent.  
 Dr. H. R. Mill, London.  
 Mrs. H. R. Mill, London.  
 Sir John Moore, Dublin.  
 Maurice P. Moore, Dublin.  
 Miss Constance Pim, Blackrock.  
 W. E. Plummer, Liverpool.  
 Colonel Rawson, C.B., York.  
 Prof. A. Lawrence Rotch, Harvard.  
 Dr. W. N. Shaw, F.R.S., London.  
 J. Smith, Crathes.  
 J. Smyth, Banbridge.  
 Miss C. O. Stevens, Oxford.  
 M. Teisserenc de Bort, Paris.  
 Prof. W. E. Thrift, Dublin.  
 Dr. Gilbert Walker, F.R.S., Simla.  
 R. S. Whipple, Cambridge.

Sir John Moore said a few words of welcome to the meteorologists visiting Dublin, and thanked the President of the Royal College of Physicians of Ireland for the kindness of the College in granting the use of their Hall for the occasion. He congratulated Section A on having as its President Dr. Shaw, who combined the highest mathematical powers with profound meteorological knowledge, and referred to the foreign and imperial meteorologists who were present.

Appropriate replies were made by M. Teisserenc de Bort, who spoke in French and was very heartily received, Prof. A. Lawrence Rotch of Harvard University, Dr. W. N. Shaw, President of Section A, Dr. Gilbert Walker, the head of the Meteorological Service in India, and Captain Lyons, Director of Surveys in Egypt. The proceedings, which were over before 10 o'clock, were characterised by the spirit of friendly cordiality usual on such occasions.



## METEOROLOGY AT THE FRANCO-BRITISH EXHIBITION.

By L. C. W. BONACINA, F.R.Met.Soc.

### II.

In this article I purpose to open out one or two subjects for discussion, concerning division (*b*) in the last article, the photographic and cartographical exhibits. The splendid series of lightning and cloud photographs is particularly to be noted. As regards lightning photographs, it is scarcely necessary to remark that they provide our only means of ascertaining anything with certainty about the shape and structure of a discharge, as well as the position of the spark-gap or line of discharge.

The excellent cloud photographs shown at the Exhibition bring out the structures, as well as the general forms of the various types of cloud in a very clear manner. I venture, however, to express the opinion that it would have been better if no systematic nomenclature had been adopted, and that, save where such general or familiar names as "cumulus," "stratus," "cirrus," "mackerel-sky," &c., could be applied, the clouds would have been better left unnamed—or as a descriptive exercise to the spectators. It is to be regretted that in the cloud-study series of exhibits of Clayden, such names should have been affixed to the photographs as the following:—Cirrus ventosus (windy cirrus); Cirrus communis (common cirrus); Cirrus inconstans (change cirrus); Alto-cumulus castellatus (high-turretted cloud); Alto-stratus maculosus (mackerel sky); Alto-cumulus informis; Cirro-stratus undatus (cirrus ripples), &c. This type of nomenclature is dangerously akin to that adopted in the classification of living creatures, and is not for reasons which will shortly be discussed, to be recommended. Whatever justification there may be for classifying and designating living individuals according to a generic and a specific title, there is certainly none in the case of the clouds. Thus, while it may be very convenient and useful, for instance, to designate one owl as a *strix flammea*, and another owl, uniting with well-marked individual characteristics various distinctive *specific* qualities such as a weird nocturnal howling propensity, as a *strix stridea*, it is neither necessary nor practicable to label and typify one cirrus cloud as

*cirrus communis*, and another as *cirrus ventosus*; for it may be said in a general way, that the only attributes which one cirrus cloud has in common with another are expressed by the generic word *cirrus*, and that the various forms which cirrus may assume are not sufficiently definite and constant as to warrant the subdivision of these clouds into species—in other words, every true cirrus cloud must be described on its own individual merits.

A great amount of time and labour has been spent in attempts to frame detailed cloud classifications,\* which (so far as I know) have never proved of any practical use, except, perhaps, to their respective originators. It may be well doubted whether a number of persons possessed of enough patience and perseverance to master one of these detailed and cumbersome classification schemes, would, on being put to the test, agree anywhere near sufficiently closely as to sanction its general adoption. Indeed, I would say that beyond the single terms cumulus, cirrus, stratus, and occasionally some of the more convenient double-names used to denote common and well-known forms of cloud and sky, such as cirro-stratus, cirro-cumulus, description should invariably take the place of classification. I would, therefore, briefly suggest the following rule for carrying out cloud observations:—First relegate, if possible, every cloud which is not absolutely amorphous to one of four primary types, cirrus, cumulus, stratus and nimbus (*amorphous rain-cloud*); secondly, if a cloud is clearly of some form intermediate between any two of these main types, denote the fact, specifying, if advisable, this secondary form by one of the more familiar double or compound names; then proceed to *describe* all further features of the cloud. By their very nature the clouds should be word-painted, not scheduled. Now in dealing with the manifold tribes of living creatures which possess organic unity and true individuality, it has been found absolutely necessary to resort to more or less comprehensive systems of classification; and though there are many intermediate types in both the animal and vegetable kingdoms, these are relatively so infrequent, whilst the “missing links” are so numerous, as not materially to render cumbersome the adopted classifications. But when we enter the mineral kingdom, and come across a great variety of wonderful and interesting things like agates and garnets, marbles, serpentines, and ophi-calcites, it is not found expedient to indicate them by generic and specific appellations; for this reason, that minerals and rocks, however marvellous and fascinating may be the crystalline structure exhibited by many of them, unlike animals and plants are devoid of

---

\* Amongst which that in Ley's “Cloud-land”—an excellent book, but marred by the nomenclature adopted. Apart from the large amount of unprofitable trouble and experience required to distinguish between *genuine* cases of “stratus quietus”; “stratus maculosus”; “stratus castellatus”; “stratus lenticularis,” I question whether in the conjoint estimation of two independent observers fifty per cent. of true stratus cloud could be classed under any of these four “species.”

organic unity, that is to say they are without true individuality. A crystal of galena is not an individual in the sense as is a man, an oak, a mouse, or a primrose-plant.

How much more futile then must be any attempt to bring an exhaustive system of classification to bear upon such objects as the clouds, which lack not only organic unity but even permanent endurance, and appear, vanish, unite and melt away almost before one has time to wonder how. Moreover, the number of intermediate forms of common occurrence is practically infinite, and this exposes the necessity of what I emphasized above, that the only satisfactory scheme of classification for the wayward clouds is a descriptive one.

Before concluding this article I should like to make a few remarks upon the cartographical exhibits. Synoptic charts and rainfall maps of course figure prominently. Amongst the rainfall maps two call for special comment, the one relating to sixty hours of incessant rainfall in the Lower Thames valley in the June of 1903, the other to a heavy snowstorm which affected the greater part of England on the night of Christmas, 1906. Concerning the former it may be said that records of abnormal weather occurrence should always on suitable occasions be brought before the public notice, because they bring home to those who reflect upon meteorological matters and remember them accurately, in a way that ordinary weather which excites less interest fails to do, that the number of combinations which the various elements of weather with respect to time and space may assume is unlimited. There will occur other June deluges in the Lower Thames Valley of type, intensity, duration and area affected perhaps not very dissimilar to that of 1903, but *when* will there be a facsimile or even an approach to one, of that phase of wet weather which attracted so much attention five years ago?

