

Symons's Meteorological Magazine.

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THE history of this Magazine as of most lives is one of alternate hope and disappointment, of struggle and slackness. At one time it seemed as if increasing support and encouragement were about to justify a course which might lead direct to popularity with profit, again, and now, the utmost we can hope for for months if not years to come is to weather the storm by shortening sail.

It is worth while to make the effort, for this Magazine possesses some elements of usefulness which ought to be preserved. It has the longest history of any journal devoted to meteorology. It makes a feature of giving expression to all sane views however much these may be at variance from orthodox scientific beliefs or from the opinions of the Editor. This is, we are convinced, the proper attitude of the scientific mind, and for our part we should feel far more ashamed of suppressing an unsuspected truth than of involuntarily giving publicity to an error. But if an error should appear we very cordially welcome its refutation.

In these days when the last word on any subject of difficulty is nationalization and the appointment of a Controller with an unlimited staff, we are conscious of being on the unpopular side in supporting individual effort, voluntary organization and consistent economy. We hold very strongly that public departments should assist such work as ours by recognition and even financial aid in emergencies, but without imposing conditions of official control which tend to stifle initiative and lessen responsibility. Experience has convinced us that work of great value is often done by voluntary Observers working not quite in the best way who would rather cease to observe than come under a rigid system of rules and regulations. We try to guide such Observers by endeavouring to increase their enthusiasm to the point which leads them voluntarily to ask for advice.

In a properly regulated State, such as we may dream of after the war, it should not be found impossible, we believe it would be easy, to unite voluntary enthusiasts in willing co-operation in a national system of rainfall observations (for example) which should be supported by public funds. But pending the dawn of that golden day we shall endeavour to render such services and produce such results as the contributions of the faithful and the restrictions of this time of stress admit.

GUNFIRE IN FRANCE, RAINFALL IN ENGLAND.

By THE EDITOR.

MR. HARRIES raises a very important point in his letter, published on another page, when he questions the validity of the regional averages used by Mr. Brodie in his article in the January number. We have always been at pains to lay the utmost stress on the importance of using the same period for average rainfalls at stations which have to be compared, and on selecting equally spaced stations when the general rainfall over a district has to be dealt with. How far these rules are followed in the official *Weather Reports* we are not aware; but we give herewith a series of values which are free from any errors of this kind. Time could only be found for dealing with two districts, one the South-East of England (comprising divisions I.-IV. of *British Rainfall*, i.e., the counties to the south-east of a line drawn from the Wash to Portland Bill), the other comprising coastal stations from Sutherland and the Hebrides to the west of Ireland, the one being the nearest, the other the most remote part of the British Isles as viewed from the centre of warlike activity in Flanders. The number of stations differed by one or two in different years; but care was always taken to ensure that the stations employed for any one year gave a true account of the general distribution of rainfall, so that it is quite certain that no one year over-represents the wetter or the drier parts of the district. The average employed in every case was that of the stations used and extended over the 35 years, 1875-1909, except in the case of 1909, when the average was for the 30 years, 1870-1899. The figures for the individual stations are those published annually in Part II. of *British Rainfall* under the title of "Monthly Rainfall . . . the average . . . being taken as 100."

The Tables represent the variations of monthly rainfall from the monthly normals, and they will no doubt be interpreted variously by various theorists. In order to facilitate discussion we group the results in a special form by taking the mean percentage for each month in three three-yearly periods, and a final mean for the whole nine years. While a month cannot have less than no rain, or a deficiency of 100 per cent., it may have as much as four times the normal rainfall or an excess of 300 per cent. at an individual station, and probably an excess of 200 per cent. for a whole region of the size of those dealt with. The limits of annual rainfall, on the other hand, range from a deficiency of about 40 per cent. to an excess of about 50 per cent. at individual stations.

A glance at the Tables shows that for both regions the nine years were as a whole wetter than the average, the south-eastern rather more so than the north-western. This increase of rainfall was not uniform throughout the year. In both regions the summer and early autumn months were considerably drier than the average, the

South Eastern Region. Rainfall as per cent. of Average.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
1909	41	34	189	94	86	174	120	94	110	166	34	168	110
1910	107	162	58	116	144	103	107	90	40	80	134	186	109
1911	73	75	116	76	69	102	13	51	70	96	142	204	91
1912	171	97	175	10	67	143	101	267	108	80	86	123	120
1913	169	49	145	154	101	40	78	58	86	129	102	46	95
1914	63	133	239	58	68	68	90	63	46	75	121	273	107
1915	174	196	70	60	161	54	166	90	99	69	106	231	121
1916	74	233	223	77	103	117	54	142	67	112	144	138	121
1917	91	56	113	84	88	118	142	206	76	120	54	62	104
1909-11	74	90	121	95	100	126	80	78	73	114	103	186	103
1912-14	134	93	186	74	79	84	90	129	80	95	103	147	107
1915-17	113	162	135	74	117	96	121	146	81	100	101	144	115
1909-17	107	115	148	81	100	102	97	118	78	103	102	159	109

