

Symons's Meteorological Magazine.

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VOL. LI.

METEOROLOGICAL OBSERVATIONS AT LU-KIA-PANG, CHINA, for 1914.

By REV. J. DE MOIDREY, S.J.

THE Lu-kia-pang Observatory is primarily intended for magnetic work and is the only one in China at which continuous automatic records are kept. This work had been carried on at Zi-ka-wei, near Shanghai, since 1877, or even since 1874, but the installation of electric tramways made it necessary to select a new site in 1908. Lu-kia-pang was chosen, 40 kilometres distant and halfway between Shanghai and Soochow, in the great, richly-watered and fertile plain of the lower Yang-tse river. The altitude is about 3 metres, the latitude $31^{\circ} 19' N.$, and the longitude $121^{\circ} 2' 26'' E.$, these data being obtained by triangulation.

There is in connection with the Observatory a second order meteorological station equipped with the following instruments: a standard mercury barometer and Richard barograph; a Fuess psychrometer, maximum and minimum thermometers and, in the same screen, a thermograph and hygrograph; a rain gauge; a wind-vane on a mast 18 metres high; an anemometer with telephonic connections; a sunshine recorder of our own make, giving a double trace on one cylinder on the scale of 30 mm. to an hour. There is also a small equatorial telescope for observing sun-spots. The time is obtained each day from Zi-ka-wei by telephone.

Observations are made daily at 8 a.m., 2 p.m. and 8 p.m. Empirical corrections are used to give the daily mean values, which are more accurate than the mean of the three observations.

An annual summary is published in our bulletin, and until 1913 it appeared also in the *Meteorologische Zeitschrift*. An abbreviated summary is also included in our 1914 annual, page 67.

We now send the observations for 1914 and 1915. The pressure records are given in millibars, but the temperature is expressed in degrees centigrade, not in degrees absolute. The hours of maximum and minimum temperatures, but not the values themselves, are taken from the Richard thermograph charts. They may be a few minutes late on account of the sluggishness of the instrument.

1914.

I.—Barometric Pressure. Millibars.

	8 a.m.	2 p.m.	8 p.m.	Daily Mean
Jan.	1026·6	1024·3	1025·9	1025·8
Feb.	1023·7	1022·3	1023·9	1023·4
Mar.	1019·1	1017·6	1018·0	1018·2
April	1015·7	1013·9	1015·1	1014·8
May	1013·2	1011·8	1012·4	1012·4
June	1005·9	1004·8	1005·2	1005·2
July	1003·4	1002·3	1002·7	1002·7
Aug.	1005·7	1004·5	1005·2	1005·0
Sept.	1012·1	1010·9	1012·1	1011·6
Oct.	1020·3	1019·5	1020·0	1019·5
Nov.	1023·2	1021·2	1022·6	1022·2
Dec.	1025·9	1024·1	1025·5	1025·1
Year	1016·2	1014·7	1015·7	1016·5

IV.

Mean amount of
Cloud at 8 a.m.,
2 p.m. & 8 p.m.

Jan. 3·8
Feb. 7·3
Mar. 7·1
April 6·6
May 7·7
June 7·6
July 4·3
Aug. 6·0
Sept. 6·2
Oct. 7·0
Nov. 5·3
Dec. 5·1
Year 6·2

V.

Days with
Thunder-
storms.

Jan. 0
Feb. 1
Mar. 0
April 4
May 2
June 2
July 3
Aug. 7
Sept. 1
Oct. 3
Nov. 2
Dec. 0
Year 25

1914.

II.—Temperature. Degrees Centigrade.

MEAN DAILY.

MINIMUM.

	Mean.	Lowest.	Highest.	Mean.	Hour. A.M. hr. min.	Lowest.	Highest.
Jan.	4·8	—3·3 ^a	13·4	—0·5	5 18	—7·2 ^c	8·9
Feb.	6·0	—0·2	15·2	2·9	4 58	—3·6	10·2
Mar.	9·7	2·8	17·3	5·9	4 45	—0·1	12·7
April	13·3	4·0	19·8	9·4	4 2	1·2	17·0
May	18·1	12·4	23·7	14·3	3 55	6·5	20·6
June	24·4	20·3	29·7	20·7	4 36	13·7	25·9
July	29·3	27·3	32·0 ^b	25·7	4 50	24·3	27·2 ^d
Aug.	27·0	24·0	30·9	23·8	3 47	20·9	26·7
Sept.	22·6	18·1	27·6	19·6	4 2	14·7	24·7
Oct.	18·1	13·4	21·7	14·6	3 12	9·8	20·0
Nov.	12·1	4·7	22·1	8·3	4 34	0·6	19·3
Dec.	6·1	1·4	12·7	2·7	4 25	—2·4	8·9
Year	16·0	—3·3	32·0	12·3	4 22	—7·2	27·2

Latest frost, March 14th; earliest, December 13th.

II.—(con)

MAXIMUM.

RANGE.

	Mean.	Hour. P.M. hr. min.	Lowest.	Highest.	Mean.	Lowest.	Highest.
Jan.	11·3	1 48	1·8 ^e	21·7	11·8	4·3	16·6
Feb.	10·2	1 52	2·3	18·6	7·1	0·3 ^g	16·2
Mar.	14·4	2 26	5·8	24·2	8·6	0·8	17·6
April	18·1	1 46	6·0	25·8	8·7	0·9	14·7
May	29·0	1 48	14·4	29·8	8·7	2·3	13·7
June	29·0	2 32	21·7	34·7	8·3	2·4	15·3
July	34·0	2 13	30·2	37·8 ^f	8·3	4·9	11·2
Aug.	31·7	2 8	26·7	35·8	7·9	4·5	9·9
Sept.	26·7	1 44	19·2	33·0	7·1	1·0	14·2
Oct.	23·0	0 43	17·4	27·8	8·4	1·5	15·8
Nov.	17·1	0 53	8·4	27·4	8·8	0·9	13·7
Dec.	10·6	1 30	5·4	19·4	7·8	1·1	14·3
Year	20·8	1 47	1·8	37·8	8·5	0·3	17·6 ^h

^a Jan. 8. ^b July 21. ^c Jan. 8. ^d July 23. ^e Jan. 7 & 8. ^f July 21. ^g Feb. 20. ^h Mar. 21.

The highest reading in each column is in heavy type, the lowest in italic.

1914.

III.—Relative Humidity. Per cent.

	RELATIVE HUMIDITY.			VAPOUR TENSION.		
	Mean.	Lowest.	Highest.	Mean.	Lowest.	Highest.
Jan.	67	31	88	4.6	2.1	8.9
Feb.	79	58	98	5.8	3.5	13.11
Mar.	78	57	97	7.5	4.1	11.8
April	79	58	96	9.9	4.7	16.3
May	77	47	93	12.7	7.1	19.1
June	79	56	96	18.8	11.3	25.3
July	78	69	84	21.7	22.2	23.9
Aug.	83	66	89	23.0	19.2	25.4
Sept.	86	75	93	18.0	12.8	25.4
Oct.	82	64	98	13.2	7.4	17.8
Nov.	75	59	94	8.5	3.9	16.1
Dec.	73	57	94	5.3	3.3	8.0
Year	78.0	31	99	12.7	2.1	28.9

1914.

VI.—Rainfall.

	(a). INTENSITY. Days with								DAYS WITH		
	mm. 0.1—0.9	1.0—2.9	3.0—4.9	5.0—9.9	10.0—19.9	20.0—39.9	40.0—59.9	60.0 & over	Rain.	Snow.	Total.
Jan.	3	1	—	—	—	—	—	—	4	0	4
Feb.	1	2	2	1	3	1	—	—	10	2	12
Mar.	3	6	1	1	2	1	—	—	14	—	14
April	6	1	1	1	5	1	—	—	15	—	15
May	3	5	3	4	0	1	—	—	16	—	16
June	1	4	2	3	0	1	—	—	13	—	13
July	3	0	0	1	1	0	0	—	5	—	5
Aug.	1	3	0	1	1	2	0	1	9	—	9
Sept.	8	3	1	3	1	2	0	—	18	—	18
Oct.	4	4	2	4	0	1	1	—	16	—	16
Nov.	3	0	0	1	0	1	1	—	6	0	6
Dec.	4	0	2	2	—	—	—	—	8	0	8
Year	40	29	14	21	16	10	3	1	134	2	136

VI.

