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THE COLD PERIOD OF MAY IN ARCTIC AND ANTARCTIC REGIONS, WITH SPECIAL REFERENCE TO 1903.

By R. C. MOSSMAN, F.R.S.E.

LONG before the days of thermometers it was well known that there occurred marked interruptions in the seasonal rise or fall of temperature. Year after year, at periods when the temperature should normally have been steadily rising, a blast of winter cold would make itself felt, while on the other hand, when the advent of winter might normally have been expected, a period of unseasonable warmth would intervene. Among such interruptions of temperature change the cold period which occurs on the 11th, 12th, and 13th of May, is one of the best known. References to this period, known on the continent as the Ice Saints' Festival, are freely incorporated in popular weather lore. Explanations of these interruptions of temperature, based on an examination of European data, were given many years ago by Dr. Buchan and others.

It has of late been more and more recognised that for the intelligent comprehension of meteorological phenomena in any specific area, we require maps dealing with the whole globe. We may take, as a practical illustration of this principle, the way in which information is obtained from widely separated localities, in connection with the preparation of Indian monsoon forecasts. From regions as far distant as Argentina and Siberia monthly cables of barometric pressure are dispatched, which information is profitably turned to account by those whose business it is to estimate the probable intensity of the monsoon current, on which depends the well-being of that country. It hardly comes as a surprise, therefore, to find that there is a most intimate and well marked relation between the meteorological conditions over the Antarctic continent, and those prevailing in Europe and regions in higher northern latitudes up to the limit of observation: this I shall endeavour to show for that

curious interruption in the normal seasonal rise of temperature known as the cold period of May.

The recent publication of the meteorological results of the British and Scottish Antarctic Expeditions places a rich mine of information regarding the climatic features of Antarctica at our disposal, which will be greatly enhanced by the further results obtained by the German, Swedish, French, and Argentine expeditions, detailed reports of which will appear in the immediate future. Many interesting facts, some of the most unexpected character, have already come to light, and that further novel developments may be expected, directly bearing on fundamental problems of atmospheric circulation, will be seen from the manner in which the observations of the *Discovery* and *Scotia* throw light on a phenomenon hitherto exclusively associated with a portion of the northern hemisphere, namely, the cold period of May.

This cold period, as is apparent from the following tables, was well marked at the winter quarters of the *Discovery* both in 1902 and 1903 as well as at Cape Adare in 1899. The following are 5 day means of pressure and temperature :—

Temperature.					Pressure.				
DISCOVERY.					At 32° and Sea Level.				
Lat. 77° 51' S. Long. 166° 45' E.					Lat. 71° 18' S. Long. 170° 10' E.				
DISCOVERY. C. ADARE.					DISCOVERY. C. ADARE.				
May.	1902.	1903.	1899.	Mean.	1902. in.	1903. in.	1899. in.	Mean. in.	
1-- 5	— 0·2	— 7·3	3·6	— 1·3	29·043	29·139	29·025	29·076	
6—10	— 5·6	—16·5	6·2	— 5·3	28·990	·318	·164	·157	
11—15	—21·0	—34·5	—13·9	—23·0	29·546	·270	·325	·380	
16—20	—23·4	—10·3	— 1·9	—11·9	·761	·121	·037	·306	
21—25	—19·2	—13·0	— 4·4	—12·2	·184	28·946	28·994	·041	
26—31	— 8·4	—18·0	—13·0	—13·1	·131	29·147	·613	28·964	

not appear in the vicinity of Cape Horn nor on the Atlantic and Pacific coasts of S. America up to about 40° N. latitude, this being

Mean Temperature of 5-day periods in May.

	SOUTH ORKNEYS.		BUENOS AIRES.		CORDOBA.		GREENLAND SEA.		FRAM.	
	Lat. 60° 44' S.	Long. 44° 50' W.	Lat. 34° 37' S.	Long. 58° 22' W.	Lat. 31° 25' S.	Long. 64° 12' W.	Lat. 77° N.	Long. 7° E.	Lat. 83° N.	Long. 76° E.
May.	5 years.		50 years.		20 years.		16 years.		3 years.	
1—5	22·9		59·1		57·9		20·8		—0·8	
6—10	16·8		58·0		56·6		19·8		6·1	
11—15	16·7		54·9		53·0		19·4		6·7	
16—20	18·2		56·3		53·1		22·8		11·2	
21—25	13·8		54·4		52·4		25·4		23·1	
26—31	14·6		54·6		53·8		29·5		24·3	

due to the development of a cyclonic area over that region, whereas in the northern part of Argentina and Chile well marked anti-cyclonic conditions prevail. In the Greenland Sea it is also associated with a high barometer. As regards Europe, where the cold spell shows itself more in the form of a retardation of the seasonal rise than of a fall of temperature, I do not propose to enter into detail, but it may be of interest to point out that the anticyclone which normally covers Scotland about the middle of May is responsible for a remarkable rise of temperature on the summit of Ben Nevis which is under the influence of a descending current of air warmed dynamically by compression.

The cold period of May is thus a bi-polar phenomenon experienced from 78° S. to at least 84° N. over the region discussed. It is specially marked in Argentina and Chile in the southern, and over the greater part of Europe in the northern hemisphere. It is absent or but feebly developed in S. America south of 40° S. At all places where it occurs it is associated with high pressure, and the anti-cyclonic conditions relative to the normal are most pronounced in Antarctica. At places where it does not occur cyclonic conditions prevail. This cold period is followed by a great rise of temperature in the northern, and a slight rise in the southern hemisphere which is most abnormal, occurring, as it does, within four weeks of the winter solstice in the southern hemisphere.

So regular a feature is the cold period of May at the South Orkneys that in only one year (1906) since the station was established in March, 1903, has it failed to make its appearance, and one is induced to ask why it failed on that occasion. The explanation is obvious when we look at a map showing the pressure distribution over the globe from 80° W. to 30° E. Over the north polar regions, north of latitude 60°, in the month under review, there was an unwonted development of anti-cyclonic conditions, while the British Islands and middle and eastern Europe were the theatre of cyclonic activity. The same conditions prevailed in the southern hemisphere at least south of 25° S. The mean barometric pressure in Buenos Aires was the lowest in

May since 1858, and there was an almost complete absence of anti-cyclonic conditions. Further south, up to at least the latitude of the South Orkneys, pressure was abnormally low, and the temperature consistently high. The cold spell was felt in the Arctic, in Iceland, in the British Islands, and possibly in other places, but at St. Petersburg the temperature rose to 86° on the 18th, while the mean, from the 1st to the 10th, was $20^{\circ}\cdot4$ above the normal.* At Buenos Aires temperature fell and pressure rose about the middle of the month, but owing to the increased southern extension of the normal low pressure area, the temperature did not fall at the South Orkneys. This was probably associated with a great development of the Antarctic anticyclone, but we have no data in this connection. For the supply of a large mass of material from Iceland and the Arctic dealing with the meteorology of this abnormal month, I am much indebted to Captain Ryder, Director of the Danish Meteorological Institute.

THE COLD PERIOD OF MAY, 1903.

In the following table will be found five day means of temperature for a large number of places, for the month of May, 1903. Similar means of barometric pressure have been computed for all the stations, but in view of the early publication, by the Meteorological Office, of the international synoptic charts for the years 1902 and 1903, embracing the whole southern hemisphere south of 30° S., it does not appear necessary to print the data, which I shall briefly summarise. By combining the existing daily weather charts, issued by the various meteorological organizations in the northern hemisphere, with the southern charts, and plotting sea and other observations for the regions north and south of the Equator not cartographically represented, we shall be able to have a picture of the general conditions over the whole globe. In this way much light will be thrown on the approximate cause of this cold period, and subsequent rise of temperature in the Antarctic and the south temperate zone.

The following condensed abstract of the conditions in 1903, taken in connection with what I have already said regarding the normal conditions, may meet the exigencies of space.

