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THE SHOWER CLOUD BLACK LINES.

By L. C. W. BONACINA.

ALL who study the clouds from either the artistic or scientific point of view, or from both, as everyone should, must be familiar with the characteristic dark stripes or streaks which appear beneath detached cloud-masses from which rain is falling. To the shepherd on the solitary hills, accustomed to take long-range views, the phenomenon, indeed, must be as familiar as any in the skies; but it can scarcely be less familiar among the ordinary phenomena of nature to any one who lives in the more open districts of London, and who examines the sky for other sights than air-craft. The appearance is most sharply defined in the case of clouds nearer the horizon than the zenith, and it is essentially characteristic of broken showery conditions of weather. It is not conspicuous against the uniform grey sky of a set-in wet day, for the reason, apparently, that on an overcast day there is not the contrast between light and shadow which is necessary in order that the raindrops may be sharply silhouetted against the background of the sky. But on a showery day with varied skies the drops may be shown up in the manner described either against the background of the cloud from which they are falling, or against clear sky appearing beneath the cloud. It is not a little surprising that a phenomenon so common in this showery climate should be so seldom referred to in literature—the more so on account of its utility as an index of falling rain at a distance.

There are a number of cloudy days in the year when it is very difficult from an inspection of the sky to tell definitely whether the tendency is showery or not. But if in any quarter of the sky you see a cloud from whose base these black lines are pendent you may say at once: "Rain is falling from that cloud"—which means, of course, that showers are about, and that it is highly probable you will experience one locally before the day is over. The association of these black lines with showery conditions is invariable, and that they are falling rain-drops shown up against the background of the sky cannot be doubted.

ROYAL METEOROLOGICAL SOCIETY.

THE annual general meeting of this Society was held on Wednesday, 16th instant, at Caxton Hall, Westminster, Major H. G. Lyons, F.R.S., President, in the Chair.

The Report of the Council for 1917 was read, and the Symons Memorial Medal, which is awarded biennially for distinguished work in connection with Meteorological Science, was presented to Dr. H. R. Mill, Director, British Rainfall Organization. The following officers were elected for the ensuing session :—*President*—Sir Napier Shaw, F.R.S. ; *Vice-Presidents*—Mr. T. W. Backhouse, Major Lyons, F.R.S., Mr. Henry Mellish, C.B., Captain A. J. Walker ; *Treasurer*—Mr. Francis Druce ; *Secretaries*—Mr. W. W. Bryant, Mr. W. Vaux Graham, M.Inst.C.E. ; *Foreign Secretary*—Mr. R. G. K. Lempfert, C.B.E. ; *Councillors*—Mr. C. E. P. Brooks, Prof. C. M. Delgado de Carvalho, Captain C. J. P. Cave, R.E., Mr. J. Edmund Clark, Mr. J. S. Dines, Mr. W. H. Dines, F.R.S., Captain G. M. B. Dobson, Mr. R. H. Hooker, Mr. Carle Salter, Major G. I. Taylor, R.F.C., Prof. H. H. Turner, F.R.S., Mr. F. J. W. Whipple.

Major H. G. Lyons delivered an address on "The Meteorological Resources of the Empire," in the course of which he remarked that in many directions steps are being taken to take stock of the resources of the Empire, and to plan how these may best be utilized in the general reconstruction which must undoubtedly be taken in hand on the cessation of hostilities. In meteorology the same should be done, for within the Empire we may meet every type of climate. The great Oversea Dominions, India, the colonies and especially the oceanic islands, not only afford the means for extending our knowledge of the direction and velocity of the currents of the upper air, to meet the demands of aviation, which will become greater in the near future, but with a very moderate increase in the resources of their existing institutions, and more active co-operation, they may powerfully aid in the solution of many meteorological problems of theoretical and practical importance.

In all countries where there is a meteorological service the network of climatological stations is controlled by one or more First Order Stations, but none as yet exist in the great colonial regions of East Africa, West Africa, or in the West Indian Islands, though there are eighteen institutions of this class in other parts of the Empire.

Nor is the study of a single region sufficient in itself. India, in preparing the Monsoon forecast, draws upon data from Egypt, St. Helena, temperate South America, etc. ; Egypt, in forming each year an estimate of the coming Nile flood utilizes information from India, Uganda, the South Atlantic, and so on. The West India

Islands need warnings of their hurricanes from the more eastward islands of their archipelago, and must utilize all that Asia and Africa can tell them about the development and movement of tropical storms before their precautions can be considered to have exhausted all the means available. All lands which lie near the sub-tropical zones of scanty rainfall are vitally interested in the problems of forecasting the probable sufficiency or failure of their rainy season. Within the limits of the Empire there are already over 1,000 climatological stations, ranging in latitude from 66° N. to 54° S. and embracing all varieties of climate, insular, continental and mountain.

