

# SYMONS'S METEOROLOGICAL MAGAZINE.

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No. CCCCXLVIII.]      MAY, 1903.      Vol. XXXVIII.

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## METEOROLOGY ON THE BRITISH ANTARCTIC EXPEDITION NEAR MOUNT EREBUS.

THE relief ship "Morning" succeeded in communicating with the "Discovery" and bringing home a full account of the most important Antarctic voyage which has yet been made. After a cruise along the edge of the great ice barrier in the southern summer of 1901-02 the "Discovery" went into winter quarters in a sheltered position 21 miles from Mount Erebus in latitude  $77^{\circ} 49' S.$ , longitude  $166^{\circ} E.$ , and here the winter was passed farther south than men had ever wintered before. During the Antarctic summer of 1902-03 sledging expeditions went out in various directions, and Captain Scott, the leader of the expedition, with Dr. Wilson and Lieutenant Shackleton, succeeded in reaching  $82^{\circ} 17' S.$  along a newly-discovered coast line, thus getting 207 nautical miles beyond the farthest south previously attained. The "Discovery" remained fast in the ice when the "Morning" left.

We have received letters from the captain, officers, and scientific staff describing their experiences and giving a preliminary account of their results. While the interest is on the whole mainly geographical, the letter (dated 16th February, 1903) from Lieutenant Charles Royds, R.N., who is in charge of the meteorological observations on board, will be welcome to our readers as giving new and thoroughly trustworthy information about the Antarctic climate. We publish the subjoined extracts with the approval of Captain Scott and Sir Clements Markham :—

"We are in a good southern latitude for observations, and without doubt are much influenced by the ice barrier. Actually in our winter quarters we are protected and sheltered by hills from N. through E. to S.S.E., and our temperatures are accordingly higher than those recorded clear of the land. The winds, on the other hand, which always blow from the E. and S.E., often have a force of 4 to 5 Beaufort at the ship, while a mile clear of the land there are only light airs or a calm. Our gales during the winter began from the E., working round to S. and S.W., when it blew its hardest, and gradually working back to E. The barometer gave absolutely no warning of gales during the winter, but during the summer the barometer generally falls for a blow. Northerly winds seem most prevalent during the summer months, and I do not think they were ever recorded in winter.

"Mount Erebus has been most useful for recording the direction of the upper air-currents, and the trend of the smoke from the crater was always logged when seen. The upper winds appear to be usually south-westerly or westerly.

"The auroral displays were not very brilliant, but although I have not really gone into the question, I believe we generally got a blow after a more than usually bright aurora.

"During the winter the wet bulb never worked, and always read some degrees higher than the dry; but once the temperature got above zero it was all right. During the winter I made some experiments for humidity by weighing a dish of water (ice) daily, and got some pleasing results which may prove useful when taken in conjunction with the readings of the hair hygograph. All recording instruments are most troublesome, as they get choked up during blizzards. The Dines anemometers, small and recording patterns, have been at work; but when it is snowing or drifting much the vanes have to be cleared two-hourly. The recording instruments always got choked in the highest wind, so that no record was obtained above 50 miles an hour; but 65 to 70 miles an hour has been indicated here by the Robinson anemometer, which once showed 90 miles an hour off Coulman Island in a howling gale. The sunshine recorder has worked excellently, and we have about two dozen 24-hourly records.

"It was impossible to measure the snow-fall, for in the southerly blizzards we could not say whether snow was falling or only drifting, and the gauges were absolutely useless. These blizzards are pretty specimens of what pranks Nature can play, and Heaven protect the man who gets more than a couple of yards away from the shelter of the ship unless he has something to guide him, as the air is a mass of whirling drift (or snow) and you absolutely can see nothing, and unless you can keep your head (as you cannot help keeping cool!) you soon find that you are lost.

"According to my calculations, which are rough and from the uncorrected temperatures, our daily mean for the year is about zero Fahrenheit. Even as early as March I got a temperature of  $-42^{\circ}$  on the barrier while doing an autumn journey, and the lowest recorded by the thermometer  $1\frac{1}{2}$  miles away from the ship was  $-62^{\circ}$  in August, while on board at the same time it was  $-50^{\circ}\cdot5$ . The highest readings were  $39^{\circ}$  in December, 1902, and January, 1903, and  $41^{\circ}\cdot5$  in January, 1902. The range of temperature between the monthly maximum and minimum varies from about  $30^{\circ}$  in summer to about  $60^{\circ}$  in winter. It is a very remarkable thing that during our southerly blizzards in mid-winter the temperature invariably rose sometimes to  $+19^{\circ}$  F., and then fell again to  $-30^{\circ}$  or under as soon as the wind returned to the eastward.

"During the sledge journeys observations were made every two hours to compare with those at the ship, and I think these should prove very valuable."

Mr. Royds sends the following table of mean and extreme temperatures at winter quarters for January, 1903, and February to December, 1902 :—

Temp.	Jan.	Feb	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Mean...	24.9	15.8	7.3	— 7.5	—12.9	—16.4	— 8.6	—17.2	—13.2	— 9.0	12.2	23.4	— 0.1
Max....	39.0	29.2	27.5	19.5	19.0	13.0	15.0	6.0	15.0	11.8	27.8	39.0	39.0
Min. ...	8.0	— 0.8	—13.2	—31.6	—39.5	—47.0	—38.0	—50.5	—44.5	—41.8	0.0	4.2	—50.5

The yearly mean of the uncorrected barometer was 29.228 inches, the highest monthly mean 29.542 in November, the highest reading 30.088 ; the lowest monthly mean was 28.762 in August, and the lowest reading 28.096.

The high temperature of the southerly wind blowing straight from the Pole at mid-winter must not be taken as an indication of a warmer climate farther south. It is probably a Föhn effect due to the thermo-dynamic heating of air descending from the summits of the great mountain ranges which were seen to the south. Similar phenomena have, however, been observed in the Arctic regions, especially during the drift of the "Fram," when there were no mountains near, and it may be that a descending rush of air is brought about near the Poles by some other agency.

## Correspondence.

### THE TEMPERATURE OF APRIL, 1903.

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

The cold weather of April, 1903, though unusual, is not unprecedented even in recent years. The average minimum temperature here for fourteen consecutive nights has been, in 1903, April 13th–26th (inclusive) 29.4, while in 1892 for the ten days ending April 19th, the average minimum was only 26.4 ; in the latter period the lowest minima were 20.2 and 21.7 on the 19th and 14th respectively ; while in 1903 the lowest were 26.6 and 26.7 on the 19th and 18th. In 1891 also the average temperature of the whole month was 40.4 against 41.8 in 1903.

The really unusual feature about the past month is that it was colder than *both* February and March. I have examined the published records for Edinburgh, London, and Paris, from which it appears that we have to go back to 1809 for a similar instance, in which year April was colder than both the preceding months in London and Paris, but not in Edinburgh. In the year 1790 also London and Edinburgh show the same feature, the Paris records not extending so far back.

I may note also that the rainfall here in March this year was the largest since 1881, 7.89 in., or more than double the average.

CHARLES L. BROOK.