North Western Region. Rainfall as per cent. of Average.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year
1909	120	80	89	156	116	57	113	80	70	128	81	96	97
1910	132	177	88	139	111	98	105	146	36	50	105	76	103
1911	73	130	69	129	94	89	128	73	78	71	114	134	97
1912	77	103	139	113	89	148	96	111	48	104	116	144	109
1913	110	77	150	148	131	128	40	42	79	87	134	108	101
1914	91	189	134	130	94	63	97	97	84	51	128	131	107
1915	129	147	72	155	44	59	124	69	58	57	75	132	94
1916	138	143	58	162	168	87	70	76	63	176	129	93	114
1917	65	38	75	98	88	94	48	104	91	182	178	72	105
1909-11	108	129	82	141	107	81	115	100	61	83	100	102	99
1912-14	93	123	141	130	105	113	78	83	70	81	126	128	106
1915-17	111	109	68	138	100	80	81	83	71	138	127	99	104
1909-17	104	120	97	137	104	91	91	89	67	101	118	110	103

nine years mean showing no excess but in most cases a marked deficiency of rainfall for June, July, August, September and October, and excesses only for the winter and early spring months November, December, January and February. In the north-west April and May were also wet, and in the south-east March and August. The most conspicuous feature is that in both regions September showed a greater deficiency than any other month. We have shown on a previous occasion that the increasing dryness of September has been a feature of the climatology of the British Isles for the past fifty years. We cannot say why this should be so, but the fact is incontestable and the tables show by the three year averages that although the deficiency was greatest in 1909-1911 the slight decrease in the deficiency occurred more in the pre-war years 1912-14 than in the war years 1915-17. It is surely remarkable that during the war not one of the three Septembers had as much as its average rainfall, and we do not suppose that less explosives were consumed in September than in other months. Again, in the south-eastern region the greatest excesses in the three war years occurred in February, March,

August and December. In February and August the war years showed a higher excess than in either of the previous three-yearly periods; but in March, the three-years' period 1912-14, and in December, both the previous three-year periods had greater excesses. Thus if the increase in the wetness of February and August is to be attributed to gun-fire, there must be some other explanation for the reduced wetness of March and December. These are only examples of the arguments which may be drawn from our tables, but they bear very strong evidence to the effect that the abnormalities of the rainfall of the war years are merely the natural development of changes which have certainly been at work for nine years and in one case no less certainly for fifty years.

In the south-eastern region the wettest January, February, July, November and December in the nine years occurred during the war; the wettest of the other seven months before the war. In the north-western region the wettest January, April, May, September, October and November occurred during the war, the other six months before the war. So far as this rough test goes the wettest months during the war were more numerous in the region remoter from the firing.

We may approach the matter also from the point of view of the frequency of wet and dry months in the period of forty-one months commencing in August, 1914, during which the war has been raging, and also in the forty-one months ending in July, 1914, when peace reigned.

Monthly rainfall is so variable that a month which has within 25 per cent. of the average rainfall cannot be treated as significant of either exceptional wetness or dryness, but may be termed *neutral*. A month with from 25 to 50 per cent. below the average may be called *dry*, with more than 50 per cent. below the average, *very dry*; while a month with between 25 and 100 per cent. of excess may be called *wet*, and one with an excess of more than 100 per cent *very wet*. Applying these terms to the two areas we find the following results:—

Number of Months out of 41.

	Very Dry.	Dry.	Neutral.	Wet.	Very Wet.
S.E. before War	5	9	15	9	3
„ during War	1	11	16	8	5
N.W. before War	3	4	20	14	0
„ during War	3	11	12	15	0

A partisan of the belief that gunfire in France influences rainfall in England would, of course, fasten on the fact that immediately before the war there were in the south-east of England 5 very dry months in 41, and during the war only 1; whilst before the war there were only 3 very wet months out of 41, and during the war, 5. But in the same period before the war there were 14 dry or very dry months, and 12 wet or very wet months, and during the war 12 dry

or very dry and 13 wet or very wet months, so a single month transferred from one category to the other would bring the result to equality or even reversal. In the north-west of the British Isles in the same two periods very dry months were equally numerous, whilst there were no very wet months. Taking dry and very dry months together there were 7 before, and 14 during the war, and of wet months there were 14 before and 15 during the war.

Much stress has been laid on the relative wetness of the years 1915 and 1916 in the south-east of England, but this fact must be considered in connection with the fact that 1917, when the war was at its intensest phase, was a year of nearly normal fall.



Correspondence.

To the Editor of Symons's Meteorological Magazine.

GUNFIRE AND RAINFALL.

