

SYMONS'S MONTHLY METEOROLOGICAL MAGAZINE.

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CLIMATE AND HEALTH.*

It will be strange if the final unravelment of the connection between weather and disease occurs in the New World, which is as but of yesterday, and not in the Old World, where it has been written about for more than two thousand years. Such an event seems to us not improbable.

When the people of the United States make up their minds as to doing anything, they have funds, extent of country, means of inter-communication, and the will to expend those resources, to a greater extent than the nations of the Old World. It is not a question of the relative skill of an individual in one world or the other; but given two men of equal ability, one in England, one in Washington, the latter has far and away the best chance; he has an area twenty times as great, he has a staff of assistants of proportional magnitude, and need not trouble about the cost of printing and engraving.

We have been led to the above remarks by examining the work mentioned below, concerning which we have a little more to say. In the first place, we must own to some amusement, astonishment and grief at the origin of what may not improbably be a work of world-wide importance. We must first justify the rather contradictory sentiments which we have just named, and to do so we must reproduce the first few lines of the Preface.

"In December, 1893, the Honorable the Secretary of Agriculture in a communication to the Chief of the Weather Bureau, enclosed a copy of a monthly report of the Cornwall County (England) Council, and wrote among other things concerning it:—

'Besides meteorological data, it contains vital statistics which may be of service, and may possibly suggest to you some manner by which, through the Weather Bureau of this Department, the sanitary conditions throughout the various States of the Union may constantly be kept before the public.'

* United States Department of Agriculture, Weather Bureau. Climate and Health. Edited under the direction of Prof. Willis Moore, Chief of the Weather Bureau, by W. F. R. Phillips, M.D. Number One. Washington, 1895, 4to, 26 pages, 20 maps.

We were 'amused' because without in the least depreciating Mr. Trevail's little monthly table, the idea of its setting in motion such an organization as that revealed by the work before us is somewhat droll. We were 'astonished' and 'grieved' because it shows the extreme difficulty of making even those high in office at all aware of what has been done, and is being done, in other parts of world. The whole Preface reads as if the suggestion had for the first time dawned upon the human race. If the Secretary had but gone to another department in his own city of Washington and consulted the superb catalogue issued by the Surgeon-General's Office (a work which has no European rival), he would have learned something as to what has been done; but, perhaps, it is as well not. Prof. Willis Moore (Chief of the Weather Bureau) has wisely placed the editorship in the hands of a medical man (Dr. W. F. R. Phillips) and if he is not hampered with detail, but allowed time to study the facts sent in to him, it is by no means improbable that he may detect hitherto unrecognized relations. A still better plan—and one the cost of which would to the United States be insignificant—would be to offer short (say, three years) appointments to half-a-dozen students who have passed good examinations in Physics and in Medicine, and let each have nothing to do with the preparation of tables but, be required to give his whole attention to the distribution of a single disease both geographically and climatologically. It would probably be well to prohibit his publishing any opinion or suggestion within the first year of his appointment; this would prevent the exercise of the natural instinct to bolster up early pronouncements.

As the Preface states that "This first number is almost wholly experimental in the sort of information it contains," we do not enter into details. It is something after the style of the returns of the Registrars General of England, Scotland and Ireland, of the *Tableaux Mensuels de Statistique Municipale* of Paris, and we were about to add the *Tablettes Mensuelles de la Soc. Roy. de Méd. Publique de Belgique*, but, to our astonishment, we find that now they contain no meteorology, although they have a special classification for *Maladies saisonnières, météoriques ou telluriques*! It differs, however, from all the above publications in the number of maps which it contains—good maps, but in which clearness has been lost by endeavouring to convey too much information upon each map.

There is no indication of any price being charged for this publication, and we infer that the United States, with its usual liberality (except as to the Bibliography of Meteorology), would be willing to exchange with the numerous analogous publications in this and other countries.

METEOROLOGICAL OBSERVATIONS IN MANCHURIA.

WE have been favoured by the Rev. Dr. Cairns Mitchell with a copy of a little book with the title "*Ten Years in Manchuria*" (Houlston and Sons), by Mr. Christie, a Presbyterian Medical Missionary, giving an interesting account of his work in that remote part of China; and giving also a summary of his daily meteorological observations during 1893. Mr. Christie gives no details as to the instruments or their position, but observations from that part of China are so scarce, that we thankfully accept this information, and hope that the Mission and the records may both go on successfully.

Meteorological Results for 1893, Moukden, Manchuria, China.

Lat. 41° 50' N. ; Lon. 123° 58' E. Altitude 320 ft.

1893.	THERMOMETER.					BARO-METER.	RAINFALL.				
	Maximum.		Minimum.		Mean for Month.		No. of days.		Max. in 24 Hours.	Total for Month.	
	Highest.	Mean.	Lowest.	Mean.			Rain.	Snow.			
January ...	40 ^o 4	16 ^o 3	-28 ^o 2	- 9 ^o 3	3 ^o 5	30.09	...	5	in.	.75	
February..	37.0	25.5	-25.0	- 5.0	10.3	30.15	...	3	...	.45
March	68.0	43.3	- 8.7	20.7	32.0	29.93	1	2	...	.40
April	77.2	63.5	29.0	38.1	50.8	29.69	5	...	.32	.93
May	86.9	73.3	32.7	49.0	61.1	29.69	7	...	.65	2.30
June	96.1	83.5	51.9	60.8	72.2	29.56	8	...	2.20	5.27	
July	95.9	89.0	64.5	70.2	79.6	29.55	6	...	3.26	4.62	
August ...	95.2	85.3	48.6	63.8	74.5	29.59	7	...	3.35	4.63	
September	86.7	75.5	38.5	50.1	62.8	29.83	5	...	1.72	3.42	
October ...	76.1	54.3	23.1	34.7	44.5	29.94	4	2	.80	2.58	
November.	54.2	39.7	- 6.9	13.8	26.8	30.01	1	1	...	1.00	
December.	47.2	25.4	-17.4	4.0	14.7	30.11	...	5	...	.72
Extremes	96.1	...	-28.2	...	..	..	44	18	3.35	27.07
Means .....	...	56.2	...	32.6	44.4	29.84	...	...	...	...

A WONDERFUL QUEENSLAND RAIN RETURN.