*Harewood Lodge, Meltham, 3rd May, 1903.*

## THE FORMATION OF CUMULUS CLOUD.

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

I suppose no one doubts that a cumulus cloud is formed by an upward current of air, but when experimenting with a kite on April 29th I had a plain proof of the fact. A kite was left flying at the end of 2700 feet of wire, and flew at an angle of about  $40^\circ$ . A large and well-defined cumulus cloud then passed over, and the angular elevation of the kite increased rapidly until it reached the high value of  $74^\circ$ ; an angle exceeding  $70^\circ$  being maintained for quite ten minutes while the cloud was overhead. The wind was blowing from south-south-west at a rate of, perhaps, 18 miles per hour, judged by the pull upon the wire, and was very uniform up to a height of 2500 feet. In such a wind the ordinary angle of the kite with 2700 feet of wire would be rather over  $45^\circ$ , so that we must suppose that the wind at a height of 2500 feet was inclined upwards at an angle of nearly  $30^\circ$ . This would give an upward component to the air of from 12 to 15 feet per second. A few heavy drops of rain fell from the cloud, and a fairly heavy shower seemed to be falling from it when it had passed a few miles away to the north. Its lower surface was above 2550 feet high, how much above I cannot say, as it was not reached by the kite. The temperature at the ground level was  $57^\circ$  F., at 2550 feet it was  $43^\circ$  F.

*Oxshott, April 30th, 1903.*

W. H. DINES.

## ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Easter Wednesday, April 15th, at the Institution of Civil Engineers, Great George Street, Westminster. Capt. D. Wilson-Barker, F.R.S.E., President, in the chair.

Mr. J. R. Sutton, M.A., was elected a Fellow of the Society.

Mr. F. J. Brodie read a paper on "The prevalence of gales on the coasts of the British Islands during the thirty years, 1871-1900," being a continuation of a paper on the same subject which he communicated to the Society last year. The average annual numbers of gales were: West coasts, 29.6; north coasts, 25.7; south coasts, 19.1; and east coasts, 15.6. The most stormy years were: West coasts, 1877 with 41 gales; north coasts, 1877 with 40 gales; south coasts, 1883 with 34 gales; and east coasts, 1877 and 1883 both with 26 gales. On the west coasts the actual maximum of gale prevalence occurs at two different times in the year, once in the five-day period, November 12th-16th, and again in the periods December 27th-31st, and January 1st-5th. On the north coasts the maximum prevalence occurs in the five-day period January 21st-25th, secondary maxima being shown in the early parts both of that month and of December. On the south coasts the actual maximum occurs in the five-day period November 7th-11th, but subsidiary maxima of almost equal intensity are recorded at precisely the same time in December and in the period January 21st-25th. On the east coasts the maximum frequency is very pro-

nounced, and occurs in the five-day period November 7th-11th, the succeeding five days being, however, almost as stormy.

Dr. R. H. Scott said that he was glad to find that Mr. Brodie's figures proved that the old idea of equinoctial gales was groundless, and that they did not exist as a constant occurrence.

Mr. C. Harding referred to the relationship between barometric pressure and wind, and said that it did not necessarily follow that the stormiest month had the isobaric lines lying most closely together; but generally in the month when storms were most frequent the variations and range of pressure were very marked.

Mr. W. H. Dines said that from his experience with kite-flying he had found that inland it was often blowing very hard at 2000 feet elevation when it was nearly calm at the surface, but that this rule did not hold when kites were flown from a vessel over the sea. Inland the isobars gave a perfectly reliable estimate of the wind force at an elevation of 1000 to 2000 feet, but they only gave a rough approximation to the wind force at the surface; it seemed likely, therefore, that winds blowing from the land would be much lighter on the coast than they would be 20 miles or so out at sea.

The President, Mr. F. C. Bayard, and Mr. R. H. Curtis also took part in the discussion, and Mr. F. J. Brodie briefly replied.

A paper by Mr. J. Baxendell on "The Duration of Rainfall" was read by the Secretary. The author referred to various patterns of self-recording raingauges and pointed out their defects and advantages, and also stated that it is hardly possible to determine from some of them the rate at which rain falls, especially in very small quantities. The records of a Halliwell self-recording raingauge, which had been in operation at Southport during 1902 gave the total rainfall for the year as 25.42 inches, and the duration 640.1 hours. The author showed that the hourly duration values give a striking curve of diurnal variation, the early morning maximum being most pronounced; the afternoon maximum is also present, but is much less protracted and of far less amplitude than the former. Minima occur about mid-day and in the evening. Mr. Baxendell concluded his paper by giving a description of the improved gauge referred to.

Mr. R. H. Curtis exhibited diagrams showing the mean hourly amounts of rain recorded by the Beckley self-recording raingauge at Valencia, Aberdeen, Falmouth, and Kew.

Mr. Baldwin Latham said he would like to see self-recording rain-gauges placed all over the country. Last year at Croydon the average hourly rate of rainfall was small, being only .039 inch, but the number of hours (539.3) was considerable.

Mr. J. Hopkinson said that the peculiarity at Southport last year of the small total rainfall but great number of days of rain would probably be found to have been general over England. It was similar to that experienced in Hertfordshire, where the number of rainy days was excessive in comparison with the amount of rainfall, which was much below the average. Both "total" and "partial" droughts were absent, and the little rain which did fall was so frequent and continuous as to give a general impression that it was a wet year.

## THE CANADIAN CLIMATE.

By R. F. STUPART, Director Meteorological Service, Dominion of Canada.

*(Concluded from p. 33.)*

THE following maps and tables indicate the observed temperatures, uncorrected for height above the sea, at representative stations in all parts of the Dominion of Canada.

