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BRITISH RAINFALL, 1916.

THE fifty-sixth annual volume of *British Rainfall** has just been published. Its late appearance is due to no slackness on the part of the Observers, for the 5,192 annual records it contains were sent in with the usual punctuality in the early part of the year. Nor, we may be allowed to say, has it been brought about by any remissness on the part of the depleted staff in the office of the British Rainfall Organization, the whole of the MS. having been completed on August 16th. The delay is solely due to the difficulties experienced by the block makers and printers in obtaining the necessary supply of skilled labour on account of the accumulated pressure of the long-continued war.

An interesting feature of the great national war museum now forming will probably be a collection of annual publications of all kinds for the last year of peace and for each year of the war. The thinning of the volumes of *British Rainfall* in the effort to keep the rising cost within the limits of the shrinking income is noticeable, the total number of pages in the issues for 1914, 1915 and the newly published 1916, being respectively 448, 338, 306. The reduction has been brought about by the successive elimination of the less essential features, the Notes of Observers on the weather, the index maps of the river-divisions, and the detailed analysis of the losses and gains having been sacrificed in order to allow of the unabridged publication of the total annual rainfall at all stations, the monthly and annual rainfall maps, with descriptive letterpress, and the treatment of the distribution of rainfall in time. These are all as full as they ever were, and preserve unbroken continuity with the past in the treatment of statistics. The description of heavy rains on rainfall days has been a little restricted, and the number of wet days selected for mapping is smaller than usual. However, all the most interesting days are treated, and we may be allowed to call special attention to this section in the new volume.

* *British Rainfall, 1916.*—On the Distribution of Rain in Space and Time over the British Isles during the year 1916. Compiled by Hugh Robert Mill and Carle Salter. London, 1917. Price, 10s.

We believe that the exact mapping of the rainfall of individual days, not necessarily the wettest days, will supply data of very great value in theoretical meteorology. For this purpose it is important to deal with the whole rainfall of a natural period and no more. In the case of a single continuous shower, which began and ended between 9 a.m. on one day and 9 a.m. on the next, the daily rainfall as measured meets this requirement, whether the fall lasted for one hour or for twenty-four. When a continuous shower is in progress at 9 a.m. part of the rain is measured for one day and part for the next ; but if no rain fell in the first rainfall day before the shower began, or in the latter part of the second rainfall day after the shower ceased, the total for the two days supplies the natural amount to be mapped, while the mapping of the two days' fall separately dissects the shower into an earlier and a later portion often showing features of great interest. When portions of two separate showers, which may belong to different meteorological types, occur in one rainfall day, the total figure when mapped does not represent an individual phenomenon, but the combined parts of two separate phenomena, and is thus of less value as a means of investigation into the nature and cause of rainfall, and the unsuspected occurrence of this kind of rain day is apt to confuse the study of individual rains. It must be remembered that the mapping of rainfall in this section is work of very high precision, the position of the isohyetal lines is as rigidly determined as the position of the coast lines or the county boundaries on the maps as printed. The rains selected for mapping in this volume include two very striking instances of unprecedentedly heavy and widespread falls in Scotland, on the east side of the country, on July 7th-8th, and on the west side, on October 11th. The last-named occasion produced the highest daily rainfall ever recorded in the British Isles up to that date, viz., 8.20 in., at Kinlochquoich, in Inverness-shire. Two other instances are the heavy rainfall over the whole south of England on August 29th, and a violent little storm in the west of Ireland, on October 21st. In all cases where the track of a depression could be shown the heavy rainfall lay far to the left of the track.

There is a diminution noted of 220 records as compared with 1915, the total number appearing being 5,192, as compared with 5,412. This amounts to a reduction of 4 per cent. owing to the war. There is reason for believing that the real reduction is much less than this as it was found impossible to get many records which are known to be going on, on account of the Observers having no leisure to copy out the figures. It is remarkable how small the shrinkage in the number of Observers is, but this is explained by the fact that before the war very few Observers were men of military age.

In his Report to the Trustees the Director says : " I am thoroughly persuaded that work of this kind is most efficiently carried on by a

voluntary agency absolutely free from red tape ; but to ensure this efficiency the generous help of the well-to-do Observers is as necessary as the devoted services of the staff." No public appeal for funds is made by the British Rainfall Organization, economy in cutting the annual coat being secured by the Director providing himself the extra cloth required after that provided by the other Observers has been used up. This may prove a very difficult operation next year.

LOCAL RAINFALL ORGANIZATIONS.

WE learn with great interest of the recent inauguration, under Mr. A. A. Barnes, C.E., of Stockport, of a new local Rainfall Organization designed to deal with an area of approximately 3,000 square miles surrounding Manchester and Stockport. Arrangements have been made for the monthly rainfall totals to be published in the *Stockport Advertiser*, and it is intended to supplement this with an annual report, illustrated by maps, for private circulation.