VI.

(b). Total Rainfall. Millimetres.

(c). Rainless Periods of 10 days or more excluding drizzle.

	8 p.m. —8 a.m.	8 a.m. —8 p.m.	Total.	Began.	Ended.	Lasted.
Jan. ..	1.1	3.6	4.7	Dec. 26, 1913	Jan. 12, 1914	18 dys.
Feb. ..	43.9	47.8	91.7	Aug. 13, 1914	Aug. 24, 1914	11 "
Mar. ..	43.2	29.5	72.7	Nov. 20, 1914	Dec. 1, 1914	11 "
April ..	42.8	66.9	109.7	Dec. 11, 1914	Dec. 20, 1914	10 "
May ..	55.0	28.0	83.0	Dec. 23, 1914	Jan. 3, 1915	12 "
June ..	77.7	56.8	134.5			
July ..	0.7	22.5	23.2			
Aug. ..	115.4	35.8	151.2			
Sept. ..	42.9	63.8	106.7			
Oct. ..	80.8	27.4	108.2			
Nov. ..	69.0	7.3	76.3			
Dec. ..	16.4	6.9	23.3			
Year ..	588.9	396.3	985.2			

1914.

VIII.

Mean Duration of Bright Sunshine.
Hours.

	Fore-noon.	After-noon.	Total.	Per-centage of possible.	Mean amount of Coud.
Jan. ..	2.9	2.7	5.6	54	4.6
Feb. ..	1.7	1.7	3.4	31	6.9
Mar. ..	2.2	2.3	4.5	38	6.2
April ..	2.9	2.8	5.7	44	5.6
May ..	2.3	2.5	4.8	35	6.5
June ..	3.0	3.1	6.1	43	5.7
July ..	5.5	5.4	10.9	78	2.2
Aug. ..	4.5	4.7	9.2	69	3.1
Sept. ..	2.9	2.8	5.7	46	5.4
Oct. ..	2.2	2.0	4.2	37	6.3
Nov. ..	2.6	2.5	5.1	48	5.2
Dec. ..	2.8	3.1	5.9	58	4.2
Year ..	2.9	3.0	5.9	48	5.2

VII.—Wind. (a).

Mean Velocity at 8 a.m., 2 p.m. and 8 p.m. Metres per second.

	Min.	Max.	Mean.
Jan. ..	1.6	7.9	3.4
Feb. ..	0.7	8.4	4.2
Mar. ..	1.2	8.9	3.8
April ..	1.5	7.2	4.1
May ..	0.3	6.1	3.2
June ..	1.4	6.1	3.6
July ..	1.3	11.6	4.4
Aug. ..	2.4	6.0	4.0
Sept. ..	1.5	7.1	4.1
Oct. ..	1.1	5.1	2.5
Nov. ..	1.5	8.0	3.5
Dec. ..	1.0	6.3	3.7
Year ..	0.3	11.6	3.7

The amount of cloud refers to the whole day, excluding the night. Table IV. is limited to the three hours of observation, 8 a.m., 2 p.m. and 8 p.m.

VII. Wind (b).—Direction. Percentage Frequency.

	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.	Vari-able.
Jan.	7	14	9	16	10	10	13	19	2	0
Feb.	11	21	13	15	4	1	5	25	0	5
Mar.	14	23	7	28	8	4	7	6	3	0
April	15	13	9	24	2	8	10	16	0	3
May	13	24	14	24	7	5	1	9	3	0
June	3	11	13	33	19	18	1	1	1	0
July	4	4	13	44	15	10	1	8	1	0
Aug.	9	8	20	34	7	12	4	6	0	0
Sept.	22	23	16	16	3	4	1	15	0	0
Oct.	12	17	13	18	2	8	9	21	0	0
Nov.	17	15	6	19	10	6	4	23	0	0
Dec.	26	16	2	7	8	10	8	23	0	0
Year	13	16	11	23	8	8	5	14	1	1

(To be continued.)

METEOROLOGICAL NEWS.

THE DEATH OF MR. E. E. GLYDE at Edmonton, Alberta, will be learned with regret by our readers. Mr. Glyde was for many years one of the most indefatigable of meteorological observers. His observations commenced in 1870, in London, but were for the most part carried on in Devonshire at Torquay and Tavistock. He left England in 1911 and since that time has contributed records from Northern Canada to the Climatological Tables for the British Empire which are published in each number of this magazine. He was an example of the best type of ardent amateur, an enthusiastic and persevering Observer and a most helpful collaborator in all investigations on which his work could throw light.

THE GREAT SNOWSTORMS OF 1916.

By L. C. W. BONACINA.

IN default of complete data based upon an organized system of snowfall observation in the British Islands, it is not possible to produce a map, or even a table of statistics, which would give a precise idea of the distribution of the heavy snowfalls of February and March; but from a mass of correspondence and newspaper material sent in to the British Rainfall Organization, I am able to furnish a few particulars regarding the local intensity and other aspects of the snowfall during the two months.

During the first three weeks of February the persistent south-westerly wind, which had brought such warmth in January without, in Eastern Britain, the storms and floods which are the common accompaniment of Atlantic warmth in winter, began to alternate rapidly with cold winds from the west and north-west, and it was during the temporary predominance of these latter that the first snow blizzards began to encroach upon these islands in a series, as it were, of advance-guards, which brought some heavy local falls more especially in Ireland and Scotland. So far as one can gather from the limited information to hand, there does not appear to have been anything abnormal about the snowfall in the Scottish Highlands, and it, therefore, need not be regarded otherwise than as an ordinary seasonal incident in a part of the country whose wild mountain glens and passes are liable in winter and spring, to be choked up with snow, for many weeks together. But about the 21st of February the wind shifted definitely to points between east and north, remaining in that quarter for some six weeks, and then began the great series of severe snowstorms which mainly affected England, Wales and the extreme south of Scotland. The snowfalls began only in the southern half of England at the date mentioned, but by the commencement of March had extended to the northern counties, and with the exception of a brief respite, in the south about February 29th, the snow spell persisted definitely till about March 12th. A rise of temperature after this date sufficed to change the precipitation to a cold rain, except in the uplands, and the rainy weather continued with obstinately leaden skies till about March 22nd, when there was a reversion, in the manner quite characteristic of the month of March, to snow, which culminated in the destructive storm of the 28th, whereby vast numbers of beautiful elm trees in the southern and midland counties were uprooted, and railway traffic hopelessly dislocated on the Midland, London and North-Western and Great Western Companies' lines, in consequence of snow-drifts and the wreckage of fallen telegraph poles. As the snowfall was general throughout England and Wales it is not surprising to find that its intensity was greatest in the hill districts, and I have little doubt that if a map showing the

aggregate depth of snow for the period could be constructed it would exhibit a close relationship to the vertical relief of the land. From the Peak, the Cotteswolds and Exmoor come the same extraordinary reports of snow-bound villages, isolated farms and sheep buried beneath gigantic drifts estimated in some cases as forty feet deep; and I may here add a few notes concerning particular districts.

The North of England and South of Scotland.—The severity of the blizzards in the Pennine Range may be gauged by the almost complete cessation of traffic throughout March on the High Peak railway, and on the line connecting Kirkby Stephen in Westmorland with Barnard Castle in Durham, which climbs to a height of 1,300 feet. In the Southern Uplands of Scotland the intensity of the weather was probably very similar, and early in March the snow in Berwickshire was reported to be lying over six feet deep in certain districts. I see no good reason to doubt the report as an approximation, and in view of the repeated heavy falls which, in a county like Berwick, may each be trusted to have deposited anything between six inches and a foot of snow, there is no escape from the conclusion that the *aggregate* depth in this part of the country was at least six feet, and that the *actual accumulated* depth of undrifted snow may well have approached this order of magnitude in the absence of the intermediate thaws which occurred in the south of England.