The snowfall map gives the hour of commencement of snow over the area affected by the great storm of December 25th, 1906. The east of Scotland, where a terrific and disastrous blizzard far worse than the one under discussion which mostly affected England raged on the following day, is marked as having "no snow." In exhibiting a map like this to the public I think it would have been desirable, in default of producing a map of the second snowstorm, to have appended a few notes concerning it to the map of the first snowstorm; both storms were clearly part and parcel of the same snowy phase of weather, and the interesting fact is not only the isolated snowstorm travelling from north-west to south-east over a more or less well defined area in a certain time, but also the incidence of one of those extremely snowy periods which are liable to prevail over the British Islands, especially the northern portion, at any time during at least six months of the year.



## THE WEATHER OF AUGUST, 1908.

By FRED. J. BRODIE.

THE almost entire absence of extreme heat, which formed so prominent a feature in the weather of last summer, was as strongly marked in August as in the earlier part of the season. Up to about the 19th of the month the pressure conditions were almost continuously anti-cyclonic, the only material interruptions occurring about the 4th and 5th, and between the 10th and 12th, when barometrical depressions spread from the westward over a large portion of the country. The weather was therefore fine and very dry, and at several places in the south of England the drought which had commenced shortly after the middle of July remained unbroken, an entire absence of rain being reported over periods varying between 30 and 35 days. With a current of air drifting in from the ocean, mainly from the north-westerly quadrant, *i.e.*, from points between west and north, the air was usually cool and pleasant, the only instances of anything in the way of hot summer weather occurring between the 2nd and 4th of the month, or on the 7th. On the earlier occasion, chiefly on the 3rd, the thermometer in the shade rose above  $80^{\circ}$  in several parts of England, and reached  $83^{\circ}$  at Epsom and Greenwich,  $84^{\circ}$  at Raunds (Northamptonshire), and Cullompton, and  $88^{\circ}$  at Maidenhead, while on the 7th readings of  $80^{\circ}$ , or slightly above it, were recorded in a few scattered portions of our southern and south-eastern counties. The nights were usually mild, but on that of the 11th—12th a sharp ground frost was experienced in many parts of North Britain, while on that of the 16th—17th a similar touch of cold occurred over an area extending as far south as the English midlands. On the former night the exposed thermometer fell to  $24^{\circ}$  at Crathes and Balmoral, to  $27^{\circ}$  at Llangammarch Wells, to  $28^{\circ}$  at Morpeth (Cockle Park), and to  $29^{\circ}$  at West Linton; on the latter occasion it sank to  $25^{\circ}$  at Llangammarch Wells, to  $26^{\circ}$  at Birmingham (Edgbaston), and to  $31^{\circ}$  at Balmoral.

After about the 19th a radical change in the weather set in, and for the remainder of the month the country was exposed to the influence of numerous cyclonic systems, the majority of which came over from the Atlantic. With such conditions rain was frequent and often very heavy, the most widespread of such visitations occurring on the 26th and 27th, and on the 31st. In the intervals between the departure of one disturbance and the arrival of the next, there were, however, substantial spells of fine weather, and over England the thermometer was, as a rule, a trifle above its normal level. The highest readings were recorded on the 24th, when the thermometer touched  $75^{\circ}$  in several parts of our eastern, midland and south-eastern counties, and reached  $77^{\circ}$  at Greenwich.

For the month, as a whole, the mean temperature was below the average; but round our extreme west and south-west coasts the deficiency was very small. In comparison with the normal, the day temperatures were, in all districts, lower than the night readings; the days and nights were, however, both warmer than in the August of last year.

## Correspondence.

To the Editor of Symons's Meteorological Magazine.

## A CONTRAST IN RAINFALL.

I SEND a note of the great contrast in rainfall from July 18th to August 18th and August 19th to 31st. No doubt you will receive many such records and may care to compare them.

From July 18th to August 18th we measured no rain at all, except .01 on July 27th and .01 on August 10th. From August 19th to 31st we have measured:—

August 19	.....	.01	August 26	.....	.93
„ 20	.....	.24	„ 27	.....	.26
„ 21	.....	.08	„ 28	.....	.24
„ 22	.....	.70	„ 29	.....	.29
„ 23	.....	1.94	„ 30	.....	.09
„ 24	.....	.10	„ 31	.....	1.32
„ 25	.....	.21			
					6.41

Chewton Priory, Bath, Sept. 1st, 1908.

WALDEGRAVE.

## THE BLACK BULB.

WITH reference to Dr. Shaw's letter in your February number and Captain Hepworth's subsequent communication, the following extract from Webster's account of Captain Foster's Antarctic Voyage\* may be of interest. Writing of the visit of this expedition to Deception Island, South Shetlands, in the year 1829, the following appears (Vol I., p. 163):—"During the months of January and February in which we were here, the warmest months of the year, we had frequent heavy falls of snow. A black-bulbed thermometer was exposed to the sun at every opportunity, and the greatest height of the mercury, under the most favourable circumstances of an unclouded meridian sun, was 77°. The general range and average of the intensity of the sun's heat was only 66°." From the mode of expression it is not unreasonable to assume that at the time indicated black bulb thermometers were accredited instruments for meteorological purposes.

R. C. MOSSMAN.

*Oficina Meteorológica Argentina, Viamonte 640,  
Buenos Aires, July 21st, 1908.*

IN his letter to you in your last issue, Mr. L. C. W. Bonacina says, *in re* black-bulb thermometers in vacuo, "Meteorologists, of course know what they are measuring." There is no "of course" in the matter, for as a rule they do not know in the least *what* they are measuring in that respect. I have known of thermometers duly

\*Narrative of a Voyage to the Southern Atlantic Ocean in the years 1828' 1829, 1830, Performed in H.M. Sloop Chanticleer, under the command of the late Captain Henry Foster, F.R.S., from the Private Journal of W. H. B. Webster, Surgeon of the Sloop. 2 vols., London, 1834.

verified at Kew, being enclosed in vacuum jackets and yet when so enclosed indicating values differing as much as  $15^{\circ}$  one from the other, simply on the ground of non-uniformity in the vacuum. This came out strongly in some investigations made at the Meteorological Office several years ago.

FREDK. GASTER, F.R.Met.Soc.

*The Homestead, Tankerton, Kent, 19th August, 1908.*

### THE METEORS.

THE last three months have furnished an unusual number of excellent opportunities for astronomical work. From June 2nd to August 17th (including 77 nights) there were 57 more or less suitable for observation.

From July 18th to August 8th, watching the sky for  $20\frac{1}{2}$  hours in the aggregate, I saw 204 meteors. The first Perseid I noted on July 21st, and quite an active shower of them had developed on July 26th.