The Address concluded with a plea for the more efficient organization of the available meteorological resources of the Empire, and a hope was expressed that a career might be available for some of the large number of trained meteorologists whom present needs had created.

At the conclusion of the meeting Sir Napier Shaw, F.R.S., took over the duties of President.

The following gentlemen were elected fellows :—Dr. Thomas Agius, Capt. H. Bathurst, Mr. F. L. Bland, Mr. L. C. W. Bonacina, Major J. Shipley Ellis, Rev. W. F. A. Ellison, M.A., Mr. F. J. Gurney, Mr. A. J. Kelley, Mr. Elliott Kitchener, Mr. W. D. Lewis, Mr., H. Lowery, Capt. S. W. Price-Williams, Mr. J. Sherwen.

THE usual monthly meeting of this Society was held on February 20th, Sir Napier Shaw, F.R.S., President, in the Chair.

A paper by Mr. F. A. Bellamy, on "The Barometer Record at the Radcliffe Observatory, Oxford, with special reference to Professor Turner's suggested discontinuities," was read. Professor Turner has in several papers to the Royal Meteorological Society claimed that meteorological history is divisible into "chapters" of an average length of six and a half years each, and has assigned the dates at which a new "chapter" opens (when there are abrupt discontinuities in meteorological phenomena) with considerable precision for the last two centuries. The evidence has hitherto been based upon the monthly values of rainfall and temperature, and he has shown that these monthly values differ systematically in the "even" chapters as compared with the "odd." To examine whether such systematic differences extended to periods shorter than one month Mr. Bellamy has analysed a series of 62 years daily barometer records. He collected all those records into daily groups and formed the means of the differences between "even and odd chapters" for corresponding days; these were in many cases

quite large, but apparently no larger than similar arbitrary differences for any chance selection of years that was made. Only one such arbitrary selection was used for comparison, but it is probably sufficient to substantiate that statement. Proceeding now to combine two consecutive days together, then three such days and so on in groups of 6 up to 180 days, Mr. Bellamy found that the differences between corresponding groups of even minus odd still remained "accidental" in character until the number of days combined reached about 30; but from this point the even minus odd set began to show an excess which gradually increased until the differences became twice as great. The inference is that for periods from one to six months there is a decided difference in the even and odd chapters for atmospheric pressure, even for one station, as has been shown for rainfall and temperature from many stations, and that the existence of discontinuities is supported.

Dr. C. Chree, F.R.S., read a paper entitled "The Diurnal Variation of Barometric Pressure at Seven British Observatories, 1871-1882." The diurnal variation of atmospheric pressure, as of any other element, can be analysed in Fourier terms or "waves," of periods 24, 12, 8 hours. In the case of the mean diurnal variation from all months of the year combined, the 12-hour wave appears of a very dominant character, the amplitude being nearly the same for all stations in the same latitude, and the phase referred to local mean time being everywhere nearly the same. The 24-hour wave on the other hand is very variable and the 8-hour wave small compared with the 12-hour wave. Taking the seven stations, Valencia, Armagh, Glasgow, Aberdeen, Stonyhurst, Fal-mouth and Kew, it is pointed out that the comparative unimportance of the 8-hour wave in the mean diurnal inequality for the year arises in great measure from the large difference that presents itself between the phase angles in two different seasons of the year. In individual months the 8-hour wave, though considerably smaller than the 12-hour wave, is far from negligible, and the phenomena presented by the 8-hour wave at the seven British stations exhibit almost as close a similarity as those presented by the 12-hour wave. The paper also considered a theory as to the nature of the 12-hour wave recently advanced by Dr. G. C. Simpson. It discussed the theory from the point of view of the variation in the phenomena throughout the year, and showed how some of Dr. Simpson's mathematical expressions can be put in a simpler form of sufficient accuracy in the case of stations in low or middle latitudes.

The following candidates were elected Fellows of the Society:—
Mr. Harry Lander, Mr. Edgar Lyman, Mrs. H. Edith Purchas.

SCOTTISH METEOROLOGICAL SOCIETY.

