

Symons's Meteorological Magazine.

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THE RAINFALL OF 1915.

A PRELIMINARY study of the rainfall of 1915 shows that the south of England was again the wettest part of the British Isles in relation to the average. In the south-eastern counties more than 130 per cent. of the average fell. Another wet band, with maxima over 120 per cent., stretched across the English midlands. In respect of the great wetness of the southern counties it is noteworthy that this has been a feature of every year since 1909. In the north-west, from the southern Pennines to the West Highlands, the rainfall was below the average, less than 90 per cent. of the average falling over the greater part of this large area and less than 80 per cent. in the west of Scotland. In the north-east, on the other hand, the rainfall was above the average, especially in the north-eastern counties of Scotland, where a large area had an excess of more than 20 per cent. The distribution of rainfall in Ireland was more simple, there being a moderate excess in the centre and south-east reaching a maximum of 20 per cent. at Dublin and a slightly deficient fall in the south-west, west and north.

The wettest months of 1915 were, with the exception of July, in the winter. February and December showed the most marked excesses, particularly in England and Wales. With local exceptions every month from March to November inclusive, except July, had less than its normal rainfall. The dryness of the spring months was in most cases rather partial, March being driest in the north-west, April in the east, and May in the north-west. June was also very dry in the north of Scotland. The most pronounced droughts however occurred in the autumn, and considerable areas, especially in the west of Scotland and the north-west of England, had a serious deficiency of rainfall every month from August to November inclusive. The north-east of Scotland on the other hand experienced several unusually heavy cyclonic rainfalls during the autumn.

The general rainfall of 1915 as deduced from 130 records uniformly distributed over the British Isles was as follows:—

England, South.	England, North.	Wales.	Scotland.	Ireland.	British Isles.
119	97	104	93	102	102 per cent. of average.

Frederic Gaster.

1842—1915.

It is with much regret that we record the death at Whitstable, on September 10th, of Frederic Gaster, who for upwards of 50 years had been a Fellow of the Royal Meteorological Society. He was a member of the staff of the Meteorological Department of the Board of Trade, and subsequently of the Meteorological Office, when in 1867 the "Department" changed its name on passing from the control of the Board of Trade to that of a Committee nominated by the Royal Society, and presided over by Sir Edward Sabine, F.R.S. At first Gaster acted as Assistant to Mr. R. Strachan, F.R.Met.Soc., who, happily, still survives; but soon after the death of Admiral FitzRoy, in 1865, the Storm-warnings and Weather-forecasts originated by him in 1861 were discontinued, and when in response to the strong public agitation which followed immediately after their suppression they were resumed, Mr. Gaster was placed in charge of that department of the Office, at the head of which was Mr. R. H. Scott, F.R.S., and this position he retained until his retirement in 1909.

During that long interval many developments and much progress in the science of Weather-forecasting took place, in all of which it is but fair to say Gaster had a most important share. Indeed, as a "Weather Expert," to use a term which has become somewhat familiar now in the newspapers, he acquired great skill in predicting the sequence of weather which would ensue upon the conditions shown on the synoptic charts, drawn from the data telegraphed to the Office twice or thrice a day, and this skill had a scientific as well as an empirical basis. The reality of the progress is authenticated by the results of the systematic checking of the forecasts made in the Office, and published in its Annual Reports, where a fairly steady increase is shown, year by year, in the percentage of "Successes," and a corresponding diminution in the "Failures."

In addition to his official work Mr. Gaster contributed during many years the weather articles which appeared regularly in the *Times*, for the production of which his unique knowledge of what was taking place not only in British, but also in European weather, eminently fitted him.

At one time his was a very familiar figure at the meetings of the Meteorological Society, for which he wrote a few papers, and at which he used frequently to take part in the discussions; but for some years prior to his retirement from the Meteorological Office his attendance was only occasional, and to most of those who now attend the meetings he was by no means so well known as he was to those who frequented them a quarter of a century ago.

R.H.C.

ROYAL METEOROLOGICAL SOCIETY.

AN ordinary meeting was held on December 15th, at the Society's Rooms, Westminster, Major H. G. Lyons, President, in the Chair.

Mr. F. J. Brodie read a paper on "The Incidence of Bright Sunshine over the United Kingdom during the 30 years, 1881-1910." The author described the evolution of the Campbell-Stokes recorder, which is now accepted as the standard instrument for sunshine observations. The essential features of the instrument had changed little since the improvements introduced by Sir George Stokes in 1879; and the records since 1880, the first year of publication in the *Weekly Weather Report*, might, therefore, be accepted as homogeneous. At the close of the decade ending with 1910, the total number of stations reporting to the Meteorological Office and the Society had reached 198. In discussing the average distribution the data from 66 stations were utilized, and maps constructed showing the seasonal and annual incidence. The broad features of the distribution, differing little from the map of the average sunshine, previously published in *Symons's Meteorological Magazine* (volume 42, face p. 150), showed an increase from north to south, with a tendency to coastal maxima and inland minima; and there was ample confirmation, even ignoring the records of the large manufacturing towns, for the area of small sunshine over the central parts of northern England. A special examination of the records in London and other manufacturing centres, showed the marked deficiency resulting from smoke, more particularly in the winter months. There was evidence, however, that the abatement of the smoke evil had somewhat remedied these conditions in recent years. In conclusion some references were made to individual examples of sunny days and weeks, and the relation of the recorded duration to the duration theoretically possible.