IN the preparation of the article on pp. 121-126 of the December number the "Iconoclastic Spirit" was too intent upon spectacular effect to be curbed by the cautionary official foot-note as to the considerable effect produced by changes in the distribution of stations. Some years ago a paper, giving the results of 60 years' rainfall on one of our sugar growing islands, was submitted to me. The conclusion arrived at was alarming. The second half of the period showed that the rainfall was double that of the first half! But the earlier records were taken in the relatively dry residential lowlands along the littoral, whereas the later ones were contributed by from two to three times as many observers, most of them in the wet upland regions of the interior. As no attempt was made to weight the records, the annual mean values of the total number of stations, and the diagram representing them, were entirely misleading.

Proverbially, mere figures can be made to prove anything. Mr. Brodie, taking a perspective view, sees only the large foreground figures of 1917, to the exclusion of those at the vanishing point, in 1881. Lieut. Dobson (p. 139), taking a full-face view of the same figures, arrives at conclusions which demolish Mr. Horner's theory. However, the solution of the problem under discussion is not to be determined by pages of vague statements and suggestions about instances of rain falling during or after some cannonading, while completely ignoring the numerous cases of the noisiest actions in the campaign which have been marked by brilliantly fine and dry weather.

What the readers of your Magazine require for their guidance are accounts of actual experiments proving beyond a doubt that under some if not all conditions noise does produce rain. If this cannot be done—all experiments thus far appear to have been hopeless failures—there is no other alternative than to class the theory with that of the angelic origin of rain given at p. 144, which is not only a far simpler, but a much prettier theory.

HY. HARRIES.

January 20th, 1918.

THE letters from Mr. D. W. Horner which appeared in the September and November issues of your Magazine (pp. 90, 115), and my article which you were good enough to insert in the December issue, have elicited a volume of criticism, mostly of a decidedly unfavourable character.

(1.) Mr. J. Edmund Clark draws attention to the fact that in the course of the past year heavy falls of rain, causing disastrous floods, were experienced in various parts of the Eastern and Southern Hemispheres, and asks, somewhat triumphantly, whether these occurrences could, with any shadow of reason, be associated with the heavy gunfire in France and in Flanders. The reply is that in our own country the feature in the rainfall has been not so much the occurrence of short lived plumps as an excess of precipitation in what may be described as the Continental regions, extending, with a few notable interruptions, over a period of three years.

(2.) Lieut. Gordon Dobson, after a mild reference to my supposed ignorance of sound statistical methods, produces a table, showing, firstly, the number of quarters in which an excess of rain occurred in England S.E. in war and in peace times; and, secondly, for the same periods, the number of quarters in which there was more rain in the south-eastern than in the north-western district. With the first set of figures little fault can be found. It is true that in the three year period, October, 1909, to September, 1912, the number of wet quarters in England, S.E., was practically as large as in the later period, October, 1914, to September, 1917. But Mr. Dobson loses sight of the fact that in the war period the excess of rain in the east and south-east of England was very much greater than in the peace period. No re-arrangement of the figures is capable of masking this feature, which is, to my mind, of considerable importance. If we assume that Mr. Dobson is dealing simply with the meteorological districts known as England, S.E. and England, N.W., and if we are to understand further that the percentage of the average is the thing to be noted my own results below given differ very materially from those of my critic.

Number of Quarters with more rain in S.E. or N.W. Districts.

	Oct. 1914— March 1916	April 1914— Sept 1917	Total (War)	Oct. 1909— March 1911	April 1911— Sept. 1912	Total (Peace)
Excess in S.E. ...	6	4	10	3	2	5
Excess in N.W. ...	0	1	1	1	3	4
Uncertain ..	0	1	1	2	1	3

(3.) Mr. Henry Harries attaches much importance to the fact that although gun practice has been for many years past in frequent progress at Shoeburyness the average rainfall in that locality is smaller than in any other part of the United Kingdom. Does Mr. Harries seriously imagine that, as regards air displacement, any comparison may be fairly drawn between the explosions at Shoeburyness and the heavy firing which is in almost constant operation (even on a fairly quiet day) along the Western Front. In the further communication from Mr. Harries, which appears in this issue of the Magazine reference is made to the possible effect of "noise" as a rain producer. For the expression "noise" I should prefer to substitute "violent concussions, producing air waves of unusual magnitude."

(4.) Mr. W. H. Dines evidently regards the whole question as beneath the notice of any serious meteorologist. His Shakespearian quotation appeals to one's sense of humour, but one cannot help thinking that Mr. Dines could "an he would" afford some real enlightenment on a subject which is scarcely capable of solution in the way suggested by our good friend Hotspur.

(5.) Mr. F. J. Wardale shows that in the distant past when big European wars were happily unknown, it was clearly possible for various sections of the United Kingdom to be affected by an excess of rain extending over a long period. He also draws attention to the fact that for many months together there is often a tendency for incoming barometrical depressions to pursue definite paths, sometimes over one portion and at other times over some other portion of this country. The causes of such tendencies remain a profound mystery, and are a serious stumbling block in the way of those who would venture upon long distance weather forecasting.

