Symons's
Meteorological Magazine.

No. 591. APRIL, 1915. Vol. L.

THE HOME OF THE BLIZZARD.*

A Review.

If a book with this title had been published a few years ago we should have expected a treatise on the variety of weather of some spot in the centre of North America, between Dakota and Alberta, and our readers may recall the article of an American writer in these pages, Vol. **46** (1911), p. 26, who desired to place upon the town formerly called Medicine Hat the unattractive designation "where the blizzards come from." Antarctic exploration has shown that, although the name of blizzard is of American origin, the full intensity of the phenomenon is only reached on the margin of the Antarctic continent and to measure that intensity we have to consider wind velocities unheard of, save, perhaps in a tropical hurricane, but as yet measured only in the far south. When Admiral Beaufort defined hurricane force the 12th and last degree of wind velocity on his scale as "that which no canvas can withstand" he little thought that the art of exploration should advance so far as to erect tents of far lighter canvas than the top sails of his frigate which should withstand for months winds far transcending his hurricane in force.

In calling the narrative of the Australasian Antarctic Expedition the "Home of the Blizzard," Sir Douglas Mawson seized upon the one element of his environment which could never be ignored. We propose, in this notice, to touch only on some points of Antarctic weather as set forth in these two fascinating and splendidly illustrated volumes. We say nothing of the book itself, except that it has been prepared for press by Dr. A. L. McLean, one of the party whose mind received the characteristic impression of Antarctica like a gramophone record; and we say nothing of

* *The Home of the Blizzard*, being the story of the Australasian Antarctic Expedition, 1911–1914, by Sir Douglas Mawson, D.Sc.B.E. Illustrated in colour and black and white, also with maps. London, William Heinemann, 1915. Size, 10×7. Pp., Vol. 1, xxx.+350, Vol. 2, xiv.+338. Price, 36s. net.

the splendid seamanship of Captain Davis, in landing the two parties which constituted the Expedition at points 1500 miles apart, or of the great land journeys with all their heroisms, their disasters and their triumphs, for all these have been fully dealt with by the newspaper press and literary journals.

The Meteorological work of the Expedition extended over two years and resulted in simultaneous sets of observations of great value. They consisted of (1) Two years' observations at Macquarie Island, practically half-way between Australia and Antarctica, by Mr. G. F. Ainsworth; (2) Two years' observations at Commonwealth Bay in Adelie Land, Sir Douglas Mawson's main base, just within the Antarctic Circle, by Mr. C. T. Madigan; (3) One year's observations in Queen Mary Land, 1500 miles west of Commonwealth Bay and nearly in the same latitude, the base of Mr. F. Wild's party, by Mr. M. H. Moyes; (4) Observations on board the *Aurora* on each of her five voyages in Antarctic and sub-Antarctic waters: (5) Less complete observations taken during the many sledge journeys from both Antarctic bases. The full discussion of all the data is, we understand, being carried out under the superintendence of Mr. Hunt, of the Commonwealth Weather Bureau, and the volumes under review do not contain any forecast of the results. They abound, however, in descriptions of weather conditions of a very interesting character. The most striking and novel feature in the whole expedition was the bold attempt to maintain communication by wireless telegraphy. The intermediate wireless station on Macquarie Island proved a complete success and daily weather reports were transmitted to Melbourne and Wellington for a considerable part of the time. The installation of the wireless masts at the main base in Adelie Land was a proceeding of extraordinary difficulty, and after it was accomplished communication was found to be impossible during the summer daylight and very difficult even in the winter night, but messages were frequently exchanged with Macquarie Island, though so far as we can ascertain, the Adelie Land observations could not reach Australia in time to be utilised for the daily weather forecast.

The measurements of wind force appear to have been made with Robinson Anemometers only, and the skill of the mechanicians had frequently to be exercised in making repairs and modifications to enable the instruments to withstand the terrible conditions in which they had to work. No doubt Mr. Hunt will discuss the question of the appropriate factor to reduce the index readings in these special circumstances to true wind velocities. It is to be regretted that no pressure tube Anemometer was available.

The nature of the prevalent weather may best be judged by a few extracts from the description of the first winter in Adelie Land, when day after day the force of the wind ranged between that of

a gale and that of a hurricane under overcast skies and in the continual presence of drifting snow. "On March 19th the first well-marked lull intervened at the height of a gale. On that day the wind which had been blowing with great force during the morning commenced to subside rapidly just after noon. Towards evening the air about the hut was quite still, except for gusts from the north and rather frequent "whirlies." This was the name adopted for whirlwinds of a few yards to a hundred yards or more in diameter, which came to be regarded as peculiar to the country. . . . . The whirlies tracked about in a most irregular manner and woe betide any light object which came in their path. The velocity of the wind in the rotating column being very great, a corresponding lifting power was imparted to it. As an illustration of this force, it may be mentioned that the lid of the air-tractor case had been left lying on the snow near the hut. It weighed more than three hundredweights, yet it was whisked into the air one morning and dropped fifty yards away. An hour afterwards it was picked up again and returned near its original position, this time striking the rocks with such force that part of it was shivered to pieces . . . . . Again the radius of activity of these whirlies was strictly limited; objects directly in their path only being disturbed. For instance, Laseron one day was skinning at one end of a seal and remained in perfect quiet, while McLean, at the other extremity, was on the edge of a furious vortex. Travelling over the sea the whirlies displayed fresh capabilities. Columns of brash-ice, frozen spray and water-vapour were frequently seen lifted to heights of from two hundred to four hundred feet, simulating water spouts."

In the steady blizzard which more frequently prevailed the practical problem of locomotion naturally acquired an absorbing interest for the explorers. "The first difficulty to be encountered was a smooth, slippery surface, offering no grip for the feet. Stepping out of the shelter of the hut, one was apt to be immediately hurled at full length down wind. No amount of exertion was of any avail unless a firm foothold had been secured. The strongest man, stepping on to ice or hard snow in plain leather or fur boots, would start gliding away with gradually increasing velocity; in the space of a few seconds, or earlier, exchanging the vertical for the horizontal position. He would then either stop suddenly against a jutting point of ice, or glide along for twenty or thirty yards till he reached a patch of rocks or some rough sastrugi. Of course we soon learned never to go without crampons on the feet. . . . . Shod with good spikes, in a steady wind, one had only to push hard to keep a sure footing. It would not be true to say "to keep erect," for equilibrium was maintained by leaning against the wind. In course of time, those whose duties habitually took them out of doors became thorough masters of

the art of walking in hurricanes—an accomplishment comparable to skating or ski-ing. Ensconsed in the lee of a substantial break-wind, one could leisurely observe the unnatural appearance of others walking about, apparently in imminent peril of falling on their faces. Experiments were tried in the steady winds; firmly planting the feet on the ground, keeping the body rigid and leaning over on the invisible support. This "lying on the wind" at equilibrium, was a unique experience. As a rule the velocity remained uniform; when it fluctuated in a series of gusts, all our experience was likely to fail, for no sooner had the correct angle for the maximum velocity been assumed than a lull intervened —with the obvious result."

An Anemograph reproduced on page 117, Vol. I., shows the record for twenty-four hours during which an average velocity of 90·1 miles per hour was maintained, while for individual hours, there was an average velocity of 97 miles. Velocities far exceeding 100 miles an hour were frequently experienced (and gusts approaching 200 were recorded on one occasion, in combination with air temperature as low as —28° F.