Col. Mellish compared the parallelism between isonephs and isohels which gave an interesting example of the importance of taking into consideration the geographical positions of the sunshine stations. At Fort Augustus the sheltered position in the Great Glen considerably reduced the duration of sunshine, an irregularity not reproduced in cloud observations.

Dr. Chree emphasized the great importance of absolutely standard instruments, especially in the uniformity of sensitiveness in the cards employed.

Mr. W. W. Bryant criticised the seasonal grouping employed by Mr. Brodie, who, following the usual practice, placed May amongst the spring months; he (Mr. Bryant) considered that with its intimate relation to the sun's altitude the seasonal arrangement of sunshine records should place May amongst the summer months. Messrs. R. H. Hooker, J. E. Clark, C. Harding, and Sir Napier Shaw also spoke.

Dr. W. Galloway gave a scientifically exact description of remarkable cloud phenomena seen by him on July 31st, 1915, from the Norfolk Broads. The phenomena, which took place in the zenith, were apparently of the nature of electrical discharges between two clouds, and were aptly compared in appearance to the movements of a pollen tube when fructifying.

Sir Napier Shaw suggested that the position of the phenomena in the zenith, where observations were comparatively rare, might in some degree account for their remarkable appearance, and instanced some sketches he had received of cloud formations viewed more nearly horizontally, which to a certain extent resembled those described by Dr. Galloway.

Mr. Tripp and Dr. C. Chree also spoke.

The following were elected fellows of the Society : Mr. R. A. Watson Watt, B.Sc., and Mr. John White.

SCOTTISH METEOROLOGICAL SOCIETY.

THE Annual Business and General Meeting of the Society was held on 21st December, 1915, in the Gould Hall, Edinburgh, Mr. J. Mackay Bernard, President, in the Chair.

The Report from the Council stated that the routine work of the Society had proceeded much on the usual lines, though difficulties inseparable from war conditions had arisen. As regards the observation of rainfall there were still large areas in the Highlands and North of Scotland for which no information was available, and though perhaps at present no great extension of the existing network of stations need be looked for, the Council were of opinion that a responsibility rested on local authorities to secure adequate representation of the areas under their control. There had, unfortunately, been a considerable shrinkage in the membership of the Society, owing mainly to the deaths of supporters of long standing.

Mr. George Williamson moved the adoption of the Report, which involved the retirement by rotation of Mr. J. Mackay Bernard from the Presidentship, after a three years' term of office. The following Council and Office-bearers were elected for the ensuing twelve months :

President : Prof. R. A. Sampson, D.Sc., F.R.S., Astronomer-Royal for Scotland ; *Vice-Presidents* : Messrs. C. T. R. Wilson, F.R.S., and A. Crichton Mitchell, D.Sc. ; *Council* : Messrs. T. S. Muir, C. G. Knott, D.Sc., James Watt, W.S., Sir R. P. Wright, F.R.S.E., Prof. T. Hudson Beare, J. D. Falconer, D.Sc., J. Mackay Bernard, M. M'Callum Fairgrieve, D. A. Stevenson ; *Hon. Sec.* : E. M. Wedderburn, W.S., D.Sc. ; *Hon. Treasurer* : W. B. Wilson, W.S.

The retiring President, Mr. Bernard, under the title of "Some Remarks on Meteorology," discussed a wide variety of topics, amongst others the physical processes underlying the formation of rain; the problems of forecasting; the appearance of the sky as a weather prognostic, and some other popular points of view; the rain-band spectroscope; and various types of weather glasses. Examples were given, of the usefulness of a Central Office as a bureau where inquiries of a purely practical nature could be dealt with. Reference was made to the oldest known weather records, and the lecturer had examined a large mass of Scottish material. Two interesting examples of weather extremes were cited. Thus, the winter of 1614-15 was so severe and so prolonged and the destruction of live stock so great, that the use of lamb as a food was prohibited by law for a certain time. Again in 1652 a wonderfully dry and warm summer was experienced, with the harvest completed in parts of Scotland early in July. "The summer produced ripe wine berries and grapes and abundance of Scotch chestnuts openly sauld at the Mercat Cross of Edinburgh and baken in pasties at banquets." The fine weather of 1652 lasted far on in the year, so that fruit trees blossomed and fruited again a second time and "salads and sybous were cried and sold in Edinburgh on the 27th of November."

