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THE RAINFALL OF 1916.

WE are happy to be able to report that there is no falling off in the number of rainfall returns received during the first ten days of January as compared with last year. More than 3,000 out of the expected total of 5,500 records have already come in to the office at Camden Square. The large Rainfall Table on pp. 184-5 presents a summary of the year as well as of the month of December, and a glance at the column showing the relation to the average tells us that the year has been an unusually wet one. Only a few stations in the north and centre of England, in the south-west of Wales, and in the extreme fringe of the Outer Hebrides, failed to record an average fall, and it is many years since so small an area of the British Isles could be called "dry" when compared with the average. The deficiency of rainfall was nowhere so much as 10 per cent., whereas in the wetter parts of the country many stations showed excesses of more than 40 per cent. The wettest part was undoubtedly the east and centre of Scotland, but large tracts in the south of England were also very wet indeed; and the uniformity of the high rainfall over the length and breadth of Ireland is perhaps the most remarkable feature of the distribution, the general excess being 14 per cent.

Considering the general rainfall of the other large divisions of the country, we find that Wales, with an excess of only 5 per cent., was nearly normal. The North of England had an excess of 9 per cent., the South of England as much as 16 per cent., and Scotland 17 per cent. The rainfall of the British Isles as a whole was 13 per cent. in excess of the average. This shows that 1916 was wetter than any year since 1912, while Scotland and Ireland were wetter than in any year since 1903, the wettest in our annals. London lay in the wettest part of England, and the total fall, 34.01 inches, has only once been exceeded appreciably. This was in 1903, when 38.10 in. fell; but in 1878 there was practical equality with 1916, the fall then being 34.08 in.

William Ellis, F.R.S.

Greenwich, 20th February, 1828—Blackheath, 11th December, 1916.

THE fateful year, 1916, has claimed yet another veteran of Meteorological science in the person of Mr. William Ellis, the successor of Glaisher as head of the Meteorological department of the Royal Observatory, Greenwich, and for a generation he was as Referee the arbiter on doubtful papers submitted to the Royal Meteorological Society. The son of an assistant at the Royal Observatory Mr. Ellis was himself in its service all his working life, and on retirement in 1893, he lived so near that it is recorded that he attended 75 consecutive annual visitations, the last of them last June.

Mr. Ellis was President of the Royal Meteorological Society in 1886-87, and to the end he took a keen interest in the work of the Society, continuing to attend the meetings long after his failing eyesight made the journey from Blackheath to Westminster and back a very serious danger. He was a frequent contributor to our pages and readers will remember with what zest he threw himself into the denunciation of all attempts to revive the old views of the influence of the Moon's phases on the Weather. He opposed these the more strongly because it is mainly to his researches that the influence of the Sun on magnetic phenomena was established, and he had satisfied himself that nothing about the Moon warranted any belief in it as a weather guide. His exhaustive volume on the fifty years' Temperature Observations at Greenwich fitly marked the close of his official career, but he continued to take the keenest interest in meteorological and astronomical matters to the end. His two vigorous letters on the limits of the seasons in our last volume are sufficient to show how alert his mental faculties remained far into his eighty-seventh year. In all his comments and controversies his strong common sense was always conspicuous.



ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday the 20th December, at the Society's Rooms, 70, Victoria Street; Major H. G. Lyons, D.Sc., F.R.S., President, in the Chair.

Mr. Carle Salter, Assistant Director of the British Rainfall Organization, read a paper on the Measurement of Rainfall Duration. Save for an article by Mr. Baldwin Latham in 1880, practically no attention appeared to have been paid to this subject till 1903, when Dr. H. R. Mill commenced collecting records for the British Isles the number of which has grown till in *British Rainfall, 1915*, as many as forty-eight records were published. An examination of these records revealed certain inconsistencies which were probably

due to personal and instrumental causes. Two short series of observations made simultaneously with the Halliwell Recorder and the Hyetograph, two of the most widely used patterns of self-recording rain gauge, showed a difference of about 10 per cent. between their respective indications. A rough comparison of all the available records suggested that the Casella Recorder gave generally the largest values and the Beckley the smallest. These differences appeared to be due principally to the varying degrees of sensitiveness of the instruments to very light rain, and the suggestion had been made that if rain of very low intensity were omitted from the records a closer approximation to homogeneity would be attained. An analysis of the "Halliwell" and "Hyetograph" records referred to, by the elimination of all rain at a less rate than .01 in. in 3 hours (or 0.1 mm. per hour) showed, however, that the original differences were not greatly reduced.

An animated discussion followed in which the President, Mr. W. B. Tripp, Mr. Baldwin Latham, Col. H. Mellish, Dr. C. Chree, Dr. H. R. Mill, Mr. F. J. W. Whipple, Mr. W. W. Bryant, Prof. H. H. Turner and Mr. Mark Zambra took part and Mr. Salter replied.

