

# SYMONS'S METEOROLOGICAL MAGAZINE.

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## AN OLD SCOTTISH WEATHER RECORD.

THE Scottish History Society has recently printed for the first time a diary kept by a country gentleman of the seventeenth century. It is merely a fragment, one surviving note-book out of a series which has been lost sight of, and it covers only the period from 1st May, 1659, to 31st January, 1660. The author, Mr. Andrew Hay, of Craignethan, led an active life, much of his time being spent on horseback in visits to Edinburgh and to Humble, in Berwickshire, each about thirty miles distant from his home in Lanarkshire, close to Biggar. After recording each day's proceedings, with very lengthy notes of the Sunday's sermons, Mr. Hay wound up with a critical estimate of his own spiritual condition, and a terse characterization of the weather of the day. The editor of the diary may possibly have felt some difficulty in distinguishing between the expressions applied to the inward and outward strife of the elements; and it might suggest itself as an interesting task to trace any possible relation between the two. However, we wish to do no more than to bring before the students of climate one of the most graphic descriptions of the variations of weather from day to day that we ever met with, rendered the more effective by the quaint and forcible language in which it is conveyed. These notes have been extracted from the volume, which is not accessible to the public, by Mrs. Mill, of Edinburgh, and they are published with the permission of the Secretary of the Scottish History Society. On account of the author constantly travelling over a circumscribed area, these notes may be taken as applying to the counties of Peebles, East Lothian and Midlothian as a whole. It is believed that other volumes of this interesting diary may be in existence, perhaps hidden away with old family papers, and it would certainly be interesting to have a set of these weather notes complete for the circle of the year.

CALENDAR OF WEATHER FROM DIARY OF ANDREW HAY,  
OF CRAIGNETHAN, LANARK.§

MAY, 1659.

- 1 May, Lord's Day, 7 hors.—A very filthie raine all day.
- 2 May, Munday, 7 acloak.—Snow & raine till 4 hors, then fair.
- 3, Twysday, 7 acloak.—A gray dawkie\* day.
- 4 May, Wednesday, 6—7 acloak.—A fair gray day.
- 5, Thursday, 7 acloak.—A gray mistie day.
- 6 May, Fryday, 7 acloak.—A foule day till neer night.
- 7, Saturnday, 6—7 acloak.—A gray louring cloudie day, some raine.
- 8 May, Lord's day, 7 acloak.—A gray cloudie day.
- 9, Munday, 7 acloak.—Warme with clouds of raine.
- 10 May, Twysday, 6 acloak.—A gray morning & faire afternoone.
- 11, Wednesday, 7 acloak.—A warme day wt 2 great showers.
- 12 May, Thursday, 7 acloak.—A very fair warme day.
- 13, Fryday, 7 acloak.—A dustling gray day.
- 14 May, Saturnday, 6 acloak.—A prettie fair seasonable day.
- 15 May, the Lord's day, 7 acloak.—A prettie fair sharp day.
- 16 May, Munday, 7 acloak.—A raine and mist all day.
- 17 May, Twysday, 6—7 acloak.—Raine till noone, thereafter fair.
- 18, Wednesday, 7 acloak.—A very hot seasonable day.
- 19 May, Thursday, 6—7 acloak.—A fair seasonable day.
- 20, Fryday, 7 acloak.—A very fair caller† day.
- 21, Saturnday, 5 acloak.—A very great raine.
- 22, Lord's day, 4—5 acloak.—A fair caller day.
- 23 May, Munday, 5 acloak.—Fair befor noone, & raine after.
- 24, Twysday, 8 acloak.—A sharp louring day wt raine.
- 25 May, Wednesday, 7 acloak.—A fair, windie day.
- 26, Thursday, 7 acloak.—A prettie fair day.
- 27 May, Fryday, 5 acloak.—A gurle‡ day of blinks & shouers.
- 28, Saturnday, 4 acloak.—Foule in the morning and windie y<sup>r</sup>after.
- 29 May, the Lord's day, 3—4 acloak.—A fair windie day.
- 30, Munday, 5 acloak.—Some shouers of raine but warme.
- 31 May, Twysday, 6—7 acloak.—A fair day and drying wind.

JUNE.

- 1 June, Wednesday, 7 acloak.—A fair, drying day.
- 2 June, Thursday, 4—5 acloak.—A very fair warme day.
- 3, Fryday, 5—6 acloak.—A gray louring fair day.
- 4 June, Saturnday, 7 acloak.—A fair warme day, but windie.
- 5 June, the Lord's day, 7 acloak.—A wind and grey day.
- 6 June, Munday, 7 acloak.—A very high wind & a cold day.
- 7, Tuysday, 7 acloak.—This was a very windie day; some raine.
- 8 June, Wednesday, 8 acloak.—A very vehement wind, and dry.
- 9, Thursday, 5—6 acloak.—A rough fair day.
- 10 June, Fryday, 5 acloak.—Fair befor, & very foule after noone.

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§ The Diary of Andrew Hay, of Craignethan, 1659–1660. Edited, with Introduction and Notes, by Alexander George Reid, F.S.A. Scot. Edinburgh. Printed at the University Press, by T. and A. Constable, for the Scottish History Society. 1901. Publications of the Scottish History Society. Vol. XXXIX.

\* Dawkie, moist.    † Caller, fresh.    ‡ Gurle, or gurlie, squally.

- 11, Saturnday, 4 acloak.—A gray day with some raine.
- 12 June, the Lord's day, 5 acloak.—A very warme day.
- 13, Munday, 5 acloak.—A prettie fair day.
- 14 June, Twysday, 4 acloak.—A drying day with some wind.
- 15, Wednesday, 8 acloak.—A fair drying day.
- 16 June, Thursday, 6 acloak.—A windie day, with some raine.
- 17, Fryday, 7 acloak.—A drying day after morning raine.
- 18 June, Saturnday, 7 acloak.—A mixed day, wind and some raine.
- 19, The Lord's day, 7 acloak.—A cold windie day & some raine.
- 20 June, Munday, 6 acloak.—A very warme, faire day.
- 21, Twysday, 4 acloak.—A prettie faire day.
- 22 June, Wednesday, 6 acloak.—A windie, ranie day.
- 23, Thursday, 7 acloak.—A prettie faire day and warme.
- 24 June, Fryday, 7 acloak.—A tollerable faire day.
- 25, Saturnday, 6—7 acloak.—A fair day but not very warme.
- 26 June, the Lord's day, 7 acloak.—A very seasonable raine all day.
- 27, Munday, 7 acloak.—Much raine fell this day.
- 28 June, Twysday, 4 acloak.—Warme & fair till night, then raine.
- 29, Wednesday, 7 acloak.—Fair before, & very foule after noone.
- 30 June, Thursday, 6—7 acloak.—A very seasonable faire day.

JULY.

- 1 July, Fryday, 7—8 acloak.—A faire warme day.
- 2 July, Saturnday, 7 acloak.—A very warme seasonable day.
- 3, The Lord's day, 7 acloak.—A prettie warme day.
- 4 July, Munday, 5—6 acloak.—A very hote day.
- 5, Twysday, 7 a'clock.—A hote day with some clouds of raine.
- 6 July, Wednesday, 6 acloak.—Foule in the morning, and faire afternoone.
- 7, Thursday, 7 acloak. A prettie faire day with some wind.
- 8 July, Fryday, 6 acloak.—A faire seasonable day.
- 9, Saturnday, 7 acloak.—A faire louring day.
- 10 July, The Lord's day, 7—8 acloak.—A faire day and seasonable.
- 11 July, Munday, 5 acloak.—A prettie fair warme day.
- 12 July, Twysday.—A louring day, wt some raine.
- 13, Wednesday, 6 acloak.—Rainie and cold before noone, faire but sharp after.
- 14 July, Thursday, 6 acloak.—A faire day but cold.
- 15, Fryday, 5—6 acloak.—Faire in the morning, and raine afternoone.
- 16 July, Saturnday, 5—6 acloak.—Faire in the morning, and foul after.
- 17, The Lord's day, 5 acloak.—Some showers of raine and cold.
- 18 July, Munday, 5 a'clock.—Fair and warme all day.
- 19, Twysday, 6 acloak.—This was a very warme day.
- 20, Wednesday, 7 acloak.—A close warme day.
- 21, Thursday, 6 acloak.—A warme day and some clouds of raine.
- 22 July, Fryday, 5—6 acloak.—Most pairt raine all day.
- 23, Saturnday, 6—7 acloak.—Great clouds of raine and many this day.
- 24 July, The Lord's day, — acloak.—Sumqt cold and a blustering wind.
- 25, Munday, 7 a'clock.—Some clouds and raine this day.
- 26 July, Twysday, 7 acloak.—Foule in the morning & fair yr after.
- 27, Wednesday, 7 acloak.—Warme clouds of rane all day.
- 28 July, Thursday, 7 acloak.—Raine most pt of this day.
- 29, Fryday, 7 hour.—Very rainie till noone, thereafter faire.