Mr. Bernard was cordially thanked for his services as President, and for his paper. Professor Sampson, Dr. Knott, and Messrs. T. S. Muir, A. Watt, G. Williamson, and W. B. Wilson took part in an interesting discussion.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

LURID SUNSET AS A PROGNOSTIC.

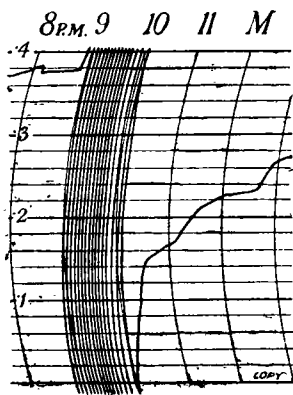
ON Thursday, November 25th, there was a magnificent sunset. As the sun was setting a lurid red glow was succeeded by a deep purple—the sky presenting the appearance of an impending thunderstorm. A friend of mine has seen similar sunsets in Ceylon, and at Trondhjem, and they are regarded as a sign that very bad weather will follow. Can any of our readers throw any information as to whether this is so?

W. SIMPSON.

24, Rectorij Road, Caversham, December 2nd 1915.

HEAVY RAIN IN COLOMBO.

I ENCLOSE herein copies of records from the pluviographs at the Observatory and the Surveyor General's Office (Fort) of the heavy rain experienced in Colombo in the early hours of the morning of 28th October. It will be seen that the maximum intensity is nearly the same for both, about 6 inches in the hour. The third



COLOMBO OBSERVATORY, 12-13 JULY, 1907

record that of 12th July, 1907, is from the Surveyor General's Office (Fort), and shows the record for one shower as far as Colombo is concerned. Here it will be noted that 6 inches of rain fell practically within the hour.

The pluviograph at the Fort is on the roof of the Surveyor General's Office at a height of 50 feet above ground level, and the indications are that on account of altitude the reading of the gauge should be increased 20 per cent. to arrive at the correct rainfall at ground level. Through retrenchment it is quite impossible to purchase pluviographs of the Richard pattern, but records from some of Ceylon's really wet places would be interesting.

J. E. EVANS,

for Superintendent Observatory, for Surveyor General.

Colombo Observatory, Ceylon, 4th November, 1915.

[The two charts from Richard's Pluviographs, referred to above, are reproduced as the frontispiece to this volume. The greatest fall of rain on record in one hour approaches 12 inches, but falls of 6 inches in an hour are extremely remarkable.—Ed. S.M.M.]

THE RAINFALL OF HAVANA AND ENGLAND, S.W.

IN 1914 the Havana rainfall during the wet season was 29 per cent. below the average, which suggested (see p. 14) that the fall in England, South-west, January to March, 1915, should be in excess of the average. The official figures published in May, 1915, give the rainfall for that district as 29 per cent. above the average. The exact coincidence is remarkable.

The figures for Havana, May to October, 1915, have now come to hand, and show the rainfall for the season as only 82 per cent. of the usual fall. This again indicates, on the strength of the correlation coefficients, a wet season in England, South-west, for January to March, 1916. It will be interesting to see whether the parallelism proves as marked this year as last.

December 30th, 1915.

A. HAMPTON BROWN.

WINTER THUNDERSTORMS.

BEING engaged on some investigations of Thunderstorms, I should like to ask readers of *Symons's Meteorological Magazine* if they would assist by sending me a note of any thunderstorms they may observe up to the end of March, 1916. The comparatively rare thunderstorms of winter are particularly useful in my investigations; but thunderstorms being often very local may be missed by the official Observers. Therefore rainfall Observers could assist very much if they would send me a postcard—(1.) when they notice sheet lightning at night; the time should be given, the direction in which seen, and whether there were many flashes or only two or three; (2.) when they hear thunder; the time should be given and the direction of the storm, and a note as to whether lightning was seen and whether rain occurred. These are the principal points on which information is required, but any further details of the storm would be useful. After the end of March thunderstorms become too common to be treated in this way, so I only ask for information up to March 31st, 1916.

CHARLES J. P. CAVE, *Capt.*

Meteorological Office, South Farnborough, Hants, December 9th, 1915.

A "PARTIAL RAIN-SPELL."

MR. A. E. SWINTON, in your Magazine for September last (p. 130), suggests the term "partial rain-spell," defining it: "A partial rain-spell is a period of more than 28 consecutive days in which there were never more than two consecutive days without rain." This definition might possibly, though not probably, lead to a *reductio ad absurdum*, for such a partial rain-spell might also be a partial drought, if the falls of rain were very small. It would be so if they did not aggregate .29 in. in 29 days. The term, I agree with Mr. Swinton, would be useful, but it should be confined to exceptional periods of wet weather, the amount as well as frequency of the rain being taken into consideration. I would, therefore, suggest the definition: "A partial rain-spell is a period of more than 28 consecutive days with an average rainfall of at least .10 in. per day and without two consecutive rainless days." This practically confines the term to a period in which at least three inches of rain fell.

