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THE RAINFALL OF 1912.

THE year 1912 proved, and we imagine that few of our readers resident in the British Isles will have failed to anticipate the fact, one of considerable excess of rainfall. At the moment of writing, some 3500 returns have been received at 62, Camden Square, and although it has not been possible to study more than a small proportion of that vast mass of data with any detail, the preliminary examination which has been made, shows without doubt that the rainfall over the whole of the country was in excess of the average amount with the exception of very limited areas, which so far as we are able to judge are confined to the south-east of Scotland. Generally speaking, the least excess of rainfall lay round the coast. All of Ireland, except the north-east and the county of Wexford, had less than 10 per cent. excess. In the west, north and east of Scotland, the rainfall was equally moderate, but in England, the county of Essex alone seems to have received so little as 110 per cent. of the average. There were four axes of high fall, exceeding 20 per cent. above the average, running parallel to one another across the United

General Rainfall of 1912 expressed as a percentage of the Average.

MONTH.	England and Wales.	Scotland.	Ireland.	British Isles.
January	138	91	107	115
February	96	97	126	104
March	199	114	164	163
April	21	90	57	49
May	91	81	63	81
June	186	156	194	181
July	123	78	126	112
August	198	119	129	158
September	63	66	23	54
October	99	106	88	98
November	92	113	86	97
December	131	159	143	143
Year 1912	121	107	109	114

Kingdom in a direction from south-west to north-east. The first appeared only in the outer Hebrides; the second culminated in Ulster and in Perthshire; the third stretched from the south-east of Ireland through south west Wales to Westmorland. The fourth and most important wet axis occupied the centre of England from Cornwall

to Yorkshire and reached the south coast, also in Sussex. Within it, the rainfall exceeded 130 per cent. of the average over a broad and apparently unbroken strip stretching from Lands End to Norfolk, and culminating in two areas where the excess was as much as 40 per cent., one of which was caused by the extraordinary East Anglian deluge of August 25th-26th, and the other by the persistently wet summer in Gloucestershire.

The above table gives a summary of the general rainfall of each month in each of the great divisions of the country, the rainfall being expressed as a percentage of the average value. It will be noticed that the excess in all parts of the country may be attributed in no small measure to the wetness of the summer months, though both March and December were also very wet on the whole. April was in the South of England one of the driest months ever known; and September, but for the rainfall of the last two days, would have equalled it in this respect.

For the whole year, England and Wales proved relatively the wettest part of the kingdom, having an excess of 21 per cent. or more than one-fifth of the average. Scotland and Ireland had a moderate excess, and the whole country an excess of 14 per cent., showing it to have been the wettest year since 1903, and with that exception the wettest since 1882.

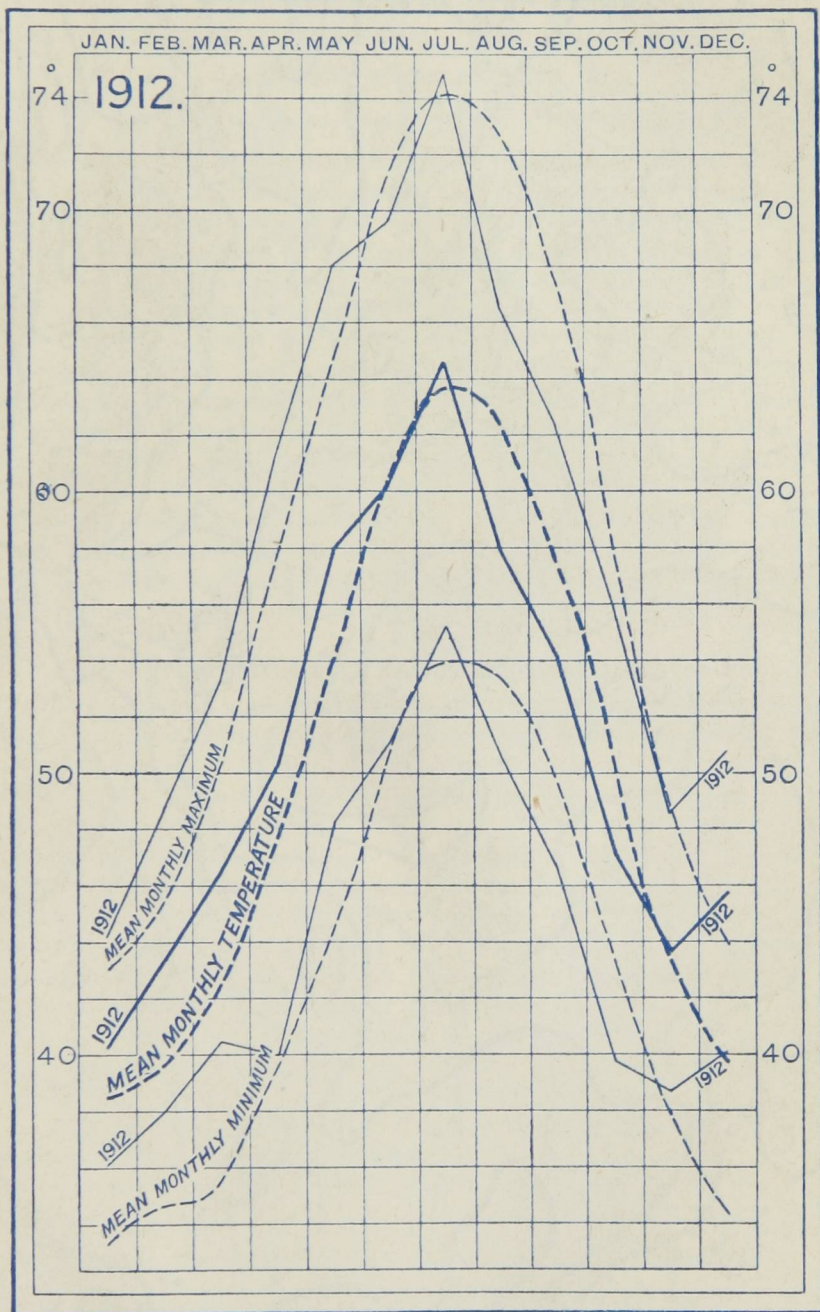
TEMPERATURE OF 1912 IN LONDON.

AN unprecedented period of thirteen consecutive months with mean temperature about the average came to an end with July, and was followed by the coldest August and September of the last 55 years. October also was a cool month, and November was about normal. December, however, was unusually mild, the mean temperature being $45^{\circ}8$ or $6^{\circ}1$ above the average, and the highest for December in the record, with the single exception of December, 1868, when the mean was $46^{\circ}0$. In spite of the great fluctuations, the mean temperature of the year differed from the average by only $0^{\circ}9$.

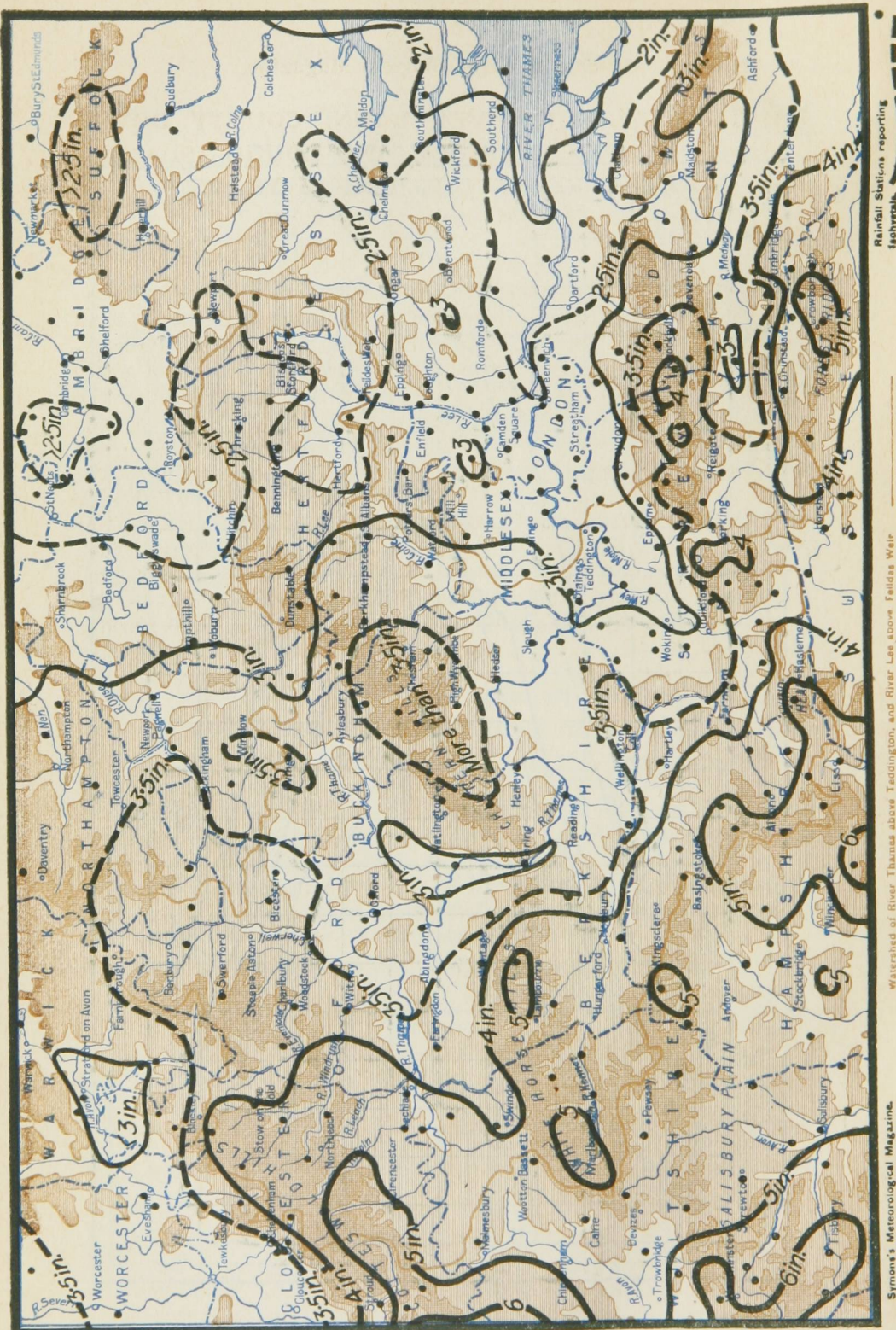
Temperature at Camden Square in 1912.

