

# Symons's Meteorological Magazine.

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## DINNER OF THE ROYAL METEOROLOGICAL SOCIETY.

THE annual dinner of the Royal Meteorological Society took place on the evening of Tuesday, June 16th, in the Balmoral Rooms of the Trocadero Restaurant. The President of the Society, Dr. H. R. Mill, was in the chair, and a small but representative gathering of the Fellows supported him on the occasion. Such dinners furnish a double opportunity; they enable Fellows who reside in distant parts of the country, and have few points of contact, to become personally acquainted, and they allow the public to see not only what are the objects pursued by the Society, but also who are the people, whether Fellows or guests, whose interest is attracted by the subject. Bearing these points in mind the President and Council of the Society invited a certain number of guests, and while deferring so far to convention as to seat a few of these alternately with Fellows, along one side of a long table, they arranged the rest of the company at numerous small tables, so that instead of one being limited to conversation with one of two neighbours, general conversation was possible between groups of four. Judging from the uniform hum of voices which rose over the whole room during dinner, the experiment was successful. The following Fellows of the Society and guests of the President and Council were present, the order of the names being alphabetical and the guests distinguished by small capitals.

MR. E. B. BARNARD, M.P. (Chairman Metropolitan Water Board), Mr. F. Campbell Bayard (Secretary), Mr. Clayton Beadle, Mr. F. J. Brodie, Mr. Eric Stuart Bruce, Captain Caborne, C.B., Mr. C. J. P. Cave, Captain M. H. Clarke and guest, Mr. J. E. Clark, CAPTAIN MUIRHEAD COLLINS, C.M.G., Mr. R. Cooke, Mr. J. A. Curtis, Dr. G. F. Deacon, Mr. F. Druce and 3 guests, Mr. F. B. Edmonds, Rev. W. Esdaile, Mr. H. N. Farrington, Rev. J. C. Fox, Mr. Vaux Graham, Mr. C. Hawksley, COLONEL HELLARD, R.E., C.B. (Director General of the Ordnance Survey), DR. A. J. HERBERTSON (Reader of Geography in the University of Oxford), REV. H. N. HUTCHINSON, Mr. R. Inwards, Mr. J. P. Jenkin, DR. J. SCOTT KELTIE, Sec. R.G.S., Mr. Baldwin Latham and guest, Mr. R. G. K. Lempfert, Dr. Lewys-Lloyd, Captain H. G. Lyons, F.R.S. (Director General of Survey Department, Egypt), DR. J. D. MCCLURE, Mr. W. Marriott, Mr. W. J. Marriott, Dr. H. R. Mill (President), Mr. R. Mond, Mr. R. W. Munro, Mr. P. P. Pennant,

Mr. C. Salter, SIR BENJAMIN STONE, M.P., DR. A. STRAHAN, F.R.S., DR. J. J. H. TEALL, F.R.S. (Director of the Geological Survey), MR. A. WATT (Secretary of the Scottish Meteorological Society), Dr. C. Theodore Williams (Treasurer).

The loyal toasts having been duly honoured, Dr. Theodore Williams proposed "The Visitors" expressing his regret that owing to indisposition Lord Strathcona had been obliged to telegraph at the last moment that he was unable to come, but paying a tribute to Canada for initiating the Conference of Imperial and Colonial Meteorologists which was about to meet, and to Australia for taking part in that gathering. He welcomed all who were present, and coupled with the toast the names of Captain Muirhead Collins, representing the Commonwealth of Australia, and Dr. J. D. McClure, Headmaster of Mill Hill School. Captain Collins, in replying, said that one of the first acts of the Federal government of Australia had been to establish a Federal Meteorological Service, the only one in the world, he believed, which produced a daily weather map of a whole continent. Dr. McClure, in a humorous speech which produced an atmosphere of genial hilarity, also responded.

Mr. E. B. Barnard, M.P., proposed the toast of The Royal Meteorological Society, wishing success and permanence to its work, the practical results of which, he confessed, appealed more powerfully to him than did its learned researches. The President, in replying, thanked the proposer for his kind words and for the stress he laid on the useful applications of meteorology, an aspect that was perhaps, not so often dealt with as it deserved to be. Since the last annual dinner the Society had been prospering and growing in numbers. They had delighted to honour the eminent French meteorologist, M. Teisserenc de Bort with their gold medal, and they had in turn been honoured and delighted by the lecture of their eminent German colleague, Dr. Hellmann, on "The Dawn of Meteorology." The aim of the Society was to advance meteorology as a science by their meetings and discussions, and to spread a knowledge of meteorological facts by influencing the teaching in schools and in some measure by endeavouring to influence the press, which, he feared, was still somewhat credulous and uncritical in the matter of long-period weather forecasts. The Society was not limited by any territorial restriction; nearly one quarter of its Fellows resided out of England, and papers were read at its meetings dealing with the phenomena of all parts of the atmosphere, from the poles to the equator. He sometimes thought that the complexity of the problem they studied and the importance of endeavouring to grasp it as a whole, were not adequately considered by men of science trained in the methods of the laboratory, but he was sure that the phenomena of nature in the open must be studied as a whole and in their natural environment, before the best results could be obtained. The modest candle of the Society was, perhaps, not set on so high or so ornate a candlestick as its light deserved, and although the Society went quietly on its way

without complaint, he doubted whether there was another scientific Society in London of equal age, equal numbers, and equal deserts, which was not either housed free of charge by Government, or at least aided by a substantial subsidy.

Mr. Baldwin Latham proposed "Kindred Institutions," dwelling on the close connection between the work of the Royal Meteorological Society, and that of other societies and institutions devoted to science and its applications, and Dr. Teall, Captain Lyons, and Mr. Watt responded in short and apposite speeches. Mr. F. Campbell Bayard proposed "The Chairman," and on the toast being responded to the meeting came to an end.

Several part-songs of an appropriate character were given at intervals by Mr. H. Shartau's quartette party, and these added much to the enjoyment of the evening.

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

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

THE district of North Otago, often called after its chief town, the Oamaru district, is sheltered on the west, north and south by mountainous ranges, which condense and precipitate on their windward slopes much of the moisture borne by the winds from these directions, and it must therefore depend chiefly on easterly weather for its rains. The north-easterly and south-easterly winds which accompany cyclonic disturbances, and are usually laden with water-vapour, sweep up the Kakanui and Waitaki valleys, causing the most abundant rains to fall over the district. In some seasons, however, these atmospheric movements do not extend their influences so far south, and then, while the North Island gets more than the usual amount of rain, those parts of the South Island depending upon them are liable to experience droughts. A prolonged dry period of an unusually severe character for any part of New Zealand, extended over the Oamaru district during the years 1889, 1890, and 1891. The years 1897 and 1898 were also very dry, and the last period of deficient rainfall, from January, 1906, to August, 1907, was 45·7 per cent. below the sum of the average monthly rainfalls for the eighteen months included.

The annual rainfall for Oamaru varied from a minimum of 13·47 in. in 1881 to a maximum of 32·82 in. in 1870, the average for 40 years—from 1867 to 1906—being 21·87 in.

The continuous and unbroken record for this period gives the following monthly averages :—

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
2·24	1·88	1·32	1·73	1·62	1·78	1·67	1·47	1·89	1·55	1·98	2·30

The average number of days with rain ( $\cdot 01$  in. or over) from the Windsor Park, Oamaru, record of 15 years are :—

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
12	11·6	9·7	9	8	7·4	8	8	9	10	11	13

showing that the expectancy of rain is greater in summer than in winter.

The Windsor Park records of the recent dry period are as follows :—

	Jan. in.	Feb. in.	Mar. in.	Apr. in.	May. in.	June. in.	July. in.	Aug. in.	Sept. in.	Oct. in.	Nov. in.	Dec. in.
1906...	—	1·25	·52	1·16	·73	1·42	·59	·59	1·46	·62	·95	2·46
1907...	·43	1·39	1·41	·58	·71	·24	·56	—	—	—	—	—

Only one month (December, 1906) had rainfall above the average of 15 years, and that by merely  $\cdot 16$  in.

The days with rain ( $\cdot 005$  in. or over) during this time were :—

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1906.....	—	13	10	5	4	5	6	4	8	7	5	10
1907.....	5	9	11	7	2	4	7	—	—	—	—	—

As might be expected in that undulating country, the records from Kauroo Hill, near Maheno, differ from the above very considerably at times. The averages from the 17 years' records at Kauroo Hill are :—

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Ins...	2·61	2·19	1·68	1·24	·94	1·18	1·28	·69	1·97	1·42	2·08	2·31
Days	9·8	7·8	6·6	6·3	4·5	4·4	5	4·6	8·2	8	9·4	10·9

and the quantity during the 18 months dry period :—

	Jan. in.	Feb. in.	Mar. in.	Apr. in.	May. in.	June. in.	July. in.	Aug. in.	Sept. in.	Oct. in.	Nov.* in.
1906.....	—	1·42	·49	·99	·71	1·19	·48	·50	2·29	·45	·98
1907.....	·46	1·95	1·63	·78	·80	·23	·50	—	—	—	—

which shows the total fall for this period as 39·1 per cent. below the average.