Prof. H. H. Turner, F.R.S., read a paper entitled "Discontinuities in Meteorological Phenomena, Third Note." In two previous papers it had been suggested that meteorological history is divided into definite chapters of average length $6\frac{1}{2}$ years, the separating dates being assigned according to a regular law. Further that if these chapters are numbered consecutively those with even numbers differ in certain essential respects from those with odd numbers. Some particular illustrations of these points had already been given, the elements studied being rainfall and temperature at different stations. The present paper gave the systematic analysis of 55 years' monthly rainfalls at twenty-eight European stations. The division into alternating chapters was clearly brought out; and it was apparently possible to assign the separating dates from this material within a month. This precision was made possible by the existence of a five-monthly periodicity, for which some evidence was given in a former communication, but which was clearly established by the mass of evidence here submitted. The division into chapters had been connected in a former paper with the movements of the earth's axis. In the present paper some earthquake statistics were presented which appeared to be favourable to this view.

Dr. H. R. Mill congratulated Prof. Turner on his successful treatment of the irregular alternating spells of excessive and deficient rainfall, the existence and capricious limits of which were shown in the coloured maps in *British Rainfall* for the last ten years.

Sir Napier Shaw said that it would indeed be a great thing for meteorology if it could be shown that the poles wagged the weather; but the problem would not be so much simplified if it should transpire that it was the weather that wagged the poles.

Correspondence.

*To the Editor of Symons's Meteorological Magazine.*THE RAINFALL OF HAVANA AND ENGLAND,
SOUTH-WEST.

FOR the past two years space has been kindly allowed for a short note to indicate the probable rainfall in the south-west of England for the three months January to March. This indication is based on a correlation between the rainfall at Havana for the wet season, May to October, and that in England, south-west, for the January to March following, the co-efficient being $\cdot 54$ and the probable error $\cdot 08$.

In 1914 the Havana rainfall was 71 per cent. of the average, while that experienced later in England, south-west, was 129 per cent. In 1915, the figures were respectively 82 and 126 per cent; This year the Havana rainfall has again been slight, only amounting to 74 per cent. of the fifty years' average, and suggests that there will be an abundant rainfall in the south-west districts of England and Wales for the three months, January to March, 1917.

Since 1911 the seasonal rainfall at Havana during May to October, with one exception, has been well below the average, while that subsequently falling in England, south-west, in January to March, has been in excess. The figures are of sufficient interest to be given in detail :

	Havana.	Eng. S.W.		Havana.	Eng. S.W.		Havana.	Eng. S.W.
1911	66	146	1913	87	138	1915	82	129
1912	108	139	1914	71	129	1916	74	...

A. HAMPTON BROWN.

December 27th, 1916.

A STAGNANT DECEMBER—COLD AND FOGGY.

THE month of December in every recent year beginning with 1910 has been (with the exception of that of 1913, which, at the close, was gloriously fine and frosty) characterized by weather of the open Atlantic type—rough, wet, and warm, providing many days and nights of dark muggy winter warmth during which the very breath of the ocean could be felt even in the interior of the country in the great broad sweeps of the moisture-laden south-westerly gale. In December, 1916, however, we reverted to another type of mid-winter weather marked by dry stagnant conditions favourable to gloomy fog-frosts in inland cities. But, except locally, as, for instance, in the south of Ireland, the cold of December, 1916, was not very severe for the season, and in London the month could

not compare in intensity of cold with the famous 1890, nor was there so sharp a spell as occurred at the end of 1908.

From the Midlands in the middle of the month came the usual winter tale of snowed-up railways, but nothing exceptional in the way of snowfall seems to have occurred.

To the above general remarks I may add a few special notes which came under my personal observation. During the night of the 14th-15th of December the northern suburbs of London had a snowfall, which, considering its local character, was rather heavy and slow to disappear. It was really quite an experience of geographical interest to travel on the morning of the 15th from the high ground of Hampstead Heath under two or three inches of snow, to Hyde Park, only four or five miles distant, where it required very sharp eyes to trace a pinch of snow "salt" here and there—raising the question to what extent Hampstead's local snowfall was due to its miniature mountain climate and what to a pure meteorological accident.

During the days around Christmas the Dartmoor plateau was sufficiently under snow to cause the lean hollows in the flanks of the great barren ridges to be outlined with an almost ghastly glare very different from the grandeur and beauty exhibited under a heavy fall of snow such as the Devonshire moors are only a little less familiar with than the north-country fells. On the morning of the 27th there was something like 15° of frost at Chagford, near Moreton-hampstead, Devon, and all window panes were thickly "ferned." The evening express from Exeter arrived at Paddington in a first-class London fog, only half an hour late, thanks apparently to the G.W.R.'s excellent device of engine-cab electric signalling, and it was interesting to observe the engine and train thickly coated with ice and rime in consequence of rushing nearly 200 miles through a freezing night fog. Like most heavy hoar frosts, however, this proved the forerunner of a warm rain-type of weather and not of a cold snow-type which in this country has quite a different set of signs.

