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## THE THUNDERSTORMS OF JULY 16th TO 20th, 1918.

THUNDERSTORMS of exceptional severity occurred in the south-eastern and Midland districts of England during this period and we print a few of the accounts which have been sent to us, adding some supplementary notes.

The principal storms appear to have been three in number. (1) The first, in east Surrey, occurred in the early hours of July 16th, and was remarkable for extraordinary hail, which is described by several correspondents. (2) On the evening of the 17th, London, especially the south, experienced exceptionally heavy rain, and a local storm of great severity is reported from Hawkedon, near Bury St. Edmunds, and one of less severity in Sussex. A sharp storm also occurred at Edinburgh later on the same evening. (3) The storm of July 20th appears to have been most notable in the Midlands, particularly round Worksop and Todmorden. The following correspondence deals with details of these storms.

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### JULY 16th.

ABOUT 2.15 a.m. on the 16th violent thunder and lightning began with heavy rain evidently accompanied by hail. In a minute violent blows were struck on the south windows by huge hailstones and less than a minute later they fell at such a rate that the deafening sound prevented the thunder from being audible. This continued for about six minutes, without the slightest slackening. When the hailstones struck the windows there was a phosphorescent flash. The lightning showed that the hillsides were white as with snow. In about 9 or 10 minutes from the start the hail had entirely ceased, and in another minute rain also practically ceased. The entire roof of the greenhouse was smashed and round the house hail lay 2 or 3 inches deep, being scattered unevenly about an inch deep on the level. Damage to vegetation was very great. The storm passed off to east by south, having come from west by south, but

the wind was south by west. The total rainfall for the day was 1.03 in., of which .80 in. almost certainly fell in ten minutes.

The hail was of three forms still quite distinct at 6 a.m. The largest had an opaque core about  $\frac{1}{4}$  in. in diameter, and were spherical or "bun-shaped" with jagged protruberances, some nearly an inch long. These were not smaller stones frozen on. Another form was opaque, very hard, and oval to spherical, from  $\frac{1}{2}$  to  $\frac{3}{4}$  in. across and looking like big sugar plums. Mixed with these were ordinary opaque hailstones. The rain was quite warm and the fall of temperature during the storm was only from 62.°5 to 59.°5 F.

The track of the storm across the valley was apparently only 300 yards wide in the worst parts, and lay nearly from south-west to north-east, and the greatest damage was almost within a mile east or west, through Walton, Tadworth, Chipstead, Coulsdon and Purley, mainly east of the Brighton Road, and Lower Sanderstead, Ballards on Shirley Hills, to Lower Shirley on the Wickham Road. The final traces of hail were at Bromley. Many windows were broken in Godstone and Little Roke, Kenley, but Kenley proper escaped almost entirely.

J. EDMUND CLARK

*Asgarth, Purley, July 16th, 1918.*

AFTER a thunder and hail storm at Purley, Surrey, this morning, between 3 and 3.30 a.m., I went into the garden and picked up large jagged hailstones. Some were of enormous size and one—a fairly regular oval or lemon shape—was  $4\frac{1}{2}$  inches in circumference. They were not several stones stuck together after fall to the ground, but were lying quite distinct on the lawn with appreciable spaces of grass between, and each was complete in itself. They were picked up almost immediately after the fall.

The above measurement was made by myself with a tape measure in the presence of my wife and two other persons. Its accuracy is supported by the fact that as late as 7 a.m. this morning, I found many distinct and separate stones of an inch or more in diameter still lying in sheltered spots. The hail broke windows in the house and completely smashed in the glass roof of a conservatory. Roads were badly torn up and flooded.

E. C. RUTHERFORD.

*L. B. and S. C. Railway, London Bridge Terminus, S.E., July 16th, 1918.*

AN extraordinarily violent hailstorm passed over here this morning at 3.30 a.m. (summer time). I was awoken by distant thunder and lightning about 2.30 and the storm appeared to approach from the direction of Kenley. When the hail fell the stones were apparently large from the first, and by the aid of the lightning I saw large masses of hailstones slide off the roof and crash to the

ground. They came down every chimney, and, coated with soot, rolled about the floors in size from that of a pea up to conglomerations of  $1\frac{1}{2}$  inch either way and  $\frac{3}{4}$  inch thick. Probably larger stones fell. The lawns remained white for half an hour after the fall although a warm, heavy rain continued to fall. Eight hours later there were cluster of hailstones as large as marbles still lying under the yew trees, although the temperature was about  $65^{\circ}$  F.

The majority of the stones were globular, but many were disc shaped, and the flatter, larger stones showed indications of conglomeration.

The destruction involved all glass of cucumber frames, rhubarb cut in holes and ribbons, early potato haulm flattened into the ground and late potato haulm very much torn, tomato plants, marrows and cucumbers were stripped and apples at least half torn off the trees. All flowers and half the leaves of trees were stripped—even gooseberries and small damsons being torn off.

ALFRED CARPENTER, Capt. R.N.