1912.	Mean. 1912.	Difference from Aver.	Mean Maximum. 1912.	Difference from Aver.	Mean Minimum. 1912.	Difference from Aver.
January	40.2	+ 1.7	44.2	+ 0.9	36.1	+ 2.3
February	43.3	+ 3.6	48.7	+ 3.2	38.0	+ 3.3
March	46.5	+ 4.4	53.3	+ 3.3	40.5	+ 5.1
April	50.2	+ 2.1	61.1	+ 3.2	40.0	+ 0.3
May	57.8	+ 3.8	68.0	+ 3.4	48.2	+ 3.6
June	60.2	+ 0.1	69.6	- 1.2	51.1	+ 0.4
July	64.5	+ 1.0	74.9	+ 0.6	55.3	+ 1.1
August	57.9	- 4.4	66.6	- 6.1	50.5	- 2.9
September	54.1	- 3.6	62.4	- 5.0	46.6	- 2.1
October	47.1	- 3.0	55.9	- 1.8	39.8	- 3.9
November	43.7	+ 0.2	48.0	- 0.5	38.7	+ 0.5
December	45.8	+ 6.1	50.8	+ 6.5	40.1	+ 5.1
Year	50.9	+ 0.9	58.5	+ 0.4	43.7	+ 1.0

SHADE TEMPERATURE AT CAMDEN SQUARE



THAMES VALLEY RAINFALL — DECEMBER, 1912.



ALTITUDE
SCALE

Below 250 feet	250 to 500 feet	500 to 1000 feet	Above 1000 feet
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SCALE OF MILES
0 5 10 15 20

**RAINFALL ON THE RIVER BANN, COUNTY DOWN,
IRELAND, AT BANBRIDGE AND LOUGH ISLAND
REAVY RESERVOIR, FOR 50 YEARS,
FROM 1862 to 1911.**

By JOHN SMYTH, M.A., Mem.Inst.C.E.I., F.R.Met.Soc., F.C.S.

IN the year 1857, as engineer of the Bann Reservoir Company, I was engaged in an arbitration between that Company and the riparian proprietors or occupiers of the lands adjoining the River Muddock, which were alleged to be flooded by an excessive amount of water sent down from the reservoir through that river (an affluent of the Bann) to supply the mills on the River Bann.

In trying to show the arbitrators that the damage done was principally due to heavy rainfalls, too great for the capacity of the several streams passing through the lands, I was met by the difficulty of making calculations of the amount of water to be provided for when I found no rain gauges had been kept in that neighbourhood or even near it. I therefore, in the meantime having well studied the subject, commenced, in the year 1861, to take rainfall observations. Amongst others I established the gauges at Milltown, Banbridge and Lough Island Reavy, and now proceed to give an account of the observations taken by means of these gauges and the results obtained from them.

MILLTOWN, BANBRIDGE.

I have prepared a summary of the 50 years' observations to accompany this paper, giving the total rainfall for each year, and for each month of the year. The mean values of all these are given for periods of 10, 20, 30, 40 and 50 years, so that by comparing these results with any year or portion of a year it will be seen whether the rainfall is below or above the average. The average rainfall for the whole period was 31·99 in. The greatest 10 years' average was 33·3 in. from 1872 to 1881. The least 10 years' average was 29·10 in. from 1862 to 1871. The wettest year was 1872, when 46·60 in. was registered. The driest, 1887, with 23·10 in. registered. The greatest fall in 24 hours was 2·30 in. on October 12th, 1865.

On July 4th, 1883, in one hour 1·60 in. fell. This is an important point to record as a guide to the capacity required for traps, grates and drains.

A copper gauge was used, 8 inches in diameter, the funnel 1 foot above the ground level, placed in a box.

The three consecutive driest years at Banbridge were 1888, 1886 and 1887, averaging 28·60 in.

BANN RESERVOIR AT LOUGH ISLAND REAVY.

I give also a summary of the 50 years' observations at this station, giving the same elements as in the case of Milltown, Banbridge.

The average rainfall for the whole period was 44·49 in. The

greatest 10 years' average was 46·61 in., from 1863 to 1872. The least 10 years' average was 40·81 in., from 1873 to 1882. The wettest year was 1872 when 61·20 in. was registered. The driest was 1887 with a fall of 26·50 in. The three driest consecutive years were 1878 to 1880, when the average fall was 35·20 in. The greatest fall in 24 hours was 3·90 in., on November 29th, 1868.

Bateman's mountain gauge was used for nearly all these observations up to 1892, when an ordinary copper 5-inch gauge was substituted. Bateman's gauge was of 8 inches diameter, read by means of a rod resting on a float, the reading being facilitated by a vernier carried in a temporary cover placed in the gauge for that purpose.

Rainfall at Foffanny, near Lough Island Reavy, for the years 1875, 1876 und 1877.

Lat. 54° 12' N. ; Lon., 6° 2' 30'' W. Above sea level, 920 ft., on the Butter Mountain, 2½ miles on the Muddock River. Above intake to Lough Island Reavy Reservoir, by mountain rain gauge 8-in. in diameter, 3 feet above surface of ground.

Month.	1875.	1876.	1877.
	in.	in.	in.
January	17·73	5·00	16·15
February	1·93	7·50	2·60
March	3·04	2·63	3·90
April	·90	5·20	10·10
May	4·25	·60	6·50
June	6·25	3·90	4·15
July	6·00	1·74	6·00
August	5·86	7·82	5·50
September	11·60	8·72	3·75
October	12·25	9·15	7·00
November	9·30	11·37	10·00
December	4·75	19·05	8·50
	83·86	82·68	84·15

Ten Years' Averages.

Milltown, Banbridge.		Bann Reservoir.	
	in.		in.
1862-1871	29·13	1863-1872	46·61
1872-1881	33·27	1873-1882	40·81
1882-1891	31·25	1883-1892	42·82
1892-1901	30·63	1893-1902	46·34
1902-1911	30·70	1903-1912	46·56
40 years' average	31·07	40 years' average	44·15
50 „ „	31·99	50 „ „	44·49

FOFFANY, near LOUGH ISLAND REAVY.

At the Belfast meeting of the British Association for the Advancement of Science, 1874, I read a paper on the "Rainfall of Ulster;" and in the discussion it was seen and felt that there was a great want of gauges over the country, so the Rainfall Committee of the

Rainfall at Milltown, Banbridge, Co. Down.

YEARS.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	TOTAL.
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
1862 to 1901	105.50	82.30	82.00	80.8	90.2	92.5	123.60	129.9	112.1	121.60	111.20	111.20	31.01
1902	1.94	2.45	1.58	2.64	3.46	2.25	3.58	2.43	3.70	1.32	3.31	2.35	38.29
1903	4.29	1.84	3.87	.88	2.30	1.22	5.95	5.08	3.89	4.63	2.07	2.26	29.21
1904	2.80	2.92	1.70	1.70	2.19	1.41	2.96	5.77	3.21	.67	2.04	1.84	28.02
1905	1.97	1.34	3.56	2.30	1.31	2.83	1.93	5.98	1.34	1.17	2.68	1.61	31.88
1906	2.58	2.42	1.76	2.28	4.38	1.02	1.91	4.09	.93	5.21	2.62	2.77	31.61
1907	1.01	1.45	2.87	2.62	3.47	4.31	3.12	2.68	.99	4.08	2.36	2.45	30.57
1908	1.908	1.66	3.30	3.00	1.53	2.04	3.94	2.13	3.27	2.70	2.45	2.44	29.11
1909	1.87	1.43	3.72	2.78	1.23	1.88	3.03	1.90	1.79	5.53	1.11	2.69	31.68
1910	1.79	3.69	1.37	2.54	1.89	4.32	3.98	3.80	1.16	1.43	2.18	3.53	25.63
1911	.60	2.13	1.24	1.75	1.84	2.29	3.44	1.04	1.41	2.71	2.89	4.29	31.99
	126.44	103.63	106.97	103.29	113.74	116.07	157.44	164.80	133.79	151.05	134.91	137.63	3.021
	2.53	2.07	2.14	2.06	2.275	2.321	3.149	3.296	2.676	3.021	2.698	2.752	

Rainfall at Bann Reservoir, Lough Island, Reavy.