30, Saturday, 7 a'clock.—A very seasonable & pleasant day.

31, The Lord's day, 6—7 a'clock.—A blasting foudre day of east winde and raine.

#### AUGUST.

1 August, Munday, 7—8 a'clock.—A most tempestuous night & day of east winde and raine.

2, Twysday, 7 a'clock.—A tollerable calm day.

3, August, Wednesday, 7 a'clock.—Wind in the morning & raine afternoone.

4, Thursday, 6 a'clock.—A fair, windie, dry day.

5 August, Fryday, 7 a'clock.—A foudre day, most part rainie all day.

6, Saturday, 8 a'clock.—A very windie goulin day.

7 August, The Lord's day, 7 a'clock.—A warme day wt some shouers.

8, Munday, 5—6 a'clock.—A very warme fair day.

9 August, Twysday, 7 a'clock.—Warme with some heaue shouers of rayne.

10, Wednesday, 8 a'clock.—A prettie good day till neer night.

11 August, Thursday, 6—7 hours.—A very great raine all day since midnyt.

12, Fryday, 7 a'clock.—A terrible raine all day.

13 August, Saturday, 6—7 hors.—Prettie fair all day.

14, The Lord's day, 4 a'clock.—A warm day wt some shouers.

15 August, Munday, 5—6 a'clock.—A good seasonable day.

16, Twysday, 7 a'clock.—Much raine fell this day. "We had great difficulties to pass the waters" [fords].

17 August, Wednesday, 5 a'clock.—A very rainie day.

18, Thursday, 6 a'clock.—A most vehement raine.

19 August, Fryday, 7 a'clock.—Fair, except some small shouers.

20, Saturday, 7 a'clock.—A very seasonable fair day.

21 August, the Lord's day, 7 a'clock.—A very seasonable day.

22, Munday, 6 a'clock.—A loursing day and some raine.

23 August, Twysday, 7 a'clock.—A very seasonable good day.

24, Wednesday, 7 a'clock.—A prettie good, warme day.

25 August, Thursday, 6—7 a'clock.—A very good fair day.

26, Fryday, 7 hors.—Fair before and raineing afternoone.

27 August, Saturday, 6 a'clock.—A prettie fair day.

28, The Lord's day, 5 a'clock.—A seasonable fair day.

29 August, Monday, 5 a'clock.—A pretty fair, loursing day.

30, Twysday, 8 a'clock.—A rainie warm day.

31 August, Wednesday, 7 a'clock.—A rainie warme day.

(To be continued.)

#### ROYAL METEOROLOGICAL SOCIETY.

THE first meeting of this Society for the present session was held on Wednesday evening, November 19th, at the Institution of Civil Engineers, Great George Street, Westminster, Mr. W. H. Dines, B.A., President, in the chair.

The following gentlemen were elected Fellows of the Society :—Mr. W. H. Archer, Mr. E. J. Bentley, Mr. J. H. W. Biggs, Mr. A. Chandler, Mr. S. F. Cody, Prof. A. C. Datta, B.A., Mr. W. Digby, C.I.E., Mr. H. S. Haworth, Mr. J. Pulteney-Tolland, Mr. W. S. Torbitt, B.A., Mr. V. M. Watermeyer, and Mr. H. B. Witty.

The President stated that the kite experiments for investigating the meteorological conditions of the upper atmosphere had been carried out during the summer months off the west coast of Scotland, the expenses having been met by grants from the Royal Society, the Royal Meteorological Society, and the British Association, and by a contribution from one of the Fellows. He also announced some donations to the Society's Research Fund.

Mr. F. Campbell Bayard read a paper entitled "English Climatology, 1881—1900," which was a discussion of the climatological data printed in the Society's *Meteorological Record*. Readers of this Magazine will, no doubt, remember that Mr. Bayard has already worked up the results for 1881—1890, and for 1891—1900, but in the present paper he gives monthly and yearly averages from 40 stations where the records have been continued during the 20 years 1881—1900. The elements dealt with are :—(1) Temperature at 9 a.m. ; (2) Mean minimum temperature ; (3) Mean maximum temperature ; (4) Mean temperature ; (5) Relative humidity ; (6) Amount of cloud ; (7) Rainfall ; and (8) Number of rainy days.

Mr. W. Marriott exhibited a series of maps showing the range of temperature, relative humidity, amount of cloud, and number of rainy days at the various stations given in the tables of Mr. Bayard's paper. These maps showed clearly that there was a much greater range of temperature at inland stations than on the coast. The influence of the warm water of the Atlantic was distinctly manifest in the small range of temperature at the south-western coast stations, and also in the very small range in the values of relative humidity. One of the most striking features brought out in these maps was the small range in the monthly amounts of cloud and in the number of rainy days over the central northern parts of England, while along the south and west coasts there was a considerable variation in these elements.

Mr. R. H. Curtis criticised several points in the paper. He thought that the large amount of cloud at Wakefield was mainly due to the quantity of smoke in that neighbourhood.

Mr. J. Hunter referred to his own long-continued series of observations at Belper and thought that 20 years was hardly long enough to give a reliable mean for rainfall.

Dr. H. R. Mill said that while 30 years have been shown to give a satisfactory average for annual rainfall, he was of opinion that perhaps 50 years are necessary to give a good monthly curve.

The President, Dr. C. Theodore Williams, Mr. J. Hopkinson, Mr. R. Inwards, Mr. F. J. Brodie, and Surgeon-Major W. G. Black also took part in the discussion, and Mr. F. C. Bayard replied.

A paper by Mr. C. V. Bellamy, M.Inst.C.E., on "The Rainfall of Dominica," was read by the Secretary. This was in continuation of a former paper on the same subject, and dealt with all the available rainfall data for the island of Dominica. In the neighbouring island of Montserrat a remarkably heavy rainfall occurred during the night of November 28-29, 1896, when 20·13 in. fell in 6 or 8 hours.

## THE CLIMATE OF THE BRITISH EMPIRE IN 1901.

THE Annual Climatological Table for 1901 is drawn up on precisely the same lines as in other years and presents very similar features. Of the fresh stations recently introduced into the monthly tables, only Lagos had completed the record for the year.

None of the extremes noted in the summary can claim distinction as "records," but a higher rainfall than that at Lagos has only twice appeared in these tables. At individual stations the sun temperatures both at London and Malta are the highest yet recorded, and at London the number of rainy days is the lowest since the tables were commenced. Mauritius, for the first time since our climatological table appeared, has a maximum temperature exceeding  $90^{\circ}$  in the shade, and Bombay and Calcutta also reached higher shade maxima than we have had occasion to note before. Curiously enough at the latter station the lowest absolute sun maximum for the period under consideration also took place. The records of relative humidity show that at Colombo and Trinidad it was the dampest year, and at Auckland the driest yet shown in these tables. If the records at the new station at Dawson on the Yukon are carried on, Winnipeg will be relieved from its hitherto unchallenged supremacy for low winter temperatures in the table, since a reading of  $-50^{\circ}\cdot 0$  was recorded at Dawson on December 31st.

Again we must beg our readers to remember that while the stations with the records of which we deal are on the whole representative stations, they are not necessarily the hottest, coldest, wettest or driest points of the British Empire. From the extraordinary richness of the varieties of climate included within the British dominions beyond the seas, those instances which are quoted cannot furnish more than a few useful samples.