*The Red House, Sanderstead, July 16th, 1918.*

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I HAVE a note from Mr. W. Clifford Smith, C.E., on the thunderstorm of July 16th at Cane Hill Asylum, the gist of which is as follows:—There was no hail as we ordinarily understand it, but flat, irregularly shaped pieces of ice from one to two inches in length and sometimes more, and about  $\frac{3}{4}$  in thick. The fall of this ice began at 3.10 a.m. and lasted from seven to ten minutes, in which time it did damage to glass to the extent of £200, and to crops on the Asylum estate to the value of £1,000. These details you can take as reliable. Mr. Smith says that at 6.30 a.m. there had been collected from the gutters of the Asylum about three cubic yards of these pieces of ice, many of which still retained their flat faces. The ice did not fall until the thunderstorm had been in operation for an hour. He gives the limits of the fall about Cane Hill as the Chipstead Railway and Carshalton Hill on the north, Hollyme Road on the west, and the Valley beyond Farthing Downs on the south.

My rainfall here was only .07 in., although I noted the storm as a severe one, but early during the night of the 17th -18th we had a wonderful display of lightning, and there appeared to me to be three distinct storms in south-east, south-west, and north-west. At times lightning was literally incessant and it wound up with very heavy rain, 1.02 in. being measured at 9 a.m. R. H. CURTIS.

*"St. Budeaux," Warlingham, July 29th, 1918.*

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## JULY 17th.

At 9 a.m. on the 18th inst. I registered 1.50 in. of rain, of which 1.35 in. fell in thirty minutes, between 6.50 and 7.20 p.m. on the 17th, during a severe thunderstorm, which passed over this district.

F. E. WRIGHT.

*Hillsboro', Camborne Road, Sutton, July 19th, 1918.*

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In a storm, on July 17th, 1.02 in. of rain fell in forty-two minutes. The total rainfall for the day was 1.14 in.

G. E. DACEY.

*65, Clarendon Road, Lewisham, S.E.*

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The rainfall from 7 p.m. to 8 p.m. during last evening's storm was 1.19 in.

E. A. MARTIN.

*285, Holmesdale Road, South Norwood, S.E., July 18th, 1918.*

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HEAVY rain fell here from 7.20 p.m. to 8.10 p.m. (summer time), which registered 1.23 in. during the fall.

G. B. HAMLIN.

*285, The Broadway, Bexley Heath, Kent, July 17th, 1918.*

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I MEASURED more rain in twenty-four hours on 17th July than I have ever done since keeping a rain gauge, now thirty years. Of the 2.53 in., more than 2 inches fell in the hour from 7 to 8 p.m. (G.M.T.)

The afternoon was very sultry with no wind whatever, and all that one could see was that it was getting darker and darker so that lamps had to be lit by 7 p.m. About 6.45 p.m. tremendous hollow-sounding rumbles began which sounded up above the clouds, and so far no lightning appeared to strike the earth; but almost at 7 p.m. the rain suddenly came down in torrents and the lightning and thunder were terrific. The rain appeared to cease a few minutes after 8 p.m., and only a slight drizzle kept on till about midnight, when all was fairly clear. I did not go out to take the measurement at 8 o'clock but I feel confident that not more than .25 in. could have fallen after that time.

Three miles from here to the south-east in a direct line a road was blocked up with soil off a hilly field, and on the hill-side it was a yard deep tapering off to a foot on the road till it reached the stream.

There was about 200 yards of the road covered, but the worst part which I have described was about 100 yards. Five men, working with two tumbrels and horses, had been at work clearing away the soil for ten days, and then no waggon could pass, only a light

cart which could get on to the grass. This is the heaviest cloudburst I have known round here, and I believe from inquiry that the thunderstorm covered a very wide district. B. P. OAKES.

*Hawkedon Rectory, Bury St. Edmunds, August 1st, 1918.*

THE Buckland district experienced the heaviest hailstorm known to the oldest inhabitant: the stones were extraordinary for their size, and caused much havoc, not only among the glass in some of the larger grounds, but especially among the flowers and the vegetables. Many of the gardens were completely devastated, the hailstones cutting off the haulms of the potatoes, and damaging dwarf and runner beans and other products as if they had been slashed with a faggot. Tomatoes and cucumbers in the greenhouses were not even immune. The area between the "Red Lion" and Reigate Heath seems to have felt the full fury of the storm. In the Dorking neighbourhood, in many parts, the corn has suffered severely, especially where there was a promise of a heavy crop. In many instances the corn has been beaten down flat.—*Dorking Advertiser.*