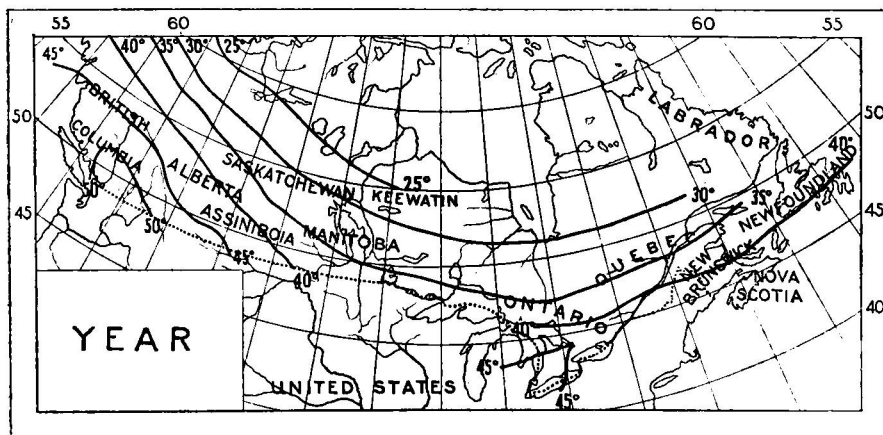
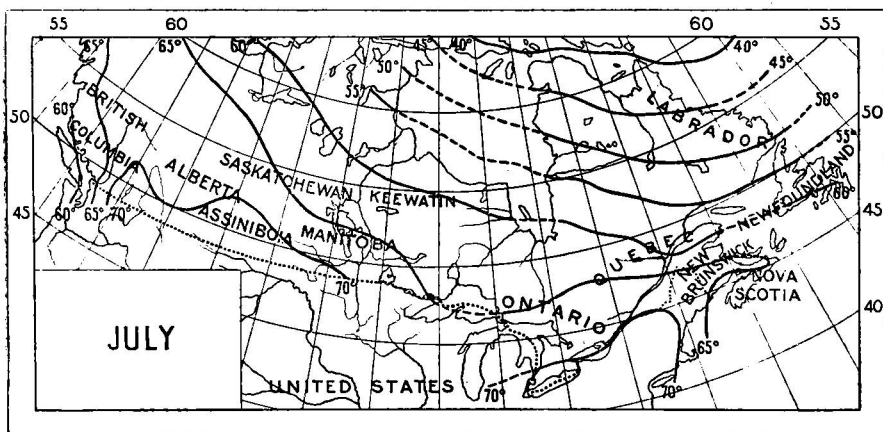
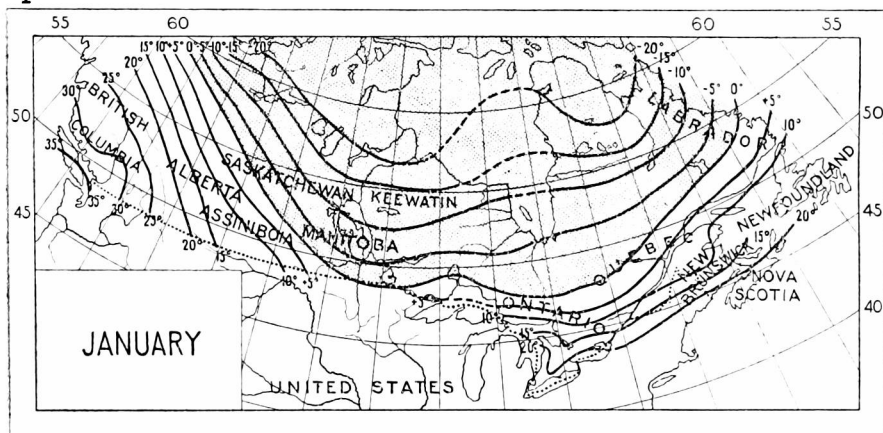


TABLE I.—*The Average Mean Highest, Mean Lowest and Mean Temperature ; the Highest and Lowest Temperature and Mean Daily Range ; also Percentage of Cloud and Precipitation in inches at various stations in Canada.*

Mean temp. is taken as $\frac{\text{Max.} + \text{Min.}}{2}$													
Temperatures not reduced to sea-level.													
VICTORIA, B.C. .... (16 years) Lat. 48° 24' N. ; Long. 123° 19' W. Height 83 ft.													
Mean Highest .....	41·9	44·1	48·9	54·9	61·6	65·5	70·9	69·2	63·8	55·8	48·3	45·5	70·9
" Lowest .....	33·1	34·1	36·1	39·4	44·2	47·8	49·6	49·8	46·1	43·7	38·8	37·0	33·1
" Temperature .....	37·5	39·1	42·5	47·2	52·9	56·6	60·3	59·5	55·0	49·7	43·6	41·3	48·8
" Daily Range .....	8·8	10·0	12·8	15·5	17·4	17·7	21·3	19·4	17·7	12·1	9·5	8·5	...
Absolute Highest .....	56	60	68	75	83	86	90	88	85	70	63	59	90
" Lowest .....	-1	6	17	29	31	36	37	37	30	22	17	8	-1
Per cent. of Cloud .....	78	75	67	65	61	60	42	42	53	67	79	79	64
Precipitation (Rain and Melted Snow) .....	5·28	4·03	2·92	2·42	1·44	1·20	0·40	0·60	2·16	2·37	6·97	7·98	37·77
KAMLOOPS, B.C. .... (12 years) Lat. 50° 41' N. ; Long. 120° 29' W. Height 1193 ft.													
Mean Highest .....	30·7	33·7	46·9	60·5	70·2	75·6	81·8	82·1	69·5	56·8	40·0	35·3	82·1
" Lowest .....	17·7	18·5	27·6	37·6	45·9	51·3	54·8	54·9	46·1	39·1	28·3	24·9	17·7
" Temperature .....	24·2	26·1	37·2	49·0	58·0	63·5	68·3	68·5	57·8	48·0	34·2	30·1	47·1
" Daily Range .....	13·0	15·2	19·3	22·9	24·3	24·3	27·0	27·2	23·4	17·7	11·7	10·4	...
Absolute Highest .....	56	64	69	78	100	101	101	101	87	82	65	56	101
" Lowest .....	-27	-27	-5	25	26	39	44	39	31	16	-22	-16	-27
Per cent. of Cloud .....	69	69	51	56	58	56	48	50	46	58	65	70	58
Precipitation .....	0·86	0·79	0·51	0·37	1·11	1·42	1·61	1·09	0·55	0·61	1·46	0·78	11·16

TABLE I.—(continued.)

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	YEAR.
<b>CALGARY, N.W.T. .... (18 years)</b> Lat. 51° 2' N.; Long. 114° 2' W. Height 3389 ft.													
Mean Highest .....	21·9	24·3	35·9	52·6	63·6	68·9	74·9	73·7	63·7	54·9	35·9	30·1	74·9
" Lowest .....	0·0	1·8	12·4	26·7	35·7	42·4	46·5	44·9	36·8	28·1	13·9	10·8	0·0
" Temperature .....	11·0	13·0	24·2	39·6	49·7	55·6	60·7	59·3	50·3	41·5	24·9	20·5	37·5
" Daily Range .....	21·9	22·5	23·5	25·9	27·9	26·5	28·4	28·8	26·9	26·8	22·0	19·3	...
Absolute Highest.....	58	59	75	77	90	94	95	95	89	85	70	58	95
" Lowest .....	40	49	34	14	12	26	31	30	17	8	31	39	49
Per cent. of Cloud .....	41	48	48	51	53	49	43	37	44	41	42	47	45
Precipitation.....	0·52	0·66	0·75	0·67	1·78	2·45	2·68	2·14	1·36	0·48	0·88	0·59	14·96
<b>WINNIPEG, MANITOBA... (22 years)</b> Lat. 49° 53'; Long. 97° 7'. Height 760 ft.													
Mean Highest .....	3·6	12·0	24·3	47·0	64·2	74·9	78·1	75·8	64·1	49·5	26·9	14·1	78·1
" Lowest .....	17·8	13·0	0·4	24·6	38·6	49·9	53·4	50·2	40·6	28·6	8·7	5·9	17·8
" Temperature .....	7·1	0·5	12·3	35·8	51·4	62·4	65·7	63·0	52·3	39·0	17·8	4·1	33·0
" Daily Range .....	21·4	25·0	23·9	22·4	25·6	25·0	24·7	25·6	23·5	20·9	18·2	20·0	23·0
Absolute Highest.....	40	46	62	90	95	96	96	98	94	86	64	45	98
" Lowest .....	48	46	38	14	15	21	36	30	19	3	34	53	53
Per cent. of Cloud .....	52	50	48	50	51	49	45	45	53	63	63	57	52
Precipitation.....	0·86	0·97	1·00	1·59	2·21	3·29	3·08	2·67	2·03	1·70	1·08	0·91	21·39
<b>TORONTO .....</b> (60 years) Lat. 43° 40'; Long. 79° 34' W. Height 350 ft.													
Mean Highest .....	28·9	29·6	35·6	48·9	61·3	72·0	77·4	75·6	67·5	54·1	42·0	32·2	77·4
" Lowest .....	14·9	14·5	21·4	32·8	42·9	52·7	57·9	57·0	49·9	38·7	29·9	19·6	14·5
" Temperature .....	21·9	22·0	28·5	40·8	52·1	62·4	67·6	66·3	58·7	46·4	36·0	25·9	44·1
" Daily Range .....	14·0	15·1	14·2	16·1	18·4	19·3	19·5	18·6	17·6	15·4	12·1	12·6	...
Absolute Highest.....	58	54	70	90	93	93	98	99	94	81	67	61	99
" Lowest .....	26	25	16	6	25	28	39	40	28	16	5	21	26
Per cent. of Cloud .....	74	69	63	58	57	52	50	50	50	62	75	76	61
Precipitation .....	2·90	2·58	2·67	2·42	3·06	2·88	2·99	2·87	3·27	...	...	...	...