The results of this small rainfall, though by no means comparable with the effects of droughts I have experienced in the heat of Australia, were more severe than I had imagined possible in this country. The fields were very bare, especially new pastures, which had been sown with English grasses in the past few years. The fields which were being ploughed showed a dry subsoil which had apparently not been moistened by a good rain for a long time. I was driven over a great part of the district and only saw one small field of fair-sized turnips, while on an average between 50 and 60 truckloads of these roots were being brought from Southland every day for Northern and Central Otago. The stacks of straw which the farmers have at

\* No value for December is given in the MS.—[ED. S.M.M.]

last learned to save at harvest time were commanding high prices, and in addition quite 9,300 tons of fodder had to be imported by the settlers to keep their starving stock alive. This food was carried free for the purchasers from the south, who were thus relieved of a great stress and encouraged to save their stock. Much of the stock had to be removed elsewhere for pasture and sold off or killed, and nearly all left were in very poor condition.

The acreage and yields for the Waitaki agricultural district for the past ten seasons as published by the Agricultural Department show a lower yield for wheat for 1906-7 than any since 1897-8, while the yield per acre in oats was the lowest recorded.

To sum up this aspect of affairs I would like to quote a concise statement of the Oamaru correspondent of the Wellington *Evening Post* (12th August, 1907), who estimated that "The eighteen months drought at Oamaru has cost the district not far short of a million sterling. On the last grain harvest, as compared with previous averages, there was a loss of £200,000, and loss on the decreased output of butter ran into nearly another £50,000. It has been computed that about 75 per cent. of cattle and 50 per cent. of sheep that were in the district twelve months ago have been potted or exported to more favoured districts."

Under such trying circumstances it was tantalising to the farmers to hear of good rains falling in other parts of the country, and to see the clouds at such times hang over the mountains or watch them passing high up in the air away to the ocean. Such disappointment as they so frequently experienced led many inhabitants of the district to regard favourably the project of experimenting for the purpose of inducing the clouds to yield their moisture. The promoters were men who commanded the respect and sympathy of the public, and a large sum of money was readily subscribed. This amount, through the efforts of Mr. J. Macpherson, M.H.R., was also supplemented by the Government, and given its greatest power of purchase through the supply of explosives at cost price from the Defence Department of New Zealand. I was ordered to proceed to Oamaru simply to watch and report upon the proposed experiments.

On my arrival I was met by the members of the Committee who had the matter in hand, and, while disclaiming all responsibility for the experiments, I discussed the project freely with them, finding their idea was to seek favourable opportunities to cause the passing clouds to precipitate. They desired me to advise them especially as to these and to indicate times when the air would be saturated with moisture, or, to adopt a phrase of the late meteorologist, Rev. Clement Ley, such a state of "unstable equilibrium" that might possibly be disturbed and the "water-dust" of the clouds be made to coalesce and precipitation ensue. They did not hold that they were able to produce rain at any time, but firmly believed that they could only operate successfully in a cloudy and saturated atmosphere. Though I could not share their very sanguine hopes for such results

as desired, I yet tried my best to meet their views, and to the utmost of my abilities heartily co-operated with the Committee. As is well-known rainfall is one of the most uncertain elements in meteorological prognostication for such a district, and the "probability of rain" with certain disturbances rarely amounts to absolute certainty; but events were moving in such a manner that I could forecast periods of saturation in the near future. The times thought most favourable for rain, fortunately for the district, coincided very nearly with such widespread and abundant rainfalls as had not occurred for years, and on this account, unfortunately for my task of giving conclusive evidence as to cause and effect in the experiments, was thereby rendered more difficult. While admitting this I desire most clearly to maintain that in no case was I able to trace such effect or success in rain-making due to the explosions, as some local residents at the time, claimed with considerable assurance. I have, moreover, read the records of similar experiments made on 27th November, 1891, on Raki's Table, and referred to with even greater confidence. Rain fell at that time, but I find from our records that the fall was heavy and general between Cape Campbell and Dunedin, and the claim made in the contemporary press that the barometer fell after the explosion, from 28.92 to 27.75 in. in ten minutes, was of course absurd.\*

The sites chosen for the new experiments were lonely hills which commanded views of the whole district, and on that account had all been used as trigonometrical stations for the survey of the district. Raki's Table, the chief site, is a flat-topped hill, 1,059 feet above sea level and 14 miles inland, as the crow flies N.N.W. from Oamaru; Round Hill, on the Totara Estate, is a remarkable cone with an elevation of 501 feet above mean sea level, and about 6 miles S.W. from Oamaru. Dalgetty's Hill, near Duntroon, is in the Waitaki watershed, and about 811 feet above mean sea level, and 15 miles N.W. from Oamaru. The positions had been carefully chosen by the Committee, and both the situations and elevations were admirable for the purpose. The aim was to work with the wind rather than against it, and it was hoped that we should be able to trace the effects of the explosions on the clouds over the area affected.

On the afternoon of the 16th August, 1907, the skies were dull, strato-cumulus clouds hung round the hills and were scattered overhead. It appeared even to be raining at a distance away to the south, but the weather was quite fine for us on the way to Arnamore station near Raki's Table. We arrived at Mr. P. I. Shand's residence about sunset, and although heavy misty clouds were falling on the Table, and residents thought rain imminent, there did not seem to be sufficient density about the clouds. The air showed a relative humidity of 92 per cent. of saturation, and only needed a fall of  $2^{\circ}.4$  to the dew point. The cool of evening was approaching, and the wind, though light was in the rainy quarter, the S.E. On the whole

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\* Surely due to a printer's error, giving 27.75 for 28.75.—Ed. *S.M.M.*

the conditions were regarded as fairly favourable. It was regarded chiefly as a trial of the bombs, and for working the men together under Corporal Meikle, prior to using the other stations.

The explosives used on this occasion were:—

5.15 p.m. ....	(1)	17½ lbs. dynamite,	12½ lbs. powder, in keg.
5.30 „ .....	(2)	17½ „ „	12½ „ „
5.45 „ .....	(3)	40 „ „	25 „ „ in case.

These behaved differently. The first shot gave off a good report, and the smoke rose and drifted gently away to the N.W. The second did not explode well, for the powder seemed to burn in the air without detonation. The third shot, which had a weight of 65 lbs., gave a great concussion to the air, and vibrations were felt over a wide area. As far, however, as we could see there were no other than normal changes going on in the atmosphere. We left for Oamaru at 10 p.m., and the evening was quite fine. In the *Oamaru Mail*, however, next day, the following paragraph appeared: “As showing that the explosions, which took place last evening, although modest compared with what are to follow, were not altogether unaccompanied by that practical result which farmers look for as the outcome of the experiments, it may be mentioned that Mr. George White and several other farmers were conversing on the probability of rain descending from a certain cloud, which appeared to be hanging on Tokaraki if unsettled by concussion, at the times the bombs were, although unknown to Mr. White and his friends, being tested on Raki's Table; and as they conversed they were surprised to hear the boom of the explosions, and immediately afterwards a shower of rain, lasting for half-an-hour, fell in the vicinity of Hilderthorpe. This may have been a coincidence, but as a coincidence it is remarkable.”

As a result of this trial it was decided that the explosions should be given more resistance, fired off rocks, and at the next opportunity detonated almost simultaneously from the other stations.

(To be continued.)

## THE WEATHER OF JUNE, 1908.

By FRED. J. BRODIE.


THE opening days of June were marked by warm thundery weather, the chief source of disturbance being seen in a shallow barometrical depression which moved very slowly northwards over the western portions of the United Kingdom. In most places the highest temperatures were recorded either on the 3rd or 4th, when the shade maxima were above 75° in the West of Scotland, and above 80° in many parts of England, the thermometer at Southampton on the 4th

touching  $85^{\circ}$ . In Ireland and the North and East of Scotland the readings at the time were mostly below  $75^{\circ}$ , and in the North of Ireland they were nearly all below  $70^{\circ}$ . After the 4th an anti-cyclone appeared off our Atlantic seaboard, and a cold wind from north and north-west spread over the entire country, the maximum temperatures of the 6th being in many places quite  $20^{\circ}$  lower than those observed 48 hours earlier. On the night of the 6th or early on the following day (Whit Sunday), the sheltered thermometer in many inland parts of Great Britain fell to within a degree or two of the freezing point, while on the surface of the ground it went below that level. At Balmoral and Morpeth (Cockle Park) the grass minimum was as low as  $29^{\circ}$ , and at Crathes (Kincardineshire) it was as low as  $27^{\circ}$ , while at Llangammarch Wells (a situation famous for extremes of temperature) the exposed thermometer fell to a minimum of  $25^{\circ}$ .

The second and third weeks in the month were marked by a long spell of cool and rather changeable weather, but over a large portion of England the only rain of any appreciable weight occurred on the 16th and 17th, the remainder of the time being mostly fair and dry. The temperatures recorded during this fortnight were seldom much above  $70^{\circ}$  in any part of the country, and in many cases they were considerably below that level, especially in the northern and eastern districts, where maximum readings varying a little on either side of  $60^{\circ}$  were common. In comparison with the average the nights were, as a rule, warmer than the days, but between the 14th and 18th, and again between the 21st and 23rd, ground frosts were again experienced in several parts of Great Britain. On the night of the 14th the exposed thermometer fell to  $28^{\circ}$  at Crathes and at Cambridge, to  $27^{\circ}$  at Birmingham, and to  $25^{\circ}$  at Llangammarch Wells; while on the night either of the 20th or 21st it sank to  $28^{\circ}$  at Harrogate and again to  $25^{\circ}$  at Llangammarch Wells, a reading of  $29^{\circ}$  being recorded on the latter occasion as far south as Greenwich, and Wisley, in Surrey.