The full moon on about August 11th and 12th, when the maximum display was expected, prevented many meteors being observed, but some brilliant specimens of Perseids appeared now and then, and sufficiently attested the fairly active return of the shower. Before midnight on August 10th I saw about 12 meteors per hour, but this number was probably doubled between midnight and 3 a.m. One of the most conspicuous Perseids seen was at 10.30 p.m. on August 2nd, and duplicate observations were made of it by Miss Irene Warner, at Bristol, and Mr. G. Powell, at Aberdare. The real heights of the object, which shone quite as brightly as Jupiter, were from 77 to 47 miles over Radnor and Carmarthen, the length of path being 57 miles, and velocity 38 miles per second.

But the finest meteor of all made its apparition on July 28th, at 11.6 p.m., lighting up the heavens with a flash more vivid and prolonged than lightning. It was seen from Bristol and South Wales, and from many places in Ireland, over the S.E. part of which (Kildare) the fireball exhibited its chief splendour, falling from 82 to 40 miles along a visible flight of 50 miles. It was not a Perseid, but a member of one of the minor showers of the epoch situated in Vulpecula. Many observers in Ireland describe the outburst of the fireball as one of startling brilliancy, the whole country being lit up as in the daytime for about two seconds.

The writer, at Bristol, observed 12 other meteors belonging to the same stream as that which furnished the fireball, but they were small, about half of them being faint shooting stars only just perceptible to the eye. This clearly proves that the most diminutive of these objects are indiscriminately distributed with the most magnificent fireballs from the same parent systems.

Of the summer meteors of 1908 it may be, generally, said that though not very abundant they were bright, interesting and well observed in the beautiful skies which prevailed.

*Bristol, 18th August, 1908.*

W. F. DENNING, F.R.A.S.



**TORNADO IN BUSHEY PARK, JUNE 1st, 1908.**

I HAVE gathered what particulars I could from the gatekeeper at Teddington Gate, Bushey, regarding a recent tornado in the park. On the evening of June 1st a thunderstorm was in progress, and a little before 10 p.m. a cold blast sprang up, when at 9.55 a hurricane of warm air from the S.E. struck the north end of the avenue of Bushey Park on the east side, where it is composed of five lines of trees, the inner row the famous chestnuts and four more of limes. The wind came from the S.E., with a noise like a train, and in a few moments 115 trees were destroyed, 28 being hawthorns in the open, the other side of the Avenue, the west side, escaping. The area of destruction was about 300 yards wide, in which 75 % of standing timber trees were destroyed, all lying from S.E. to N.W., with two to 3 tons of earth at the root of each. One (130 feet high) fell on Gate Lodge, and destroyed the roof and upper walls, but so great was the roar of the wind that the inhabitants of the Lodge heard nothing but the wind. At this point the path of the storm changed from N.W. to N.E., and destroyed 11 trees in private grounds. Another thunderstorm raged at 2 a.m. on June 3rd, and on June 4th, about 6 p.m., 3 trees were struck on the same unlucky spot. All the trees lie from S.E. to N.W., so it hardly seems as if the wind were of a rotatory nature. It is supposed to have originated east of Epsom, and done damage at Surbiton, but I cannot trace the storm beyond the north side of Bushey Park, as similar damage at Fulwell station, to N.E., occurred one hour earlier apparently. It therefore seems that either the trees exhausted the force of the cyclone, or it rebounded into the air. Little rain fell. Only two men were on the spot, one of whom gave me the particulars.

STANLEY SINGLE.

*Park View, Leopold Road, Wimbledon, S.W.  
July 23rd, 1908.*

**LOW SEPTEMBER TEMPERATURE.**

THE readings of the thermometers in the screen, taken at 9 a.m., to-day, showed the following extremely low temperatures for the preceding 24 hours :—

Maximum 53°·2. Minimum 37°·2. Approximate Mean 45°·2.

No records for a long period are available for Weybridge, but those for Greenwich Observatory for 1841-1905 give the following as the lowest for September 5th for that period, viz. :—

Lowest Maximum.....	57°·9 in 1841.
Lowest Minimum.....	38°·4 in 1892.
Lowest Mean .....	49°·3 in 1841.

My readings for this morning are therefore very remarkable for this time of year.

H. K. G. ROGERS.

*Glenart, Weybridge, 5th September, 1908.*

### THE GREEN FLASH.

I OBSERVE that the correspondence on the subject of "the Green Flash" has been re-opened in *Symons's Meteorological Magazine* for last month.

I hope, therefore, that you will allow me to reply to your editorial criticism (Vol. 41, pp. 236-7) of the attempt I made to explain the phenomenon in the letters you were good enough to publish in Vol. 41, pp. 11, 29, 92, 190 and 234.

I beg to observe that I by no means "confused the phenomenon of 'the green flash' with the familiar effects of complementary colours." On the contrary, I endeavoured constantly to find the fundamental principle of the physiological contrast of colour amid the various details and modifications of the phenomena described by your correspondents.

I am convinced that the so-called "green flash" is the after-image or visionary image of the impression produced on the retina by the last rays of the setting, or by the first rays of the rising sun, seen in the complementary blue-green colour. The letters of your correspondents, Mr. W. L. Fox and Mr. M. Hall, on p. 234 of Vol. 41 and p. 235 of Vol. 42, further confirmed this conviction.

I hope as soon as an opportunity occurs to repeat, so far as I am able to do so, the experiments described by your correspondents, and will then write again giving some account of the results of my experiments.

R. C. CANN LIPPINCOTT.

*Over Court, Almondsbury, Bristol, 10th February, 1908.*

[We admire the firm convictions of our correspondent to whom we have given generously of our space. We should almost regret his conversion to the equally definite, though opposed view, which we, in common with all the physicists and physiologists who have written on the subject, feel constrained to hold.—Ed., *S.M.M.*]

### LARGE HAIL IN SUNSHINE.

ABOUT 2 p.m. on July 2nd, while thunder was rumbling all round about, but none overhead, all at once there began to drop large particles of ice, and then broad pieces about half-an-inch across and about a quarter of an inch thick in the centre. The centre was very white sharp out to the edge and clear. About five minutes later down came large round pieces of ice about the size of marbles, an inch in diameter and very clear. These continued to fall for a few minutes, the whole occurrence not lasting more than from 10 to 15 minutes, during which time the sun was shining brightly and the day very hot. The fall of ice came while the thunder was in a north-east direction; the thunder went right round from north-east, through the east to south-west, and finished in the north-west. We had no rain. I have never seen anything of the kind a quarter of the size of the ice-balls.

D. A. FRASER.

*Derry Lodge, Braemar, July 6th, 1908.*

## GREAT RANGE OF TEMPERATURE.

THE remarkable change in temperature during the last few days may be of interest.

Temp at 2.30 p.m., Thursday, June 4th	.....	83°·3
„ 2.30 a.m., Sunday, „ 7th	.....	37°·3

showing a difference of 46°·0 in 60 hours. Surely this must be unusual in the south of England.

E. L. HAWKE.

2, Akenside Road, Fitzjohn's Avenue, Hampstead, N.W. 7th June, '08.

---

## REVIEW.

*Third Annual Report of the Meteorological Committee to the Lords Commissioners of His Majesty's Treasury.* For the year ended 31st March, 1908 [Cd. 4239]. London: Printed for H.M. Stationery Office. 1908. Size 9½ × 6, pp. 164. Price 1s. 5d.