IN the *Met. Mag.* for April and May, 1893, under the heading *Queensland Floods*, we reprinted several very remarkable records of rainfall, and expressed the hope that we might see some official and trustworthy statement by Mr. Wragge. We have heard of his predicting the weather for the whole continent of Australia, and of his starting a mountain station in Tasmania, but we have not seen a single report upon the rainfall of Queensland; and now that a friend has sent us the following, we do not know whether or not it is to be regarded as the wettest station in Australia. According to the *Melbourne Argus*, at Crohamhurst, in the Blackall Ranges, 77.31 in. of rain fell in the four days, Jan. 31st—Feb. 3rd, 1893, and at

Mooloolah 67 in. in three days, at about the same date, but as we have had no returns from Queensland of late years, we cannot say whether these stations are or are not wetter than Goondi—to all appearance it is hard to beat—and apparently that part of Queensland has water enough and to spare.

Rainfall at Goondi Mill, Johnstone River, Queensland.

MONTH.	Total Rainfall for Month.	No. of Days.	Greatest Fall in one day.	Date.	No. of days with 2 in. rain and upwards.
1894.	in.		in.		
January	26·77	25	5·05	16	4
February	24·55	15	7·54	23	6
March	38·36	23	6·40	20	7
April	71·44	25	15·69	6	10
May	8·28	19	1·11	8	...
June	8·61	13	4·53	22	1
July	5·87	11	2·37	2	1
August	6·44	10	2·27	18	2
September	2·38	11	1·20	18	...
October	3·34	16	·82	30	...
November	32·48	20	5·07	21	8
December	12·98	21	1·88	26	...
Total	241·50	209	15·69		39

WE have also been favoured by Captain Wilson-Barker, R.N.R., F.R.Met.Soc., with a weekly return for quite another district. We have reduced it, as nearly as practicable, to monthly values and append it. But, as a rule, we think that local returns should always go to the central office of the country. We are sure that Mr. Ellery's successor at Melbourne Observatory would welcome the assistance of Captain Wilson-Barker's correspondent at Warragul.

Rainfall at Fern Hills, Warragul, Victoria, Australia.

Month.	1893.	1894.	1895.
	in.	in.	in.
January .....	...	·92	1·29
February .....	...	1·37	·56
March .....	...	3·35	2·15
April .....	...	2·45	3·43
May .....	...	4·37	1·63
June .....	...	1·87	4·49
July .....	...	6·39	4·35
August .....	...	6·09	4·16
September	6·80	3·92	...
October	3·77	3·45	...
November	3·17	·33	...
December	4·91	2·75	...
Total .....	...	37·26	...

Snow on 21st and 22nd July, 1895.

THE CLIMATE OF THE BRITISH EMPIRE IN 1894.

The Climatological Table and Summary for 1894 show many familiar features, and the extremes are mostly distributed among the usual stations. Australia records the highest shade temp., and Winnipeg, of course, the lowest. In the 12 years for which the annual summaries have appeared in this magazine, Adelaide has yielded the highest max. in 10 years, Melbourne in one, and Calcutta in one; Adelaide also has, in nine years, recorded the highest sun max.

Winnipeg has never been equalled for lowness of absolute shade min., and of mean temp., or for total range of temp., and has only twice failed to record the greatest mean daily range. As regards mean temperature, Ceylon, with values ranging only from $80^{\circ}2$ in 1887 to $81^{\circ}1$ in 1885, has always headed the list.

The least daily range has generally been recorded at a thoroughly insular station, but Bombay in one year—1892, was bracketed with Ceylon.

The lowest relative humidity has invariably occurred at Adelaide, while the highest relative humidity has in different years been recorded at Falkland Isles, Winnipeg, Barbados, London and Esquimalt.

The greatest rainfall has in six years been registered at Ceylon, three at Bombay, and three at Trinidad; while the least rainfall has been distributed among six stations—Adelaide, Melbourne, Malta, Winnipeg, Jamaica and London.

Malta comes out well at the head of the list for cloudlessness, having recorded the least in eight years, Bombay in four, and Calcutta in one.

These comparisons are, to a certain extent, affected by the changes that have occurred from time to time in the list of stations, but the great majority extend over the whole period. The Cape of Good Hope appeared from the commencement of the tables in "*The Colonies*" in 1874 very regularly for many years, but we have very reluctantly had to abandon it, for of late all our efforts to obtain regular returns have failed.

To return to the 1894 results. The shade max. at Adelaide, $107^{\circ}0$, has been exceeded in ten years, but the min. at Winnipeg, $-46^{\circ}1$, and the extreme range at the same station, have only twice been beaten.

Winnipeg, with a mean temp. of $36^{\circ}5$, can hardly be congratulated on having had a *warm* year, though that value is the highest for that station shown in the 12 years.

The max., in sun, at Trinidad, $177^{\circ}0$, has been exceeded only by $180^{\circ}0$ at Adelaide in 1882.

The extreme rainfall ($77\cdot46$ in.) at Ceylon is, with one exception, the smallest in the 12 years, but the least rainfall is not remarkable.

Curiously enough, London and Esquimalt record the greatest amount of cloud, and each has done the same in two previous years

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE FOR 1894.