IN a paper on "Some cases of Ground-ice and the meteorological conditions that determined them," read on December 20th, at the Annual General Meeting of the Society, Mr. Watt noted that towards the end of January, 1917, various water-supply systems were seriously affected by the formation of "ground-ice," though interruptions from that cause had not previously been experienced even during longer and more severe spells of cold. Occurrences at some of the Greenock reservoirs and at Lochrutton Loch, near Dumfries, had been especially noteworthy. The weather had been for some three weeks before not only very cold but continuously rather stormy, with north-easterly winds, so that there had been an unusually thorough mixing of the waters of lakes and reservoirs, comparable with that obtaining in running waters. In these circumstances there would be a quite unusual cooling of the whole mass of water, whilst waves or wavelets prevented the formation of a protective surface ice-sheet. In comparatively quiet anticyclonic weather, such as characterised a frost such as that of January and February, 1895, "ground-ice" formed only in running streams. The researches some eighty years ago of the Rev. James Farquharson, F.R.S., of Alford, seemed to indicate that radiation from the floor of a stream was the determining factor in the formation of "ground-ice." There was also "Frazil-ice," which appeared in the form of little spicules on the surface of running water.

Dr. John Aitken, F.R.S., in a paper on "Ground-ice," communicated the results of some experiments which showed that "Ground-ice" was really made up of crystals of "Frazil-ice" which had been carried away by the stream and had come in contact with and adhered to the stones and rocks in the bed of the stream. Farquharson's radiation theory could hardly be a sufficient explanation of the formation of "Ground-ice" as water must be cooled some degrees below 32° F. before it can freeze, unless there be ice present, and the bottom of a river was never likely to be cooled much below 32° F. with water flowing over it. Moreover, "Ground-ice" was of a soft and spongy character and not clear and solid as it would have been if formed *in situ*. The spicules of "Frazil-ice" might or might not adhere to obstacles in the stream and the part played by radiation from the river bed seemed to be to help to cool the stones and rocks sufficiently to prevent the spicules slipping when they came in contact with them. If the temperature of the water was rising and the ice beginning to melt, the ice slipped over an obstacle, but with a falling temperature it adhered to it.

NOTE !—Summer Time commences Sunday, 24th March.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

COLD DECEMBER DAYS IN AMERICA.

DECEMBER, 1917, was one of the most remarkable months in meteorological records in the eastern section of the United States. During the last three days of the year intensely cold weather prevailed. Subjoined are temperatures for the three days at Philadelphia :—

	Max.	Min.	Mean.	Below Normal.
Dec. 29th	10	2	6	27
„ 30th	8	-4	2	31
„ 31st	11	0	5	28

These are from standard thermometers exposed in a weather bureau instrument shelter. The high barometer that dominated the weather was above thirty-one inches over the north-west.

C. DECKER.

2330 S. 21st Street, Philadelphia, U.S.A.

THE RAINFALL OF HAVANA AND ENGLAND,
SOUTH-WEST.

THE rainfall data for Havana, Cuba, for the rainy season May-October, 1917, have now been received. The figures show only 57 per cent. of the average fall for these months, and, with one exception, the rainfall at Havana during the wet season has been deficient each year since 1911.

Previous notes have shown the connection between the rainfall at Havana during May-October, and the subsequent amount registered in England, South-west, during January-March following. the correlation co-efficient being $-.54$ and the probable error $.08$

The rainfall of Havana for 1917 being so much below the average suggests copious precipitation in England, South-west, during January-March of the present year, but in 1916 the Havana figures also indicated a similar result and the amount recorded was only 69 per cent. of the average. In view of the complete failure of last year's indication faith in the correlated connection between the two districts is distinctly shaken, and it will be interesting to see if last year was the exception that proves the rule. Perhaps the believers in the rain-producing effect of gun-fire will urge that the heavy precipitation normal to the western districts of this country has been diverted to the eastern counties?

January 7th, 1918.

A. HAMPTON BROWN.

THE SQUALL OF NOVEMBER 25th, 1917.

WHEN I wrote on this subject in the last number I had not examined the instrumental records for the London district, and from casual eye observation was under the impression that the squall took place in a cold N.W. current of more or less uniform temperature. But through the kindness of Mr. Bryant of Greenwich Observatory I have obtained sufficient instrumental information to show that the squall was marked by a sudden shift of wind to a still colder quarter, and that it can, therefore, be easily enough explained in the ordinary way.