Towards the close of the month the weather became more summer-like, the highest temperatures being recorded in the western parts of the Kingdom, where the amount of bright sunshine was unusually large. At some few stations in Wales and the West of England the thermometer on the 28th and 29th rose to  $80^{\circ}$ , or even slightly above.

The mean temperature of the month differed but little from the average, a slight excess being reported over Eastern, Central, and Southern England, but a slight deficit in most other localities. In the southern districts the excess was due mainly to nocturnal warmth, the day temperatures showing a very close agreement with the normal. In the north an excess of heat at night was more than counter-balanced by a deficiency of seasonable warmth in the daytime.



**THE WHIRLWIND IN NORTH HERTFORDSHIRE ON  
4th JUNE, 1908.**

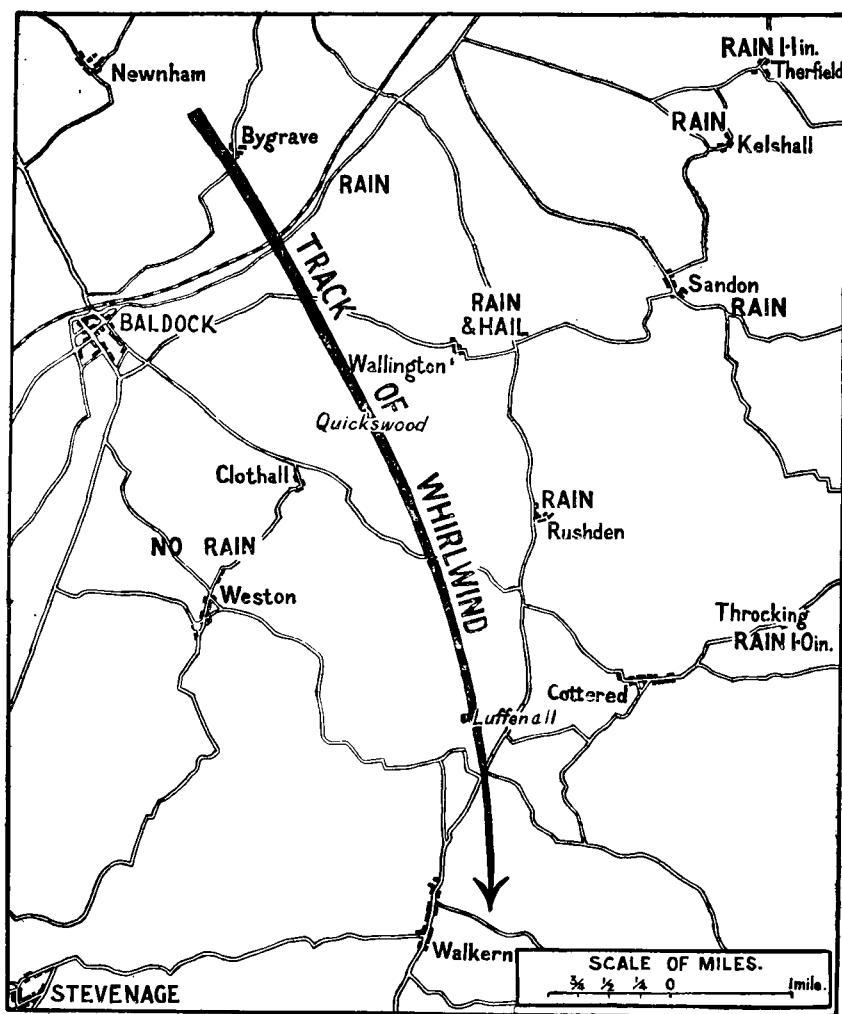
BY WILLIAM HILL.

ON Thursday, 4th June, the weather of North Herts was in a very unsettled condition. The height of the barometer at 9 a.m. was 30.15 in. (cor. for sea level), the maximum temperature for the day was 82°, the air was close and muggy, the wind W.N.W., light. A thunderstorm to the south of Hitchin between 10 and 11 a.m. drifted slowly towards the south-east, the rumbling of distant thunder was heard at frequent intervals during the day. At 3.45 p.m. I watched a fine mass of cumulus rise from the north-west and drift slowly to the north-east quadrant of the heavens, it had all the appearance of a gathering thunderstorm; at 4.15 p.m. fragments of misty stratus, below the main body of the cumulus cloud, were noticed driving rapidly from the north-east. During the passage of this cloud the wind came from the north-west in fitful, but strong, gusts, alternating with periods of flat calm.

Between 4 and 4.30 p.m. some gentlemen playing at golf on Royston Heath became interested in a thunderstorm lying to the east of that town, which appeared to be either drifting or extending itself in a southerly direction. A second thundercloud was then seen rising from the north and spread or drifted rapidly towards the first storm, which it ultimately joined. One observer says:—"At the moment when these two clouds approached each other, and while there was yet an interval between them, I saw, formed in this space, a funnel-shaped mass of vapour." When the clouds joined the cone-shaped mass of vapour was still apparent. The point of the cone repeatedly altered in appearance, at one time extending its apex towards the earth, and at another becoming suddenly truncated, the point ending off squarely. Small patches of greyish white vapour were seen on the periphery of the cone, apparently revolving rapidly with an upward movement. In general shape it resembled that of a water-spout. In the course of the next few minutes a second cone appeared in advance of the first (*i.e.*, in its front, according to the direction in which the first cone appeared to be moving, viz, N.N.W. to S.S.E.) Its diameter was much less than that of the first, and it had a distinct curve near the apex. From the larger cone as well as from a cloud in its rear, heavy rain appeared to be falling.

The phenomena described above, which lasted some 15 or 20 minutes, appear to have accompanied the passage of a storm of rain and wind, both of considerable intensity locally, separate from each other, but apparently moving in the same direction along parallel lines. The wind storm was the more remarkable. It was a violent whirlwind, varying somewhat in diameter, but generally of about 40 to 50 yards, in fact a miniature tornado. It appears to have commenced between Bygrave and Newnham, villages some 2 or 3 miles north and north-east of Baldock, and passing just south of the Bygrave farm homestead, travelled rapidly in a southerly direction to

Quickswood, and from thence to Luffenall and Walkern, a distance of about 6 miles, as shown on the accompanying map.



### WHIRLWIND OF JUNE 4TH, 1908.

The power of the wind within the whirl was great and in its track large branches of trees were broken, or rather twisted off. It upset a Hertfordshire farm cart laden with artificial manure and ashes, the weight of which could not have been less than 20-25 cwt., overturned two ricks, estimated together to have contained 30 tons of hay, a considerable portion of which was taken up in the whirl and distributed over the surrounding country. An oat stack 250 yards further on shared the same fate, the sheaves and straw being scattered far and wide. I saw two sheaves, but with the oats cut off as with a knife, lying at least 400 yards from the stack. At Bygrave, besides

damage to trees, a small moveable hen house was destroyed, portions of it were picked up at Quickwood, 2 miles away. The passage of the whirlwind through the small woods at Quickwood could readily be seen in a track about 50 yards broad, by the many white ends of the broken branches. Trees which had stiff branches like the oak, suffered most, young trees and those of more elastic nature coming off best. A fine large hawthorn standing alone in a meadow seemed to have been twisted round and torn away from the ground at the base



FIG. 2.—HAWTHORN TREE BROKEN AND TWISTED BY WHIRLWIND  
NEAR QUICKWOOD.

of the trunk, all branches, indeed, gave evidence of twisting rather than of simple fracture. Beyond Quickwood the whirl seems to have gradually lost its energy, though at Luffenall it partly unroofed and damaged a barn, but beyond this no serious harm seems to have been done. A strong wind with whirling motion was recognised at Walkern.

No rain accompanied this storm, and none fell to the westward of its track ; but to the north and east heavy rain fell less than a mile away, while at Wallingford and neighbourhood very large jagged hailstones were reported. The great fall of rain which I imagine came from the cone and following cloud which was seen from Royston, fell still further away along a line indicated by Odsey (just south-east of Ashwell Station) Kelshall, Gannock, and Sandon. South of this the whole storm, including that from Royston, seems to have merged into one disturbance, and after hanging around for some hours moved off in a south-easterly direction. Very heavy rain with hail is reported from Newsells and Barkway,

An observer at Hinxworth (just north of Newnham) says :—" I saw a storm about 4 o'clock coming up from the direction of Royston, and

another from the northward; just as these two storms seemed to meet above me I noticed a whirlwind in the direction of Bygrave, (possibly this cloud from the north was the one I was watching.)