What such a storm was like may be gathered from the following:

"Picture drift so dense that daylight comes through dully, though, maybe, the sun shines in a cloudless sky; the drift is hurled, screaming through space at a hundred miles an hour, and the temperature is below zero, Fahrenheit. . . . . Shroud the infuriated elements in the darkness of a polar night, and the blizzard is presented in a severer aspect. A plunge into the writhing storm-whirl stamps upon the senses an indelible and awful impression seldom equalled in the whole gamut of natural experience. The world a void, grisly, fierce and appalling. We stumble and struggle through the Stygian gloom; the merciless blast—an incubus of vengeance—stabs, buffets, and freezes; the stinging drift blinds and chokes. In a ruthless grip we realize that we are

poor windlestraws
On the great sullen, roaring pool of Time."

Similar instances of the intensity of the winds on the north coast of Antarctica have been recorded by other expeditions. We may recall in particular the observations of Mr. Priestley at Cape Adare, during the wintering of the Northern Party of Scott's last Expedition, when a small pebble caught up from the beach was blown against the solar radiation thermometer with such velocity that it cut through the vacuum bulb a clean round hole such as might be made by a rifle bullet without starring the glass. The local restriction of these furious winds is very remarkable. It has frequently been noticed that when a very violent blizzard is blowing off shore there may be little or no wind a few miles out at sea, and

observations seem to suggest that these violent and continuous torrents of air are often thin sheets moving at a certain altitude, and probably in a plane inclined to the horizon, so that the calm to which we have referred may concern only the surface air while the blizzard is still raging a few thousand feet above. The tremendous intensity of wind experienced at Adelie Land and at Cape Adare does not seem to have been met with at inland positions, or in McMurdo Sound, where sea ice extended for a long distance from the shore in winter. The intensity of the wind would thus seem to be associated with the abrupt contact of the intensely cold land ice and the comparatively warm water of the ocean kept free from ice by the off shore direction of the wind, thus the surface temperature of hundreds of square miles of sea could not be much lower than 28° F., while the surface of the land ice and the air over it was probably less than —30° F., so that a difference of about 60° in temperature is maintained between two adjacent areas, and this difference must give rise to very powerful circulatory movements. It is worth noting, however, that the average force of the wind in the Antarctic regions varies greatly from year to year, and in 1912-13 the observations of Scott's last Expedition at McMurdo Sound (simultaneous with those of Sir Douglas Mawson's Expedition in Adelie Land), showed wind forces very much greater than those recorded in the same place during the expeditions of the *Discovery* and the *Nimrod.*

Correspondence.

To the Editor of Symons's Meteorological Magazine.

THE WET WINTER.

As it is notorious that the first Canadian contingent struck a peculiarly bad patch of weather this winter on Salisbury Plain, and found that usually rather dry region a swamp of wet and mud. A few statistics may be of interest.

The rain for the last five months, which may be said to have begun on the 4th October, is as follows :—

Month.	Rain.	Computed Av.	Record	Year
Oct	3·22	3·50	9.38	1903.
Nov.	5·64	3·00	7·33	1894.
Dec.	6·96	3·00	8·77	1911.
Jan.	4·73	3·00	6·01*	1906.
Feb.	5·78	2·25	5·78	1915.

* Probably somewhat exceeded in 1877 perhaps 6 35.

It will be seen that only one of the five months exceeded all previous records, viz., February; but the cause of the Canadian discomfort is not far to seek, when we find that whether we take the whole five months, the last four, the last three, the last two, or the last one, in each case all records are exceeded for the respective periods.

Early in January the chalk springs rose higher than they have done since April, 1774, and even for that date I have only a record from one particular spot, where the effect may possibly have been local. Moreover, I have no record of the water running from Candown beyond Tilshead twice in one winter season, as it did this year in January and again in the fourth week of February.

F. J. WARDALE.

Shrewton, Wilts., 7th March, 1915.

MUSICAL SNOWFLAKES.

I READ with great interest the importance which is attached to the want of information as to the depth of snow in this country.

I wonder if any of your readers have ever observed during a snow storm, when the air is absolutely calm, that the large flakes in certain conditions, when falling, cause a musical sound. I am doubtful if it is imagination or a fact that the dry flakes falling cause this. Perhaps some of those interested in the larger question of snow would give their experiences.

H. H. GIBSON.

Fernhill, Belfast, February 24th, 1915.

THE LIMITS OF THE SEASONS.

I HAVE read in the last month or two in your magazine proposals in regard to the Seasons, suggesting changes of the months which are to be considered as Spring, Summer, Autumn, and Winter. The point is whether we are to consider the matter from an astronomical or a meteorological position. That at the Winter solstice we have the shortest day and the greatest gloom is true, and the strongest twilight at the Summer solstice is also true, but this is not meteorology, in which the temperature of individual months should not be considered, but rather the general conditions. On the average of years at Greenwich the greatest heat comes in the middle of July, that of August is nearly equal, and in June it is less than both. Also in Winter the lowest temperature comes in the first week of January, remaining with small variation to the commencement of February before definite rise begins. Meteorology has great variations in different years, but take any twenty years

there is no doubt that the highest and lowest temperatures of the year occur as above stated. In the case of snow the preponderance is undoubtedly in the first three months of the year, as compared with the last three months of the year, being rare in November, and still more so in October. Again March is not the middle of Spring, and September is not the middle of Autumn. So taking March, April, May, as representing Spring, June, July, August, as representing Summer, September, October, November as representing Autumn, and December, January, February, as representing Winter, we seem to have a natural division of the months, in which the Summer and Winter maximum and minimum of temperature of the year distinctly follow the solstice by nearly a month. As regards Spring and Autumn the Equinox cannot be said to be respectively the middle of either, which falls later in both cases. Equal division of the months seems best to represent the Seasons of the English climate. In other countries in parts of the Continent, or in Canada, the Spring is short. That is to say equal division into Seasons does not apply. One rather unexpected result in regard to the month of May was that I also found the average proportion of sunshine in that month, during my time at Greenwich, to be greater than that of either June or July, but I do not know whether this was maintained in following years.

WILLIAM ELLIS.

March 27th, 1915.

FORECASTING WEATHER BY MEANS OF CORRELATION.

Is not Mr. Dines a little unfair to correlation in his letter on page 30 of your March Magazine. By a "pure guess" at to-morrow's temperature, I take him to mean a "statement" of the normal temperature at that time of year. The actual temperature will differ from the normal temperature by about 6° F. in one case out of three. (The 6° F. is probably too low a value for day temperature at an inland station for the winter at any rate; it is also different for temperatures above the normal from what it is for temperatures below the normal); but accepting the figure, the normal day temperature at Kew Observatory, on April 15th, is about 55° F., and if I "guess" 55° I shall be no more than 6° F. wrong once out of every three "guesses." If, however, I know that on April 14th the temperature is 65° F., and using Mr. Dines' factor of ·80 I guess t = 63° F. for the temperature on April 15th, then I take Mr. Dines to mean that in one such case out of three, the actual temperature t would differ from 63° F. by more than 3°·6 F. But that does not make my forecast better than the "pure guess" only in the ratio 6 to 3·6, or 10 to 6. I have implicitly forecasted

a relatively warm day, and the day will nearly always be relatively warm.

The value of a forecast of temperature does not depend only on the difference of the actual from the forecasted temperature. The following example, purely hypothetical, illustrates this :

In March the normal night temperature is never below freezing point in London ; it costs me £x every night to take precautions to save me from £y damage by frost. If I act on the "pure guess," either I never take precautions or what is more probable, I remember the deviations and always take precautions and spend £ax to save £ay. Thus my gross profits are £$a(y—x)$.

But if I have a correlation co-efficient which tells me that a night will probably have a temperature below the normal, I take precantions and I do this, say, on n nights. On m other nights I do not take precautions and save £mx ; but naturally on some of these occasions, say p, I lose £py. If I can make $mx > py$, I shall benefit by the correlation and that is clearly possible.