There were in fact two squalls that morning. The first passed over Greenwich soon after 4 a.m., with a shift of wind from W.S.W. to W.N.W., and sudden drop of temperature. The second (which caught me whilst out at Hampstead) passed over Greenwich about 11.30 a.m., with wind-shift from W.N.W. to N.N.W. and greater fall in temperature than on the first occasion. Hence there was a succession of cold "douches" from more northerly points of the compass, and I have little doubt that cartographic investigation for the morning in question would confirm the passage across the country of minor line-squalls in connection with the juxtaposition of air currents of different temperatures. Out walking I was not sufficiently alert to notice that the wind had shifted a couple of points, and, of course, temperature changes cannot be accurately judged.

L. C. W. BONACINA.

February 3rd, 1918.

WARM FEBRUARY.

DURING my readings of temperature here only four times in the past thirty-two years has the February mean maximum been higher than that of February, 1918. Only once has the mean minimum of February been higher than that of February, 1918, and only twice has the maximum and minimum combined been higher than that of February, 1918. The following table gives the data for the years referred to:—

		Max.		Min.		Mean.
February, 1899	...	48·4	...	37·7	...	43·1
1903	...	48·1	...	40·5	...	44·3
1910	...	47·8	...	39·0	...	43·4
1914	...	48·6	...	41·4	...	45·0
1918	...	47·4	...	40·7	...	44·0

JOHN DOVER.

Totland Bay, Isle of Wight, 1st March, 1918.

EXCEPTIONAL DRYNESS OF NOVEMBER AND DECEMBER—A COMPARISON.

THE rainfall for November and December has been so exceptionally small for that period that I think the figures are sufficiently interesting to quote, therefore I give below a table of the rainfall for November and December of each year since 1911 :—

	No. of Wet days.	1912.	No. of Wet days.	1913.	No. of Wet days.	1914.	No. of Wet days.	1915.	No. of Wet days.	1916.	No. of Wet days.	1917.	No. of Wet days	
1911.														
Nov.	5·05	19	2·37	17	3·38	18	4·60	19	3·59	8	4·50	20	1·00	11
Dec.	8·69	27	4·62	23	2·04	12	10·46	26	9·52	25	4·39	18	1·08	8
	13·74	46	6·99	40	5·42	30	15·06	45	13·11	33	8·89	38	2·08	19

The scanty rainfall during the past two months is undoubtedly due to the prevalence of N.W.-N.E. winds which have been particularly common lately.

S. HYLEA GREVES.

Rodney House, Bournemouth, January 4th, 1918.

REMARKABLE LOWNESS OF STREAMS IN DEVON.

ALTHOUGH we had anything but a fine summer and have had no absolute or partial droughts, yet streams in this neighbourhood are lower than they have been for years. This substantiates the fact that summer rains do not affect springs as winter rains or snow do, as in this locality, although last winter was severe, there was very little snow, and this winter seems likely to follow suit, the heavy snowfalls in the eastern and midland counties not reaching this part of England.

D. W. HORNER, F.R.Met.Soc.

Moretonhampstead, January 4th, 1918.

PROTECTIVE POWER OF SNOW.

THE following observation shows the remarkable extent to which a covering of snow protects the ground and plant life from intense cold. About 6 p.m. on the 13th January, a minimum thermometer was placed on the ground in the centre of my lawn here, the temperature then being only a few degrees below freezing. Snow then fell to the depth of one and a half inches. At 11 p.m. the snow had ceased falling and it was a bright starlight night, and very cold. A second minimum thermometer was then placed on the top of the snow. No more snow fell in the night. In the morning the two thermometers recorded the following minimum temperatures :— On the top of the snow, 2° below zero ; under the snow, 24°, or a difference of 26°.

A. R. CROSSLEY.

Falling Royd, Hebden Bridge, 2nd February, 1918.

THE WEATHER OF FEBRUARY.

By F. J. BRODIE.

OWING to prevalence of wind from south and west the mean temperature was considerably above the average, both in the daytime and at night.