Wales.—There seems little doubt that in the high Cambrian ranges the snow at times lay feet deep; and we are fortunate in the correspondence from Mr. Gethin Jones, who estimates the aggregate depth of snow in the Black Mountains during February and March as some 10 feet. Perhaps Mr. Gethin Jones will give us further information as to what depth the snow actually accumulated at various levels in the Black Mountains, and also the date when the last traces of the snow will disappear. His letter in the March number refers to an aggregate depth of 8 feet in less than three weeks, and it is very doubtful if snowfall of this intensity is *normally* exceeded in any part of the world, even in the far-famed Rockies, where the annual aggregate of snowfall is said to range from 20 feet to 30 feet, and where the perennial accumulations give rise to great glaciers as in other high mountain systems.

The West of England.—The West Country newspapers report heavy falls of snow in Somerset, Devon and Cornwall, but state that the experiences of March, 1891, had not in general been repeated. On the whole Exmoor appears to have suffered even more than Dartmoor, and the stories relating to the tunnelling of huge drifts for buried sheep recall to mind the type of storm fixed in literature by Blackmore in the well-known romance of "Lorna Doone," and by the Rev. S. Baring-Gould in "Dartmoor Idylls," the latter perpetuating the blizzard of 1891.

The Midlands and South of England.—Various reports are at hand respecting the snowing up of farms and villages in Warwickshire and Staffordshire, and of the blocking up of roads in Hampshire and Berkshire. In the London district and over much of the south of England a succession of 4-inch snowfalls brings the aggregate up to the neighbourhood of two feet, but as there was a complete absence of hard frost, and as there were marked thaws between the storms the actual accumulated depth was never very great. In the London Squares there were missing the great banks of piled up snow which were so conspicuous in the previous heavy falls early in March, 1909, when the cold was much more severe than in 1916.

As a result of careful recollection of snow year by year, I can assert positively that taking the United Kingdom as a whole and leaving individual local snowstorms out of account, the snow spell of the present year was the greatest the country has suffered since the first half of February in 1900. In "British Rainfall," for that year, the quantity of snow is described as "unprecedented"; and as very low temperatures occurred during that period it was a peculiarly impressive example of the genuine Arctic spell—though curiously it is seldom quoted among records of frost and snow.

Although eclipsed by 1916, the first three months of 1915 were decidedly snowy, and taking advantage of the heavy falls about January 22nd, I asked Observers under the auspices of the British Rainfall Organization to commence furnishing material which, in due course, would give us a knowledge of the seasonal and geographical distribution of snow in the United Kingdom, like that which exists for the United States. The recent experience gives me an opportunity to re-iterate the appeal made last year in the number of this Magazine for February, 1915. It occurs to me that the subject may have suffered neglect on account of the difficulties in the way of recording the depth of snow-fall with any accuracy. But why demand a degree of precision which is not at all necessary? What we desire to get is a general idea how the different parts of the kingdom compare with one another in the amount and frequency of snow, and no intelligent Observer exercising a little judgment should fall into any great error in making a statement as to the approximate depth of undrifted snow after every fall in his locality. Sleet should be regarded as an occurrence of snow and rain together, and, as it does not lie, there is, of course, no depth of *snow* to record.

With regard to the geographical distribution, I suppose we may say at once that Scotland is snowier than England, and England than Ireland; but leaving Scotland out of account, which is the snowiest county or region in England? Probably Yorkshire as a whole will be found to carry off the prize among the counties, but the entire

length of the wild Pennine chain from the Peak to the Cheviots, has a veritable genius for snow, and no doubt represents the great snow zone of the country. Again, it is likely that Cornwall, projecting out into the warm south-west would be generally regarded as getting less snow than any other county, and in the absence of scientific data I certainly do not feel justified in suggesting that any other southerly county gets less. But I do want to emphasize a fact that has long fascinated me very much, namely, that those three counties, Somerset, Devon and Cornwall, which lie in the far west of England, have experienced—climatically influenced as they are by large areas of elevated moorland—some truly classical blizzards, the like of which I do not think have been seen in the "Home" counties, where it may, perhaps, snow more often. The relative liability to snow of different parts of the country cannot be gleaned from the winter isothermal lines with their north-south trend, and I think the "iso-chional" lines will be found to trend east-west. If the temperature more often favours snow in the east than in the west of England, the moister atmosphere in the west favours heavier snowfall in general spells of cold weather.

As regards the seasonal distribution, all we know is that the snow season, at all events in the lowlands of Britain, is well defined, embracing the six months November to April, or the four winter and two spring months. Taking the country as a whole, I suspect that February and March will prove to surpass December and January in respect of frequency, if not aggregate depth, of snow.

In offering these remarks I am actuated by a strong appreciation of the fact that alike in its appearance, its effects and in many of its economic functions, snow is a very different thing from rain, and requires to be studied separately as well as in conjunction with the latter. From the purely scientific point of view the erratic behaviour of snow in time and space makes it perhaps the most interesting feature of British climatology. The experience of each succeeding year strengthens the vivid impression I have always had that although snow is by no means always in evidence during the mild winter in England, it would yet be difficult to beat this country in the severity of its snowstorms and the peculiar intensity of its snow spells when these do occur. It is indeed, difficult to imagine a set of physical conditions better calculated to breed great snowstorms of the type which figures so prominently in Scottish romantic literature than the wild tracts of mountain, fell and moor which cover so much of the northern and western parts of the kingdom, and over which the atmosphere is ever charged with the moisture of the stormy western ocean.

Let us set some machinery going by the commencement of next snow season, November, 1916, designed for the organized observation of the depth and frequency of British snowfall.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

THE ANOMALOUS FIRST QUARTER OF 1916.

THIS has been a remarkable quarter; January, with a mean temperature of $44^{\circ}7$, was the warmest in my record (1879-1916), being $1^{\circ}6$ above 1898, and probably the warmest since 1796. February had 8.19 in. of rain and snow, and twenty-seven rain days. March, mean temperature $35^{\circ}3$, was colder than any other, except 1883; the maximum being $2^{\circ}0$ below that very cold month and the range only $7^{\circ}2$, much the lowest in March, and with only one month, January, 1897, with $6^{\circ}5$, substantially lower for 36 years. The total snow fall from February 25th to March 26th, was approximately a little over three feet, but on some days it could not be measured accurately owing to the mixture of rain, sleet and snow. It must be a long time since March had a mean temperature $9^{\circ}4$ lower than January in the same year.

C. L. BROOK.

Harewood Lodge, Meltham, 3rd April, 1916.

RAINFALL AND CLOUD LEVEL.

IN answer to Mr. Bonacina's appeal in the last paragraph of his communication on this subject in the March number of the Magazine, I offer the following observation for what it is worth. I had ascended Snowdon one day when its summit was in a cloud. As we were coming down, when we had got well below the cloud-cap, so that a wide view was obtained of the surrounding country it began to rain, and I was interested in watching the process of the rainfall on a somewhat steeper slope than that on which my party were standing. No distinct cloud was there formed. What I noticed was the sudden coming into being of baseless rods of rain at a distance that I estimated at thirty or forty yards from the side of the slope. It was this last point that specially engaged my attention. I was not thinking of the cloudless formation of rain or the occurrence of rain below the level of the cloud. All that was in my mind was the interesting case in refutation of the idea, which it is so difficult to drive out of text-books and so much more difficult to remove from the minds of teachers, that rain is formed by vapour-bearing winds "coming in contact with cold mountain sides."

GEO. G. CHISHOLM.

12, Hallhead Road, Edinburgh, April 4th, 1916.

WINTER THUNDERSTORMS.

At the beginning of the year I asked Rainfall Observers and readers of this Magazine for accounts of thunderstorms occurring during the winter. I have had so many answers that I have been unable to acknowledge all personally. I wish to thank all those correspondents who have sent me information and to assure them that their reports have been of the greatest value. Up to the present I have received 824 accounts of storms which have taken place between December 1st and March 31st. Thunder or lightning was observed somewhere in the British Islands on 72 out of the 122 days during this period. Reports have come from all parts of the British Islands with the exception of the north of Scotland. At some future time I hope to be able to publish a full report of the thunderstorms of the past winter. CHARLES J. P. CAVE.