If, for example, we take 5° F. and 4° F. as the figures for the pure guess and the correlated forecasts corresponding with Mr. Dines' 6° F. and 3°·6 F. ; then, whenever the forecast says "temperature 36° or below," I shall take precautions and in only a few cases will my precautions have been unnecessary. If the forecast says above 36°, I shall not take precautions, and in less than $\frac{1}{6}$ of these cases would precautions have been required. We may take on the average half the forecasts above and half below 36°, say 15 of each. Thus I shall save at least £15x, and at the worst lose £3y, and my gross profits are increased by 15x—3y. Previous to using correlation I could just pay the expenses of my establishment ; now I am happily in possession of a comfortable income of which the ratio 5/4 can convey no adequate impression.

E. GOLD.

7th April, 1915.

THE SEASONS—RECURRING COLD PERIODS.

THE correspondence on this subject will lead most of us to interesting reflections and many differences of opinion will be expressed.

It seems to me, briefly, that the division authorised by the International Meteorological Committee is the best that can be generally adopted. There are objections, no doubt, but it has significant conveniences and falls into natural accordance with the temperature of ordinary seasons. The alternative suggestions that have been made appear open to more serious opposition, though they each have something to recommend them. Try how we may, we cannot bring the weather into harmony with any arbitrary apportionment of the calendar. Occasionally there must occur

glaring inconsistencies. The obvious thing to do is to adopt that arrangement which most nearly and easily responds to the requirements, and this I believe is found in the even tri-monthly periods favoured by the Meteorological Committee.

In Luke Howard's "Climate of London," first Edition, 1818, he gives seasons as follows, and their temperatures :—

Winter	begins	December	7th,	lasts	89	days, temp.	37°·76
Spring	„	March	6th,	„	93	„ „	48°·94
Summer	„	June	7th,	„	93	„ „	60°·66
Autumn	„	September	8th,	„	90	„ „	49°·37

On looking through the average daily temperatures for Greenwich, 1841-1905, given in Whitaker's Almanack for 1915, I was struck with their irregular variations. From such a long series—65 years—one would have inferred a pretty even curve in the rising and falling of the thermometer readings, from winter to summer, and summer to winter respectively, but there are remarkable oscillations.

I find there are well defined cold periods.

February 7th—12th.	June 6th—11th.
March 6th—12th.	October 7th—13th.
„ 18th—21st.	November 6th—12th.
April 7th—11th.	December 16th—23rd.

Declines of temperature apparently occur in a striking manne in the second week of six of the months, and with a mean date on about the 9th or 10th day. This fact appears to me to possess a special significance, and can hardly be regarded as a chance result.

The temperatures apparently, give no countenance to the idea of "St. Martin's Little Summer," on or about November 11th, for the increase of cold appears very decided and to be unchecked during the first half of November.

In *Astronomische Nachrichten*, for 1839, No. 385, Prof. Erman stated that the cold days of the 11th to 13th of May, and the 5th and 7th of February, were owing to the passage of falling stars between us and the sun.

I cannot find that the May cold has been corroborated since Erman's investigation, though the February period has recurred at a slightly later date. Is there a meteoric swarm with a periodic time of about 30½ days, and sufficiently distended to occupy about six days in passing the sun, revolving around that luminary at little inclination, but with the necessary density to moderate the solar rays in an appreciable degree? Possibly the corona might have afforded evidence during past total eclipses of the sun. This is a mere suggestion on imperfect data, but the matter may be worth further enquiry.

W. F. DENNING.

Bristol, February 16th, 1915.

RAPID RISE IN A CHALK WELL.

As, judging by the correspondence I have received, my observations on the Well at Chelsham have aroused considerable interest. I think you may like to publish their continuation to March 9th.

Date.	JANUARY. Depth to Water from Surface.	Daily Rain-fall.	FEBRUARY. Depth to Water from Surface.	Daily Rain-fall.	MARCH. Depth to Water from Surface.	Daily Rain-fall.
	ft.	in.	ft.	in.	ft.	in.
1 ...	109	·64	85	·19	56½	·04
2 ...	105	·14	85	·21	57	·35
3 ...	..	·32	85	...	58	·06
4 ...	98	·18	85½	...	58½	...
5 ...	96	·02	85½	·48	59	...
6 ...	94	·50	86	·08	60	...
7 ...	92	·61	...	·54	...	...
8 ...	90	·08	86½	·85	61	...
9 ...	87	·01	86	·09	63	...
10 ...	...	·35	83	...		
11 ...	80	·01	79	...		
12 ...	78	·08	77	·08		
13 ...	77	...	75	·90		
14 ...	77	·02	...	·07		
15 ...	77	·19	72	...		
16 ...	77	...	71	·58		
17 ...	...	·01	69	·55		
18 ...	77	...	67	·13		
19 ...	79	...	64	·20		
20 ...	79	·32	61	...		
21 ...	81	·15	...	·07		
22 ...	81	1·00*	57	·06		
23 ...	81	...	56½	·24		
24 ...	...	...	56	...		
25 ...	81	...	55½	...		
26 ...	83	...	55½	·09		
27 ...	83½	...	56	·07		
28 ...	84	...	...	·06		
29 ...	84½	...				
30 ...	85	·05				
31 ...	...	·02				
		4·70		5·54		

* Snow.

The Bourne broke out at the Rose and Crown in the Kenley Valley on February 2nd, and is now flowing strongly as high up the valley as the Lodge to Marden Park, just to the east of the viaduct on the Oxted and East Grinstead Railway, about 1½ miles below the Well at which the foregoing observations were taken. The underground water gradient between these two points is about 39 feet per mile. The average gradient between the Well and the Springs at Croydon is now about 34 feet per mile, compared with about 16 feet per mile in November last, when the water in the Well reached its lowest level.

W. VAUX GRAHAM.

5, Queen Anne's Gate, Westminster, S.W., March 10th, 1915.

CORSICA IN MAY.

By Rev. R. P. Dansey.

In May last Mr. V. H. Gatty made an expedition to Corsica and kindly asked me to accompany him. Some notes on the meteorological features of that island may not be without interest to your readers.

Most of our stay was spent at the Col Vizzavona (3,800 ft.), situated in the midst of a beech forest which was already green when we arrived on the 3rd, though some of the trees were not in their full foliage; this beech forest goes up to a height of about 5,000 ft., but had not come out much above 4,200 ft.