L. C. W. BONACINA.

30th December, 1916.

METEOROLOGICAL OBSERVATIONS AT LU-KIA-PANG.

ERRATA.

THROUGH a copyist's error in the statistics for 1915 which appear on p. 53 in your Magazine for May, 1916, the daily mean barometer readings for the months are incorrectly set forth. They should be as follows (the figures 10 are omitted before the monthly values):—

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	YEAR
26·72	21·48	21·48	15·99	09·77	05·98	03·64	02·99	12·06	16·77	24·96	24·39	15·52

J. DE MOIDREY, S.J.

Zi-Ka-Wei, Nov. 12th, 1916.

REVIEWS.

The Weather Map. An introduction to modern meteorology, by SIR NAPIER SHAW, F.R.S., Director of the Meteorological Office. Published by the Authority of the Meteorological Committee. London . . . Stationery Office, 1916. Size, 6 × 5. Pp. 94, plates. Price 4d.

WERE it not for the formal blue paper covers this little book, with its quaint form, miniature size, and well-designed illustrations, would merit the designation of "dainty" and we could hardly imagine a prettier or more welcome Christmas present to any lover of Nature than a nicely bound copy. Sir Napier Shaw writes with a pleasant style far removed from the usual formal diction to which the printers to the Stationery Office are accustomed. It appears from the first line that the book appeals to persons engaged in war-like operations, a fact which serves to remind those who are not that the whole strength of the Meteorological Office has been turned for the last two years to the service of the Navy and Army. Yet the little book appeals no less to the student of the weather who has to content himself with inglorious routine at home, and to school teachers above all. A master of his subject like Sir Napier Shaw naturally lays stress on the fact which the junior meteorological official is apt to forget, namely, that modern meteorology depends on the organized work of the army of humble Observers as well as on the highly specialized labours of the officials at headquarters. It is plain that the better-informed the Observer is as to the purpose and the utility of his observations the more useful will his data be to the specialist who utilizes them for drawing general conclusions, and detailed forecasts. To all Observers this book is invaluable, and we recommend everyone who reads this notice to send five penny stamps to the Meteorological Office, South Kensington, London, S.W., and secure a copy without delay. It is unquestionably the best fourpenceworth ever published by the Office. One difficulty which may conceivably present itself to some readers will shortly be overcome by the publication of a glossary of the technical terms employed, although these are for the most part quite clearly explained as they occur. The little book requires no criticism, and indeed the excellence of its intentions would disarm a critic were he inclined to be captious. We may note, however, that on p. 16 the action of growing plants on carbonic acid is incompletely stated as of course it is only green plants which act, and that only under the stimulus of sunlight. On p. 23 there is a very exceptional occurrence, a sentence which is not quite clear. It reads: "With the ubiquity of pressure comes the idea of its distribution and for this purpose we regard the pressure as uniform." It would scarcely be easy to draw an isobaric map if the pressure were uniform over the whole area dealt with.

Statistical climatic summaries for six stations in different parts of the world, on a somewhat novel plan, and fifteen isopleth diagrams associating seasonal and diurnal variations at the four observatories of the Meteorological Office complete the delightful compendium.

The Rain Children, a fairy-tale in Physics. By T. H. ORPEN, M.A.
With seven illustrations by C. E. Brock, R. I., London, Society for Promoting Christian Knowledge. Size $8\frac{1}{2} \times 6$. Pp. viii. & 112. Price 2s. 6d.

To write a successful fairy-tale of science is one of the most difficult feats in literature, and Mr. Orpen has been remarkably successful. We speak only of the scientific part or kernel dealing with the Rain Children story, leaving to others the fairytale of History which forms the husk of the nut and relates to Thales of Miletus, as a pagan philosopher and as a Christian missionary.

There are ten short chapters each representing an experience of a little girl with the fairy rain children and the titles are, Aunt Heat, Aunt Cold, Colonel Lightning, The Hammer Pond, the Battle of the Aunts, Snow-drill, To the Everlasting Hills, the Power of Steam, the River of Ice, and the Tunnel makers. The idea is that the Rain Children or rain drops, whose father is the Sun, and their mother the Sea, do all the work of the world under the directions of two Aunts who hate each other and never meet, Aunt Heat the sister of the Sun, and Aunt Cold, the sister of the Sea. Colonel Lightning, always followed by Sergeant Thunder, dashes across the story very effectively and the Rain Children are very delicately and cleverly handled. An obvious criticism that Heat and Cold are not both entities is anticipated by a scornful remark of Aunt Heat that Aunt Cold is after all "only a negative term," but the point is not elaborated. It would be the worst of bad taste to force a fairy-tale too far, and Mr. Orpen has been very happy in avoiding forced similes and even in refraining from exhausting the legitimate latitude of his subject. We hope that he will add more chapters to a later edition and suggest as themes, among others, Big Brother Wind who helps the Rain Children up to the mountain tops, Grandfather Gravity, who guides them home to their mother, the Fog Fiends, who attack the rain children from chimney pots and drag them into mischief, and The Transformation Scene, where chemical forces might come into play. The book should arouse a real interest in Nature on the part of children, and leave practically nothing to unlearn.