## SUMMARY.

<i>Highest Temp. in Shade</i> .....	$110^{\circ}\cdot 0$ at Adelaide on February 6th.
<i>Lowest</i> " " .....	$-36^{\circ}\cdot 8$ at Winnipeg on January 2nd.
<i>Greatest Range in year</i> .....	$129^{\circ}\cdot 6$ at Winnipeg.
<i>Least</i> " " .....	$21^{\circ}\cdot 8$ at Grenada.
<i>Greatest Mean Daily Range</i> ...	$23^{\circ}\cdot 7$ at Winnipeg.
<i>Least</i> " " .....	$9^{\circ}\cdot 4$ at Grenada.
<i>Highest Mean Temp.</i> .....	$82^{\circ}$ 1 at Colombo.
<i>Lowest</i> " " .....	$36^{\circ}\cdot 4$ at Winnipeg.
<i>Driest Station</i> .....	Adelaide, mean humidity 59.
<i>Dampest</i> " " .....	Colombo, " " 82.
<i>Highest Temp. in Sun</i> .....	$168^{\circ}\cdot 0$ at Trinidad.
<i>Lowest Temp. on Grass*</i> .....	$-12^{\circ}\cdot 5$ at Toronto.
<i>Greatest Rainfall</i> .....	114·01 in. at Lagos, W. Africa.
<i>Least</i> " " .....	18·01 in. at Adelaide.
<i>Most Cloud</i> .....	6·3 at Melbourne and Victoria, B.C.
<i>Least</i> " " .....	3·0 at Malta and Grenada.

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\* The min. on grass is not recorded at the other Canadian stations.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE FOR 1901.

STATIONS.	ABSOLUTE.				AVERAGE.				ABSOLUTE.		TOTAL RAIN.		AVER. AGE.			
	Maximum.		Minimum.		Max.	Min.	Mean.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.		Days.		
	Temp.	Date.	Temp.	Date.												
<i>Those in Italics are South of the Equator.</i>														Cloud.		
London .....	89·9	July 19	17·9	February 14	°	58·4	42·2	50·3	42·4	77	in.	139·8	16·3	22·18	128	0-10
Malta .....	103·0	July 3	39·5	January 6	°	72·6	58·4	65·5	56·5	76		162·9	35·4	24·85	81	5·8
Lagos, W. Africa.....	96·1	December 8	...	.....	°	86·9	...	65·5	74·7	80		158·0	53·0	114·01	...	3·0
Cape Town .....	99·1	February 23	37·1	June 18	°	71·0	54·1	62·5	52·7	70		...	...	25·68	100	4·2
Mauritius .....	90·7	January 1	55·3	September 28	°	81·0	67·7	74·4	63·3	75		153·6	47·5	56·47	180	5·7
Calcutta .....	108·4	June 11	50·1	January 25	°	87·8	70·9	79·3	68·4	72		157·0	44·0	70·11	79	4·0
Bombay .....	96·4	March 12	58·4	February 22	°	86·3	75·4	80·8	71·6	75		151·5	48·9	75·32	98	4·6
Colombo, Ceylon .....	94·0	February 19	68·8	November 28	°	88·6	75·6	82·1	73·7	82		159·8	63·8	77·56	185	4·8
Melbourne .....	109·5	February 7	30·0	July 6	°	67·1	49·5	58·3	47·5	51		158·3	22·9	27·45	113	6·3
Adelaide.....	110·0	February 6	35·2	August 1	°	73·5	53·7	63·5	47·4	59		163·0	25·9	18·01	124	5·1
Sydney .....	104·0	December 17	38·4	June 16	°	69·7	55·8	62·8	51·9	72		157·1	30·0	40·12	151	4·6
Hellington .....	79·0	January 19	30·0	July 5	°	61·4	48·7	55·1	44·6	69		140·0	22·0	41·57	166	4·6
Auckland .....	79·0	January 6	37·0	June 23 & 25	°	63·7	52·9	58·3	47·7	68		152·0	33·0	38·49	176	5·6
Jamaica, Halfway Tree.....}	... ..	.....	... ..	.....	°	... ..	... ..	... ..	... ..	... ..		... ..	... ..	49·19	93	...
Trinidad .....	96·0	May 11	60·0	January 31	°	87·8	69·9	78·8	72·8	81		168·0	51·0	59·32	138	...
Grenada .....	90·0	October 6	68·2	January 13	°	83·5	74·1	78·8	71·1	76		160·0	...	92·15	233	3·0
Toronto .....	97·1	June 27	-10·9	January 19	°	54·5	37·6	46·0	39·4	77		113·4	-12·5	32·20	...	6·1
New Brunswick, } Fredericton.....}	... ..	.....	... ..	.....	°	... ..	... ..	... ..	... ..	... ..		... ..	... ..	... ..	...	...
St. John, N.B.....	... ..	.....	... ..	.....	°	... ..	... ..	... ..	... ..	... ..		... ..	... ..	... ..	...	...
Winnipeg, Manitoba }	92·8	July 14	-36·8	January 2	°	48·3	24·6	36·4	... ..	... ..		... ..	... ..	23·90	101	...
Victoria, B.C. ....}	79·2	August 15	24·0	January 4	°	55·4	44·2	49·8	... ..	... ..		... ..	... ..	26·13	148	6·3
Dawson, Yukon ...}	... ..	.....	... ..	.....	°	... ..	... ..	... ..	... ..	... ..		... ..	... ..	... ..	...	...

## METEOROLOGICAL NEWS AND NOTES.

THE BEN NEVIS OBSERVATORIES have been made the subject of the following Memorandum, the contents of which will be welcome to all meteorologists:--

In a Memorandum, dated June, 1902, the Directors intimated that the Observatories at the top of Ben Nevis and in Fort William were to be discontinued at the beginning of October, 1902. In consequence of a proposal by the Treasury to make an inquiry into the administration of the grant to the Meteorological Council, the Directors were urged by Members of Parliament and others interested in the Observatories, to make an effort to keep the Observatories at work till the inquiry had been completed. They have now to intimate that they have succeeded in obtaining the necessary funds, and that there will be no stoppage of the work at the Observatories till October, 1904; that is, the work will go on as hitherto for other two years. One generous donor is to provide the whole funds necessary for the second year. This prolongation will give ample time to make such arrangements as may be consequent on the Report of the Committee of Inquiry.

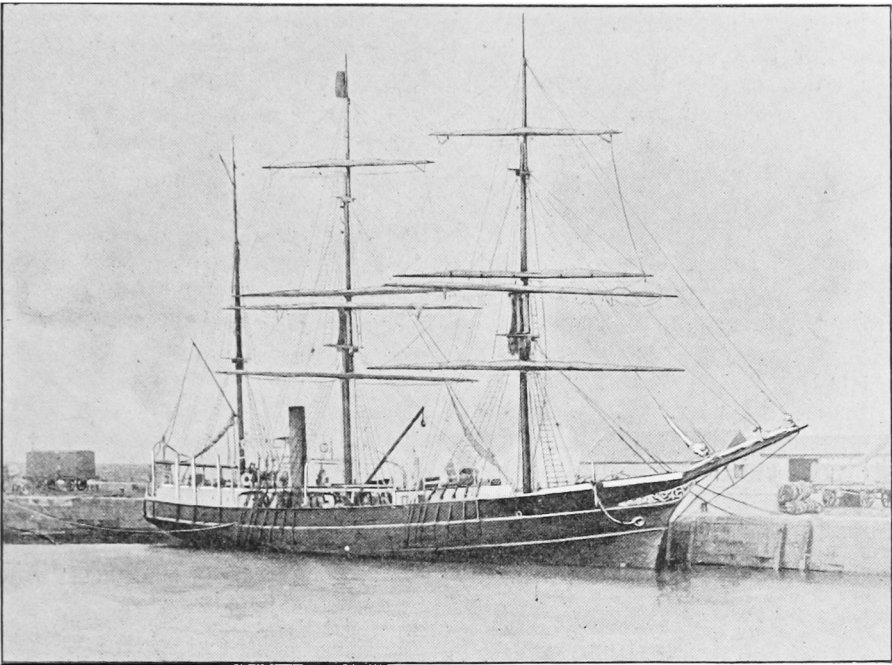
THE BIDSTON OBSERVATORY, opposite Liverpool, where much excellent meteorological work has been carried on for many years, is threatened with extinction. The Mersey Docks and Harbour Board, to which the observatory belongs, is, we understand, applying to Parliament for a Bill containing a clause "to relieve the Board from all obligations to maintain the Observatory on Bidston Hill, and to authorise the Board to sell or dispose of the same and the site thereof and the instruments and the appurtenances therein and connected therewith." Much surprise and regret is expressed in the Liverpool newspapers, and suggestions have been made that the proposed University of Liverpool or the Municipal authorities should assume the duties which the Dock Board is anxious to cease to perform.