We need hardly say that we heartily welcome this latest addition to the small group of local associations who are rendering special assistance to the British Rainfall Organization by stimulating local interest in rainfall observing, in a systematic manner. Among other special services we believe that every opportunity is taken to encourage the use of standard instruments and uniform methods of observing.

The local organizations now in existence include, besides the newly formed Manchester and Stockport, the Croydon Natural History Society (dealing with parts of London, Surrey and Kent), the Hertfordshire Natural History Society, the Northamptonshire Natural History Society, the Norfolk Rainfall Organization, the Mid-Wessex Rainfall Association (parts of Somerset, Wiltshire and Dorset), the Dorset Field Club, the Cardiff Naturalists' Society, and Miss Marshall's Lake District system. Among less formal collections of records published at intervals we may mention those of Sir John Moore (parts of Ireland), Mr. A. Collenette (Guernsey), and Mr. C. V. Hawksford (Jersey).

In the case of institutions which have funds at their disposal for defraying the cost of printing the war has fortunately not interfered materially with this very useful work, but local newspapers have, in some instances, found it necessary either to discontinue printing tables or to print them only in an abbreviated form, thereby considerably reducing their value. We trust that Mr. Barnes's scheme will overcome temporary difficulties of this kind, and shortly find opportunities for developing itself under more favourable conditions. We wish it the success which it undoubtedly merits.

RAINFALL IN RELATION TO CYCLONIC
CENTRES—A REVIEW.*

BY CARLE SALTER.

SINCE Dr. H. R. Mill first drew attention in 1904 to the unsymmetrical distribution of rainfall about the paths of moving cyclonic systems, this problem has been studied by a number of leading meteorologists both in Europe and America. The conclusions arrived at have been decidedly conflicting, in some cases even directly contradictory, and three Japanese investigators have, in consequence, been led to make an investigation on somewhat different lines. The method followed consisted in dividing the area covered by Japan and the surrounding seas into numbered squares, regarded as geographical units, and classified primarily in three main groups, referring respectively to the Pacific coast, the coast of the Japan Sea, and the interior of Japan. In each of these squares the number of instances was tabulated when rain was observed to have occurred on any occasion when a single and well defined depression centre could be located in any part of the whole area of the map. The rainfall appears to have been considered solely in point of its occurrence and not in respect of its amount, and the cyclone in point of its position at a given time and not in respect of its direction of travel. In these respects the data differ from those considered by Dr. Mill and Mr. W. G. Reed. The tabulated records provided material for calculating the probability of rain falling in any individual square for a large number of depression centre-points, and the percentages of probability when plotted on maps yielded isopleths of great interest. We are inclined to deprecate the use of the word "isohyet" as applicable to such lines of equal probability, not because it is intrinsically inaccurate, but because it has passed into the currency of meteorological terminology as a term for lines of equal rainfall amount.

These maps are studied in relation to the configuration of the land. It is shown that in the front of a distant cyclone the Pacific coast has a greater expectation of rain than the Japan Sea coast, whereas in the rear the reverse is the case. In the immediate vicinity of the centre of the depression the difference between the east and west coasts is not so conspicuous. In the inner region of a cyclone the effect of land configuration appears to be less pronounced than on the outskirts. When the centre is situated in the Japan Sea the expectation of rain is greater on both coasts of Japan than in the interior of the islands. These generalizations refer to the mean distribution: with individual cases, discrepancies sometimes arise.

* On the Distribution of Cyclonic Precipitation in Japan. By T. Terada, T. Yokota and S. Otuki. (Journal of the College of Science, Imp. Univ., Tokyo.) Tokio, 1916. Size 10 by 7½. Pp. 32.

A second set of maps show the loci of centres of depressions bringing equal expectation of rain to any one spot. These "centre-locus" maps indicate clearly that the normal position of the area of greatest rainfall expectation lies mostly on the east, north-east or north side of the cyclone, but there are characteristic differences between the Pacific coast, the interior and the Japan Sea coast, in this respect. With depressions moving northwards this gives the maximum precipitation expectation to the forward right-hand quadrant. In this case, therefore, the results tend to confirm Abercrombie's hypothesis.