Meteorological Office, South Farnborough, April 5th, 1916.

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ROYAL METEOROLOGICAL SOCIETY.

A MEETING of the Society was held on March 15th, at the Surveyor's Institution, Major H. G. Lyons, F.R.S., President, in the Chair.

Sir Napier Shaw, F.R.S., gave a lecture on "The Meteorology of the Globe in 1911." He said that such a formidable task as the discussion of the Meteorology of the Globe for any year was undertaken only on the approaching publication of the "*Reseau Mondial, 1911*." The Meteorological Office has authorized the preparation of an annual statement of the meteorological observations at a large number of uniformly distributed points over the land surface of the Earth. These figures for the year 1911 are now on the point of publication, and the work, although French in title, is written in English. The *Reseau Mondial, 1911*, gives particulars of pressure, temperature and rainfall, in the units of millibars, absolute temperature degrees and millimetres, respectively, there being two stations for each ten degrees square of latitude and longitude, omitting the regions beyond 80 degrees north and south. Positive and negative signs are used to indicate differences from the normal, where such normals existed or could be computed. One page is devoted to each ten degrees of latitude, beginning at the equator and working polewards. The stations are arranged in their order round the globe. Although many of the stations employed are unfamiliar it is remarkable that such a number of stations lie in British possessions, a fact which throws a greater responsibility on the British Empire for the furtherance of the study of Meteorology.

The following were elected Fellows of the Society: Miss S. A. Acland and Mr. Joseph Pizzala.

## THE HURRICANE IN JAMAICA, AUGUST 12th and 13th, 1915.

THE following notes are extracted from the official report on the exceptionally severe hurricane of August 12th and 13th, 1915. drawn up by Mr. Maxwell Hall, Government meteorologist.


It appears that the centre of the depression moved westward on a course nearly parallel to the north-eastern coast of the island and fifteen or twenty miles to the north. The maps accompanying the report show that the centre was opposite the east end of Jamaica, about 10 p.m. on August 12th, and opposite, but much further from the west end at about 8 a.m. on August 13th. From Dominica to Jamaica the centre moved at the rate of 19 miles per hour, but subsequently travelled more slowly, passing near Cayman Brac at 11 a.m. on the 13th, and reaching Galveston about mid-day on the 16th. At 11 p.m. on August 12th the wind was from the north nearly all along the northern coast and it was this side of the island which suffered most. The sea driven ashore by the northerly winds swept away everything within its reach; wharves, houses, roads, bridges and part of the railway track. All the towns and villages from Manchioneal to Falmouth along the north coast suffered to a greater or less extent and the total damage was very great, although the wind barely reached hurricane force, or force 12 on the Beaufort Scale.

At Port Maria houses were carried along the street like canoes for a quarter of a mile, wharves and sheds were completely destroyed and 250 to 300 persons were rendered homeless.

A sullen sky in the direction of the sea, heavy roaring billows and a few warnings from the Weather Bureau were the only hints that Annotto Bay had of the visitation of the hurricane, which entirely altered a portion of the town. It was a terrifying sight to see buildings being thrown against each other by the sea. Many of the houses could not subsequently be located, while the road through the entire sea-swept area was unrecognisable.

Over the whole island most of the parishes lost between 80 and 90 per cent. of the bananas, but the loss of cocoanuts was apparently only about 1 per cent. Generally the damage done to buildings was slight compared with that in the hurricanes of 1903 and 1912.

The report includes tabular statements of the pressure and wind observations at the principal meteorological stations. Mr. Maxwell Hall observes that the cyclone exhibited the same regular arrangement of barometric distribution as he has noted on previous occasions, namely that the fall of pressure below the mean at any point varies inversely as the square of the distance from the centre. If this principle can be established it affords facilities for calculating the time of arrival of the centre at any place.