YEARS.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	TOTAL.
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
1862 to 1901	176.20	137.60	125.90	120.70	106.7	106.2	117.5	142.2	143.1	205.8	199.1	179.3	59.22
1902	3.26	5.61	2.24	5.11	7.06	4.12	5.19	4.50	4.77	2.66	9.77	4.93	60.15
1903	7.41	5.01	7.61	1.83	2.82	1.19	5.68	5.87	5.24	8.53	2.16	6.80	40.97
1904	5.55	5.62	3.68	2.10	2.47	4.38	3.00	5.88	4.34	.48	7.17	2.30	44.27
1905	2.99	2.19	6.80	3.93	.59	3.23	1.37	9.12	1.77	1.73	5.99	4.56	35.82
1906	4.90	2.10	1.64	2.09	5.42	1.05	2.84	3.04	.73	6.91	2.79	2.31	44.51
1907	1.12	2.91	2.86	4.76	5.59	5.30	2.85	2.73	1.12	6.94	4.24	4.09	46.14
1908	3.25	1.80	7.46	4.81	2.65	2.27	2.93	4.03	4.86	3.40	3.74	4.94	40.28
1909	2.25	1.59	6.35	5.53	1.25	2.72	3.32	1.68	2.21	6.10	1.19	6.09	48.33
1910	2.82	10.02	3.09	2.92	2.10	3.46	3.79	6.26	.87	1.47	2.18	9.35	46.00
1911	1.89	2.72	1.69	3.95	2.76	2.97	2.76	1.89	1.49	5.75	5.79	12.43	46.569
Average of 50 years.....	211.64	177.17	169.32	157.73	139.41	136.89	151.23	187.20	170.50	249.77	238.03	237.10	44.49
	4.233	3.54	3.38	3.15	2.79	2.74	3.02	3.74	3.41	4.99	4.76	4.74	

Summary of Rainfall at Milltown, Banbridge, Co. Down, 10 years, from 1902 to 1911.

YEARS.	Jan.	First 2 months.	First 3 months.	First 4 months.	First 5 months.	First 6 months.	First 7 months.	First 8 months.	First 9 months.	First 10 months.	First 11 months.	12 months
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
1902	1.94	4.39	5.97	8.62	12.76	14.32	17.90	20.33	24.04	25.35	28.67	31.02
1903	4.29	6.13	10.00	10.88	13.19	14.41	20.36	25.45	29.33	33.96	36.03	38.29
1904	2.80	5.72	7.42	9.13	11.31	12.72	15.68	21.45	24.66	25.33	27.36	29.21
1905	1.97	3.31	6.88	9.17	10.48	12.31	15.24	21.23	22.56	23.73	26.42	28.02
1906	2.58	5.00	6.76	9.04	13.32	14.34	16.25	20.34	21.28	26.49	29.11	31.89
1907	1.01	2.46	5.34	7.95	11.43	15.73	18.85	21.53	22.52	26.61	28.96	31.61
1908	2.09	3.75	7.05	10.05	11.60	13.64	17.58	19.72	22.98	25.68	28.14	30.57
1909	1.87	3.30	7.03	9.80	11.03	13.07	16.09	18.00	19.78	25.32	26.42	29.11
1910	1.79	5.48	6.85	9.39	11.28	15.60	19.58	23.38	24.54	25.97	28.15	31.68
1911	.60	2.73	3.97	5.71	7.56	9.85	13.30	14.33	15.75	18.46	21.34	25.63
	2.094	4.227	6.727	8.974	11.396	13.590	17.083	20.576	22.744	25.690	28.060	30.703

Summary of Rainfall at Bann Reservoir, Lough Island, Reary, 10 years, from 1902 to 1911.

YEARS.	Jan.	First 2 months.	First 3 months.	First 4 months.	First 5 months.	First 6 months.	First 7 months.	First 8 months.	First 9 months.	First 10 months.	First 11 months.	12 months
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
1902	3.26	8.87	11.11	16.22	23.28	27.40	32.59	37.09	41.86	44.52	54.29	59.22
1903	7.41	12.42	20.03	21.86	24.68	25.87	31.55	37.42	42.66	51.19	53.35	60.15
1904	5.55	11.17	14.85	16.95	19.42	23.80	26.80	32.68	37.02	37.50	38.67	40.97
1905	2.99	5.18	11.98	15.91	16.50	19.73	21.10	30.22	31.99	33.72	39.71	44.27
1906	4.90	7.00	8.64	10.73	16.15	17.20	20.04	23.08	23.81	30.72	33.51	35.82
1907	1.12	4.03	6.89	11.65	17.24	22.54	25.39	28.02	29.14	36.08	40.32	44.41
1908	3.25	5.05	12.51	12.32	19.97	22.24	25.17	29.20	34.06	37.46	41.20	46.14
1909	2.25	3.84	10.19	15.72	16.97	19.69	23.01	24.69	26.90	33.00	34.19	40.28
1910	2.82	12.84	15.93	18.85	20.95	24.41	28.20	34.46	35.33	36.80	38.98	48.33
1911	1.89	4.61	6.30	10.25	13.01	15.98	18.74	20.63	22.12	27.87	33.57	46.00
	35.44	7.501	12.043	15.546	18.817	21.886	25.259	29.749	32.489	36.886	40.779	46.559

Association supplied gauges to a number of suitable applicants, whom I was enabled to induce to undertake the work. I was particularly anxious to get observations on the highest point possible near the Reservoir, so employed a man called Patrick McAlinden, who then lived in the highest inhabited house, to take the three years' observations which I herewith supply. It will be seen that the average at this high elevation (920 feet) is nearly double that at the Reservoir; such, however, was to be expected from its position close to the higher range of mountains (rising from 2,000 to nearly 3,000 ft.) which intercept the southerly water-laden currents, and cooling them cause them to precipitate their moisture as they pass over. I would have been glad, however, to have had a longer series, but McAlinden left the place and went to live near the Deers Meadow Mountain, where the river Bann rises. I induced him to try a gauge there, at an elevation of 1,300 feet above sea level, but 2 miles from his house. It was soon, however, interfered with, so I removed it to Divis Mountain, near Belfast, where the late Mr. Lavens Euart employed a gamekeeper to observe, but the arrangement did not succeed as it was interfered with there also.

The detailed annual figures for the forty years, 1862-1901, were published in *Symons's Meteorological Magazine* for December, 1903, and February, 1904 (vol. 38, pp. 198-201; 39, pp. 13-15). The figures for the fifth decade completing the half-century are given in the foregoing Tables.

AWARD OF PRIZE BY THE GERMAN METEOROLOGICAL SOCIETY.

At the Eleventh General Meeting of the German Meteorological Society at Hamburg, in September, 1908, when the Society celebrated its 25th anniversary, it was decided to offer a prize of 3000 marks for the best discussion of the meteorological results obtained in the International Investigation of the Upper Air. The conditions were published in this Magazine in October, 1908 (p. 179). Briefly, they were: (1) the judges were free to divide the prize; (2) the competition was open to persons of any nationality; (3) the essays were to be in German, English or French, and had to be sent in before December 31st, 1911. At the meeting of the German Meteorological Society at Munich, in October, 1911, it was resolved that if no essay could be awarded the prize, the adjudicators could extend the period by one year, and take into account works already published. The five adjudicators were Professors Hellmann and Hergesell and Drs. Assmann, Köppen and Schmauss. Information has recently been received that the adjudicators have given their decision, and have awarded the first prize of 2000 marks (£100) to Mr. E. Gold, Superintendent of Statistics at the Meteorological Office, London, for his discussion entitled, "The International Kite and Balloon Ascents."

THE WEATHER OF DECEMBER.

By FRED. J. BRODIE.

IN a meteorological sense December, 1912, was quite an eventful month. The opening days witnessed a continuation of the frost which had set in towards the close of November. Early on the 1st the sheltered thermometer fell at least 10° below the freezing point in many of the English and Irish districts, and at least 20° below it in several parts of Scotland and the neighbouring English counties. On the same night, and on the morning of the 2nd, the minima in the screen were as low as 2° at Balmoral, 8° at Nairn, and 9° at Aberdeen, while on the morning of the 3rd a reading of 8° was recorded at West Linton. On the surface of the grass readings as low as 5° were registered in many parts of North Britain, the thermometer sinking to zero at Crathes and Balmoral, and to 4° below zero at Worksoy.