TABLE I.—(continued.)

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	YEAR.
<b>MONTREAL</b> .....(24 years) Lat. 43° 30' N.; Long. 73° 35' W. Height 187 ft.													
Mean Highest .....	20·7	23·4	30·7	49·0	64·0	73·7	77·4	75·1	66·5	52·9	38·7	26·2	77·4
" Lowest .....	4·4	7·4	16·9	32·8	45·8	56·4	60·8	58·9	50·8	34·0	26·6	12·1	4·4
" Temperature .....	12·3	15·6	24·3	40·6	54·7	65·0	68·9	66·8	58·5	46·0	31·7	19·2	42·0
" Daily Range .....	16·3	16·0	13·8	16·2	18·2	17·3	16·6	16·2	15·7	13·0	12·1	14·1	...
Absolute Highest.....	52	50	57	77	92	98	94	90	91	78	68	59	98
" Lowest .....	26	24	15	8	25	38	46	45	33	22	1	21	26
Per cent. of Cloud .....	61	59	56	53	58	53	52	53	49	59	72	66	58
Precipitation .....	3·73	3·07	3·79	2·24	2·95	3·53	4·29	3·57	3·30	3·13	3·74	3·65	40·99
<b>FREDERICTON, N.B.</b> .....(24 years) Lat. 45° 37'; Long. 66° 36'. Height 164 ft.													
Mean Highest .....	23·3	26·3	35·2	48·9	63·2	72·2	75·9	73·6	65·5	52·3	41·7	27·3	75·9
" Lowest .....	2·8	3·9	16·0	28·1	39·9	49·1	54·4	53·5	41·9	34·4	24·9	9·0	2·8
" Temperature .....	11·8	15·8	25·4	37·9	51·1	60·6	66·0	64·1	56·2	44·1	32·0	18·6	40·3
" Daily Range .....	20·5	22·4	19·2	20·8	23·3	23·1	21·5	20·1	20·6	17·9	16·8	18·3	...
Absolute Highest.....	52	51	65	77	92	97	96	95	88	82	64	58	97
" Lowest .....	34	30	27	4	24	32	38	39	25	15	16	31	34
Per cent. of Cloud .....	52	55	52	53	58	55	51	53	55	55	64	54	55
Precipitation .....	2·43	3·76	4·12	2·59	4·23	3·64	3·79	4·18	3·21	3·93	4·21	3·62	43·71
<b>CHARLOTTETOWN, P.E.I.</b> (24 years) Lat. 46° 14'; Long. 63° 10'. Height 38 ft.													
Mean Highest .....	24·0	25·3	31·3	41·4	54·8	66·4	71·6	72·2	63·7	52·8	40·1	29·8	72·2
" Lowest .....	6·2	7·0	16·0	27·4	37·7	49·0	56·2	57·1	49·7	40·2	28·3	15·9	6·2
" Temperature .....	15·1	16·1	23·7	34·4	46·3	57·7	63·9	64·7	56·7	46·5	34·2	22·9	40·2
" Daily Range .....	17·8	18·3	15·3	14·0	17·1	17·4	15·4	15·1	14·0	12·6	11·8	13·9	...
Absolute Highest.....	50	47	53	68	79	85	88	88	82	74	63	52	88
" Lowest .....	27	17	14	2	26	36	42	44	34	26	1	18	27
Per cent. of Cloud .....	61	58	64	57	57	58	53	59	52	70	71	71	61
Precipitation .....	4·06	3·25	3·09	2·61	3·06	2·60	3·43	3·96	3·35	4·65	3·74	3·98	41·78

TABLE I.—(continued.)

HALIFAX, NOVA SCOTIA (24 years)		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Lat. 44° 39' N.; Long. 63° 36' W. Height 97 ft.														
Mean Highest .....		30.9	31.6	36.5	46.6	58.4	68.2	73.9	74.3	67.6	56.2	44.2	34.3	74.3
" Lowest .....		13.1	13.9	20.8	29.9	38.9	47.0	54.4	55.4	48.8	39.8	32.2	19.7	13.1
" Temperature .....		22.0	22.7	28.7	38.2	48.7	57.6	64.2	64.8	58.2	48.0	38.2	27.0	43.2
" Daily Range .....		17.8	17.7	15.7	16.7	19.5	21.2	19.5	18.9	18.8	16.4	12.0	14.6	...
Absolute Highest.....		55	50	55	76	88	93	93	93	85	80	65	55	93
" Lowest .....		-16	-17	-9	7	24	33	41	42	32	23	4	-11	-17
Per cent. of Cloud .....		61	59	64	61	62	61	58	57	53	54	64	64	60
Precipitation.....		5.63	4.94	5.15	4.00	4.43	3.68	3.43	3.96	3.53	5.21	5.26	5.52	54.74

TABLE II.—Percentage of Bright Sunshine at Thirteen Stations in the Dominion (100 being constant sunshine).