THE Meteorological Office is rapidly becoming one of the promptest in the world in the matter of publication. The Hourly Readings at the four Observatories, and the Observations at Second Order Stations, are now being published monthly in time to be utilized in many weather discussions, and the Annual Report is now before us. These are by no means spasmodic efforts. Dr. Shaw says in his Report:—

“These changes are all based upon the general principle that the value of observations collected by the Office is largely enhanced, and the greatest practical economy is secured, by prompt publication in sufficient detail to serve at least as a full index of all the available material. This principle is equally applicable as regards the immediate practical use of the observations, and as regards meteorological research. It leads to the organization of the Office on such lines that all observations reported to it are forthwith examined, tabulated and made ready for use, and not merely stored for possible use in the future. The principle is now generally applied to all branches of the work of the Office.”

The Meteorological Office now enjoys the privilege of Government Offices in having an account with the Post Office, which enables them to dispense with stamping publications sent out, and relieves the correspondents of the Office from prepaying their communications.

The Report describes the steps which have been taken, so far without complete success, to provide against the overlapping of publications by the various meteorological authorities.

The reasons which have led to the change of hour of morning observations at telegraphic reporting stations from 8 a.m. to 7 a.m. are set out in full. They are concerned chiefly with the improvement of international co-operation in preparing synoptic charts, and so may be expected to improve the prevision of the weather; but

from the climatological, and especially from the rainfall point of view, we earnestly hope that whenever it is possible observations will also be taken at 9 a.m.

We have not space to follow all the activities of the Meteorological Office as set forth in this Report; but the Office is evidently very much alive, and its work in all directions is growing in efficiency and gaining public recognition. The success of the hay-harvest forecasts appears to have been unusually striking, and the letter of gratitude quoted from a Cornish farmer has a warmth rare in the history of any predictor.

## REPORT UPON DRY PERIOD AND RAIN-MAKING EXPERIMENTS AT OAMARU, NEW ZEALAND.

By REV. D. C. BATES, F.R. Met. Soc.

(Continued from p. 138.)

From Raki's Table I watched the experiments at Dalgety's Hill,  $5\frac{1}{2}$  miles to the N.E., and those at Round Hill,  $9\frac{1}{2}$  miles to the S.E. The skies were again very heavy—stratus clouds were between 800 and 1,000 ft. above the Table most of the time, and hung low, but well defined underneath all round, excepting in one bright patch away to S.W., where there was an arch over a mountain range. The wind at first was a light N.W., and later shifted to S.W. without much change in the clouds, except, perhaps, they lowered as the evening advanced. This time so far as we could see everywhere, there was no apparent change made by the explosions, and the smoke drifted upwards, and then gently away on the breeze. The barometer falling slowly all the time, the high relative humidity approached saturation at sundown, but though the mist looked heavy all about, the rain was not quite ready, and explosions did not seem to expedite matters. Up to that time the experiments certainly were ineffective in the precipitation of rain. It did, however, come some hours afterwards, and some people in the locality might possibly attribute this result to the experiments, but those who were actual eye witnesses on those lonely heights could, I imagine, hardly entertain such ideas. Those efforts were puny in comparison with the mighty forces which were at that moment developing independently over thousands of square miles in a cyclone similar to, but more intense than, the one which had brought rain only a few days before. Rain commenced at Oamaru about midnight on a N.E. wind, and was general throughout the district of North Otago, and through Central Otago did not benefit as much as expected, yet so far as the Oamaru district was concerned, the dry period was at an end, and there was great rejoicing everywhere.

The rainfalls of the locality were as follows:—

	Windsor Park.	Otokaike	Living- stone.	Arn- more.	Kurow.	Wai- mate.	Oamaru	Totara.	Kauroo Hill.
22nd...	·47	·19	·41	·35	·23	·43	·39	·30	·31
23rd...	1·44	·88	1·12	1·65	·44	2·10	2·02	2·24	1·88

## GENERAL OBSERVATIONS.

An increased interest in meteorology has, I trust, been a direct outcome of these experiments in the district. Though science may not yet be able to forecast drought periods, yet they may be promptly recognised, and then with the aid of experience to be gained from other lands, combatted on scientific lines, and, by turning adverse circumstances to good account, success wrested even from apparent failure. These costly efforts in rain-making are regarded at present as misguided and vain by all scientific meteorologists, while to their chagrin really valuable work is often neglected for want of public interest. On this visit I have established four new third-class stations for the observation of rainfall in the Oamaru district, and I would earnestly recommend the establishment of one second-class station at Oamaru.

One argument used in favour of the experiments is that rain generally followed great battles, explosions and disturbances of the air as by reverberations of thunder—nay even the passage of a train through a moisture-laden atmosphere. I was informed that in parts of Wales where slate quarrying is carried on, it usually rains every day while blasting is done, but that the Sundays will be fine because operations cease. Reviews of troops and sham fights have been followed by rain, and this has been attributed to the firing. The coincidence of rain with reviews has often been unduly impressed upon the minds of people by its effect on smart dresses and uniforms, for the display of which, and for convenience in marching, cumbersome overcoats have been discarded, and this fact discounts such evidence. Prof. T. Russell, in his "Meteorology," says: "It has been supposed that concussion of artillery fire in battles produces rain, and that great battles are followed by heavy rain. There is no reason why this should be so. No physical relation has ever been traced between concussion of air and formation of water-drops. The belief is very ancient that battles are followed by rain. In Plutarch's Lives it is related that after the battle of Marsalia, in France, a great rainfall followed, and it is mentioned as being a well-known fact that all great battles are followed by heavy rain. This was certainly a case when rain was not due to artillery fire."

Globules of water are formed on particles of dust, and there is no reason to suppose that these droplets are hollow vesicles which could be burst by explosions. Condensation is induced in a supersaturated atmosphere by the presence of dust, the fumes of ammonia, phosphorus, sulphur, &c., as these particles form nuclei for the minute spherical drops of water. The passage of a train might bring such in smoke, but the results would only be insignificant. Fog from smoke may hang over London, but the rain is no greater than in the country. Thunder and lightning again are effects of electrical disturbance, which is also a result of the usual cause of precipitation, viz., a cooling of a vapour-laden atmosphere. A thunderstorm is caused by the meeting of winds from different sources, one warm and

moist and the other dry and cold. These may meet laterally, or there may be an overturning of the atmosphere when they suddenly meet above. The latter idea is theoretically the nearest approach to what is sought by advocates of explosions as a means of causing rain to fall. The sudden conversion of a solid explosive substance into gases perhaps 1,500 times greater in volume is accompanied by tremendous expansion, force and heat. This would drive the air about in every direction, and until diffusion of the gases took place would create a state of atmospheric instability. Condensation first taking place aloft, then possibly drops falling and introducing a cooler current around, which might cause local showers, such as a fall from thunderstorm from the cumulus or anvil-shaped clouds caused by "unstable equilibrium." For such effects I watched most carefully, but in this direction the explosions had apparently no more effect on the vast expanse of the air than would the striking of a match in a room.