Within the last two years we have had here such a period three times: March 1st to 30th, 1914, 30 days with 4.85 in. of rain falling on 27 days; November 14th, 1914, to January, 16th, 1915, 64 days with 11.45 in. of rain on 45 days; and November 29th to December 27th, 1915, 29 days, with 5.84 in. of rain on 25 days.

JOHN HOPKINSON.

Weetwood, Watford, 29th December, 1915.

THE FIRST LONDON BAROMETER.

IN reading "The Lives of the Norths," by Roger North, lately, I came across the following passage relating to the early history of the barometer, which I think may be of interest to your readers. It occurs in the life of Lord Guildford, Lord Keeper in the last years of Charles II., volume II., pp. 202, ff. ed. of 1826. No dates are given in the work from beginning to end, but it may be taken as referring to the period between 1670 and 1680. The passage is as follows : "His lordship was much affected by the discoveries which fell in the consequences of the Torricellian experiment : whereby a new world of air, compressing everything it touches, is revealed. He could not but observe a manifest connexion between the alterations of the mercurial station, and the course of the winds and weather ; but could not fix in his mind any certain rules of indication, but rather the contrary, viz., that events failed as often as corresponded with the ordinary expectation. But yet he would not give it over for desperate, and hoped that a more general observation might generate a better prognostic of the weather from it, than was yet known. And that must be expected from a more diffused, if not an universal use of it, which could not then be thought of ; because the instruments were rare, and confined to the cabinets of the virtuosi ; and one was not to be had but by means of some of them. Therefore his lordship thought fit to put some ordinary tradesmen upon making and selling them in their shops ; and accordingly he sent for Jones, the clock maker in Inner Temple Lane ; and having shown him the fabric, and given him proper cautions in the erecting of them, recommended the setting them forth for sale in his shop ; and, it being a new thing, he would certainly find customers. He did so, and was the first person that exposed the instrument to sale publicly in London. Then others took it up, and few clock makers, instrument makers, cabinet makers and divers other trades were without them always in their shops, ready for sale."

A page or two earlier (197) there is a curious account of an instrument made by Sir Samuel Moreland, and called by him a "statick barometer" ; "and he defied all the virtuosi to resolve it." The description is minute and detailed, but baffles my comprehension. Perhaps some of your more scientific readers might find amusement in working it out.

G. SEARLE.

COLD NOVEMBERS AND SEVERE WINTERS.

HERE the mean temperature of November, 1915, was 38°.5, or nearly 5° below the average. It occurred to me to examine previous records of temperature in order to trace whether a severe winter usually follows a frosty November. I give a table in which the values are selected from the Greenwich records, viz., Belville's

1812-48, and those tabulated in Greenwich Meteorological Observations, Parts III. and IV., 1849-1905.

Cold November. Dec., Jan. and Feb. following.				Cold November. Dec., Jan. and Feb. following.			
Year.	Mean Temp.	Mean Temp.	Diff. from average 1841-1905.	Year.	Mean Temp.	Mean Temp.	Diff. from average 1841-1905.
1812 ...	40·3	37·0	—2·3	1854 ...	40·6	35·1	—4·2
1813 ...	40·3	31·9	—7·4	1858 ...	39·5	41·7	+2·4
1815 ...	38·7	36·3	—3·0	1862 ...	39·8	42·7	+3·4
1816 ...	39·1	40·6	+1·3	1871 ...	37·4	41·6	+2·3
1819 ...	40·9	34·8	—4·5	1878 ...	39·8	34·6	—4·7
1826 ...	40·5	36·3	—3·0	1879 ...	38·5	36·0	—3·3
1829 ...	39·4	33·2	—6·1	1887 ...	40·8	37·1	—2·2
1837 ...	40·8	34·4	—4·9	1896 ...	40·5	39·3	0·0
1851 ...	37·7	41·1	+1·8	1910 ...	38·6	41·4	+2·1
				Averages	43·5	39·3	

Thus in 11 cases cold winters succeeded cold Novembers, while in only 6 instances mild seasons ensued. I am not in possession of the Greenwich temperatures since 1905, but have appended the figures for 1910-11, from Camden Square, which prove that a frosty November preceded a warm winter, and it is notable that before the very severe winter of 1895, we had an unusually mild November!

In the "Annuaire Astronomique," by Camille Flammarion, I consulted the "Temperatures mensuelles et annuelles relevées à l'Observatoire de Paris," from 1801 to 1914, with a view to extending this enquiry. I found, however, that in a decided majority of cases (9 to 4), a frosty November ante-dated a warm winter. To what extent local conditions may have induced different results for Greenwich and Paris I cannot say. The discordances in monthly temperatures were often considerable, thus at Greenwich, in November, 1910, the weather was much colder than in November, 1909, whereas at Paris by far the colder month was November, 1909. It is sufficiently obvious from these inconsistencies revealed from my extremely partial enquiry, that the character of a coming winter cannot be safely foretold from the weather of a prior November.