## RAINFALL TABLE FOR MARCH, 1916.

| STATION.                        | COUNTY.           | Lat.<br>N. | Long.<br>W.<br>[*E.] | Height<br>above<br>Sea.<br>ft. | RAINFALL<br>OF MONTH.          |              |
|---------------------------------|-------------------|------------|----------------------|--------------------------------|--------------------------------|--------------|
|                                 |                   |            |                      |                                | Aver.<br>1875—<br>1909.<br>in. | 1916.<br>in. |
| Camden Square.....              | London.....       | 51 32      | 0 8                  | 111                            | 1'70                           | 4'67         |
| Tenterden.....                  | Kent.....         | 51 4       | *0 41                | 190                            | 1'95                           | 3'27         |
| Arundel (Patching).....         | Sussex.....       | 50 51      | 0 27                 | 130                            | 1'95                           | 4'52         |
| Fordingbridge (Oaklands)...     | Hampshire....     | 50 56      | 1 38                 | 135                            | 2'09                           | 3'12         |
| Oxford (Magdalen College)...    | Oxfordshire....   | 51 45      | 1 15                 | 186                            | 1'45                           | 5'08         |
| Wellingborough (Swanspool)...   | Northampton...    | 52 18      | 0 41                 | 155                            | 1'72                           | 4'52         |
| Bury St. Edmunds (Westley)...   | Suffolk.....      | 52 15      | *0 40                | 226                            | 1'71                           | 3'41         |
| Geldeston [Beccles].....        | Norfolk.....      | 52 27      | *1 31                | 38                             | 1'57                           | 3'05         |
| Polapit Tamar [Launceston]...   | Devon.....        | 50 40      | 4 22                 | 315                            | 2'74                           | 2'80         |
| Rousdon [Lyme Regis].....       | ".....            | 50 41      | 3 0                  | 516                            | 2'30                           | 3'73         |
| Stroud (Field Place).....       | Gloucestershire.. | 51 44      | 2 13                 | 226                            | 2'01                           | 3'47         |
| Church Stretton (Wolstaston)..  | Shropshire.....   | 52 35      | 2 48                 | 800                            | 2'19                           | 2'83         |
| Boston.....                     | Lincolnshire..... | 52 58      | 0 1                  | 11                             | 1'47                           | 4'27         |
| Workshop (Hodsock Priory)...    | Nottinghamshire   | 53 22      | 1 5                  | 56                             | 1'70                           | 3'89         |
| Mickleover Manor.....           | Derbyshire.....   | 52 54      | 1 32                 | 280                            | 1'69                           | 4'50         |
| Macclesfield.....               | Cheshire.....     | 53 15      | 2 7                  | 501                            | 2'50                           | 2'20         |
| Southport (Hesketh Park)...     | Lancashire.....   | 53 39      | 2 59                 | 38                             | 2'11                           | 2'09         |
| Arncliffe Vicarage.....         | Yorkshire, W.R.   | 54 8       | 2 6                  | 732                            | 5'17                           | 4'48         |
| Goldsborough Hall.....          | ".....            | 54 0       | 1 25                 | 119                            | 2'00                           | 4'04         |
| Hull (Pearson Park).....        | " E.R.....        | 53 45      | 0 20                 | 6                              | 1'84                           | 3'70         |
| Newcastle (Town Moor)...        | Northumberland    | 54 59      | 1 38                 | 201                            | 2'10                           | 3'64         |
| Borrowdale (Seathwaite)...      | Cumberland.....   | 54 30      | 3 10                 | 423                            | 10'63                          | 3'22         |
| Cardiff (Ely).....              | Glamorgan.....    | 51 29      | 3 13                 | 53                             | 2'89                           | 3'61         |
| Haverfordwest.....              | Pembroke.....     | 51 48      | 4 58                 | 90                             | 3'16                           | 2'21         |
| Aberystwyth (Gogerddan)...      | Cardigan.....     | 52 26      | 4 1                  | 83                             | 3'04                           | 2'52         |
| Llandudno.....                  | Carnarvon.....    | 53 20      | 3 50                 | 72                             | 2'13                           | 1'91         |
| Cargen [Dumtries].....          | Kirkcudbright...  | 55 2       | 3 37                 | 80                             | 3'33                           | 1'76         |
| Marchmont House.....            | Berwick.....      | 55 44      | 2 24                 | 498                            | 2'64                           | 4'42         |
| Girvan (Pinmore).....           | Ayr.....          | 55 10      | 4 49                 | 207                            | 3'62                           | 1'28         |
| Glasgow (Queen's Park)...       | Renfrew.....      | 55 53      | 4 18                 | 144                            | 2'61                           | 1'98         |
| Islay (Eallabus).....           | Argyll.....       | 55 47      | 6 15                 | 68                             | 3'68                           | 1'84         |
| Mull (Quinish).....             | ".....            | 56 34      | 6 13                 | 35                             | 4'28                           | 1'01         |
| Balquhiddier (Stronvar).....    | Perth.....        | 56 21      | 4 23                 | 422                            | 6'02                           | 2'25         |
| Dundee (Eastern Necropolis)...  | Forfar.....       | 56 28      | 2 57                 | 199                            | 2'06                           | 3'22         |
| Braemar.....                    | Aberdeen.....     | 57 0       | 3 24                 | 1114                           | 2'87                           | 4'50         |
| Aberdeen (Cranford).....        | ".....            | 57 8       | 2 7                  | 120                            | 2'65                           | 2'18         |
| Gordon Castle.....              | Moray.....        | 57 37      | 3 5                  | 107                            | 2'36                           | 2'21         |
| Drumnadrochit.....              | E. Inverness....  | 57 20      | 4 29                 | 138                            | 3'09                           | 2'47         |
| Fort William.....               | ".....            | 56 49      | 5 6                  | 171                            | 6'39                           | 2'14         |
| Loch Torridon (Bendamph)...     | W. Ross.....      | 57 32      | 5 32                 | 20                             | 7'29                           | 2'94         |
| Dunrobin Castle.....            | Sutherland.....   | 57 59      | 3 56                 | 14                             | 2'64                           | 2'53         |
| Killarney (District Asylum)...  | Kerry.....        | 52 4       | 9 31                 | 178                            | 4'51                           | 1'96         |
| Waterford (Brook Lodge)...      | Waterford.....    | 52 15      | 7 7                  | 104                            | 2'64                           | 1'66         |
| Nenagh (Castle Lough).....      | Tipperary.....    | 52 54      | 8 24                 | 120                            | 2'99                           | 1'88         |
| Ennistymon House.....           | Clare.....        | 52 57      | 9 18                 | 37                             | 3'24                           | 2'44         |
| Gorey (Courtown House)...       | Wexford.....      | 52 40      | 6 13                 | 80                             | 2'28                           | 3'62         |
| Abbey Leix (Blandsfort).....    | Queen's County..  | 52 56      | 7 17                 | 532                            | 2'59                           | 2'25         |
| Dublin (Fitz William Square)... | Dublin.....       | 53 21      | 6 14                 | 54                             | 1'98                           | 3'40         |
| Mullingar (Belvedere).....      | Westmeath.....    | 53 29      | 7 22                 | 367                            | 2'64                           | 2'77         |
| Crossmolina (Enniscoe).....     | Mayo.....         | 54 4       | 9 16                 | 74                             | 4'36                           | 3'38         |
| Cong (The Glebe).....           | ".....            | 53 33      | 9 16                 | 112                            | 3'80                           | 2'63         |
| Collooney (Markree Obsy.)...    | Sligo.....        | 54 11      | 8 27                 | 127                            | 3'33                           | 1'95         |
| Seaforde.....                   | Down.....         | 54 19      | 5 50                 | 180                            | 2'84                           | 2'32         |
| Ballymena (Harryville).....     | Antrim.....       | 54 52      | 6 13                 | 150                            | 3'07                           | 1'83         |
| Omagh (Edenfel).....            | Tyrone.....       | 54 36      | 7 18                 | 280                            | 2'98                           | 1'45         |