The conclusion one forms with regard to the question under issue is that, in the opinions of many of our ablest meteorologists, the impossibility of any connection between gunfire and rainfall is so clearly established that further discussion of the subject would be nothing less than a waste of time. There is, on the other hand, a small but not insignificant minority in whose ranks I prefer, for the moment, to stand, whose minds are still open to conviction on the one side or the other. All doubts upon the matter might, I venture to think, be solved by an enquiry conducted upon the following lines :—

(1.) By procuring from official, or other reliable, sources the dates, upon which the bombardments along the Western Front have been unusually heavy and prolonged.

(2.) By examining carefully the daily weather maps and reports for two or three days prior and for about a week subsequent, to the above dates with a view to discovering :—

(a.) Whether the barometrical conditions were distinctly unfavourable to the production of rain, and whether in such cases any material precipitation was reported in our eastern and southern districts.

(b.) Whether the conditions were of an indefinite type, whether in such cases any rain fell, and whether it was heavier or more general than might have been expected.

(c.) Whether the conditions were of a pronounced rainy type, and whether in such cases the precipitation was heavier than might have been expected.

With regard to (b.) and (c.) some difficulty would arise owing to the impossibility of estimating correctly the quantity of rain which is likely to occur within any given area under favourable rainfall conditions. Some of our heaviest rains, such for instance as the Norfolk fall of August, 1912, and the Somerset fall of June last, appear to have been wholly unexpected; and in the present state of weather knowledge it seems quite impossible to account satisfactorily either for cloudbursts which are purely local, or for others which cover, as in the cases mentioned, a tolerably wide area.

In spite of such difficulties the enquiry suggested would, in all probability, yield results of a sufficiently decisive character to remove all doubts as to the meteorological effect of gunfire, and in the opinion of many of us such a consummation would fully compensate for the time and trouble involved in the investigation.

FREDK. J. BRODIE.

30 Loxley Road, Wandsworth Common, Feb. 10th, 1918.

COLD OF JANUARY 13th.

ON January 13th the thermometer fell to -4° on the low ground near the river. On the lawn 90 feet above it it marked 1° . On April 1st, 1917, it marked -5° , and on the lawn 90 feet higher it was 3° . An interesting point is that an Aucuba bush, about 4 feet high, was badly cut in April. The same bush (what remains of it) is as fresh as can be, which shows the effect when the sap was rising and when the plant was at rest.

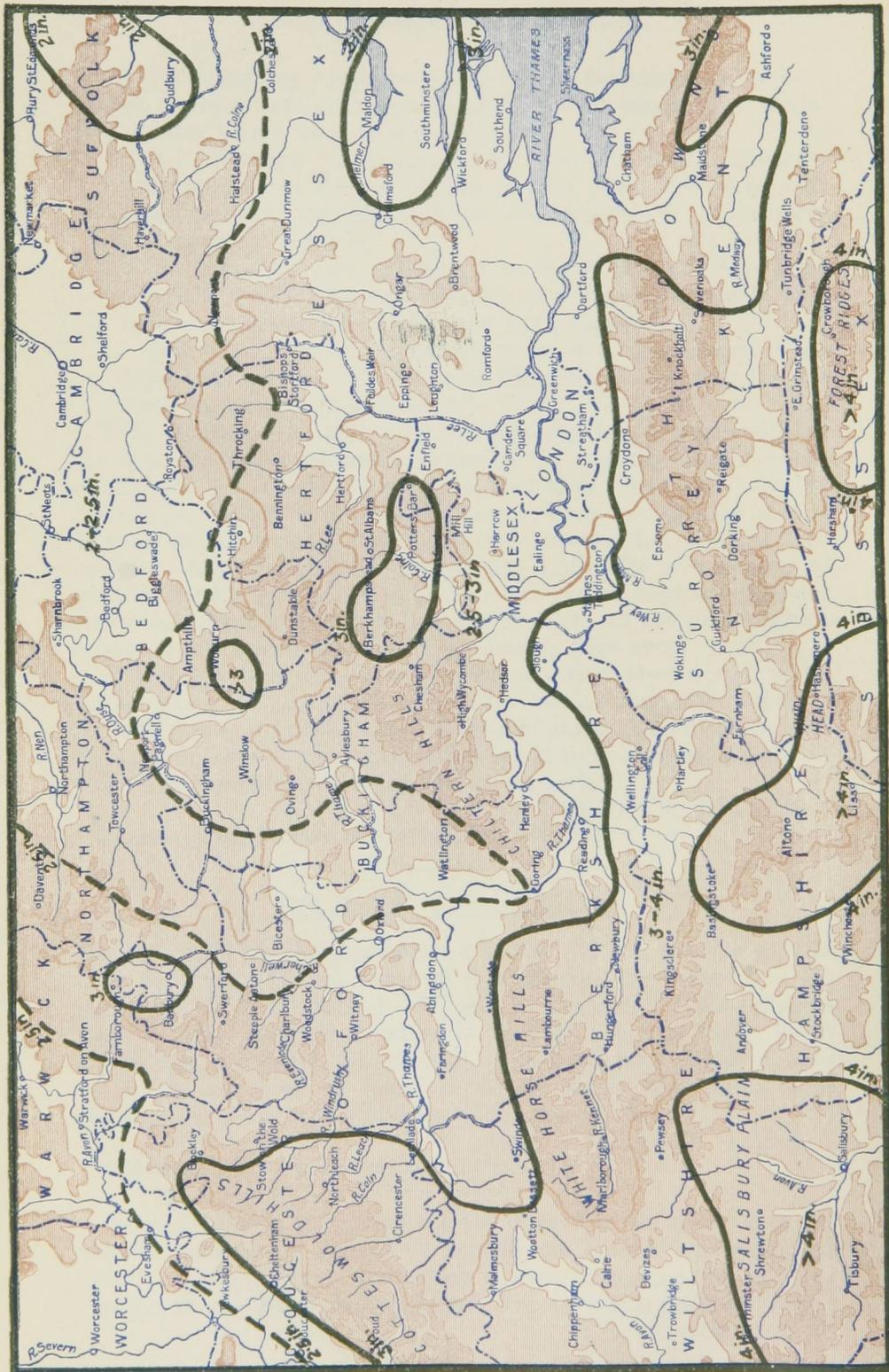
WILLIAM ELLIS.