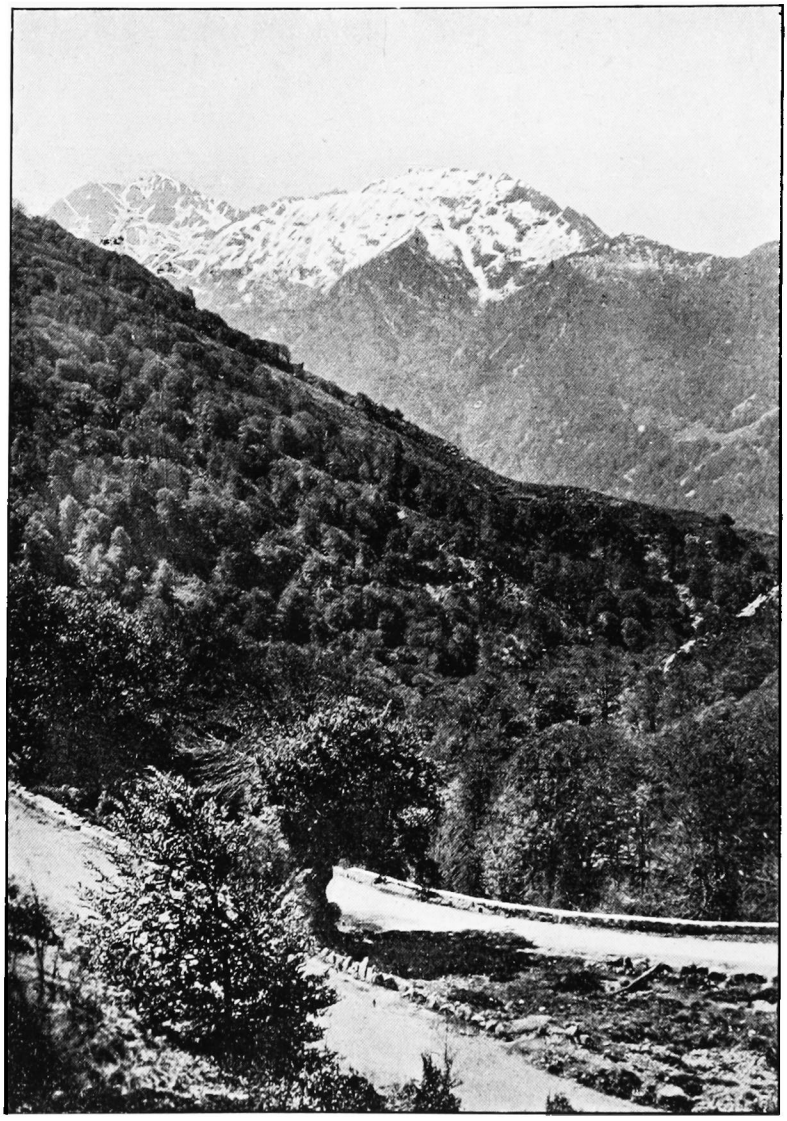
The Col Vizzavona is almost in the centre of the island and is on the main range of mountains and perhaps as wet as any place in Corsica. At any rate rain fell more or less continuously for 60 hours, from the 8th to 10th, with a max. temp. of only 40°·5 on the latter day. After the first day's rain we conceived the idea of trying to measure it in a tin requisitioned from the kitchen. During the second twenty-four hours we collected $1\frac{3}{4}$ ins. The rain for that period had slackened appreciably and we calculated that 4 to 5 ins. must have fallen in the 60 hours. The fall was snow above 4,500 ft. or so, and lay above 5,400 ft. The temperature at Vizzavona was seldom above 56°. There had been 5 ft. of snow here for two months in the winter, and certainly as regards this winter (1913-1914), more snow seems to have fallen in Corsica than at the same height in England, although it is 800 miles further south. Certainly if our own Snowdon had been 200 ft. higher, to equal the Col Vizzavona, it would not have carried so much snow as did the latter place.

A peculiar feature at Vizzavona was that the finer and more sunny the day, the more certain were the mountain peaks to condense cloud between 9 and 10 a.m. each day, and to keep enveloped all day till sunset, when it would become absolutely clear again. This went on as regularly as clock-work, with light airs from W. or S.W. On May 19th we reached the top of Monte D'Oro (7,842 ft.) at 10 a.m. on a morning which had been cloudless, but the usual cloud formation enveloped the mountain just before we attained the summit, and though we waited for a view till 2.40 p.m., it was all in vain. There was no wind, temperature 40°-42°, and light showers of graupel and snow. At sunset the whole sky cleared, as usual.

The snow level on the north slopes was about 6,000 ft., though it descended in places to as low as 5,200 ft., and though no mountains reach the snow-line, the highest, Cinto, being just under 9,000 ft., there must be several peaks with permanent snow-beds, some of them in all probability more approximating to a small glacier than a snow-bed.

Eagles are numerous round Vizzavona; on one occasion while

resting alone on the top of one of the lower heights one of these birds came swooping down apparently straight for me. When he had got within about 100 ft. or so I thought it was about time to



PUNTA VETTA FROM ABOVE COL VIZZAVONA.

move, so stood up and whirled my ice-axe whereupon he made off. The month before our arrival two young eagles had actually found their way into the hotel, but had effected their escape.

On May 21st we left Vizzavona, and this day the wind got into the north-east, and it became much hotter and drier, while the peaks remained clear all day and never condensed any vapour round their summits, though the atmosphere was hazy, as it is in England in hot summer weather with easterly breezes.

The highest temperature noted was over 80° at Corte (inland) on the 21st; the same evening it was 70° in the rock-bound Golo Gorge an hour after sunset, when quite dark. Lowest 32° on Monte Incudine (7,200 ft.) at 6 a.m. on 16th.

The temperature of the sea was 70° off the west coast (in the Gulf of Sagone) on the 24th. I shall never forget this, as being the most delightful—as well as most-needed—bathe I have ever had.

It is so hot and unhealthy on the east coast in the height of the summer that one town—Aleria—has to be completely evacuated for three months. The forests are magnificent; above the beeches come the pines and some of these giants run up to 80 or 100 feet without any appreciable diminution in girth, while some of the mountain peaks are exceptionally grand and rugged.

No snow ever lies at Ajaccio (sea-level), but it does so most winters at 2,000 ft, for a day or two at a time.

For those who desire further information about this beautiful island—which possesses good roads over mountain passes and very little traffic—a paper by Mr. V. H. Gatty has just appeared in the February number of the Alpine Journal. June is probably the best month to visit the country, anyway for mountain excursions.

ROYAL METEOROLOGICAL SOCIETY.

A MEETING of the Society was held on March 17th, at the Surveyors' Institution, Westminster; Captain H. G. Lyons, F.R.S., President, in the chair.

Following the custom of the Society a lecture bearing on a subject connected with Meteorology, but not essentially meteorological, is delivered by invitation of the Council at the Spring Meeting. On this occasion Dr. W. G. Duffield, Professor of Physics at University College, Reading, dealt with the Meteorology of the Sun; that is to say, with the movements which take place in the solar atmosphere. He showed that by means of the spetroscope it was possible not only to detect the existence of all the known elements in a state of incandescent vapour in the solar atmosphere, but also to ascertain their distribution and relative movements.

Thus the constitution and circulation of the sun's atmosphere has been traced out irrespective of the ocular evidence afforded by the appearance of sun-spots and prominences and in recent years great advances have been made in determining the strati-

fication of the photosphere. Dr. Duffield pronounced solar meteorology to be in some respects more simple than terrestrial, and showed that it was possible to draw trajectories of the elements of solar whirls and sunspots by actual observations, while such a study of cyclonic depressions in the earth's atmosphere can only be carried out indirectly by reference to records of barometric pressure and winds long after the phenomena had passed. The lecturer concluded with a plea for further research into the relationships between solar and terrestrial phenomena which are of equal value and interest both to meteorologists and physicists.

Dr. H. R. Mill, in proposing a vote of thanks, congratulated Dr. Duffield upon the luminous manner in which he had treated the source of light. Lieut.-Col. Mellish seconded the vote of thanks which was put by the Chairman and carried by the largest audience which we remember to have sseen at one of these meetings.

METEOROLOGICAL NEWS AND NOTES.

The Royal Geographical Society has awarded the Victoria Gold Medal for Geographical Research to Dr. H. R. Mill, for his investigations and writings on geographical subjects, including Oceanography and the Cartographic Study of Rainfall.

Dr. Martin Gil, of Cordoba, has, we understand, from private correspondence, been appointed Direction of the Argentine Metorological Office, in succession to Mr. Walter G. Davis, whose long labours for the Argentine Government have brought the Weather Service of Argentine to a completeness and efficiency second only to that of the United States, and the Great Countries of Europe.

The Argentine Meteorological Station in the South Orkneys, founded by Dr. Bruce's Antarctic Expedition in the *Scotia*, is being continued and the *Geographical Journal* announces that a party of meteorologists left Buenos Aires in January to relieve those who had spent the previous year on Laurie Island. The new party is under the charge of Mr. H. Basche-Wiig.