(1) That the cold period of May, 1903, was most marked in Antarctica, where it was accompanied by a considerable increase of pressure. As the pressure increase was very large at the South Orkneys it is not unlikely that the focus of anticyclonic activity was located to the south of the Weddell Sea in 78° S., 60° to 20° W., another centre being located in the north of Argentina.

(2) That between the 11th and the 15th a low pressure area was formed, probably round the globe, between latitudes 40° and 59° south, and that in those regions the cold spell did not occur. This is supported by data from the Cape Horn region and Kerguelen. Temperature, however, fell at the Falkland Islands.

(3) That over the greater part of South America and Europe

* See "The Rainfall of Scotland in May, 1906," by A. Watt. *Jour. Scot. Met. Soc.*, 3rd Series, No. XXIII.

MEAN TEMPERATURES FOR 5-DAY PERIODS DURING MAY, 1903.

NOTE.—The means for the British Islands are the average of the 20 stations given in returns from "Meteorological Observations at Stations of the Second Order." "n" signifies that the mean is the average of the daily maxima and minima.

STATION.	Lat.	Long.	Height, feet.	Hours.	1—5.	6—10.	11—15.	16—20.	21—25.	26—31.	MEAN.
<i>Discovery</i> ...	77 51 S.	166 44 E.	4	2 hourly	—13°0	—16°5	—34°2	—10°3	—13°0	—18°0	—16°0
South Orkneys, Cape Pembroke	60 44	44 39 W.	17	hourly	11°5	12°0	5°3	20°4	27°7	24°2	17°1
Falkland Islands...	51 41	57 42	20	4 hourly	41°1	42°0	38°4	42°9	41°9	40°8	41°2
<i>Atlantic Coast</i> —											
Dungeness...	52 24 N.	68 25	10	8, 2, 9	42°7	42°3	43°4	41°9	42°0	41°4	42°1
Port Coyle...	51 00	69 20	50	M	43°9	40°6	42°6	39°6	44°6	44°2	41°2
Port Madryn	42 46	65 01	76	M	56°3	51°4	47°7	49°8	51°4	48°0	50°6
Buenos Ayres	34 37 S.	58 22	72	7, 2, 9	60°6	62°3	52°2	56°5	59°0	58°6	57°9
Cordoba ...	31 25	64 12	1437	M	58°3	65°8	54°3	49°1	57°0	57°9	57°1
Rio de Janeiro	22 54	43 10	203	M	76°6	76°6	71°8	65°3	68°7	68°4	71°2
<i>Pacific Coast</i> —											
Evangelists Island	52 24	76 06	174	8, 2, 9	42°9	41°6	45°3	44°1	41°4	43°5	43°0
Point Zarara	40 01	73 44	125	"	52°7	51°6	50°1	49°8	51°2	49°3	50°7
Juan Fernandez	33 37	78 50	33	"	60°6	59°6	58°7	58°2	59°1	58°2	58°9
Chanaral Island	29 01	71 37	157	"	58°2	58°5	54°9	54°4	55°5	57°1	56°4
Liquique	20 12	70 11	30	"	62°5	62°6	62°6	62°0	61°8	61°5	62°1
Sucre (Bolivia)	19 02	65 17	9331	"	58°3	56°8	54°5	54°1	57°2	56°8	56°1
Butavia	6 11 N.	106 50 E.	23	hourly	79°5	78°0	80°6	79°3	80°7	79°2	79°4
Mexico	19 26	99 08 W.	7480	"	61°9	64°8	64°9	69°4	69°8	68°8	66°6
Honolulu	21 18	157 50	50	6, 2, 9	70°0	70°2	71°8	69°8	73°2	72°6	71°3
Turin	45 04	7 42 E.	906	9, 3, 9	50°8	54°5	52°7	58°7	66°4	62°2	57°7
Stäntis	47 15	9 20	8202	hourly	28°7	27°8	25°2	25°8	37°9	38°4	30°9
Zurich	47 23	8 33	1617	"	51°5	52°6	51°1	50°8	63°3	63°7	55°6
Bremen	53 08	8 48	52	"	51°6	49°5	47°4	46°4	54°4	64°8	52°3
Potsdam	52 23	13 04	279	"	62°3	53°3	50°8	48°0	58°7	62°7	56°4
Vienna	48 15	16 21	666	"	59°6	57°9	56°3	52°8	59°1	62°0	57°4
Karlsruhe	49 01	8 25	415	M	54°8	55°7	52°3	51°5	62°4	66°0	57°4
England (10 Stations)	52 45	2°07 W.	189	M	50°1	48°7	48°0	48°6	55°3	57°7	51°5
Scotland (6 ")	57 06	3°50	277	M	45°6	44°5	46°0	46°4	52°5	54°4	48°3
Ireland (4 ")	53 45	7°20	165	M	49°0	47°3	47°9	48°8	52°4	50°3	50°5
Stockholm	59 21	18°03 E.	146	hourly	41°9	41°5	45°9	47°8	54°9	61°0	49°3
Christiania	59 55	10°43	82	"	49°2	43°0	47°0	47°8	55°3	65°6	51°8
Skutenaes	59 09	5°16	12	8, 2, 8	49°4	45°9	44°7	45°9	51°5	56°9	49°1
Bodö ...	67 17	14°24	67	"	39°0	39°6	40°2	45°2	48°8	48°9	43°7
Vardö	70 22	31°08	33	"	22°9	20°2	38°1	37°7	39°2	42°6	36°2

pressure rose with a sharp drop in temperature, but that Ireland, Scotland, Norway and Sweden were under the influence of a low pressure area and did not experience the marked fall of temperature which occurred in England and Southern Europe.

(4) That the abnormally warm period over Antarctica and South America, from the 21st to the 25th, was accompanied by a general fall of pressure, while in Europe temperature rose sharply with an increase of pressure most pronounced north of 50° N.

While I have been dealing with one specific cold period experienced, as we have seen, in both hemispheres, an examination of a large mass of data published in the *Annals of the Argentine Meteorological Office* as well as daily mean temperatures for each day in the year, at the South Orkneys for 5 years, at Buenos Aires for 50 years and at Cordoba for 20 years, enables me to affirm that warm and cold periods are synchronous in both hemispheres. This is especially the case over the Atlantic area and adjacent continents from about 70° W. to 30° E. If, for example, one plots the mean daily temperature at the winter quarters of the *Discovery* in 78° S. and of the *Scotia* in 61° S., for the year 1903, and compares them with similar curves of daily temperature in Europe (see, for example, the chart of mean daily temperature at 4 stations, appended to Professor Schultheiss' report on the meteorology of Baden, *Deutsches Meteorologisches Jahrbuch für 1903. Baden*), the inter-relation between these remote regions can be seen at a glance. Not only so, but the dominating influence of the conditions in Antarctica proper, on the climate of the S. Orkneys, the Falkland Islands, and Argentina are also very pronounced.

Further, the curve of mean barometric pressure at the South Orkneys for each day in the year, during the last five years, bears so close a resemblance to that which I prepared for Edinburgh, based on 50 years' data, that it would appear that the two barometers are moving in unison. The explanation of this is yet to be discovered, but that there is such unison seems to me indisputable in view of the data before me. That there are such intimate inter-relations between that portion of the globe covered by the north and south Atlantic seems to be due to the regular sequence of the atmospheric "centres of action," which are, the north polar anticyclone, the Icelandic low, the north Atlantic high, the south Atlantic high, the Weddell Sea low, and the Antarctic anticyclone, the centres of which, meteorologically speaking, are approximately in the same meridians. The simplicity of this arrangement is obviously due to the absence of disturbing land masses.

In conclusion, I can only reiterate what I emphasized at the International Polar Congress held at Brussels in 1906, namely, that the next Polar campaign for meteorological purposes must be directed simultaneously to both Arctic and Antarctic regions, since it is only in this way that we shall be able to throw light on the inter-relations that would appear to exist between the north and south polar circulations.