Early on the 3rd, when a large cyclonic disturbance appeared over the northern part of the Atlantic, a mild southerly breeze set in over all our more western districts, and in the course of the ensuing 24 hours a rapid thaw took place, the temperatures recorded in eastern and central Scotland on the morning of the 4th being from 20° to 25° higher than those of the previous day. Throughout the remainder of the month a southerly to south-westerly type of weather continued, with scarcely any intermission, and over the southern half of the Kingdom frost was rare and of the slightest possible character. In Scotland some rather sharp touches were experienced on the 27th and 28th, the thermometer in the screen falling to 23° at Balmoral and to 24° at Fort Augustus. On the nights of the 13th and 14th the minima were exceedingly high, the thermometer at many southern stations failing to sink below 50° . The midday temperatures were nearly always well in excess of the average, the warmest weather occurring about the 13th and 14th, the 20th and the 27th and 28th. On each of these occasions the thermometer over a large portion of the United Kingdom rose well above 55° , and at Newton Rigg on the 14th it reached 60° . Owing to the marked prevalence of equatorial breezes the mean temperature of the month was everywhere in excess of the average. In Ireland and Scotland the excess was not very large, but over central and southern England it amounted to between 5° and 7° ; in London the month was the mildest December for at least 40 years past. Gales from points between south and west were of frequent occurrence, but in the earlier half of the month the only one of much importance was that of the 13th—15th, when the wind blew with considerable violence on nearly all parts of our coasts.

Christmas week was distinguished by a spell of the worst weather it had seen for many years past. The day of the great festival was allowed to pass in comparative peace, but on Christmas Eve, and again on Boxing Day, the country was visited by storms of unusual

severity. In the earlier instance the bad weather was due to a cyclonic system whose centre moved in a north-north-easterly direction outside our western and northern coasts. Strong gales from south, veering to south-west, were experienced over nearly the whole kingdom, the extreme velocity of the wind in gusts being as high as 74 miles per hour at Pendennis Castle (Falmouth), 76 miles at Holyhead, and 88 miles at Quilty (Co. Clare). The Boxing Day storm was caused by a depression, originally of great depth, which advanced over our south-west coasts from the westward quite early in the morning. The centre afterwards moved eastwards across England, but in the course of its passage the disturbance rapidly diminished in intensity, and by the morning of the 27th its presence somewhere over Germany or the Baltic was scarcely revealed by the synoptic weather map. During its progress a violent gale from south-west and west was experienced on all our south and south-west coasts and in the Bay of Biscay, the wind rising in squalls to a velocity of 88 miles per hour at Scilly and no less than 98 miles at Pendennis Castle, where many gusts exceeding 80 miles were registered. The gale was accompanied by unusually heavy seas, resulting in several maritime casualties, and the return to port of the outward bound P. and O. steamer *Narrung*, which was all but engulfed by a huge wave encountered off Ushant. Heavy rains were experienced at the same time in most districts; in London the total fall on Christmas Day and Boxing Day was the heaviest recorded at such a time for at least 40 years past.

The total duration of bright sunshine in December was almost everywhere below the average. At Stornoway and Pembroke, and probably at other places in the western parts of the Kingdom, considerably less than half the normal amount was recorded.



ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, December 18th, at the Surveyors' Institute, Great George Street, Westminster, Dr. H. N. Dickson, President, in the Chair.

Reference was made to the loss which the Society had sustained by the death of Dr. C. Theodore Williams, who had held the office of President in 1892 and 1893, and of Treasurer from 1898 until the time of his death, except in 1900, the year of the Society's Jubilee, when he was appointed President for the second time. A vote of condolence with Mrs. Williams was passed by the meeting.

Professor H. Bassett read a paper on the "Probable Utility of Salinity Observations in the Irish Sea for long-date Weather Forecasting." He pointed out that it is generally recognised that atmospheric disturbances are largely due to inequalities in the distribution of temperature on land or sea. The cyclones which reach the British Isles nearly all arrive from the Atlantic, con

sequently any alteration in the distribution of temperature in the Atlantic may be expected to affect their number and character. The oceanographic investigations which have been carried out in the North Atlantic and in European waters during the past fifteen years have shown that they are affected by a periodic change in salinity and temperature, the period of which is about one year. This change is of such a nature that the water is saltier and relatively warmer in the winter and spring months and fresher and relatively cooler in the summer and autumn, the time of maximum salinity depending somewhat on the geographical position. Professor Bassett described the result of a series of salinity observations which he had carried out in the Irish Sea, and stated that he found that the salinity changes and the time of their occurrence preceded certain seasonal types of weather. He was, therefore, of opinion that if monthly observations of the salinities were made at certain stations on the line of the Calf of Man to Holyhead, these would enable forecasts of the general character of the weather to be given four or five months ahead.

Mr. C. Harding referred to the charts of sea temperature published by the Meteorological Office, and said that he would like to see some clue to the aid of weather forecasting in the ocean currents as suggested by Prof. Bassett, but he feared it would not help much.

Dr. H. R. Mill thought better results might be obtained by observations made off the west of Ireland rather than in the Irish Sea.

The President, after referring to the investigations which he and Dr. Mill had carried out nearly thirty years ago, said that in connection with Prof. Bassett's remarks about the spread of Mediterranean water in the Atlantic, he would like to draw attention to the importance of the estimations of gas contents in tracing water from different sources.

Mr. R. Strachan and Mr. W. B. Tripp also spoke.

Mr. J. Edmund Clark read a paper on "Air Currents at a Height of 50 miles, as indicated by the Bolide, February 22nd, 1909." This meteor was at least four times as bright as Venus, and when first seen by the author at Purley, at 7.34 p.m., it was distant some 80 miles, and disappeared about 210 miles away. The meteor left a remarkably bright streak in the sky which was watched by observers in the south of England and north-west of France for the long period of 104 minutes. Mr. Clark collected the various observations on the form and drift of the streak, and after plotting them on charts he came to the conclusion that at the elevation of between $49\frac{1}{2}$ and 51 miles the streak lay in a west wind of great velocity, and that at $51\frac{1}{2}$ miles the current was almost from the east with a velocity of about 100 miles an hour. Above this the current changed to south-east and ultimately to south-west; the adopted positions indicating a maximum velocity of 135 miles per hour at the height of 54 miles.

A note on a suggested "New Form of Standard Barometer," by M. C. Anthony, M.Inst.C.E., was also read.

New Fellows elected: Mr. H. W. Braby, B.A., Mr. G. M. B. Dobson, B.A., Mr. H. Montgomery, Dr. A. B. Northcote, and Mr. A. Zammar.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

THE WEATHER OF CHRISTMAS, 1912.

THE weather conditions of the past Christmas in and about London were so bad that a few notes on them may be interesting. The Meteorological Office Daily Weather Reports show that a S. to S.W. current of air was blowing over the country generally, barometric pressure being high to the S. and S.W. and low to the N.W.

Dec. 24th.—A depression off the Irish coast moved N.E. Rain fell from about 1.15 p.m. to 3.45 p.m.

Dec. 25th.—This was a day of secondaries. One which moved across England from the W. is shewn on the 6 p.m. chart over the south part of the North Sea. Rain fell from 10.15 a.m. to 4.30 p.m. There was little wind, S. (S.E. for a time) to S.W. The lower clouds for a time moved from the W.N.W. in the late afternoon. The evening was fine.

Dec. 26th.—An important depression moved eastward across England. It is shewn over the eastern counties at 6 p.m. Was this a primary or a very intense secondary? Rain began to fall at about 7.50 a.m. There was a finer and drier interval between 10.30 and 11.30 a.m., but rain fell most of the rest of the day. Strong winds and gales were caused by this depression.

Dec. 27th.—Conditions were very similar to those of Christmas Eve, but the depression spread rather than moved over the country, and the barometric fall was less and slower than on the preceding days, and unsteady in the evening hours.

The depressions of the 24th, 25th and 26th were each different in conditions and behaviour. The first was a primary, and the barometric fall ceased abruptly. The second (and perhaps the third) was a secondary. Neither of the first two developed any great wind energy; the third did. The amplitude and rate of fall of the barometer increased successively in the three. In the system of the 26th rain did not begin until about 8 hours after the barometer gave signs of its approach; in the two former, the intervals were about three hours and four hours. In the two former there were no breaks in the barometric fall or in the rainfall; in the last (as has been said) there was about an hour's break in the rain in the morning, and this seems to have been associated with a complete cessation of about the same duration in the fall of the barometer. The depression filled up to some extent during the day, but when the break occurred, the centre was still to the westward of London, and it would be interesting to know whether the temporary cessation was due to a check in the rate of advance, or whether this was at any rate one of its causes.