Bygrave and Quickswood are each on a hill, two miles apart, a broad valley separates them, the ground on either side rising in gentle slopes. The fields are large and open, almost without hedge-rows; there are no trees at all, but along the balks which separate the areas of cultivated land are large whitethorn bushes. Two men at the bottom of this valley, in charge of the cart already mentioned, say:—"We saw over Bygrave a tall column, which we took to be smoke, and thinking the farm was on fire we looked along the road for a mounted messenger going to Baldock for the fire engine. But as we looked we saw that the column was moving, and moving in our direction. As it passed over ploughed land it raised a thick column of dust, when over a field of growing corn the dust nearly ceased. As it seemed about to pass over where we were we unharnessed our horse and went to one side for 200 yards. The storm passed with a rush like escaping steam; as the whirlwind was now on ploughed land we could not see much for dust: the wind where we were was strong. On returning to our cart we found it turned upside down; it was about two thirds full of ashes. The whirlwind was about 50 yards across."

Another man, working in a field near Quickswood, about half a mile from the track of the whirlwind, says:—"I saw the storm near Bygrave, and watched it until it was hidden behind the shoulder of the hill; I do not think the column of dust was more than 150 ft. high, for when it passed the hill it became completely hidden from me. I think it was about 5 minutes or a little longer from the time I saw it till it disappeared behind the hill."

### Correspondence.

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

#### HIGH MAY TEMPERATURE IN DERBYSHIRE.

For thirty years thermometers have been read by my sister, Miss Hunter, or myself at Field Head House, Belper, under exactly similar conditions, and I may add, in passing, that the monthly summary has been published in the "Meteorological Record of the Royal Meteorological Society" since the commencement.

The following figures for May are those for the only three years when the mean monthly temp. exceeded 53°·0 (corrected).

Year.	TEMPERATURE.				RAIN. in.	Days.	TOTAL from Jan. 1. in.
	9 a.m.	Max.	Min.	Mean.			
May, 1895.....	53°·4	62°·9	44°·1	53°·5	·61	8	9·96
„ 1893 ....	54°·9	62°·7	45°·2	53°·9	2·80	10	9·48
„ 1889.....	53°·2	62°·3	46°·8	54°·5	4·22	16	8·27
„ 1908.....	53°·9	62°·5	46°·5	54°·5	3·22	16	11·83

*Belper, June 21st, 1908.*

JOHN HUNTER.

## THE COLD SPRING.

IN my letter (p. 92), fifth line from end, there should be a semicolon after "reached." The point is that 51 is the highest figure previously reached in the whole series (c) ; not merely in those two columns.

I may note that while March was cold and April very cold, the warmth of May seems to have brought up the mean temperature of the three months close to the average.

A.B.M.

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I HAVE been puzzling over A. B. M.'s letter on the above subject. It may be that the clouded state of my intellect makes me fail to grasp his meaning, but certainly I, for one, am unable to see the point of his contention. If he is a new weather prophet perhaps he *will*, in future, be kind enough to prophesy before instead of after the event, and then we shall be able to test his predictions.

A PUZZLED METEOROLOGIST.

30th June, 1908.

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## COMING METEORS.

METEOROLOGICAL observers are often casual meteoric observers as well ; everyone, indeed, accustomed to watching atmospheric phenomena must have noticed many of those celestial visitants known as meteors, appearing under every gradation of magnitude from the tiny shooting star to the sky-illuminating fireball.

During the last half of July there is a great increase in the number of these cosmic meteors as compared with the earlier months, and a further development occurs in August, for there is a very rich and durable shower of Perseids presented during the first fortnight, and reaching a maximum on about the 11th. This year a nearly full moon will interfere with satisfactory observations during the second week of August, but over the period, July 25th to August 5th, meteors will be pretty abundant in the dark sky, and even in the presence of bright moonlight ; on later nights many of the more conspicuous ones appearing near the time of maximum will be seen. Observers will do useful work in counting the numbers visible on different nights, and in recording the apparent paths of the brighter objects amongst the stars. This may be done either by giving the positions relatively to stars near, or by plotting the flights on a celestial globe or star map, and reading off the Right Ascensions and Declinations of the beginning and end points. Data of this kind will be valuable to those engaged in investigating this branch, as such materials afford the means of determining pretty accurately the heights, velocities and radiant points of those meteors which may fortunately have been observed at more than one station with the necessary fulness and precision.

W. F. DENNING.

Bristol, June 17th, 1908.

## IONS AS NUCLEI OF CONDENSATION.

I HAVE just been reading the abstract of lectures on the Geographical Distribution of Rainfall in the British Isles in the April number of your Magazine, and note that Dr. Mill, like other writers on the formation of rain drops, looks on ions as possible nuclei of condensation. That view has become stereotyped in all books dealing with the subject—as might be expected, having the stamp of high authority on it. When Mr. Wilson published his paper on the action of these ions on condensation, I at once wrote a letter to *Nature* (29th March, 1900) pointing out many objections to the suggestion. I would like to refer your readers to that letter; but I may restate some of the physics here. Condensation takes place on ions only when the air is extremely highly supersaturated. Air while there is dust in it cannot become supersaturated. We have never yet found any air free from dust; even at a height of many thousand feet there is generally over 100 particles per cubic centimetre. As a matter of fact the air with the lowest number of dust particles has been observed at low level, in an area where the air was well washed by frequent showers of rain. If there is such a thing as dustless air there does not seem to be any chance of ions enabling it to make a cloud, though they might cause rain. No doubt clouds can be produced on ions, but in the artificial conditions the cooling by expansion is instantaneous, whereas in nature it is slow, and whenever a nucleus was formed it would grow at such a rate in the supersaturated air that it would rapidly attain the size of a raindrop and fall, and in so doing relieve the tension all round it, and another centre of condensation could not form near the path of its fall. This cannot be shown experimentally, because if you expand the air slowly you cannot get the necessary supersaturation owing to air receiving heat from the containing vessel.

I hope your readers will reconsider the matter, and withhold their judgment till they get evidence of the existence of dustless air. For the reason given, the existence of clouds at great elevations, such as the higher cirrus, indicates the presence of dust even at these elevations.

JOHN AITKEN.

*Ardentlea, Falkirk, 15th June, 1908.*

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### SCOTTISH METEOROLOGICAL SOCIETY.

A BUSINESS meeting of this Society was held on July 9th, at 4 p.m., at 5, St. Andrew Square, Edinburgh, Sir Arthur Mitchell, K.C.B., Vice-President, in the chair.

The Council had prepared a revised form of Constitution, which had been previously circulated amongst the members, and on the motion of Mr. G. Williamson, seconded by Mr. J. Anderson, was unanimously adopted.

The Council also submitted a statement regarding the work and the financial position of the Society. It was explained that when the Ben Nevis Observatories were closed in 1904, and their affairs wound

up, they were found to be about £470 in debt. This absorbed the Society's reserve fund of £300 which had been lent to the Observatories, and left a bank overdraft of £170, for which the Society had to assume responsibility. Mr. W. B. Wilson, the Honorary Treasurer, stated that this overdraft had been slightly reduced out of the ordinary income of the Society, and that it would be a relief to the Council if some special means of liquidating this obligation could be found. A useful discussion took place as to various fields of activity in which the Society might engage, the speakers including Professor Dyson, Astronomer Royal for Scotland, Professor Crum Brown, Professor Knott, Mr. Macdonald, Secretary of the Highland and Agricultural Society, Mr. T. S. Muir, of the Royal High School, Edinburgh, Mr. J. Anderson, and Mr. A. Watt.

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### METEOROLOGICAL NEWS AND NOTES.

EDITORIAL NOTE.—It has been necessary to prepare the present number of the Magazine for press a week earlier than usual, and it has consequently been found impossible to do justice to a large amount of interesting correspondence dealing mainly with the thunderstorms of June 4th, and with the remarkable prolongation of twilight which occurred in all parts of Great Britain on June 30th, July 1st, and other nights. The effect as observed at Mill Hill was similar to that of an ordinary June night in the extreme North of Scotland, where high cirrus always reflects some sunlight at that season, and though the sky was clear, the reflection may have been from dust. Reference should also have been made to the absolute drought which prevailed over the greater part of England from June 18th to July 2nd or 8th, to the thunderstorms which brought the drought to a close, and to the extraordinarily low rainfall of June in the West of England. We hope next month to begin the publication of a series of three articles on the meteorological exhibits at the Franco-British Exhibition, and have arranged with a meteorologist who is not himself an exhibitor to write them.

THE CONFERENCE OF METEOROLOGISTS IN CANADA has been postponed to next year, when it will be held at Winnipeg. The programme for a meeting at Quebec, including a dinner at the Hotel Frontenac, had been issued, the representatives from Great Britain had taken their passage to sail on July 9th, and had made all other arrangements, when a notice of postponement was received by cable on June 27th. The wisdom of postponing the meeting until next year was pointed out in our February number (p. 19), and we cannot help regretting that the suggestion was not adopted then.

"BRITISH RAINFALL, 1907," will probably not be published until September, as Dr. H. R. Mill's engagement to leave for Canada on July 9th involved an arrangement of the work of the Rainfall Organization, which could not be altered at the short notice given of the postponement of the Quebec Conference, and he was obliged, with much regret, to break a rule which should always be observed—no holiday before publication.