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Victoria, British Columbia .....	20	23	38	39	41	41	56	55	44	35	20	15	36
Agassiz, " .....	18	19	25	24	31	33	46	45	31	28	17	13	28
Battleford, North West Territories .....	32	39	49	52	49	54	58	54	49	56	31	27	46
Indian Head " .....	30	34	37	38	46	47	55	49	42	34	24	24	38
Brandon, Manitoba .....	40	46	44	44	47	56	56	55	49	36	40	36	46
Winnipeg, " .....	42	47	51	50	54	56	57	59	47	36	34	36	47
Woodstock, Ontario .....	21	29	31	43	54	53	58	55	49	39	25	20	40
Barrie, " .....	19	28	38	45	44	51	56	56	48	34	19	16	38
Toronto, " .....	27	36	43	50	50	56	60	59	58	42	28	23	44
Lindsay, " .....	24	35	44	51	47	55	57	55	53	38	25	21	42
Kingston, " .....	27	36	44	49	47	54	58	57	51	41	27	26	43
Montreal, Quebec .....	33	42	46	51	51	55	59	58	54	42	28	27	45
Fredericton, New Brunswick .....	40	44	42	46	45	47	50	50	48	43	32	31	43

## REVIEW.

*London Fog Inquiry, 1901-02. Report to Meteorological Council, by Captain ALFRED CARPENTER, R.N., D.S.O. London: Printed for H.M. Stationery Office, 1903. Size 12 x 10. Pp. 28. Plates.*

THE London County Council, after receiving Captain Carpenter's report on the Fog Inquiry, has, we regret to say, resolved to discontinue the subsidy which had made it possible to carry on systematic observations during the winter of 1901-02. This is unfortunate, because the first season's work with a body mainly composed of inexperienced observers is necessarily largely a matter of organizing and training a staff, which in a second season would be much more efficient, and immediate results which would enable fogs to be predicted with unerring precision could not be expected.

There were 46 places of observation at parks, fire brigade, police, and coastguard stations in all parts of London and the immediate surroundings, but they were not all at work until January 5th, 1902. Three varieties of fog were noted: (1) thin fog or mist, which slightly hinders traffic by river and rail but not by road; (2) moderately thick fog which hinders all traffic and makes it impossible to discern a man by day more than 100 yards away; and (3) dense fog which stops all traffic on the river and makes it very slow by road or rail, while in the daytime an object cannot be distinguished across the street. In addition to this, darkness due to high fog, but not interfering with lights at the street level was also taken into account. Special observations were made at considerable heights on the top of the dome of St. Paul's and on the Victoria Tower of the Palace of Westminster.

It was found that light fogs were so frequent that they could be considered to be permanent features of London in winter, and so they are left out of account as far as regards frequency. Regent's Park and Kingsland Road, N., had fog on 59 days between 15th December and 14th March; Bermondsey came next with 42 days; Camberwell, Clerkenwell, and Regent Street had 26 days; Southwark, Poplar, and the Isle of Dogs had from 13 to 10 days; and Dulwich had the distinction of having only one. Fogs were least frequent on Mondays (87 occasions), and most frequent on Fridays (163 occasions), and the hours of greatest density were from 6 a.m. to noon. The density of fog was not found to diminish appreciably with height above the ground, and the appearance of fog was very often simultaneous over the area, while in no case did fog drift up the estuary into London. Fogs never appeared in cyclonic conditions, but 33 out of 52 observed cases were formed during anti-cyclonic weather. No severe fogs occurred when the air temperature was above 40°.

The result of the inquiry is to satisfy Captain Carpenter that something might be done to predict fogs if the records of thermographs in all parts of London could be compared, and readings obtained from thermometers suspended over London from balloons.

## RAINFALL AND TEMPERATURE, APRIL, 1903.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					Days on which -01 or more fell.	TEMPERATURE.				No. of Nights below 32°.	
		Total Fall.	Difference from average 1890-9.	Greatest Fall in 24 hours.		Max.		Min.					
				Dpth	Date			Deg.	Date	Deg.	Date		
		inches.	inches.	in.				Deg.	Date	Deg.	Date	In shade.	On grass.
I.	London (Camden Square) ...	2.14	+	.62	.44	26a	13	61.1	29	27.8	18	9	17
II.	Tenterden .....	2.20	+	.43	1.05	26	13	60.0	30	26.0	17	8	14
III.	Hartley Wintney .....	1.81	+	.17	.55	28	12	59.0	28c	25.0	19e	17	19
IV.	Hitchin .....	1.55	+	.03	.33	28	14	58.0	29	26.0	17f	12	...
V.	Winslow (Addington) .....	1.48	—	.08	.40	28	12	60.0	25	23.0	19	12	16
VI.	Bury St. Edmunds (Westley) .....	1.96	+	.43	.30	1	15	60.0	28	26.0	16g	...	...
VII.	Norwich (Brundall) .....	2.52	+	1.01	.35	1	22	60.0	29b	28.6	20	7	16
VIII.	Winterborne Steepleton .....	4.31	...	...	1.14	25	11	56.2	8	25.0	18	10	18
IX.	Torquay .....	1.34	...	...	.33	29b	9	57.8	11	32.0	17	1	8
X.	Polapit Tamar [Launceston]..	2.23	+	.07	.53	30	16	57.1	9	23.8	18	8	9
XI.	Stroud (Upfield) .....	2.30	+	.46	.80	28	13	60.0	28d	29.0	13h	7	...
XII.	Church Stretton (Woolstaston) ..	1.47	—	.41	.60	28	13	62.5	28	21.0	18	9	...
XIII.	Worcester (Diglis Lock) .....	1.78	+	.35	.56	28	13	...	...	...	...	...	...
XIV.	Boston .....	1.74	+	.36	.44	30	12	61.0	28	25.0	16	10	...
XV.	Hesley Hall [Tickhill].....	1.29	—	.05	.54	30	12	60.0	28	26.0	23	12	...
XVI.	Derby (Midland Railway).....	1.90	+	.35	.60	30	15	61.0	30	27.0	18i	11	...
XVII.	Bolton (The Park).....	2.30	+	.11	.43	3, 14	17	56.2	28	27.3	18	9	...
XVIII.	Wetherby (Ribston Hall) ...	1.43	—	.31	.30	30	14	...	...	...	...	...	...
XIX.	Arncliffe Vicarage.....	3.26	—	.10	1.20	3	15	...	...	...	...	...	...
XX.	Hull (Pearson Park) .....	1.99	+	.40	.42	30	17	60.0	28	26.0	13	11	18
XXI.	Newcastle (Town Moor) .....	1.44	—	.22	.40	14	15	...	...	...	...	...	...
XXII.	Borrowdale (Seathwaite).....	4.81	—	1.53	2.00	3	17	56.3	8, 28	25.4	18	9	...
XXIII.	Cardiff (Ely).....	2.32	+	.14	.84	25	15	...	...	...	...	...	...
XXIV.	Haverfordwest .....	2.91	+	.49	1.10	25	14	59.3	10	27.3	18	7	13
XXV.	Aberystwith (Gogerddan) ...	2.99	+	.42	.75	25	12	65.0	28	20.0	15j	13	...
XXVI.	Llandudno .....	1.28	—	.50	.36	30	12	56.0	10d	31.0	18	1	...
XXVII.	Cargen [Dumfries] .....	1.53	—	.80	.83	29	6	58.0	8	24.0	18	14	...
XXVIII.	Edinburgh (Royal Observatory) ..	1.06	...	...	.29	29	14	54.0	8	26.5	15	10	18
XXIX.	Colmonell .....	1.10	—	1.07	.45	3	7	60.0	30	25.0	23	10	...
XXX.	Tighnabruach .....	2.48	...	...	.83	3	12	57.0	30	28.0	12k	9	...
XXXI.	Mull (Quinish) .....	2.35	—	.44	.72	3	17	...	...	...	...	...	...
XXXII.	Loch Leven Sluices .....	1.29	—	.70	.36	28b	8	...	...	...	...	...	...
XXXIII.	Dundee (Eastern Necropolis) ..	1.00	—	.54	.45	27	11	58.9	8	28.1	17	14	...
XXXIV.	Braemar .....	2.29	+	.20	.51	27	22	53.8	30	23.0	24	18	24
XXXV.	Aberdeen (Cranford) ...	2.14	+	.30	.21	14	24	58.0	6	28.0	16h	13	...
XXXVI.	Cawdor (Budgate) .....	1.40	—	.17	.23	11	20	...	...	...	...	...	...
XXXVII.	Strathconan [Beaully] .....	...	...	...	...	...	...	...	...	...	...	...	...
XXXVIII.	Glencarron Lodge .....	7.14	+	2.48	1.06	5	18	57.9	25	22.6	16	14	...
XXXIX.	Dunrobin .....	2.69	+	.92	.50	6	18	59.0	9	30.0	14g	8	...
XL.	S. Ronaldshay (Roeberry) ...	2.45	+	.53	.29	20	22	51.0	30	25.0	16	11	...
XLI.	Darrynane Abbey.....	2.14	—	1.36	.42	25	17	...	...	32.0	13	1	...
XLII.	Waterford (Brook Lodge) ...	1.40	—	1.22	.62	28	11	59.0	8	26.0	14	7	...
XLIII.	Broadford (Hurdlestown) ...	1.84	—	0.24	.61	28	17	...	...	...	...	...	...
XLIV.	Carlow (Browne's Hill) .....	1.87	—	.42	.46	25	12	...	...	...	...	...	...
XLV.	Dublin (Fitz William Square) ..	1.05	—	.92	.34	25	17	61.1	6	29.9	17	4	7
XLVI.	Ballinasloe .....	1.44	—	.85	.23	3	18	62.0	30	25.0	17	12	...
XLVII.	Clifden (Kylemore) .....	3.44	—	1.33	.66	5	12	...	...	...	...	...	...
XLVIII.	Seaforde .....	1.37	—	1.06	.35	14	14	64.0	27	25.0	17	14	16
XLIX.	Londonderry (Creggan Res.) ..	2.14	—	.32	.47	14	19	...	...	...	...	...	...
L.	Omagh (Edenfel) .....	2.40	+	.04	.45	14	17	59.0	30	26.0	17	9	13