W. F. DENNING.

Bristol, December 15th, 1915.

THE NOVEMBER FROST.

THE mean temperature of November, 1915, in this district, was 33°·06, and apart from the single instance of January, 1908, with a mean of 33°·00, there has been no month with a lower temperature since February, 1902, 31°·7. The mean minimum was 24°·5 (instrument unscreened and four feet above ground on post), and this works out as colder than the mean monthly minimum of any month since February, 1900 (22°·2). No November in the last sixteen years shows a lower mean minimum than 27°·3, in 1910.

Prior to 1900 my observations do not show the means, only the extremes. The mean maximum for November was $41^{\circ}6$, which is the lowest November maximum in my observations, back to 1900, the nearest approach to it being $42^{\circ}5$ in 1910. The absolute minimum was 11° on 27th. There were 23 frosts and the maximum failed to reach 40° on twelve days, and on one of these days (27th), failed to reach 32° .

The frost seems to have been still more severe in Scotland. An interesting article on the sudden migration of grouse owing to the cold and snow appeared in *The Field* of December 11th. There it is stated that seldom within the memory of man has such a severe November been experienced in Scotland. Skating on the Tweed and Nith was general, on pools where a week previous the salmon angler had been throwing his fly.

Near Preston skating was indulged in as early as November 18th, and the friend who told me said it was the earliest date in his recollection, and continued for ten days, an unprecedented circumstance.

R. P. DANSEY.

Kentchurch Rectory, Hereford, December, 1915.

REVIEWS.

Memoirs of the Indian Meteorological Department, Vol. XXI.' Part X., Correlation in Seasonal Variations of Weather. IV.' Sunspots and Rainfall. By DR. G. T. WALKER, C.S.I., F.R.S. Simla, 1915. Size 13×8 . Pp. 33, 1 plate. *Part V., Sunspots and Temperature.* By DR. G. T. WALKER, C.S.I., F.R.S. Simla, 1915. Size, 13×8 . Pp. 30, 1 plate.

IN these two memoirs Dr. Walker deals respectively with the relation between sunspots and rainfall, and sunspots and temperature, at a large number of places over the earth's surface. The results of these two inquiries are on the whole not in sympathy with those who believe in the potent influence of variations in sunspot activity and corresponding variations in atmospheric conditions. "The general impression left by an examination of the chart may be one of disappointment at the comparative insignificance and inconsistency of the results; The co-efficient of rainfall with sunspots is not in general larger than would be produced by mere chance It is only where the co-efficients over a region have some appreciable tendency towards uniformity that a real relationship may be concluded. The relationship seems real in the case of the Nile and India; but, perhaps the clearest case is South America, where below latitude 30° rainfall is deficient when sunspots are numerous." This latter remark regarding South American relations is of much interest, since it seems to

corroborate the belief which is officially expressed by several of the Weather Services in that continent. As regards temperature, it is shown that in the Polar regions of the Eurasian continent there is a tendency to higher values at times of sunspot maxima. This statement, to which attention has not hitherto been drawn, applies also to the western portion of Europe and of the Mediterranean, including Algeria.

Dr. Walker is extending the examination of the correlations so as to include pressure and other elements, when the problem as a whole will be considered in the light of the complete evidence. This extension of the subject will be looked forward to with much interest by those who agree that for such questions we require data dealing with the whole world.

R.C.M.

Meteorology of Australia. Commonwealth Bureau of Meteorology. Results of Rainfall Observations made in Queensland. By H. A. HUNT, Commonwealth Meteorologist. Melbourne, 1914. Size, 12 × 9½. Pp. 285, and plates. Price, 10s. 6d.

THIS is the third and most recent of the series of rainfall investigations at present being published by the Commonwealth Bureau of Meteorology, and contains tabulations of all available annual totals and number of rain days for 1040 stations in Queensland. Many of the records extend over more than 30 years, so a good working basis is provided for the discussion of rainfall problems. Monthly and annual values to the end of 1912 are given for 137 representative stations, which, as the author remarks "will be found of especial interest in connection with inquiries and investigations in regard to local seasonal rainfall." The heaviest rains are in January and February and the bulk of the years' precipitation falls between December and April, when the heating of the centre of the continent is responsible for the formation of a low pressure area, or monsoonal depression accompanied by a permanent on shore wind. Over the greater portion of Queensland the winter is usually quite dry, the maximum rainfall is recorded at Harvey Creek, 167 inches, closely followed by Innisfail with 151 inches, both located in 17½° S., close to the coast. Inland the rainfall falls off very rapidly.