An attempt is made to reconcile the conclusions of Professor Hann and Dr. Mill by consideration of orographical and other external circumstances, but a complete explanation is impossible owing to lack of data. It should be borne in mind that whilst the authors deal with occurrence of actual rain at the moment of observation, the method used by Dr. Mill, which, following Mr. W. G. Reed, they dub the "smear" method, takes account of the precipitation during the whole period of the passage of the centre of the depression between given points. Thus whilst it does not distinguish the limits of the rain-fields at any individual epoch, it has the advantage of locating clearly the regions of heaviest rainfall. The authors appear to be under a slight misapprehension on this point. The "smears" referred to are enclosed by the outline of the area over which, during the passage of the cyclone, one inch of rain or more fell. Since the publication of these maps most instances of heavy daily rainfall in the British Isles have been mapped in relation to the movements of the accompanying cyclonic centres in *British Rainfall*. These subsequent maps include isohyets for other values than 1 inch and where practicable give the zero line or outside limit of the rain field. Taken together they present a great weight of evidence in favour of the hypothesis that in the British Isles the heaviest rainfall occurs on the left-hand side of the track, and that it appears commonly to occur principally in advance of the centre, or in the forward left-hand quadrant. The whole rain-field, though almost always extending across the track is nearly always wider on the left than on the right. These generalizations appear to hold good in whatever direction the depression is travelling, though it must be admitted that instances of east-west movement are rare. An interesting suggestion as to the phenomenon of intensified rainfall on the left, from the pen of Mr. R. Corless, appeared in this magazine (vol. 46, 1911, p. 85), and offered a well reasoned explanation which would appear to hold good for other parts of the world, but there are so many complicated orographical and convectional influences which may operate to interfere with the normal circulation in individual cases that it is probable that the contradictory conclusions arrived at by Hann and Reed may be explained by local circumstances.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

THE READING OF THE MENISCUS— ALSO GUNFIRE.

I HAVE read with interest the letter of Mr. Lowe in your September number, the more so as I have myself been experimenting for a short time with two Snowdon rain-gauges, and a Glaisher pattern (Negretti and Zambra, 1868) with very much the same results.

Absolute accuracy of measurement is, of course, unattainable; but in view of the loss by evaporation, which, I think, is greater with the Snowdon pattern, and the loss in the actual pouring from the receiver into the measuring glass, for it is a wet receiver, not a dry one, that one puts back into place, do we not rather require some counterbalancing error, such as we should get by reading the meniscus midway, or at the top, rather than at the bottom? This error would be none too much in warm weather.

I did not in my last letter raise the question of comparison between the rainfall of England, and that of the Continent, and the rest of the world. But twenty years' experience on the shores of the Mediterranean showed me that "a six-foot circle of short grass round the gauge" was generally an impossibility outside England; and unfortunately the more one proves that 3 or 4 feet is too high for the gauge mouth in England, the more one is proving also that our figures and those of Europe and Asia, etc., are not properly comparable. I believe that $1\frac{1}{2}$ metres is the standard height in some countries. A standard height for rain gauge mouths the whole world over is a desideratum—not to be obtained while the war goes on.

Touching the connection between the Heavy Firing and the Torrential Rains, I welcome Mr. Horner's letter. An ignorant amateur like myself, who perceives that the three years of war have been also years of very large rainfall and of torrential down-pours, may be allowed to wonder whether or not here is a case of cause and effect. He sees that the parts of England nearer to the explosions have experienced very heavy rains; and he does not know that these explosions can have no effect further afield, say, on the moisture-laden air coming up from the Atlantic, causing that rain to fall heavily in a smaller area which should have been distributed over a larger one. It is surely a case for the open mind.

H. A. BOYS, F.R.Met.Soc.

North Cadbury Rectory, Oct. 3rd, 1917.

HEAVY RAINFALL IN SOUTH-EAST ENGLAND.

MAY I ask for a little space to reply to Mr. Harries (p. 99) ?

He seems to confuse my *theory* with the popular belief that anything that makes a noise will bring down rain ! In this he is mistaken, as I will show by a quotation from "Star and Weather Gossip." by Mr. Joseph H. Elgie, F.R.A.S., published in 1915, where that gentleman kindly printed a note by me on the subject as follows:—"Mr. D. W. Horner, F.R.Met.Soc., has been good enough to send me an expression of opinion on the subject (of gunfire and rain). He believes that with a dry and rainless atmosphere, such, for instance, as was experienced at the beginning of the war, *no amount of cannonading, however violent, will cause a drop of rain to fall.* If, however, the atmosphere be thick with rain-bearing clouds, as during the phenomenally wet December of 1914, he thinks that the rainfall, which would have been in any case heavy, would be made heavier '*by the concussion setting free the extra moisture usually held in suspension.*' I also mentioned this matter in a letter to your magazine, September, 1916, p. 120, so my theory is by no means new, and it is curious that it should have gone so long unchallenged.

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

Moretonhampstead, Devon, Nov. 5th, 1917.

 THE GREEN FLASH AT SUNRISE.

HAVING read with keen interest the account of a "green flash" by Mr. J. G. Wood in the October magazine, I think that an extract from my meteorological note-book would be of interest, although I have witnessed many sunrises and sunsets, but never another like that which I now describe :—

"July 7th, 1916. Watched sunrise and noticed a peculiar blue light on top of sun, immediately before sun rose, the colour was similar to that caused by an electric light burning mercury, a greyish blue, and very bright. It only lasted a moment, and then disappeared as suddenly as it appeared. I have many times watched sunrise but do not remember seeing the same thing before. The clouds were only broken sufficiently for the sun to shine through for about ten minutes after sunrise, the sky being overcast."

GEO. E. DANES.

Alderney Lighthouse, Channel Islands, Oct. 21st, 1917.

REPORT ON ATMOSPHERIC POLLUTION.