+ Shows that the fall was above the average ; — that it was below it.

a and 28. b and 30. c and 29. d and 29, 30. e and 20. f and 22. g and 18. h and 17.

i and 19, 20. j and 16, 17, 18, 19. k and 14.

## SUPPLEMENTARY RAINFALL, APRIL, 1903.

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Uxbridge, Harefield Pk..	2.28	XI.	Llandefaelog-fach.....	2.24
II.	Dorking, Abinger Hall..	2.60	„	New Radnor, Ednol.....	2.91
„	Sheppey, Leysdown .....	1.74	„	Rhayader, Nantgwillt ...	2.69
„	Hailsham .....	1.98	„	Lake Vyrnwy .....	2.22
„	Crowborough.....	2.81	„	Ruthin, Plâs Drâw .....	1.85
„	Ryde, Beldornie Tower..	2.44	„	Criccieth, Talarvor .....	2.05
„	Bournemouth, Kempsey ..	3.00	„	I. of Anglesey, Lligwy..	1.75
„	Emsworth, Redlands ...	2.72	„	Douglas, Woodville.....	1.83
„	Alton, Ashdell .....	2.54	XII.	Stoneykirk, Ardwell Ho.	1.28
„	Newbury, Welford Park ..	3.06	„	Dalry, Old Garroch .....	2.32
III.	Oxford, Magdalen Coll..	2.13	„	Moniaive, Maxwelton Ho.	1.33
„	Banbury, Bloxham .....	1.96	„	Lilliesleaf, Riddell .....	1.57
„	Pitsford, Sedgebrook ...	1.76	XIII.	N. Esk Res. [Penicuik]	1.50
„	Huntingdon, Brampton..	1.35	XIV.	Dalry, Blair .....	2.30
„	Wisbech, Bank House...	1.50	„	Glasgow, Queen's Park..	1.34
IV.	Southend .....	1.74	XV.	Inveraray, Newtown ...	3.24
„	Colchester, Lexden .....	1.88	„	Ballachulish, Ardsheal...	3.13
„	Saffron Waldon, Newport	1.74	„	Campbeltown, Redknowe	1.77
„	Rendlesham Hall .....	2.01	„	Islay, Ballabus.....	2.37
„	Swaffham .....	1.92	XVI.	Dollar.....	1.12
V.	Salisbury, Alderbury ...	2.65	„	Balquhiddier, Stronvar...	1.91
„	Bishop's Cannings .....	3.23	„	Coupar Angus Station...	1.31
„	Ashburton, Druid House ..	2.22	„	Blair Atholl ...	1.11
„	Okehampton, Oaklands..	1.99	„	Montrose, Sunnyside ...	1.38
„	Hartland Abbey .....	1.80	XVII.	Alford, Lynturk Manse..	3.22
„	Lynmouth, Rock House ..	1.84	„	Keith H.R.S.....	3.08
„	Probus, Lamellyn .....	1.91	XVIII.	Fearn, Lower Pitkerrie..	1.98
„	Wellington, The Avenue ..	2.16	„	S. Uist, Askernish .....	1.62
„	North Cadbury Rectory ..	3.57	„	Invergarry .....	2.39
VI.	Clifton, Pembroke Road ..	3.25	„	Aviemore, Alvie Manse..	1.75
„	Ross, The Graig .....	2.31	„	Loch Ness, Drumnadrochit	1.65
„	Shifnal, Hatton Grange ..	1.37	XIX.	Invershin .....	4.07
„	Wem, Clive Vicarage ...	...	„	Bettyhill .....	2.88
„	Cheadle, The Heath Ho.	2.09	„	Watten H.R.S.....	2.32
„	Coventry, Kingswood ...	1.62	XX.	Cork, Wellesley Terrace	1.82
VII.	Market Overton .....	1.86	„	Killarney, District Asyl.	2.19
„	Grantham, Stainby .....	1.98	„	Glenam [Clonmel] .....	1.78
„	Horncastle, Bucknall ...	1.35	„	Ballingarry, Hazelfort...	1.56
„	Worksop, Hodsck Priory ..	1.12	„	Miltown Malbay .....	2.31
VIII.	Neston, Hinderton .....	1.71	XXI.	Gorey, Courtown House ..	1.03
„	Southport, Hesketh Park ..	1.78	„	Moynalty, Westland ...	1.55
„	Chatburn, Middlewood..	2.93	„	Athlone, Twyford .....	1.28
„	Duddon Val., Seathwaite Vic.	3.16	„	Mullingar, Belvedere ...	1.96
IX.	Langsett Moor, Up. Midhope	2.30	XXII.	Woodlawn .....	1.68
„	Baldersby .....	1.11	„	Westport, Murrisk Abbey	2.01
„	Scalby, Silverdale .....	2.78	„	Crossmolina, Enniscoe ..	2.43
„	Ingleby Greenhow Vic..	1.82	„	Collooney, Markree Obs.	2.27
„	Middleton, Mickleton ...	1.54	XXIII.	Enniskillen, Portora ...	1.65
X.	Beltingham .....	1.84	„	Warrenpoint.....	1.61
„	Bamburgh .....	1.50	„	Banbridge, Milltown ...	.88
„	Keswick, The Bank .....	1.48	„	Belfast, Springfield .....	1.82
„	Melmerby Rectory .....	1.33	„	Bushmills, Dundarave..	1.82
XI.	Llanfrechfa Grange .....	2.17	„	Stewartstown .....	1.32
„	Treherbert, Tyn-y-waun ..	3.79	„	Killybegs .....	4.09
„	Castle Malgwyn .....	2.44	„	Horn Head .....	2.36