*July 20th, 1918.*

#### RAINFALL OF JULY 17th.

Tilbury .....	7.30 to 9 p.m.	..	1 hr. 30 min.	..	1.50 in.
Old Ford ....	{ 6.55 ,, 8.45 ,,	..	1 ,, 50 ,,	..	1.53 ,, }
	{ 6.55 ,, 7.35 ,,	..	40 ,,	..	1.34 ,, }
Shad Thames	{ 6.15 ,, 8.5 ,,	..	1 ,, 50 ,,	..	2.32 ,, }
	{ 6.20 ,, 6.50 ,,	..	30 ,,	..	2.07 ,, }
Clapton Pond	{ 5.45 ,, 7.25	..	1 ,, 40 ,,	..	1.48 ,, }
	{ 5.45 ,, 6.20 ,,	..	35 ,,	..	1.35 ,, }
Barnes, Castlenau	Between 5 and 7 p.m.	..	40 ,,	..	.41 ,

#### JULY 20th.

PERHAPS you will like to have some remarks on the severe storm here, on Saturday, the 20th inst. The day was fine, though not settled. Thunder was first heard about 4.20 p.m. (summer time). The main fall of rain was from about 7.2 to 8.30 p.m., when 1.79 in. was measured—also I measured .21 in. about 10.14 p.m. At 10 a.m. on the 21st, I measured .08 in., so that the total for the day was 2.08 in. The duration of the heavy fall was one feature; also the thunder, which was heavy and frequent, chiefly between 7.12 and 7.41 p.m. No hail of any importance was observed.

The storm caused flooding and I have heard of a waterspout.

JAS. EDESON.

*Clinton Villas, Worksop, 29th July, 1918.*

## RAINFALL OF JULY 20th.

Workshop (Hodsock Priory) . . . .	10 min. . .	·53 in.
„ (Gateford Hill) . . . . .	4 hours . .	2·50 „

METEOROLOGICAL OBSERVATIONS AT  
LU-KIA-PANG, CHINA, FOR 1917.

By REV. J. DE MOIDREY, S.J.

(Continued from page 56).

III.—Relative Humidity. Per cent.

	RELATIVE HUMIDITY.			VAPOUR TENSION.		
	Mean.	Lowest.	Highest.	Mean.	Lowest.	Highest.
Jan. . . . .	70	50	92	3·2	1·3	5·3
Feb. . . . .	68	48	93	4·1	2·2	7·1
Mar. . . . .	69	51	96	5·6	3·2	8·8
April . . . .	64	36	97	8·0	4·8	11·2
May . . . . .	64	39	97	10·8	6·9	15·6
June . . . . .	83	67	97	18·9	12·4	25·3
July . . . . .	84	67	95	23·1	18·5	27·9
Aug. . . . .	81	65	94	22·5	17·1	26·4
Sept. . . . .	84	72	95	19·4	11·9	26·0
Oct. . . . .	79	58	98	11·9	5·7	15·0
Nov. . . . .	76	63	99	7·0	4·3	12·6
Dec. . . . .	72	54	96	4·3	1·7	9·7
Year . . . . .	74	36	99	11·6	1·3	27·9

VI.—Rainfall.

	(a.) INTENSITY. Days with								Days with		
	0·1—0·9	1·0—2·9	3·0—4·9	5·0—9·9	10·0—19·9	20·0—39·9	40·0—59·9	60·0 & over	Rain.	Snow.	Total.
Jan . . . . .	3	2	—	1	—	—	—	—	4	2	6
Feb. . . . .	2	2	—	2	—	—	—	—	4	1	5
Mar. . . . .	3	2	1	3	1	—	—	—	9	—	9
April . . . .	4	2	1	1	1	—	—	—	9	—	9
May . . . . .	4	2	2	3	1	—	—	—	11	—	11
June . . . . .	3	5	—	1	3	1	—	2	15	—	15
July . . . . .	—	2	1	3	—	1	1	—	8	—	8
Aug. . . . .	4	—	2	2	1	3	—	—	10	—	10
Sept. . . . .	7	1	2	3	2	1	—	—	13	—	13
Oct. . . . .	5	2	1	—	3	1	—	—	8	—	8
Nov. . . . .	5	3	—	—	—	—	1	—	5	—	5
Dec. . . . .	2	2	—	—	1	—	—	—	4	—	4
Year . . . . .	42	25	10	19	13	7	2	2	100	3	103

VI.—(con.)

(b.) Total Rainfall. Millimeters.			(c.) Rainless Periods of 10 days or more, excluding dew.			
	8 p.m. —8 a.m.	8 a.m. —8 p.m.	Total.	Began.	Ended.	Lasted.
Jan. ....	3·1	8·6	11·7	Jan. 2	Jan. 21	20 days
Feb. ..	5·9	9·8	15·7	Mar. 19	April 9	22 "
Mar. ...	36·0	12·7	48·7	Oct. 5	Oct. 22	18 "
April ..	16·3	10·7	27·0	Nov. 8	Nov. 29	22 "
May....	24·1	21·9	46·0	Dec. 2	Dec. 11	10 "
June ...	134·5	149·2	283·7	Dec. 15	*	
July ..	58·7	63·9	122·6			
Aug. ...	48·4	54·0	102·4			
Sept. ..	66·9	17·5	84·4			
Oct. ...	26·3	8·8	35·1			
Nov. ...	19·2	31·0	50·2			
Dec. ..	9·6	9·5	19·1			
Year ...	449·0	397·6	846·6			

\*The last rainless period was not ended when sending the report, on February 2nd, 1913, 50 days.