During the first week the British Isles lay between a large anticyclone over central Europe and a series of depressions moving northwards along our Atlantic seaboard. Southerly winds prevailed generally, and the weather was mild and changeable, maximum temperatures slightly above 55° being recorded on the 4th and again on the 7th in several parts of England. After about the 5th the anticyclone drifted slowly southwards to the Mediterranean. This change was accompanied in our islands by a gradual veering of the wind, first to S.W., and afterwards to W., but temperature remained high, the maximum readings of the 10th-12th being again above 55° at many stations in England and Ireland. The Atlantic depressions pursued in the meantime, an easterly course, between Iceland and Scotland, and the wind on our western and northern coasts occasionally rose to the force of a gale. On the 12th and 13th the weather became dull and gloomy and fog prevailed extensively over our eastern districts. After the 13th a new anticyclone extended westward over Great Britain, a light breeze from S. and S.E. set in, and temperature fell decidedly. Between the 14th and 17th sharp night frosts were in fact experienced, the temperature falling to 20° in the east centre and south of England, while the grass temperature reached 9° on the 17th at Wisley, and at Raunds. After the 17th a high-pressure system extended northwards from the Azores region, and between the 20th and 26th, when depressions passed from Greenland to Scandinavia, a mild westerly breeze of increasing strength set in over our islands, and temperature again rose considerably above the average. The warmest weather occurred on the 22nd or 23rd, reaching 60° at Geldeston, and 61° at Aberdeen, the latter a reading exceeded once only at Aberdeen during 50 years, 64° having been observed on the 22nd of the month in 1897.

On the 27th, in the rear of one of the northern disturbances, a secondary depression was developed near the Faeroe, and on the following day, when this system moved southwards over the North Sea, a northerly gale sprang up over nearly the whole of the United Kingdom, and blew with great strength on our north and north-west coasts. At Holyhead the wind reached, in gusts, a velocity of 72 miles, and at Aberdeen, 74 miles per hour. Snow fell heavily in the north, and sleet or hail in all other districts, and on the 28th the thermometer in many places failed to reach a maximum of 40° .

Over the United Kingdom as a whole the total duration of bright sunshine in February was below the normal, and in the west little more than one half. In the London district, the average was slightly exceeded. At Kew the duration for December to February was 178 hours, being 37 more than the average.

The only part of the British Isles with appreciably less than the average rainfall was in the south of England, and in the extreme south-east little more than half the average fell, less than 1.00 in. being recorded from Cromer to Beachy Head. The fall increased towards the west, and exceeded 5 inches over all elevated regions, except in Devonshire, and 10 inches over considerable areas in Wales and Scotland. Nearly twice the average fell in the West Highlands and in the north of Ireland. The general rainfall expressed as a percentage of the average, was:—England and Wales, 107, Scotland, 159, Ireland, 166, British Isles, 140 per cent.

In London (Oamden Square), the mean temperature was $43^{\circ}4$, or $3^{\circ}7$ above the average. The duration of bright sunshine was 38.9 hours, and the duration of rainfall, 25.3 hours. Evaporation, .27 in.