STATIONS. <i>Those in Italics are South of the Equator.</i>	ABSOLUTE.			AVERAGE.					ABSOLUTE.		TOTAL RAIN.		AVER- AGE. Cloud.	
	Maximum.		Minimum. Temp.	Date	Max.	Min.	Mean.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.		Days.
	Temp.	Date.												
England, London ...	88.2	July 6	13.1	January 5	58.1	43.2	50.7	43.9	81	128.2	14.3	in. 27.94	185	0-10
Malta	96.3	July 12	41.7	March 29	72.7	59.3	66.0	56.4	76	147.5	35.5	25.16	90	6.3
Mauritius	86.4	January 6	56.8	June 11	79.2	68.5	73.9	64.7	76	138.1	44.6	48.91	196	4.6
Calcutta	105.1	May 17	50.1	January 9	86.4	71.0	78.7	70.7	79	159.7	41.0	48.66	96	5.7
Bombay	93.0	June 1	64.0	December 15	85.6	75.0	80.3	71.9	76	142.5	54.5	66.85	124	4.2
Ceylon, Colombo ...	91.8	February 14	66.0	January 29	86.4	75.2	80.8	71.8	78	153.5	54.0	77.46	183	4.0
Melbourne	105.7	November 27	31.7	July 11	67.5	50.5	59.0	49.5	73	152.1	27.0	22.61	138	5.7
Adelaide.....	107.0	November 26	37.2	July 8, Sep. 6	72.4	53.0	62.7	48.6	63	165.0	30.7	20.80	134	6.0
Sydney ..	97.5	November 26	40.4	July 11	69.5	56.7	63.1	53.2	75	156.2	27.9	38.24	188	4.8
Wellington	80.0	{ Jan. 13, 15 February 23 December 30 }	{ 33.3 35.0 }	{ August 6 September 3 }	62.4	50.5	56.5	47.6	73	145.0	21.0	51.01	162	4.7
Auckland	82.0	{ January 27 June 22 July 17 }	{ 35.0 61.2 }	{ September 3 March 9 }	66.2	53.3	59.8	52.8	78	148.0	30.0	41.11	180	5.4
Jamaica, Kingston..	92.9	{ September 21 February 8 February 2 }	{ 67.0 60.0 }	{ March 9 Mar. 7, Apl. 3 }	86.8	70.3	78.5	69.1	78	...	...	34.91	83	4.2
Grenada	88.5	{ February 2 March 2 May 13 }	{ 67.0 60.0 }	{ March 23 February 24 }	82.9	73.3	78.1	69.5	74	164.5	...	67.88	256	4.0
Trinidad.....	95.0	{ March 2 May 13 June 26 }	{ 60.0 — 9.9 }	{ March 23 February 24 }	87.8	69.1	78.5	69.8	78	177.0	59.0	52.30	...	...
Toronto	90.7	June 26	— 9.9	February 24	54.9	38.6	46.8	39.6	75	...	—11.2	29.58	185	6.0
Manitoba Winnipeg	95.8	July 16	—46.1	January 24	48.1	25.0	36.5	...	...	...	...	18.12	134	5.3
British Columbia, { Esquimalt	84.0	July 12	—20.2	February 19	54.0	41.4	47.7	43.8	88	...	...	42.79	213	6.3

Summary.

Highest Temp. in Shade	...	107°·0 at Adelaide on Nov. 26.
Lowest " " "	...	—46°·1 at Winnipeg on Jan 24.
Greatest Range in year ...	...	141°·9 at Winnipeg.
Least " " "	...	25°·8 at Colombo, Ceylon.
Greatest Mean Daily Range	...	23°·1 at Winnipeg.
Least " " "	...	10°·6 at Bombay.
Highest Mean Temp. ...	...	80°·8 at Colombo, Ceylon.
Lowest " " "	...	36°·5 at Winnipeg.
Driest Station ...	...	Adelaide, mean humidity 63.
Dampest Station...	...	Esquimalt mean humidity, 88.
Highest Temp. in Sun ...	...	177°·0 at Trinidad.
Lowest Temp. on Grass...	...	—11°·2 at Toronto.*
Greatest Rainfall	...	77·46 in. at Colombo, Ceylon.
Least " "	...	18·12 in. at Winnipeg.
Most Cloudy Stations	...	London and Esquimalt ; average amount 6·3.
Least " " "	...	Bombay and Grenada ; average amount 4·0.

ROYAL METEOROLOGICAL SOCIETY.

THE opening meeting of the session was held in the new building of the Institution of Civil Engineers on Wednesday evening, November 20th, Mr. R. Inwards, F.R.A.S., President, in the Chair.

Mr. W. H. Dines, by the aid of a small fan fixed over a vessel of hot water shielded from draughts, showed an experimental illustration of the formation of a "Tornado cloud," or waterspout. The characteristic funnel cloud was readily seen extending from the tray of hot water to the fan, and when the draught was strong and the conditions were favourable, a decided protuberance was observed on the surface of the water just under the end of the cloud. Mr. Dines is of opinion that the cloud is formed by true dynamic cooling, as the air saturated by the vapour from the hot water comes under the influence of the decreased pressure at the centre.

The President, Captain Wilson-Barker, Messrs. Bayard, Tripp, Marriott, Dickson, Symons and Admiral Maclear took part in the discussion, and all who had seen the phenomena in nature spoke of the wonderful fidelity of the representation.

A paper by Mr. J. Eliot, F.R.S., followed "On the origin of the cold weather storms of the year 1893 in India, and the character of the air movement on the Indian Seas and Equatorial Belt, more especially during the South-west Monsoon period." This was a discussion of the data contained in the *Indian Monsoon Area Charts*, the

* The min. on grass is not recorded at Canadian Stations, except Toronto.

publication of which was sanctioned by the Indian Government for the two years 1893-4. Cyclonic storms are of frequent occurrence during both the N.E. and the S.W. Monsoons, but they differ in many important respects. The storms of the S.W. Monsoon originate almost invariably over a sea surface, and travel in very variable directions, and occasionally develop into intense and furious hurricanes. The cyclonic storms of the N.E. Monsoon almost invariably originate over the plateau of Persia or Baluchistan, or in North-Western India, and travel in an easterly direction at a velocity ranging between 15 and 20 miles an hour. These plateau-formed storms of the cold weather are the chief instruments of the distribution of the moderate rainfall essential for the great cold weather wheat and other crops of Northern India—and are the chief sources of the snowfall of the Western Himalayas. After giving an account of the more important cold weather storms in January and February, 1893, and the results of the tabulation of the wind observations for the Equatorial Belt, the author describes the “burst of the Monsoon.” Mr. Eliot says that the evidence of the year 1893 is strongly in favour of the supposition that the S.W. Monsoon currents in the Indian Seas are the direct continuation, north of the Equator, of the horizontal movement of the S.E. Trade Winds; and that the larger variations in the strength of the S.E. Trades near the Equator during the Monsoon period are reproduced in the Monsoon currents in the Indian Seas from June to September.

Mr. Baldwin Latham, while appreciating the value of the paper, did not think that it fully cleared up the matter. Mr. Scott said that an examination of the Monsoon Charts which were in the library of the Meteorological Office showed the great deficiency of observations over the sea. The Indian Government, in view of the importance of the subject, had authorized the issue of the Charts for three more years. Captain Wilson-Barker dwelt upon the extent and importance of the work and considered that the weak point was the scarcity of observations over the sea; he thought, that the effect of the Himalayas was hardly sufficiently taken into account. Mr. C. Harding spoke with great appreciation of the paper and of the foresight which Mr. Blanford has shown in arriving, from the imperfect evidence available in the absence of synoptic charts, at a similar conclusion to the author. He gave illustrations of the manner in which meteorologists might be misled by working entirely with mean values. Mr. H. N. Dickson thought that Mr. Eliot's work would be greatly aided by a knowledge of the conditions prevailing on the Northern side of the Himalayas.