The weather of the 27th was not very wet until after 4 p.m. ; and on the 28th there was no rain until after 7 p.m., between which hour and 11.30 p.m. rain fell, again due to the passage of a secondary depression. There seem to have been many secondaries during these few days.

F. DRUCE.

65, Cadogan Square, S.W., Jan. 4th, 1913.

WATERSPOUTS.

I SEE that you have in the last number of the *Meteorological Magazine* a letter and some notes on waterspouts, and the enclosed extract from my diary may be of interest in connection with it.

"June 24th, 1869. About 7 p.m., while we were running (in a steamer from Hull) across the mouth of the Selbø Fjord (between Stavanger and Bergen), a waterspout was seen in the west, curling down from a mass of cirro-stratus cloud: the end seemed to melt away and not to reach the sea. Further to the south were two groups of them, which apparently were smaller in size and only descended a little way. The sky at the time was covered with cirro-stratus and cirro-cumulus cloud."

Printed in "The Coast of Norway," chromolithographs of sketches by the late Elijah Walton, with text by T. G. Bonney.

T. G. BONNEY.

9, Scroope Terrace, Cambridge, 17th December, 1912.

THE ASPECT OF THE SKY IN 1912.

EXCESS of cloud has often been noted this year, but I have not seen any mention of, what has appeared to me very remarkable, the want of blueness in the sky, especially during the summer. With this seems to be connected a phenomenon of the nature of "Bishop's Ring." It may be remembered that after the eruption of Krakatoa in 1883, there appeared a large corona round the sun, the outer part of which was pink or salmon-coloured, and was called "Bishop's Ring;" the interior was light blue or green; it was best seen near sunrise and sunset. In the course of many years this gradually faded, and ultimately no trace of it remained; whether there was any feeble manifestation of the kind before the eruption, I am unable to say, as one's attention was naturally not directed particularly to the point. Since then, however, there has at times been a recrudescence of a large corona, which no doubt is capable of being formed by other kinds of dust; and this year it has been more marked, though of very feeble colours, the reddish being replaced by a dull brownish hue, and the interior being bluish or greenish white, the result being an excessive glare round the sun. The corona is rather larger than in the case of the Krakatoa dust, the distance of the brownest part being perhaps 40° from the sun.

It would appear from these observations that there must be some kind of film high up in the atmosphere—not so high up as the Krakatoa dust was—and that this film still remains, as the corona continues, though the sky is sometimes fairly blue.

It is not only at Sunderland that these remarks apply, but also in other places where I have travelled.

There has been, however, a singular scarcity of true cirrus, and also of halos.

T. W. BACKHOUSE.

West Hendon House, Sunderland, 21st December, 1912.

IMPORTANCE OF SETTING RAIN GAUGE LEVEL.

I HAVE had for many years on my lawn a Symons's Copper Rain Gauge of 5 inches diameter. I subsequently placed within 5 feet of it a Snowdon Copper Rain Gauge of the same diameter. When comparing the readings I noticed variations sometimes of as much as two hundredths of an inch, if the total rainfall approached an inch, and on making experiments, in order to account for these variations, I found that when the rims of both funnels were perfectly level the variations in the readings occur very seldom, and are then due to storms of rain accompanied by driving winds. Since satisfying myself as to this I have tested the setting of the funnels every day with a small spirit level in two directions at right angles to each other, and other observers may be glad to follow this practice.

STANLEY F. DEWEY, F.R.Met.Soc.

The Rectory, Moretonhampstead, Devon, November 22nd, 1912.

[It is always satisfactory to find precautions embodied in the Rules for Rainfall Observers confirmed by independent observations; and it may be said that the statement in Rule 4, "the funnel of a rain gauge should be set exactly level," embodies a generation of experience as to the result of erroneous setting, similar to that of Mr. Dewey.—ED., *S.M.M.*]

REVIEWS.

GIOVANNI MAGRINI. *Terza relazione annuale del Direttore dell' Ufficio Idrografico.* [Third annual Report of the Director of the Hydrographic Office] Venezia, 1912. Size 10 × 6½. Pp. 72 and plates.

THIS report describes the work of the new Hydrographic service of the province of Venetia, which takes account of the whole water system, from the rain falling in the Alpine valleys to the languid tides of the Adriatic. The organization includes a network of rainfall stations, a number of stations for recording the flow of rivers, the fluctuations in the level of lakes and the tides along the coast. It also makes provision for a geological survey dealing with the

permeability of rocks, an experimental department for studying the conditions of the flow of water in channels, a telephonic system designed to give timely warning of floods, and a library of works relating to the scientific study of water in nature which is designed on very comprehensive lines. The institution of this Service in an Italian province illustrates the gradual awakening to a sense of the importance of gaining some exact knowledge regarding the water resources of the land, which a recent statement in Parliament leads us to hope is extending to the authorities of our own country also.

The South Pole: An account of the Norwegian Antarctic Expedition in the "Fram," 1910-1912, by ROALD AMUNDSEN, translated from the Norwegian by A. G. Chater, with maps and numerous illustrations, in two volumes. London, John Murray, 1912. Size $9\frac{1}{2} \times 6\frac{1}{2}$. Pp. xxxvi. + 392, x. + 450, plates. Price 42s.

THE main interest in these fascinating volumes is, of course, the wonderful story of the journey of Captain Amundsen with his four companions to the South Pole and back, and the story is uncommonly well-told and admirably translated and illustrated. To the "man in the street" the attainment of the Pole wipes out all interest in the Antarctic regions. To him they are done with, their purpose is served and he will wait for a new sensation in what appears to him the no less possible feat of an airman reaching the upper limit of the atmosphere. To students of meteorology, on the other hand, the attainment of the Pole means little, it does not diminish the problem of the Antarctic or abate in the least the interest with which we look forward to fresh information as to the climatic conditions of the great ice-covered continent. The uniqueness of the Antarctic region consists in the fact that practically the whole area within the Antarctic circle—more than eight million square miles—is uniformly covered with a snow surface and has an atmospheric temperature below the freezing point all the year round. The only diversity in this great area is due to the sea round its outer edge and the mountains and plateaux which fill a large part of the interior.

Amundsen's expedition was not intended to be much concerned with scientific matters and the scientific equipment was neither extensive nor carefully chosen; whereas everything directly conducing to the main aim of the expedition, such as clothing, ski, sledges, food and dogs, were probably a few degrees nearer perfection than in any previous Polar journey. When we remember that the *Fram* in which Captain Amundsen sailed was equipped ostensibly for a drift across the North Polar regions, probably lasting from three to five years, and the sole use of such a drift would lie in the meteorological and oceanographical observations to be made, we are at a loss to understand the casual way in which the meteorological apparatus was brought together. The maximum thermometers would not work,

and there were no minimum thermometers on the expedition; a curious contrast to the foresight which caused all the spirit thermometers of Captain Scott's expedition on the *Discovery* to be provided with minimum indices. The thermograph and hygrograph taken were old and not satisfactory, but there was at least one good barograph and the mercurial barometers, if not read with very high precision, were, at any rate, of the best pattern and of good construction.

A brief discussion of the meteorological results is given in an Appendix by Mr. B. J. Birkeland, the general impression created by which is that a little more care before leaving home would have secured a better equipment at no greater cost, and the labour of the three readings daily would not have been so nearly thrown away as in fact it was. The readings three times daily, at 8 a.m., 2 p.m. and 8 p.m., at the base station, in latitude $78^{\circ} 38' S.$, are given in full during the period April 1st, 1911, to January 29th, 1912, for the following instruments:—barometer, dry bulb thermometer, hair hygrometer and Robinson anemometer. There are no maxima or minima to record, but the lowest temperature observed was $-73^{\circ} 3 F.$ on August 13th, and the highest $+31^{\circ} 7 F.$ on December 5th. The highest corrected barometer reading was 31.14 in., and the lowest was 28.02 in.; the mean for the whole period was 29.07 in. Perhaps the most valuable of the meteorological observations concerned the direction of the wind, and we give below in line A the percentage of cases of wind from each of the directions named, and in line B the percentage of cases on days of high wind which numbered 5.6 per cent. of the total wind observations.

	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
(A)	1.9	7.8	31.9	6.9	12.3	14.3	2.6	1.1	21.3
(B)	7	12	51	10	4	10	2	4	

It will be observed that 46.6 per cent. of all wind, and 73 per cent. of strong winds, had a more or less easterly direction, while only 28 per cent. of all winds, and 16 per cent. of strong, had a westerly direction. The position was a favourable one for wind observations as the Barrier surface was fairly level and there was no land to deflect the wind currents.

During the winter the nine men who formed the expedition amused themselves by guessing the temperature in the morning before breakfast, each guess being made independently and the results entered in a book which was afterwards compared with the observations. As for the result:—"It proved that the winner's mean temperature agreed within a few tenths of a degree with the actual mean temperature of the month, and if one took the mean of all the competitors' mean temperatures it gave a result which, practically speaking, agreed with the reality. It was especially with this object in view that this guessing was instituted. If, later on, we should be so unlucky as to lose all our thermometers we should not be entirely at a loss."