IN our last volume we gave a detailed summary of the First Report of the Committee appointed in 1912 at the International Exhibition and Conference held in London to investigate the question of atmospheric pollution. The second report has just been issued in a special supplement to *The Lancet* of October 27th, 1917, dealing with the work carried on during the year 1915-6. A curious informality in connection with this Report is that it is not signed, nor is the name of Chairman, Secretary or any member of the Committee given. The Report is headed "Meteorological Office, Advisory Committee on Atmospheric Pollution," and it is no doubt by accident that the names have been omitted. The present position of the investigation may be gathered from the following extracts from the Introduction to the Second Report, which after pointing out that the work of the Committee consisted (1) of the organization of the scheme and the carrying on of the work ; (2) of the establishment and operating of the collecting stations, goes on to say :—

"In view of the above considerations, application was made to the Department of Scientific and Industrial Research for a Government grant in aid of the work included under No. 2, and the Committee have now gratefully to acknowledge the generous help given to them by the Department.

"Not only have their financial difficulties been met by a substantial grant, but the work has been given official approval and status by placing it under the control of the Meteorological Office. The Committee has been constituted an "Advisory Committee on Atmospheric Pollution" to the Meteorological Office, and its original title has been altered accordingly. At the same time little change in the personnel has been made, with the exception that the Department of Scientific and Industrial Research have power to appoint a representative, and it has also been decided to ask each co-operating authority to appoint a representative. It will thus be seen that a new impetus has been given to the work, and although, strictly speaking, the changes which are above indicated took place during 1917, yet as their effect is retrospective as above indicated, it appeared best to set them forth here."

The Report deals in great detail with the impurities collected from the air in various places, and attention is drawn to the fact that an increase in the amount of solid impurities which was observed in summer was probably due to blown dust rather than to matter suspended in the air. The value of the researches is practical rather than scientific, the bearings on the health of towns being obviously the most important. A valuable sidelight is thrown on the waste of fuel by the figures which are obtained of the actual weight of carbon thrown off unburned in smoke. It is not impossible that some relation to meteorological phenomena may ultimately emerge ; but so far no stress has been laid on this aspect.

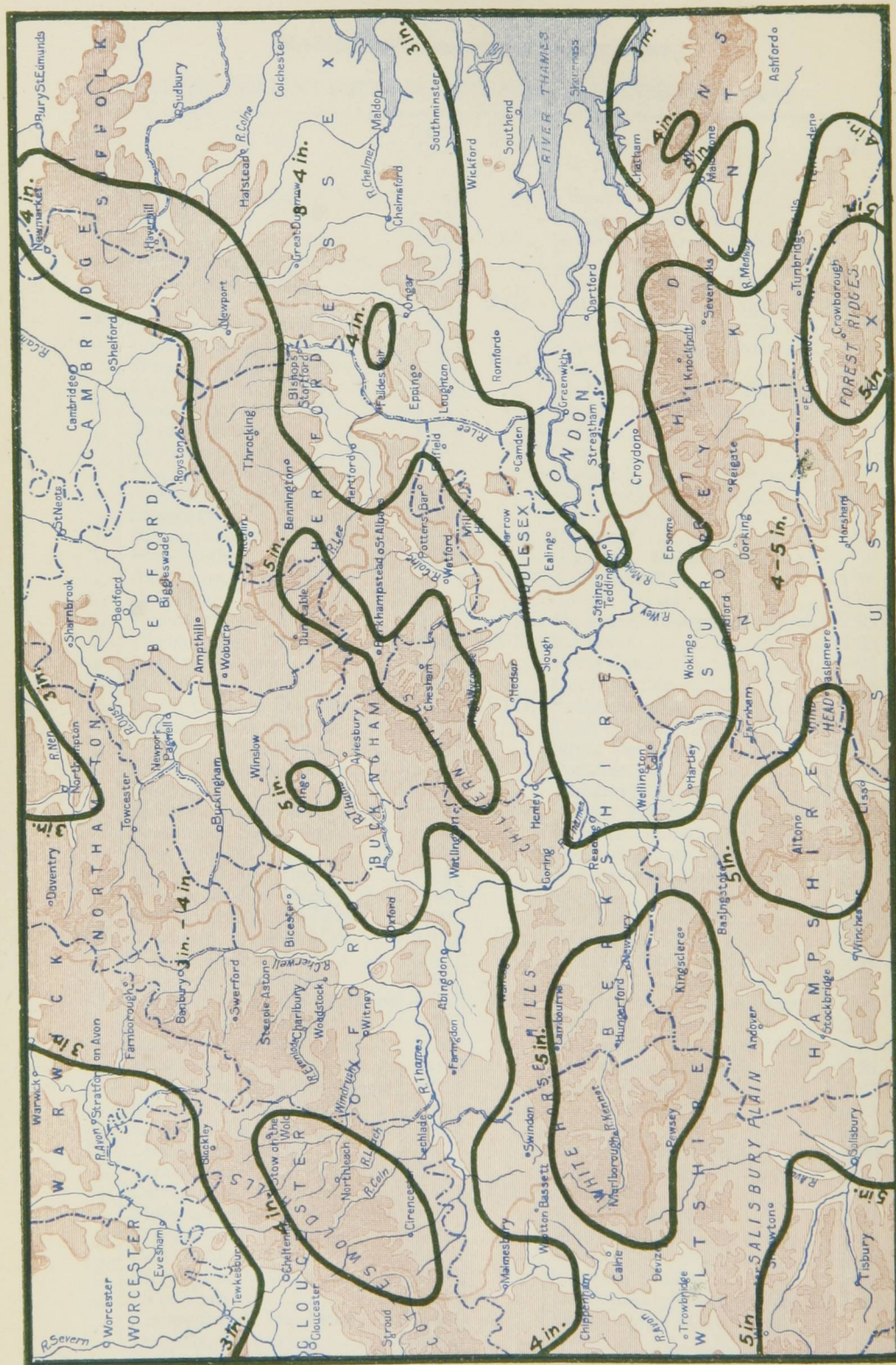
RAINFALL TABLE FOR OCTOBER, 1917.