Bothalhaugh, Morpeth, January 26th, 1918.

NOTE.—In order to concentrate the interest in the question of the possible influence of gunfire on rainfall, we have left no space this month for a number of interesting matters, including the January meeting of the Royal Meteorological Society, which are held over,

ED. S.M.M.

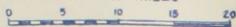
THAMES VALLEY RAINFALL JANUARY, 1918.



ALTITUDE SCALE

Below 250 feet	250 to 500 feet	500 to 1000 feet	Above 1000 feet
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SCALE OF MILES



THE WEATHER OF JANUARY.

THE month was cold in its first half, and remarkably mild during the second half. During the cold period comparatively little snow fell. The distribution of barometric pressure about the middle of the month was complex, but during the first ten days pressure was high off the west of Ireland and low over Scandinavia, while in the last ten days of the month the reverse conditions obtained. The mean temperature of the month taking the country as a whole was in close accordance with the average, but in the north and east of Scotland was a degree and a half under, and in the north-west of England a degree above the average. The lowest temperatures were recorded in Scotland, on the 14th or 15th, the minima in shade falling to -3° , at West Linton, -1° at Eskdalemuir, and 4° , at Balmoral. In England readings under 12° were confined to northern districts; and at Scilly, on the 14th, the lowest was only 39° . The cold in Scotland was quite exceptional, the Dee and the lower reaches of Loch Lomond being frozen for the first time since the memorable frost of 1895. About the 17th a mild south-westerly current spread over the country, and by the 24th or 25th shade maxima exceeding 55° had been recorded at a large number of places, the maximum values being 58° , at London (Westminster), on the 24th, and at Hawarden Bridge on the 25th. As far north as Gordon Castle a value of 56° was reported on the former day.

Bright sunshine was deficient except on the south coast, where there was an average of three hours a day, while the average in the north of Scotland was only half an hour. The south-east of England was relatively sunny with about two hours a day. Compared with the average the dullest weather was experienced over Ireland.

The rainfall was in general above the average, the excess being considerable in the south and west parts of the country, Kerry, the Devon-Cornwall peninsula, Kirkcudbright and Wigtown, for example, all having a heavy rainfall. The actual amounts rose to as much as 10 inches at Killarney, 8 inches on Dartmoor, and 11 inches at Shiel, in Kirkcudbright. Slightly larger amounts fell in the normally wet areas where the excess as compared with the average was, however, slight.

The least rainfall, from 1.50 to 2 inches, was recorded in the central Highlands of Scotland, the north Midlands, the Fen district, and in Kings Co. In our map of the Thames Valley the southern portion of a dry area and the northern part of the wet area near the south coast are included. The general fall expressed as a percentage of the average was:—England and Wales, 123 per cent; Scotland, 104 per cent.; Ireland, 110 per cent.; British Isles, 113 per cent.

In London (Camden Square), the mean temperature was $39^{\circ}.3$, or $0^{\circ}.8$, above the average. The duration of bright sunshine was 29.2 hours, and the duration of rainfall, 61.0 hours. Evaporation, .14 in.

RAINFALL TABLE FOR JANUARY, 1918.