The work is well illustrated with 27 annual rainfall maps, monthly normal maps, an average rainfall map, an *interior* rainfall map of Papua, and many diagrams and maps showing distribution of frost, heights of floods, and frequency of wind, thunder and hail storms. A very interesting general chronological history of remarkable atmospheric occurrences during the past half century is also given, and an appendix contains monthly and yearly meteorological means and extremes at Brisbane from 1887 to 1912.

R.C.M.

RAINFALL TABLE FOR DECEMBER, 1915.

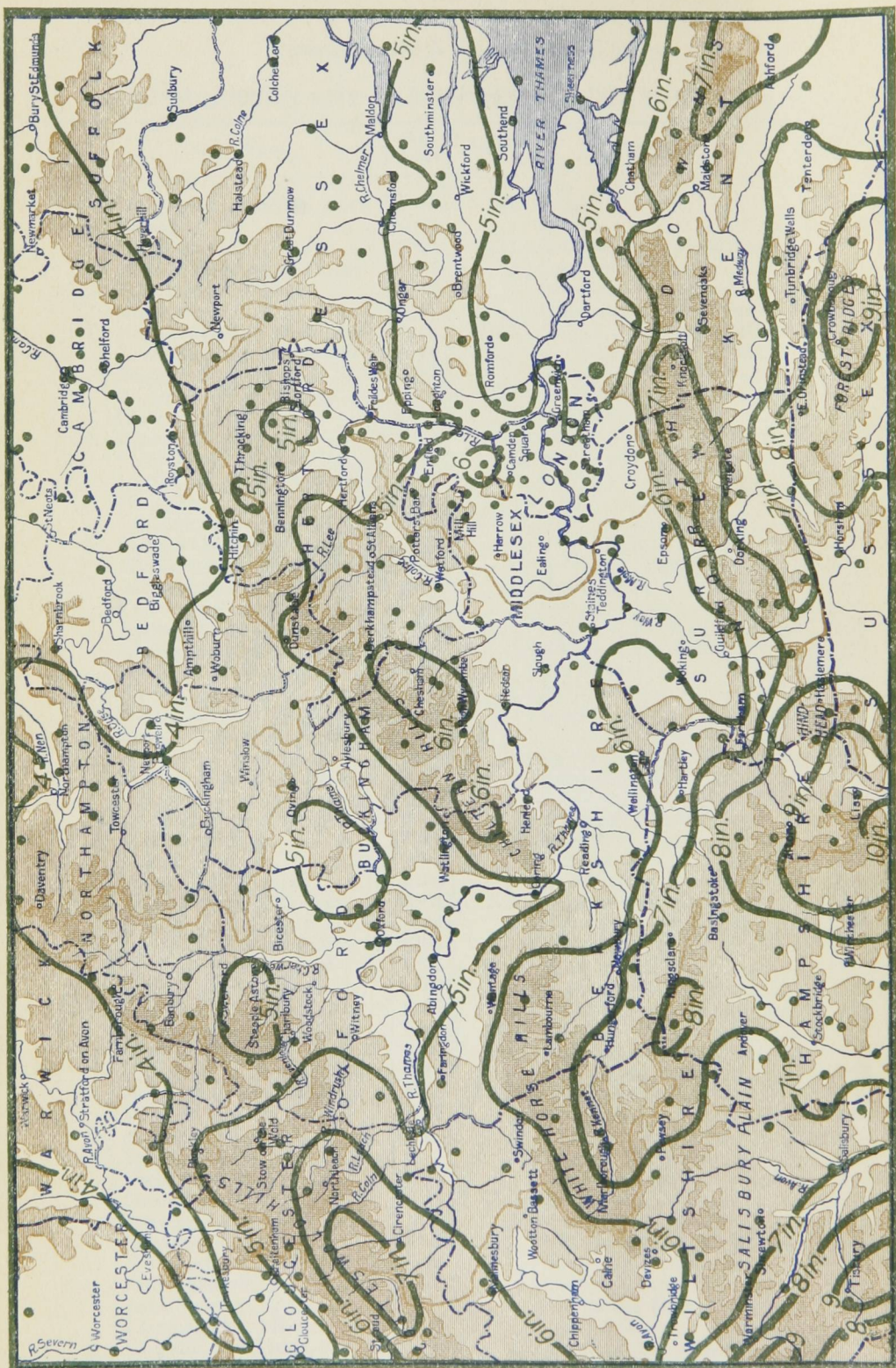
STATION.	COUNTY.	Lat. N.	Long. W. [°E.]	Height above Sea. ft.	RAINFALL OF MONTH.	
					Aver. 1875— 1909. in.	1915. in.
Camden Square.....	London	51 32	0 8	111	2'13	5'64
Tenterden.....	Kent	51 4	*0 41	190	2'77	6'94
Arundel (Patching).....	Sussex	50 51	0 27	130	2'91	8'42
Fawley (Cadland)	Hampshire	50 50	1 22	52	3'23	9'26
Oxford (Magdalen College).....	Oxfordshire	51 45	1 15	186	2'06	4'41
Wellingborough(Swanspool).....	Northampton	52 18	0 41	155	2'13	4'30
Shoeburyness.....	Essex	51 31	*0 48	13	1'71	4'23
Bury St. Edmunds(Westley).....	Suffolk	52 15	*0 40	226	2'14	3'52
Geldeston [Beccles].....	Norfolk.....	52 27	*1 31	38	2'07	3'43
Polapit Tamar [Launceston].....	Devon	50 40	4 22	315	4'46	9'52
Rousdon [Lyme Regis]	"	50 41	3 0	516	3'68	8'01
Stroud (Upfield)	Gloucestershire	51 44	2 13	226	2'71	4'73
Church Stretton (Wolstaston).....	Shropshire	52 35	2 48	800	2'99	6'51
Boston	Lincolnshire.....	52 58	0 1	11	1'88	4'90
Worksop (Hodsock Priory).....	Nottinghamshire	53 22	1 5	56	2'17	5'31
Mickleover Manor	Derbyshire	52 54	1 32	280	2'38	4'88
Macclesfield	Cheshire	53 15	2 7	501	3'35	4'98
Southport (Hesketh Park).....	Lancashire	53 39	2 59	38	3'10	6'44
Arncliffe Vicarage	Yorkshire, W.R.	54 8	2 6	732	6'75	9'89
Wetherby (Ribston Hall)	"	53 59	1 24	130	2'27	5'88
Hull (Pearson Park)	" E.R.	53 45	0 20	6	2'32	5'02