VIII.

Mean Duration of Bright Sunshine. Hours.

	Fore-noon.	After-noon.	Total.	Per-centage of possible.	Mean amount of Cloud.
Jan. ...	3·3	3·1	6·4	62	0·4
Feb. ..	2·9	2·8	5·7	51	0·5
Mar. ...	3·3	3·0	6·3	52	0·5
April ..	3·0	2·8	5·8	44	0·6
May....	3·6	3·4	7·0	51	0·5
June ...	2·2	2·0	4·2	30	0·7
July ..	3·5	3·0	6·5	47	0·5
Aug. ...	4·0	3·8	7·8	59	0·4
Sept. ..	3·0	2·6	5·6	45	0·5
Oct. ...	2·4	1·6	4·0	35	0·6
Nov. ...	2·7	2·6	5·3	50	0·5
Dec.* ..	—	—	—	—	—
Year* ..	3·1	2·8	5·9	48	0·9

VII.—Wind (a.)

Mean Velocity at 8 a.m., 2 p.m. and 8 p.m. Metres per second.

	Mean.	Min.	Max.
Jan. ...	3·8	8·8	7·3
Feb. ...	3·5	0·4	8·2
Mar....	3·4	1·1	5·4
April ...	3·7	1·2	8·1
May ...	3·4	1·3	6·1
June ...	2·9	1·0	4·9
July ...	4·4	1·7	7·9
Aug. ...	2·4	0·3	6·9
Sept. ...	3·3	0·9	7·9
Oct. ...	2·4	0·3	4·0
Nov. ..	2·6	0·0	6·1
Dec. ..	3·5	0·7	7·3
Year ..	3·3	0·0	8·2

VII.—Wind. (b.) Direction. Percentage Frequency.

	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.	Vari-able
Jan.....	13	7	6	8	4	6	13	39	4	0
Feb.....	20	15	13	12	5	5	4	15	8	2
Mar. ....	20	13	11	21	4	6	4	15	5	1
April ....	6	15	19	24	6	11	3	9	7	1
May ....	5	13	9	22	15	16	10	5	3	1
June ....	3	13	24	28	11	8	2	3	7	0
July.....	3	6	17	46	18	6	1	2	1	0
Aug. ....	2	13	18	15	10	12	3	9	17	0
Sept. ....	21	21	8	20	7	2	2	10	6	2
Oct. ....	19	24	15	5	1	2	7	14	12	0
Nov. ....	20	8	7	3	3	4	7	22	24	0
Dec. ....	13	4	9	2	4	3	14	40	9	2
Year ....	12	13	13	17	7	7	6	15	9	1

\* Sunshine recorder was under repair. Yearly means are not correct.

ERRATUM.—Vol. 52, p. 68—last line of table VII., Col. 1—For 22 read 15.

## REVIEW.

*Observations Météorologiques*, 1917. By A. Collenette, Guernsey, 1918. Size, 11 × 8½. Pp. 16. One plate.

MR. COLLENETTE'S fifteenth annual report on the climate of Guernsey—a subject which he has made peculiarly his own, is of especial interest as containing a large scale map of the distribution of average rainfall over the island. The method followed is somewhat original, the isopleths representing not the actual rainfall but the percentage of the fall at the standard station at St. Martin's Road, where observations are available for the long period of seventy-five years. This station, with an average annual fall of 36·7 inches, is, it appears, the rainiest spot in the island, and the map shows a fairly uniform falling off in all directions, the rainfall being below 90 per cent. of the standard in the western half of the island, and along the north coast, and less than 80 per cent. in the extreme west. The map is put forward, we gather, only as a first approximation to the true distribution, but Mr. Collenette's intimate knowledge of the climatic conditions of Guernsey, coupled with the care he has lavished on the observing stations, of which a tour, under Mr. Collenette's guidance gave us recent evidence, give great weight to his expression of opinion on the subject. C.S.

## METEOROLOGICAL NEWS AND NOTES.

AT THE ANNUAL MEETING of the Trustees of the British Rainfall Organization, held at 62, Camden Square, on July 31st, Mr. Carle Salter, the Assistant-Director of the Organization, was appointed Joint-Director with Dr. H. R. Mill, for the period during which Dr. Mill continues to be Director, or for such shorter period as may be determined by the Trustees. Mr. Salter has been connected with the British Rainfall Organization as Assistant, Chief Assistant and Assistant-Director for twenty-one years, having joined the Staff in the time of the Founder of the Organization, Mr. G. J. Symons.

MR. A. PEARSE JENKIN, F.R.Met.Soc., read a paper, entitled, "Suggestions for a Rainfall Map of Cornwall," at the Summer meeting of the Royal Cornwall Polytechnic Society at Falmouth, on July 30th. He laid stress on the importance of an exact knowledge of the distribution of average annual rainfall, and pointed out that the preparation of a satisfactory rainfall map of Cornwall was rendered difficult by the existence of wide stretches of country without any observing stations. He urged the importance of establishing new rainfall stations in such areas.