RAINFALL TABLE FOR FEBRUARY, 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.....	<i>London</i>	1'66	1'11	— '55	67	'25	24	16
Tenterden.....	<i>Kent</i>	1'90	'89	—1'01	47	'21	24	14
Arundel (Patching).....	<i>Sussex</i>	2'17	1'10	—1'07	51	'24	24	11
Fordingbridge (Oaklands)...	<i>Hampshire</i>	2'34	1'99	— '35	85	'35	8	18
Oxford (Magdalen College).....	<i>Oxfordshire</i>	1'62	1'00	— '62	62	'15	5	12
Wellingborough(Swanspool)	<i>Northampton</i>	1'70	1'12	— '58	66	'18	2,6	15
Bury St. Edmunds(Westley)	<i>Suffolk</i>	1'59	'92	— '67	58	'20	12	11
Geldeston [Beccles].....	<i>Norfolk</i>	1'41	'75	— '66	53	'13	24	13
Polapit Tamar [Launceston]	<i>Devon</i>	2'95	2'82	— '13	96	'38	2	19
Rousdon [Lyme Regis].....	".....	2'50	1'71	— '79	68	'36	8	16
Stroud (Field Place).....	<i>Gloucester</i> ..	2'12	1'48	— '64	70	'24	24	16
Church Stretton.....	<i>Shropshire</i>..	...	2'33	...	...	'59	9	17
Boston.....	<i>Lincoln</i>	1'53	1'57	+ '04	103	'47	9	18
Worksop (Hodsock Priory)	<i>Nottingham</i>	1'64	1'35	— '29	82	'30	9	16
Mickleover Manor.....	<i>Derbyshire</i>	1'71	1'98	+ '27	116	'57	10	17
Buxton.....	".....	4'01	5'96	+1'95	149	1'24	6	21
Southport (Hesketh Park)..	<i>Lancashire</i>	2'07	2'89	+ '82	140	'56	20	18
Arncliffe Vicarage.....	<i>York, W.R.</i>	4'88	6'75	+1'87	138	...	...	...
Wetherby (Ribston Hall)...	".....	1'71	2'64	+ '93	154	'53	9	14
Hull (Pearson Park).....	" <i>E.R.</i>	1'78	1'66	— '12	93	'33	9	17
Newcastle (Town Moor).....	<i>Northland</i>	1'63	1'26	— '37	77	'20	20	14
Borrowdale (Seathwaite)...	<i>Cumberland</i>	10'96	20'56	+9'60	187	4'45	21	25
Cardiff (Ely).....	<i>Glamorgan</i>	3'07	2'04	—1'03	66	'27	2	22
Haverfordwest.....	<i>Pembroke</i>	3'42	2'98	— '44	87	'78	6	20
Aberystwyth (Gogerddan)..	<i>Cardigan</i>	3'09	4'17	+1'08	135	'83	6	21
Llandudno.....	<i>Carnarvon</i>	2'11	2'74	+ '63	130	'69	6	20
Cargen [Dumfries].....	<i>Kirkcudbrt.</i>	3'42	5'56	+2'14	163	'73	10	25
Marchmont House.....	<i>Berwick</i>	2'15	2'31	+ '16	107	'33	28	19
Girvan (Pinmore).....	<i>Ayr</i>	3'87	6'37	+2'50	165	'98	17	25
Glasgow (Queen's Park)...	<i>Renfrew</i>	2'70	4'71	+2'01	174	'74	22	24
Islay (Eallabus).....	<i>Argyll</i>	3'91	6'20	+2'29	159	1'08	18	25
Mull (Quinish).....	".....	4'45	9'32	+4'87	209	1'14	17	26
Balquhider (Stronvar).....	<i>Perth</i>	6'33	13'13	+6'80	207	1'96	21	25
Dundee (Eastern Necropolis)	<i>Forfar</i>	1'91	1'95	+ '04	102	'35	27	22
Braemar.....	<i>Aberdeen</i>	2'55	4'20	+1'65	165	'80	27	21
Aberdeen (Cranford).....	".....	2'36	1'39	— '97	59	'32	12	13
Gordon Castle.....	<i>Moray</i>	1'95	1'58	— '37	81	'28	27	14
Drumadrochit.....	<i>Inverness</i>	2'89	4'22	+1'33	146	'57	21	25
Fort William.....	".....	6'85	13'14	+6'29	192	1'48	23	26
Loch Torridon (Bendamph)	<i>Ross</i>	7'53	14'19	+6'66	188	1'19	17	27
Dunrobin Castle.....	<i>Sutherland</i>	2'58	3'00	+ '42	116	'57	24	16
Killarney (District Asylum)	<i>Kerry</i>	4'99	7'47	+2'48	150	'94	18	26
Waterford (Brook Lodge)...	<i>Waterford</i>	3'18	3'83	+ '65	120	'44	1	23
Nenagh (Castle Lough).....	<i>Tipperary</i>	2'89	5'72	+2'83	198	'95	18	24
Ennistymon House.....	<i>Clare</i>	3'44	4'74	+1'30	138	'58	17	23
Gorey (Courtown House)...	<i>Wexford</i>	2'75	3'50	+ '75	127	'63	16	23
Abbey Leix (Blandsfort)....	<i>Queen's Co.</i>	2'55	4'70	+2'15	184	'74	18	23
Dublin (FitzWilliam Square)	<i>Dublin</i>	1'93	1'90	— '03	98	'29	17	21
Mullingar (Belvedere).....	<i>Westmeath</i>	2'67	4'04	+1'37	151	'67	11	23
Crossmolina (Enniscoe).....	<i>Mayo</i>	4'20	7'10	+2'90	169	1'04	17	26
Cong (The Glebe).....	".....	3'72	6'74	+3'02	181	1'17	17	25
Collonoy (Markree Obsy.)...	<i>Sligo</i>	3'20	6'17	+2'97	193	'73	17	26
Seaforde.....	<i>Down</i>	2'81	4'49	+1'68	160	'76	18	23
Ballymena (Harryville).....	<i>Antrim</i>	2'99	5'36	+2'37	179	1'31	18	24
Omagh (Edenfel).....	<i>Tyrene</i>	2'68	5'13	+2'45	191	'75	18	26

SUPPLEMENTARY RAINFALL, FEBRUARY, 1918.