RAINFALL TABLE FOR MARCH, 1916—*continued.*

| RAINFALL OF MONTH ( <i>con.</i> ) |          |                   |             |    | RAINFALL FROM JAN. 1. |       |                      |          | Mean Annual 1875-1909. | STATION.         |
|-----------------------------------|----------|-------------------|-------------|----|-----------------------|-------|----------------------|----------|------------------------|------------------|
| Diff. from Av. in.                | % of Av. | Max. in 24 hours. | No. of Days |    | Aver. 1875-1909.      | 1916. | Diff. from Aver. in. | % of Av. |                        |                  |
|                                   |          | in. Date.         |             |    | in.                   | in.   |                      |          | in.                    |                  |
| +2.97                             | 275      | 1.07              | 27          | 22 | 5.19                  | 9.43  | +4.24                | 182      | 25.11                  | Camden Square    |
| +1.32                             | 168      | .62               | 7, 22       | 23 | 5.99                  | 9.32  | +3.33                | 156      | 27.64                  | Tenterden        |
| +2.57                             | 232      | 1.07              | 27          | 20 | 6.71                  | 11.28 | +4.57                | 168      | 30.48                  | Patching         |
| +1.03                             | 149      | .90               | 27          | 21 | 7.10                  | 9.88  | +2.78                | 139      | 31.06                  | Fordingbridge    |
| +3.63                             | 350      | 1.39              | 27          | 14 | 4.85                  | 10.05 | +5.20                | 207      | 24.58                  | Oxford           |
| +2.80                             | 263      | 1.01              | 27          | 21 | 5.32                  | 9.31  | +3.99                | 175      | 25.20                  | Swanspool        |
| +1.70                             | 199      | .70               | 27          | 23 | 5.00                  | 9.24  | +4.24                | 185      | 25.40                  | Westley          |
| +1.48                             | 194      | .55               | 27          | 28 | 4.51                  | 8.16  | +3.65                | 181      | 23.73                  | Geldeston        |
| + .06                             | 102      | 1.16              | 27          | 18 | 9.28                  | 12.86 | +3.58                | 139      | 38.27                  | Polapit Tamar    |
| +1.43                             | 162      | 1.07              | 27          | 16 | 7.74                  | 10.55 | +2.81                | 136      | 33.54                  | Rousdon          |
| +1.46                             | 173      | .85               | 27          | 20 | 6.46                  | 9.52  | +3.06                | 147      | 29.81                  | Stroud           |
| + .64                             | 129      | .42               | 21          | 24 | 6.87                  | 9.29  | +2.42                | 135      | 32.41                  | Wolstaston       |
| +2.80                             | 290      | .88               | 28          | 25 | 4.54                  | 9.06  | +4.52                | 200      | 23.35                  | Boston           |
| +2.19                             | 229      | .63               | 15          | 23 | 5.04                  | 7.98  | +2.94                | 158      | 24.46                  | Hodsock Priory   |
| +2.81                             | 266      | .75               | 15          | 21 | 5.35                  | 11.11 | +5.76                | 208      | 26.65                  | Mickleover       |
| - .30                             | 88       | .45               | 16          | 15 | 7.46                  | 8.11  | + .65                | 109      | 34.73                  | Macclesfield     |
| - .02                             | 99       | .55               | 20          | 15 | 6.73                  | 6.37  | - .36                | 95       | 32.70                  | Southport        |
| - .69                             | 86       | .61               | 11          | 20 | 16.31                 | 19.62 | +3.31                | 120      | 61.49                  | Arncliffe        |
| +2.04                             | 202      | .83               | 15          | 20 | 5.66                  | 8.56  | +2.90                | 151      | 27.29                  | Goldborough Hall |
| +1.86                             | 201      | .43               | 11          | 25 | 5.32                  | 7.71  | +2.39                | 145      | 26.42                  | Hull             |
| +1.54                             | 173      | .46               | 15          | 26 | 5.63                  | 7.42  | +1.79                | 132      | 27.94                  | Newcastle        |
| -7.41                             | 30       | 1.20              | 26          | 12 | 35.03                 | 38.70 | +3.67                | 110      | 129.48                 | Seathwaite       |
| + .72                             | 125      | 1.05              | 27          | 22 | 9.61                  | 12.99 | +3.38                | 135      | 42.28                  | Cardiff          |
| - .95                             | 70       | .68               | 27          | 19 | 11.27                 | 10.57 | - .70                | 94       | 46.81                  | Haverfordwest    |
| - .52                             | 83       | .55               | 20          | 18 | 10.04                 | 10.68 | + .64                | 106      | 45.46                  | Gogerddan        |
| - .22                             | 90       | .80               | 20          | 16 | 6.75                  | 8.12  | +1.37                | 120      | 30.36                  | Llandudno        |
| -1.57                             | 53       | .64               | 19          | 14 | 10.85                 | 12.95 | +2.10                | 119      | 43.47                  | Cargen           |
| +1.78                             | 167      | .64               | 16          | 21 | 7.19                  | 10.87 | +3.68                | 151      | 33.76                  | Marchmont        |
| -2.34                             | 35       | .26               | 26          | 12 | 12.27                 | 12.57 | + .30                | 102      | 49.77                  | Girvan           |
| - .63                             | 76       | .48               | 26          | 15 | 8.84                  | 11.58 | +2.74                | 131      | 35.97                  | Glasgow          |
| -1.84                             | 50       | .47               | 25          | 10 | 12.37                 | 13.21 | + .84                | 107      | 48.79                  | Eallabus         |
| -3.27                             | 24       | .21               | 25          | 12 | 14.28                 | 12.46 | -1.82                | 87       | 56.57                  | Quinish          |
| -3.77                             | 37       | .94               | 25          | 9  | 21.09                 | 26.81 | +5.72                | 127      | 73.77                  | Stronvar         |
| +1.16                             | 156      | 1.00              | 16          | 17 | 5.98                  | 7.32  | +1.34                | 122      | 28.64                  | Dundee           |
| +1.63                             | 157      | .62               | 12          | 21 | 8.34                  | 14.59 | +6.25                | 175      | 34.93                  | Braemar          |
| - .47                             | 82       | .30               | 25          | 26 | 7.37                  | 4.89  | -2.48                | 66       | 32.73                  | Aberdeen         |
| - .15                             | 94       | .25               | 22          | 24 | 6.30                  | 6.87  | + .57                | 109      | 30.34                  | Gordon Castle    |
| - .62                             | 80       | .80               | 3           | 22 | 9.61                  | 15.73 | +6.12                | 164      | 36.13                  | Drumnadrochit    |
| -4.25                             | 33       | .49               | 30          | 18 | 22.44                 | 27.77 | +5.33                | 124      | 75.80                  | Fort William     |
| -4.35                             | 40       | .91               | 30          | 10 | 24.24                 | 30.19 | +5.95                | 125      | 83.93                  | Bendampf         |
| - .11                             | 96       | .64               | 16          | 15 | 7.97                  | 10.81 | +2.84                | 136      | 31.90                  | Dunrobin Castle  |
| -2.55                             | 43       | .30               | 2           | 21 | 15.44                 | 13.62 | -1.82                | 88       | 54.81                  | Killarney        |
| - .98                             | 63       | .49               | 19          | 18 | 9.60                  | 8.19  | -1.41                | 85       | 39.57                  | Waterford        |
| -1.11                             | 63       | .34               | 19          | 18 | 9.76                  | 10.70 | + .94                | 110      | 39.43                  | Castle Lough     |
| - .90                             | 75       | .32               | 13          | 18 | 10.98                 | 12.72 | +1.74                | 116      | 46.52                  | Ennistymon       |
| +1.34                             | 159      | .45               | 16          | 21 | 8.22                  | 9.76  | +1.54                | 119      | 34.99                  | Courtown Ho.     |
| - .34                             | 87       | .35               | 19          | 23 | 8.29                  | 8.63  | + .34                | 104      | 35.92                  | Abbey Leix       |
| +1.42                             | 172      | .70               | 19          | 24 | 6.05                  | 8.36  | +2.31                | 138      | 27.68                  | Dublin           |
| + .13                             | 105      | .48               | 19          | 23 | 8.41                  | 10.57 | +2.16                | 126      | 36.15                  | Mullingar        |
| - .98                             | 78       | .64               | 2           | 21 | 13.91                 | 16.13 | +2.22                | 116      | 52.87                  | Enniscoe         |
| -1.17                             | 69       | .49               | 19          | 20 | 12.31                 | 13.63 | +1.32                | 111      | 48.90                  | Cong             |
| -1.38                             | 59       | .48               | 25          | 19 | 10.40                 | 10.28 | - .12                | 99       | 42.71                  | Markree          |
| - .52                             | 82       | .39               | 19          | 13 | 9.06                  | 8.19  | - .87                | 90       | 38.91                  | Seaforde         |
| -1.24                             | 60       | .35               | 19          | 18 | 9.79                  | 9.71  | - .08                | 99       | 40.84                  | Ballymena        |
| -1.53                             | 49       | .25               | 25          | 22 | 9.12                  | 9.33  | + .21                | 102      | 39.38                  | Omagh            |