The death of Mr. Frank T. Bullen, the famous author of experience and tales of the sea, recalls the fact that from 1883 to 1899, sixteen years, he was a clerk in the Marine Department of the Meteorological Office. His earlier experiences of fourteen years afloat in all capacities, from ship's boy to chief mate, gave him the first hand data which his literary skill enabled him to put before the world the unique series of word pictures of modern sailing ship life.

INTERNATIONAL BALLOON ASCENTS.

By W. H. DINES, F.R.S.

January 3rd, 1912.

Starting Point.	Country.	A (He) miles	B (Te) ° F.	C miles.	D ° F.	E miles.	F
Brussels	Belgium ..	7·8	—78	10·6	—76	86	S.E.
Hamburg	Germany..	6·6?	—82	8·0?	—71	115	E.S.E.
Strassburg	„ ..	7·6	—80	8·8	—76	64	S.E.
Vienna.....	Austria....	6·2	—85	6·6	—78	75	S.S.E.
Pavlowsk.....	Russia	5·1	—68	6·0	—60	37	S.E.

January 4th, 1912.

Brussels	Belgium ..	7·7	—89	9·2	—80	86	S.E.
Hamburg.....	Germany..	6·8	—83	10·7	?	135	S.E.
Strassburg.....	„ ..	7·4	—79	7·5	—77	67	?
Pavlowsk.....	Russia	5·2	—76	6·0	—67	50	S.S.E.
Nizhni Olchedaeff	„	5·8	—63	6·0	—63	71	E. by S.
Ekaterinburg....	Siberia....	5·0	—71	6·3	—65	155	E.N.E.

January 5th, 1912.

Manchester	England ..	6·7	—70	7·4	—65	132	S.E. by E.
Brussels	Belgium ..	6·5	—85	9·5	—83	114	E.
Hamburg.....	Germany..	6·6	—60	7·2	—60	95	E.
Lindenberg.....	„	6·8	—81	8·8	—75	109	E.S.E.
Paris.....	France....	7·0	—78	11·2	—69	418	E.
Strassburg	Germany..	7·3	—92	8·4	—79	69	E.
Munich	„ ..	7·1	—86	7·5	—86	63	E.S.E.
Vienna.....	Austria ..	5·9	—89	6·9	—87	101	E.S.E.
Pavlowsk.....	Russia	5·1	—71	5·9	—71	47	S.E. by E.

A Height in miles of commencement of isothermal column.
B Temperature, F°., at bottom of column.
C Greatest height of reliable record in miles.
D Temperature, F°., at greatest height.
E Distance in miles of point where balloon fell
F Bearing of falling point from starting point

This series of ascents seems to have been particularly unfortunate. Four balloons were sent up from Pyrton Hill, and three from Pavia, and none of them were found. Among those found, in many instances the clock stopped or the record failed, and of the remainder many heights were less than six miles.

During the three days very great changes of pressure occurred. A depression passed in from N.W. to S.E., and on the 4th all the East of Europe was covered by a low pressure area. On the next day this united with a new depression that was coming in from Iceland. There seems to have been a greater drift of the balloons than usual to the east and south-east, and it is probable that most or all of the balloons from Pyrton Hill fell in the Channel.

RAINFALL TABLE FOR MARCH, 1915.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	RAINFALL OF MONTH. Aver. 1875—1909. in.	1915. in.
		° ′	° ′			
Camden Square	*London*	51 32	0 8	111	1·70	·86
Tenterden	*Kent*	51 4	*0 41	190	1·95	·81
Arundel (Patching)	*Sussex*	50 51	0 27	130	1·95	·91
Fawley (Cadland)	*Hampshire*	50 50	1 22	52	2·17	·95
Oxford (Magdalen College).	*Oxfordshire*	51 45	1 15	186	1·45	1·20
Wellingborough(Swanspool)	*Northampton*	52 18	0 41	155	1·72	1·17
Shoeburyness	*Essex*	51 31	*0 48	13	1·19	·88
Bury St. Edmunds(Westley)	*Suffolk*	52 15	*0 40	226	1·71	1·72
Geldeston [Beccles]	*Norfolk*	52 27	*1 31	38	1·57	1·73
Polapit Tamar [Launceston]	*Devon*	50 40	4 22	315	2·74	·64
Rousdon [Lyme Regis]	,,	50 41	3 0	516	2·30	·98
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	2·01	1·29
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	2·19	·71
Boston	*Lincolnshire*	52 58	0 1	11	1·47	1·25
Worksop (Hodsock Priory).	*Nottinghamshire*	53 22	1 5	56	1·70	·99
Mickleover Manor	*Derbyshire*	52 54	1 32	280	1·69	1·01
Macclesfield	*Cheshire*	53 15	2 7	501	2·50	1·62
Southport (Hesketh Park)	*Lancashire*	53 39	2 59	38	2·11	1·26
Arncliffe Vicarage	*Yorkshire, W.R.*	54 8	2 6	732	5·17	1·48
Wetherby (Ribston Hall)	,, ,,	53 59	1 24	130	1·92	1·12
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	1·84	1·37
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	2·10	2·31
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	10·63	5·28
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	2·89	1·44
Haverfordwest	*Pembroke*	51 48	4 58	90	3·16	·93
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	3·04	1·93
Llandudno	*Carnarvon*	53 20	3 50	72	2·13	·64
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	3·33	1·90
Marchmont House	*Berwick*	55 44	2 24	498	2·64	2·13
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	3·62	2·45
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	2·61	1·03
Inveraray (Newtown)	*Argyll*	56 14	5 4	17	5·41	4·83
Mull (Quinish)	,,	56 34	6 13	35	4·28	4·11
Dundee(EasternNecropolis)	*Forfar*	56 28	2 57	199	2·06	1·43
Braemar	*Aberdeen*	57 0	3 24	1114	2·87	1·82
Aberdeen (Cranford)	,,	57 8	2 7	120	2·65	2·18
Gordon Castle	*Moray*	57 37	3 5	107	2·36	3·47
Fort Augustus(S. Benedict's)	*E. Inverness*	57 9	4 41	68	3·79	1·63
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	7·29	6·02
Dunrobin Castle	*Sutherland*	57 59	3 56	14	2·64	2·89
Wick	*Caithness*	58 26	3 6	77	2·24	2·01
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	4·51	1·08
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	2·64	1·38
Nenagh (Castle Lough)	*Tipperary*	52 54	8 24	120	2·99	·87
Ennistymon House	*Clare*	52 57	9 18	37	3·24	1·39
Gorey (Courtown House)	*Wexford*	52 40	6 13	80	2·28	·97
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	2·59	1·06
Dublin(FitzWilliamSquare)	*Dublin*	53 21	6 14	54	1·98	1·10
Mullingar (Belvedere)	*Westmeath*	53 29	7 22	367	2·64	·90
Crossmolina (Enniscoe)	*Mayo*	54 4	9 16	74	4·36	1·64
Cong (The Glebe)	,,	53 33	9 16	112	3·80	1·24
Collooney (Markree Obsy.)	*Sligo*	54 11	8 27	127	3·33	1·06
Seaforde	*Down*	54 19	5 50	180	2·84	1·26
Bushmills (Dundarave)	*Antrim*	55 12	6 30	162	2·73	1·46
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	2·98	1·59