Newcastle (Town Moor)	Northumberland	54 59	1 38	201	2'46	6'50
Borrowdale (Seathwaite)	Cumberland.....	54 30	3 10	423	15'14	21'03
Cardiff (Ely)	Glamorgan	51 29	3 13	53	4'70	8'55
Haverfordwest.....	Pembroke	51 48	4 58	90	5'18	9'48
Aberystwyth (Gogerddan).....	Cardigan	52 26	4 1	83	4'66	8'27
Llandudno	Carnarvon	53 20	3 50	72	2'84	6'54
Cargen [Dumfries]	Kirkcudbright.....	55 2	3 37	80	4'84	8'77
Marchmont House	Berwick.....	55 44	2 24	498	2'83	6'75
Girvan (Pinmore).....	Ayr	55 10	4 49	207	5'48	7'17
Glasgow (Queen's Park)	Renfrew	55 53	4 18	144	3'95	4'87
Inveraray (Newtown)	Argyll	56 14	5 4	17	8'57	5'35
Mull (Quinish).....	"	56 34	6 13	35	6'59	7'85
Dundee (Eastern Necropolis).....	Forfar	56 28	2 57	199	2'67	6'10
Braemar	Aberdeen	57 0	3 24	114	3'13	6'68
Aberdeen (Cranford)	"	57 8	2 7	120	3'43	7'00
Gordon Castle	Moray	57 37	3 5	107	2'72	5'15
Fort Augustus (S. Benedict's).....	E. Inverness	57 9	4 41	68	5'62	4'55
Loch Torridon (Bendamph).....	W. Ross	57 32	5 32	20	9'86	9'00
Dunrobin Castle	Sutherland	57 59	3 56	14	3'09	5'35
Wick	Caitness	58 26	3 6	77	3'11	4'41
Killarney (District Asylum).....	Kerry	52 4	9 31	178	6'92	8'08
Waterford (Brook Lodge).....	Waterford	52 15	7 7	104	4'32	6'89
Nenagh (Castle Lough).....	Tipperary.....	52 54	8 24	120	4'34	6'09
Ennistymon House.....	Clare	52 57	9 18	37	5'03	7'36
Gorey (Courtown House)	Wexford	52 40	6 13	80	3'42	7'13
Abbey Leix (Blandsfort).....	Queen's County.....	52 56	7 17	532	3'41	4'58
Dublin (Fitz William Square).....	Dublin	53 21	6 14	54	2'27	4'88
Mullingar (Belvedere)	Westmeath	53 29	7 22	367	3'39	5'84
Crossmolina (Enniscoe).....	Mayo	54 4	9 16	74	6'11	10'25
Cong (The Glebe).....	"	53 33	9 16	112	5'42	8'21
Collooney (Markree Obsy.).....	Sligo	54 11	8 27	127	4'34	7'39
Seaforde	Down.....	54 19	5 50	180	3'77	7'29
Bushmills (Dundarave)	Antrim	55 12	6 30	162	3'87	...
Omagh (Edenfel).....	Tyrone	54 36	7 18	280	3'91	5'79