## SUPPLEMENTARY RAINFALL, MARCH, 1916.

| Div.  | STATION.                     | Rain<br>inches. | Div.   | STATION.                      | Rain<br>inches |
|-------|------------------------------|-----------------|--------|-------------------------------|----------------|
| II.   | Warlingham, Redvers Road .   | 5.44            | XI.    | Lligwy .....                  | 1.64           |
| „     | Ramsgate .....               | 2.99            | „      | Douglas .....                 | 1.67           |
| „     | Hailsham .....               | 2.57            | XII.   | Stoneykirk, Ardwell House...  | 1.04           |
| „     | Totland Bay, Aston House...  | 3.55            | „      | Carsphairn Shiel .....        | 1.53           |
| „     | Stockbridge, Ashley.. .....  | 3.42            | „      | Beattock, Kinnelhead .....    | 1.46           |
| „     | Grayshott .....              | 5.21            | „      | Langholm, Drove Road .....    | 3.32           |
| III.  | Harrow Weald, Hill House...  | 4.86            | XIII.  | Selkirk, The Hangingshaw..    | 4.31           |
| „     | Pitsford, Sedgebrook... ..   | 4.49            | „      | North Berwick Reservoir...    | 2.79           |
| „     | Woburn, Milton Bryant.....   | 5.08            | „      | Edinburgh, Royal Observaty.   | 2.86           |
| „     | Chatteris, The Priory.....   | 3.48            | XIV.   | Mayhole, Knockdon Farm...     | 1.00           |
| IV.   | Elsenham, Gaunts End .....   | 3.90            | XV.    | Buchlyvie, The Manse.....     | 2.15           |
| „     | Shoeburyness .....           | 3.45            | „      | Ballachulish House .....      | 2.53           |
| „     | Colchester, Hill Ho., Lexden | 3.58            | „      | Oban.....                     | .74            |
| „     | Ipswich, Rookwood, Copdock   | 4.12            | „      | Campbeltown, Witchburn ..     | 1.99           |
| „     | Aylsham, Rippon Hall .....   | 3.30            | „      | Holy Loch, Ardnadam.....      | 2.31           |
| „     | Swaffham .....               | 3.61            | „      | Tiree, Cornaigmore .....      | 1.07           |
| V.    | Bishops Cannings .....       | 3.50            | XVI.   | Dollar Academy .....          | ...            |
| „     | Wimborne, St. John's Hill... | 3.52            | „      | Glenlyon, Meggernie Castle..  | 1.98           |
| „     | Ashburton, Druid House....   | 4.60            | „      | Blair Atholl .....            | 1.11           |
| „     | Cullompton .....             | 3.70            | „      | Coupar Angus .....            | 2.87           |
| „     | Lynmouth, Rock House .....   | 3.27            | „      | Montrose, Sunnyside Asylum.   | 2.82           |
| „     | Okehampton, Oaklands.....    | 4.23            | XVII.  | Alford, Lynturk Manse .....   | 2.89           |
| „     | Hartland Abbey.....          | 4.06            | „      | Fyvie Castle .....            | 3.82           |
| „     | Probus, Lamellyn .....       | 2.84            | „      | Keith Station .. ..           | 1.68           |
| „     | North Cadbury Rectory.....   | 3.36            | XVIII. | Rothiemurchus .....           | 2.19           |
| VI.   | Clifton, Stoke Bishop .....  | 3.99            | „      | Loch Quoich, Loan .....       | ...            |
| „     | Ledbury Underdown.....       | 3.96            | „      | Skye, Dunvegan .....          | 2.14           |
| „     | Shifnal, Hatton Grange.....  | 3.08            | „      | Lochmaddy, Bayhead .....      | .95            |
| „     | Droitwich .....              | 3.18            | „      | Fortrose .....                | 1.86           |
| „     | Blockley, Upton Wold.....    | 4.76            | „      | Glen carron Lodge .....       | 3.90           |
| VII.  | Market Overton.....          | 4.69            | XIX.   | Altnaharra .....              | 3.61           |
| „     | Market Rasen .....           | 4.23            | „      | Melvich .....                 | 2.06           |
| „     | Bawtry, Hesley Hall .....    | 4.77            | „      | Loch More, Achfary .....      | 4.30           |
| „     | Derby, Midland Railway.....  | 3.64            | XX.    | Dunmanway, The Rectory ..     | 2.83           |
| „     | Buxton .....                 | 3.30            | „      | Glanmire, Lota Lodge.....     | 1.92           |
| VIII. | Nantwich, Dorfold Hall ..... | 1.95            | „      | Mitchelstown Castle.....      | 1.69           |
| „     | Chatburn, Middlewood .....   | 2.85            | „      | Darrynane Abbey.....          | 2.18           |
| „     | Lancaster, Strathspey .....  | 1.20            | „      | Clonmel, Bruce Villa .....    | 1.89           |
| IX.   | Langsett Moor, Up. Midhope   | 4.05            | „      | Newmarket-on-Fergus, Fenloe   | ...            |
| „     | Scarborough, Scalby .....    | 4.14            | XXI.   | Enniscorthy, Ballyhyland...   | 2.87           |
| „     | Ingleby Greenhow .....       | 4.91            | „      | Rothnen, Clonmannon .....     | 3.29           |
| „     | Mickleton .....              | 2.28            | „      | Ballycumber, Moorrock Lodge   | 1.36           |
| X.    | Bellingham, High Green Manor | 4.35            | „      | Balbriggan, Ardgillan .....   | 2.76           |
| „     | Ilderton, Lilburn Cottage .. | 3.74            | „      | Castle Forbes Gardens.....    | 1.68           |
| „     | Thirlmere, The Bank .....    | 2.04            | XXII.  | Ballynahinch Castle.....      | 1.85           |
| XI.   | Llanfrehfa Grange .....      | 5.35            | „      | Woodlawn .....                | 2.29           |
| „     | Treherbert, Tyn-y-waun ..... | 4.05            | „      | Westport, St. Helens .....    | 2.45           |
| „     | Carmarthen, The Friary ..... | 2.11            | „      | Dugort, Slievemore Hotel ..   | 2.00           |
| „     | Fishguard, Goodwick Station. | 1.11            | XXIII. | Enniskillen, Portora.....     | 1.43           |
| „     | Crickhowell, Tal-y-maes..... | ...             | „      | Dartrey [Cootehill] .....     | 1.54           |
| „     | New Radnor, Ednol .....      | 4.26            | „      | Warrenpoint, Manor House ..   | 2.03           |
| „     | Birmingham WW., Tyrmynydd    | ...             | „      | Belfast, Cave Hill Road ..... | 2.37           |
| „     | Lake Vyrnwy .....            | 3.31            | „      | Glenarne Castle.....          | 2.49           |
| „     | Llangynhafal, Plâs Drâw..... | 3.73            | „      | Londonderry, Creggan Res...   | 1.89           |
| „     | Dolgelly, Bryntirion.....    | 2.00            | „      | Dunfanaghy, Horn Head .....   | 2.44           |
| „     | Bettws-y-Coed, Tyn-y-bryn... | 2.96            | „      | Killybegs .....               | 2.11           |





# THAMES VALLEY RAINFALL — MARCH, 1916.



ALTITUDE SCALE

|                |                 |                  |                 |
|----------------|-----------------|------------------|-----------------|
| Below 250 feet | 250 to 500 feet | 500 to 1000 feet | Above 1000 feet |
|----------------|-----------------|------------------|-----------------|

SCALE OF MILES

Watershed of River Thames above Teddington, and River Lee above Fulkles Weib

Rainfall Stations reporting  
isohyals



## THE WEATHER OF MARCH.

DURING practically the whole month barometric pressure was high near the Arctic Circle, and low over southern Europe, conditions being thus favourable for northerly and easterly winds, which blew with a strength and persistence unequalled for many years. Deep depressions passed eastward over the south of England on the 2nd, 21st and 28th. Temperature was below the average in all parts of the United Kingdom, the defect as compared with the normal ranging from 2° F. over the east and south-east of England to about 4° F. in the east of Scotland, the south-west of England and the south of Ireland. Except for a few days, about the 18th, and again at the end of the month, the day maximum temperatures were everywhere below 50°, even at places situated on the normally favoured south coast. At Bath, Clifton and Guernsey on the 18th temperature in the screen rose to 59°, and at Norwich on the 19th to 61°. On the last day of the month shade maxima of 57° or 58° were again recorded in many districts. Owing to cloudy skies, the moderate terrestrial radiation and the total absence of anti-cyclonic conditions, no very low temperatures were recorded. On the 4th a shade minimum of 17° was noted at Kilmarnock, a similar value being recorded on the 5th at Llangammarch Wells.

The duration of bright sunshine was much below the normal until quite the close of the month, when a few bright days were experienced. The most sunless weather occurred over the northern half of England, where the daily amount fell short of the average by more than an hour and a half. Over Ireland the deficiency was only half this amount. The durations at individual stations were as follows: Camden Square, 51 hours; Copdock, 66 hours; Weymouth, 88 hours; Sidmouth, 113 hours; Selborne, 81 hours; Totland Bay, 94 hours; Hodsock Priory, 54 hours; Bolton, 33 hours; Southport, 61 hours; Hull, 38 hours; Haverfordwest, 99 hours; Swinton, 70 hours; Paisley, 78 hours; Perth, 88 hours; Markree Castle, 84 hours.

Rainfall as was to be expected with the abnormal pressure conditions, was very unequally distributed over the country. Heavy daily falls were infrequent, that of the 27th over the south and east of England yielding, however, more than an inch, which in many places fell as snow (See ante p. 37). At Camden Square the fall exceeded an inch for the first time on record in March. The west coast was in general much drier than the east, this contrast being more marked in Scotland than in England and Ireland, where the precipitation was comparatively uniform owing to the southern track taken by many of the depressions. In England the wettest areas, with more than 5 inches, occurred in isolated patches over the southern inland regions, while considerably less than 2 inches fell on a narrow strip on the west coast between the Mersey and the Solway Firth, where in some places less than an inch fell. In Scotland the eastern coastal fringe had a relatively small rainfall, the maximum fall—over 4 inches in places—being recorded in the central uplands open to the north and east, and in the counties of Ross and Sutherland. The smallest rainfall which, at some places was less than an inch, occurred on the west coast, where only a quarter of the average fell. In Ireland the rainfall exceeded four inches in three small patches, situated in Co. Down and Co. Wicklow on the east, and over a small area in Connemara in the west. Less than two inches fell over a large part of the north and south-west. The general rainfall, expressed as a percentage of the average, was, England and Wales, 138 per cent.; Scotland, 66 per cent.; Ireland, 78 per cent.; British Isles, 98 per cent.