STATION.	COUNTY.	RAINFALL.						
		Aver. 1875— 1909. in.	1917. in.	Diff. from Av. in.	Per cent. of Av.	Max. in 24 hours.		No. of Days
						in.	Date.	
Camden Square.....	<i>London</i>	2.72	3.25	+ .53	120	.42	12	19
Tenterden.....	<i>Kent</i>	3.48	3.88	+ .40	112	.64	7	21
Arundel (Patching).....	<i>Sussex</i>	4.01	4.41	+ .40	110	.59	11	17
Fordingbridge (Oaklands)...	<i>Hampshire</i>	3.97	5.08	+1.11	128	1.39	16	26
Oxford (Magdalen College)...	<i>Oxfordshire</i>	2.82	3.99	+1.17	142	.69	16	20
Wellingborough (Swanspool)...	<i>Northampton</i>	2.60	2.88	+ .28	111	.40	4	18
Bury St. Edmunds (Westley)...	<i>Suffolk</i>	2.72	3.98	+1.26	146	.80	4	16
Geldeston (Beccles).....	<i>Norfolk</i>	2.84	3.06	+ .22	108	.77	4	21
Polapit Tamar [Launceston]...	<i>Devon</i>	4.84	7.82	+2.98	162	.97	12	27
Rousdon [Lyme Regis].....	.....	3.81	3.25	— .56	85	.41	8	19
Stroud (Field Place).....	<i>Gloucester</i>	3.21	3.45	+ .24	107	.67	3	24
Church Stretton (Wolstaston)...	<i>Shropshire</i>	3.77	3.93	+ .16	104	...	...	...
Boston.....	<i>Lincoln</i>	2.75	3.12	+ .37	114	.56	4	18
Workshop (Hodsock Priory)...	<i>Nottingham</i>	2.77	2.28	— .49	82	.43	8	20
Mickleover Manor.....	<i>Derbyshire</i>	2.81	4.24	+1.43	151	.52	7	21
Buxton.....	.....	5.23	7.45	+2.22	142	.99	8	26
Southport (Hesketh Park)...	<i>Lancashire</i>	3.74	6.73	+2.99	180	.66	3	24
Arncliffe Vicarage.....	<i>York, W. R.</i>	6.48	...	...	...	...	...	...
Wetherby (Ribston Hall)...	.....	3.18	3.47	+ .29	109	.49	12	27
Hull (Pearson Park).....	..... <i>E. R.</i>	3.19	2.68	— .51	84	.45	7	18
Newcastle (Town Moor).....	<i>Northland</i>	3.20	2.36	— .84	74	.57	8	20
Borrowdale (Seathwaite)...	<i>Cumberland</i>	12.71	21.86	+9.15	173	3.32	22	25
Cardiff (Ely).....	<i>Glamorgan</i>	4.87	7.06	+2.19	145	1.55	3	29
Haverfordwest.....	<i>Pembroke</i>	5.51	5.51	.00	100	.67	29	24
Aberystwyth (Gogerddan)...	<i>Cardigan</i>	5.38	7.79	+2.41	145	.77	8	28
Llandudno.....	<i>Carnarvon</i>	3.78	5.16	+1.38	137	.85	12	26
Cargen [Dumfries].....	<i>Kirkcudbrt.</i>	4.45	7.05	+2.60	158	.91	24	25
Marchmont House.....	<i>Berwick</i>	3.83	4.18	+ .35	109	.64	24	21
Girvan (Pinmore).....	<i>Ayr</i>	5.38	10.54	+5.16	196	1.30	30	27
Glasgow (Queen's Park)...	<i>Renfrew</i>	3.36	5.95	+2.59	177	.81	23	25
Islay (Eallabus).....	<i>Argyll</i>	4.95	12.13	+7.18	245	1.52	20	31
Mull (Quinish).....	.....	5.87	12.52	+6.65	213	1.90	29	29
Balquhider (Stronvar).....	<i>Perth</i>	7.29	11.83	+4.54	162	1.97	20	25
Dundee (Eastern Necropolis)...	<i>Forfar</i>	2.81	2.43	— .38	87	.38	24	20
Braemar.....	<i>Aberdeen</i>	3.88	4.38	+ .50	113	.71	24	26
Aberdeen (Cranford).....	.....	3.23	3.50	+ .27	108	.51	7	24
Gordon Castle.....	<i>Moray</i>	3.38	4.40	+1.02	130	...	...	...
Drumnadrochit.....	<i>Inverness</i>	3.49	5.69	+2.20	163	.72	24	28
Fort William.....	.....	7.32	12.97	+5.65	177	1.65	22	28
Loch Torridon (Bendamph)...	<i>Ross</i>	8.38	17.29	+8.91	206	1.81	27	29
Dunrobin Castle.....	<i>Sutherland</i>	3.15	6.84	+3.69	217	1.42	27	24
Killarney (District Asylum)...	<i>Kerry</i>	5.59	7.60	+2.01	137	.69	30	30
Waterford (Brook Lodge)...	<i>Waterford</i>	4.00	2.82	— 1.18	70	.55	20	22
Nenagh (Castle Lough).....	<i>Tipperary</i>	3.48	5.34	+1.86	153	.59	3	28
Ennistymon House.....	<i>Clare</i>	4.40	7.11	+2.71	162	.94	11	29
Gorey (Courtown House)...	<i>Wexford</i>	3.75	2.57	— 1.18	69	.36	3, 29	23
Abbey Leix (Blandsfort)....	<i>Queen's Co.</i>	3.53	3.15	— .38	89	.49	8	23
Dublin (Fitz William Square)...	<i>Dublin</i>	2.88	2.60	— .28	90	.57	3	24
Mullingar (Belvedere).....	<i>Westmeath</i>	3.19	6.02	+2.83	189	1.00	3	22
Crossmolina (Enniscoe).....	<i>Mayo</i>	5.27	8.70	+3.43	165	.76	20	30
Cong (The Glebe).....	.....	4.60	8.16	+3.56	177	.76	8	29
Collooney (Markree Obay.)...	<i>Sligo</i>	4.21	9.26	+5.05	220	.71	20	29
Seaforde.....	<i>Down</i>	3.65	4.48	+ .83	123	.62	24	22
Ballymena (Harryville).....	<i>Antrim</i>	3.78	6.27	+2.49	166	.56	20, 29	28
Omagh (Edenfel).....	<i>Tyrone</i>	3.76	8.36	+4.60	222	.76	24	30