The forces arrayed against artificial changes in the atmosphere are tremendous—almost beyond conception. Defining a unit of heat as the amount needed to raise the temperature of a pound of water one degree Fahr., about a thousand units are needed to transform a pound of water into vapour. When vapour turns to water, latent heat is liberated in a corresponding amount. Now an inch of rain corresponds to 22,635 gallons, or rather over 101 tons of water to the acre, or over 64,640 tons to the square mile. The heat developed or released under such conditions of condensation from vapour to water for an inch of rain to the square mile is estimated as equivalent to the work done by 100,000,000 horse-power for half-an-hour. Consider again the sweep of a wind, 500 miles across horizontally, and three miles high, allowing for an hour at the rate of 20 miles. The force of the mightiest explosion with all its gas put forth into the air is in comparison less than a drop in a bucket.

Firstly and lastly rainfall is concerned with temperature in its relation to aqueous vapour. Air at different temperatures will hold different quantities of water-vapour, which is an invisible gas and lighter than the air itself. For example, at 80° F. two cubic feet of air will sustain 22 grains weight of vapour, at 60° the same measure would hold 11½, but at 32° only 4¼ grains. Any additional moisture would be condensed at those temperatures, or a lowering of the temperature would have the same effect, namely, condensation. At ordinary temperatures the capacity of the air for vapour is doubled for every 18° F. Cooling the air by mixture of a cold upper current with a lower warm and vapour-laden one, the meeting of tropical and polar winds in circulating storms, a warm and moist air impinging on a cold surface would condense the vapour into dew, fog, rain or snow; and, on the contrary, a warm surface would evaporate water by the conduction of the heat from the ground. Until it can be shown that the temperature of the air can be controlled by gigantic cooling operations we may look in vain for any alteration in the natural and

well-established order of events by way of the production of artificial rain.

In ancient times and long before European settlement trees seem to have flourished in the Oamaru district, for I am told that big roots are still found in the soil, but, except around the homesteads, the country is very bare of trees. Around their homes the settlers have mostly planted pines, which have flourished wonderfully, but if larger and more varied plantations were made particularly in belts intercepting the N.W. and S.W. winds, though they might not increase the rainfall, yet the trees would not only act as shelters and wind-breakers, but also conserve the rainfall which now occasionally runs off in floods. Where possible, the planting of deep-rooted rather than surface-rooting trees of a deciduous kind would bring up water from the lower water-tables, and not only prevent surface evaporation by the winds, but also as they transpire freely in the summer, create a beneficial humidity in their neighbourhood. The excessive heat of a bare sun-baked soil drives away the rain from a drought-stricken district, and thus diminish the "probability of rain," which could from time to time otherwise be reasonably forecasted. So far as one can see the only objections which can be urged against the planting of trees are the occupation of fertile lands by comparatively unproductive trees, and the possible harbouring of the small bird pest. The losses, however, would undoubtedly be more than compensated for by wider general benefits, and the whole question is one which assuredly concerns the community at large, and could with advantage be dealt with by local or general government regulations.

Action with regard to both the planting and destruction of the trees is a matter of vital importance to the country. Whether forest trees increase the rainfall or are themselves the result of an abundant precipitation is not the question one would raise at the present time, but rather considerations of evaporation, shelter, run-off, etc., as affected by tree-planting, and of more than passing interest to the people of Oamaru.

---

### METEOROLOGICAL NOTE.

THE RANGE OF ICEBERGS IN THE ATLANTIC has an important bearing on the weather, and some interest has attached to the farthest point to the eastward at which icebergs have been seen. A statement had become vaguely current that large icebergs had once appeared off the Orkneys, and during his visit to London last year Professor Krümmel, of Kiel, enlisted the good offices of Captain Campbell Hepworth in the search for the original record. The result was to find an entry in the log of H.M.S. Cove, under the command of Captain James Clark Ross, R.N., which stated that two icebergs had been sighted in 60°55' N., 5°50' W. at 11.30 a.m. on 14th January, 1836. The authenticity of the occurrence of icebergs in the eastern North Atlantic has thus been proved.

## RAINFALL TABLE FOR AUGUST, 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	2'33	2'94
Tenterden.....	Kent .....	51 4	*0 41	190	2'37	3'56
West Dean .....	Hampshire .....	51 3	1 38	137	2'60	3'27
Hartley Wintney .....	" .....	51 18	0 53	222	2'09	3'25
Hitchin .....	Hertfordshire .....	51 57	0 17	238	2'26	2'74
Winslow (Addington) .....	Buckinghamshr. ....	51 58	0 53	309	2'53	2'92
Bury St. Edmunds (Westley) .....	Suffolk .....	52 15	*0 40	226	2'40	2'49
Brundall .....	Norfolk .....	52 37	*1 26	66	2'19	...
Winterbourne Steepleton ..	Dorset .....	50 42	2 31	316	3'18	5'33
Torquay (Cary Green) .....	Devon .....	50 28	3 32	12	2'91	4'00
Polapit Tamar [Launceston] ..	" .....	50 40	4 22	315	3'19	4'42
Bath .....	Somerset .....	51 23	2 21	67	2'96	4'15
Stroud (Upfield) .....	Gloucestershire ..	51 44	2 13	226	2'83	3'88
Church Stretton (Wolstaston)..	Shropshire .....	52 35	2 48	800	3'24	4'28
Coventry (Kingswood) .....	Warwickshire .....	52 24	1 30	340	2'77	3'05
Boston .....	Lincolnshire .....	52 58	0 1	25	2'25	2'41
Worksop (Hodsock Priory). ..	Nottinghamshire ..	53 22	1 5	56	2'31	2'14
Derby (Midland Railway)...	Derbyshire .....	52 55	1 28	156	2'42	3'81
Bolton (Queen's Park) .....	Lancashire .....	53 35	2 28	390	4'36	3'68
Wetherby (Ribston Hall) ...	Yorkshire, W.R. ....	53 59	1 24	130	2'59	1'76
Arneliffe Vicarage .....	" .....	54 8	2 6	732	5'43	5'59
Hull (Pearson Park) .....	" E.R. ....	53 45	0 20	6	2'81	1'94
Newcastle (Town Moor) ...	Northumberland ..	54 59	1 38	201	3'14	1'75
Borrowdale (Seathwaite) ...	Cumberland.....	54 30	3 10	423	11'23	14'43
Cardiff (Ely).....	Glamorgan .....	51 29	3 13	53	4'52	6'89
Haverfordwest (High Street) ..	Pembroke .....	51 48	4 58	95	4'04	5'08
Aberystwyth (Gogerddan)..	Cardigan .....	52 26	4 1	83	4'60	5'14
Llandudno .....	Carnarvon .....	53 20	3 50	72	2'86	2'70
Cargen [Dumfries] .....	Kirkcudbright... ..	55 2	3 37	80	4'10	4'85
Hawick (Branksholm) .....	Roxburgh .....	55 24	2 51	457	3'33	3'50
Edinburgh (Royal Observatory.)	Midlothian .....	55 55	3 11	442	...	1'68
Girvan (Pinmore).....	Ayr .....	55 10	4 49	207	4'34	4'65
Glasgow (Queen's Park) ...	Renfrew .....	55 53	4 18	144	3'79	2'68
Tighnabruaich .....	Argyll .....	55 55	5 14	50	5'13	6'25
Mull (Quinish) .....	" .....	56 36	6 13	35	4'84	4'69
Dundee (Eastern Necropolis) ..	Forfar ..	56 28	2 57	199	3'08	2'75
Braemar .....	Aberdeen .....	57 0	3 24	1114	3'83	2'33
Aberdeen (Cranford) .....	" .....	57 8	2 7	120	3'22	2'73
Cawdor .....	Nairn .....	57 31	3 57	250	3'07	1'91
Fort Augustus (S. Benedict's) ..	E. Inverness ..	57 9	4 41	68	3'35	4'27
Loch Torridon (Bendamph) ..	W. Ross .....	57 32	5 32	20	6'91	6'29
Dunrobin Castle .....	Sutherland .....	57 59	3 56	14	2'65	1'56
Castletown .....	Caithness .....	58 35	3 23	100	...	1'73
Killarney (District Asylum) ..	Kerry .....	52 4	9 31	178	4'92	4'23
Waterford (Brook Lodge)...	Waterford .....	52 15	7 7	104	3'71	4'64
Broadford (Hurdlestown) ...	Clare .....	52 48	8 38	167	3'79	5'31
Abbey Leix (Blandsfort) .....	Queen's County..	52 56	7 17	532	3'94	3'34
Dublin (Fitz William Square) ..	Dublin .....	53 21	6 14	54	3'02	3'44
Ballinasloe .....	Galway .....	53 20	8 15	160	3'96	3'18
Clifden (Kylemore House) ..	" .....	53 32	9 52	105	7'90	...
Crossmolina (Enniscoe) .....	Mayo .....	54 4	9 18	74	4'57	3'97
Collooney (Markree Obsy.) ..	Sligo .....	54 11	8 27	127	4'16	3'84
Seaforde .....	Down .....	54 19	5 50	180	3'52	2'51
Londonderry (Creggan Res.) ..	Londonderry ..	54 59	7 19	320	3'94	4'52