RAINFALL TABLE FOR DECEMBER, 1916.

STATION.	COUNTY.	Lat. N.	Long. W. [°E.]	Height above Sea. ft.	RAINFALL OF MONTH.	
					Aver. 1875— 1909. in.	1916. in.
Camden Square.....	London	51 32	0 8	111	2'13	2'55
Tenterden.....	Kent	51 4	*0 41	190	2'77	4'19
Arundel (Patching).....	Sussex	50 51	0 27	130	2'91	5'12
Fordingbridge (Oaklands)...	Hampshire	50 56	1 38	135	3'35	4'33
Oxford (Magdalen College)...	Oxfordshire	51 45	1 15	186	2'06	2'73
Wellingborough(Swanspool)...	Northampton	52 18	0 41	155	2'13	2'57
Bury St. Edmunds(Westley)...	Suffolk	52 15	*0 40	226	2'14	2'89
Geldeston [Beccles].....	Norfolk.....	52 27	*1 31	38	2'07	3'18
Polapit Tamar [Launceston]...	Devon	50 40	4 22	315	4'46	4'88
Rousdon [Lyme Regis]	"	50 41	3 0	516	3'68	4'76
Stroud (Field Place)	Gloucestershire	51 44	2 13	226	2'71	3'63
Church Stretton (Wolstaston)...	Shropshire	52 35	2 48	800	2'99	2'05
Boston	Lincolnshire.....	52 58	0 1	11	1'88	3'00
Worksop (Hodsock Priory)...	Nottinghamshire	53 22	1 5	56	2'17	2'16
Mickleover Manor	Derbyshire	52 54	1 32	280	2'38	2'54
Macclesfield	Cheshire	53 15	2 7	501	3'35	...
Southport (Hesketh Park)...	Lancashire	53 39	2 59	38	3'10	2'52
Arncliffe Vicarage	Yorkshire, W.R.	54 8	2 6	732	6'75	4'09
Goldsborough Hall	"	54 0	1 25	119	2'29	1'96
Hull (Pearson Park)	" E.R.	53 45	0 20	0	2'32	2'72
Newcastle (Town Moor) ...	Northumberland	54 59	1 38	201	2'46	4'12
Borrowdale (Seathwaite) ...	Cumberland.....	54 30	3 10	423	15'14	...
Cardiff (Ely).....	Glamorgan	51 29	3 13	53	4'70	3'79
Haverfordwest.....	Pembroke	51 48	4 58	90	5'18	4'34
Aberystwyth (Gogerddan)...	Cardigan	52 26	4 1	83	4'66	4'62
Llandudno	Carnarvon	53 20	3 50	72	2'84	1'68
Cargen [Duntries]	Kirkcudbright.....	55 2	3 37	80	4'84	5'01
Marchmont House	Berwick	55 44	2 24	498	2'83	3'91
Girvan (Pinnmore).....	Ayr	55 10	4 49	207	5'48	6'09
Glasgow (Queen's Park) ...	Renfrew	55 53	4 18	144	3'95	4'60
Islay (Eallabus)	Argyll	55 47	6 15	68	5'73	5'42
Mull (Quinish).....	"	56 34	6 13	35	6'59	6'64
Balquhiddy (Stronvar).....	Perth.....	56 21	4 23	422	8'83	...
Dundee (Eastern Necropolis)...	Forfar	56 28	2 57	199	2'67	3'81
Braemar	Aberdeen	57 0	3 24	1114	3'13	3'74
Aberdeen (Cranford)	"	57 8	2 7	120	3'43	4'16
Gordon Castle	Moray	57 37	3 5	107	2'72	2'01
Drumnadrochit	E. Inverness	57 20	4 29	138	3'76	3'88
Fort William	"	56 49	5 6	171	9'41	6'12
Loch Torridon (Bendamph)...	W. Ross	57 32	5 32	20	9'86	9'59
Dunrobin Castle	Sutherland	57 59	3 56	14	3'09	2'77
Killarney (District Asylum)...	Kerry	52 4	9 31	178	6'92	4'88
Waterford (Brook Lodge)...	Waterford	52 15	7 7	104	4'32	3'21
Nenagh (Castle Lough).....	Tipperary.....	52 54	8 24	120	4'34	4'11
Ennistymon House.....	Clare	52 57	9 18	37	5'03	5'05
Gorey (Courtown House) ..	Wexford	52 40	6 13	80	3'42	2'98
Abbey Leix (Blandsfort)....	Queen's County.....	52 56	7 17	532	3'41	4'30
Dublin (FitzWilliam Square)...	Dublin	53 21	6 14	54	2'27	2'72
Mullingar (Belvedere)	Westmeath	53 29	7 22	307	3'39	3'44
Crossmolina (Enniscoe).....	Mayo.....	54 4	9 16	74	6'11	5'94
Cong (The Glebe).....	"	53 33	9 16	112	5'42	5'39
Collooney (Markree Obsy.)...	Sligo	54 11	8 27	127	4'34	4'81
Seaforde	Down.....	54 19	5 50	180	3'77	2'96
Ballymena (Harryville).....	Antrim	54 52	0 13	150	3'97	3'59
Omagh (Edenfel).....	Tyrone	54 36	7 18	280	3'91	3'26