SUPPLEMENTARY RAINFALL, OCTOBER, 1917.

Div.	STATION.	Rain inches.	Div.	STATION.	Rain inches.
II.	Warlingham, Redvers Road..	4.82	XI.	Lligwy	7.53
"	Ramsgate	2.79	"	Douglas, Isle of Man	7.37
"	Hailsham	4.60	XII.	Stoneykirk, Ardwell House...	6.66
"	Totland Bay, Aston House...	3.95	"	Carsphairn, Shiel	15.78
"	Stockbridge, Ashley..	4.32	"	Langholm, Drove Road	8.50
"	Grayshott	5.13	XIII.	Selkirk, The Hangingshaw..	4.33
III.	Harrow Weald, Hill House...	4.31	"	North Berwick Reservoir...	2.55
"	Pitsford, Sedgebrook.....	2.87	"	Edinburgh, Royal Observaty.	2.62
"	Woburn, Milton Bryant.....	3.79	XIV.	Biggar.....	5.12
"	Chatteris, The Priory.....	3.53	"	Maybole, Knockdon Farm ...	6.71
IV.	Elsenham, Gaunts End	4.06	XV.	Buchlyvie, The Manse.....	7.75
"	Shoeburyness	1.97	"	Ardgour House	16.62
"	Colchester, Hill Ho., Lexden	3.48	"	Oban.....	10.06
"	Ipswich, Rookwood, Copdock	3.69	"	Campbeltown, Witchburn ..	11.51
"	Aylsham, Rippon Hall	3.56	"	Holy Loch, Ardnadam	14.75
"	Swoffham	3.75	"	Tiree, Cornaigmore	10.11
V.	Bishops Cannings	5.60	XVI.	Glenquey	7.80
"	Weymouth.....	3.71	"	Glenlyon, Meggernie Castle..	9.76
"	Ashburton, Druid House	8.04	"	Blair Atholl	4.16
"	Cullompton	5.42	"	Coupar Angus	2.65
"	Lynmouth, Rock House	8.48	"	Montrose, Sunnyside Asylum.	2.83
"	Okehampton, Oaklands.....	10.10	XVII.	Balmoral	3.85
"	Hartland Abbey.....	6.10	"	Fyvie Castle	5.27
"	St. Austell, Trevarna	7.65	"	Keith Station ..	6.28
"	North Cadbury Rectory.....	3.59	XVIII.	Rothiemurchus	4.13
VI.	Clifton, Stoke Bishop	5.92	"	Loch Quoich, Loan	29.25
"	Ledbury, Underdown.....	2.49	"	Skye, Dunvegan	15.72
"	Shifnal, Hatton Grange.....	3.18	"	Fortrose	4.41
"	Droitwich	2.74	"	Glencarron Lodge	13.81
"	Blockley, Upton Wold.....	3.44	XIX.	Tongue Manse	7.75
VII.	Grantham, Saltersford.....	2.96	"	Melvich	6.90
"	Market Rasen	2.92	"	Loch More, Achfary	14.65
"	Bawtry, Hesley Hall	2.68	XX.	Dunmanway, The Rectory ..	6.99
"	Whaley Bridge, Mosley Hall	6.44	"	Glanmire, Lota Lodge.....	3.88
"	Derby, Midland Railway.....	3.60	"	Mitchelstown Castle.....	4.21
VIII.	Nantwich, Dorfold Hall	5.17	"	Darrynane Abbey.....	7.75
"	Bolton, Queen's Park	8.86	"	Clonmel, Bruce Villa	2.90
"	Lancaster, Strathspey	5.87	"	Broadford, Hurdlestown.....	7.34
IX.	Langsett Moor, Up. Midhope	4.65	XXI.	Enniscorthy, Ballyhyland...	3.58
"	Scarborough, Scalby	3.70	"	Rathnew, Clonmannon	2.46
"	Ingleby Greenhow	3.74	"	Ballycumber, Moorock Lodge	4.66
"	Mickleton	4.00	"	Balbriggan, Ardgillan	3.21
X.	Bellingham, High Green Manor	3.86	"	Castle Forbes Gardens.....	4.63
"	Ilderton, Lilburn Cottage ...	3.26	XXII.	Ballynahinch Castle.....	10.85
"	Keswick, The Bank.....	9.93	"	Woodlawn	5.84
XI.	Llanfrechfa Grange	5.17	"	Westport, St. Helens ...	8.93
"	Treherbert, Tyn-y-waun	12.78	"	Dugort, Slievemore Hotel ...	13.40
"	Carmarthen, The Friary	6.82	XXIII.	Enniskillen, Portora.....	7.71
"	Fishguard, Goodwick Station.	5.37	"	Dartrey [Cootehill]	5.25