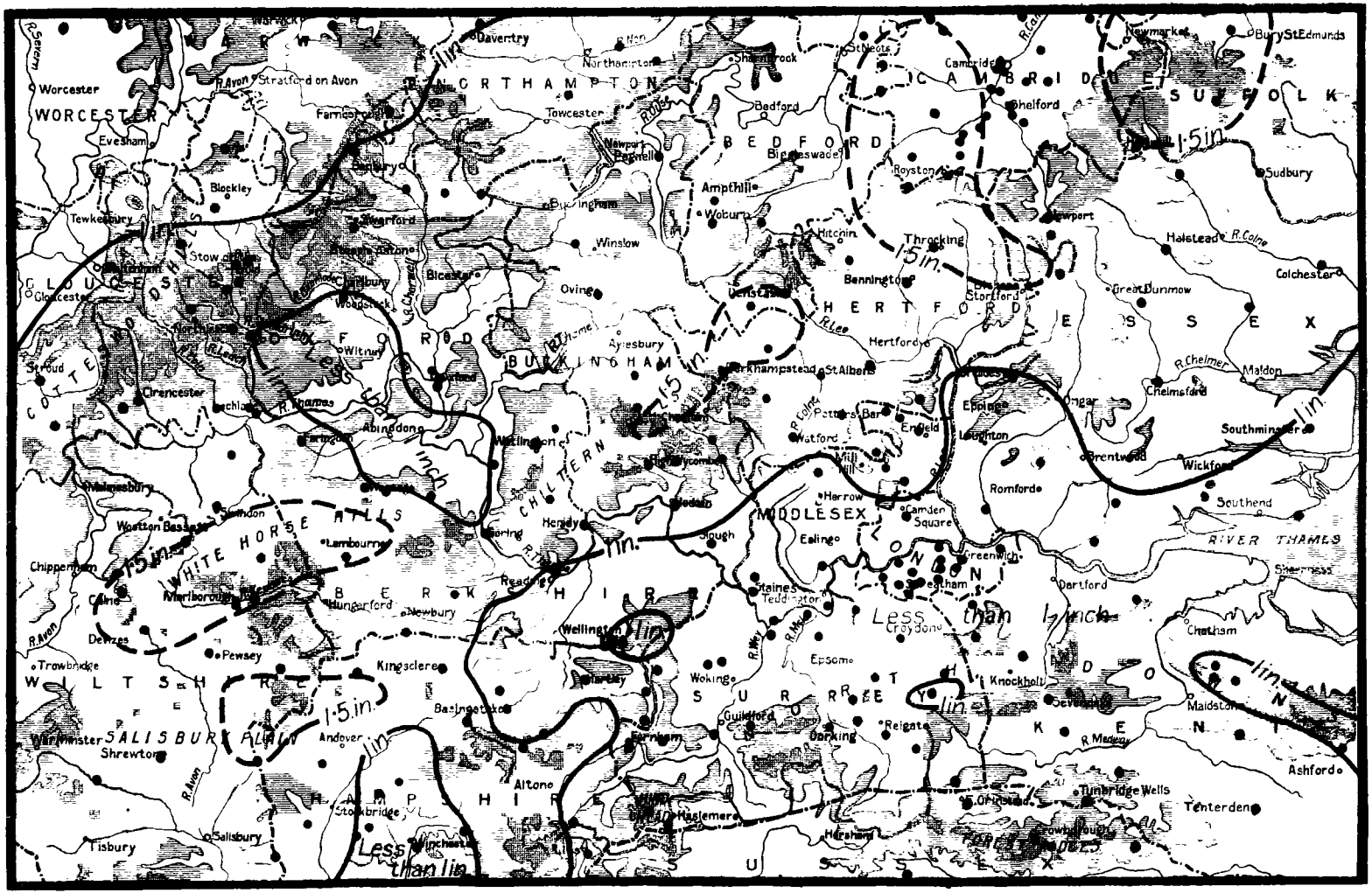
RAINFALL TABLE FOR MARCH, 1915—*continued.*

RAINFALL OF MONTH (*con.*)					RAINFALL FROM JAN. 1.					
Diff. from Av. in.	% of Av.	Max. in 24 hours. in.	Max. in 24 hours. Date.	No. of Days	Aver. 1875–1909. in.	1915. in.	Diff. from Aver. in.	% of Av.	Mean Annual 1875–1909. in.	STATION.
— ·84	51	·25	2	12	5·19	8·40	+3·21	162	25·11	Camden Square
—1·14	42	·20	2	12	5·99	8·44	+2·45	141	27·64	Tenterden
—1·04	47	·26	2, 23	9	6·71	10·46	+3·75	156	30·48	Patching
—1·22	44	·22	2	9	7·20	10·58	+3·38	147	31·87	Cadland
— ·25	83	·50	22	12	4·85	7·12	+2·27	147	24·58	Oxford
— ·55	68	·30	22	12	5·32	5·96	+ ·64	112	25·20	Swanspool
— ·31	74	·13	2	14	3·71	4·45	+ ·74	120	19·28	Shoeburyness
+ ·01	101	·35	18	16	5·00	7·14	+2·14	143	25·40	Westley
+ ·16	110	·33	24	17	4·51	8·05	+3·54	178	23·73	Geldeston
—2·10	23	·14	10	10	9·28	14·52	+5·24	156	38·27	Polapit Tamar
—1·32	43	·50	22	7	7·74	9·98	+2·24	129	33·54	Rousdon
— ·72	64	·55	23	9	6·46	8·84	+2·38	137	29·81	Stroud
—1·48	32	·33	2	8	6·87	10·83	+3·96	158	32·41	Wolstaston
— ·22	85	·28	7	16	4·54	5·95	+1·41	131	23·35	Boston
— ·71	58	·30	18	12	5·04	5·81	+ .77	115	24·46	Hodsock Priory
— ·68	60	·28	22	14	5·35	6·15	+ ·80	115	26·65	Mickleover
— ·88	65	·26	5	15	7·46	10·95	+3·49	147	34·73	Macclesfield
— ·85	60	·33	2	12	6·73	8·79	+2·06	131	32·70	Southport
—3·69	29	·30	2	7	16·31	21·27	+4·96	130	61·49	Arncliffe
— ·80	58	·28	18	6	5·52	8·00	+2·48	145	26·87	Ribston Hall
— ·47	74	·52	18	15	5·32	7·63	+2·31	143	26·42	Hull
+ ·21	110	1·08	18	16	5·63	7·03	+1·40	125	27·94	Newcastle
—5·35	50	1·33	6	14	35·03	42·47	+7·44	121	129·48	Seathwaite
—1·45	50	·39	2	11	9·61	11·02	+1·41	115	42·28	Cardiff
—2·23	29	·29	2	8	11·27	14·02	+2·75	124	46·81	Haverfordwest
—1·11	64	·66	2	10	10·04	14·95	+4·91	149	45·46	Gogerddan
—1·49	30	·18	5	12	6·75	7·77	+1·02	115	30·36	Llandudno
—1·43	57	·60	18	13	10·85	16·53	+5·68	152	43·47	Cargen
— ·51	81	·47	27	14	7·19	7·35	+ ·16	102	33·76	Marchmont
—1·17	68	·65	2	16	12·27	17·48	+5·21	143	49·77	Girvan
—1·58	39	·19	24	14	8·84	7·83	—1·01	89	35·97	Glasgow
— ·58	89	1·43	4	15	18·46	22·08	+3·62	120	68·67	Inveraray
— ·17	96	1·26	4	20	14·28	17·94	+3·66	126	56·57	Quinish
— ·63	69	·38	17	13	5·98	7·85	+1·87	131	28·64	Dundee
—1·05	63	·54	23	16	8·34	13·19	+4.85	158	34·93	Braemar
— ·47	82	·45	17	18	7·37	9·73	+2·36	132	32·73	Aberdeen
+1·11	147	·79	5	23	6·30	8·87	+2·57	141	30·34	Gordon Castle
—2·16	43	·26	25	15	13·57	9·25	—4·32	68	44·53	Fort Augustus
—1·27	83	1·14	4	23	24·24	25·21	+ ·97	104	83·93	Bendamph
+ ·25	109	·50	6	17	7·97	...	...	...	31·90	Dunrobin Castl
— ·23	90	..	...	...	6·95	6·67	— ·28	96	29·88	Wick
—3·43	24	·27	3, 22	14	15·44	16·48	+1·04	107	54·81	Killarney
—1·26	52	·56	22	9	9·60	9·05	— ·55	94	39·57	Waterford
—2·12	29	·40	2	8	9·76	11·12	+1·36	114	39·43	Castle Lough
—1·85	43	·44	2	16	10·98	14·38	+3·40	131	46·52	Ennistymon
—1·31	42	·42	22	7	8·22	8·58	+ ·36	104	34·99	Courtown Ho.
—1·53	41	·46	2	10	8·29	9·37	+1·08	113	35·92	Abbey Leix
— ·88	56	·53	22	13	6·05	6·48	+ ·43	107	27·68	Dublin
—1·74	34	·20	1	14	8·41	11·28	+2·87	134	36·15	Mullingar
—2·72	38	·33	2	20	13·91	15·04	+1·13	108	52·87	Enniscoe
—2·56	33	·49	2	11	12·31	13·55	+1·24	110	48·90	Cong
—2·27	32	·30	2	16	10·40	12·68	+2·28	122	42·71	Markree
—1·58	44	·25	22	14	9·06	9·80	+ ·74	108	38·91	Seaforde
—1·27	53	·24	2	18	8·48	7·15	—1·33	84	37·56	Dundarave
—1·39	53	·37	2	15	9·12	10·34	+1·22	113	39·38	Omagh