RAINFALL TABLE FOR DECEMBER 1912.

STATION.	COUNTY.	Lat. N.	Long. W. [°E.]	Height above Sea. ft.	RAINFALL OF MONTH.	
					Aver. 1875— 1909. in.	1912. in.
Camden Square.....	London.....	51 32	0 8	111	2'13	2'80
Tenterden.....	Kent.....	51 4	*0 41	190	2'77	3'38
Arundel (Patching).....	Sussex.....	50 51	0 27	130	2'91	3'71
Fawley (Cadland).....	Hampshire.....	50 50	1 22	52	3'23	...
Oxford (Magdalen College).....	Oxfordshire.....	51 45	1 15	186	2'06	3'14
Wellingborough (Croyland Abbey).....	Northampton.....	52 18	0 41	174	2'13	2'96
Shoeburyness.....	Essex.....	51 31	*0 48	13	1'71	1'81
Bury St. Edmunds (Westley).....	Suffolk.....	52 15	*0 40	226	2'14	2'42
Geldeston [Beccles].....	Norfolk.....	52 27	*1 31	38	2'07	1'93
Polapit Tamar [Launceston].....	Devon.....	50 40	4 22	315	4'46	6'18
Rousdon [Lyne Regis].....	".....	50 41	3 0	516	3'68	5'25
Stroud (Upfield).....	Gloucestershire.....	51 44	2 13	226	2'71	4'34
Church Stretton (Wolstaston).....	Shropshire.....	52 35	2 48	800	2'99	4'05
Coventry (Kingswood).....	Warwickshire.....	52 24	1 30	340	2'66	3'87
Boston.....	Lincolnshire.....	52 58	0 1	25	1'88	3'18
Workshop (Hodsock Priory).....	Nottinghamshire.....	53 22	1 5	56	2'17	2'43
Macclesfield.....	Cheshire.....	53 15	2 7	501	3'35	3'81
Southport (Hesketh Park).....	Lancashire.....	53 38	2 59	38	3'10	2'83
Arncliffe Vicarage.....	Yorkshire, W.R.....	54 8	2 6	732	6'75	7'84
Wetherby (Ribston Hall).....	".....	53 59	1 24	130	2'27	1'91
Hull (Pearson Park).....	E.R.....	53 45	0 20	6	2'32	2'10
Newcastle (Town Moor).....	Northumberland.....	54 59	1 38	201	2'46	1'28
Borrowdale (Seathwaite).....	Cumberland.....	54 30	3 10	423	15'14	23'42
Cardiff (Ely).....	Glamorgan.....	51 29	3 13	53	4'70	7'77
Haverfordwest.....	Pembroke.....	51 48	4 58	95	5'18	6'55
Aberystwyth (Gogerddan).....	Cardigan.....	52 26	4 1	83	4'66	7'12
Llandudno.....	Carnarvon.....	53 20	3 50	72	2'84	2'93
Cargen [Dumtries].....	Kirkcudbright.....	55 2	3 37	80	4'84	8'38
Marchmont House.....	Berwick.....	55 44	2 24	498	2'83	2'52
Girvan (Pinmore).....	Ayr.....	55 10	4 49	207	5'48	7'29
Glasgow (Queen's Park).....	Renfrew.....	55 53	4 18	144	3'95	7'09
Inveraray (Newtown).....	Argyll.....	56 14	5 4	17	8'57	19'70
Mull (Quinish).....	".....	56 34	6 13	35	6'59	11'04
Dundee (Eastern Necropolis).....	Forfar.....	56 28	2 57	199	2'67	2'04
Braemar.....	Aberdeen.....	57 0	3 24	1114	3'13	5'49
Aberdeen (Cranford).....	".....	57 8	2 7	120	3'43	1'29
Cawdor.....	Nairn.....	57 31	3 57	250	2'53	3'58
Fort Augustus (S. Benedict's).....	E. Inverness.....	57 9	4 41	68	5'62	12'16
Loch Torridon (Bendamph).....	W. Ross.....	57 32	5 32	20	9'86	16'43
Dunrobin Castle.....	Sutherland.....	57 59	3 56	14	3'09	3'92
Wick.....	Caithness.....	58 26	3 6	77	3'11	3'57
Killarney (District Asylum).....	Kerry.....	52 4	9 31	178	6'92	9'59
Waterford (Brook Lodge).....	Waterford.....	52 15	7 7	104	4'32	4'05
Nenagh (Castle Lough).....	Tipperary.....	52 54	8 24	120	4'34	5'91
Miltown Malbay.....	Clare.....	52 52	9 26	400	4'84	...
Gorey (Courtown House).....	Wexford.....	52 40	6 13	80	3'42	2'62
Abbey Leix (Blandsfort).....	Queen's County.....	52 56	7 17	532	3'41	3'89
Dublin (Fitz William Square).....	Dublin.....	53 21	6 14	54	2'27	1'89
Mullingar (Belvedere).....	Westmeath.....	53 29	7 22	367	3'39	5'19
Cong (The Glebe).....	Mayo.....	53 33	9 16	112	5'42	10'70
Crossmolina (Enniscoe).....	".....	54 4	9 16	74	6'11	13'29
Collooney (Markree Obsy.).....	Sligo.....	54 11	8 27	127	4'34	6'66
Seaforde.....	Down.....	54 19	5 50	180	3'77	4'12
Bushmills (Dundarave).....	Antrim.....	55 12	6 30	162	3'87	4'50
Omagh (Edenfel).....	Tyrone.....	54 36	7 18	280	3'91	6'76

RAINFALL TABLE FOR DECEMBER, 1912—*continued.*

RAINFALL OF MONTH (<i>con.</i>)					RAINFALL FROM JAN. 1.				Mean Annual 1875-1909.	STATION.
Diff. from Av. in.	% of Av.	Max. in 24 hours.	No. of Days		Aver. 1875-1909.	1912.	Diff. from Aver. in.	% of Av.		
		in. Date.			in.	in.			in.	
+ .67	131	.45	25	18	25.11	27.88	+2.77	111	25.11	Camden Square
+ .61	122	.58	26	21	27.64	33.30	+5.66	120	27.64	Tenterden
+ .80	127	.60	27	20	30.48	38.81	+8.33	127	30.48	Patching
...	...	...	...	...	31.87	...	...	...	31.87	Cadland
+1.08	152	.63	28	22	24.58	30.86	+6.28	125	24.58	Oxford
+ .83	139	.74	28	19	25.17	30.56	+5.39	121	25.17	Croyland Abbey
+ .10	106	.41	25	16	19.28	20.19	+ .91	105	19.28	Shoeburyness
+ .28	113	.38	28	18	25.40	31.11	+5.71	123	25.40	Westley
- .14	93	.27	1, 9	19	23.73	29.25	+5.52	123	23.73	Geldeston
+1.72	139	.62	26	27	38.27	49.99	+11.72	131	38.27	Polapit Tamar
+1.57	143	.61	9	24	33.54	41.46	+7.92	124	33.54	Rousdon
+1.63	160	.51	28	24	29.81	43.81	+14.00	147	29.81	Stroud
+1.06	135	1.31	17	25	32.41	39.00	+6.59	120	32.41	Wolstaston
+1.21	145	.61	11	19	28.98	37.69	+8.71	130	28.98	Coventry
+1.30	169	.55	11	25	23.35	31.03	+7.68	133	23.35	Boston
+ .26	112	.78	11	16	24.46	33.45	+8.99	137	24.46	Hodsock Priory
+ .46	114	.75	11	20	34.73	37.23	+2.50	110	34.73	Macclesfield
- .27	91	.40	17	27	32.70	37.13	+4.43	113	32.70	Southport
+1.09	116	1.06	13	25	61.49	69.15	+7.66	112	61.49	Arneliffe
- .36	84	.31	17	12	26.87	35.81	+8.94	133	26.87	Ribston Hall
- .22	91	.73	11	18	26.42	33.23	+6.81	126	26.42	Hull
-1.18	52	.40	15	17	27.94	31.54	+3.60	113	27.94	Newcastle
+8.28	154	5.70	13	30	129.48	143.15	+13.67	111	129.48	Seathwaite
+3.07	165	.86	27	27	42.28	56.38	+14.10	133	42.28	Cardiff
+1.37	126	.79	10	22	46.81	57.97	+11.16	124	46.81	Haverfordwest
+2.46	153	1.08	11	28	45.46	56.75	+11.29	125	45.46	Gogerddan
+ .09	103	.61	11	22	30.36	33.05	+2.69	109	30.36	Llandudno
+3.54	173	1.09	30	28	43.47	54.37	+10.90	125	43.47	Cargen
- .31	89	.40	27	20	33.76	31.93	-1.83	95	33.76	Marchmont
+1.81	133	.90	3	29	49.77	53.59	+3.82	108	49.77	Girvan
+3.14	179	1.00	13	27	35.97	38.01	+2.04	106	35.97	Glasgow
+1.13	230	2.21	30	30	68.67	82.01	+13.34	119	68.67	Inveraray
+4.45	168	.96	27	29	56.57	56.46	- .11	100	56.57	Quinish
- .63	76	.33	13	24	28.64	28.09	- .55	98	28.64	Dundee
+2.36	175	.78	24	21	34.93	39.16	+4.23	112	34.93	Braemar
-2.14	38	.30	27	15	32.73	32.94	+ .21	101	32.73	Aberdeen
+1.05	141	.70	19	16	29.33	27.03	-2.30	92	29.33	Cawdor
+6.54	216	1.55	13	27	44.53	50.26	+5.73	113	44.53	Fort Augustus
+6.57	167	1.42	30	27	83.93	87.88	+3.95	105	83.93	Bendamph
+ .83	127	.48	4	16	31.90	33.90	+2.00	106	31.90	Dunrobin Castle
+ .46	115	.55	24	25	29.88	31.90	+2.02	107	29.88	Wick
+2.67	138	1.11	9	31	54.81	56.17	+1.36	102	54.81	Killarney
- .27	94	.57	25	27	39.57	42.56	+2.99	108	39.57	Waterford
+1.57	136	.55	20	31	39.43	40.22	+ .79	102	39.43	Castle Lough
...	...	...	...	...	45.11	...	...	...	45.11	Miltown Malbay
- .80	77	.36	25	27	34.99	42.19	+7.20	121	34.99	Courtown Ho.
+ .48	114	.38	17	30	35.92	37.23	+1.31	104	35.92	Abbey Leix
- .38	83	.42	25	23	27.68	27.65	- .03	100	27.68	Dublin
+1.80	153	.75	20	28	36.15	41.86	+5.71	116	36.15	Mullingar
+5.28	197	1.15	13	21	48.90	50.77	+1.86	104	48.90	Cong
+7.18	217	1.08	30	31	52.87	...	...	...	52.87	Enniscoe
+2.32	153	.52	12	28	42.71	49.05	+6.34	115	42.71	Markree
+ .35	109	.48	1	28	38.91	45.56	+6.65	117	38.91	Seaforde
+ .63	116	.42	12	29	37.56	41.33	+3.77	110	37.56	Dundarave
+2.85	173	.55	15	30	30.38	48.31	+8.93	123	30.38	Omagh