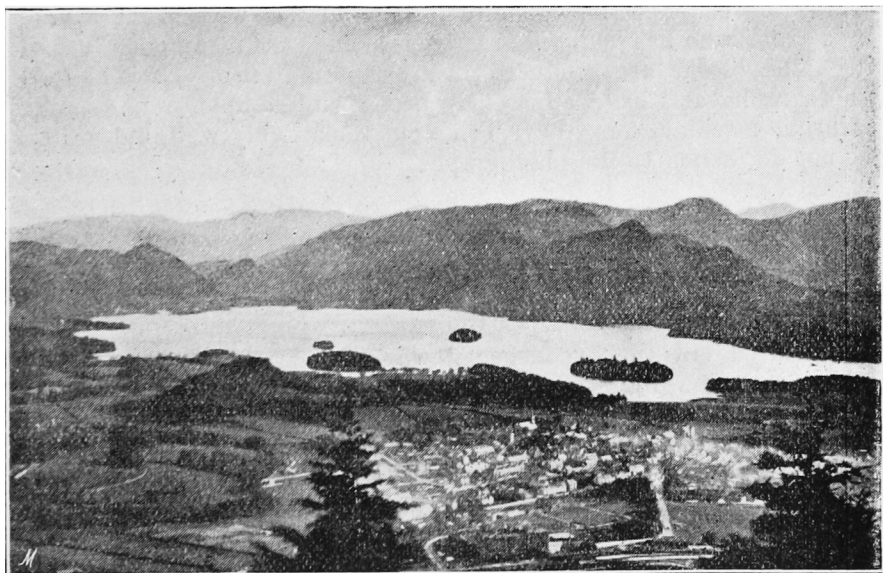
A paper, by Mr. C. Davison, F.G.S., “On the Diurnal Variation of Wind Velocity at Tokio, Japan,” was also read.

REVIEWS.

The English Lakes, with Bathymetrical Maps and Illustrations, by HUGH ROBERT MILL, D.Sc., F.R.S.E. [From the *Geographical Journal*.] G. Philip and Son, London, 1895, large 8vo., 64 pages, 20 engravings and 8 large, folding, coloured maps.

It is very curious how frequently volunteer work is better than that produced by Government officials who, having National money to spend are unfettered as to cost.

This fascinating paper is a good illustration of what we have just said. As far as we can ascertain its origin is as follows :—Dr. Mill felt that it was a national disgrace that no survey had been made of the English Lakes. Their position and the configuration of the water surface had been laid down with absolute precision on the 6-inch Ordnance Maps, approximate statements as to the greatest depth in each lake had been given in *Black's Guide to the Lakes*, and a few soundings in some of them by Crosthwaite in 1792, and on some of the 6-inch Geological Survey Maps, but nothing of a complete nature had been done. Dr. Mill undertook to do it without remuneration, provided that the Royal Geographical Society would defray actual expenses ; the Society accepted the offer, and Dr. and Mrs. Mill and Mr. Heawood have done the work in a style worthy of all praise.



GENERAL VIEW OF DERWENTWATER FROM THE NORTH.

[Photograph by Mr. A. Pettitt, Keswick.]

Although the book contains a mass of statistics it must not be assumed to be dry reading, quite the contrary, and whether one's tastes be merely æsthetic, or meteorological, or geological or cartographical, in each case we could strongly recommend the securing of a copy while any are to be had. We had occasion recently to refer to the beauty of Bartholomew's colour map printing, and the eight maps given here are worthy of their reputation, there is a general one of the country, and there are seven detail ones on the scale of two inches to the mile which leave nothing to be desired. As to the illustrations we have the pleasure of reproducing one of the twenty to speak for itself.

The paper is clearly and pleasantly written and should, we think, be read by all who take an intelligent interest in the most beautiful country in the British Isles.

As an indication of the thoroughness with which the work was done we find that the depth of the water was determined at 5068 spots along lines of soundings the aggregate length of which was 153 miles.

Clouds and Weather. A study for navigators by CAPTAIN D. WILSON BARKER, F.R.S.E., F.R.Met.Soc. *Shipping World* Office, Arundel Street, Strand, 1895. 8vo., 22pp.

TWENTY-FOUR reproductions of photographs of clouds, a page of diagrams and the needful text offered at sixpence can hardly be accused of being costly. The little pamphlet is written for sailors by a sailor who has had wide experience and has made good use of it. The blocks are produced from Captain Wilson Barker's own photographs and have apparently been printed upon a newspaper printing machine, some have come out remarkably well, but others do not do justice to the photographs.

Meteorologische Volksbücher, VON PROF. DR. HELLMAMN. Second ed. Paetel, Berlin, large 8vo, 68 pages.

WE pointed out the excellence of this work when the first edition appeared; our verdict has been confirmed by the sale of the whole edition, and the appearance of a second. It is considerably enlarged and brought thoroughly up to date. For instance, Firmin de Belleval is duly credited with the treatise, "De mutatione aeris," &c.; but there is no more information about Joannes de Sacro Bosco. We, as Englishmen, ought to find out more than was given in the *Met. Mag.*, Vol. xxvi. (1891), p. 133-134. Will one of our readers take it up? Some Yorkshireman might search for records of the Twelfth-century astronomer.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, MAY, 1895.