MR. H. E. HAMBERG, who has been a member of the staff of the Central Meteorological Institute in Stockholm for twenty-four years, has been appointed Director of the Institute, in succession to the late Mr. Robert Rubenson.

DR. W. N. SHAW, F.R.S., read a paper at the meeting of the Aëronautical Society on December 4th, on the contributions which balloon and kite investigations have made to Meteorology. He called special attention to the fact that cyclonic storms had been shown to be characteristic of the lower strata of the atmosphere.

THE BELGIAN MAGAZINE "CIEL ET TERRE" states that at a recent meeting of the Belgian Geological Society, Professor E. Lagrange and M. E. Vanden Broeck proposed to undertake a scientific study of all the phenomena of geophysics during the year 1902, on the exceptional character of which they laid stress. They propose to take into account the seismic, volcanic, meteorological, magnetic and solar phenomena of the year as observed in all parts of the world, and they request the collaboration of foreign workers, who may, pending the appointment of an executive committee, communicate with Professor Lagrange, 60, Rue des Champs Elysées, Brussels.





THE ANTARCTIC RESEARCH SHIP "SCOTIA."

## THE METEOROLOGICAL EQUIPMENT OF THE SCOTTISH ANTARCTIC EXPEDITION.\*

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

IN order to prevent this short article from assuming the form of a catalogue of meteorological instruments, I shall restrict my remarks to a few generalisations on the apparatus provided. The Scottish Antarctic Expedition, under the leadership of Mr. W. S. Bruce, while primarily an expedition on the Challenger and Valdivia lines, viz., for oceanographical research, is in all points of its equipment prepared to winter amidst the ice. The meteorological apparatus taken therefore provides for such a contingency. To give a list of the instruments provided is unnecessary, but a few notes on the broad aspects of the work now begun and contemplated, may be of interest. At present, on the voyage to Madeira, observations are taken every four hours, but south of latitude  $30^{\circ}$  S. readings will be

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\* This article was written on the voyage of the *Scotia*, and posted at Madeira. We understand that the expedition will remain continuously at work for one year, and that a second year's work will be undertaken if funds are forthcoming.—ED. *S.M.M.*

taken every two hours, and after passing the Falkland Islands, every hour, day and night.

For temperature observations two screens of the ordinary pattern for use on ship board are provided, each containing a dry and wet bulb thermometer. They have been placed aft, on cross beams raised well above the surface of the poop deck, and clear of it, one on the port the other on the starboard side. On the weather side are also suspended a Richard thermograph and hygrograph, the latter in such a position as to be uninfluenced by artificial changes in the humidity, such as may be occasioned by the deck being washed, or by rain. A special form of screen has been devised for these instruments, made of wood and calico, which answers well if one may judge from the comparative readings obtained from the thermometers in the adjoining screens. A marine rain gauge, provided by Dr. W. G. Black, is placed on the weather side, also on one of the cross beams referred to. A suitable place for his evaporator has not yet been found. A Stevenson screen of the ordinary land pattern, containing a maximum and minimum thermometer, is located on the roof of the forward laboratory, amidships. Inside this laboratory is a Kew marine barometer, and the Richard statoscope (an extremely delicate barograph), for measuring the height of ocean waves. This instrument was tried in the Bay of Biscay and found to answer well, the mean height recorded being 11.4 feet from trough to crest. In the writer's cabin is a large Richard barograph and another marine barometer. Small barographs are also suspended in Mr. Bruce's cabin, and in the chart room.

A Whipple temperature indicator is also in Mr. Bruce's cabin, the platinum resistance thermometer for surface sea temperature work being placed well forward on the starboard side, and the cable led along the gunwale under the rail. Eye observations of sea surface temperature, from water drawn up in a bucket, will be taken several times daily, as a check on the readings of the platinum thermometer. The thickness of the rainband in the spectrum of sunlight is taken four times daily, also observations on the number of dust particles by means of Aitken's pocket dust-counter.

A prominent feature of the meteorological work will be the investigation of the upper atmosphere by means of kites carrying meteorographs. A special engine for reeling in the four miles of kite wire has been constructed, and this can be worked either directly from a 10 h.p. quick-working steam winch, or by a petrol motor. Five aluminium meteorographs have been taken, also two large box kites, standing over seven feet high. A large stock of bamboo rods, calico, and wire, are provided for the construction of more kites should they be required, but this is unlikely as the kites are very strong and durable, one of the two taken, though in use for nearly three years, being to all appearance as good as new. The services rendered to the expedition by Mr. John Anderson, who

has directed the preliminary kite work, both on land and on sea, have been of the utmost value.

With reference to the equipment for a land station in the far south, I have been largely guided by the information kindly furnished by the Meteorological Office relative to the instruments supplied to the "Discovery." Our stock of apparatus is practically similar, and need not be given in detail. In connection with our preparations I have received much valuable advice and help, from among others, Dr. Buchan, Mr. R. T. Omond, Prof. Copeland, Mr. J. Y. Buchanan, and Mr. John Aitken.

In this short notice I have merely indicated in a general manner the meteorological work with which I am more immediately associated, in conjunction with Mr. W. S. Bruce and Mr. D. W. Wilton (the assistant zoologist), who are both meteorologists of wide experience. I have said nothing about the physical apparatus provided for extending our knowledge of the science of the sea, such as the reversing thermometers, the Pettersson-Nansen insulating water bottles and the chemical and bacteriological equipment generally.

If I may be permitted to do so, I should like to draw attention to the utterly inadequate methods at present in vogue for the prosecution of meteorological work at sea. The subject is undoubtedly a difficult one, but a committee of experts might take the matter up and devise, for example, a thermometer screen which, in addition to the dry and wet bulbs, might also contain a specially constructed maximum and minimum thermometer (not a Six's), which would be uninfluenced by the rolling or pitching of the ship. Special screens to be suspended from spring hooks are also much needed for the Richard hygrograph and thermograph, and a sunshine recorder, mounted like the rain gauge on gymbals, might be practicable. As regards sea temperature work, some form of self-registering platinum-resistance thermometer might surely be devised, which could be lowered into the sea and record graphically the variations of temperature as it descended into the depths.

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## REVIEWS.

*Wind Charts for the Coastal Regions of South America.* Prepared in the Meteorological Office under the superintendence of COMMANDER CAMPBELL HEPWORTH, R.N.R. Published by the Hydrographic Department of the Admiralty, 1902. Size  $26\frac{1}{2} \times 20$ . Price 7s.

THERE are twelve maps of South America, from the equator southward, one for each month of the year, with the sea within about 300 miles of the coast divided into a number of rectangular areas in each of which there is a wind-rose showing the average frequency and force of winds from sixteen directions. This atlas gives the results for the coast region of a very extensive work now in progress

at the Meteorological Office on the winds of the Atlantic and eastern margin of the Pacific from the Equator to  $70^{\circ}$  S. The portion now published generalizes the results of 264,639 observations of wind and simultaneous readings of the barometer. Isobars for each tenth of an inch are given as well as the wind roses.

A general result of great interest is that on the west coast of South America from about  $40^{\circ}$  S. northward to the Equator the prevailing wind for every month blows from southerly points and parallel with the coast, thus explaining the aridity of the coast plain, and contradicting the common notion that the trade wind blows across the Andes. South of  $40^{\circ}$  S. the direction varies somewhat with the season, but westerly points always predominate, blowing on the whole at right angles to the shore and accounting for the heavy rainfall of that part. On the east coast, except in the trade-wind belt, there is no very great predominance of one direction over another, and even in the trades the range in direction is far greater than in the constant southerly winds of the west coast.

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*Temperatures in Kingston, Jamaica, and the connection between sun-spot frequency, the mean max. temperature and the rainfall in Jamaica.*

By MAXWELL HALL. Kingston, 1902. Size,  $13\frac{1}{2} \times 8\frac{1}{2}$ . Pp. 12.