## RAINFALL TABLE FOR JUNE, 1908.

| STATION.                         | COUNTY.               | Lat.<br>N. | Long.<br>W.<br>[°E.] | Height<br>above<br>Sea.<br>ft. | RAINFALL<br>OF MONTH.    |              |
|----------------------------------|-----------------------|------------|----------------------|--------------------------------|--------------------------|--------------|
|                                  |                       |            |                      |                                | Aver.<br>1870-99.<br>in. | 1908.<br>in. |
| Camden Square.....               | London .....          | 51 32      | 0 8                  | 111                            | 2'09                     | 1'26         |
| Tenterden.....                   | Kent .....            | 51 4       | *0 41                | 190                            | 1'96                     | 1'32         |
| West Dean .....                  | Hampshire .....       | 51 3       | 1 38                 | 137                            | 2'02                     | '75          |
| Hartley Wintney .....            | " .....               | 51 18      | 0 53                 | 222                            | 1'89                     | '98          |
| Hitchin .....                    | Hertfordshire .....   | 51 57      | 0 17                 | 238                            | 1'89                     | '86          |
| Winslow (Addington) .....        | Buckinghamshr. ....   | 51 58      | 0 53                 | 309                            | 1'99                     | 1'60         |
| Bury St. Edmunds (Westley) ..... | Suffolk .....         | 52 15      | *0 40                | 226                            | 2'04                     | '95          |
| Brundall .....                   | Norfolk .....         | 52 37      | *1 26                | 66                             | 1'89                     | '83          |
| Winterbourne Steepleton ...      | Dorset .....          | 50 42      | 2 31                 | 316                            | 2'32                     | '32          |
| Torquay (Cary Green) .....       | Devon .....           | 50 28      | 3 32                 | 12                             | 2'13                     | '31          |
| Polapit Tamar [Launceston]       | " .....               | 50 40      | 4 22                 | 315                            | 2'12                     | '97          |
| Bath .....                       | Somerset .....        | 51 23      | 2 21                 | 67                             | 2'31                     | '51          |
| Stroud (Upfield) .....           | Gloucestershire ..... | 51 44      | 2 13                 | 226                            | 2'23                     | '69          |
| Church Stretton (Wolstaston)..   | Shropshire .....      | 52 35      | 2 48                 | 800                            | 2'46                     | 1'86         |
| Coventry (Kingswood) .....       | Warwickshire .....    | 52 24      | 1 30                 | 340                            | 2'41                     | 1'62         |
| Boston .....                     | Lincolnshire .....    | 52 58      | 0 1                  | 25                             | 1'94                     | 1'55         |
| Workshop (Hodsock Priory) ..     | Nottinghamshire ..... | 53 22      | 1 5                  | 56                             | 2'24                     | 1'60         |
| Derby (Midland Railway) ..       | Derbyshire .....      | 52 55      | 1 28                 | 156                            | 2'70                     | 1'53         |
| Bolton (Queen's Park) .....      | Lancashire .....      | 53 35      | 2 28                 | 390                            | 3'21                     | 2'83         |
| Wetherby (Ribston Hall) ...      | Yorkshire, W.R. ....  | 53 59      | 1 24                 | 130                            | 2'38                     | 1'27         |
| Arneliffe Vicarage .....         | " .....               | 54 8       | 2 6                  | 732                            | 3'69                     | 2'44         |
| Hull (Pearson Park) .....        | " .....               | 53 45      | 0 20                 | 6                              | 2'12                     | '91          |
| Newcastle (Town Moor) ...        | Northumberland .....  | 54 59      | 1 38                 | 201                            | 2'03                     | '37          |
| Borrowdale (Seathwaite) ...      | Cumberland .....      | 54 30      | 3 10                 | 423                            | 6'97                     | 8'01         |
| Cardiff (Ely) .....              | Glamorgan .....       | 51 29      | 3 13                 | 53                             | 2'53                     | '36          |
| Haverfordwest (High Street) ..   | Pembroke .....        | 51 48      | 4 58                 | 95                             | 2'61                     | 1'27         |
| Aberystwyth (Gogerddan) ..       | Cardigan .....        | 52 26      | 4 1                  | 83                             | 2'93                     | 1'94         |
| Llandudno .....                  | Carnarvon .....       | 53 20      | 3 50                 | 72                             | 2'00                     | 2'39         |
| Cargen [Dumfries] .....          | Kirkcudbright .....   | 55 2       | 3 37                 | 80                             | 2'68                     | 3'23         |
| Hawick (Branksholm) .....        | Roxburgh .....        | 55 24      | 2 51                 | 457                            | 2'21                     | 1'62         |
| Edinburgh (Royal Observatory) .. | Midlothian .....      | 55 55      | 3 11                 | 442                            | ...                      | '96          |
| Girvan (Pinmore) .....           | Ayr .....             | 55 10      | 4 49                 | 207                            | 2'95                     | 3'25         |
| Glasgow (Queen's Park) ...       | Renfrew .....         | 55 53      | 4 18                 | 144                            | 2'70                     | 2'52         |
| Tighnabruaich .....              | Argyll .....          | 55 55      | 5 14                 | 50                             | 3'76                     | 3'84         |
| Mull (Quinish) .....             | " .....               | 56 36      | 6 13                 | 35                             | 3'55                     | 3'70         |
| Dundee (Eastern Necropolis) ..   | Forfar .....          | 56 28      | 2 57                 | 199                            | 2'15                     | 1'06         |
| Braemar .....                    | Aberdeen .....        | 57 0       | 3 24                 | 1114                           | 2'44                     | 1'00         |
| Aberdeen (Cranford) .....        | " .....               | 57 8       | 2 7                  | 120                            | 2'09                     | 1'64         |
| Cawdor .....                     | Nairn .....           | 57 31      | 3 57                 | 250                            | 2'24                     | 1'04         |
| Fort Augustus (S. Benedict's) .. | E. Inverness .....    | 57 9       | 4 41                 | 68                             | 2'28                     | 2'91         |
| Loch Torridon (Bendamph) ..      | W. Ross .....         | 57 32      | 5 32                 | 20                             | 4'78                     | 6'67         |
| Dunrobin Castle .....            | Sutherland .....      | 57 59      | 3 56                 | 14                             | 2'14                     | 2'25         |
| Castletown .....                 | Caithness .....       | 58 35      | 3 23                 | 100                            | ...                      | 2'25         |
| Killarney (District Asylum) ..   | Kerry .....           | 52 4       | 9 31                 | 178                            | 3'29                     | 1'24         |
| Waterford (Brook Lodge) ...      | Waterford .....       | 52 15      | 7 7                  | 104                            | 2'61                     | 1'15         |
| Broadford (Hurdlestown) ..       | Clare .....           | 52 48      | 8 38                 | 167                            | 2'52                     | 2'19         |
| Abbey Leix (Blandsfort) ...      | Queen's County .....  | 52 56      | 7 17                 | 532                            | 2'43                     | 1'63         |
| Dublin (Fitz William Square) ..  | Dublin .....          | 53 21      | 6 14                 | 54                             | 1'95                     | 1'65         |
| Ballinasloe .....                | Galway .....          | 53 20      | 8 15                 | 160                            | 2'69                     | 1'76         |
| Clifden (Kylemore House) ..      | " .....               | 53 32      | 9 52                 | 105                            | 5'33                     | ...          |
| Crossmolina (Ennisceoe) .....    | Mayo .....            | 54 4       | 9 18                 | 74                             | 2'95                     | 4'19         |
| Collooney (Markree Obsy.) ..     | Sligo .....           | 54 11      | 8 27                 | 127                            | 3'16                     | 3'19         |
| Seaforde .....                   | Down .....            | 54 19      | 5 50                 | 180                            | 2'72                     | 2'94         |
| Londonderry (Creggan Res.) ..    | Londonderry .....     | 54 59      | 7 19                 | 320                            | 2'92                     | 2'88         |