In the Thames Valley more than 5 inches fell along the North Downs, the Chilterns and in Bucks., and less than 4 inches to the east of London. In London (Camden Square), the mean temperature of the month was 39°·8, or 2°·3 below the average. The duration of rainfall was 133·6 hours, being the greatest in any month since records commenced in 1880, while the rainfall, 4·67 inches, was probably the greatest March fall in London during the last two centuries.

## Climatological Table for the British Empire, October, 1915.

| STATIONS.<br><br>(Those in italics are<br>South of the Equator.) | Absolute. |       |          |       | Average. |      |               |           | Absolute.       |                   | Total Rain |       | Aver. |
|------------------------------------------------------------------|-----------|-------|----------|-------|----------|------|---------------|-----------|-----------------|-------------------|------------|-------|-------|
|                                                                  | Maximum.  |       | Minimum. |       | Max.     | Min. | Dew<br>Point. | Humidity. | Max. in<br>Sun. | Min. on<br>Grass. | Depth.     | Days. |       |
|                                                                  | Temp.     | Date. | Temp.    | Date. |          |      |               |           |                 |                   |            |       |       |
|                                                                  |           |       |          |       |          |      |               | 0-100     |                 |                   | inches     |       |       |
| London, Camden Square                                            | 68°0      | 12    | 34°8     | 1     | 57°4     | 44°0 | 45°5          | 88        | 107°7           | 30°0              | 2·06       | 12    | 7·6   |
| Malta ... ..                                                     | 80·6      | 2     | 58·5     | 31    | 73·9     | 65·2 | ...           | 77        | 133·0           | ...               | 1·17       | 6     | 2·5   |
| Lagos ... ..                                                     | 88·0      | sev.  | 71·0     | sev.  | 86·1     | 74·8 | 74·1          | 79        | 157·3           | 68·0              | 7·66       | 19    | 7·6   |
| Cape Town ... ..                                                 | 96·7      | 31    | 44·4     | 7     | 69·9     | 53·3 | 52·8          | 71        | ...             | ...               | ·51        | 5     | 4·6   |
| Johannesburg ... ..                                              | 85·4      | 23a   | 39·0     | 17    | 72·6     | 49·7 | 43·5          | 60        | ...             | 36·2              | 4·30       | 7     | 3·0   |
| Mauritius ... ..                                                 | 84·1      | 31    | 55·5     | 12    | 81·5     | 63·6 | 59·7          | 65        | ...             | 47·4              | ·17        | 4     | 4·5   |
| Bloemfontein ... ..                                              | 92·8      | 24    | 37·7     | 8     | 77·4     | 49·5 | 40·6          | 43        | ...             | ...               | 2·90       | 6     | 3·4   |
| Calcutta ... ..                                                  | 93·9      | 13    | 73·1     | 26b   | 89·6     | 77·7 | 76·9          | 83        | ...             | 63·9              | 3·90       | 7     | 6·4   |
| Bombay ... ..                                                    | 91·1      | 30    | 74·6     | 10    | 86·8     | 77·7 | 75·4          | 81        | 138·0           | 57·1              | 2·55       | 9     | 4·2   |
| Madras ... ..                                                    | 97·7      | 17    | 71·4     | 11    | 91·9     | 77·0 | 74·4          | 78        | 161·1           | 71·9              | 2·64       | 10    | 4·7   |
| Colombo, Ceylon ... ..                                           | 87·4      | 24    | 71·2     | 26d   | 85·5     | 75·4 | 73·6          | 83        | 160·1           | 67·7              | 14·12      | 16    | 6·2   |
| Hongkong ... ..                                                  | 87·8      | 25    | 62·6     | 31    | 82·7     | 75·4 | 70·8          | 75        | ...             | ...               | 11·71      | 10    | 6·7   |
| Sydney ... ..                                                    | 83·9      | 23    | 46·3     | 7     | 72·3     | 55·6 | 45·9          | 47        | 137·5           | 37·3              | ·98        | 10    | 4·6   |
| Melbourne ... ..                                                 | 84·7      | 11    | 34·0     | 6     | 65·6     | 47·7 | 44·0          | 60        | 136·6           | 26·9              | 2·83       | 19    | 6·1   |
| Adelaide ... ..                                                  | 90·0      | 20    | 44·8     | 6     | 70·5     | 51·5 | 46·0          | 56        | 148·9           | 32·8              | ·67        | 11    | 5·6   |
| Perth ... ..                                                     | 83·5      | 4     | 45·9     | 15    | 68·7     | 53·9 | 50·4          | 66        | 145·6           | 39·3              | 2·87       | 14    | 5·6   |
| Coolgardie ... ..                                                | 96·8      | 26    | 36·6     | 14    | 79·6     | 49·2 | 41·9          | 37        | 152·2           | 33·4              | ·21        | 4     | 2·1   |
| Hobart, Tasmania ... ..                                          | 77·6      | 11    | 37·0     | 7     | 61·4     | 45·0 | 40·6          | 59        | 141·0           | 27·2              | 3·83       | 22    | 6·2   |
| Wellington ... ..                                                | 67·0      | 15    | 36·8     | 21    | 62·2     | 51·8 | 49·5          | 76        | 131·2           | 31·4              | 2·50       | 15    | 7·1   |
| Auckland ... ..                                                  | 70·5      | 10b   | 47·0     | 23    | 64·9     | 53·4 | 52·8          | 80        | 143·0           | 42·0              | 3·62       | 20    | 6·5   |
| Jamaica, Kingston ... ..                                         | 92·5      | 15    | 70·8     | 20    | 88·7     | 73·6 | 73·4          | 86        | ...             | ...               | 12·78      | 11    | ...   |
| Grenada ... ..                                                   | 92·0      | 8     | 71·0     | 17b   | 86·0     | 74·0 | ...           | 78        | 137·0           | ...               | 7·98       | 14    | 3·1   |
| Toronto ... ..                                                   | 78·7      | 4     | 30·2     | 25    | 60·0     | 43·8 | 43·4          | 80        | 126·0           | 26·9              | 2·19       | 9     | 4·8   |
| Fredericton ... ..                                               | 75·0      | 13c   | 26·0     | 26    | 58·2     | 37·1 | ...           | ...       | ...             | ...               | 2·23       | 11    | 5·1   |
| St. John, N.B. ... ..                                            | 63·3      | 17    | 31·7     | 23    | 54·5     | 42·3 | 42·8          | 76        | ...             | 28·7              | 3·08       | 10    | 5·2   |
| Alberta, Edmonton ... ..                                         | 71·4      | 15    | 19·0     | 7     | 53·5     | 32·8 | ...           | 70        | 116·0           | 10·5              | ·21        | 5     | 6·2   |
| Victoria, B.C. ... ..                                            | 63·1      | 7     | 43·0     | 30    | 55·5     | 46·7 | 47·0          | 87        | 123·0           | 35·2              | 4·20       | 20    | 6·8   |

a and 24, 25. b and 27. c and 14. d and 28.

MALTA.—Crops and water storage suffering for want of rain.

Johannesburg.—Bright sunshine, 291·2 hours.

Mauritius.—Mean temp. 0°·3 above, dew point 1·9 below, and R 1·11 in. below, averages. Mean velocity of wind 10·3 miles.

Bloemfontein.—The highest rainfall for October on record.

COLOMBO, CEYLON.—Mean temp. 80°·5, or 0°·4 above, dew point 0°·4 below, and R 1·54 in. below, averages. TSS on 4 days.

HONGKONG.—Mean temp. 78°·9, mean hourly velocity of wind 13·9 miles. Bright sunshine 187·3 hours.

Melbourne.—Mean temp. 1°·0 below and R ·25 in. above, averages.

Adelaide.—Mean temp. 1°·0 below and R 1·07 in. below, averages.

Coolgardie.—Temp. 0°·5 above and R half an inch below, averages.

Hobart.—Mean temp. 0°·9 below and R 1·62 in. above, averages.

Wellington.—Mean temp. 2°·9 above and R 1·71 in. below, averages. Bright sunshine 181·1 hours; frosts on three days.

Auckland.—Warm and cloudy. R slightly above average, and mean temp. above.

ALBERTA, EDMONTON.—A dry sunny warm month.