## RAINFALL TABLE FOR AUGUST, 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.	1908.	Diff. from Aver. in.	% of Av.		
		in. Date.			in.	in.			in.	
+ '61	126	'74	23	16	15'45	17'87	+2'42	116	25'16	Camden Square
+1'19	150	1'09	23	15	16'18	16'09	— '09	99	28'36	Tenterden
+ '67	126	'73	31	14	17'83	16'76	—1'07	94	29'93	West Dean
+1'16	155	1'10	23	15	16'06	17'53	+1'47	109	27'10	Hartley Wintney
+ '48	121	'60	23	17	15'07	16'36	+1'29	109	24'66	Hitchin
+ '39	115	'86	31	14	16'58	18'15	+1'57	109	26'75	Addington
+ '09	104	'49	5	15	15'63	16'31	+ '68	104	25'39	Westley
...	...	...	...	...	15'01	...	...	...	25'40	Brundall
+2'15	167	1'90	27	12	22'32	20'10	—2'22	90	39'00	Winterbourne Stpltn
+1'09	137	'85	31	13	20'69	15'99	—4'70	77	35'00	Torquay
+1'23	138	'90	31	15	21'57	23'01	+1'44	107	38'85	Polapit Tamar
+1'19	140	1'11	31	13	18'82	16'61	—2'21	88	30'75	Bath
+1'05	137	1'53	31	14	18'56	16'46	—2'10	89	29'85	Stroud
+1'04	132	1'05	31	15	20'21	22'48	+2'27	111	33'04	Wolstaston
+ '28	110	1'21	31	15	18'08	17'32	— '76	96	29'21	Coventry
+ '16	107	'61	31	16	14'45	16'03	+1'58	111	23'30	Boston
— '17	93	'61	20	15	15'63	15'35	— '28	98	24'70	Hodsock Priory
+1'39	157	'68	26	16	16'53	17'80	+1'27	108	26'18	Derby
— '68	84	'79	26	17	25'23	30'06	+4'83	119	42'43	Bolton
— '83	68	'41	31	12	16'83	18'33	+1'50	109	26'96	Ribston Hall
+ '16	103	1'30	31	19	36'87	42'35	+5'48	115	60'96	Arncliffe Vic.
— '87	69	'38	31	16	16'55	14'68	—1'87	89	27'02	Hull
—1'39	56	'50	31	17	17'40	16'33	—1'07	94	27'99	Newcastle
+3'20	128	3'99	26	18	77'96	80'92	+2'96	104	132'68	Seathwaite
+2'37	152	2'15	31	14	25'23	23'27	—1'96	92	42'81	Cardiff
+1'04	126	1'19	31	15	27'41	26'95	— '46	98	47'88	Haverfordwest
+ '54	112	1'43	27	15	26'46	30'12	+3'66	114	45'41	Gogerddan
— '16	94	'53	20	17	17'65	20'65	+3'00	117	30'98	Llandudno
+ '75	118	1'06	26	13	26'15	32'32	+6'17	124	43'43	Cargen
+ '17	105	'76	24	16	21'33	21'85	+ '52	102	34'80	Braxholm
...	...	'88	31	12	...	15'95	...	...	...	Edinburgh
+ '31	107	'92	26	20	28'46	32'48	+4'02	114	48'87	Girvan
—1'11	71	'68	31	13	22'09	22'32	+ '23	101	35'80	Glasgow
+1'12	122	1'48	26	16	34'11	42'24	+8'13	124	57'90	Tighnabruaich
— '15	97	'82	27	20	33'06	33'56	+ '50	102	57'53	Quinish
— '33	89	1'35	31	15	18'20	14'49	—3'71	80	28'95	Dundee
—1'50	61	...	...	...	21'66	22'26	+ '60	103	36'07	Braemar
— '49	85	'80	31	17	19'93	17'19	—2'74	86	33'01	Aberdeen
—1'16	62	'37	24	14	18'33	15'25	—3'08	83	29'37	Cawdor
+ '92	128	1'08	9	13	25'75	28'52	+2'77	111	43'71	Fort Augustus
— '62	91	1'72	9	20	49'41	57'17	+7'76	116	86'50	Bendampf
—1'09	59	'42	9	13	18'92	23'16	+4'24	123	31'60	Dunrobin Castle
...	...	'36	26	21	...	20'75	...	...	...	Castletown
— '69	86	'93	22	15	34'90	28'90	—6'00	83	58'11	Killarney
+ '93	125	'86	31	14	24'00	22'68	—1'32	94	39'30	Waterford
+1'52	140	'82	23	16	20'85	24'91	+4'06	119	33'47	Hurdlestown
— '60	85	'56	22	17	22'19	20'66	—1'53	93	35'19	Abbey Leix
+ '42	114	1'65	20	15	17'53	17'25	— '28	98	27'75	Dublin
— '78	80	'45	23, 31	16	23'19	21'44	—1'75	92	37'04	Ballinasloe
...	...	...	...	...	48'34	...	...	...	80'23	Kylemore House
— '60	87	'97	31	14	29'90	34'22	+4'32	114	50'50	Enniscoe
— '32	92	'66	24	19	25'32	30'62	+5'30	121	41'83	Markree Obsy.
—1'01	71	'51	31	15	23'84	25'90	+2'06	109	38'61	Seaforde
+ '58	115	1'29	26	21	24'48	28'68	+4'20	117	41'20	Londonderry