## RAINFALL TABLE FOR JUNE, 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 | Date. | Aver. 1870-99.        | 1908. | Diff. from Aver. in. | % of Av. |                        |                     |
|                          |          | in.               |             |       | in.                   | in.   |                      |          | in.                    |                     |
| — .83                    | 60       | .47               | 1           | 8     | 10.63                 | 11.57 | + .94                | 109      | 25.16                  | Camden Square       |
| — .64                    | 67       | .61               | 1           | 7     | 11.55                 | 9.67  | —1.88                | 84       | 28.36                  | Tenterden           |
| —1.27                    | 37       | .25               | 16          | 6     | 12.61                 | 12.15 | — .46                | 96       | 29.93                  | West Dean           |
| — .91                    | 52       | .60               | 1           | 5     | 11.59                 | 12.68 | +1.09                | 109      | 27.10                  | Hartley Wintney     |
| —1.03                    | 46       | .33               | 16          | 7     | 10.26                 | 10.71 | + .45                | 104      | 24.66                  | Hitchin             |
| — .39                    | 80       | .74               | 1           | 7     | 11.28                 | 13.16 | +1.88                | 117      | 26.75                  | Addington           |
| —1.09                    | 47       | .44               | 16          | 6     | 10.32                 | 10.40 | + .08                | 101      | 25.39                  | Westley             |
| —1.06                    | 44       | .22               | 17          | 10    | 10.12                 | 11.05 | + .93                | 109      | 25.40                  | Brundall            |
| —2.00                    | 14       | .15               | 1           | 5     | 16.36                 | 12.57 | —3.79                | 77       | 39.00                  | Winterbourne Stpltn |
| —1.82                    | 15       | .14               | 1           | 6     | 15.05                 | 10.71 | —4.34                | 71       | 35.00                  | Torquay             |
| —1.15                    | 46       | .32               | 30          | 8     | 15.45                 | 16.04 | + .59                | 104      | 38.85                  | Polapit Tamar       |
| —1.80                    | 22       | .35               | 1           | 4     | 13.03                 | 9.93  | —3.10                | 76       | 30.75                  | Bath                |
| —1.54                    | 31       | .23               | 1           | 11    | 12.83                 | 10.75 | —2.08                | 84       | 29.85                  | Stroud              |
| — .60                    | 76       | .91               | 17          | 7     | 14.31                 | 15.00 | + .69                | 105      | 33.04                  | Wolstaston          |
| — .79                    | 67       | .59               | 17          | 9     | 12.56                 | 11.88 | — .68                | 95       | 29.21                  | Coventry            |
| — .39                    | 80       | .50               | 1           | 10    | 9.76                  | 10.39 | + .63                | 106      | 23.30                  | Boston              |
| — .64                    | 71       | .51               | 3           | 8     | 10.81                 | 10.77 | — .04                | 100      | 24.70                  | Hodsock Priory      |
| —1.17                    | 57       | .54               | 1           | 8     | 11.48                 | 11.54 | + .06                | 101      | 26.18                  | Derby               |
| — .38                    | 88       | .82               | 1           | 12    | 16.75                 | 20.53 | +3.78                | 123      | 42.43                  | Bolton              |
| —1.11                    | 53       | .45               | 1           | 7     | 11.63                 | 13.85 | +2.22                | 119      | 26.96                  | Ribston Hall        |
| —1.25                    | 66       | 1.28              | 13          | 12    | 26.47                 | 30.31 | +3.84                | 114      | 60.96                  | Arncliffe Vic.      |
| —1.21                    | 43       | .41               | 17          | 9     | 11.24                 | 10.30 | — .94                | 92       | 27.02                  | Hull                |
| —1.66                    | 18       | .17               | 13          | 12    | 11.35                 | 11.73 | + .38                | 103      | 27.99                  | Newcastle           |
| +1.04                    | 115      | 4.55              | 13          | 13    | 57.36                 | 58.29 | + .93                | 102      | 132.68                 | Seathwaite          |
| —2.17                    | 14       | .10               | 11, 15      | 4     | 17.19                 | 13.36 | —3.83                | 78       | 42.81                  | Cardiff             |
| —1.34                    | 49       | .48               | 1           | 10    | 19.67                 | 17.05 | —2.62                | 87       | 47.88                  | Haverfordwest       |
| — .99                    | 66       | .65               | 1           | 10    | 17.59                 | 20.11 | +2.52                | 114      | 45.41                  | Gogerddan           |
| + .39                    | 120      | .63               | 17          | 12    | 12.18                 | 15.41 | +3.23                | 127      | 30.98                  | Llandudno           |
| + .55                    | 120      | 1.21              | 13          | 10    | 18.75                 | 23.21 | +4.46                | 124      | 43.43                  | Cargen              |
| — .59                    | 73       | .79               | 13          | 11    | 14.66                 | 15.66 | +1.00                | 107      | 34.80                  | Branxholm           |
| ...                      | ...      | .40               | 13          | 12    | ...                   | 10.95 | ...                  | ...      | ...                    | Edinburgh           |
| + .30                    | 110      | .68               | 13          | 19    | 20.52                 | 23.25 | +2.73                | 113      | 48.87                  | Girvan              |
| — .18                    | 93       | .60               | 2, 11       | 14    | 14.94                 | ...   | ...                  | ...      | 35.80                  | Glasgow             |
| + .08                    | 102      | .66               | 13          | 14    | 24.65                 | 29.88 | +5.23                | 121      | 57.90                  | Tighnabruaich       |
| + .15                    | 104      | .69               | 10          | 17    | 23.84                 | 24.51 | + .67                | 103      | 57.53                  | Quinish             |
| —1.09                    | 49       | .23               | 19          | 11    | 12.09                 | 9.79  | —2.30                | 81       | 28.95                  | Dundee              |
| —1.44                    | 41       | ...               | ...         | ...   | 14.94                 | 17.11 | +2.17                | 115      | 36.07                  | Braemar             |
| — .45                    | 78       | .60               | 11          | 15    | 13.69                 | 12.15 | —1.54                | 89       | 33.01                  | Aberdeen            |
| —1.20                    | 46       | .35               | 14          | 7     | 11.92                 | 11.92 | .00                  | 100      | 29.37                  | Cawdor              |
| + .63                    | 128      | .75               | 13          | 15    | 19.30                 | 22.24 | +2.94                | 115      | 43.71                  | Fort Augustus       |
| +1.89                    | 139      | 1.04              | 9           | 20    | 36.04                 | 48.45 | +12.41               | 135      | 86.50                  | Bendampf            |
| +1.11                    | 105      | .60               | 13          | 17    | 13.45                 | 19.65 | +6.20                | 146      | 31.60                  | Dunrobin Castle     |
| ...                      | ...      | .40               | 12          | 20    | ...                   | 17.55 | ...                  | ...      | ...                    | Castletown          |
| —2.05                    | 38       | .48               | 16          | 12    | 25.99                 | 21.11 | —4.88                | 81       | 58.11                  | Killarney           |
| —1.46                    | 44       | .32               | 17          | 8     | 17.19                 | 14.18 | —3.01                | 82       | 39.30                  | Waterford           |
| — .33                    | 87       | .35               | 13          | 18    | 14.12                 | 15.79 | +1.67                | 112      | 33.47                  | Hurdlestown         |
| — .80                    | 67       | .44               | 17          | 15    | 15.20                 | 14.97 | — .23                | 98       | 35.19                  | Abbey Leix          |
| — .30                    | 85       | .35               | 16          | 12    | 11.88                 | 11.73 | — .15                | 99       | 27.75                  | Dublin              |
| — .93                    | 65       | .68               | 16          | 15    | 15.92                 | 16.80 | + .88                | 106      | 37.04                  | Ballinasloe         |
| ...                      | ...      | ...               | ...         | ...   | 34.29                 | ...   | ...                  | ...      | 80.23                  | Kylemore House      |
| +1.24                    | 142      | .90               | 10          | 17    | 21.74                 | 27.98 | +6.24                | 129      | 50.50                  | Enniscoe            |
| + .03                    | 101      | .63               | 1           | 16    | 17.51                 | 24.31 | +6.80                | 139      | 41.83                  | Markree Obsy.       |
| + .22                    | 108      | 1.21              | 2           | 12    | 16.92                 | 19.52 | +2.60                | 115      | 38.61                  | Seaforde            |
| — .04                    | 99       | .68               | 13          | 18    | 17.07                 | 19.98 | +2.91                | 117      | 41.20                  | Londonderry         |