BRITISH RAINFALL, 1917, is now complete, and the MS. is in the printer's hands, but difficulties of production will delay the publication until a period at least as late as it was last year.



THAMES VALLEY RAINFALL. JULY, 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 JULY.

THE month opened with about a week of fine summer weather, and a mean temperature slightly above the average in all but the north-western and extreme northern parts of the United Kingdom. On the 1st, and again on the 7th or 8th, the thermometer rose to between  $75^{\circ}$  and  $80^{\circ}$  over the inland portions of England, and on the former date it touched  $84^{\circ}$  (in the Glaisher screen) at Camden Square.

The distribution of barometric pressure was at the time anticyclonic, but after the 7th a marked change took place, and for about three weeks the weather was influenced by numerous depressions which came in, at first from the northern, and afterwards from the more central portions of the North Atlantic. The accompanying winds were often light and variable, but as a rule blew from some easterly quarter in the north, and from the southerly to westerly quadrant in the south. In Scotland the air was, therefore, cool for the time of the year. Early on the 10th the sheltered thermometer sank to  $30^{\circ}$  at Balmoral, and  $28^{\circ}$  at West Linton, the minimum readings on the grass being in each case a couple of degrees lower than those in the screen. Over the major part of England and Ireland the mean temperature agreed pretty closely with the average, an exception occurring on the 16th and 17th, when the thermometer rose to  $80^{\circ}$  or slightly above it at a few isolated spots in East Anglia. During this long spell of cyclonic weather, rain was frequent and often very heavy, more especially in the southern and south-eastern portions of the London district, where the total fall in eighteen or nineteen days was largely in excess of anything previously recorded in any complete July. An equally striking feature in connection with this long spell of disturbed weather was the abnormal frequency of thunderstorms, accompanied in many instances by torrential falls of rain or hail. At a large number of stations in England thunder occurred on at least seven or eight days, and at Richmond and Yarmouth on nine days, the number recorded at Kew Observatory being greater than in any July since the year 1880, when twelve days were affected.

After about the 27th an anticyclone extended over the United Kingdom from the south-westward and occasioned a decided improvement in the weather and a general increase of temperature. On the 31st the thermometer rose to  $80^{\circ}$  or slightly above it in several English districts, and touched  $82^{\circ}$  at Clifton (Bristol) and Jersey.

In spite of so much unfavourable weather the total duration of bright sunshine over the country, as a whole, was in excess of the average, but at a few places in the eastern and south-eastern portions of Great Britain there was a slight deficit.

The total rainfall of the month was in excess of the average in nearly all parts of the British Isles, and was exceptionally large in the south of England and in the east of Scotland, where rather more than double the average fell at one or two stations. As will be clear from the correspondence which we publish this month thunderstorms of a remarkable nature occurred in the south, principally to the south of London, where a number of stations experienced a total rainfall exceeding 7 inches in the month. More than 6 inches fell over a strip of country extending from Devonshire to Essex, a portion of which comes within the scope of the map of the Thames Valley facing this page. Less than 3 inches of rain fell over a part of the English Midlands, but more than 4 inches over the greater part of the country, practically everywhere in Scotland, and over the most of Ireland. The general rainfall of the countries expressed as a percentage of the average was :—England and Wales, 146 ; Scotland, 141 ; Ireland, 126 ; British Isles, 140.

In London (Camden Square) the mean temperature was  $63^{\circ}\cdot 0$ , or  $0^{\circ}\cdot 5$  below the average. The duration of bright sunshine was 163·2 hours, and of rainfall, 47·2 hours. The total evaporation was 2·59 in.