## SUPPLEMENTARY RAINFALL, AUGUST, 1908.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Warlingham, Redvers Road	4.75	XI.	Rhayader, Tyrmynydd .....	7.12
„	Ramsgate .....	2.51	„	Lake Vyrnwy .....	4.89
„	Steyning .....	3.72	„	Llangyhanfal, Plâs Draw. ....	3.06
„	Hailsham .....	3.82	„	Criccieth, Talarvor .....	2.33
„	Totland Bay, Aston House ..	2.23	„	Llanberis, Pen-y-pass .....	11.58
„	Emsworth, Redlands .....	3.36	„	Lligwy .....	3.18
„	Stockbridge, Ashley .....	3.43	„	Douglas, Woodville .....	3.23
„	Reading, Calcot Place .....	2.77	XII.	Stoneykirk, Ardwell House ..	3.44
III.	Harrow Weald, Hill House ..	2.45	„	Dalry, The Old Garroch ...	4.81
„	Oxford, Magdalen College ..	2.93	„	Langholm, Drove Road .....	7.03
„	Pitsford, Sedgebrook .....	3.11	„	Moniaive, Maxwellton House ..	3.84
„	Huntingdon, Brampton .....	3.00	XIII.	N. Esk Reservoir [Penicuik] ..	3.35
„	Woburn, Milton Bryant .....	2.87	XIV.	Maybole, Knockdon Farm ..	3.40
„	Wisbech, Bank House .....	2.21	XV.	Campbeltown, Witchburn ..	3.90
IV.	Southend Water Works .....	2.41	„	Inveraray, Newtown .....	7.25
„	Colchester, Lexden .....	1.72	„	Ballachulish House .....	7.12
„	Newport, The Vicarage .....	2.66	„	Islay, Eallabus .....	5.91
„	Rendlesham .....	1.42	XVI.	Dollar Academy .....	3.33
„	Swaffham .....	2.23	„	Loch Leven Sluice .....	1.98
„	Blakeney .....	2.33	„	Balquhidder, Stronvar .....	6.24
V.	Bishops Cannings .....	4.08	„	Perth, The Museum .....	2.93
„	Ashburton, Druid House ...	6.36	„	Coupar Angus Station .....	3.95
„	Honiton, Combe Raleigh ...	3.48	„	Blair Atholl .....	2.73
„	Okehampton, Oaklands .....	4.73	„	Montrose, Sunnyside Asylum ..	3.30
„	Hartland Abbey .....	3.77	XVII.	Alford, Lynturk Manse ...	2.28
„	Lynmouth, Rock House .....	5.47	„	Keith Station .....	2.29
„	Probus, Lamellyn .....	3.90	XVIII.	N. Uist, Lochmaddy .....	3.80
„	North Cadbury Rectory ...	2.51	„	Alvey Manse .....	1.88
VI.	Clifton, Pembroke Road ...	4.63	„	Loch Ness, Drumnadrochit ..	2.69
„	Ross, The Graig .....	3.01	„	Glencarron Lodge .....	5.33
„	Shifnal, Hatton Grange .....	3.03	„	Fearn, Lower Pitkerrie .....	1.36
„	Blockley, Upton Wold .....	3.54	XIX.	Invershin .....	1.98
„	Worcester, Boughton Park ..	2.60	„	Altnaharra .....	1.71
VII.	Market Overton .....	3.24	„	Bettyhill .....	1.66
„	Market Rasen .....	2.20	XX.	Dunmanway, The Rectory ..	4.95
„	Bawtry, Hesley Hall .....	2.07	„	Cork .....	3.38
„	Buxton .....	3.97	„	Darrynane Abbey .....	4.86
VIII.	Neston, Hinderton Lodge ..	2.83	„	Glenam [Clonmel] .....	4.28
„	Southport, Hesketh Park ..	3.33	„	Ballingarry, Gurteen .....	3.95
„	Chatburn, Middlewood .....	3.31	„	Miltown Malbay .....	5.39
„	Cartmel, Flookburgh .....	4.42	XXI.	Gorey, Courtown House ...	3.96
IX.	Langsett Moor, Up. Midhope ..	3.64	„	Moynalty, Westland .....	2.39
„	Scarborough, Scalby .....	2.53	„	Athlone, Twyford .....	2.98
„	Ingleby Greenhow .....	2.55	„	Mullingar, Belvedere .....	3.16
„	Mickleton .....	1.78	XXII.	Woodlawn .....	4.94
X.	Bardon Mill, Beltingham ...	...	„	Westport, St. Helens .....	4.98
„	Ewesley, Fallowlees .....	2.87	„	Mohill .....	2.41
„	Ilderton, Lilburn Cottage ..	1.49	XXIII.	Enniskillen, Portora .....	...
„	Keswick, York Bank .....	7.52	„	Dartrey [Cootehill] .....	3.13
XI.	Llanfrechfa Grange .....	6.69	„	Warrenpoint, Manor House ..	2.78
„	Treherbert, Tyn-y-waun ...	10.36	„	Banbridge, Milltown .....	2.14
„	Carmarthen, The Friary .....	6.28	„	Belfast, Springfield .....	2.85
„	Castle Malgwyn [Llechryd] ..	5.28	„	Bushmills, Dundarave .....	3.82
„	Plynlimon .....	9.70	„	Stewartstown .....	...
„	Crickhowell, Ffordlas .....	6.50	„	Killybegs .....	5.41
„	New Radnor, Ednol .....	4.97	„	Horn Head ...	6.74

## METEOROLOGICAL NOTES ON AUGUST, 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.—The dry, sunny weather of the latter part of July continued until 4th, giving an absolute drought of 17 days. With the exception of a few fine days in the middle, the remainder of the month was unsettled with frequent R and occasional TSS. Duration of sunshine, 179·3\* hours, and of R 48·4 hours. Mean temp. 60°·9, or 1°·2 below the average. Shade max. 83°·9 on 3rd; min. 45°·4 on 12th. F 0, f 0.

TENTERDEN.—Duration of sunshine, 224·0† hours. Shade max. 79°·0 on 4th; min. 41°·5 on 12th. F 0, f 0.

TOTLAND BAY.—Duration of sunshine, 251·6\* hours. Shade max. 76°·1 on 3rd; min. 46°·1 on 17th. F 0, f 0.

PITSFORD.—Mean temp. 58°·4. Shade max. 81°·5 on 3rd; min. 39°·4 on 17th.

TORQUAY.—Duration of sunshine, 237·0\* hours, or 30·4 hours above the average. Mean temp. 61°·3 or 0°·2 below the average. Shade max. 77°·9 on 7th; min. 47°·6 on 11th. F 0, f 0.

NORTH CADBURY.—Abundant sunshine was experienced to 19th, and no R fell, giving an absolute drought of 32 days. R fell every day from 19th to the end. Shade max. 81°·2 on 3rd; min. 41°·0 on 12th. F 0, f 0.

BATH.—Shade max. 79°·5 on 3rd; min. 41°·0 on 12th. F 0, f 0.

ROSS.—Shade max. 84°·6 on 3rd; min. 42°·0 on 12th. F 0, f 0.

HODSOCK PRIORY.—Shade max. 81°·8 on 3rd; min. 35°·6 on 17th. F 0, f 2.