## SUPPLEMENTARY RAINFALL, JUNE, 1908.

| Div.  | STATION.                     | Rain<br>inches | Div.   | STATION.                    | Rain.<br>inches |
|-------|------------------------------|----------------|--------|-----------------------------|-----------------|
| II.   | Warlingham, Redvers Road     | 1·85           | XI.    | Rhayader, Tyrmynydd .....   | 1·60            |
| „     | Ramsgate .....               | 1·67           | „      | Lake Vyrnwy .....           | 4·01            |
| „     | Steyping .....               | 1·17           | „      | Llangyhanfal, Plás Draw.... | 2·14            |
| „     | Hailsham .....               | 1·37           | „      | Criccieth, Talarvor.....    | 2·38            |
| „     | Totland Bay, Aston House.    | ·54            | „      | Llanberis, Pen-y-pass ..... | 5·50            |
| „     | Emsworth, Redlands.....      | 1·26           | „      | Lligwy .....                | 2·92            |
| „     | Stockbridge, Ashley .....    | ·60            | „      | Douglas, Woodville .....    | 2·29            |
| „     | Reading, Calcot Place.....   | ·95            | XII.   | Stoneykirk, Ardwell House   | 2·83            |
| III.  | Harrow Weald, Hill House.    | 1·77           | „      | Dalry, The Old Garroch ...  | 3·31            |
| „     | Oxford, Magdalen College..   | 1·51           | „      | Langholm, Drove Road.....   | 3·52            |
| „     | Pitsford, Sedgebrook .....   | 1·11           | „      | Moniaive, Maxwellton House  | 4·06            |
| „     | Huntingdon, Brampton.....    | ·91            | XIII.  | N. Esk Reservoir [Penicuik] | 1·75            |
| „     | Woburn, Milton Bryant.....   | 1·47           | XIV.   | Maybole, Knockdon Farm..    | 2·38            |
| „     | Wisbech, Bank House .....    | 1·08           | XV.    | Campbeltown, Witchburn...   | 2·82            |
| IV.   | Southend Water Works.....    | 1·21           | „      | Inveraray, Newtown .....    | 4·13            |
| „     | Colchester, Lexden.....      | ·60            | „      | Ballachulish House.....     | 5·59            |
| „     | Newport, The Vicarage.....   | 1·41           | „      | Islay, Eallabus .....       | 3·27            |
| „     | Rendlesham .....             | ·63            | XVI.   | Dollar Academy .....        | 1·76            |
| „     | Swaffham .....               | 1·14           | „      | Loch Leven Sluice .....     | 1·67            |
| „     | Blakeney .....               | 1·03           | „      | Balquhiddy, Stronvar .....  | 3·98            |
| V.    | Bishops Cannings .....       | 1·32           | „      | Perth, The Museum .....     | 1·68            |
| „     | Ashburton, Druid House ...   | ·89            | „      | Coupar Angus Station .....  | 1·74            |
| „     | Honiton, Combe Raleigh ...   | ·59            | „      | Blair Atholl.....           | 1·67            |
| „     | Okehampton, Oaklands.....    | 1·62           | „      | Montrose, Sunnyside Asylum  | 1·04            |
| „     | Hartland Abbey .....         | ·81            | XVII.  | Alford, Lynturk Manse ...   | 1·21            |
| „     | Lynmouth, Rock House ...     | ·81            | „      | Keith Station .....         | 1·61            |
| „     | Probus, Lamellyn .....       | 1·51           | XVIII. | N. Uist, Lochmaddy .....    | 2·94            |
| „     | North Cadbury Rectory ...    | ·29            | „      | Alvey Manse .....           | 1·94            |
| VI.   | Clifton, Pembroke Road ...   | ·71            | „      | Loch Ness, Drumnadrochit.   | 1·44            |
| „     | Ross, The Graig .....        | 1·15           | „      | Glencarron Lodge .....      | 6·03            |
| „     | Shifnal, Hatton Grange.....  | 2·60           | „      | Fearn, Lower Pitkerrie..... | ·71             |
| „     | Blockley, Upton Wold .....   | 1·82           | XIX.   | Invershin .....             | 1·54            |
| „     | Worcester, Boughton Park.    | 2·40           | „      | Altnaharra .....            | 2·37            |
| VII.  | Market Overton .....         | ·95            | „      | Bettyhill ..                | 1·88            |
| „     | Market Rasen .....           | 1·42           | XX.    | Dunmanway, The Rectory..    | 1·19            |
| „     | Bawtry, Hesley Hall.....     | 1·16           | „      | Cork .....                  | ·73             |
| „     | Buxton.....                  | 2·33           | „      | Darrynane Abbey .....       | 1·20            |
| VIII. | Neston, Hinderton Lodge...   | 1·99           | „      | Glenam [Clonmel] .....      | 1·58            |
| „     | Southport, Hesketh Park...   | 1·93           | „      | Ballingarry, Gurteen .....  | 1·20            |
| „     | Chatburn, Middlewood .....   | 2·52           | „      | Miltown Malbay.....         | 1·84            |
| „     | Cartmel, Flookburgh .....    | 2·65           | XXI.   | Gorey, Courtown House ...   | 2·13            |
| IX.   | Langsett Moor, Up. Midhope   | 2·71           | „      | Moynalty, Westland .....    | 1·70            |
| „     | Scarborough, Scalby .....    | 1·52           | „      | Athlone, Twyford .....      | 1·17            |
| „     | Ingleby Greenhow .....       | ·74            | „      | Mullingar, Belvedere.....   | ·97             |
| „     | Mickleton .....              | ·90            | XXII.  | Woodlawn .....              | 2·40            |
| X.    | Bardon Mill, Beltingham ...  | ·87            | „      | Westport, St. Helens .....  | 2·40            |
| „     | Ewesley, Fallowlees .....    | ·43            | „      | Mohill .....                | 1·95            |
| „     | Ilderton, Lilburn Cottage..  | ·35            | XXIII. | Enniskillen, Portora .....  | 2·27            |
| „     | Keswick, York Bank .....     | 2·95           | „      | Dartrey [Cootehill].....    | 2·39            |
| XI.   | Llanfrechfa Grange.....      | 1·15           | „      | Warrenpoint, Manor House    | 1·71            |
| „     | Treherbert, Tyn-y-waun ...   | 1·75           | „      | Banbridge, Milltown .....   | 2·04            |
| „     | Carmarthen, The Friary ..... | 1·66           | „      | Belfast, Springfield .....  | 3·89            |
| „     | Castle Malgwyn [Llechryd].   | 1·47           | „      | Bushmills, Dundarave .....  | 4·07            |
| „     | Plynlimon.....               | 5·30           | „      | Stewartstown.....           | 2·15            |
| „     | Crickhowell, Ffordlas.....   | 1·60           | „      | Killybegs .....             | 4·31            |
| „     | New Radnor, Ednol .....      | 1·97           | „      | Horn Head ...               | 2·79            |

## METEOROLOGICAL NOTES ON JUNE, 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.—Warm weather with many TSS characterised the first week and the remainder of the month was bright and sunny. Mean temp.  $61^{\circ}\cdot 8$  or  $1^{\circ}\cdot 4$  above the average. Duration of sunshine,  $240\cdot 0^*$  hours, and of R  $20\cdot 8$  hours. Shade max.  $86^{\circ}\cdot 0$  on 4th; min.  $41^{\circ}\cdot 1$  on 7th. F 0, f 0.

TENTERDEN.—Duration of sunshine,  $245\cdot 4\dagger$  hours. Shade max.  $85^{\circ}\cdot 0$  on 4th; min.  $40^{\circ}\cdot 0$  on 7th. F 0, f 0.

TOTLAND BAY.—The driest June during 22 years. Duration of sunshine,  $297\cdot 6^*$  hours. Shade max.  $82^{\circ}\cdot 3$  on 4th; this was the hottest day recorded since July, 1900; min.  $45^{\circ}\cdot 0$  on 26th. F 0, f 0.

PITSFORD.—Mean temp.  $58^{\circ}\cdot 5$ . Shade max.  $82^{\circ}\cdot 3$  on 3rd; min.  $34^{\circ}\cdot 2$  on 15th.

TORQUAY.—Duration of sunshine,  $280\cdot 2^*$  hours, or  $54\cdot 2$  above the average. Mean temp.  $59^{\circ}\cdot 3$  or  $0^{\circ}\cdot 7$  above the average. Shade max.  $77^{\circ}\cdot 9$  on 4th; min.  $43^{\circ}\cdot 9$  on 19th. F 0, f 0.

NORTH CADBURY.—Extremely dry, beginning and ending with hot days and warm nights, but with low max. temps. from 5th to 21st. Shade max.  $86^{\circ}\cdot 3$  on 3rd; min.  $37^{\circ}\cdot 0$  on 19th. F 0, f 0.

BATH.—Shade max.  $81^{\circ}\cdot 3$  on 3rd; min.  $37^{\circ}\cdot 5$  on 19th. F 0, f 0.

ROSS.—Shade max.  $83^{\circ}\cdot 3$  on 26th; min.  $37^{\circ}\cdot 5$  on 25th. F 0, f 0.

HODSOCK.—Shade max.  $80^{\circ}\cdot 4$  on 3rd; min.  $34^{\circ}\cdot 2$  on 21st. F 0, f 4.

BUXTON.—Mean temp.  $54^{\circ}\cdot 0$  or  $0^{\circ}\cdot 6$  below the average. Duration of sunshine,  $204\cdot 1^*$  hours. Shade max.  $76^{\circ}\cdot 7$  on 3rd; min.  $33^{\circ}\cdot 9$  on 21st. F 0, f 0.

BOLTON.—Mean temp.  $55^{\circ}\cdot 3$ , or  $0^{\circ}\cdot 2$  below the average. Duration of sunshine,  $158\cdot 3^*$  hours, or  $3\cdot 3$  hours above the average. Shade max.  $82^{\circ}\cdot 8$  on 3rd; min.  $41^{\circ}\cdot 1$  on 15th. F 0, f 0.

SOUTHPORT.—Mean temp.  $56^{\circ}\cdot 8$ , or  $0^{\circ}\cdot 1$  below the average. Duration of sunshine,  $215\cdot 7^*$  hours, or 9 hours above the average; duration of R,  $36\cdot 4$  hours. Shade max.  $77^{\circ}\cdot 1$  on 30th; min.  $40^{\circ}\cdot 2$  on 21st. F 0, f 0.

HULL.—Duration of sunshine  $165\cdot 3^*$  hours. Shade max.  $78^{\circ}\cdot 0$  on 4th; min.  $38^{\circ}\cdot 0$  on 7th. F 0, f 0.

HAVERFORDWEST.—Duration of sunshine  $273\cdot 2^*$  hours.

LLANDUDNO.—Shade max.  $80^{\circ}\cdot 0$  on 28th; min.  $45^{\circ}\cdot 4$  on 17th. F 0, f 0.

DOUGLAS.—Wretched weather with low temp. prevailed until 24th but the last six days were brilliantly fine and warm.

DUMFRIES.—The first half was cold and unsettled but from 19th to 30th warm and dry. The remarkable light on the night of 30th made it possible to read a watch face in the open between midnight and 1 a.m. Shade max.  $84^{\circ}\cdot 0$  on 28th; min.  $40^{\circ}\cdot 0$  on 12th, 17th and 21st.

MAXWELTON.—A TS occurred on 2nd of a severity not equalled for years. Shade max.  $86^{\circ}\cdot 0$  on 28th; min.  $34^{\circ}\cdot 0$  on 12th.

EDINBURGH.—Shade max.  $76^{\circ}\cdot 1$  on 27th; min.  $42^{\circ}\cdot 7$  on 5th. F 0, f 0.