Div.	STATION.	Rain inches.	Div.	STATION.	Rain inches.
II.	Warlingham, Redvers Road..	1·76	XI.	Lligwy	3·36
„	Ramsgate	·61	„	Douglas, Isle of Man	5·12
„	Hailsham	1·19	XII.	Stoneykirk, Ardwell House...	3·92
„	Totland Bay, Aston House...	1·17	„	Carsphairn, Shiel	11·39
„	Stockbridge, Ashley	1·63	„	Langholm, Drove Road	6·25
„	Grayshott	2·21	XIII.	Selkirk, The Hangingshaw..	2·59
III.	Harrow Weald, Hill House...	1·21	„	North Berwick Reservoir.....	2·46
„	Pitsford, Sedgebrook.....	1·02	„	Edinburgh, Royal Observaty.	2·47
„	Woburn, Milton Bryant.....	·97	XIV.	Biggar.....	4·62
„	Chatteris, The Priory.....	·92	„	Maybole, Knockdon Farm ...	5·10
IV.	Elsenham, Gaunts End	·82	XV.	Buchlyvie, The Manse	7·46
„	Shoeburyness	·71	„	Ardgour House	14·21
„	Colchester, Hill Ho., Lexden	·52	„	Oban.....	6·83
„	Ipswich, Rookwood, Copdock	·65	„	Campbeltown, Witchburn ..	6·34
„	Aylsham, Rippon Hall	1·19	„	Holy Loch, Ardnadam.....	13·03
„	Swaffham	1·08	„	Tiree, Cornaigmore .....	...
V.	Bishops Cannings	1·35	XVI.	Glenquay	8·50
„	Weymouth.....	1·29	„	Glenlyon, Meggernie Castle..	...
„	Ashburton, Druid House	3·48	„	Blair Atholl	4·24
„	Cullompton	1·82	„	Coupar Angus	2·26
„	Lynmouth, Rock House	3·15	„	Montrose, Sunnyside Asylum.	1·75
„	Okehampton, Oaklands.....	3·62	XVII.	Balmoral	2·74
„	Hartland Abbey.....	2·35	„	Fyvie Castle	1·16
„	St. Austell, Trevarna	3·61	„	Keith Station	1·72
„	North Cadbury Rectory.....	1·10	XVIII.	Rothiemurchus	3·32
VI.	Clifton, Stoke Bishop	2·32	„	Loch Quoich, Loan	31·40
„	Ledbury, Underdown.....	·93	„	Skye, Dunvegan	11·26
„	Shifnal, Hatton Grange.....	1·50	„	Fortrose.....	2·38
„	Droitwich	1·35	„	Glen carron Lodge	11·09
„	Blockley, Upton Wold.....	1·57	XIX.	Tongue Manse	2·86
VII.	Grantham, Saltersford.....	1·58	„	Melvich	2·94
„	Market Rasen	1·72	„	Loch More, Achfary	7·39
„	Bawtry, Hesley Hall	1·43	XX.	Dunmanway, The Rectory ..	8·79
„	Whaley Bridge, Mosley Hall	5·48	„	Glanmire, Lota Lodge.....	6·55
„	Derby, Midland Railway.....	1·99	„	Mitchelstown Castle.....	6·04
VIII.	Nantwich, Dorfold Hall	2·39	„	Darrynane Abbey.....	5·76
„	Bolton, Queen's Park	4·71	„	Clonmel, Bruce Villa	5·31
„	Lancaster, Strathspey	4·25	„	Broadford, Hurdlestown.....	5·22
IX.	Langsett Moor, Up. Midhope	4·64	XXI.	Enniscorthy, Ballyhyland..	4·54
„	Scarborough, Scalby	2·10	„	Rathnew, Clonmannon	3·48
„	Ingleby Greenhow	1·31	„	Ballycumber, Moorock Lodge	3·58
„	Mickleton	5·60	„	Balbriggan, Ardgillan	2·97
X.	Bellingham, High Green Manor	2·69	„	Castle Forbes Gardens.....	4·22
„	Ilderton, Lilburn Cottage ...	1·06	XXII.	Ballynahinch Castle.....	7·43
„	Keswick, The Bank	8·30	„	Woodlawn	3·38
XI.	Llanfrecifa Grange	2·85	„	Westport, St. Helens	2·99
„	Treherbert, Tyn-y-waun	9·47	„	Dugort, Slievemore Hotel ...	8·10
„	Carmarthen, The Friary	3·48	XXIII.	Enniskillen, Portora.....	4·86
„	Fishguard, Goodwick Station.	2·93	„	Dartrey [Cootehill]	3·84
„	Crickhowell, Tal-y-maes	2·20	„	Warrenpoint, Manor House ..	4·53
„	New Radnor, Ednol	3·69	„	Belfast, Cave Hill Road	4·94
„	Birmingham WW., Tyrmynydd	6·21	„	Glenarm Castle	5·00
„	Lake Vyrnwy	9·06	„	Londonderry, Creggan Res...	3·83
„	Llangynhafal, Plas Drâw.....	2·91	„	Dunfanaghy, Horn Head ...	...
„	Rhwibryfdir	15·15	„	Killybegs	6·17
„	Dolgelly, Bryntirion.....	6·95			

Climatological Table for the British Empire, September, 1917.