BOLTON.—Mean temp. 55°·8, or 1°·0 below the average. Duration of sunshine, 124·3\* hours, or 5·7 hours above the average. Shade max. 72°·4 on 2nd; min. 42°·9 on 12th. F 0, f 0.

SOUTHPORT.—Duration of sunshine, 187·7\* hours, or 17 hours above the average; duration of R, 42·7 hours. Mean temp 58°·5, or 1°·0 below the average. Shade max. 70°·6 on 16th; min. 44°·9 on 17th. F 0, f 0.

HULL.—Duration of sunshine, 160\* hours. Shade max. 80°·0 on 3rd; min. 41°·0 on 11th and 12th. F 0, f 0.

HAVERFORDWEST.—Fine and warm to 17th, then wet and unsettled. Duration of sunshine 217·4\* hours. Shade max. 74°·6 on 3rd; min. 42°·4 on 17th and 18th. F 0, f 0.

LLANDUDNO.—Shade max. 74°·0 on 3rd; min. 50°·0 on 17th. F 0, f 0.

DOUGLAS.—Fairly dry to 19th, but thereafter extraordinarily bad weather, with a succession of strong N. winds. A violent gale on 31st caused the boats to be several hours late.

MAXWELTON.—Shade max. 81°·0 on 2nd; min. 37°·0 on 12th.

EDINBURGH.—Mean temp. 56°·1. Duration of sunshine, 196·1\* hours. Shade max. 74°·2 on 2nd; min. 51°·5 on 20th. F 0, f 0.

DUNDEE.—Shade max. 80°·6 on 2nd; min. 38°·2 on 13th. F 0.

BALLACHULISH HOUSE.—Shade max. 78°·0 on 20th; min. 39°·0 on 11th. F 0, f 0.

WATERFORD.—Shade max. 77°·0 on 1st; min. 40°·0 on 12th. F 0.

DUBLIN.—Mean temp. 59°·1, or 0°·6 below the average. Shade max. 76°·3 on 3rd; min. 47°·2 on 11th. F 0, f 0.

MARKREE.—Shade max. 74°·8 on 3rd; min. 39°·9 on 17th. F 0, f 1.

WARRENPOINT.—Shade max. 72°·0 on 4th; min. 45°·0 on 11th, 16th, 29th and 31st. F 0, f 0.

\* Campbell-Stokes.

† Jordan.

## Climatological Table for the British Empire, March, 1908.

STATIONS.  (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain		Aver. Cloud.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
London, Camden Square	58°1	24	25°6	15	48°1	34°7	37°3	87	97·6	20·8	inches 2·37	18	6·4
Malta ... ..	64·4	2	47·6	15	60·0	51·6	48·1	76	133·9	...	2·98	12	5·1
Lagos ... ..	94·0	18	72·0	23	90·1	77·3	75·7	71	169·0	66·0	6·00	9	7·2
Cape Town ... ..	83·8	6	51·5	26	76·4	58·4	55·6	69	...	...	·46	6	3·9
Durban, Natal ... ..	92·9	12	57·8	25	81·2	65·8	...	...	146·2	...	4·76	13	5·0
Johannesburg ... ..	84·3	13	47·7	25	72·2	53·2	53·2	77	153·0	47·4	5·11	14	4·2
Mauritius ... ..	86·0	6	65·6	24	82·8	71·8	69·9	80	146·2	54·7	8·00	14	5·1
Calcutta... ..	104·9	31	60·1	3	94·6	69·1	63·1	58	157·7	51·1	·00	0	2·1
Bombay... ..	89·1	27	63·5	2	85·0	71·3	66·4	70	134·0	55·5	·06	1	1·1
Madras ... ..	97·5	10	62·5	9	90·1	71·2	69·6	73	143·4	57·5	·00	0	2·7
Kodaikanal ... ..	72·6	16	45·6	4	67·5	50·0	44·1	61	139·4	30·2	3·44	7	3·6
Colombo, Ceylon ... ..	91·6	21	72·0	12	89·7	74·5	72·5	75	160·8	69·2	4·48	11	4·4
Hongkong ... ..	79·1	31	46·6	7	65·9	57·0	54·4	76	124·7	...	·77	6	6·6
Melbourne ... ..	95·2	8	43·4	19	73·0	55·6	50·1	59	151·2	38·2	2·18	12	5·7
Adelaide ... ..	94·2	7	45·6	21	76·6	58·0	53·1	62	151·1	38·8	2·78	12	5·9
Coolgardie ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Perth ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Sydney ... ..	86·7	31	56·0	28	76·3	62·9	59·0	70	123·3	45·9	2·46	16	4·2
Wellington ... ..	72·0	1,2,3	46·0	16	64·1	55·6	52·2	76	124·0	31·0	4·87	16	4·0
Auckland ... ..	81·0	6	52·0	17	70·8	60·2	56·5	74	140·0	47·0	8·12	17	5·9
Jamaica, Kingston ... ..	91·8	9	63·3	6	87·1	68·3	69·0	75	...	...	1·27	9	...
Trinidad ... ..	89·0	var.	64·0	var.	87·4	66·3	73·4	88	162·0	61·0	1·79	7	...
Grenada ... ..	86·2	5	68·2	20	83·8	72·2	66·0	68	152·2	...	1·99	18	2·9
Toronto ... ..	63·8	26	7·5	4	39·0	23·9	...	84	...	...	1·63	16	7·3
Fredericton ... ..	54·0	24	-9·0	11	35·7	13·8	...	75	...	...	2·20	8	5·9
St. John's, N.B. ... ..	48·4	24	-1·0	10	35·6	20·7	...	...	...	...	3·76	14	5·5
Victoria, B.C. ... ..	55·2	23	27·2	6	49·6	37·7	...	77	...	...	4·58	17	7·0

MALTA.—Mean temp. of air 55°·8. Average hours of bright sunshine, 6·2.

Johannesburg.—Bright sunshine, 224·9 hours.

Mauritius.—Mean temp. of air 0°·5, dew point 0°·7, and relative humidity 0·5 per cent., below, and R 4·75 in. above, averages. Mean hourly velocity of wind, 13·8 miles, or 3·4 miles above average.

MADRAS.—Bright sunshine, 235·6 hours.

KODAIKANAL.—Bright sunshine, 239 hours, TSS on 8 days and hoar frost on 4 days.

COLOMBO.—Mean temp. of air, 82°·9 or 0°·8 above, of dew point, 0°·4 below, and R 1·1 in. below, averages. Mean hourly velocity of wind, 4·4 miles.

HONGKONG.—Mean temp. of air, 61°·2. R 2·10 in. below average. Bright sunshine, 146·0 hours, mean hourly velocity of wind, 15·4 miles.

Melbourne.—Mean temp. of air 0°·8 above, and R 1·05 in. above, averages.

Adelaide.—Mean temp. of air 2°·7 below, and R 1·71 in. above, averages.

Sydney.—Mean temp. of air 0°·4 above, and R 2·70 in. below, averages.

Wellington.—Mean temp. of air 0°·7 below, and R 1·42 in. above, averages.



# RAINFALL OF THAMES VALLEY, SEPTEMBER, 1908.