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		
England, London	86.2	30	35.7	2	68.3	46.0	45.1	68	128.9	30.2	.34	5	4.0
Malta.....	81.6	24	53.1	9	72.7	59.3	57.2	75	136.6	47.4	.51	3	5.8
<i>Mauritius</i>	81.9	3	66.2	27 <i>b</i>	78.3	70.4	65.9	78	129.2	55.3	3.09	21	5.1
Calcutta.....	107.2	20	70.2	4	96.2	79.1	77.9	74	159.2	68.9	2.41	4	4.1
Bombay.....	91.8	19	78.3	4	90.3	80.6	75.0	73	140.9	73.7	.08	2	3.0
Ceylon, Colombo	93.7	1	74.6	16	89.4	78.7	74.0	78	157.0	68.0	10.09	25	7.0
<i>Melbourne</i>	66.3	3	31.3	26	59.7	45.7	45.5	76	119.0	26.7	.97	15	7.1
<i>Adelaide</i>	71.7	13	36.9	26	63.5	47.6	45.9	70	132.0	29.6	.84	9	5.3
<i>Sydney</i>	71.2	14	43.1	27	63.9	51.4	49.0	82	120.3	34.3	1.87	15	5.0
<i>Wellington</i>	65.0	9	39.0	19 <i>c</i>	57.6	47.0	43.7	73	109.0	27.0	4.70	15	5.0
<i>Auckland</i>	68.0	2	43.0	23	61.8	51.3	48.8	76	129.0	37.0	5.52	21	6.5
Jamaica, Kingston.....	89.5	14	70.4	4	87.8	73.2	71.1	76	...	...	1.98	8	4.6
Trinidad	95.0	11	65.0	20	90.3	70.4	69.7	70	169.0	64.0	2.11	9	...
Grenada.....	85.0	18 <i>a</i>	71.0	3	83.0	74.6	69.3	71	149.6	...	3.41	19	4.6
Toronto	93.4	30	27.9	13	62.3	44.5	44.6	70	...	23.0	2.31	8	4.3
New Brunswick, Fredericton	91.7	7	26.5	2	67.8	41.5	43.1	61	...	...	.95	16	5.5
Manitoba, Winnipeg	80.0	22	24.8	13	67.3	40.8	...	...	...	...	3.74	13	6.4
British Columbia, Esquimalt.....	82.0	15	36.1	5	61.1	44.1	47.3	87	...	...	1.60	17	6.1

a—24 and 26; *b*—and 29; *c*—and 23.

REMARKS.

MALTA.—Adopted mean temp. (64°·9), 0°·8 above the average. Mean hourly velocity of wind 8·9 miles. Temp. of sea rose to 70°·0. Thunderstorms on 5th and 6th. Lightning on 9th and 10th. Hail on 5th.

J. F. DOBSON.

Mauritius.—Mean temp. of air 1°·0 above, of dew point 1°·6 above, and rainfall .91 in. below, their respective averages. Mean hourly velocity of wind 13·0 miles, or 3·0 miles above average; extremes, 30·2 on 6th, and 1·8 on 11th; prevailing direction, E.S.E.

C. MELDRUM, F.R.S.

CEYLON, COLOMBO.—Thunderstorms on nine days, and lightning on five other days.

D. G. MANTELL.

Adelaide.—Mean temp. 2°·1 below the average of 38 years. Very dry; rainfall 2·10 in. below the average.

C. TODD, F.R.S.

Sydney.—Mean temp. 0°·7 below, humidity 7 above, and rainfall 3·27 in. below, their respective averages.

H. C. RUSSELL, F.R.S.

Wellington.—A few fine days during the early and latter parts of the month, but generally showery and unpleasant weather and cold, with prevailing S. and S.E. winds. Hail on 17th. Fog on 14th, 21st and 22nd. Mean temp. 0°·3 above, and rainfall .29 in. below, the average.

R. B. GORE.

Auckland.—An unusually rainy May, the rainfall being 1·41 in. over the average of 28 years. Mean temp. and barometrical pressure both slightly below the average.

T. F. CHEESEMAN.

JAMAICA, KINGSTON.—Mean hourly velocity of wind 4·4 miles. Rainfall in N. and W.C. divisions 43 and 9 per cent. above, and in N.E. and S. divisions 19 and 26 per cent. below, the respective averages, giving as the result an average fall for the island.

R. JOHNSTONE.

TRINIDAD.—Rainfall 1·54 in. below the average of 30 years.

J. H. HART.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JUNE, 1895.

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.									
	°		°		°	°	°	0-100	°		inches		%
England, London	83·9	23	42·2	15	73·6	50·6	47·6	62	135·3	34·4	·30	4	4·8
Malta	88·1	29	57·1	1	79·2	65·1	62·7	75	139·9	51·0	·00	0	3·2
<i>Mauritius</i>	77·6	3	54·8	22	74·8	65·6	61·2	75	123·2	45·6	2·85	19	5·5
Calcutta	95·3	14	72·8	1	90·1	77·7	78·4	84	157·8	71·3	11·82	16	6·4
Bombay	93·8	7	75·1	20	88·0	79·8	77·2	82	143·4	73·7	17·84	20	7·0
Ceylon, Colombo	90·2	11	73·6	14	87·9	77·5	74·3	82	151·5	70·0	13·99	24	6·1
<i>Melbourne</i>	66·1	6	29·5	17	57·6	42·6	42·7	78	114·1	20·4	1·74	13	6·4
<i>Adelaide</i>	68·5	6	39·6	5	61·0	46·7	46·1	75	129·0	31·5	2·89	16	5·8
<i>Sydney</i>	70·0	20	41·8	30	61·2	47·6	43·2	77	106·3	28·7	·93	13	3·8
<i>Wellington</i>	62·8	10	32·5	21	54·4	43·2	41·5	77	103·0	22·0	9·52	23	5·9
<i>Auckland</i>	63·0	12	40·0	21	58·3	48·4	46·0	76	116·0	36·0	6·14	25	6·6
Jamaica, Kingston	91·9	17a	69·7	1	89·0	73·4	69·7	70	..	..	·32	3	4·2
Trinidad	91·0	7	67·0	13b	88·6	70·3	70·6	76	171·0	66·0	5·00	13	..
Grenada	85·6	4	71·0	19	82·7	74·1	72·4	76	148·5	..	6·20	24	5·1
Toronto	93·1	2	45·8	8	79·0	56·7	55·6	67	109·5	39·4	·75	9	3·8
New Brunswick, Fredericton	91·7	12	37·5	9	77·5	51·3	50·1	57	..	..	2·86	11	4·6
Manitoba, Winnipeg British Columbia, Esquimalt	80·0	16	34·8	26	69·5	47·6	...	...	..	..	2·31	18	7·5
	75·2	7	39·4	2	65·3	48·4	52·8	89	..	..	·48	11	5·4

a—and 18; b—and 29.

REMARKS.

MALTA.—Mean temp. 71° 0, 0°·6 below average; mean hourly velocity of wind 10·4 miles. Average temp of sea, 74°·0. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·1 below, of dew point 0°·6 above, and rainfall ·81 in. above, their respective averages. Mean hourly velocity of wind 12·8 miles, or 1·4 mile above average; extremes, 29·6 on 11th and 2·0 on 9th; prevailing direction E.S.E. C. MELDRUM, F.R.S.