THE relation between the sun-spot and maximum temperature curves is very striking; but the rainfall curve is much less congruent with that of sun-spots.

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*The Dominion of the Air, the story of Aërial Navigation*, by the REV. J. M. BACON. London, Cassell and Company. *Not dated*. Size,  $8 \times 5\frac{1}{2}$ . Pp. viii. + 348.

AN interesting popular sketch of the incidents in the history of ballooning, with frequent reference to the use of balloons for scientific purposes. The disadvantages of a balloon floating in the air and drifting with the wind for delicate thermometric observations, as compared with a kite past which the wind is always blowing strongly, are pointed out; but more might, in our opinion, have been said of the admirable work now being carried on by the International Aëronautical Association. We fear indeed that the popular idea of the balloon as a showman's or adventure-seeker's toy will not be altogether dispelled by the numerous extracts from newspapers, and the reproductions of posters that enliven this very readable book. We would gladly have seen more of Mr. Bacon's own experiences—the references to his observations on the extraordinary complexity of the air-currents in the atmosphere striking us as perhaps the most interesting part of this work.

The general reader will not at once see where the advantage of inflating a balloon with hydrogen comes in when he reads on p. 104, "whereas 1000 cubic feet of hydrogen is capable of lifting 7 lbs., the same quantity of coal gas of ordinary quality will raise but

35 lbs." But the author has reason to complain of his printer in several places ; the pages yielding an unusual crop of typographical slips, sometimes misleading and always irritating. The illustrations, on the other hand, are excellent, if not invariably required for the elucidation of the text.

### GAMBLING BY RAIN GAUGE.

DR. HELLMANN sends us a cutting from a German newspaper, which is worth translating, as showing to what base uses a rain gauge may be turned, to nothing less in fact than a substitute for a roulette wheel. We cannot vouch for the truth of the paragraph, but we give the statement as it stands.

*"An Indian Sport.*—Educated Europeans must soon learn to grow accustomed to a name which at first has a somewhat barbarous sound—*Barsat ka satta*. It is a very simple game, which had its origin in India. It consists in betting on the amount of rain which will fall on a certain day, and it thus converts meteorology into a sport. In order to measure the intensity of the rainfall, vessels with divisions marked on the side are placed on the terraces or balconies of the houses. However simple this way of finding amusement on a rainy day may appear, it has attained so much popularity in India that great and small take up *Barsat ka satta*. The betting grew more general, and the sums risked higher, until finally many families came to financial ruin, and numerous suicides resulted. The state of matters became so serious that the British Government was at last obliged to interfere and forbid the game. As a result of this regulation the British public became acquainted with the Indian sport, and during the expected rainy summer in England *Barsat ka satta* will be played with enthusiasm."

If the game does eventually oust ping-pong we trust that the players will see that the best type of rain gauge is established, and the records regularly kept. Hitherto British rainfall observers have been remarkably long lived, and we do not even now anticipate an epidemic of suicide and ruin following on the abuse of the harmless necessary rain gauge.

### Correspondence.

#### THE MOON AND THUNDERSTORMS.

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

BEFORE entering upon a discussion as to whether more thunderstorms occur at the time of full or new moon, it would be well to make sure that the greater light at the time of full moon has not introduced a systematic error into the observations. It is certain that a flash of lightning would be more likely to be noted on a dark than on a bright night, and that therefore, *cæteris paribus*, more observations of lightning will be recorded at the time of new than at the time of full moon.

W. H. DINES.

*December 6th, 1902.*

## COLONIAL METEOROLOGY.

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

To my mind, the comparison you draw in the September number, p. 127, between the governments of Australia and Cape Colony, tells altogether the other way. What efforts the latter made "to keep its meteorological system at work during the war," I really do not know, seeing that it has never hitherto made any effort in time of peace. The Cape vote for meteorology is £600 per annum. Out of that all salaries, rent of offices, travelling expenses, cost of instruments,—in fact everything, has to be paid. It has no observatory of any shape or form, for any science whatever. On the other hand, each of four of the Australian colonies has an observatory and weather service; and in addition they subscribe another £1,000 between them. Of course it is to be hoped that this amount may be doubled or trebled in the near future; but meanwhile it would appear that Australia spends as much upon science in one year as Cape Colony does in ten. A few volunteer observers here did, it is true, in the infested districts, try to keep their end up, and in some cases succeeded, but what credit that can be to the government is hard to see. Even in volunteer effort we are far behind the Australians.

*Kenilworth, Kimberley, 11th Oct., 1902.*

J. R. SUTTON.

[Mr. Sutton scarcely appreciates our careful selection of words in speaking of "the efforts *in* Cape Colony;" we did not say "*of* Cape Colony," for we had in view the work of the devoted individual observers like himself, not the funds given by the government. Now in a time of peace and re-organization it may not be too much to hope that the Cape government will realise that it is true economy to spend annually a few thousand pounds of public money on an efficient meteorological service, and that a central meteorological office will ultimately be established, not for Cape Colony only, but for British South Africa as a whole. That the fine observatory at Cape Town is supported by Imperial funds may possibly account for the absence of any observatory supported by the Colony. We appreciate very highly the admirable Weather Services of the Australian States, yet there too the work ought to be supplemented and completed by a properly constituted federal department.—Ed. *S.M.M.*]

## BOOKS RECEIVED.

Rousdon Observatory, Devon. Meteorological observations for the year 1901, continued under the superintendence of the Hon. Lady Peek, F.R. Met.Soc. Volume XVIII. London, 1902. Size 11 × 8½. Pp. 12.

Annals of the Astronomical Observatory of Harvard College. Vol XLIII. Part II. Observations and Investigations made at the Blue Hill Meteorological Observatory, Mass., U.S.A., in the years 1899 and 1900, under the direction of A. Lawrence Rotch. Cambridge (Mass.), 1902. Size 12 × 10. Pp. 39–110.

# THE ELEVEN MONTHS' RAINFALL OF 1902.

*Aggregate Rainfall for January--November, 1902.*

Stations.	Diff. from Aver.	Per cent. of Aver.	Stations.	Diff. from Aver.	Per cent. of Aver.	Station.	Diff. from Aver.	Per cent. Aver.
	in.			in.			in.	
London .....	-1.52	93	Arnccliffe .....	-19.09	65	Aberdeen .....	-2.40	92
Tenterden .....	-5.27	78	Hull .....	-3.44	85	Cawdor .....	-4.80	83
Hartley Wintney .....	-2.73	88	Newcastle.....	-4.50	81	Strathconan ...	-10.88	77
Hitchin .....	- .95	96	Seathwaite ..	-40.10	66	Glencarron .....	-13.46	84
Winslow .....	-5.00	77	Cardiff .....	-4.28	88	Dunrobin .....	-5.63	80
Westley .....	-2.81	88	Haverfordwest	-1.53	96	Darrynane .....	-8.00	82
Brundall.....	-2.23	90	Gogerddan ...	-8.64	78	Waterford .....	+2.84	108
Blandford .....	...	...	Llandudno ...	-5.24	81	Broadford.....	-3.23	89
Polapit Tamar ...	-2.72	92	Dumfries .....	-8.28	79	Carlow .....	+1.31	104
Stroud .....	-1.96	92	Lilliesleaf .....	-4.33	84	Dublin .....	+2.86	111
Woolstaston .....	+1.96	107	Colmonell .....	...	...	Mullingar.....	-4.75	86
Worcester .....	+2.28	111	Glasgow .....	-6.53	80	Ballinasloe ...	-5.70	83
Boston .....	+1.76	109	Islay .....	-2.23	95	Clifden .....	-16.00	78
Hesley Hall .....	- .50	97	Mull .....	-3.46	93	Crossmolina ...	-5.60	88
Derby.....	+ .85	104	Loch Leven ...	-9.11	72	Seaforde .....	+5.65	117
Manchester .....	...	...	Dundee .....	-4.59	81	Londonderry..	-5.17	86
Wetherby .....	-2.13	90	Braemar .....	-4.96	84	Omagh .....	+ .18	101

November showed a very unequal distribution of rainfall. The north of Scotland was the driest part of the British Islands, with less than an inch of rain in Caithness and round the Moray Firth. Less than an inch also fell on the south side of the Firth of Forth. The whole of the east and centre of England had less than two inches of rain, and all stations in this area had less than the November average. In South Wales and the south-west of England, on the other hand, the rainfall was more than five inches over a considerable area, and the average was considerably exceeded. Ireland had a very heavy rainfall everywhere, much exceeding the average in the west and south.