STATION.	COUNTY.	RAINFALL.						
		Aver. 1875— 1909— in.	1918. in.	Diff. from Av. in.	Per cent. of Av.	Max. in 24 hours.		No. of Days
						in.	Date.	
Camden Square.....	London.....	1·83	2·86	+1·03	156	1·23	15	18
Tenterden.....	Kent.....	2·14	3·21	+1·07	150	1·49	15	19
Arundel (Patching).....	Sussex.....	2·59	3·80	+1·21	147	1·58	15	14
Fordingbridge (Oaklands)...	Hampshire.....	2·67	4·48	+1·81	168	1·30	15	19
Oxford (Magdalen College).....	Oxfordshire.....	1·78	2·74	+·96	154	1·26	15	12
Wellingborough(Swanspool).....	Northampn.....	1·90	1·62	—·28	85	·24	14	17
Bury St. Edmunds(Westley).....	Suffolk.....	1·70	2·24	+·54	132	·95	15	13
Geldeston [Beccles].....	Norfolk.....	1·53	2·73	+1·20	179	1·21	15	21
Polapit Tamar [Launceston].....	Devon.....	3·59	5·83	+2·24	163	1·51	15	24
Rousdon [Lyme Regis].....	„.....	2·94	3·92	+·98	133	1·57	15	18
Stroud (Field Place).....	Gloucester ..	2·33	3·03	+·70	130	·75	19	15
Church Stretton.....	Shropshire.....	.....	3·11	.....	.....	·51	15	15
Boston.....	Lincoln.....	1·54	1·68	+·14	109	·36	15	19
Worksop (Hodsock Priory).....	Nottingham.....	1·70	1·63	—·07	96	·29	15	15
Mickleover Manor.....	Derbyshire.....	1·95	2·07	+·12	106	·45	19	18
Buxton.....	„.....	4·41	3·91	—·50	89	·63	9	18
Southport (Hesketh Park).....	Lancashire.....	2·55	2·87	+·32	113	·79	14	20
Arncliffe Vicarage.....	York, W.R.....	6·26	.....	.....	.....	.....	.....	.....
Wetherby (Ribston Hall) ..	„ „.....	1·89	2·28	+·39	121	·62	18	9
Hull (Pearson Park).....	„ E.R.....	1·70	1·82	+·12	107	·26	18	17
Newcastle (Town Moor) ..	Northland.....	1·90	2·73	+·83	144	·68	18	16
Borrowdale (Seathwaite) ..	Cumberland.....	13·44	15·46	+2·02	116	2·95	20	14
Cardiff (Ely).....	Glamorgan.....	3·65	4·78	+1·13	131	1·52	18	22
Haverfordwest.....	Pembroke.....	4·69	4·95	+·26	106	·72	17	20
Aberystwyth (Gogerddan).....	Cardigan.....	3·91	3·16	—·75	81	·83	18	16
Llandudno.....	Carnarvon.....	2·51	2·20	—·31	88	·71	14	17
Cargen [Dumfries].....	Kirkcudbrt.....	4·10	5·93	+1·83	145	1·50	19	18
Marchmont House.....	Berwick.....	2·40	2·73	+·33	114	·59	19	14
Girvan (Pinmore).....	Ayr.....	4·78	5·09	+·31	107	·50	9	25
Glasgow (Queen's Park) ..	Renfrew.....	3·53	4·09	+·56	116	1·75	20	15
Islay (Eallabus).....	Argyll.....	4·78	4·18	—·60	88	·49	19	27
Mull (Quinish).....	„.....	5·55	3·88	—1·67	70	·53	19	25
Balquhiddy (Stronvar).....	Perth.....	8·74	7·80	—·94	89	1·87	29	22
Dundee (Eastern Necropolis).....	Forfar.....	2·01	2·01	·00	100	·59	19	15
Braemar.....	Aberdeen.....	2·92	2·02	—·90	69	·54	22	13
Aberdeen (Cranford).....	„.....	2·36	2·98	+·62	126	·71	22	20
Gordon Castle.....	Moray.....	1·99	3·21	+1·22	161	·42	22	20
Drumadrochit.....	Inverness.....	3·63	3·84	+·21	106	·81	21	24
Fort William.....	„.....	9·20	8·55	—·65	95	2·16	28	26
Loch Torridon (Bendamph).....	Ross.....	9·42	11·53	+2·11	122	1·01	28	26
Dunrobin Castle.....	Sutherland.....	2·75	3·24	+·49	118	·70	21	16
Killarney (District Asylum).....	Kerry.....	5·94	9·51	+3·57	160	1·47	25	25
Waterford (Brook Lodge).....	Waterford.....	3·78	3·87	+·09	103	·98	14	17
Nenagh (Castle Lough).....	Tipperary.....	3·88	3·39	—·49	87	·50	18	21
Ennistymon House.....	Clare.....	4·30	3·26	—1·04	76	·59	25	22
Gorey (Courtown House) ..	Wexford.....	3·19	4·34	+1·15	136	1·00	14	17
Abbey Leix (Blandsfort).....	Queen's Co.....	3·15	2·68	—·47	85	·64	14	19
Dublin (Fitz William Square).....	Dublin.....	2·14	1·60	—·54	75	·35	18	15
Mullingar (Belvedere).....	Westmeath.....	3·10	2·88	—·22	93	·86	17	15
Crossmolina (Enniscoe).....	Mayo.....	5·35	6·10	+·75	114	1·03	17	27
Cong (The Glebe).....	„.....	4·79	5·94	+1·15	124	1·38	17	23
Collooney (Markree Obsy.).....	Sligo.....	3·87	4·57	+·70	118	1·10	17	26
Seaforde.....	Down.....	3·41	4·98	+1·57	146	1·05	19	21
Ballymena (Harryville).....	Antrim.....	3·73	3·67	—·06	98	·35	8	25
Omagh (Edenfel).....	Tyrone.....	3·46	2·86	—·60	83	·43	18	24

SUPPLEMENTARY RAINFALL, JANUARY, 1918.