CEYLON, COLOMBO.—Lightning was seen on the 5th and 10th, and thunderstorms occurred on 8 days. D. G. MANTELL.

Adelaide.—Mean temp. 0°·3 above, and rainfall ·10 in. above, the average of 38 years. C. TODD, F.R.S.

Sydney.—Mean temp. same as the average; humidity 1 below, and rainfall 4·46 in. below, the average. H. C. RUSSELL, F.R.S.

Wellington.—Showery in the early part of the month, then a few fine days until 11th, when it rained heavily (2·27 in.), and continued showery almost for the remainder of the month. Wind variable and on the whole moderate. H on 18th and 19th. Fog on 16th, 17th, and 29th. Rainfall nearly twice the average. R. B. GORE.

Auckland.—An exceptionally wet and stormy month, the rainfall being nearly 1·50 in. above the average. Barometric pressure and mean temperature both slightly under the average. T. F. CHEESEMAN.

JAMAICA.—Mean hourly velocity of wind 4·9 miles. Rainfall very deficient, being only half the average in the N. and W.C. divisions, and less than half in the N.E. and S. divisions. Hail at Kew Park on 28th, and at Vale Royal on the 6th, stones in the latter case being $\frac{3}{4}$ inch in diameter, and tasting salt. Vale Royal is 3 miles from the sea, at an elevation of about 800 ft. R. JOHNSTONE.

TRINIDAD.—Rainfall 3·04 in. below the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL,
NOVEMBER, 1895.

[For the Counties, Latitudes, and Longitudes of most of these Stations,
see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger Hall .	5 67	XI.	Lake Vyrnwy	7 51
„	Birchington, Thor	2 99	„	Corwen, Rhug	4 81
„	Hailsham	5 43	„	Carnarvon, Cocksidia ...	6 50
„	Ryde, Thornbrough	4 70	„	I. of Man, Douglas	3 81
„	Emsworth, Redlands ...	5 23	XII.	Stoneykirk, Ardwell Ho.	4 29
„	Alton, Ashdell	6 02	„	New Galloway, Glenlee	7 34
III.	Oxford, Magdalen Col.	4 17	„	Melrose, Abbey Gate ...	...
„	Banbury, Bloxham	4 94	XIII.	N. Esk Res. [Penicuick]	3 50
„	Northampton, Sedgebrook	3 72	„	Edinburgh, Blacket Pl.	2 60
„	Alconbury	3 14	XIV.	Glasgow, Queen's Park..	4 08
„	Wisbech, Bank House...	2 90	XV.	Inverary, Newtown	8 35
IV.	Southend	3 27	„	Islay, Gruinart Schools..	4 63
„	Hailow, Sheering.....	3 39	XVI.	Dollar.....	4 02
„	Colchester, Lexden	2 03	„	Balquhider, Stronvar...	11 68
„	Rendlesham Hall	1 87	„	Ballinluig	5 57
„	Diss	2 01	„	Dalnaspidal H.R.S.....	9 18
„	Swaffham	3 07	XVII.	Keith H.R.S.....	1 39
V.	Salisbury, Alderbury ...	5 97	„	Forres H.R.S. ...	91
„	Bishop's Cannings	5 85	XVIII.	Fearn, Lower Pitkerrie..	40
„	Blandford, Whatcombe .	7 09	„	Loch Shield, Glenaladale	...
„	Ashburton, Holne Vic...	13 03	„	N. Uist, Loch Maddy ...	4 45
„	Okehampton, Oaklands.	8 00	„	Invergarry	6 93
„	Hartland Abbey	5 19	„	Aviemore H.R.S.	2 68
„	Lynmouth, Glenthorne.	7 33	„	Loch Ness, Drumnadrochit	2 88
„	Probus, Lamellyn	6 44	XIX.	Invershin	79
„	Wellington, Sunnyside..	...	„	Scourie	3 02
„	Wincanton, Stowell Rec.	6 55	„	Watten H.R.S.....	1 60
VI.	Clifton, Pembroke Road	5 38	XX.	Dunmanway, Coolkelure	10 92
„	Ross, The Graig	4 80	„	Fermoy Gas Works .....	...
„	Wern, Clive Vicarage ...	2 45	„	Killarney, Woodlawn ...	7 94
„	Cheadle, The Heath Ho.	3 62	„	Caber, Duneske	6 05
„	Worcester, Diglis Lock	3 25	„	Ballingarry, Hazelfort...	4 71
„	Coventry, Coundon	4 93	„	Limerick, Kilcornan ...	4 87
VII.	Ketton Hall [Stamford]	3 59	„	Ennis .....	...
„	Grantham, Stainby	3 86	„	Miltown Malbay .....	...
„	Horncastle, Bucknall ...	2 60	XXI.	Gorey, Courtown House	5 06
„	Workshop, Hodsck Priory	3 07	„	Athlone, Twyford	4 78
VIII.	Neston, Hinderton	2 87	„	Mullingar, B. Ivedere ...	4 25
„	Preston, Haighton	2 87	„	Longford, Currygrane...	3 95
„	Broughton-in-Furness ...	4 95	XXII.	Woodlawn	5 61
IX.	Ripon, Mickley.....	5 07	„	Crossmolina, Enniscoe ..	5 96
„	Melmerby, Baldersby ...	4 06	„	Collooney, Markree Obs.	3 72
„	Scarborough, South Cliff	...	„	Ballinamore, Lawderdale	...
„	Middleton, Mickleton ...	4 93	XXIII.	Lough Sheelin, Arley...	3 90
X.	Haltwhistle, Unthank...	3 24	„	Warrenpoint.....	4 29
„	Bamburgh	2 47	„	Seaford.....	4 95
„	Keswick, The Beeches...	...	„	Belfast, Springfield	3 25
XI.	Llanfrechfa Grange	6 76	„	Bushmills, Dundarave..	2 61
„	Llandovery	6 20	„	Stewartstown	3 46
„	Castle Malgwyn	6 08	„	Buncrana	3 97
„	Builth, Abergwessin Vic.	10 40	„	Lounge Swilly, Carrablagh.	4 62
„	Rhayader, Nantgwilt...	9 14			