The result has been to intensify the deficiency of rain in England, reducing the small area in the Midlands, within which the average for the ten years 1890-99 (itself deficient) has been exceeded but slightly improving the state of matters in the west. The east of Ireland has received more than its normal rainfall; but in spite of the heavy falls in the west of that island there is still a deficiency of from 10 to 20 per cent. Generalizing, we may say that England and Wales as a whole has received 90 per cent. of the amount of rain which might be expected in the first eleven months of 1902, Scotland as a whole has received little more than 80 per cent., while Ireland has received 95 per cent. As October and November are two of the wettest months of the year, the outlook for water-storage in some parts of the country is very far from satisfactory.

## NOVEMBER, 1902.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.						TEMPERATURE.				No. of Nights below 32°.	
		Total Fall.	Difference from average 1890-9.	Greatest Fall in 24 hours.		Days on which $\geq 0.1$ or more fell.	Max.		Min.				
				Dpth	Date		Deg.	Date	Deg.	Date			
											inches.	inches.	in.
I.	London (Camden Square) ...	1.80	— .42	.36	29a	11	59.3	6	26.7	21	4	10	
II.	Tenterden .....	2.26	— .31	.49	8	17	58.5	6	28.0	20	6	12	
III.	Hartley Wintney .....	2.64	+ .16	.40	29	16	58.0	28	24.0	21	8	11	
IV.	Hitchin .....	1.47	— .95	.27	28	13	59.0	6	26.0	17b	7	...	
V.	Winslow (Addington) .....	1.63	— .84	.36	29	14	58.0	3	27.0	21	5	9	
VI.	Bury St. Edmunds (Westley) .....	1.42	— 1.08	.36	24a	11	62.0	1	26.0	22	...	...	
VII.	Norwich (Brundall) .....	1.42	— 1.04	.51	30	10	60.8	1	29.0	22	5	16	
VIII.	Winterborne Steepleton .....	5.40	...	.83	24	16	56.8	6	28.1	22	7	9	
IX.	Torquay .....	4.93	...	.87	27	18	64.7	1	33.4	20	0	0	
X.	Polapit Tamar [Launceston]..	5.24	+ 1.36	1.17	27	20	60.4	1	27.0	19	4	5	
XI.	Stroud (Upfield) .....	2.40	— .29	.55	8	14	55.0	1,6,7	28.0	20b	4	...	
XII.	Church Stretton (Woolstaston) .....	2.49	— .29	.59	8	16	57.0	1	27.0	19b	5	...	
XIII.	Worcester (Diglis Lock) .....	2.25	+ .15	.35	27	16	...	...	...	...	...	...	
XIV.	Boston .....	1.24	— .61	.35	30	8	58.0	10	28.0	22	...	...	
XV.	Hesley Hall [Tickhill] .....	1.59	— .35	.54	30	15	58.0	1	23.0	18c	8	...	
XVI.	Derby (Midland Railway) .....	1.69	— .24	.22	23	15	59.0	1	30.0	20d	3	...	
XVII.	Manchester (Plymouth Grove) .....	...	...	...	...	...	...	...	...	...	...	...	
XVIII.	Wetherby (Ribston Hall) ...	1.68	— .28	.42	24	14	...	...	...	...	...	...	
XIX.	Skipton (Arnccliffe) .....	3.97	— 2.10	.76	8	18	...	...	...	...	...	...	
XX.	Hull (Pearson Park) .....	1.34	— .95	.42	24	12	61.0	1	28.0	22	5	10	
XXI.	Newcastle (Town Moor) .....	1.21	— 1.25	.30	8	10	...	...	...	...	...	...	
XXII.	Borrowdale (Seathwaite) .....	9.26	+ 4.72	2.45	8	18	56.5	6	26.7	21	4	...	
XXIII.	Cardiff (Ely) .....	4.62	+ .66	1.29	8	19	...	...	...	...	...	...	
XXIV.	Haverfordwest .....	7.13	+ 2.27	1.08	27	19	56.6	6	25.4	19	3	11	
XXV.	Aberystwith (Gogerddan) ...	3.18	— 1.77	.90	28	14	58.0	1,6	20.0	19	9	...	
XXVI.	Llandudno .....	1.65	— 1.69	.56	28	20	59.0	1	31.8	21	1	...	
XXVII.	Cargen [Dumfries] .....	4.21	— .33	.86	11	15	57.0	6	25.0	22	6	...	
XXVIII.	Edinburgh (Royal Observatory) ..	.60	...	.20	8	11	58.5	6	29.8	22	2	10	
XXIX.	Colmonell .....	...	...	...	...	...	...	...	...	...	...	...	
XXX.	Tighnabruaich .....	5.35	...	1.38	28	20	50.0	6,7	30.0	20b	2	...	
XXXI.	Mull (Quinish) .....	5.70	— .27	1.02	7	21	...	...	...	...	...	...	
XXXII.	Loch Leven Sluices .....	2.31	+ 1.34	.46	25	12	...	...	...	...	...	...	
XXXIII.	Dundee (Eastern Necropolis) ..	2.90	+ .09	.70	8	16	57.7	1	30.6	22	2	...	
XXXIV.	Braemar .....	3.15	— .62	.90	8	20	55.3	6	25.8	24	6	17	
XXXV.	Aberdeen (Cranford) .....	2.78	— .58	.63	6	19	55.0	15	28.0	23	2	...	
XXXVI.	Cawdor (Budgate) .....	.75	— 1.99	.35	8	10	...	...	...	...	...	...	
XXXVII.	Strathconan [Beaul] .....	1.95	— 3.70	.60	10	7	...	...	...	...	...	...	
XXXVIII.	Glencarron Lodge .....	3.40	— 6.52	1.02	2	17	61.9	15	32.0	18	1	...	
XXXIX.	Dunrobin .....	1.10	— 2.19	.25	8	12	58.0	1	35.0	24	0	...	
XL.	S. Ronaldshay (Roeberry) ...	1.65	— 2.42	.25	9	18	53.0	13	35.0	30	0	...	
XLI.	Darrynane Abbey .....	6.59	+ 1.64	.93	10	28	...	...	33.0	29	...	...	
XLII.	Waterford (Brook Lodge) ...	7.31	+ 3.79	1.26	6	21	57.5	3	30.0	27	2	...	
XLIII.	Broadford (Hurdlestown) ...	4.90	+ 1.65	.78	6	23	54.0	1	29.0	19	6	...	
XLIV.	Carlow (Browne's Hill) .....	4.75	+ 1.68	1.04	6	18	...	...	...	...	...	...	
XLV.	Dublin (Fitz William Square) ..	3.33	+ .77	.88	6	18	58.9	1	35.2	27	0	5	
XLVI.	Ballinasloe .....	4.80	+ 1.23	1.14	6	25	56.0	1,2,3	21.0	20	9	...	
XLVII.	Clifden (Kylemore) .....	11.04	+ 3.10	2.06	10	21	...	...	...	...	...	...	
XLVIII.	Seaforde .....	6.07	+ 2.37	1.01	11	22	55.0	1,4,6	29.0	28	3	5	
XLIX.	Londonderry (Creggan Res.) ..	2.92	— .95	.73	8	21	...	...	...	...	...	...	
L.	Omagh (Edenfel) .....	4.38	+ .67	1.14	6	22	54.0	14	28.0	26	4	10	

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

a—and 30.

b—and 21.

c—and 22.

d—and 21, 22.



SUPPLEMENTARY TABLE OF RAINFALL,  
 NOVEMBER, 1902.