RAINFALL TABLE FOR DECEMBER, 1916—continued.

RAINFALL OF MONTH (con.)					RAINFALL FROM JAN. 1.				Mean Annual 1875-1909.	STATION.
Diff. from Av. in.	% of Av.	Max. in 24 hours. in.	No. of Days		Aver. 1875-1909. in.	1916. in.	Diff. from Aver. in.	% of Av.		
+ .42	120	.43	22	15	25.11	34.01	+8.90	135	25.11	Camden Square
+1.42	151	.70	22	21	27.64	33.68	+6.04	122	27.64	Tenterden
+2.21	176	.64	20, 22	16	30.48	37.97	+7.49	125	30.48	Patching
+ .98	129	1.41	20	18	31.06	40.29	+9.23	130	31.06	Fordingbridge
+ .67	133	.73	20	13	24.58	29.63	+5.05	121	24.58	Oxford
+ .44	121	.58	21	15	25.20	26.58	+1.38	105	25.20	Swanspool
+ .75	135	.44	22	19	25.40	32.95	+7.55	130	25.40	Westley
+1.11	154	.43	21	23	23.73	27.69	+3.96	117	23.73	Geldeston
+ .42	109	1.19	9	20	38.27	41.92	+3.65	110	38.27	Polapit Tamar
+1.08	129	1.61	20	15	33.54	37.94	+4.40	113	33.54	Rousdon
+ .92	134	.62	21, 22	14	29.81	34.78	+4.97	117	29.81	Stroud
— .94	69	.38	22	17	32.41	32.07	— .34	99	32.41	Wolstaston
+1.12	160	.61	21	20	23.35	29.05	+5.70	124	23.35	Boston
— .01	100	.30	21, 22	20	24.46	24.46	.00	100	24.46	Hodsock Priory
+ .16	107	.48	23	14	26.65	31.02	+4.37	116	26.65	Mickleover
...	...	...	...	...	34.73	...	...	...	34.73	Macclesfield
— .58	81	.52	28	19	32.70	31.42	—1.28	96	32.70	Southport
—2.66	61	.70	30	12	61.49	67.77	+6.28	110	61.49	Arncliffe
— .33	86	.29	23	15	27.29	28.64	+1.35	105	27.29	Goldsborough Hall
+ .40	117	.42	21	25	26.42	28.48	+2.06	108	26.42	Hull
+1.66	168	.72	9	17	27.94	31.40	+3.46	112	27.94	Newcastle
...	...	...	...	...	129.48	...	...	129.48	Seathwaite	
— .91	81	.65	22	19	42.28	48.03	+5.75	114	42.28	Cardiff
— .84	84	1.06	9	21	46.81	43.34	—3.47	93	46.81	Haverfordwest
— .04	99	1.09	28	18	45.46	46.94	+1.48	103	45.46	Gogerddan
—1.16	59	.36	28	20	30.36	30.06	— .30	99	30.36	Llandudno
+ .17	104	1.02	28	24	43.47	53.80	+10.33	124	43.47	Cargen
+1.08	138	.92	9	17	33.76	45.00	+11.24	133	33.76	Marchmont
+ .61	111	.75	15	23	49.77	51.64	+1.87	104	49.77	Girvan
+ .65	116	.61	20	21	35.97	43.98	+8.01	122	35.97	Glasgow
— .31	95	1.11	20	26	48.79	51.36	+2.57	105	48.79	Eallabus
+ .05	101	.63	20	24	56.57	55.55	—1.02	98	56.57	Quinish
...	...	...	...	...	73.77	...	...	...	73.77	Stronvar
+1.14	143	1.39	9	23	28.64	40.72	+12.08	142	28.64	Dundee
+ .61	119	1.40	9	17	34.93	47.82	+12.89	137	34.93	Braemar
+ .73	121	.83	9	25	32.73	36.21	+3.48	111	32.73	Aberdeen
— .71	74	.43	9	19	30.34	35.84	+5.50	118	30.34	Gordon Castle
+ .12	103	.90	27	25	36.13	49.19	+13.06	136	36.13	Drumnadrochit
—3.29	65	.82	28, 29	24	75.80	83.13	+7.33	110	75.80	Fort William
— .27	97	1.16	15	26	83.93	88.40	+4.47	105	83.93	Bendampf
— .32	90	.49	9	17	31.90	35.01	+3.11	110	31.90	Dunrobin Castle
—2.04	71	.84	14	27	54.81	69.55	+14.74	127	54.81	Killarney
—1.11	74	.64	8	14	39.57	39.88	+ .31	101	39.57	Waterford
— .23	95	1.10	28	20	39.43	43.64	+4.21	111	39.43	Castle Lough
+ .02	100	.62	8	24	46.52	54.31	+7.79	117	46.52	Ennistymon
+ .44	87	.60	8	15	34.99	37.74	+2.75	108	34.99	Courtown Ho.
+ .89	126	1.50	9	24	35.92	41.81	+5.89	116	35.92	Abbey Leix
+ .45	120	.49	12	24	27.68	38.60	+10.92	139	27.68	Dublin
+ .05	101	1.00	9	18	36.15	46.29	+10.14	128	36.15	Mullingar
— .17	97	.72	8	28	52.87	62.50	+9.63	118	52.87	Enniscpe
— .03	99	.90	28	25	48.90	56.20	+7.30	115	48.90	Cong
+ .47	111	1.02	8	23	42.71	55.30	+12.59	130	42.71	Markree
— .81	79	.84	20	21	38.91	41.20	+2.29	106	38.91	Seaforde
— .38	90	.71	9	26	40.84	44.28	+3.44	108	40.84	Ballymena
— .65	83	.52	9	19	39.38	43.31	+3.93	110	39.38	Omagh