## METEOROLOGICAL NOTES ON APRIL, 1903.

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.

## ENGLAND.

LONDON, CAMDEN SQUARE.—Changeable and unsettled, with a period of dry but cold weather in the middle. S falling on 4 days. The mean temp. was  $45^{\circ}2$ , or  $2^{\circ}9$  below the average. This was  $1^{\circ}2$  below the mean temp. of March, 1903, and only  $0^{\circ}1$  above that of February.

TENTERDEN.—The middle of the month was very cold and dry, with strong N. winds. S on 16th and ice over  $\frac{1}{4}$  inch thick on 17th. Sunshine 165 hours.

CROWBOROUGH.—The chief feature was the unseasonable cold period which lasted from 12th to 25th, with mean temp. of  $39^{\circ}7$ .

HARTLEY WINTNEY.—The period of cold weather from 9th to 26th, with N. wind, grass frost each night and occasional showers of sleet, has never been equalled. Ozone on 25 days with a mean of 5.0.

PITSFORD, SEDGEBROOK.—Very cold with bitter northerly winds during the day time and sharp frosts at night. Fruit much damaged. S on 12th and 13th.

COLCHESTER, LEXDEN.—Cold till 25th especially from 11th to 21st, when N. wind prevailed with occasional S, seriously checking the forward vegetation.

WINTERBORNE STEEPLETON.—Mean temp.  $2^{\circ}9$  below the average of 10 years, and less than in any year in that period. The R was greater than in any April except 1897.

TORQUAY, CARY GREEN.—R  $1.07$  in. below the average. Mean temp.  $47^{\circ}1$ , or  $0^{\circ}8$  below the average. Duration of sunshine 180.6 hours, or 0.4 hours above the average. Mean amount of ozone 5.2; max. 8.5 on 5th with W.S.W. wind; min. 3.0 on 28th with S.S.W. wind.

WELLINGTON, THE AVENUE.—Very low temp., especially from about 12th to 24th, with 8 night frosts in the screen, the same number as in January.

NORTH CADBURY RECTORY.—The coldest April in 7 years after the warmest March. In spite of 5 warm nights at the end, the average min. in shade and on grass was lower than any of the winter months.

CLIFTON, PEMBROKE ROAD.—Mostly dry and cold, with frequent night frosts till 25th, when a change occurred, with 34 hours R. Remainder mild and rainy; 3.00 in. of R fell in the last 6 days.

ROSS, THE GRAIG.—Another extraordinary month, just the reverse of last. The first 11 days, except 3rd, were warm and fine. Vegetation very forward. From 12th to 25th every day was below the average temp. with severe frosts. No such April remembered except 1837 and possibly 1847.

BOLTON, THE PARK.—Cold period from 9th to 19th, but by no means without precedent. Mean temp.  $41^{\circ}1$ , or  $3^{\circ}1$  below the average. Duration of sunshine  $125\frac{1}{4}$  hours, on 24 days, being  $14\frac{1}{2}$  hours above the average.

HULI, PEARSON PARK.—Very unsettled, with heavy showers. Frequently very cold and unpleasant. H on 6 days. An inch and a half of S on 16th.

## WALES AND THE ISLANDS.

HAVERFORDWEST.—From 11th to 24th the weather was very severe, the unequalled cold spell being preceded and followed by wet mild weather.

DOUGLAS, WOODVILLE.—The beginning was very cold and unseasonable with biting N.W. and W. winds and gales, such as characterised the preceding months. From 11th to 19th was intensely cold with frost and S. Easter Monday had a temp.  $10^{\circ}$  below that of Boxing Day. Vegetation backward.

## SCOTLAND.

CARGEN [DUMFRIES].—The mean temp.,  $42^{\circ}2$ , although only slightly below that of 43 years, was lower than that of the two preceding months. Notwithstanding the previous heavy R the neighbourhood suffered severely from the

dry weather, until the end of the month. Frost between 20th and 25th with cold winds and considerable sunshine, caused great destruction among early vegetables. T and L on 30th.

LILLIESLEAF, RIDDELL.—From 11th to 26th N.E. wind prevailed, with night frosts, doing a little damage to fruit. Very heavy TS on 30th at about 3 p.m., for half an hour, with .18 in. of R.

TIGHNABRUACH.—April, if dry, was cold and wintry. On 14th there was 2½ inches of S, succeeded for several days by sharp frost, doing considerable damage to fruit blossom and garden plants.

COUPAR ANGUS.—The first month since October with deficient R, the total being .39 in. below the average. A long spell of low temp. from 11th to 26th had a mean nearly 5°·0 below the average for April.

LYNTURK MANSE.—S fell on 11 days.

DRUMNADROCHIT.—The dull and wet first half coming after the heavy R of the previous three months, kept the ground water-logged, and spring operations have rarely been so far behind.

# IRELAND.

CORK, WELLESLEY TERRACE.—R 1·06 in. below the average, but for the past 4 months an excess of 5·79 in. Mean temp. was the lowest in April for 20 years.

DUBLIN, FITZWILLIAM SQUARE.—Mean temp. 45°·9, or 1°·7 below the average, and only 0°·3 warmer than March. Polar winds predominated. Mean temp. for the week 12th to 18th, was 39°·5. High winds occurred on 7 days, reaching the force of a gale on 7th only. Fog on 4 days. L on 30th.

BELFAST, SPRINGFIELD.—Warm and pleasant, except for brief S and H showers from 12th to 14th. Distinctly a boon to farmers.

OMAGH, EDENFEL.—Although the R was but little over the average, the saturation of the soil from the extraordinary R of the first quarter continued to delay farming operations, and the unusual cold of the middle week seriously checked vegetation. Better conditions, however, prevailed at the close. Martins appeared on 10th and swallows on 19th, but did not remain.