## RAINFALL TABLE FOR JULY, 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.....	2·57	4·74	+2·17	185	·56	26	18
Tenterden.....	Kent.....	2·21	3·59	+1·38	163	·98	20	15
Arundel (Patching).....	Sussex.....	2·46	4·73	+2·27	192	...	...	14
Fordingbridge (Oaklands)...	Hampshire.....	2·14	4·68	+2·54	219	·73	17	17
Oxford (Magdalen College)...	Oxfordshire.....	2·43	4·12	+1·69	169	·63	17	16
Wellingborough(Swanspool)...	Northampton.....	2·54	2·81	+·27	111	·67	17	17
Bury St. Edmunds(Westley)...	Suffolk.....	2·68	4·24	+1·56	159	1·93	17	16
Geldeston [Beccles].....	Norfolk.....	2·37	3·76	+·139	159	·89	17, 20	19
Polapit Tamar [Launceston]...	Devon.....	2·74	4·12	+1·38	150	·89	22	19
Rousdon [Lyme Regis].....	".....	2·68	4·92	+2·24	184	·88	22	19
Stroud (Field Place).....	Gloucester.....	2·75	2·95	+·20	107	·44	26	19
Church Stretton (Wolstaston)...	Shropshire.....	2·58	2·81	+·23	109	·68	15	16
Boston.....	Lincoln.....	2·35	2·86	+·51	122	·99	17	18
Workshop (Hodsock Priory)...	Nottingham.....	2·35	3·64	+1·29	155	1·09	20	18
Mickleover Manor.....	Derbyshire.....	2·57	3·23	+·66	126	·58	26	18
Congleton (Buglawton Vic.)...	Cheshire.....	3·03	3·70	+·67	122	·56	20	19
Southport (Hesketh Park)...	Lancashire.....	2·92	4·06	+1·14	139	·48	17	16
Wetherby (Ribston Hall).....	York, W. R. ....	2·56	3·78	+1·22	148	·63	18	16
Hull (Pearson Park).....	" E. R. ....	2·39	3·31	+·92	138	1·07	16	18
Newcastle (Town Moor).....	Northland.....	2·90	4·00	+1·10	138	·71	16	18
Borrowdale (Seathwaite).....	Cumberland.....	8·91	...	...	...	...	...	...
Cardiff (Ely).....	Glamorgan.....	3·26	5·54	+2·28	170	·85	22	19
Haverfordwest.....	Pembroke.....	3·39	5·19	+1·80	153	1·18	17	17
Aberystwyth (Gogerddan)...	Cardigan.....	4·03	4·85	+·82	120	·75	15	17
Llandudno.....	Carnarvon.....	2·52	2·54	+·02	101	·51	15	18
Cargen [Dumfries].....	Kirkcudbrt. ....	3·20	3·94	+·74	123	·81	15	19
Marchmont House.....	Berwick.....	3·30	3·14	-·16	95	·85	20	15
Girvan (Pinmore).....	Ayr.....	3·73	3·80	+·07	102	1·30	20	18
Glasgow (Queen's Park).....	Renfrew.....	2·91	3·07	+·16	106	·57	23	19
Islay (Eallabus).....	Argyll.....	3·41	3·59	+·18	105	·49	22	20
Mull (Quinish).....	".....	4·12	4·96	+·84	120	·76	22	21
Balquhidder (Stronvar).....	Perth.....	4·34	3·75	-·59	86	1·00	22	17
Dundee (Eastern Necropolis)...	Forfar.....	2·84	5·54	+2·70	195	1·14	20	18
Braemar.....	Aberdeen.....	2·65	6·62	+3·97	250	1·65	17	17
Aberdeen (Cranford).....	".....	3·00	6·42	+3·42	214	1·40	21	17
Gordon Castle.....	Moray.....	3·25	5·02	+1·77	154	·97	21	20
Drumna drochit.....	Inverness.....	3·37	5·04	+1·67	150	·80	17	18
Fort William.....	".....	4·92	4·65	-·27	95	·66	7	20
Loch Torridon (Bendamph)...	Ross.....	5·35	8·97	+3·62	168	1·31	12	21
Dunrobin Castle.....	Sutherland.....	2·91	6·93	+4·02	238	1·48	11	17
Glanmire (Lota Lodge).....	Cork.....	2·73	4·68	+1·95	171	·86	21	21
Killarney (District Asylum)...	Kerry.....	3·53	4·10	+·57	116	·86	31	22
Waterford (Brook Lodge)...	Waterford.....	3·13	3·03	-·10	97	·83	21	19
Nenagh (Castle Lough).....	Tipperary.....	3·02	5·09	+2·07	169	·73	13	22
Ennistymon House.....	Clare.....	3·57	5·94	+2·37	166	·77	31	21
Gorey (Courtown House).....	Wexford.....	2·90	2·67	-·23	92	·62	21	18
Abbey Leix (Blandsfort).....	Queen's Co. ....	2·99	3·62	+·63	120	·49	14	20
Dublin (Fitz William Square)...	Dublin.....	2·60	2·76	+·16	106	·47	12	18
Mullingar (Belvedere).....	Westmeath.....	3·16	4·07	+·91	129	·87	14	18
Crossmolina (Enniscoe).....	Mayo.....	3·26	4·81	+1·55	148	·69	7	22
Cong (The Glebe).....	".....	3·72	4·23	+·51	114	·74	31	20
Collooney (Markree Obsy.)...	Sligo.....	3·36	3·31	-·05	99	·53	7	22
Seaforde.....	Down.....	3·32	4·76	+1·44	143	1·02	17	17
Ballymena (Harryville).....	Antrim.....	3·44	4·16	+·72	121	·66	22	18
Omagh (Edenfel).....	Tyrone.....	3·34	3·48	+·14	104	·57	25	19

SUPPLEMENTARY RAINFALL, JULY, 1918.