SUPPLEMENTARY RAINFALL, DECEMBER, 1916.

Div.	STATION.	Rain inches.	Div.	STATION.	Rain inches.
II.	Warlingham, Redvers Road .	3.85	XI.	Lligwy	3.22
„	Ramsgate	2.79	„	Douglas, Isle of Man .....	...
„	Hailsham	5.21	XII.	Stoneykirk, Ardwell House...	3.20
„	Totland Bay, Aston House...	4.22	„	Carsphairn, Shiel	7.86
„	Stockbridge, Ashley	4.35	„	Beattock, Kinnelhead	6.02
„	Grayshott	4.11	„	Langholm, Drove Road	4.52
III.	Harrow Weald, Hill House...	2.81	XIII.	Selkirk, The Hangingshaw..	3.30
„	Pitsford, Sedgebrook	2.63	„	North Berwick Reservoir...	2.60
„	Woburn, Milton Bryant.	2.77	„	Edinburgh, Royal Observat.	2.92
„	Chatteris, The Priory	2.71	XIV.	Mayhole, Knockdon Farm ...	5.19
IV.	Elsenham, Gaunts End	2.93	XV.	Buchlyvie, The Manse .....	...
„	Shoeburyness	1.99	„	Ballachulish House	5.09
„	Colchester, Hill Ho., Lexden	2.53	„	Oban	5.38
„	Ipswich, Rookwood, Copdock	3.03	„	Campbeltown, Witchburn ..	6.00
„	Aylsham, Rippon Hall	3.44	„	Holy Loch, Ardnadam	7.66
„	Swaffham	3.03	„	Tiree, Cornaigmore	5.28
V.	Bishops Cannings	3.71	XVI.	Dollar Academy	4.23
„	Wimborne, St. John's Hill ...	4.63	„	Glenlyon, Meggernie Castle..	6.94
„	Ashburton, Druid House	4.98	„	Blair Atholl	3.82
„	Cullompton	4.06	„	Coupar Angus	3.48
„	Lynmouth, Rock House	3.54	„	Montrose, Sunnyside Asylum.	3.37
„	Okehampton, Oaklands	4.98	XVII.	Alford, Lynturk Manse	3.76
„	Hartland Abbey	4.80	„	Fyvie Castle	3.91
„	St. Austell, Trevarna	4.98	„	Keith Station	3.10
„	North Cadbury Rectory.	3.84	XVIII.	Rothiemurchus	2.76
VI.	Clifton, Stoke Bishop	4.26	„	Loch Quoich, Loan	11.20
„	Ledbury, Underdown	2.10	„	Skye, Dunvegan	6.92
„	Shifnal, Hatton Grange	2.72	„	Lochmaddy, Bayhead	4.86
„	Droitwich	2.34	„	Fortrose	2.29
„	Blockley, Upton Wold	3.74	„	Glencarron Lodge	7.35
VII.	Grantham, Saltersford	2.74	XIX.	Altnaharra .....	...
„	Market Rasen	2.41	„	Melvich	4.02
„	Bawtry, Hesley Hall	2.21	„	Loch More, Achfary	7.15
„	Derby, Midland Railway	2.37	XX.	Dunmanway, The Rectory ..	4.79
„	Buxton	3.90	„	Glanmire, Lota Lodge	2.71
VIII.	Nantwich, Dorfold Hall	2.36	„	Mitchelstown Castle	3.10
„	Chatburn, Middlewood .....	...	„	Darrynane Abbey .....	...
„	Lancaster, Strathspey	3.08	„	Clonmel, Bruce Villa	2.71
IX.	Langsett Moor, Up. Midhope	3.72	„	Broadford, Hurdlestown	4.29
„	Scarborough, Scalby	4.47	XXI.	Enniscorthy, Ballyhyland...	3.89
„	Ingleby Greenhow	3.11	„	Rathnew, Clonmannon	3.32
„	Mickleton	3.20	„	Ballycumber, Moorrock Lodge	2.74
X.	Bellingham, High Green Manor	3.95	„	Balbriggan, Ardgillan	3.61
„	Ilderton, Lilburn Cottage ...	3.36	„	Castle Forbes Gardens	3.26
„	Keswick, The Bank	5.22	XXII.	Ballynahinch Castle	7.44
XI.	Llanfrechfa Grange	3.20	„	Woodlawn	2.51
„	Treherbert, Tyn-y-waun	7.92	„	Westport, St. Helens ...	5.01
„	Carmarthen, The Friary	4.09	„	Dugot, Slievemore Hotel ...	8.59
„	Fishguard, Goodwick Station.	4.03	XXIII.	Enniskillen, Portora	3.32
„	Crickhowell, Tal-y-maes	3.00	„	Dartrey [Cootehill]	3.02
„	New Radnor, Ednol	2.38	„	Warrenpoint, Manor House ..	3.48
„	Birmingham WW., Tyrmynydd	3.77	„	Belfast, Cave Hill Road	2.26
„	Lake Vyrnwy	4.32	„	Glenarm Castle	5.44
„	Llangynhafal, Plas Draw	1.79	„	Londonderry, Creggan Res...	3.39
„	Dolgelly, Bryntirion	4.31	„	Dunfanaghy, Horn Head ...	4.92
„	Bettws-y-Coed, Tyn-y-bryn...	3.94	„	Killybegs	5.53