SUNSHINE FOR JANUARY IN LONDON.

THE comparatively small number of sunshine recorders in use makes it impossible to prepare anything approaching to a correct map of the distribution of duration of sunshine in London and its immediate neighbourhood. This being so, we think it is not without interest to compare the sunshine of January, 1909, as observed at three characteristic stations, (1) the tower of the Wesleyan Training College at Westminster, the record for which is taken from the *Daily Weather Report* of the Meteorological Office, this record being taken 80 feet above the level of the ground; (2) the roof of the rainfall office at Camden Square, the instrument being 14 feet above the ground, and the position three miles north of Westminster; and (3) Mill Hill, where the recorder is 4 feet above the ground, and its position 6 miles north-west of Camden Square or 9 miles north-north-west of Westminster. From the elevated position of the Westminster instrument it undoubtedly records much more sunshine than could be registered at the ground level, even with an equally free horizon. At Camden Square surrounding trees and houses cut off an appreciable amount of direct sunshine in summer; but in winter the rays of the sun reach the recorder as soon as the sun is high enough to give a record in clear air. At Mill Hill the exposure is almost perfect from horizon to horizon. The pattern of sunshine recorder is the same at all three, being that known as the Campbell-Stokes.

Daily Sunshine for January, 1909.

	West- minster. 107 ft.	Camden Square. 125 ft.	Mill Hill. 390 ft.		West- minster. 107 ft.	Camden Square. 125 ft.	Mill Hill. 390 ft.
1....	—	...	...	17....	1.1	0.9	2.2
2....	—	...	...	18....	2.6	1.4	2.3
3....	—	...	...	19....	—	0.6	1.0
4....	—	...	...	20....	0.5	4.6	6.0
5....	—	...	...	21....	...	0.7	0.3
6....	0.2	...	0.7	22....	—	—	—
7....	2.5	2.6	2.9	23....	—	—	—
8....	3.5	3.9	4.0	24....	—	—	3.0
9....	0.7	2.6	1.8	25....	—	2.2	5.7
10....	—	—	—	26....	0.3	3.5	5.0
11....	1.3	1.3	2.5	27....	—	—	4.7
12....	2.9	3.7	5.0	28....	—	—	—
13....	—	—	—	29....	0.1	—	—
14....	2.8	2.2	3.6	30....	3.8	5.0	5.0
15....	5.9	5.0	6.1	31....	—	—	—
16....	4.8	4.4	5.6				
Total.....					33.0	44.6	67.4

The Table shows that the total duration of sunshine for the month was 33 hours at Westminster, $44\frac{1}{2}$ hours at Camden Square, and $67\frac{1}{2}$ hours at Mill Hill; in other figures, taking the Westminster sunshine as 100, that at Camden Square was 135 and at Mill Hill 204, or more than double. Unfortunately the wealthy dwellers on

the margin of Hampstead Heath have succeeded in preventing the establishment of a meteorological station there, so it is impossible to say whether the sunshine for the month there was proportional to its distance from Westminster, or to its height above the sea. During the four days from the 24th to the 27th, the sun shone brightly for 20 minutes at Westminster, for $5\frac{3}{4}$ hours at Camden Square, and for $18\frac{1}{2}$ hours at Mill Hill. The contrast was most marked on the 27th, when the prevalence of fog prevented any record at Westminster or Camden Square; but, as the fog ceased about the level of 320 feet on the slopes of Mill Hill, the record there showed a duration of $4\frac{3}{4}$ hours. On the 28th, however, the fog rose higher, and no sunshine was recorded at any of the three stations.

We call attention to these striking differences between places lying within the London postal district, and within 10 miles of Charing Cross, in order to show how much interest attaches to differences in climate due to local differences in configuration; and how misleading it is to compare, say, "London" as a whole on the strength of the reading at one station with, say, Brighton or the Isle of Wight. The variability of duration of sunshine is perhaps greater than that of any other meteorological element, and also more important; but very substantial differences in temperature and rainfall also occur within a very few miles when the surface of the ground is undulated to the extent of a few hundred feet.

THE WEATHER OF JANUARY, 1909.

By FRED. J. BRODIE.

THROUGHOUT the earlier half of January, and in fact up to about the 18th of the month, the weather over the United Kingdom was influenced by large cyclonic disturbances, whose centres moved from Iceland to the north of Scandinavia. The prevailing winds were therefore from the westward, and the weather was of a very changeable character; but in the southern districts the rains were usually light, and were interspersed with long intervals of bright sunshine. The passage of the various northern disturbances was accompanied by frequent slight variations of wind, between south-west and north-west, and by considerable fluctuations in temperature. During the first six days, when the air came mostly from the south-westward, the weather was mild and open, especially about the 2nd and 3rd, when the thermometer rose to between 50° and 55° in all districts excepting the south-east of England, and touched 56° at one of the most northern stations, Wick. Thunderstorms occurred in various parts of Great Britain on the 6th and 7th, and again about a week later.

A temporary break in the spell of mild weather was brought about

on the 7th and 8th by a change in the movement of one of the northern low-pressure systems, the centre passing in this case in a southerly direction across Scandinavia and Denmark to the Baltic. The wind in these islands consequently shifted for a time to north-west and north, and blew with the force of a gale, with a decided fall of temperature, and squalls of hail or snow in many northern and eastern districts. Sharp frosts were experienced on the nights of the 7th and 8th, the sheltered thermometer sinking to 25° at Cromer and West Linton, and to 26° at Buxton and Llangammarch Wells, while the thermometer on the grass fell to 20° , or slightly below it, at several stations in the northern and central parts of the country.

On the 9th the wind returned to the southward of west, and the weather again became mild, the open conditions lasting in the southern districts until after the middle of the month. In Scotland and the north of Ireland there was, however, after the 10th a considerable admixture of cold breezes from north-west, with heavy falls of snow between the 14th and 16th. Sharp frost occurred in the north on the 12th and 13th, when the thermometer in the screen fell to 18° at Balmoral and 24° at Strathpeffer and West Linton, the readings on the grass being as low as 9° at Crathes, 12° at Balmoral, 16° at West Linton, and 19° at Morpeth (Cockle Park). After the 16th a strong south-westerly wind set in over the entire kingdom and occasioned a rapid melting of the snow in the north, which, together with a heavy fall of rain on the 17th, led to floods of considerable severity.

After the 19th, the conditions were almost persistently anti-cyclonic, and the wind therefore fell light, while thick fogs appeared in the closing week in many inland parts of the country, the weather in surrounding places being at the time exceedingly fine and bright. Temperature now fell decidedly, and between the 25th and 28th a very sharp frost was experienced over nearly the whole of England and Wales. In the screen the thermometer fell below 20° in many places, and slightly below 15° at some of the more central stations; while on the surface of the grass the readings were as low as 2° at Llangammarch Wells, 10° at Harrogate, and 11° at Morpeth, Sheffield, Birmingham and Portsmouth. In Ireland and Scotland the weather was less severe than in England, a similar feature being observed in connexion with the December frost, which, by way, occurred at almost precisely the same time in the month. At the close of January a north-westerly breeze sprang up, and the thermometer rose somewhat decidedly, but over the country generally it remained below its normal level for the time of year.

Over England the mean temperature of the month differed but little from the average. In Ireland there was a general excess of warmth, while in Scotland the results were very discordant, some stations showing an excess and others a slight deficiency.



Correspondence.

To the Editor of Symons's Meteorological Magazine.

THE LOW TEMPERATURE OF DECEMBER IN LONDON.

I SEE by a note in the last number, that the maximum temperature of $23^{\circ}\cdot7$ in December 29th last is the lowest maximum recorded at Camden Square, with one exception, in 51 years. It is interesting to observe the effect of dense white fog such as we get in a low-lying station like this (16 ft. above sea level), situated practically in a river valley. I have registered two maxima lower than the one you quote, and one equal to it in 25 years here, viz.: January 4th, 1893, $22^{\circ}\cdot1$; January 1st, 1887, $22^{\circ}\cdot5$; December 14th, 1890, $23^{\circ}\cdot8$. The maximum here on December 29th last was $24^{\circ}\cdot8$.