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	74·9	5, 8	43·0	30	69·8	51·9	54·5	...	0·100	119·9	43·8	2·31	11	6·6
Malta	89·6	2	63·5	30	82·5	72·0	...	76	140·0	...	1·70	1	0·8	
Lagos	92·2	12	70·0	13	84·6	73·8	72·2	80	149·2	68·0	9·93	22	8·5	
Cape Town	79·2	15	39·1	17	66·8	49·5	50·2	72	...	...	1·72	8	4·5
Johannesburg	76·0	7	38·2	14	67·1	46·3	44·0	75	...	34·0	1·14	8	5·6	
Mauritius	78·2	8	55·5	28	75·5	61·5	57·4	69	...	49·6	·91	16	5·5	
Bloemfontein	82·1	22	32·4	14	71·8	42·3	41·2	61	..	...	·51	3	3·5
Calcutta... ..	91·7	5	75·2	18	87·7	78·0	77·0	85	...	73·1	8·09	16	7·6	
Bombay... ..	88·3	24	74·0	3	83·8	77·0	76·1	88	136·0	70·1	19·58	25	8·3	
Madras	94·0	4	72·8	30	90·0	76·6	74·6	82	161·0	73·0	5·30	16	6·7	
Colombo, Ceylon	87·1	15	72·8	25	84·4	75·4	73·6	84	154·8	68·8	12·74	23	8·0	
Hongkong	89·9	20	74·3	23	86·6	78·1	74·2	77	...	...	4·88	12	5·0
Sydney	83·8	28	45·5	11	68·3	52·7	48·0	64	131·1	33·0	5·42	10	4·5	
Melbourne	72·1	30	36·8	19	62·9	47·1	45·3	64	128·1	27·3	3·42	15	6·1	
Adelaide	79·4	11	39·9	25	66·2	47·7	47·4	70	137·6	32·0	3·68	20	5·6	
Perth	69·0	23	43·6	13	66·2	50·2	49·1	74	135·2	33·1	6·79	24	7·3	
Coolgardie	78·6	30	33·0	4	67·6	43·9	38·7	46	138·4	29·0	·51	5	3·7	
Hobart, Tasmania	70·3	21	38·0	15	58·6	44·0	41·1	65	132·7	28·1	2·76	19	6·8	
Wellington ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Auckland ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Jamaica, Kingston	91·2	5	70·3	11	87·4	72·6	72·0	83	...	...	8·00	16	5·8
Grenada	91·0	20	70·0	29	86·0	75·0	...	79	138·0	...	6·89	19	5·0	
Toronto	81·0	1	36·0	11	69·3	47·9	50·0	81	131·4	30·7	·65	8	3·4	
Fredericton	82·0	19	29·0	23	67·7	40·4	47·6	80	...	...	·90	9	3·8
St. John, N.B.	78·0	27	35·0	23	63·2	46·3	47·8	75	135·2	30·5	1·24	9	4·0	
Victoria, B.C.	76·0	1	46·0	20	61·8	49·9	50·0	83	131·2	36·5	1·06	15	5·5	

Johannesburg.—Bright sunshine 237·95 hours.

COLOMBO, CEYLON.—Mean temp. 79°·9, or 1°·0 below, dew point equal to the average and R 7·85 in. above average. Mean hourly velocity of wind 5·6 miles.

HONGKONG.—Mean temp. 82°·0. Bright sunshine 266·5 hours. Mean hourly velocity of wind 10·4 miles.

Sydney.—Very severe gales and heavy R on the 19th with much damage to buildings, wires, shipping and trees.

Melbourne.—Temp. 1°·0 above, and R 1·03 in. above, averages. Northern rivers in flood. Crops good, fruit being a record yield.

Adelaide.—Mean temp. equal to the average, R 1·73 in. above, averages.

Perth.—Rainfall 3·53 in. above, average. Gales and high winds.

Coolgardie.—Temp. 2°·9 below, and R slightly below, averages.

KINGSTON, JAMAICA.—A hurricane passed across the island on 23rd, but not much damage was done. R twice the average.