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Uxbridge, Harefield Pk..	1·93	XI.	Castle Malgwyn .....	4·74
II.	Dorking, Abinger Hall ..	3·29	„	Builth, Abergwesyn Vic. ...	...
„	Sheppey, Leysdown .....	1·38	„	Rhayader, Nantgwillt ...	5·21
„	Hailsham .....	3·07	„	Lake Vyrnwy .....	3·61
„	Crowborough .....	3·18	„	Ruthin, Plâs Drâw .....	1·87
„	Ryde, Beldornie Tower..	3·42	„	Criccieth, Talarvor .....	3·17
„	Emsworth, Redlands ...	3·56	„	I. of Anglesey, Lligwy..	3·10
„	Alton, Ashdell .....	3·44	„	Douglas, Woodville .....	4·22
„	Newbury, Welford Park	3·81	XII.	Stoneykirk, Ardwell Ho.	5·15
III.	Oxford, Magdalen Coll..	2·22	„	Dalry, Old Garroch .....	6·53
„	Banbury, Bloxham .....	2·25	„	Montaive, Maxwelton Ho.	4·79
„	Pitsford, Sedgebrook ...	1·73	„	Lilliesleaf, Riddell .....	1·76
„	Huntingdon, Brampton..	1·55	XIII.	N. Esk Res. [Penicuik]	...
„	Wisbech, Bank House...	1·50	XIV.	Glasgow, Queen's Park..	2·20
IV.	Southend .....	1·53	XV.	Inveraray, Newtown ...	5·77
„	Colchester, Lexden .....	1·60	„	Ballachulish, Ardsheal...	5·42
„	Saffron Waldon, Newport	1·01	„	Islay, Eallabus .....	5·39
„	Rendlesham Hall .....	1·28	XVI.	Dollar .....	2·49
„	Swaffham .....	1·30	„	Balquhiddie, Stronvar...	...
V.	Salisbury, Alderbury ...	4·21	„	Coupar Angus Station...	4·65
„	Bishop's Cannings .....	2·35	„	Blair Atholl .....	5·05
„	Blandford, Whatcombe ..	...	„	Montrose, Sunnyside ...	3·27
„	Ashburton, Druid House	7·44	XVII.	Keith H.R.S. ....	1·55
„	Okehampton, Oaklands.	5·72	XVIII.	Fearn, Lower Pitkerrie..	·47
„	Hartland Abbey .....	4·51	„	S. Uist, Askernish .....	3·78
„	Lynmouth, Rock House	4·10	„	Invergarry .....	2·43
„	Probus, Lamellyn .....	5·42	„	Aviemore, Alvie Manse.	·63
„	Wellington, The Avenue	4·25	„	Loch Ness, Drumnadrochit	·75
„	North Cadbury Rectory	3·37	XIX.	Invershin .....	1·62
VI.	Clifton, Pembroke Road	2·65	„	Bettyhill .....	·60
„	Ross, The Graig .....	2·64	„	Watten H.R.S. ....	·94
„	Shifnal, Hatton Grange	1·77	XX.	Dunmanway, Coolkelure	...
„	Wem, Clive Vicarage ...	1·67	„	Cork, Wellesley Terrace	8·52
„	Cheadle, The Heath Ho.	2·39	„	Killarney, District Asyl.	7·88
„	Coventry, Priory Row ..	1·94	„	Caher, Duneske .....	...
VII.	Market Overton .....	2·24	„	Ballingarry, Hazelfort...	4·76
„	Grantham, Stainby .....	2·09	„	Miltown Malbay .....	6·48
„	Horncastle, Bucknall ...	1·19	XXI.	Gorey, Courtown House	4·44
„	Worksop, Hodsock Priory	1·58	„	Moynalty, Westland ...	3·26
VIII.	Neston, Hinderton .....	1·67	„	Athlone, Twyford .....	4·57
„	Southport, Hesketh Park	1·89	„	Mullingar, Belvedere ...	3·85
„	Chatburn, Middlewood.	2·17	XXII.	Woodlawn .....	4·98
„	Duddon Val., Seathwaite Vic.	6·89	„	Westport, Murrisk Abbey	6·44
IX.	Baldersby .....	1·79	„	Crossmolina, Enniscoe ..	6·45
„	Scalby, Silverdale .....	1·14	„	Collooney, Markree Obs.	5·15
„	Ingleby Greenhow Vic..	1·18	XXIII.	Enniskillen, Model Sch.	...
„	Middleton, Mickleton ...	2·25	„	Warrenpoint .....	5·83
X.	Beltingham .....	1·24	„	Banbridge, Milltown ...	3·31
„	Bamburgh .....	1·63	„	Belfast, Springfield .....	3·67
„	Keswick, The Bank .....	3·81	„	Bushmills, Dundarave..	3·45
XI.	Llanfrechfa Grange .....	4·18	„	Stewartstown .....	3·25
„	Treherbert, Tyn-y-waun	7·79	„	Killybegs .....	5·03
„	Llandovery .....	3·69	„	Horn Head .....	4·69

## METEOROLOGICAL NOTES ON NOVEMBER, 1902.

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 AND WALES.

LONDON, CAMDEN SQUARE.—Mild and cloudy, with a fair amount of fog and slightly deficient R. Frost in the third week. Mean temp.  $44^{\circ}8$ , or  $1^{\circ}8$  above the average.

ABINGER HALL.—Very showery to 11th, with nasturtiums and other flowers in full bloom. Cold and dry from 11th to 24th. Showers later. R still needed, the soil being perfectly dry under shrubs.

TENTERDEN.—Max. temp. over  $52^{\circ}$  for the first fortnight; third week very cold; last week warm and rainy. Duration of sunshine 58 hours.

SHEPPEY, LEYSDOWN.—The first three weeks were particularly fine and bright, with no fog. Very cold from 16th to 21st. The last three days accounted for more than half the total R.

CROWBOROUGH.—Damp and misty; mild on the whole notwithstanding a cold spell from 17th to 22nd. Very light showers of S on 19th and 20th.

WINSLOW, ADDINGTON.—Very dull, with little sunshine. Very cold from 18th to 22nd.

PITSFORD, SEDGEBROOK.—R  $\cdot 69$  in. below the average. Mean temp.  $43^{\circ}5$ .

BURY ST. EDMUNDS, WESTLEY.—Very mild till 17th; then a cold snap for a week. Great want of water felt, many deep chalk wells being dry.

NORWICH, BRUNDALL.—The mean temp. of the first fortnight was  $4^{\circ}7$  higher than that of the first fortnight of May, 1902. The mean temp. of the week ending 22nd was however  $10^{\circ}2$  lower than that of the previous week. Fewer days with R than in any November in 20 years.

WINTERBOURNE STEEPLTON.—A cold spell occurred in the third week, between two wet periods. R nearly an inch above the average of 10 years.

TORQUAY, CARY GREEN.—R  $1\cdot 16$  in. above the average. Mean temp.  $49^{\circ}4$ , or  $2^{\circ}$  above the average. Duration of sunshine  $69\cdot 2$  hours, or  $6\cdot 0$  hours above the average. Mean amount of ozone  $5\cdot 4$ , max.  $9\cdot 0$  on 5th, 8th, 11th, and 28th; min.  $1\cdot 0$  on 3rd, 20th and 27th.

POLAPIT TAMAR.—Generally wet, especially the last 10 days, but warm, although the wind was frequently easterly.

OKEHAMPTON, OAKLANDS.—When dry there was a very cold E. wind.

LYNMOUTH, ROCK HOUSE.—Except between 16th and 21st it was mild, with very few bright days and no violent gales.

WELLINGTON, THE AVENUE.—The first part was mild, with a good deal of R at times, but some very fine days. From 16th to 21st was cold, and from 22nd to end wet and mild. R about an inch above the normal amount.

NORTH CADBURY RECTORY.—A curious month, with 20 maxima at or above  $52^{\circ}5$ , and also with the four coldest consecutive November days for several years. Remarkably fine and dry from 12th to 21st.

CLIFTON, PEMBROKE ROAD.—Mild and rainy till 11th; dry, with E. winds and slight frost from 12th to 21st, and dull and rainy from 22nd to 30th. R nearly half-an-inch below the average, but a full number of rainy days.

ROSS, THE GRAIG.—Notwithstanding a very cold week from 16th to 22nd, the temp. was rather above the average. Seldom have so many plants continued in such perfection of flowering as up to November 7th, tender plants not being injured till 18th, the latest on record.

COVENTRY, PRIORY ROW.—For the most part mild and open, with a sharp snap of dry frost from 17th to 22nd. Vegetation continued growing until the frost, and the cold would not have been severe but for the rasping E. wind.