I am responsible for the maximum of $19^{\circ}\cdot5$ during the day of December 22nd, 1890, quoted in Mr. Hawke's letter, but emphasis must be laid on *day*, i.e., up to 9 p.m., as by 9 a.m. next day the temperature had risen to $29^{\circ}\cdot5$. Similarly on January 5th, 1894, the maximum up to 9 p.m. was only 21° .

On January 25th this year the maximum here was $34^{\circ}\cdot3$, while at St. James' Park it was 41° , again owing to thick white fog just here.

G. SEARLE.

30, Edith Road, West Kensington, W., January 27th, 1909.

THE QUESTION OF SUNSPOT INFLUENCE.

It occurred to me lately to treat the subject in this way:—

From the series of annual sunspot numbers (1841–1907, Wolf & Wolfer's), pick out the 12 highest and the 12 lowest, noting the years. Call those year groups A and B. Next, find the averages of various temperature items, at Greenwich, in the years of Group A, and in those of B, and compare those averages.

The group A contains (in descending order), '70, '48, '71, '72, '47, '49, '60, '59, '93, '94, '61, '92. Group B (in ascending order), '01, '78, '56, '02, '79, '89, '55, '88, '90, '67, '00, '43.

The items dealt with in the table below are these:—*a*, number of frost days in the year; *b*, frost days in first half; *c*, frost days in second half; *d*, frost days in December–February (following year); *e*, days with 70° or more; *f*, days with 80° or more; *g*, mean temperature of spring; *h*, mean temperature of autumn; *i*, warm months in year.

	<i>Averages.</i>								
	<i>a.</i>	<i>b.</i>	<i>c.</i>	<i>d.</i>	<i>e.</i>	<i>f.</i>	<i>g.</i>	<i>h.</i>	<i>i.</i>
Group A	53·9	36·1	17·8	33·6	80·5	16·7	48·3	50·1	6·5
„ B	63·2	41·3	21·8	40·1	66·2	9·9	46·5	50·0	5·1
A–B	–9·3	–5·2	–4·0	–6·5	+14·3	+6·8	+1·8	+·1	+1·4

These data seem to agree in indicating more warmth, on the

whole, when sunspots are numerous than when they are few. Of the seasons, (mean temp.) I have given only spring and autumn (the others being dealt with otherwise), but it could be shown that *any three contiguous months* present the same relation. In autumn the difference is least of all; in February-April greatest ($+2^{\circ}1$).

While most of those differences are considerable, it is doubtful, I think, if the *maximum* contrasts are brought out by this method, at least in the case of winter cold, where some tendency to "lag" may be perceived.

ALEX. B. MACDOWALL.

A PECULIAR RAINBOW.

BETWEEN 9.30 a.m. and 9.45 a.m. to-day a peculiar rainbow was observed here. Opposite the sun there was a bow, similar in form to that of an ordinary rainbow, the highest point of which I should judge to be about 40° above the horizon. The bow, however, was nearly colourless, the brightest portion appearing quite white, with a darker reddish tinge on the outside, and perhaps just a trace of violet inside. The most peculiar thing, however, was that the bow appeared not to be associated with falling rain in the usual way, but to be formed in the clouds; for the white illuminated part showed up, very distinctly, small cirro-stratus clouds which were continually passing by from the N.W., whilst the bow remained stationary. The lower side portions of the bow, and at times the whole, were obscured by passing scud. The sun was not shining *here* at the time. There had been a good deal of rain in the night, and the weather was unsettled and showery.

ARTHUR PEARSE JENKIN, F.R.Met.Soc.

Treowgie, Redruth, January 8th, 1909.

THUNDER SQUALL ON JANUARY 7th.

A VERY short, but violent thunder squall passed over this district on the night of January 7th. The weather previous to the disturbance had been overcast and squally, with a falling barometer. Towards 11.45 p.m. a dense black cloud (cu-nim.) moved up rapidly from the W., the wind increasing suddenly to almost gale force, and accompanied by a marked moaning sound. There was a loud rolling clap of thunder at 11.50 p.m. at zenith, very heavy rain commencing at 11.52 p.m., the wind-force being estimated as 7. The falling rain had a distinctly rotatory motion (as seen against an arc lamp), and was dashed to the ground with great force. A second thunder clap occurred at 11.54 p.m., followed one second afterwards by fork lightning of a red colour. The rain ceased at 11.58 p.m., and at 12 p.m. the wind had dropped to a light breeze from N.W.; sheet lightning was seen to S. There was a sudden increase in pressure amounting to .03 in., and a fall in temperature of 6° ; rainfall, .10 in. No hail fell, the path lying to the northward.

Epsom, January 9th, 1909.

SPENCER C. RUSSELL

METEOROLOGICAL OBSERVATIONS AT PEMBA.

By THEODORE BURTT.

FROM time to time accounts of the observations taken at the Friends' Industrial Mission, Banani, Pemba, have been given in the Magazine.

I now enclose a summary of observations as regards temperature and rainfall for the past nine years, and feel sure it will interest some of your readers. The variation in temperature is seen to be very small, whereas that in rainfall is very considerable: 1906 showing an excess of 45·34 in. above 1903.

Summary of Meteorological Observations taken at Banani, Pemba, East Africa, for 9 years, 1899-1907.

Year.	Mean Max.	Mean Min.	Absolute Max.	Absolute Min.	Extreme Range.	Rainfall. in.	Rain Days.
1899.....	83·3	70·2	92·0	65·0	27·0	105·24	149
1900.....	83·5	71·3	95·0	66·0	29·0	90·35	160
1901.....	81·8	70·4	90·5	65·0	25·5	92·78	166
1902.....	82·8	71·4	91·0	67·0	24·0	68·72	132
1903.....	82·3	71·3	91·5	66·0	25·5	63·24	136
1904.....	81·0	70·4	90·5	65·0	25·5	86·23	156
1905.....	81·6	71·3	90·5	64·0	26·5	101·28	153
1906.....	81·4	70·5	92·0	64·0	28·0	108·58	175
1907.....	81·5	70·2	89·0	63·0	26·0	76·23	177
For 9 years	82·1	70·8	95·0	63·0	32·0	88·07	156

The question suggests itself whether there is any connection between the amount of rain at Pemba and in India. The monsoon blows from the African coast in the direction of India, and it seems possible that a light rainfall here might indicate a light rainfall there: or, on the other hand, might it be that because we get less rain than usual they will get more in India?

During the first six months of 1908 we had a rainfall of 47·41 in., so we shall probably have rather less than the average of the past nine years.

REVIEW.

The Judgment of Paris and some other legends astronomically considered.

By the HON. EMMELINE M. PLUNKET. With illustrations. London, John Murray, 1908. Size 8 x 6. Pp. vi. + 200.

AN interesting and suggestive discussion of Homeric legends on the hypothesis that the various heroes and heroines represent astronomical bodies or events, and the incidents of their history refer to the relative positions of the sun, moon and planets to the stars at various seasons of the year. The ingenuity of the chain of hypothesis is worthy of the highest praise, and the authoress writes with a restraint and caution which command respect; but for our part we cannot see that the result is more than an indication of what may possibly be the case, and does not amount to a proof that it probably was.

ROYAL METEOROLOGICAL SOCIETY.

THE Annual General Meeting of this Society was held on January 20th, at the Institution of Civil Engineers, Westminster, Dr. H. R. Mill, President, in the chair.

The Council, in presenting their Report, referred to the increasing interest in meteorology which is apparent throughout the country, and they believe that this is, in some measure, due to the scheme of lectures inaugurated by the Society. Particulars were given of the investigation into the meteorological conditions of the free atmosphere by means of kites and balloons, of the prize competition for teachers, of the lectures and other work carried on by the Society during the past year. The number of Fellows now on the roll is 746.