SUPPLEMENTARY RAINFALL, MARCH, 1915.

Div.	STATION.	Rain inches	Div.	STATION.	Rain inches.
II.	Warlingham, Redvers Road .	·73	XI.	Lligwy	·72
,,	Ramsgate	1·13	,,	Douglas	1·91
,,	Hailsham	·83	XII.	Stoneykirk, Ardwell House...	2·31
,,	Totland Bay, Aston House...	·79	,,	Carsphairn Shiel	2·78
,,	Stockbridge, Ashley..	1·03	,,	Beattock, Kinnelhead	2·16
,,	Grayshott	·76	,,	Langholm, Drove Road	3·02
III.	Harrow Weald, Hill House...	·94	XIII.	Meggat Water, Cramilt Lodge	1·20
,,	Caversham, Rectory Road ...	1·00	,,	North Berwick Reservoir.....	1·14
,,	Pitsford, Sedgebrook...	1·03	,,	Edinburgh, Royal Observaty.	1·14
,,	Woburn, Milton Bryant.....	1·28	XIV.	Maybole, Knockdon Farm ...	1·54
,,	Chatteris, The Priory..... ...	1·20	XV.	Ballachulish House	7·36
IV.	Elsenham, Gaunts End	1·50	,,	Campbeltown, Witchburn ..	2·35
,,	Colchester, Hill Ho., Lexden	1·14	,,	Holy Loch, Ardnadam.....	5·03
,,	Ipswich, Rookwood, Copdock	1·42	,,	Islay, Eallabus	3·02
,,	Blakeney	1·38	,,	Tiree, Cornaigmore	3·39
,,	Swaffham ..	1·50	XVI.	Dollar Academy	2·85
V	Bishops Cannings	1·59	,,	Balquhidder, Stronvar.....	...
,,	Wimborne, St. John's Hill...	·86	,,	Glenlyon, Meggernie Castle..	3·20
,,	Ashburton, Druid House.. ...	1·09	,,	Blair Atholl	1·84
,,	Cullompton	·87	,,	Coupar Angus	1·49
,,	Lynmouth, Rock House	·69	,,	Montrose, Sunnyside Asylum.	1·22
,,	Okehampton, Oaklands.. ...	·87	XVII.	Alford, Lynturk Manse	2·04
,,	Hartland Abbey	·88	,,	Fyvie Castle	3·07
,,	Probus, Lamellyn.....	·77	,,	Keith Station ..	3·34
,,	North Cadbury Rectory.	1·12	XVIII.	Rothiemurchus	2·41
VI.	Clifton, Pembroke Road.....	1·37	,,	Loch Quoich, Loan	14·20
,,	Ross, The Graig	·71	,,	Drumnadrochit	2·67
,,	Shifnal, Hatton Grange.....	1·02	,,	Skye, Dunvegan	5·16
,,	Droitwich	·67	,,	Lochmaddy, Bayhead	3·58
,,	Blockley, Upton Wold.....	·97	,,	Glencarron Lodge	8·63
VII.	Market Overton.....	1·51	XIX.	Invershin	2·66
,,	Market Rasen	·91	,,	Melvich	3·64
,,	Bawtry, Hesley Hall	1·12	,,	Loch Stack, Achfary	7·95
,,	Derby, Midland Railway.....	·98	XX.	Dunmanway, The Rectory ..	1·48
,,	Buxton	...	,,	Glanmire, Lota Lodge.....	·70
VIII.	Nantwich, Dorfold Hall	1·56	,,	Mitchelstown Castle.....	·94
,,	Chatburn, Middlewood	2·25	,,	Darrynane Abbey.....	1·22
,,	Lancaster, Strathspey	1·88	,,	Clonmel, Bruce Villa	·90
IX.	Langsett Moor, Up. Midhope	·94	,,	Newmarket-on-Fergus, Fenloe	1·27
,,	Scarborough, Scalby	1·93	XXI.	Laragh, Glendalough	·61
,,	Ingleby Greenhow	2·05	,,	Ballycumber, Moorock Lodge	·68
,,	Mickleton	1·70	,,	Balbriggan, Ardgillan	·76
X.	Bellingham, High Green Manor	2·03	XXII.	Ballynahinch Castle.....	1·95
,,	Ilderton, Lilburn Cottage ...	1·83	,,	Woodlawn	1·05
,,	Keswick, The Bank.....	2·29	,,	Westport, St. Helens	1·01
XI.	Llanfrechfa Grange	1·22	,,	Dugort, Slievemore Hotel ...	1·90
,,	Treherbert, Tyn-y-waun	3·13	,,	Mohill Rectory ..	·84
,,	Carmarthen, The Friary	1·35	XXIII.	Enniskillen, Portora.....	1·34
,,	Fishguard Goodwick Station.	·91	,,	Dartrey [Cootehill]	1·07
,,	Crickhowell, Tal-y-maes.....	1·20	,,	Warrenpoint, Manor House ..	·76
,,	New Radnor, Ednol	1·60	,,	Banbridge, Milltown	·65
,,	Birmingham WW., Tyrmynydd	1·85	,,	Belfast, Cave Hill Road	1·24
,,	Lake Vyrnwy	...	,,	Ballymena Harryville	1·45
,,	Llangynhafal, Plâs Draw.....	·98	,,	Londonderry, Creggan Res...	1·74
,,	Dolgelly, Bryntirion.....	3·79	,,	Dunfanaghy, Horn Head ...	1·95
,,	Bettws-y-Coed, Tyn-y-bryn...	...	,,	Killybegs	3·33

THAMES VALLEY RAINFALL —— MARCH, 1915.



Symons's Meteorological Magazine

Watershed of River Thames above Teddington, and River Lee above Feildes Weir

Rainfall Stations reporting ● ● ● ● ● ●

Isohyetals

THE WEATHER OF MARCH.