"	Crickhowell, Tal-y-maes.....	7.00	"	Warrenpoint, Manor House ..	4.48
"	New Radnor, Ednol	6.53	"	Belfast, Cave Hill Road	6.59
"	Birmingham WW., Tyrmynydd	9.26	"	Glenarm Castle	7.73
"	Lake Vyrnwy	8.54	"	Londonderry, Creggan Res...	7.92
"	Llangynhafal, Plas Drâw.....	5.98	"	Dunfanaghy, Horn Head ...	
"	Dolgelly, Bryntirion.....	10.55	"	Killybegs	11.27
"	Bettws-y-Coed, Tyn-y-bryn...	9.60			

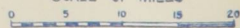
THAMES VALLEY RAINFALL. OCTOBER, 1917.



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 OCTOBER.

THE outstanding features of the weather of October were a low mean temperature, and a general excess of rainfall, with frequent and unseasonable snow storms in northern districts.

The month opened with a high pressure system over southern Europe and a low pressure area near Iceland, the accompanying southerly and south-westerly winds bringing a high temperature, especially over southern and eastern England, where shade maxima exceeding 70° were recorded at several places on the first three days of the month. The highest values were recorded on the 2nd, Geldeston, in Norfolk, 74° , Greenwich, 73° , and Tunbridge Wells, Raunds and York, 72° . In Scotland and Ireland the temperature at the same time was low.

During the month there was an almost complete absence of anti-cyclonic conditions, except round about the 20th, when the continental high pressure area was transferred to the east and south-east of England. In general the greater part of the month was very unsettled, with frequent snow, hail, and gales, especially in the north and west, where conditions were dominated by the passage of frequent cyclonic systems between the north of Scotland and Iceland, the rough weather extending to the Midlands of England and the south generally on several occasions, with thunderstorms in places. The lowest temperature of the month was recorded as early as the 7th, when Balmoral and West Linton recorded a shade value of 22° , the frost being general over the country except at stations on or near the coast. Owing to the absence of any pronounced spell of warm weather the mean temperature of the month was everywhere considerably below the average, as much as 4° F. in the north-east of England, and over 3° in the north and west of Scotland. For the whole country the temperature was nearly 3° below the average, and only in the English Channel was the deficiency less than 2° .

The average daily amount of bright sunshine varied from 5 hours, in the east of England, to less than 2 hours, in the north of Scotland. The excess as compared with the average, was most pronounced in the Midlands and eastern and south-eastern districts, where it amounted to rather more than an hour per day. More than a third of the total possible was recorded in most districts, and nearly half the possible in the Midlands.