The Report having been adopted, and certain alterations made in the by-laws to ensure a definite amount of fresh blood in the Council each year, and to remove some restrictions on the rights of authors in their papers, the thanks of the Society were given to the Council and to the Auditors, and also to the President and Council of the Institution of Civil Engineers for permitting the Society to hold its meetings at the Institution.

The President then delivered an address on "Some Aims and Efforts of the Society in Relation to the Public and to Meteorological Science." He pointed out that the Fellows of the Society belonged to at least three orders, *viz.* :—Meteorologists by profession or special study, observers, and persons interested in meteorology though not themselves actively engaged in meteorological work. The last order was representatives of the more intelligent part of the public. The careless public were notoriously impatient of scientific methods and singularly credulous regarding the pretensions of paradoxers, and a certain section of the press reflected the views of the careless public with great fidelity. The Society, although mainly concerned with the advancement of the science of meteorology, owed something to the public, and one of its aims was to correct popular misconceptions and endeavour to diffuse sound views. While there was no room in a scientific society for the discussion of paradoxical views which were in conflict with the proved principles of physics, there was no reason why the aims of the paradoxers, to arrive at long-distance forecasts of weather, to establish climatic cycles or even to control the weather, should not be followed out by scientific methods.

With regard to the failure of the public to understand the purpose or realize the importance of meteorological work, the history of the efforts of the Hampstead Scientific Society to establish a second-order station on Hampstead Heath, and of the popular opposition which thwarted them, was referred to. Another aspect of popular ignorance was revealed in the exaggerated importance assigned to small differences in instrumental readings as indicating differences of climate between one place and another, and in the curious fear of low temperature and high rainfall which sometimes even led to the suppression of observations for fear of creating misconceptions. The public

seemed to have difficulty in realizing that dust, which is an accompaniment of dry weather, and not rain, is the greatest danger to health. The fear of conveying false impressions by publishing correct statistics had a very bad effect on the observer, disturbing that equanimity of mind which is necessary for the best work.

The President said that the present time was a very interesting period in the history of Meteorology, as the exploration of the free air was leading to great scientific advances. It was noticeable that other sciences had made gigantic strides when they were utilized for practical purposes, and it seemed to him that the advent of aerial navigation would do for meteorology what the introduction of submarine cables did for the allied science of oceanography. Aviation would make it more important to have an exact knowledge of atmospheric circulation, and of the disturbances due to changes in sun-heating as clouds passed, and especially of the nature of cyclones and squalls. Reference was made to the steps which had been taken towards co-operation between the various meteorological agencies of the country, and the hope was expressed that this might yet go further with good results.

A vote of thanks was given to Dr. Mill for his services as President, and also for his address, on the motion of Mr. Druce, seconded by Dr. Shaw.

The following were elected the Council for 1909 :—

President. Lt.-Col. H. Mellish ; *Vice-Presidents*, Mr. W. W. Bryant, Mr. W. H. Dines, F.R.S., Commander M. W. C. Hepworth, C.B., R.N.R., and Dr. H. R. Mill ; *Treasurer*, Dr. C. Theodore Williams ; *Secretaries*, Mr. F. C. Bayard and Commander W. F. Caborne, C.B., R.N.R. ; *Foreign Secretary*, Dr. R. H. Scott, F.R.S. ; *Councillors*, Mr. R. Bentley, Mr. F. J. Brodie, Mr. C. J. P. Cave, Dr. H. N. Dickson, Mr. F. Druce, Mr. E. Gold, Mr. R. Inwards, Mr. B. Latham, Mr. R. G. K. Lempfert, Colonel H. E. Rawson, C.B., Capt. R. C. Warden, and Commander D. Wilson-Barker, R.N.R.

During the evening the following were elected Fellows of the Society :—Lieut. W. de M. Baynham, R.N.R., Dr. J. Knight, Capt. P. N. Layton, Mr. W. P. J. Le Brocq, M.A., Mr. R. E. Nicholas, F.L.S., and Mr. W. Sedgwick.

METEOROLOGICAL NEWS AND NOTES.

IN THE DECEMBER NUMBER of this Magazine, pp. 249–250 were missing from a few copies. Readers are requested to refer to their copies, and on letting the editor know that they are incomplete, they will receive the missing leaf for insertion. Application should be made to 62, Camden Square, London, N.W.

DR. H. R. MILL WILL LECTURE for the Gilchrist Educational Trust on "Rain," at the following places in the north of England during the first week of March :—at Broomhill on March 1st, at Seaton-Delavel on the 2nd, at Usworth and Washington on the 3rd, at New Herrington on the 4th, and at Loftus-in-Cleveland on the 5th. He

hopes to be able to inspect a number of rain gauges in the district in the course of his visit.

THE PORT ELIZABETH FLOOD ON NOVEMBER 16th, 1908, was due to one of the very local, but intense, downpours which occur especially along the coast districts of South Africa. Cape Town had such a visitation shortly before the visit of the British Association, in 1905. The damage at Port Elizabeth, at first perhaps over-estimated at more than £200,000, was due to the utter inability of the small creek, Baaken's River, to accommodate the abnormal down-rush, although the gathering-ground of the stream goes back only some 10 or 15 miles, with an average width of 3 or 4 miles. The fact, however, that much of the mischief occurred on "reclaimed" ground, is significant. The fall in the city area was $3\frac{1}{4}$ inches, by no means enough to account for the change in two hours of a rivulet into a raging torrent 200 yards wide, and 20 to 30 feet deep. A short way back the floods overtopped a gorge some 150 feet wide and 40 to 50 feet deep. The rise was too sudden for people to do more than rush for their lives. Some had to swim to safety. Many buildings collapsed. A mule was saved by being washed on to the municipal stables roof, its comrades perishing. At the climax the waters rose six feet in five minutes, and *débris* from an upper bridge blocked the main bridge, diverting more water through the town. The centre of the downpour may have been on the farms of a Mr. Parkins and a Mr. Lovemore, lasting from 3 a.m. to 10.30 a.m. Both considered that a foot of rain fell. The mealie lands were stripped to the depth of the ploughing; all trees and bushes were swept away over a space of a mile along the river. By 2 o'clock the weather had changed to a glorious summer afternoon. So a few years back (1904 or 1905) at Durban, a few hours after a continuous fall of over 12 inches in about 30 hours, the water carts were again busy. The catchment area is only 36 square miles. A local estimate averages the fall over this at 10 inches, enough to account for a flood 50 feet deep, 150 feet wide, and over 15 miles in length.

HEAVY RAINFALL IN BARBADOS forms the subject of a note in the *West India Committee Circular* of January 5th, 1909, illustrated by two photographs of raging torrents, where, a couple of hours before, there was not a drop of water. The note runs:—"Mr. E. C. Jackman calls our attention to the remarkable partiality which has characterised the rainfall of Barbados during 1908. As an example he points out that between 11 a.m. and 1 p.m. on November 29th, no less than 4.25 ins. fell over an area of six or eight square miles. He happened, he writes, to be in the centre of the display. This heavy downfall in so short a time caused streams to appear where usually no water is to be found. Across the "Pine" Plantation, St. Michael, a river about 20 ft. broad rushed along to pour itself, with a resounding roar, into the culvert at the head of Bishop's Court Hill." One photograph shows the torrent passing into the culvert, where, a couple of hours before there was not a drop of moisture, and the other illustrates the river flowing across the "Pine."