Div.	STATION.	Rain inches.	Div.	STATION.	Rain inches.
II.	Warlingham, Redvers Road..	5·48	XI.	Lligwy .....	4·17
„	Ramsgate .....	3·60	„	Douglas, Isle of Man .....	3·21
„	Hailsham .....	4·70	XII.	Stoneykirk, Ardwell House...	2·34
„	Totland Bay, Aston House...	3·28	„	Carsphairn, Shiel .....	5·37
„	Stockbridge, Ashley.. .....	6·19	„	Langholm, Drove Road .....	5·99
„	Grayshott .....	4·77	XIII.	Selkirk, The Hangingshaw..	4·04
III.	Harrow Weald, Hill House...	3·41	„	North Berwick Reservoir.....	3·81
„	Pitsford, Sedgebrook.....	2·87	„	Edinburgh, Royal Observaty.	3·56
„	Woburn, Milton Bryant.....	3·72	XIV.	Biggar.....	3·47
„	Chatteris, The Priory.....	2·57	„	Maybole, Knockdon Farm ...	2·47
IV.	Elsenham, Gaunts End .....	4·96	XV.	Buchlyvie, The Manse .....	3·22
„	Shoeburyness .....	4·74	„	Ardgour House .....	7·40
„	Colchester, Hill Ho., Lexden	4·67	„	Oban.....	3·93
„	Ipswich, Rookwood, Copdock	3·87	„	Campbeltown, Witchburn ..	...
„	Aylsham, Rippon Hall .....	3·58	„	Holy Loch, Ardnadam.....	4·57
„	Swoffham .....	3·40	„	Tiree, Cornaigmore .....	...
V.	Bishops Cannings .....	6·27	XVI.	Glenquey .....	4·90
„	Weymouth.....	3·59	„	Loch Rannoch Dall.....	4·29
„	Ashburton, Druid House.. ..	5·33	„	Blair Atholl .....	5·49
„	Cullompton .....	4·36	„	Coupar Angus .....	5·88
„	Lynmouth, Rock House .....	4·63	„	Montrose, Sunnyside Asylum.	4·32
„	Okehampton, Oaklands... ..	4·37	„	Balmoral .....	5·52
„	Hartland Abbey.....	4·77	XVII.	Fyvie Castle .....	7·48
„	St. Austell, Trevarna .....	5·10	„	Keith Station .. ..	4·79
„	North Cadbury Rectory.....	6·14	XVIII.	Rothiemurchus .....	4·97
VI.	Clifton, Stoke Bishop .....	5·54	„	Loch Quoich, Loan .....	12·60
„	Ledbury, Underdown.....	2·39	„	Skye, Dunvegan .....	5·84
„	Shifnal, Hatton Grange.....	3·37	„	Fortrose.....	2·94
„	Droitwich .....	2·44	„	Glencarron Lodge .....	6·07
„	Blockley, Upton Wold.....	3·26	XIX.	Tongue Manse .....	5·67
VII.	Grantham, Saltersford.....	2·62	„	Melvich .....	5·93
„	Louth Westgate .....	...	„	Loch More, Achfary .....	7·94
„	Bawtry, Hesley Hall .....	3·71	XX.	Dunmanway, The Rectory ..	5·92
„	Whaley Bridge, Mosley Hall	4·21	„	Mitchelstown Castle.....	3·53
„	Derby, Midland Railway.....	2·46	„	Gep of Dunloe Gearahameen	7·30
VIII.	Nantwich, Dorfold Hall .....	3·62	„	Darrynane Abbey.....	5·35
„	Bolton, Queen's Park .....	4·18	„	Clonmel, Bruce Villa .....	3·50
„	Lancaster, Strathspey .....	4·85	„	Broadford, Hurdlestown....	5·05
IX.	Langsett Moor, Up. Midhope	2·88	XXI.	Enniscorthy, Ballyhyland...	4·31
„	Scarborough, Scalby .....	4·68	„	Rathnew, Clonmannon .....	2·59
„	Ingleby Greenhow .....	4·56	„	Ballycumber, Moorock Lodge	4·10
„	Mickleton .....	4·40	„	Balbriggan, Ardgillan .....	3·20
X.	Bellingham, High Green Manor	4·29	„	Castle Forbes Gardens.....	2·83
„	Ilderton, Lilburn Cottage ..	3·59	XXII.	Ballynahinch Castle.....	6·18
„	Keswick, The Bank.....	4·35	„	Woodlawn .....	3·77
XI.	Llanfrechfa Grange .....	...	„	Westport, St. Helens ... ..	2·95
„	Treherbert, Tyn-y-waun .....	9·43	„	Dugort, Slievemore Hotel ...	3·78
„	Carmarthen, The Friary .....	5·80	XXIII.	Enniskillen, Portora .....	...
„	Fishguard, Goodwick Station.	4·16	„	Dartrey [Cootehill] .....	5·29
„	Crickhowell, Tal-y-maes.....	4·00	„	Warrenpoint, Manor House ..	5·11
„	Gwernargllwydd .....	2·00	„	Belfast, Cave Hill Road .....	4·19
„	Birmingham WW., Tyrmynydd	5·11	„	Glenarm Castle .....	3·36
„	Lake Vyrnwy .....	6·19	„	Londonderry, Creggan Res...	3·57
„	Llangynhafal, Plas Drâw.....	3·35	„	Milford, The Manse.....	...
„	Rhwibryfdir .....	13·53	„	Killybegs .....	4·14
„	Dolgelly, Bryntirion.....	4·02			