In the first week of the month the conditions were unsettled with frequent rain though the precipitation was not generally heavy, except in Scotland and the north-west of England. On the 1st thunderstorms occurred over practically the whole of the southern half of Great Britain and in many places were accompanied by snow. A depression of some intensity which moved across the northern part of the Kingdom, from the Atlantic, caused heavy rain in the west of Scotland on the 4th, many stations having more than 1·50 in. At Ballachulish House there was as much as 3·11 in., at North Ballachulish 2·61 in., and at Glencarron 2·46 in. About an inch also fell at these stations on the 5th. A large anticyclonic system spread over the Kingdom on the 8th and a general improvement in the weather set in. Temperature rose in most districts on the 10th. On the 12th the shade maxima reached 61° at Crieff, on the 13th 62° at Alnwick Castle and 60° at Hereford, and on the 14th 60° or 61° occurred at several stations in the north of England and in Scotland, and 55° generally south of the Tweed and in the north of Ireland. On the 17th a disturbance appeared over the central part of Great Britain, causing gales in the northern half of the Kingdom and a sudden and considerable fall in temperature. Snow fell heavily over the whole of the eastern half of Great Britain and caused much damage in some places. At Geldeston the snow was preceded by unusual darkness from 7.30 to 9.30 a.m. At Macclesfield the depth was 5 inches with drifts 5 feet deep in places. In the southern counties of Scotland the depth was rather more. Trees were blown down at Mansfield and many sheep were smothered by the drifting snow on the hills around Hawick. In the Peak District, Northumberland, and Berwickshire railway communication was temporarily cut off. An anticyclone spread over the southern part of the Kingdom on the 20th and fine weather ensued with higher temperatures. A large depression passed up the Bay of Biscay in a northerly direction on the 22nd and 23rd and changeable conditions again set in. Occasional snow showers occurred in nearly all parts of the Kingdom, though the falls were never heavy. Severe frosts occurred daily in the last week over practically the whole of the British Isles. Between the 28th and 30th shade minima of 19° were recorded at Balmoral and Raunds, and 18° at Kilmarnock and Llangammarch Wells.

Except for a few small scattered areas along the east coast and in the north of Scotland, the rainfall of the month was everywhere below the average.

Practically the whole of the south-eastern Counties of England had less than an inch. In the accompanying map of the Thames Valley no isohyet so high as 2·00 in. appears, and over the whole of England and Wales only the mountain or moorland districts had more than this amount, a very exceptional circumstance. In Scotland less than 3·00 in. fell to the east of a line joining Inverness and Glasgow. The deficiency was greatest in Ireland, almost the whole of the central portion receiving less than an inch. At Killarney the total was only 24 per cent. of the average fall for March.

The duration of sunshine varied and in some places was considerable. The following amounts are reported: London (Camden Square), 80·0 hours; Margate, 96·0 hours; Worthing, 117·2 hours; Copdock, 93·2 hours; Weymouth, 140·8 hours; Ashbourne, 110·6 hours; Bolton, 65·0 hours; Haverfordwest, 144·3 hours; Paisley, 120·0 hours, and Loch Stack, 54·3 hours.

In London the conditions were generally cloudy with occasional bright sunny days. Temperature was low in the latter part of the month and the mean temperature, 42°·0, was 0°·1 below the average, this being the first occasion that the monthly mean temperature has been below the average since January, 1914. Duration of rainfall, 34·8 hours. Evaporation, ·66 in.

Over the Kingdom as a whole the general rainfall expressed as a percentage of the average was as follows: England and Wales, 54; Scotland, 79; Ireland, 40; British Isles, 58.

Climatological Table for the British Empire, October, 1914.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	68·5	1	34·7	12	59·6	45·7	47·2	86	106·8	31·3	1·25	13	7·2
Malta	77·0	12	61·2	14	72·4	66·6	...	76	134·0	...	2·03	9	1·1
Lagos	88·3	31	71·0	3	86·3	75·8	73·7	78	161·4	68·0	4·25	14	7·2
Cape Town	84·3	28	49·3	27	71·9	55·6	54·1	70	...	...	·55	4	3·7
Natal, Durban ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Johannesburg	85·6	9	44·0	28	74·7	52·7	49·1	67	...	44·0	2·25	10	4·0
Mauritius	84·1	24	58·3	13	80·4	63·6	59·8	68	...	49·1	·69	16	5·6
Bloemfontein	89·3	22	41·0	2	80·2	54·4	47·1	51	...	...	1·11	5	2·4
Calcutta...	92·0	1	65·5	30	88·8	72·8	70·2	72	...	61·5	·32	1	3·2
Bombay...	94·2	22	75·9	18	90·9	78·6	74·3	73	140·8	65·5	·01	1	3·1
Madras	97·3	6	72·3	29	87·5	75·1	74·2	84	168·6	71·7	19·22	18	6·5
Colombo, Ceylon ...	89·9	19	72·2	8	86·2	73·8	74·7	84	162·0	70·3	16·02	29	8·5
Hongkong	85·4	7	66·5	22	81·2	74·3	69·6	77	...	...	6·45	17	6·5
Sydney	96·0	30	50·7	13	73·4	57·4	54·4	69	151·9	42·8	7·53	15	5·1
Melbourne	98·4	24	32·8	16	73·7	49·9	45·4	52	149·8	26·4	·29	6	4·0
Adelaide	102·2	24	43·7	12	81·9	57·2	46·7	37	157·6	33·0	·17	3	3·6
Perth	88·2	4	46·1	24	75·4	56·2	53·0	63	154·0	38·7	1·46	11	5·4
Coolgardie	96·6	4	46·0	24	81·1	56·7	46·7	41	160·4	45·0	1·70	7	5·0
Hobart, Tasmania ..	92·0	24	35·8	18	66·8	46·7	40·3	49	147·0	25·0	·39	6	5·0
Wellington ...	69·0	14*	38·8	4	61·3	49·9	46·3	71	138·0	26·4	1·54	8	6·2
Auckland	66·0	12	44·0	30	62·0	49·3	48·4	77	133·0	40·0	1·15	11	6·0
Jamaica, Kingston .	94·7	11	71·2	22	90·7	73·9	71·9	80	...	...	1·58	5	4·9
Grenada	90·0	27	73·0	22†	85·7	75·6	...	79	136·0	...	8·44	23	4·2
Toronto	79·2	21	26·0	27	61·4	44·1	45·6	86	126·7	23·9	1·54	10	4·0
Fredericton	76·8	5	13·0	28	57·6	35·5	...	78	...	...	3·09	8	4·8
St. John, N.B. ...	74·0	3	23·8	28	55·8	42·0	42·0	76	...	...	2·97	11	4·6
Alberta, Edmonton ...	68·0	14	23·1	28	53·7	32·9	...	77	118·5	17·8	1·08	8	5·7
Victoria, B.C.	67·0	14	42·0	22	58·0	47·5	...	90	...	...	2·58	12	7·0

* and 26. † and 23.

Johannesburg.—Bright sunshine 236·9 hours.

Mauritius.—Mean temp. 1°·1, dew point 1°·8, and R ·59 in., below averages. Mean hourly velocity of wind 10·9 miles.

COLOMBO, CEYLON.—Mean temp. 80°·0, same as average, dew point 0°·6 above, and R ·14 in. above, averages. Mean hourly velocity of wind 3·8 miles.

HONGKONG.—Mean temp. 77°·5, mean hourly velocity of wind 13·3 miles. Bright sunshine 192·5 hours.

Melbourne.—Mean temp. and mean daily maxima a record. R ·29 in., the lowest on record.

Adelaide.—Hottest and driest October on record. Mean max. + 9°·4. Mean min. + 5°·9. Mean temp. + 7°·7. R 1·58 in. below, averages.

Perth.—Mean temp. 5°·0, and R above averages.

Coolgardie.—Temp. 5°·3 above average.

Hobart.—Temp. 2°·7 above, and R 1·84 in. below, averages.

Wellington.—Mean temp. 1°·5 above, and R 2·67 in. below, averages. Bright sunshine 210 hours. H on 28th.

Auckland.—Dry, cool and cloudy month. R and temp. below averages.

ALBERTA, EDMONTON.—A warm month. R slightly above average.