RAINFALL TABLE FOR JANUARY, 1909.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	RAINFALL OF MONTH.	
					Aver. 1870-99. in.	1909. in.
Camden Square.....	<i>London</i>	51 32	0 8	111	1·89	·71
Tenterden.....	<i>Kent</i>	51 4	*0 41	190	2·36	·88
West Dean.....	<i>Hampshire</i>	51 3	1 38	137	2·68	·88
Hartley Wintney.....	".....	51 18	0 53	222	2·39	·94
Hitchin.....	<i>Hertfordshire</i> ...	51 57	0 17	238	1·81	·78
Winslow (Addington).....	<i>Buckinghamshr.</i>	51 58	0 53	309	2·05	·92
Bury St. Edmunds (Westley).....	<i>Suffolk</i>	52 15	*0 40	226	1·70	·95
Brundall.....	<i>Norfolk</i>	52 37	*1 26	66	1·67	·64
Winterbourne Steepleton...	<i>Dorset</i>	50 42	2 31	316	3·90	1·48
Torquay (Cary Green).....	<i>Devon</i>	50 28	3 32	12	3·19	1·57
Polapit Tamar [Launceston].....	".....	50 40	4 22	315	3·87	2·76
Bath.....	<i>Somerset</i>	51 23	2 21	67	2·52	1·17
Stroud (Upfield).....	<i>Gloucestershire</i> ..	51 44	2 13	226	2·46	1·10
Church Stretton (Wolstaston)..	<i>Shropshire</i>	52 35	2 48	800	2·81	1·63
Coventry (Kingswood).....	<i>Warwickshire</i> ...	52 24	1 30	340	2·34	1·16
Boston.....	<i>Lincolnshire</i>	52 58	0 1	25	1·59	·90
Workshop (Hodsock Priory).....	<i>Nottinghamshire</i>	53 22	1 5	56	1·74	1·12
Derby (Midland Railway).....	<i>Derbyshire</i>	52 55	1 28	156	1·95	1·28
Bolton (Queen's Park).....	<i>Lancashire</i>	53 35	2 28	390	3·38	2·28
Wetherby (Ribston Hall)...	<i>Yorkshire, W.R.</i>	53 59	1 24	130	1·89	·80
Arncliffe Vicarage.....	".....	54 8	2 6	732	6·33	4·82
Hull (Pearson Park).....	"..... <i>E.R.</i>	53 45	0 20	6	1·80	·65
Newcastle (Town Moor)...	<i>Northumberland</i>	54 59	1 38	201	1·96	·93
Borrowdale (Seathwaite)...	<i>Cumberland</i>	54 30	3 10	423	14·71	10·63
Cardiff (Ely).....	<i>Glamorgan</i>	51 29	3 13	53	3·85	2·06
Haverfordwest (High Street).....	<i>Pembroke</i>	51 48	4 58	95	5·13	2·34
Aberystwyth (Gogerddan).....	<i>Cardigan</i>	52 26	4 1	83	3·87	3·22
Llandudno.....	<i>Carnarvon</i>	53 20	3 50	72	2·57	2·16
Cargen [Dumfries].....	<i>Kirkcudbright</i> ...	55 2	3 37	80	4·54	5·71
Hawick (Braxholm).....	<i>Roxburgh</i>	55 24	2 51	457	3·19	3·43
Edinburgh (Royal Observy.).....	<i>Midlothian</i>	55 55	3 11	442	...	2·61
Girvan (Pinnore).....	<i>Ayr</i>	55 10	4 49	207	4·92	5·05
Glasgow (Queen's Park)...	<i>Renfrew</i>	55 53	4 18	144	3·25	5·36
Inveraray, (Newtown).....	<i>Argyll</i>	55 14	5 4	17	6·63	9·35
Mull (Quinish).....	".....	56 36	6 13	35	5·85	6·50
Dundee (Eastern Necropolis).....	<i>Forfar</i>	56 28	2 57	199	2·10	1·47
Braemar.....	<i>Aberdeen</i>	57 0	3 24	1114	2·91	3·30
Aberdeen (Cranford).....	".....	57 8	2 7	120	2·32	1·95
Cawdor.....	<i>Nairn</i>	57 31	3 57	250	2·14	2·43
Fort Augustus (S. Benedict's).....	<i>E. Inverness</i> ...	57 9	4 41	68	5·10	6·18
Loch Torridon (Bendamph).....	<i>W. Ross</i>	57 32	5 32	20	8·75	12·00
Dunrobin Castle.....	<i>Sutherland</i>	57 59	3 56	14	2·62	3·36
Castletown.....	<i>Caithness</i>	58 35	3 23	100	...	3·71
Killarney (District Asylum).....	<i>Kerry</i>	52 4	9 31	178	6·57	4·58
Waterford (Brook Lodge)...	<i>Waterford</i>	52 15	7 7	104	4·06	1·97
Broadford (Hurdlestown).....	<i>Clare</i>	52 48	8 38	167	2·98	3·33
Abbey Leix (Blandsfort).....	<i>Queen's County</i> ..	52 56	7 17	532	3·14	2·69
Dublin (Fitz William Square).....	<i>Dublin</i>	53 21	6 14	54	2·16	1·26
Mullingar (Belvedere).....	<i>Westmeath</i>	53 29	7 22	367	3·06	2·72
Ballinasloe.....	<i>Galway</i>	53 20	8 15	160	3·49	2·55
Crossmolina (Enniscoo).....	<i>Mayo</i>	54 4	9 18	74	5·00	5·12
Collooney (Markree Obsy.).....	<i>Sligo</i>	54 11	8 27	127	3·61	4·97
Seaforde.....	<i>Down</i>	54 19	5 50	180	3·63	2·30
Londonderry (Creggan Res.).....	<i>Londonderry</i> ...	54 59	7 19	320	3·56	5·43
Omagh (Edenfel).....	<i>Tyrone</i>	54 36	7 18	280	3·34	3·79

RAINFALL TABLE FOR JANUARY, 1909—*continued.*

RAINFALL OF MONTH (<i>con.</i>)				RAINFALL FROM JAN. 1.				Mean Annual 1870-1899.	STATION.
Diff. from Av. in.	% of Av.	Max. in 24 hours. in. Date.	No. of Days	Aver. 1870-99. in.	1909. in.	Diff. from Aver. in.	% of Av.		
-1.18	38	.16 10	13	...	...	...	...	25.16	Camden Square
-1.48	37	.22 14	17	...	...	...	...	28.36	Tenterden
-1.80	33	.29 14	14	...	...	...	...	29.93	West Dean
-1.45	39	.15 10	16	...	...	...	...	27.10	Hartley Wintney
-1.03	43	.19 7	11	...	...	...	...	24.66	Hitchin
-1.13	45	.15 10	14	...	...	...	...	26.75	Addington
- .75	56	.17 8, 9	11	...	...	...	...	25.39	Westley
-1.03	38	.14 8, 29	11	...	...	...	...	25.40	Brundall
-2.42	38	.30 14	16	...	...	...	...	39.00	Winterbourne Stpltn
-1.62	49	.56 12	15	...	...	...	...	35.00	Torquay
-1.11	71	.45 10	17	...	...	...	...	38.85	Polapit Tamar
-1.35	46	.24 18	15	...	...	...	...	30.75	Bath
-1.36	45	.44 15	13	...	...	...	...	29.85	Stroud
-1.18	58	.38 7	15	...	...	...	...	33.04	Wolstaston
-1.18	50	.37 7	10	...	...	...	...	29.21	Coventry
- .69	57	.18 7, 9	12	...	...	...	...	23.30	Boston
- .62	64	.25 13	13	...	...	...	...	24.70	Hodsock Priory
- .67	66	.27 7	15	...	...	...	...	26.18	Derby
-1.10	67	.52 14	19	...	...	...	...	42.43	Bolton
-1.09	42	.23 13, 14	8	...	...	...	...	26.96	Ribston Hall
-1.51	76	1.26 14	20	...	...	...	...	60.96	Arncliffe Vic.
-1.15	36	.11 13, 14	14	...	...	...	...	27.02	Hull
-1.03	47	.20 15	13	...	...	...	...	27.99	Newcastle
-4.08	72	2.00 17	19	...	...	...	...	132.68	Seathwaite
-1.79	54	.75 15	16	...	...	...	...	42.81	Cardiff
-2.79	46	.44 10	17	...	...	...	...	47.88	Haverfordwest
- .65	83	.65 10	18	...	...	...	...	45.41	Gogerddan
- .41	84	.59 14	18	...	...	...	...	30.98	Llandudno
+1.17	126	1.30 18	14	...	...	...	...	43.43	Cargen
+ .24	108	.66 13	16	...	...	...	...	34.80	Branxholm
...	...	.45 14	14	...	...	...	...	...	Edinburgh
+ .13	103	.72 14	23	...	...	...	...	48.87	Girvan
+2.11	165	1.04 17	19	...	...	...	...	35.80	Glasgow
+2.72	141	1.77 17	26	...	...	...	...	57.90	Inveraray.
+ .65	111	.81 17	26	...	...	...	...	57.53	Quinish
- .63	70	.38 14	13	...	...	...	...	28.95	Dundee
+ .39	113	...	...	...	...	...	...	36.07	Braemar
- .37	84	.70 14	15	...	...	...	...	33.01	Aberdeen
+ .29	114	.70 13	12	...	...	...	...	29.37	Cawdor
+1.08	121	1.60 17	24	...	...	...	...	43.71	Fort Augustus
+3.25	137	1.82 12	30	...	...	...	...	86.50	Bendamph
+ .74	128	.48 13	15	...	...	...	...	31.60	Dunrobin Castle
...	...	.46 10	24	...	...	...	...	...	Castletown
-1.99	70	1.15 17	25	...	...	...	...	58.11	Killarney
-2.09	48	.44 14	15	...	...	...	...	39.30	Waterford
+ .35	112	.60 17	22	...	...	...	...	33.47	Hurdlestown
- .45	86	.50 15	17	...	...	...	...	35.19	Abbey Leix
- .90	58	.22 10	14	...	...	...	...	27.75	Dublin
- .34	89	.65 15	16	...	...	...	...	36.48	Mullingar.
- .94	73	.53 17	22	...	...	...	...	37.04	Ballinasloe
+ .12	102	1.20 17	22	...	...	...	...	50.50	Enniscoie
+1.36	138	1.36 17	24	...	...	...	...	41.83	Markree Obsy.
-1.33	63	.46 13	21	...	...	...	...	38.61	Seaforde
+1.87	153	1.15 17	24	...	...	...	...	41.20	Londonderry
+ .45	113	1.38 17	25	...	...	...	...	37.85	Omagh