Div.	STATION.	Rain inches.	Div.	STATION.	Rain inches.
II.	Warlingham, Redvers Road ..	3·62	XI.	Lligwy	3·76
„	Ramsgate	2·73	„	Douglas, Isle of Man .....	..
„	Hailsham	3·99	XII.	Stoneykirk, Ardwell House...	4·07
„	Totland Bay, Aston House...	2·93	„	Carsphairn, Shiel	11·01
„	Stockbridge, Ashley	3·75	„	Langholm, Drove Road	6·81
„	Grayshott	4·11	XIII.	Selkirk, The Hangingshaw..	3·80
III.	Harrow Weald, Hill House...	2·56	„	North Berwick Reservoir...	2·11
„	Pitsford, Sedgebrook	2·36	„	Edinburgh, Royal Observatry.	2·03
„	Woburn, Milton Bryant	3·29	XIV.	Biggar	2·37
„	Chatteris, The Priory	1·84	„	Maybole, Knockdon Farm ...	3·77
IV.	Elsenham, Gaunts End	2·91	XV.	Buchlyvie, The Manse	6·20
„	Shoeburyness	2·74	„	Ardgour House	12·97
„	Colchester, Hill Ho., Lexden	2·56	„	Oban	5·47
„	Ipswich, Rookwood, Copdock	2·50	„	Campbeltown, Witchburn ..	4·75
„	Aylsham, Rippon Hall	2·02	„	Holy Loch, Ardnadam	10·10
„	Swaffham	2·46	„	Tiree, Cornaigmore	2·53
V.	Bishops Cannings	3·14	XVI.	Glenquey	6·30
„	Weymouth	3·18	„	Glenlyon, Meggernie Castle..	..
„	Ashburton, Druid House.. ..	6·86	„	Blair Atholl	1·51
„	Cullompton	5·44	„	Coupar Angus	1·90
„	Lynmouth, Rock House	5·78	„	Montrose, Sunnyside Asylum.	2·02
„	Okehampton, Oaklands	6·81	XVII.	Balmoral	3·18
„	Hartland Abbey	4·85	„	Fyvie Castle	5·01
„	St. Austell, Trevarna	4·97	„	Keith Station	4·29
„	North Cadbury Rectory	3·30	XVIII.	Rothiemurchus	2·57
VI.	Clifton, Stoke Bishop	3·63	„	Loch Quoich, Loan	13·30
„	Ledbury, Underdown	2·42	„	Skye, Dunvegan	7·20
„	Shifnal, Hatton Grange	1·77	„	Fortrose	3·28
„	Droitwich	2·22	„	Glen carron Lodge	7·08
„	Blockley, Upton Wold	3·18	XIX.	Tongue Manse	4·17
VII.	Grantham, Saltersford	1·52	„	Melvich	3·35
„	Market Rasen	1·66	„	Loch More, Achfary	6·95
„	Bawtry, Hesley Hall	1·22	XX.	Dunmanway, The Rectory ..	7·76
„	Whaley Bridge, Mosley Hall	3·16	„	Glanmire, Lota Lodge	4·70
„	Derby, Midland Railway	1·70	„	Mitchelstown Castle	4·33
VIII.	Nantwich, Dorfold Hall	1·86	„	Darrynane Abbey	6·08
„	Bolton, Queen's Park	3·72	„	Clonmel, Bruce Villa	3·66
„	Lancaster, Strathspey	4·14	„	Broadford, Hurdlestown	3·62
IX.	Langsett Moor, Up. Midhope	3·11	XXI.	Enniscorthy, Ballyhyland..	3·55
„	Scarborough, Scalby	2·27	„	Rathnew, Clonmannon	3·73
„	Ingleby Greenhow	1·89	„	Balycumber, Moorock Lodge	2·12
„	Mickleton	3·90	„	Balbriggan, Ardgillan	2·65
X.	Bellingham, High Green Manor	4·08	„	Castle Forbes Gardens	3·38
„	Ilderton, Lilburn Cottage ...	2·76	XXII.	Ballynahinch Castle	6·34
„	Keswick, The Bank	7·05	„	Woodlawn	2·40
XI.	Llanfrechfa Grange	4·24	„	Westport, St. Helens	5·05
„	Treherbert, Tyn-y-waun	8·73	„	Dugort, Slievemore Hotel ...	5·13
„	Carmarthen, The Friary	5·60	XXIII.	Enniskillen, Portora	4·14
„	Fishguard, Goodwick Station.	4·50	„	Dartrey [Cootehill]	3·19
„	Crickhowell, Tal-y-maes	4·50	„	Warrenpoint, Manor House ..	3·12
„	New Radnor, Ednol	2·60	„	Belfast, Cave Hill Road	4·72
„	Birmingham WW., Tyrmynydd	6·18	„	Glenarm Castle	3·85
„	Lake Vyrnwy	5·28	„	Londonderry, Creggan Res...	3·19
„	Llangynhafal, Plas Drâw	1·89	„	Dunfanaghy, Horn Head ...	..
„	Dolgelly, Bryntirion	4·72	„	Killybegs	4·07
„	Bettws-y-Coed, Tyn-y-bryn...	..			