NOVEMBER, 1895.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					Days on which 401 or more fell.	TEMPERATURE.				No. of Nights below 32°.	
		Total Fall.	Differ- ence from average 1880-9.	Greatest Fall in 24 hours		Max.		Min.					
				Dpth	Date	Deg.		Date	Deg.	Date.			
I.	London (Camden Square) ...	inches. 3.17	inches. + .51	in. .58	28	19	63.5	16	32.0	18	1	8	
II.	Maidstone (Hunton Court)...	4.77	+ 1.84	.48	3	22	...	...	...	...	...	...
III.	Strathfield Turgiss	5.12	+ 2.40	.84	5	24	63.5	16	27.3	18	5	11	
III.	Hitchin	3.83	+ 1.15	.95	5	20	63.0	16	28.0	2, 26	5	...	
IV.	Winslow (Addington)	4.88	+ 1.95	.98	10	21	62.0	16	27.0	18	3	6	
IV.	Bury St. Edmunds (Westley) ...	2.66	+ .11	.39	22	16	62.0	16	31.0	12	...	...
V.	Norwich (Brundall)	2.67	...	.47	5	21	62.8	16	28.0	3	2	11
V.	Weymouth (Langton Herring) ...	5.85	+ 2.19	.98	4	22	59.0	16	34.0	24	0	...	
"	Torquay (Cary Green) ...	7.98	...	1.35	10	20	64.1	16	37.2	18	0	1	
"	Polapit Tamar [Launceston]..	7.25	+ 2.91	1.07	5	23	62.0	16	29.4	18	2	4	
VI.	Stroud (Upfield)	5.02	+ 1.69	.67	10	25	60.0	16	33.0	17	0	...	
"	Church Stretton (Woolstaston) ...	4.31	+ .79	1.23	10	24	58.0	16	31.0	23	2	8	
"	Tenbury (Orleton)	4.70	+ 1.56	.91	10	22	62.0	16	26.3	18	2	6	
VII.	Leicester (Barkby)	3.63	+ 1.34	.68	29	24	63.0	16	27.0	18	6	14	
"	Boston	2.12	— .08	.38	10	14	60.0	16	30.0	18	2	...	
"	Hesley Hall (Tickhill).....	3.06	+ 1.04	.61	29	21	62.0	16	26.0	19	6	...	
VIII.	Manchester (Plymouth Grove) ...	2.42	— .58	.43	16	19	60.0	16	30.0	17	2	3	
IX.	Wetherby (Ribston Hall) ...	2.55	+ .48	.32	6	15	...	...	...	...	...	...
"	Skipton (Arncliffe)	7.48	+ .73	.97	16	21	...	...	...	...	...	...
"	Hull (Pearson Park)	2.25	+ .24	.41	27	17	63.0	16	25.0	19	4	5	
X.	Newcastle (Town Moor)	2.42	+ .02	.43	5	17	...	...	...	...	...	...
XI.	Borrowdale (Seathwaite).....	11.57	— 3.22	2.29	10	18	...	...	...	...	...	...
XI.	Cardiff (Ely).....	5.14	+ .23	1.01	5	21	...	...	...	...	...	...
"	Haverfordwest	5.10	— .76	.77	15	27	59.4	16	30.0	18	2	10	
"	Aberystwith (Gogerddan) ...	3.14	— 1.97	.66	10	19	56.0	8a	21.0	3	9	...	
XII.	Llandudno	3.71	+ .62	.70	16	17	63.4	15	32.0	4	1	...	
"	Cargen [Dumfries]	6.61	+ 2.05	.86	9, 21	18	57.6	15	28.2	1	5	...	
"	Jedburgh (Sunnyside)	2.83	+ .33	.51	16	17	55.0	10b	27.0	2	6	...	
XIV.	Colmonell	5.69	...	1.20	9	15	55.0	10	22.0	25	8	...	
XV.	Lochgilphead (Kilmory)	6.67	— .62	.91	5	20	...	...	27.0	22	4	...
XV.	Mull (Quinish)	6.54	— .45	.90	10	21	...	...	...	...	...	...
XVI.	Loch Leven Sluices	3.70	— .26	.50	22	18	...	...	...	...	...	...
"	Dundee (Eastern Necropolis) ...	2.75	+ .05	.65	21	21	54.1	11	26.5	1	5	...	
XVII.	Braemar	3.74	— .84	1.00	10	18	51.0	11	20.6	3	8	19	
"	Aberdeen (Cranford) ...	3.95	...	.75	10	17	55.0	7, 10	25.0	1	8	...
XVIII.	Strathconan [Beaul]	5.41	— 1.15	.90	16	14	...	...	...	...	...	...
"	Glencarron Lodge	7.05	...	.86	7	19	58.0	6	23.0	2, 4	10	...
"	Cawdor [Nairn]	1.53	— 1.32	.40	22	15	...	...	...	...	...	...
XIX.	Dunrobin	2.02	— .81	.40	6, 21	12	51.0	7	28.5	2	10	...	
"	S. Ronaldsay (Roeberry).....	2.18	— 1.24	.60	10	18	51.0	10	34.0	22	0	...	
XX.	Darrynane Abbey	6.52	...	1.14	15	25	...	...	...	...	...	...
"	Waterford (Brook Lodge) ...	6.20	+ 2.53	1.20	15	22	59.0	23	28.0	4	3	...	
"	O'Briensbridge (Ross)	3.34	...	.54	15	20	...	...	...	...	...	...
XXI.	Carlow (Browne's Hill)	4.77	+ 1.71	.77	15	18	...	...	...	...	...	...
"	Dublin (Fitz William Square) ...	3.58	+ .75	.89	15	21	58.8	15	34.3	4	0	5	
XXII.	Ballinasloe	4.83	+ .92	.65	15	22	53.0	7, 21	31.0	18	1	...	
"	Clifden (Kylemore)	7.58	...	1.11	10	23	...	...	...	...	...	...
XXIII.	Waringstown	3.29	+ .19	.52	15	20	58.0	7	29.0	3, 17	5	13	
"	Londonderry (Creggan Res.) ..	3.14	— 1.38	.55	10	22	...	...	...	...	...	...
"	Omagh (Edenfel)	4.56	+ .69	.95	10	21	53.0	10	29.0	17	3	10	

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

a—and 15, 16. b—and 15.

METEOROLOGICAL NOTES ON NOVEMBER, 1895.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; 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.