SUPPLEMENTARY RAINFALL, JANUARY, 1909.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Warlingham, Redvers Road	1·35	XI.	Rhayader, Tyrmynydd	4·97
„	Ramsgate	·65	„	Lake Vyrnwy	4·82
„	Steyning.....	1·24	„	Llangyhanfal, Plâs Draw....	1·92
„	Hailsham	1·18	„	Llwdiarth Esgob.....	2·30
„	Totland Bay, Aston House ..	·91	„	Snowdon, Cwm Dyli	6·56
„	Emsworth, Redlands.....	·98	„	Lligwy	2·17
„	Stockbridge, Ashley	1·02	„	Douglas, Woodville	1·85
„	Reading, Calcot Place.....	·76	XII.	Stoneykirk, Ardwell House ..	1·75
III.	Harrow Weald, Hill House ..	·81	„	Dalry, The Old Garroch ...	7·77
„	Oxford, Magdalen College....	·75	„	Langholm, Drove Road.....	4·71
„	Pitsford, Sedgebrook.....	1·08	„	Montaive, Maxwelton House ..	6·56
„	Huntingdon, Brampton.....	·84	XIII.	N. Esk Reservoir [Penicuik]	4·45
„	Woburn, Milton Bryant.....	·69	XIV.	Maybole, Knockdon Farm..	4·10
„	Wisbech, Monica Road.....	·75	XV.	Campbeltown, Witchburn...	4·31
IV.	Southend Water Works.....	·89	„	Glenreaddell Mains	4·57
„	Colchester, Lexden.....	·71	„	Ballachulish House.....	11·05
„	Newport, The Vicarage.....	·86	„	Islay, Eallabus	6·10
„	Rendlesham	·43	XVI.	Dollar Academy	4·94
„	Swaffham	·75	„	Loch Leven Sluice	3·72
„	Blakeney	·89	„	Balquhiddier, Stronvar	10·24
V.	Bishops Cannings	·76	„	Perth, The Museum	2·64
„	Ashburton, Druid House ...	2·68	„	Coupar Angus	2·19
„	Honiton, Combe Raleigh ...	1·80	„	Blair Atholl.....	4·48
„	Okehampton, Oaklands.....	3·13	„	Montrose, Sunnyside Asylum	1·22
„	Hartland Abbey	1·78	XVII.	Alford, Lynturk Manse ...	1·61
„	Lynmouth, Rock House ...	3·00	„	Keith Station	·93
„	Probus, Lamellyn	2·96	XVIII.	N. Uist, Lochmaddy	3·52
„	North Cadbury Rectory ...	1·50	„	Alvey Manse	5·15
VI.	Clifton, Pembroke Road ...	1·58	„	Loch Ness, Drumnadrochit.	8·92
„	Ross, The Graig	1·06	„	Glencarron Lodge	3·13
„	Shifnal, Hatton Grange.....	1·03	„	Fearn, Lower Pitkerrie.....	5·76
„	Blockley, Upton Wold	1·33	XIX.	Invershin	4·49
„	Worcester, Boughton Park ..	1·00	„	Altnaharra	3·50
VII.	Market Overton	1·05	„	Bettyhill	2·09
„	Market Rasen	·90	„	Mitchelstown Castle	3·68
„	Bawtry, Hesley Hall.....	·83	„	Glenam [Clonmel]	3·02
„	Buxton.....	2·54	„	Ballingarry, Gurteen	4·34
VIII.	Neston, Hinderton Lodge....	1·72	„	Miltown Malbay.....	1·43
„	Southport, Hesketh Park...	2·09	„	Gorey, Courtown House ...	2·42
„	Chatburn, Middlewood	2·60	„	Moynalty, Westland	2·65
„	Cartmel, Flookburgh	2·70	„	Athlone, Twyford	4·05
IX.	Langsett Moor, Up. Midhope	3·38	XXI.	Woodlawn	5·06
„	Scarborough, Scalby	1·06	„	Westport, St. Helens	3·15
„	Ingleby Greenhow	·88	„	Mohill	4·17
„	Mickleton.....	1·62	XXII.	Enniskillen, Portora	2·85
X.	Bardon Mill, Beltingham ...	2·39	„	Dartrey [Cootehill].....	2·26
„	Ewesley, Font Reservoir ...	1·33	„	Warrenpoint, Manor House ..	1·87
„	Ilderton, Lilburn Cottage....	1·86	„	Banbridge, Milltown	2·55
„	Keswick, The Bank	6·65	„	Belfast, Springfield	4·01
XI.	Llanfrechfa Grange.....	1·30	„	Bushmills, Dundarave	4·39
„	Treherbert, Tyn-y-waun ...	4·30	„	Sion House	7·28
„	Carmarthen, The Friary.....	2·43	„	Killybegs	5·46
„	Castle Malgwyn [Llechryd]..	2·76	„	Horn Head ...	
„	Plynlimon.....	7·70			
„	Crickhowell, Ffordlas.....	2·70			
„	New Radnor, Ednol	2·54			

METEOROLOGICAL NOTES ON JANUARY, 1909.

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.—Dull, sunless conditions characterized the first week, but the following fortnight was fair or fine with much wind between 13th and 18th. Severe frosts occurred in the last week with unusually dense fog throughout 27th, 28th, and to noon on 29th. Duration of sunshine 44·6* hours, and of R 19·0 hours. Mean temp. 38°·5, or 0°·4 above the average. Shade max. 51°·0 on 14th; min. 24°·6 on 25th. F10, f 23.

TENTERDEN.—Duration of sunshine 73·0† hours. Shade max. 50°·0 on 11th; min. 19°·0 on 29th. F 10, f 21.