Climatological Table for the British Empire, August, 1917.

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	80.5	22	49.6	20	71.4	55.6	55.8	83	131.3	47.6	3.99	23	7.3
Malta	93.6	30	69.5	12	87.0	74.5	...	74	143.0	...	.00	0	0.5
Lagos	89.0	1	70.5	3	82.5	72.9	73.1	86	147.2	69.0	22.77	28	9.0
Cape Town	72.4	18	38.4	26	62.4	46.6	45.9	73	...	...	2.15	13	5.3
Johannesburg	68.5	6	28.6	9	58.7	39.6	36.0	73	...	30.1	2.57	10	3.2
Mauritius	76.3	29	54.0	22	74.0	61.6	58.5	75	...	.96	2.60	24	6.4
Bloemfontein	74.7	4	24.1	3	60.4	34.9	34.7	70	...	...	1.96	10	4.5
Calcutta	91.7	22	75.6	13	87.8	78.7	77.7	86	...	74.1	14.27	18	8.9
Bombay	87.7	18	73.4	15	83.6	77.1	76.4	38	133.5	71.1	33.27	28	9.0
Madras	98.3	2	73.7	29	92.1	77.1	74.5	79	161.5	73.1	6.39	18	6.1
Colombo, Ceylon	87.8	2	73.7	26	85.4	76.9	73.0	80	153.2	68.0	2.28	14	7.9
Hongkong	90.5	29	74.4	14	87.2	78.3	76.2	83	...	...	11.95	14	5.5
Sydney	70.2	30	40.1	2	62.0	46.8	42.7	69	119.2	29.2	2.04	11	3.2
Melbourne	67.6	28	33.0	5	59.2	44.6	43.3	68	115.6	25.9	2.25	13	5.5
Adelaide	74.3	9, 17	37.7	26	62.0	45.6	44.9	70	127.9	28.1	3.04	14	4.9
Perth	73.6	25	36.3	10	62.3	46.6	45.9	70	131.2	31.4	4.56	14	5.3
Coolgardie	77.2	27	31.8	18	63.0	41.0	35.8	51	135.8	27.0	.62	6	3.6
Hobart, Tasmania	64.0	10	35.8	6	56.9	41.9	39.0	64	113.4	29.2	2.30	15	5.5
Wellington	60.3	25	34.1	21*	55.4	43.9	43.4	79	122.5	25.0	3.94	15	5.5
Auckland ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Jamaica, Kingston	91.8	25	70.5	25	89.7	73.3	71.2	80	...	...	1.15	6	5.2
Grenada	89.0	30	71.0	5, 24	85.0	75.0	...	78	138.0	...	10.58	23	4.0
Toronto	92.0	1	46.0	31	77.7	57.7	58.7	81	141.8	40.2	4.44	12	5.8
Fredericton	91.0	2	44.0	27	78.1	56.7	61.1	83	...	...	7.20	13	5.7
St. John, N.B.	84.0	7	50.0	27	70.5	55.9	58.0	85	141.2	45.9	4.34	16	6.4
Victoria, B.C.	82.0	31	49.0	5, 8	69.2	51.6	52.0	76	134.8	39.0	.19	1	1.9

* And 27.

Johannesburg.—Bright sunshine 258.4 hours.

COLOMBO, CEYLON.—Mean temp. 81.1, same as average, dew point 0.6 below, average and R .40 in. below average. Mean hourly velocity of wind 5.6 miles.

HONGKONG.—Mean temp. 82.0. Bright sunshine 239.6 hours. Mean hourly velocity of wind 7.4 miles.

Melbourne.—Mean temp. 0.8 above, and R .45 in. above, averages. A remarkable meteoric display on the 20th. Fine aurora australis on the 9th at 7 p.m.

Adelaide.—Mean temp. 0.1 below, and R .54 in. above, averages.

Coolgardie.—Temp. 1.7 below average.

Hobart.—Magnificent aurora australis on the 9th.

Wellington.—Mean temp. 1.2 above and rainfall .56 in. below averages. Bright sunshine 148.1 hours. Frost on 10 days. Cloudy and showery month.