Rainfall was above the average nearly everywhere. In some parts of the west of Scotland and the northern central parts of Ireland, the amounts recorded were unprecedented for October over a long series of years. Thus the observer at Omagh remarks: "The wettest October since the records here commenced 54 years ago and probably the highest fall for one month." About double the average fell in the north and west, and the only areas showing a slight deficiency were portions of the north-east of England, the east of Scotland, and east and south-east of Ireland, where at some stations the rainfall was under 2.50 in.

On the other hand as much as from 15 to 30 inches fell in parts of west Inverness, while spots in the Lake District and north-west Wales had over 20 inches. In parts of Kerry and Galway over 15 inches fell. Over the greater part of the country the rainfall varied between 3.5 and 7.0 in. A noteworthy feature was the large number of rainy days in the north and west, rain falling on every day of the month at some places, while a great many stations had only two or at most three days without rain.

The general rainfall, expressed as a percentage of the average, was:—England and Wales, 129 per cent.; Scotland, 158 per cent.; Ireland, 147 per cent.; British Isles, 142 per cent.

In London (Camden Square), the mean temperature was 47.1° , being 3° under the average. Duration of rainfall, 57.1 hours, of sunshine, 116 hours. Evaporation, .75 in.

Climatological Table for the British Empire, May, 1917.

STATIONS. (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	83·9	27	35·2	7	71·4	48·5	48·0	...	128·5	33·7	1·99	8	5·2
Malta	78·4	11	58·0	1	70·8	61·3	...	81	133·5	...	·16	3	2·4
Lagos ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Cape Town	77·8	2	43·1	29	64·9	50·7	49·6	75	...	...	4·28	10	5·1
Johannesburg	69·9	24	35·8	27	63·3	45·2	36·7	61	...	33·0	·75	6	3·3
Mauritius	81·9	9	57·0	18	79·2	64·4	64·2	79	...	49·3	·94	16	4·5
Bloemfontein	72·3	25	23·1	31	65·9	34·3	34·3	61	...	...	·12	1	1·4
Calcutta ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Bombay	92·0	31	75·1	5	90·1	79·2	74·4	72	135·6	69·3	·88	9	3·1
Madras	105·3	25	74·5	29	97·0	79·6	71·6	65	158·6	72·0	·62	4	2·5
Colombo, Ceylon	90·7	17	71·3	1	87·8	76·2	74·0	80	156·5	67·2	5·59	14	5·9
Hongkong	89·6	31	59·7	1	79·4	70·9	69·5	82	...	...	9·69	14	7·3
Sydney	73·2	6	43·0	27	63·4	49·9	46·2	70	119·8	29·3	3·52	6	3·2
Melbourne ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Adelaide	71·3	30	44·6	13	63·1	51·8	48·0	72	127·6	33·1	5·19	20	7·1
Perth ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Coolgardie	72·5	2	35·5	17	64·3	44·9	42·0	59	128·5	30·0	1·27	8	4·6
Hobart, Tasmania	64·9	17	30·9	28	55·2	42·8	39·9	69	115·8	27·6	2·31	17	6·2
Wellington	68·2	10	40·9	3	60·1	50·1	50·0	83	129·0	26·2	5·31	21	6·1
Auckland ... ..	...	...	...	...	64·0	53·1	...	...	...	...	8·01	26	...
Jamaica, Kingston	92·7	25	69·6	1	88·3	72·5	70·4	77	...	...	1·99	9	3·3
Grenada	89·0	18	71·0	26	85·6	74·1	...	72	139·0	...	2·12	11	3·2
Toronto	77·8	18	34·0	8	57·9	40·7	36·9	64	132·4	28·9	2·36	14	5·7
Fredericton	65·0	19*	25·0	1	53·6	34·6	37·0	76	...	...	4·50	14	7·3
St. John, N.B.	63·3	16	26·0	1	49·5	36·6	37·1	78	131·1	23·6	4·08	15	7·4
Victoria, B.C.	62·0	6	39·7	17	55·9	43·9	44·0	83	130·0	31·0	·56	7	5·1

* And 31.

Johannesburg.—Bright sunshine 271·9 hours.

COLOMBO, CEYLON.—Mean temp. 82°·0 or 0°·6 below, dew point 1°·6 below and R 6·96 in. below averages. Mean hourly wind velocity 4·6 miles. Rain storm 29th when ·42 in. fell. TS on 3 days.

HONGKONG.—Mean temp. 74°·8. Bright sunshine 168·6. Mean hourly velocity of wind 9·9 miles.

Adelaide.—Mean temp. 0°·7 below and R 2·51 in. above averages. A very wet and cloudy month.

Coolgardie.—Temp. 3°·2 below, and R about $\frac{1}{4}$ in. below averages.

Wellington.—Mean temp. 2°·3 above, and R ·43 in above, averages. Bright sunshine 120·9 hours. Cloudy unsettled and wet month.