## Climatological Table for the British Empire, February, 1918.

STATIONS. <i>(Those in italics are South of the Equator.)</i>	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, Camdensquare	59·2	23	22·9	18	49·2	38·4	...	0·100	88	100·5	21·3	1·11	16	7·6
Malta ... ..	61·9	25	45·6	18	57·5	50·1	...	78	114·0	31·4	1·08	10	2·6	
Lagos ... ..	91·0	17	68·5	1	88·6	74·9	72·4	73	145·3	65·0	3·66	2	5·3	
Cape Town ... ..	99·1	13	54·1	3	82·6	61·8	58·0	62	...	...	4·76	2	2·4	
Johannesburg ... ..	80·1	16	44·8	11	73·6	55·0	56·9	85	...	44·1	15·06	15	6·4	
Mauritius ... ..	86·2	14	65·8	18	82·5	71·3	70·2	81	...	61·0	10·60	24	6·4	
Bloemfontein ... ..	95·7	16	48·9	1	85·2	59·4	56·0	61	...	...	2·94	7	4·6	
Calcutta... ..	92·0	28	49·7	1	85·1	58·8	54·4	57	...	39·1	·00	0	0·5	
Madras ... ..	94·5	15	60·3	15	85·5	66·3	66·2	75	157·1	56·6	2·18	2	1·8	
Colombo, Ceylon ... ..	90·3	12a	63·4	18	86·3	68·3	65·8	73	159·1	53·3	·10	2	2·9	
Hongkong ... ..	72·2	26	50·0	19	64·5	55·7	50·4	71	...	...	·02	1	5·1	
Sydney ... ..	92·0	9	56·0	24	76·6	63·6	60·5	69	150·0	52·2	4·88	15	6·0	
Melbourne ... ..	98·8	11	49·4	27	78·3	58·0	55·1	62	152·3	41·2	1·08	11	4·8	
Adelaide ... ..	109·2	11	45·5	23	85·8	61·6	52·9	45	162·2	36·7	·19	4	4·3	
Perth ... ..	93·6	16	55·3	12	83·5	65·8	63·1	66	162·9	47·1	1·21	5	4·6	
Coolgardie ... ..	102·0	18	47·8	12	86·4	64·1	55·3	50	166·4	46·0	2·43	11	5·8	
Brisbane ... ..	96·1	4	62·1	16	83·4	67·4	64·4	71	155·3	58·6	2·25	11	5·3	
Hobart, Tasmania ... ..	88·1	12	46·1	26	71·9	54·3	50·3	62	144·6	40·2	1·80	11	5·7	
Wellington ... ..	79·3	6	51·0	20	71·8	59·5	55·6	73	154·0	42·3	5·04	8	6·8	
Jamaica, Kingston ... ..	88·8	28	64·6	21	85·0	67·6	65·3	76	...	...	·52	7	4·0	
Grenada ... ..	84·0	10,11	69·0	1,22	82·0	71·0	..	76	138·0	...	3·35	19	4·0	
Toronto ... ..	48·8	20	-20·2	5	30·7	11·6	15·5	85	110·2	-26·2	4·05	15	6·0	
Fredericton ... ..	48·0	20	25·5	22	24·0	-2·2	4·5	83	...	...	3·41	16	5·6	
St. John, N.B. ... ..	48·1	25	-14·0	6	26·6	7·6	10·7	75	104·5	-14·9	4·60	19	5·8	
Victoria, B.C. ... ..	51·8	3, 5	25·4	18	43·9	35·2	33·0	77	104·0	18·0	3·87	19	7·1	
<i>Mauritius (January)</i>	88·0	10	67·7	4	84·8	71·7	68·2	73	...	60·7	5·28	20	5·5	

a-17.

*Malta.*—Crops suffering for want of rain. If drought continues, crops will be damaged, and the storage of water considerably decreased.

*Johannesburg.*—Bright sunshine 194·5 hours.

COLOMBO, CEYLON.—Mean temp. 77°·3, or 2°·3 below, dew point 4·4 below, and R 1·86 in. below, averages. Mean hourly velocity of wind 5·5 miles.

HONGKONG.—Mean temp. 59·2. Bright sunshine 203·6 hours. Mean hourly velocity of wind 14·4 miles.

*Sydney.*—Unsettled with rain and cool S. winds. Fine toward the end.

*Melbourne.*—Temp. 0°·8 above, and R ·62 in. below, averages.

*Adelaide.*—Mean temp. 0·4 in. below, and R ·44 in. below, averages.

*Brisbane.*—R 4·32 in. below average.

*Wellington.*—Mean temp. 3°·3 above, and R 1·77 in. above, average. Bright sunshine, 158·5 hours.