THAMES VALLEY RAINFALL — DECEMBER, 1916.



ALTITUDE SCALE

Below 250 feet 250 to 500 feet 500 to 1000 feet Above 1000 feet

SCALE OF MILES

0 5 10 15 20

THE WEATHER OF DECEMBER.

THE weather of December, although finer and drier in the western than in the eastern half of the United Kingdom, was for the most part cold, cheerless, and often very misty or foggy. With the exception of a few days at the commencement and end of the month the thermometer was almost invariably below its normal December level. Over the country as a whole shade maxima as high as 40° were in fact very rare, and between the 14th and 18th, and again on the 27th, there were a large number of places in which the thermometer failed to get as high as freezing point all day. Frost was recorded in the screen on many successive nights, and was often severe, the lowest temperatures occurring, as a rule, between the 17th and 20th of the month. On the last mentioned date the screened thermometer fell to 11° at West Linton (in Peeblesshire), 12° at Balmoral, 13° at Alnwick Castle, and 16° at Harrogate. On the surface of the grass frost was experienced in several places on more than 20 occasions, and at Benson (Oxon.) on as many as 25 occasions. The sharpest ground frosts appear to have occurred on the night of the 19th, 20th, when the exposed thermometer sank to 3° at Worksop, 8° at Harrogate, and 10° at Balmoral, Raunds, Malvern and Marlborough. After the 27th, when a brisk current of air swept in from the south-westward a rapid rise of temperature occurred, the morning readings at some of the English stations on the 29th being as much as 23° or 24° higher than those of the previous day. The highest temperatures of the month occurred very generally between the 27th and 29th, when the thermometer rose to 55° and upwards in most of the English and Irish districts and reached 59° at Shaftesbury and at Birr Castle (Kings Co.). The warmth came, however, far too late to have any material effect upon the mean temperature of the month, which was everywhere below the normal, and over central and southern England considerably below it.

Heavy falls of rain were experienced locally in several parts of Great Britain on the 8th and 9th and in the south-west of England on the 20th, and snow or sleet occurred in most districts about the middle of the month, but seldom lay on the ground for any considerable time.

The total rainfall was slightly in excess of the average over the greater part of England and southern Scotland, but rather less in the west and north of Scotland and most of Ireland. The general values for the countries expressed as a percentage of the average were:—England and Wales 112, Scotland 99, Ireland 93, British Isles 102.

The thickest and most widespread fogs occurred respectively on the 16th and on the 26th and 27th. On each occasion a very large part of England was affected, and much delay and interruption to traffic was occasioned. The unusually dense fog which accumulated over the London district on the evening of the 27th was responsible for a large number of street accidents, several of which proved fatal. The frequency of this very undesirable element may be gauged by the fact that at Kew Observatory morning fogs were reported on as many as 8 days, afternoon fogs on 6 days, and evening fogs on 7 days. For the 5 years ended 1915 the average number of morning and evening fogs at this locality in December was only 1, and of afternoon fogs less than 1.