## THE FOUR MONTHS' RAINFALL OF 1903.

*Aggregate Rainfall for January—April, 1903.*

Stations.	Diff. from Aver.	Per cent. of Aver.	Stations.	Diff. from Aver.	Per cent. of Aver.	Stations.	Diff. from Aver.	Per cent. of Aver.
	in.			in.			in.	
London .....	+1·26	120	Arnccliffe ...+	13·23	167	Braemar ...+	10·79	211
Tenterden .....	+·84	112	Hull .....	+·74	111	Aberdeen .....	+2·34	126
Hartley Wintney .....	+2·95	144	Newcastle.....	—·41	94	Cawdor .....	+4·56	157
Hitchin .....	+2·19	136	Seathwaite +	22·45	151	Glencarron +	16·83	157
Winslow .....	+1·59	125	Cardiff .....	+5·04	145	Dunrobin .....	+2·56	128
Westley .....	—·13	98	Haverfordwest	+5·43	141	Darrynane ...	+1·95	112
Brundall.....	—·04	99	Gogerddan ...	+5·10	140	Waterford ...	+4·57	140
Alderbury .....	+3·43	143	Llandudno ...	+5·26	164	Broadford ...	+4·85	150
Ashburton .....	+5·61	134	Dumfries ...+	10·00	173	Carlow .....	+5·61	155
Polapit Tamar ...	+5·45	153	Lilliesleaf .....	+7·26	184	Dublin .....	+2·29	129
Stroud .....	+3·31	143	Colmonell .....	+3·59	126	Mullingar .....	+8·62	183
Woolstaston .....	+3·10	138	Glasgow ...+	13·22	226	Ballinasloe ...	+6·48	161
Boston .....	+1·08	120	Inveraray ...+	12·84	155	Clifden .....	+5·67	123
Hesley Hall .....	+·90	116	Islay .....	+6·81	149	Crossmolina ...	+8·59	152
Derby .....	+2·46	141	Mull .....	+7·15	141	Seaforde .....	+3·91	135
Bolton .....	+2·99	129	Loch Leven +	11·36	207	Londonderry..	+3·97	135
Wetherby .....	+2·87	144	Dundee .....	+2·37	129	Omagh .....	+8·57	178

## CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, NOVEMBER, 1902.

STATIONS.  (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain.		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
°		°		°	°	°	0-100	°	°	inches			
London, Camden Square	59·3	6	26·7	21	50·0	40·0	41·7	91	83·6	22·2	1·30	11	6·9
Malta.....	78·0	2	47·8	24	67·2	55·5	53·0	78	124·5	41·9	7·02	10	3·5
Lagos, W. Africa .....	90·1	18a	75·1	var.	86·5	77·5	75·2	77	148·0	...	·16	1	...
Cape Town ...	89·7	23	47·7	18	70·3	53·0	51·1	67	...	...	·85	7	3·6
Durban, Natal .....	92·3	20	57·1	11	79·6	62·2	...	...	143·3	...	5·15	19	6·3
Mauritius.....	89·9	20	59·3	4	86·4	67·7	65·6	69	152·7	51·8	1·32	7	5·3
Calcutta.....	88·1	3	56·9	26	82·5	63·4	62·2	69	152·9	51·2	·05	1	1·4
Bombay.....	91·4	8	72·6	30	88·6	75·8	68·6	66	139·8	61·9	·01	1	1·8
Madras .....	88·9	7	69·6	12	84·2	74·0	72·1	83	139·0	66·8	10·51	17	6·0
Kodaikanal .....	67·1	24	47·2	30	61·5	50·5	51·6	89	135·2	36·4	9·38	16	6·5
Colombo, Ceylon.....	90·7	23	71·5	6	87·4	74·0	73·2	83	152·0	70·2	20·10	24	7·4
Hongkong.....	80·1	21	62·8	25	75·9	67·6	63·0	74	131·6	...	5·40	13	5·5
Melbourne.....	101·4	25	45·0	29	76·8	53·7	49·5	59	155·2	35·8	·98	7	5·8
Adelaide .....	101·8	3	47·5	21	83·6	59·7	49·1	45	159·3	42·5	·56	6	4·1
Coolgardie .....	106·2	23	46·2	27	84·1	55·2	...	...	171·6	...	·97	3	3·1
Sydney .....	95·0	7	56·8	1	76·4	63·0	58·6	67	139·0	47·0	2·80	18	5·4
Wellington .....	69·0	7, 9	38·0	25	61·6	47·6	46·1	74	129·0	30·0	2·96	15	6·3
Auckland .....	72·5	23	48·0	5	64·4	52·2	44·7	60	136·0	45·0	·88	12	5·2
Jamaica, Negril Point..	90·4	17	68·3	24	86·5	71·7	71·6	78	...	...	2·22	6	...
Trinidad .....	93·0	29b	68·0	22c	88·9	71·1	76·3	88	162·0	66·0	2·74	11	...
Grenada.....	87·6	7	72·0	19	84·0	74·8	71·7	76	155·0	...	7·85	22	2·6
Toronto .....	65·1	12	16·2	29	50·3	35·5	39·1	82	78·2	11·2	1·70	12	7·1
Fredericton, N.B. ....	56·8	2	13·8	26	43·6	26·4	26·8	65	...	...	1·64	8	6·7
Winnipeg .....	57·0	2	— 7·0	26	35·3	16·7	...	...	...	...	1·02	5	6·4
Victoria, B.C. ....	54·9	10	33·4	29	48·1	41·1	41·0	88	...	...	6·15	24	8·2
Dawson .....	20·4	1	—48·0	28	—0·9	—11·2	...	...	...	...	1·10	4	4·4

a—and 20, 21. b—and 30. c—and 28.

MALTA.—Mean temp. of air 60°·4, or 1°·9, below average. Mean hourly velocity of wind 9·5 miles or 0·1 above average. Mean temp. of sea 66°·4. J. F. DOBSON.

Mauritius.—Mean temp. of air 1°·3, dew point 1°·5 above, and rainfall ·57 in., and mean hourly velocity of wind 1·8 miles below, averages. L and T on 25th. T. F. CLAXTON.

MADRAS.—Sunshine 107·3 hours, or 31·2 per cent. of possible. R. D. JONES.

KODAIKANAL.—Mean temp. of air 54°·6. Sunshine 73·9 hours. pro C. MICHIE SMITH.

COLOMBO.—Mean temp. of air 79°·9 or 0°·1 above, of dew point 0°·9 above, and R 7·33 in. above, averages. Mean hourly velocity of wind 5·7 miles; prevailing direction N., N.E. and N.W. TSS on 24 days, causing numerous casualties. In one case several persons were knocked down by a return flash. Close to the spot where they were standing a small fissure over 6 feet deep and very narrow was found, the ground having been disturbed all round in a circle 10 inches in diameter and 9 inches deep.

H. O. BARNARD.

HONGKONG.—Mean temp. 71°·5 or 2°·3 above, sunshine 150·8 or 45 hours below, R 4·23 in. above, their respective averages. Mean hourly velocity of wind 11·4 miles; prevailing direction E.N.E. F. G. FIGG.

Adelaide.—Mean temp. 71°·6; highest on record for November in 46 years, being 4°·5 above average. R 42 in. below average. C. TODD, F.R.S.

Auckland.—Mean temp. 2° below the average and R not one-third of the average. An unusually cool and dry November. T. F. CHEESEMAN.