HULL, PEARSON PARK.—Very dull generally, with frequent fogs, the latter half being characterised by very cold E. and S.E. winds. Duration of sunshine  $23\frac{1}{4}$  hours.

# WALES AND THE ISLANDS.

LLANFRECHFA GRANGE.—Temp. very low from 18th to 23rd.

HAVERFORDWEST.—After 5 dry and cold days a gale occurred on 6th, and wet and stormy weather lasted till 15th, when the wind shifted to E., and cold gloomy weather prevailed to 24th, thereafter mild and wet. Duration of sunshine 37·7 hours.

ABERYSTWITH, GOGERDDAN.—Not many fogs but a fair amount of wet and dull weather. Rather sharp and sudden frost in the third week, cutting off the foliage of fruit trees.

DOUGLAS, WOODVILLE.—The first fortnight was mild, very wet, and somewhat stormy, succeeded by an extremely cold, dry week. The rest was again wet, with average temp. The wind, which was persistently in the E., blew more or less strongly nearly every day, though rarely reaching the force of a moderate gale. No frost.

# SCOTLAND.

MONIAIVE, MAXWELTON HOUSE.—R ·06 in. above the average of 10 years.

LILLIESLEAF, RIDDELL.—R on 13 days, but the rest of the month was remarkably dull, dark and drizzly. Little frost and very mild weather. Two apple trees bearing blossom on December 1st.

TIGHNABRUACH.—For 16 days the wind was steady from E., and on 9 others it blew part of the 24 hours from the E., though upper cloud motion was from S.

BALLACHULISH, ARDSHEAL.—Exceptionally dry, R 2·28 in. below the average.

COUPAR ANGUS.—Generally open and warm, with mean temp. 42°·7, or about 3° above the average. The remarkable feature was the excessive R, and November redeems the deficiency of the previous months.

AYIEMORE, ALVIE MANSE.—Unprecedentedly dry.

DRUMNADROCHIT.—R abnormally small, being 2·45 in. below the average of 16 years, and ·40 in. less than the previous smallest. The total fall of the first 11 months was 7·57 in. below the average.

BETTYHILL.—Unusually dry; bright, with frequent strong winds and some slight frosts about the middle.

# IRELAND.

CORK, WELLESLEY TERRACE.—R the greatest for 37 years. Storms on 8th and 21st; during the latter, bar. fell 1 inch in 24 hours.

DARRYNANE ABBEY.—Wet and, on the whole, mild.

MILTOWN MALBAY.—Almost one continual downpour, the total being more than any previous three months of the year put together. One week, about the 20th, was very cold.

DUBLIN, FITZWILLIAM SQUARE.—A fitting sequel to the dreary wet months which preceded it. There was indeed a remarkable anti-cyclonic period, cold, rainless, and squally, from 14th to 21st, but for the rest R fell almost daily and often heavily. Mean temp. 47°·5, or 2°·1 above the average. High winds on 20 days, reaching the force of a gale on three. Foggy on 6 days. L on 9th. Sleet and H on 20th and H on 29th.

COLLOONEY, MARKREE OBSERVATORY.—The early part was much broken, having heavy R and high wind on some days. From 17th to 21st was bitterly cold, yet fine and dry. Warmer afterwards, but frost set in towards the end.

## CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JUNE, 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.	Cloud.
	Temp.	Date.	Temp.	Date.									
London, Camden Square	84.5	28	39.2	10	68.8	50.7	49.6	66	129.1	37.7	3.13	19	6.4
Malta.....	90.9	11	56.5	20	79.1	63.9	58.7	70	140.1	51.4	.00	0	2.4
Cape Town ..	75.0	18	39.9	9	61.9	49.1	50.2	81	...	...	4.64	21	7.3
Durban, Natal .....	78.3	27	47.4	14	73.3	52.6	...	...	130.3	...	.73	3	1.3
Mauritius.....	81.4	24	60.1	4a	78.1	64.7	62.8	75	138.5	49.5	1.65	14	5.0
Calcutta.....	97.5	23	70.7	4	92.2	78.7	77.6	79	153.7	70.9	5.47	13	7.7
Bombay.....	94.9	3	75.4	13	89.9	81.0	77.3	78	143.5	73.6	9.77	14	5.8
Madras .....	107.8	5	74.5	20	99.4	82.5	72.6	64	148.2	74.3	.39	6	5.1
Kodaikanal .....	70.3	2	51.0	21	66.2	53.9	51.4	76	145.3	42.8	3.67	15	6.5
Colombo, Ceylon.....	91.7	18	73.0	20	88.5	78.4	75.1	80	147.0	71.0	9.84	20	7.2
Hongkong.....	89.3	6	71.9	29	84.2	77.6	74.8	83	150.6	...	15.44	19	9.0
Melbourne.....	60.6	30	35.3	29b	56.1	42.3	44.1	85	119.9	26.1	2.70	14	7.0
Adelaide .....	69.3	4	36.9	26	61.1	46.1	45.3	77	123.5	31.2	3.88	18	6.1
Coolgardie .....	78.4	1	35.3	18	62.2	43.4	42.0	67	138.0	29.9	1.35	4	4.9
Sydney .....	68.5	20	42.3	29	61.1	48.3	43.0	77	111.3	34.1	.63	10	3.9
Wellington .....	60.0	24	33.0	30	54.5	45.2	41.8	74	95.0	26.0	4.84	24	7.6
Auckland .....	62.5	13	40.0	30	58.1	48.2	44.2	72	118.0	36.0	3.22	12	5.0
Jamaica, Negril Point..	89.9	30	72.4	28	87.0	74.8	74.4	78	...	...	3.82	14	...
Trinidad .....	90.0	2	69.0	3c	87.6	71.6	75.3	84	163.0	64.0	10.05	19	...
Grenada.....	86.2	5	68.4	30	82.8	74.7	73.0	79	147.2	...	9.18	25	4.4
Toronto .....	81.2	3	38.2	6	70.1	49.9	50.4	74	104.8	30.4	3.55	12	6.3
Fredericton, N.B. ....	84.7	2	33.0	1	66.9	44.6	44.4	60	...	...	6.27	17	6.6
Winnipeg .....	79.3	2	37.0	19	67.1	46.9	...	...	...	...	3.46	14	7.2
Victoria, B.C. ....	79.1	20	57.3	3	64.1	50.4	...	...	...	...	.08	3	6.9
Dawson .....	84.6	30	27.0	10	72.1	43.7	...	...	...	...	.86	3	3.9

a—and 21. b—and 30. c—and 28.

## REMARKS.

MALTA.—Mean temp. of air 70°·3, or 1°·3, below, and mean hourly velocity of wind 9·8 or 1·1 above, average. Mean temp. of sea 70°·4. T on 27th. J. F. DOBSON.

Mauritius.—Mean temp. of air 2°·0, dew point 2°·0 above, and E·26 in. below, their respective averages. Mean hourly velocity of wind 9·8 miles, or 1·5 below average; extremes 24·5 on 22nd, and 1·6 on 11th, prevailing direction E.S.E. to S.E.

T. F. CLAXTON.

MADRAS.—Sunshine 139·8 hours, or 36·3 per cent. of possible amount. L on 12 days. Evaporation 8·94 in.

A. MOFFAT.

KODAIKANAL.—Bright sunshine 135·2 hours.

C. MICHIE SMITH.

COLOMBO, CEYLON.—Mean temp. of air 82°·8 or 1°·8 above, of dew point 75°·1 or 1°·0 above, and E 9·84 in., or 1·56 in. above, their respective averages. Mean hourly velocity of wind 9 miles, prevailing direction S.W. TSS on 2 days. H. O. BARNARD.

HONGKONG.—Mean temp. of air 80°·3. Sunshine 84·7, or 71 hours below average. Mean hourly velocity of wind 14·5 miles, prevailing direction S.S.E. F. G. FIGG.

Adelaide.—E 1·03 in. above average of 45 years. Good rain all over agricultural areas, but dry on the outlying pastoral country.

C. TODD, F.R.S.

Coolgardie.—Nearly all E fell during first week, after which the weather was fine and fresh.

W. ERNEST COOKE.

Auckland.—Mean temp. slightly, and E 1½ in. below, average. T. F. CHEESEMAN.

TRINIDAD.—E 1·73 in. above the 40 years' average. J. H. HART.