SUPPLEMENTARY RAINFALL, DECEMBER, 1912.

Div.	STATION.	Rain inches	Div.	STATION.	Rain inches.
II.	Warlingham, Redvers Road..	3·98	XI.	Lligwy	3·83
"	Ramsgate	2·05	"	Douglas .....	...
"	Hailsham	4·55	XII.	Stoneykirk, Ardwell House...	4·42
"	Totland Bay, Aston House...	3·70	"	Dalry, The Old Garroch.....	11·84
"	Stockbridge, Ashley..	5·04	"	Langholm, Drove Road	6·54
"	Grayshott	5·26	"	Beattock, Kinnelhead	12·55
"	Caversham, Rectory Road ..	2·99	XIII.	St. Mary's Loch, Cramilt Ldge	9·28
III.	Harrow Weald, Hill House...	2·90	"	North Berwick Reservoir.....	1·77
"	Pitsford, Sedgebrook.....	3·04	"	Edinburgh, Royal Observaty.	3·11
"	Woburn, Milton Bryant.....	3·07	XIV.	Maybole, Knockdon Farm ..	6·60
"	Chatteris, The Priory.....	2·28	XV.	Campbeltown, Witchburn ..	8·67
IV.	Colchester, Lexden	2·06	"	Holy Loch, Ardnadam.....	21·58
"	Newport.....	2·61	"	Ballachulish House	25·20
"	Ipswich, Copdock	1·92	"	Islay, Eallabus	8·57
"	Blakeney	2·33	"	Tiree, Cornaigmore	8·91
"	Swaffham	2·91	XVI.	Dollar Academy	5·77
V.	Bishops Cannings	4·95	"	Balquhider, Stronvar.....	24·98
"	Winterbourne Steepleton.....	6·71	"	Coupar Angus	4·37
"	Ashburton, Druid House.....	8·57	"	Glenlyon, Meggernie Castle..	16·70
"	Cullompton	5·31	"	Blair Athol	7·85
"	Lynmouth, Rock House ..	7·70	"	Montrose, Sunnyside Asylum.	1·65
"	Okehampton, Oaklands.....	7·65	XVII.	Alford, Lynturk Manse	1·25
"	Hartland Abbey.....	6·02	"	Fyvie Castle	1·53
"	Probus, Lamellyn.....	5·19	"	Keith Station ..	2·45
"	North Cadbury Rectory.....	4·78	XVIII.	Skye, Dunvegan	16·39
VI.	Clifton, Pembroke Road.....	6·57	"	N. Uist, Lochmaddy	10·32
"	Ross, The Graig	3·33	"	Glenquoich, Loan.....	29·90
"	Shifnal, Hatton Grange.....	2·73	"	Alvey Manse.....	6·50
"	Droitwich	3·72	"	Loch Ness, Drumnadrochit ..	7·26
"	Blockley, Upton Wold.....	4·12	"	Glencarron Lodge	16·92
VII.	Market Overton.....	3·61	XIX.	Invershin	3·25
"	Market Rasen	3·02	"	Loch Stack, Ardochullin	10·29
"	Bawtry, Hesley Hall	2·22	"	Melvich	4·18
"	Derby, Midland Railway.....	3·36	XX.	Skibbereen Rectory	7·53
"	Buxton	6·52	"	Dunmanway, The Rectory ..	10·43
VIII.	Nantwich, Dorfold Hall	2·36	"	Glanmire, Lota Lodge.....	4·14
"	Chatburn, Middlewood	4·86	"	Mitchelstown Castle.....	5·12
"	Cartmel, Flookburgh	5·79	"	Darrynane Abbey.....	6·07
IX.	Langsett Moor, Up. Midhope	6·21	"	Clonmel, Bruce Villa	4·00
"	Scarborough, Scalby	1·58	"	Newmarket-on-Fergus-Fenloe	5·28
"	Ingleby Greenhow	1·46	XXI.	Laragh, Glendalough	4·70
"	Mickleton	5·80	"	Ballycumber, Moorock Lodge	3·24
X.	Bellingham, High Green Manor	3·98	"	Balbriggan, Ardgillan	2·33
"	Ilderton, Lilburn Cottage ..	1·48	XXII.	Woodlawn	4·57
"	Keswick, The Bank.....	9·07	"	Westport, St. Helens ..	9·23
XI.	Llanfrechfa Grange	7·81	"	Achill Island, Dugort	11·91
"	Treherbert, Tyn-y-waun	16·76	"	Mohill, The Rectory	4·95
"	Carmarthen, The Friary	7·28	XXIII.	Enniskillen, Portora.....	6·52
"	Castle Malgwyn [Llechryd]...	6·08	"	Dartrey [Cootehill]	5·10
"	Crickhowell, Tal-y-maes.....	6·10	"	Warrenpoint, Manor House ..	5·46
"	New Radnor, Ednol	5·85	"	Banbridge, Milltown	2·80
"	Rhayader, Tyrmynydd	9·65	"	Belfast, Cave Hill Road	4·93
"	Lake Vyrnwy	8·65	"	Glenarm Castle.....	6·39
"	Llangyhanfal, Plâs Draw.....	2·50	"	Londonderry, Creggan Res...	5·32
"	Dolgelly, Bryntirion.....	7·08	"	Killybegs	8·86
"	Bettws-y-Coed, Tyn-y-bryn...	11·15	"	Horn Head	6·68

METEOROLOGICAL NOTES ON DECEMBER, 1912.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow; F for number of days Frost in Screen; f on Grass.

LONDON, CAMDEN SQUARE.—Cloudy and unsettled weather generally with a few bright sunny days. Temp. throughout was unusually high, the mean temp., $45^{\circ}\cdot8$, being $6^{\circ}\cdot1$ above the average, and the highest for December in the 55 years' record, excepting only December, 1868, when the mean was $46^{\circ}\cdot0$. The mean max. temp., $50^{\circ}\cdot8$, was the highest ever recorded in December. Duration of sunshine $20\cdot5^*$ hours, and of R $57\cdot9$ hours. Evaporation $\cdot12$ in. Shade max. $56^{\circ}\cdot8$ on 14th; min. $23^{\circ}\cdot4$ on 1st. F 2, f 8.

TENTERDEN.—A warm month. Mean temp. $45^{\circ}\cdot0$. Duration of sunshine $41\cdot0^{\dagger}$ hours. Shade max. $55^{\circ}\cdot0$ on 24th; min. $25^{\circ}\cdot0$ on 1st. F 2, f 9.

TOTLAND BAY.—Mean temp. $47^{\circ}\cdot2$, the highest for December in the record, excepting December, 1898. Duration of sunshine $33\cdot4^*$ hours. Shade max., $53^{\circ}\cdot1$ on 27th; min., $30^{\circ}\cdot6$ on 1st. F 1, f 3.