DUNDEE.—Shade max.  $81^{\circ}\cdot 9$  on 25th; min.  $40^{\circ}\cdot 9$  on 20th.

FORT AUGUSTUS.—Shade max.  $78^{\circ}\cdot 9$  on 27th; min.  $40^{\circ}\cdot 0$  on 14th, 20th, and 24th.

WATERFORD.—The driest June for 19 years. Shade max.  $76^{\circ}\cdot 5$  on 27th; min.  $38^{\circ}\cdot 0$  on 16th.

DUBLIN.—Mean temp.  $57^{\circ}\cdot 0$  or  $0^{\circ}\cdot 9$  below the average. A splendid solar halo with prismatic colours was seen at noon on 8th. Shade max.  $71^{\circ}\cdot 3$  on 29th; min.  $44^{\circ}\cdot 6$  on 7th. F 0, f 0.

WARRENPOINT.—A most favourable month for farmers, the crops looking and promising well. Shade max.  $71^{\circ}\cdot 0$  on 25th, 26th and 29th; min.  $40^{\circ}\cdot 0$  on 11th. F 0, f 0.

MARKREE.—Shade max.  $78^{\circ}\cdot 3$  on 29th; min.  $38^{\circ}\cdot 0$  on 25th. F 0, f 2.

\* Campbell-Stokes.

† Jordan.

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

| STATIONS.<br><br>(Those in italics are<br>South of the Equator.) | Absolute. |       |          |       | Average. |      |               |                     | Absolute.       |                   | Total Rain |       | Aver. |
|------------------------------------------------------------------|-----------|-------|----------|-------|----------|------|---------------|---------------------|-----------------|-------------------|------------|-------|-------|
|                                                                  | Maximum.  |       | Minimum. |       | Max.     | Min. | Dew<br>Point. | Humidity.           | Max. in<br>Sun. | Min. on<br>Grass. | Depth.     | Days. |       |
|                                                                  | Temp.     | Date. | Temp.    | Date. |          |      |               |                     |                 |                   |            |       |       |
|                                                                  | 55°8      | 27    | 17°1     | 12    | 41°9     | 31°3 | 35°7          | 92 <sup>0.100</sup> | 70°7            | 17°0              | inches     |       |       |
| London, Camden Square                                            | 55°8      | 27    | 17°1     | 12    | 41°9     | 31°3 | 35°7          | 92                  | 70°7            | 17°0              | 1·93       | 10    | 7·3   |
| Malta ... ..                                                     | 67·5      | 1     | 48·0     | 26    | 59·8     | 51·7 | 46·9          | 78                  | 131·9           | ...               | ·70        | 6     | 5·7   |
| Lagos ... ..                                                     | 91·0      | 25    | 69·0     | 29    | 87·4     | 76·4 | 74·1          | 75                  | 145·0           | 66·0              | ·05        | 2     | 7·9   |
| Cape Town ... ..                                                 | 93·3      | 7     | 48·3     | 1     | 77·0     | 58·3 | 56·0          | 66                  | ...             | ...               | ·98        | 7     | 3·7   |
| Durban, Natal ... ..                                             | 96·5      | 14    | 58·5     | 2     | 83·0     | 66·9 | ...           | ...                 | 150·9           | ...               | 1·94       | 17    | 4·5   |
| Johannesburg ... ..                                              | 86·1      | 20    | 43·8     | 2     | 77·0     | 55·0 | 54·2          | 70                  | 155·0           | 41·6              | 2·08       | 15    | 5·0   |
| Mauritius ... ..                                                 | 88·1      | 22    | 68·1     | 17    | 84·5     | 73·8 | 72·5          | 82                  | 153·4           | 63·6              | 10·32      | 22    | 7·1   |
| Calcutta... ..                                                   | 83·4      | 26    | 47·4     | 9     | 76·4     | 53·5 | 53·8          | 69                  | 138·6           | 41·1              | ·86        | 4     | 2·0   |
| Bombay... ..                                                     | 87·4      | 7     | 62·3     | 13    | 83·4     | 68·7 | 63·9          | 68                  | 134·3           | 52·9              | ·10        | 3     | 1·2   |
| Madras ... ..                                                    | 87·9      | 29    | 60·8     | 20    | 84·4     | 68·3 | 68·2          | 79                  | 137·9           | 57·1              | ·02        | 1     | 2·9   |
| Kodaikanal ... ..                                                | 73·2      | 25    | 42·4     | 21    | 63·9     | 47·6 | 43·8          | 67                  | 124·0           | 19·2              | 1·12       | 10    | 4·1   |
| Colombo, Ceylon ... ..                                           | 90·1      | 18    | 65·8     | 20    | 87·8     | 72·5 | 70·9          | 75                  | 156·7           | 61·0              | 4·20       | 11    | 3·7   |
| Hongkong ... ..                                                  | 75·2      | 20    | 48·9     | 8     | 66·8     | 58·1 | 55·6          | 78                  | 124·0           | ...               | 2·64       | 7     | 7·6   |
| Melbourne ... ..                                                 | ...       | ...   | ...      | ...   | ...      | ...  | ...           | ...                 | ...             | ...               | ...        | ...   | ...   |
| Adelaide ... ..                                                  | 111·5     | 15    | 56·3     | 24    | 94·7     | 67·9 | 53·7          | 38                  | 156·9           | 48·2              | ·33        | 1     | 2·6   |
| Coolgardie ... ..                                                | 112·0     | 4     | 49·6     | 20    | 92·4     | 61·5 | 49·9          | 39                  | 180·0           | 48·0              | ·05        | 2     | 1·5   |
| Perth ... ..                                                     | 100·0     | 23    | 52·9     | 8     | 81·8     | 60·7 | 54·0          | 54                  | 166·0           | 50·3              | ·14        | 4     | 4·2   |
| Sydney ... ..                                                    | 93·9      | 28    | 60·2     | 2     | 81·4     | 66·3 | 62·0          | 62                  | 129·4           | 52·0              | 1·80       | 12    | 4·7   |
| Wellington ... ..                                                | 75·0      | a 3   | 45·0     | 18    | 68·6     | 55·7 | 54·0          | 75                  | 127·0           | 31·0              | ·64        | 5     | 5·8   |
| Auckland ... ..                                                  | 81·5      | 16    | 50·0     | 18    | 74·7     | 60·1 | 49·7          | 52                  | 147·0           | 44·0              | ·45        | 3     | 3·8   |
| Jamaica, Kingston ... ..                                         | 90·4      | 3     | 65·2     | 31    | 86·2     | 68·1 | 66·0          | 73                  | ...             | ...               | ·92        | 8     | 4·8   |
| Trinidad ... ..                                                  | ...       | ...   | ...      | ...   | ...      | ...  | ...           | ...                 | ...             | ...               | ...        | ...   | ...   |
| Grenada ... ..                                                   | 83·8      | 22    | 70·0     | 12    | 81·7     | 72·5 | 68·7          | 74                  | 145·2           | ...               | 2·72       | 18    | 3·7   |
| Toronto ... ..                                                   | 41·5      | 21    | -13·8    | 30    | 31·9     | 16·9 | ...           | 91                  | ...             | ...               | 2·51       | 14    | 7·9   |
| Fredericton ... ..                                               | 49·0      | 8     | -12·0    | 31    | 28·2     | 5·4  | ...           | 82                  | ...             | ...               | 5·01       | 13    | 5·6   |
| St. John's, N.B. ... ..                                          | 49·8      | 8     | -9·4     | 31    | 33·3     | 13·9 | ...           | ...                 | ...             | ...               | 4·76       | 14    | 5·6   |
| Victoria, B.C. ... ..                                            | 49·3      | 5     | 26·2     | 30    | 44·7     | 38·4 | ...           | 85                  | ...             | ...               | 3·22       | 19    | 8·0   |

a and 14, 15, 21.

MALTA.—Mean temp. of air 54°·8. Average hours of bright sunshine 5·7.

Johannesburg.—Bright sunshine 272·4 hours.

Mauritius.—Mean temp. of air 0°·3 below, of dew point 2°·3, relative humidity 6·7 per cent., and R 2·98 in. above, averages. Mean hourly velocity of wind 9·5 miles, or 1·6 below average.

KODAIKANAL.—Bright sunshine 235 hours. Hoar frost on 11 days.

COLOMBO.—Mean temp. of air 79°·5, or 0°·4 above, of dew point 0°·8 above, and R ·63 in. above, averages. Mean hourly velocity of wind 7·1 miles. TSS on 2 days.

HONGKONG.—Mean temp. of air 62°·0, or 1°·9 above, and R 1·18 in. above, averages. Bright sunshine 143·2 hours. Mean hourly velocity of wind 11·3 miles.

Adelaide.—The hottest January on record. Mean max. temp. 8°·2 above, and mean min. temp. 6°·3 above, averages. There were 12 days over 105°, and 14 days over 100°, and the temp. did not fall below 70° on 12 nights.

Sydney.—Mean temp. of air 2°·0 above, and R 1·65 in. below, averages.

Wellington.—Mean temp. of air 0°·6 below, and R 2·82 in. below, averages.



# RAINFALL OF THAMES VALLEY JULY. 1908.