TOTLAND BAY.—Duration of sunshine 78·1* hours. Mean temp. 41°·0. Shade max. 52°·3 on 1st; min. 25°·1 on 28th. F 8, f 15.

PITSFORD.—R ·58 in. below the average. Mean temp. 36°·3. Shade max. 49°·1 on 10th; min. 20°·4 on 26th and 28th. F 15.

TORQUAY.—Duration of sunshine 76·1* hours, or 11·2 hours above the average. Mean temp. 42°·2, or 0°·2 below the average. Shade max. 54°·2 on 10th; min. 28°·1 on 28th. F 7, f 15.

NORTH CADBURY.—The first week and last 13 days were fine and very still, but the weather was boisterous from 13th to 18th. Shade max. 52°·5 on 1st; min. 25°·5 on 27th and 28th. F 13, f 20.

ROSS.—Shade max. 50°·2 on 18th; min. 22°·5 on 28th. F 13, f 21.

HODSOCK PRIORY.—Shade max. 53°·0 on 3rd; min. 15°·5 on 26th. F 14, f 26.

SOUTHPORT.—R ·61 in. below the average of 35 years. Duration of sunshine 52·2* hours, or 7·0 hours above the average. Duration of R 42·4 hours. Mean temp. 38°·9, or 0°·3 above the average. Shade max. 52°·2 on 18th; min. 24°·0 on 28th. F 8, f 16.

HULL.—Duration of sunshine 18·5* hours. Shade max. 50°·0 on 18th; min. 19°·0 on 27th. F 14, f 24.

HAVERFORDWEST.—Mild and stormy to 18th, and then much colder to 27th; very little fog. Duration of sunshine 56·8* hours. Shade max. 58°·5 on 19th; min. 20°·6 on 23rd. F 8, f 11.

CARMARTHEN.—Wet and dull in the first half, and cold and frosty later. Bad weather for the roads which were much cut up.

LLANDUDNO.—Shade max. 52°·5 on 17th; min. 25°·5 on 24th. F 5.

DOUGLAS.—Fine and mild at first, but from 11th to 18th it was bitterly cold, and there were violent gales with heavy R and H. The weather then became somewhat milder with damp fogs.

DUMFRIES.—Shade max. 52°·0 on 3rd; min. 21°·0 on 25th. F 16.

EDINBURGH.—Shade max. 51°·5 on 2nd; min. 28°·4 on 25th. F 11, f 18.

DUNDEE.—Shade max. 49°·9 on 18th; min. 25°·0 on 28th. F 15.

FORT AUGUSTUS.—Shade max. 49°·9 on 2nd; min. 25°·7 on 13th. F 15.

WATERFORD.—Shade max. 54°·0 on 3rd and 4th; min. 26°·0 on 19th and 24th. F 10.

DUBLIN.—Open, rather damp and cloudy conditions with W. and S.W. winds. Mean temp. 42°·3. Shade max. 53°·2 on 1st and 18th; min. 31°·7 on 16th. F 1, f 14.

MARKREE.—Shade max. 54°·0 on 17th; min. 26°·0 on 29th. F 6, f 21.

WARRENPOINT.—Shade max. 55°·0 on 2nd; min. 30°·0 on 19th. F 4, f 15.

* Campbell-Stokes

† Jordan

Climatological Table for the British Empire, August, 1908.

STATIONS. (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain		Aver. Cloud.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
London, Camden Square	83.9	3	45.4	12	71.0	52.5	54.3	82	125.6	40.5	2.94	16	5.3
Malta	90.1	7	69.5	20	84.1	72.5	68.2	77	157.2	...	.00	0	2.2
Lagos	86.0	29	70.0	11	82.9	73.5	72.4	79	161.0	65.0	2.60	10	8.2
Cape Town	71.7	26	37.7	1	61.8	47.9	48.0	77	...	...	3.03	13	6.4
Durban, Natal	99.9	30	47.7	6	74.4	56.2	...	...	148.3	...	1.80	13	4.1
Johannesburg	76.8	31	31.3	3	66.0	44.9	42.6	70	133.6	30.6	.16	3	1.7
Mauritius	79.5	24	55.8	30	75.9	63.3	61.2	76	137.1	48.0	2.71	16	5.8
Calcutta... ..	90.8	9, 25	76.5	30	88.3	78.8	77.9	87	161.1	74.9	14.43	22	8.3
Bombay... ..	85.1	29	75.4	16	83.3	76.8	75.4	86	127.4	71.8	9.67	27	9.3
Madras	98.9	17	71.6	25	95.2	77.7	73.9	75	145.0	71.0	4.70	12	6.6
Kodaikanal	66.6	23*	50.8	3	63.3	52.4	51.6	83	137.6	42.8	5.08	21	6.5
Colombo, Ceylon	88.7	28	73.2	5	86.3	76.8	73.8	78	158.8	73.0	2.14	12	6.1
Hongkong	92.3	7	74.9	21	87.3	78.5	76.4	83	143.2	...	12.07	17	6.6
Melbourne	61.7	13	31.0	1	56.0	41.2	39.7	72	109.2	26.4	1.26	16	6.0
Adelaide	70.8	15	36.1	26	60.3	41.8	43.4	74	125.3	26.5	2.35	18	6.2
Coolgardie	72.0	14	32.0	31	60.5	39.0	38.4	64	137.4	29.4	.87	9	5.2
Perth	70.1	28	35.4	31	63.9	46.0	44.6	69	131.6	29.9	4.41	16	4.9
Sydney	72.2	22	40.9	26	61.1	46.8	45.8	80	103.1	33.0	9.68	20	...
Wellington	58.0	18	33.0	1, 2	51.3	40.4	38.4	75	98.0	26.0	3.39	14	6.4
Auckland	62.0	24	38.0	8	56.4	45.1	43.5	77	120.0	32.0	3.78	13	5.0
Jamaica, Kingston	93.1	4	71.9	17	90.7	74.1	71.0	75	...	...	1.41	9	4.3
Trinidad ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Grenada	88.2	7	72.6	14	84.7	75.6	72.6	77	148.4	...	6.86	27	5.2
Toronto	92.0	4	43.0	23	77.8	56.1	...	...	128.3	40.8	2.83	6	3.5
Fredericton	83.0	11	38.0	29	73.1	51.8	...	73	...	...	3.62	7	4.4
St. John's, N.B.	76.2	14	51.5	21	67.3	55.0	...	...	...	...	5.21	14	5.2
Victoria, B.C.	83.7	18	47.4	2	70.5	51.4	...	70	...	...	.67	4	3.0

* and 27.

MALTA.—Mean temp. of air 77°·9. Mean daily bright sunshine 12·4 hours, and mean hourly velocity of wind 6·8 miles.

Johannesburg.—Bright sunshine 298 hours.

Mauritius.—Mean temp. of air 1°·1, of dew point 1°·8, and R .47 in., above averages. Mean hourly velocity of wind 11·3 miles, or 1·0 below average.

KODAIKANAL.—Bright sunshine 153 hours.

COLOMBO.—Mean temp. of air 79°·2, or 1°·5 below, of dew point 0°·5 above, and R 1·42 in. below, averages. Mean hourly velocity of wind, 6·4 miles.

HONGKONG.—Mean temp. of air 82°·1. Bright sunshine 219·9 hours. R 2·10 in. below average. Mean hourly velocity of wind 7·1 miles.

Melbourne.—Mean temp. of air 2°·4 below, and R .55 in. below, averages.

Adelaide.—Mean temp. of air 1°·2 below the average. R normal.

Sydney.—Mean temp. of air 0°·8 below, and R 6·39 in. above, averages.

Wellington.—Mean temp. of air 2°·6 below, and R 1·54 in. below, averages. Bright sunshine 152·5.

RAINFALL OF THAMES VALLEY, FEBRUARY, 1909.



Water-level of River Thames above Teddington, and River Lee above Faldes Weir.