PITSFORD.—Shade max. $56^{\circ}\cdot5$ on 14th; min. $24^{\circ}\cdot6$ on 1st. F 3.

IPSWICH, COPDOCK.—Mean temp. $43^{\circ}\cdot4$, and the warmest December recorded here. Duration of sunshine $25\cdot7^{\dagger}$ hours. Shade max. $56^{\circ}\cdot6$ on 14th; min. $28^{\circ}\cdot0$ on 1st. F 1, f 11.

POLAPIT TAMAR.—A mild, wet and rather stormy month. Shade max. $55^{\circ}\cdot0$ on 27th; min. $24^{\circ}\cdot0$ on 1st. F 2, f 5.

NORTH CADBURY.—A mild December, temp. reaching 50° or above on 20 days. Shade max. $55^{\circ}\cdot5$ on 14th; min. $25^{\circ}\cdot0$ on 1st. F 2, f 12.

ROSS.—The warmest December since 1868. Shade max. $56^{\circ}\cdot8$ on 14th; min. $24^{\circ}\cdot8$ on 1st. F 4.

HODSOCK PRIORY.—Only $12\cdot5^*$ hours of sunshine, the least in December since 1890. Shade max. $58^{\circ}\cdot3$ on 14th; min. $15^{\circ}\cdot9$ on 1st. F 5, f 20.

SOUTHPORT.—Duration of sunshine $16\cdot3^*$ hours, and of R $68\cdot7$ hours. Evaporation $\cdot27$ in. Mean temp. $44^{\circ}\cdot2$, or $4^{\circ}\cdot7$ above the average. Shade max. $55^{\circ}\cdot0$ on 11th; min. $25^{\circ}\cdot0$ on 1st. F 3, f 14.

LILBURN COTTAGE.—Very mild and showery. Much wind, strong gales at times and very variable.

HAVERFORDWEST.—Wet, stormy and very mild. Spring flowers in bloom. Duration of sunshine $38\cdot2^*$ hours. Shade max. $57^{\circ}\cdot2$ on 26th; min. $31^{\circ}\cdot0$ on 1st. F 3.

BETTWS-Y-COED.—The wettest month since the record commenced here, and the least amount of sunshine, the total being only $10\cdot9$ hours. Shade max. $58^{\circ}\cdot0$ on 24th; min. $32^{\circ}\cdot0$ on 3rd. F 1, f 3.

CARGEN.—Severe S.W. gale on 24th. Pastures green and fresh. Shade max. $54^{\circ}\cdot8$ on 14th; min. $9^{\circ}\cdot0$ on 1st. F 5.

EDINBURGH.—Frequent S.W. gales. Shade max. $54^{\circ}\cdot5$ on 13th; min. $23^{\circ}\cdot4$ on 1st. F 4, f 13.

INVERARAY.—The greatest R registered here in any one month, the nearest being December, 1898, when $16\cdot24$ in. was measured.

LYNTURK MANSE.—R markedly below the average. Shade max. $53^{\circ}\cdot5$ on 11th; min. $0^{\circ}\cdot0$ on 1st.

DRUMADROCHT.—R $3\cdot38$ in. above the average. Destructive floods and great gales. In many cases corn still in the fields.

LOCH STACK.—Duration of sunshine $5\cdot1^*$ hours.

DUNMANWAY.—Very unsettled month. Some bright sunny days, especially in last week. Stormy at intervals from 22nd to 29th.

DUBLIN.—Almost constant S.W. winds, open, wet and stormy weather. Mean temp. $46^{\circ}\cdot1$, or $4^{\circ}\cdot1$ above the average. Shade max. $57^{\circ}\cdot2$ on 11th and 13th; min. $28^{\circ}\cdot7$ on 1st. F 1, f 6.

ENNISCOE.—The heaviest R for any month in 38 years' record.

OMAGH.—Comparatively mild and excessively wet. Shade max. $54^{\circ}\cdot0$ on 3rd and 4th; min. $16^{\circ}\cdot0$ on 1st. F 7.

* Campbell-Stokes.

† Jordan.

Climatological Table for the British Empire, July, 1912.

STATIONS. (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain		Aver. Cloud.	
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.		
	Temp.	Date.	Temp.	Date.										
London, Camden Square	91°4	12	47°1	9	74°9	55°3	56°1	0-100	77	132°7	44°2	inches 1·44	12	6·3
Malta
Lagos	87·5	18	71°0	11	83·3	74·2	72·1	79	153·5	69·0	7·47	23	8·0	
Cape Town	80·0	19	38·0	29	64·4	46·1	49·7	81	...	...	2·17	13	4·7
Durban, Natal
Johannesburg	67·1	8	29·8	29	59·8	40·2	34·1	66	122·0	30·3	·01	1	1·2	
Mauritius	77·3	2	57·4	11	74·5	61·9	58·5	73	142·1	50·9	1·95	13	4·9	
Bloemfontein	69·6	24	30·5	14, 8	61·9	34·9	31·7	66	...	...	·42	2	2·5
Calcutta... ..	92·9	14	74·6	2	89·1	78·8	78·2	87	...	73·5	11·48	20	8·7	
Bombay... ..	89·1	1	74·4	30	85·1	78·8	77·1	85	128·0	72·0	25·77	29	8·6	
Madras	102·8	30	75·2	20	96·8	79·7	73·7	71	145·4	74·5	2·22	17	7·5	
Kodaikanal	67·8	3	50·2	23	62·5	53·1	51·1	82	144·9	43·9	3·29	18	8·1	
Colombo, Ceylon	88·1	6	73·2	26	86·3	78·2	73·8	76	148·0	68·1	2·50	13	6·7	
Hongkong	91·3	20	76·8	18, 24	83·0	79·5	76·2	80	140·4	...	7·56	19	6·4	
Sydney	68·6	12	41·9	21	58·6	47·1	45·5	81	115·1	31·0	10·72	28	6·3	
Melbourne	63·2	1	30·8	16	55·7	41·6	40·6	73	101·5	23·9	2·01	19	6·0	
Adelaide	64·4	5	38·7	19	59·0	44·8	44·7	71	123·5	28·5	2·60	16	5·8	
Perth	70·2	28	37·0	25	62·1	48·5	47·7	75	116·8	27·9	8·72	21	6·6	
Coolgardie	71·6	4	34·8	1, 25	60·4	42·7	41·1	65	134·0	31·3	1·28	14	5·9	
Hobart, Tasmania	58·5	2	29·8	16	50·8	39·8	38·4	74	102·6	23·0	1·51	19	6·5	
Wellington	59·8	12	35·0	22	52·0	43·6	43·8	85	108·8	28·0	9·46	21	7·4	
Auckland	62·0	18	38·5	31	55·7	45·2	45·5	84	86·0	35·0	4·97	19	6·3	
Jamaica, Kingston	93·2	29	72·7	24	90·9	70·8	71·3	74	...	...	·02	1	...
Grenada	87·0	15	75·0	Sev.	83·3	76·3	...	78	...	...	11·39	26	5·0
Toronto	92·0	8	46·0	1, 20	79·8	59·5	...	...	144·3	41·0	1·95	11	4·2
Fredericton	95·8	8	41·5	1	77·6	54·9	...	75	...	...	4·85	14	5·4
St. John, N.B.	77·5	2	45·0	1	66·1	54·5	...	83	...	...	4·00	12	6·5
Edmonton, Alta.	81·0	31	34·1	14	67·8	48·2	...	77	133·2	26·5	4·12	15	5·4	
Victoria, B.C.	89·8	17	45·5	8	71·5	52·2	...	71	...	...	1·15	7	4·0

Johannesburg.—Bright sunshine 292·3 hours.

Mauritius.—Mean temp. of air normal. Dew point 1°·2, and R ·69 in. below averages. Mean hourly velocity of wind 13·4 miles or 2·8 miles above average.

KODAIKANAL.—Bright sunshine 78 hours.

COLOMBO.—Mean temp. of air 82°·3 or 1°·8 above, of dew point 0°·4 above, and R 1·94 in. below, averages. Mean hourly velocity of wind 7·7 miles. TSS on 2 days.

HONGKONG.—Mean temp. of air 83°·0. Bright sunshine 262·7 hours. Mean hourly velocity of wind 10·6 miles.

Sydney.—Mean temp. of air 0°·6 above, and R 5·97 in. above, averages.

Melbourne.—Mean temp. of air 0°·1 above, and R ·16 in. above, averages.

Adelaide.—Mean temp. of air 0°·4 above, and R ·02 in. above, averages.

Perth.—R 2·34 in. above average.

Coolgardie.—Mean temp. of air 0°·8 above average.

Hobart.—Mean temp. of air 0°·4 below, and R ·59 in. below, averages.

Wellington.—Mean temp. of air 0°·4, and R 3·65 in., above averages. Bright sunshine 56·5 hours. The wettest July since 1892.