In the matter of bright sunshine the western half of the country fared much better than the eastern and central districts. In the south-west of England and the north of Ireland the mean daily duration was more than half an hour in excess of the average. Over the eastern, central and southern parts of England there was a general deficiency, and in the eastern and midland counties the mean daily duration (less than an hour) was considerably less than half the amount recorded in the south-west.

An unusually fine lunar halo was observed at Aberdeen on the 7th, and thunderstorms occurred at Falmouth on the 10th, and at Dublin on the 12th.

In London (Camden Square) the mean temperature of the month was $37^{\circ}\cdot4$ or $2^{\circ}\cdot3$ below the average. Duration of rainfall $54\cdot0$ hours. Evaporation nil.

Climatological Table for the British Empire, July, 1916.

STATIONS. (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	84·4	31	47·0	15	72·1	53·0	54·0	78	133·2	45·7	1·68	13	7·1
Malta	96·4	12	70·2	19	86·2	76·4	...	89	146·0	...	·00	0	0·4
Lagos	86·2	1	70·0	3, 11	82·5	73·0	72·1	82	150·2	67·0	7·59	20	8·3
Cape Town	73·1	5	35·8	12	61·8	46·5	48·1	82	...	...	3·25	13	5·7
Johannesburg	69·6	14	32·5	9	62·4	42·2	30·2	53	...	30·2	·00	0	0·8
Mauritius	76·3	23	54·5	27	73·2	58·8	55·9	71	...	48·2	·74	14	5·1
Bloemfontein	70·5	19	20·4	24	64·4	32·5	28·9	58	..	...	·23	1	1·3
Calcutta	93·1	23	75·0	13	89·6	79·0	77·5	83	...	73·6	7·60	7	8·5
Bombay	88·7	2	75·4	14	85·0	78·8	77·4	87	133·8	73·2	25·10	25	8·9
Madras	99·4	1	73·1	4, 5	92·8	77·6	74·6	77	157·0	73·2	3·66	11	6·1
Colombo, Ceylon	89·1	14	70·2	18	85·0	75·5	74·0	85	159·0	69·4	13·54	25	8·0
Hongkong	92·1	24	73·5	9	88·0	78·2	75·5	79	...	...	8·30	13	4·8
Sydney	66·5	8	43·0	17	59·8	47·7	44·3	76	109·5	32·8	3·26	18	...
Melbourne	62·3	25	35·9	13	56·3	42·6	41·5	72	112·3	26·8	1·54	16	6·3
Adelaide	65·3	24	8·6	2	59·0	46·1	45·0	75	121·0	28·9	3·30	17	5·6
Perth ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Coolgardie	70·8	23	53·0	4*	57·7	41·1	38·7	61	125·0	27·0	1·07	12	6·0
Hobart, Tasmania ..	58·7	27	34·1	15	52·3	40·1	39·2	75	116·2	25·0	4·53	21	6·5
Wellington	62·0	1	33·4	29	53·9	44·3	45·1	86	108·8	24·0	6·42	17	7·6
Auckland ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Jamaica, Kingston ..	92·5	20	69·3	24	88·1	73·1	73·1	78	...	...	3·94	12	...
Grenada	89·0	7	71·0	11	85·0	75·0	...	76	135·0	...	10·23	19	2·5
Toronto	100·2	30	53·7	1	86·6	65·5	64·5	71	147·0	42·6	·36	4	3·5
Fredericton	93·2	20	43·0	10	78·0	55·7	60·4	78	...	...	5·06	11	5·4
St. John, N.B.	77·3	22	48·4	8	65·9	48·4	54·0	86	136·7	44·0	5·50	14	6·9
Victoria, B.C.	79·8	30	45·1	26	64·4	50·8	50·0	78	139·0	36·2	1·23	...	...

* 10, 19.

Johannesburg.—Bright sunshine, 313·8 hours.

COLOMBO, CEYLON.—Mean temp. 80°·3, or 0°·6 below. dew point 0°·2 below, and R 6·40 in. above, averages. Mean hourly velocity of wind 5·8 miles.

HONGKONG.—Mean temp. 82°·7, mean hourly velocity of wind 7·2 miles. Bright sunshine 277·1 hours.

Melbourne.—Mean temp. 0°·9 above, and R ·30 in. below, averages.

Adelaide.—Mean temp. 1°·0 above, and R ·68 in. above, averages.

Coolgardie.—Temperature 1°·6 below the average. R normal.

Hobart.—R 2·45 in. above average.

Wellington.—Mean temp. 1°·6 above, and R ·54 in., above, averages. Bright sunshine 75·3 hours.