STRATHFIELD TURGISS.—The weather was very changeable at the commencement of the month, R falling daily, with strong S. or W. gales, especially about the 5th, and again on the 10th, 15th, and 23rd. A break in the stormy weather occurred on the 24th, followed by a dull foggy period. Trees bare of leaves by the 13th. T on 11th.

ADDINGTON.—Rainfall the greatest, and max. temp. in shade the highest, ever registered here in November. A very open month; frost in the shade on only three days. High wind on 10th, 24th, 25th, and 26th. Dense fog on 4th and 22nd.

BURY ST. EDMUNDS, WESTLEY.—A very mild, foggy month, with very little sunshine and more R than usual. Distant L at night on 11th; S on 22nd.

NORWICH, BRUNDALL.—An exceedingly mild month, the mean temp. ($46^{\circ}\cdot7$) being about 4° above the average. The max. rose to $60^{\circ}\cdot8$ on the 15th and $62^{\circ}\cdot8$ on the 16th, the last-named reading being the highest ever recorded in November by the observer. Fog in the evening on 1st; S.W. gale on 6th, and southerly gales on 10th and 16th. High wind from N. or N.E. on 23rd, 24th, and 25th. L on 11th.

WEYMOUTH, LANGTON HERRING.—A very wet and mild month. Average temp. at 9 a.m. ($47^{\circ}\cdot9$) $3^{\circ}\cdot6$ above the average of 23 years. The weather was very stormy on the 10th, 16th, and 24th. Dense fog on the 8th, and fogs on the 7th, 22nd, and 27th. T and L on the 12th. The average min. is no less than $2^{\circ}\cdot2$ higher than the average min. of October.

TORQUAY, CARY GREEN.—R $3\cdot98$ in. above the average. Mean temp. ($50^{\circ}\cdot3$) $3^{\circ}\cdot1$ above the average. Duration of sunshine 47 hours, being 14 hours 40 minutes below the average; 8 sunless days.

POLAPIT TAMAR [LAUNCESTON].—An abnormally wet month. It was generally warm, the average max. shade temp. being $54^{\circ}\cdot1$, and also rather stormy. Fog on 4 days. T on 9th and 11th. Gales from S.S.W. on 10th, and S.S.E. on 15th and 16th.

STROUD, UPFIELD.—S.W. gales on 5th, 6th, 10th, 15th, and 16th; E. gale on 25th. T and L on 5th, 11th, and 12th.

WOOLSTASTON.—A wet and stormy month. Heavy gales on 5th, 10th, 15th, and 16th. Only six days without rain. Mean temp. $43^{\circ}\cdot8$.

TENBURY, ORLETON.—A wet, warm month. With the exception of 1888, the wettest November since 1852. Mean temp. $3^{\circ}\cdot3$ above the average of 34 years. Heavy T on 14th. Gales on 10th, 14th, and 25th. Fog on 8 days.

LEICESTER, BARKBY.—Continuous wet, but no heavy falls of R. Not much frost, and none severe. Mean temp. $44^{\circ}\cdot7$.

MANCHESTER, PLYMOUTH GROVE.—Mean temp. $44^{\circ}\cdot5$.

ARNCLIFFE.—A very wet month, with temperature higher than usual.

SEATHWAITE.—T and L at 6.30 p.m. on 13th. T and L and H at 4.15 p.m. on 14th. Fog on 7th, 11th, 20th, 22nd, 28th, and 30th.

WALES.

HAVERFORDWEST.—The unusual severity of the weather at the end of October changed in character on the advent of this month to mildness and constant R, and on several occasions it was very stormy, especially from the 9th to the 14th. An almost entire absence of frost was characteristic of the whole month, and R fell on 27 out of the 30 days. Prevailing winds S.S.E., S.W., and W.

ABERYSTWITH, GOGERDDAN.—Gales and strong winds from S.E. from 6th to 16th, and from N.E. from 24th to 26th.

SCOTLAND.

CARGEN [DUMFRIES].—A very unsettled month. Gales were experienced on 10th and 15th, the one on the latter date being exceptionally severe and causing considerable damage throughout the district. The mean temp. of the month slightly exceeds that of October, and is $1^{\circ}\cdot9$ above the average. It is somewhat remarkable that while the number of hours of sunshine during this month is 5 less than the average for November for 36 years, it exceeds the average of the preceding 10 years by 11, the average sunshine for the years 1885-94 being only 54 hours. T and L were noted on the 14th. The open weather has been very favourable to the turnip crop, which exceeds all anticipations, and pastures still afford a fair "bite." S.W. gale on 10th and severe gale on 15th.

JEDBURGH.—The weather has shown no peculiarities during the month; on the whole it has been mild, except on the 11th, and it has been calm and dull. All out-door work has gone on unchecked.

COLMONELL.—Rainfall $\cdot42$ in. more than the average of 19 years. Mean temp. ($43^{\circ}\cdot5$) $2^{\circ}\cdot8$ above the average.

ABERDEEN, CRANFORD.—Strong gales on the 10th, 16th and 21st. S. RONALDSAY, ROEBERRY.—Upon the whole a fair month. Strong gales from S.W. on the 11th, and from the S. on the 15th and 20th. Mean temp. $42^{\circ}\cdot3$.

IRELAND.

DARRYNANE ABBEY.—A very wet month, and warm, except a few days in the middle. One vivid flash of lightning on 16th with loud thunder.

WATERFORD, BROOK LODGE.—Heavy fog on 3rd and 4th. Gale from S.W. on 5th, and heavy gale on 10th. T and L on 14th.

DUBLIN.—November proved an open, dull, squally and rainy month. It was perceptibly warmer than October, and no frost was recorded in the screen. On the grass the thermometer fell to, or below, 32° on 5 nights only, compared with 12 nights in October. The range of pressure was great—nearly two inches. Only twice in the last 30 years has November been milder than in the present year—in 1881, when the mean was $50^{\circ}\cdot3$, and in 1894, when it was $47^{\circ}\cdot8$. The mean temp. ($47^{\circ}\cdot0$) is $2^{\circ}\cdot3$ above the average. High winds were noted on 15 days, and attained the force of a gale on seven occasions. The atmosphere was more or less foggy on 6 days. Lunar halos were seen on the 4th and 30th. H fell on the 16th.

KYLEMORE HOUSE.—Very stormy in the second week, with T and L on the 11th, and T, L and H on 13th.

OMAGH, EDENFEL.—A typical November, with rainfall considerably, and temperature somewhat, above the average, accompanied during the second week by strong S.W. gales.