RAINFALL TABLE FOR DECEMBER, 1915—*continued.*

RAINFALL OF MONTH (con.)					RAINFALL FROM JAN. 1.				Mean Annual 1875- 1909. in.	STATION.
Diff. from Av. in.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1875- 1909. in.	1915. in.	Diff. from Aver. in.	% of Av.		
		in.	Date.							
+3.51	255	.72	9	22	25.11	32.18	+7.07	128	25.11	Camden Square
+4.17	251	.79	9	23	27.64	34.58	+6.94	125	27.64	Tenterden
+5.51	289	1.00	9	26	30.48	42.44	+11.96	139	30.48	Patching
+6.03	287	.94	23	24	31.87	43.41	+11.50	136	31.87	Cadland
+2.35	214	.69	9	23	24.58	29.38	+4.80	120	24.58	Oxford
+2.17	202	.56	4	25	25.20	24.77	— .43	98	25.20	Swanspool
+2.52	247	.62	3	19	19.28	25.66	+6.38	133	19.28	Shoeburyness
+1.38	165	.50	9	21	25.40	24.56	— .84	97	25.40	Westley
+1.36	166	.39	9	25	23.73	29.98	+6.25	126	23.73	Geldeston
+5.06	213	.96	5	27	38.27	46.36	+8.09	121	38.27	Polapit Tamar
+4.33	218	.95	14	28	33.54	39.72	+6.18	118	33.54	Rousdon
+2.02	175	.66	26	23	29.81	32.46	+2.65	109	29.81	Stroud
+3.52	218	.85	4	28	32.41	39.55	+7.14	122	32.41	Wolstaston
+3.02	261	.78	4	26	23.35	26.92	+3.57	115	23.35	Boston
+3.14	245	1.01	4	24	24.46	25.74	+1.28	105	24.46	Hodsock Priory
+2.50	205	.92	4	23	26.65	31.65	+5.00	119	26.65	Mickleover
+1.63	149	.60	27	19	34.73	34.08	— .65	98	34.73	Macclesfield
+3.34	208	.93	5	27	32.70	32.05	— .65	98	32.70	Southport
+3.14	147	1.75	5	24	61.49	52.81	— 8.68	86	61.49	Arncliffe
+3.61	258	1.00	4	18	26.87	28.49	+1.62	106	26.87	Ribston Hall
+2.70	216	1.04	4	27	26.42	27.87	+1.45	105	26.42	Hull
+4.04	264	.91	4	26	27.94	26.37	— 1.57	94	27.94	Newcastle
+5.89	139	2.00	12	23	129.48	103.52	— 25.96	80	129.48	Seathwaite
+3.85	182	1.44	14	28	42.28	40.47	— 1.81	96	42.28	Cardiff
+4.30	183	1.38	5	28	46.81	49.27	+2.46	105	46.81	Haverfordwest
+3.61	177	.89	20	29	45.46	45.27	— .19	100	45.46	Gogerddan
+3.70	230	.72	4	25	30.36	33.56	+3.20	111	30.36	Llandudno
+3.93	181	1.53	5	24	43.47	45.65	+2.18	105	43.47	Cargen
+3.92	238	1.17	5	24	33.76	33.57	— .19	99	33.76	Marchmont
+1.69	131	.80	31	25	49.77	44.12	— 5.65	89	49.77	Girvan
+ .92	123	.87	10	23	35.97	28.70	— 7.27	80	35.97	Glasgow
— 3.22	119	.71	31	24	68.67	55.34	— 13.33	81	68.67	Inveraray
+1.26	119	1.73	10	22	56.57	45.20	— 11.37	80	56.57	Quinish
+3.43	228	1.06	5	20	28.64	29.99	+1.35	105	28.64	Dundee
+3.55	213	.85	31	23	34.93	43.03	+8.10	123	34.93	Braemar
+3.57	204	1.27	5	24	32.73	36.65	+3.92	112	32.73	Aberdeen
+2.43	189	.82	10	28	30.34	37.40	+7.06	123	30.34	Gordon Castle
— 1.07	81	.94	7	25	44.53	32.84	— 11.69	74	44.53	Fort Augustus
— .86	91	1.61	7	23	83.93	71.80	— 12.13	86	83.93	Bendampf
+2.26	173	.83	6	18	31.90	32.82	+ .92	103	31.90	Dunrobin Castle
+1.30	142	...	...	...	29.88	26.62	— 3.26	89	29.88	Wick
+1.16	117	1.79	31	28	54.81	52.40	— 2.41	96	54.81	Killarney
+2.57	160	.97	26	22	39.57	41.42	+1.85	105	39.57	Waterford
+1.75	140	.90	26	23	39.43	41.72	+2.29	106	39.43	Castle Lough
+2.33	146	.68	31	26	46.52	48.67	+2.15	105	46.52	Ennistymon
+3.71	208	1.08	31	24	34.99	40.57	+5.58	116	34.99	Courtown Ho.
+1.17	136	.56	26	24	35.92	35.46	— .46	99	35.92	Abbey Leix
+2.61	215	.53	3	25	27.68	33.54	+5.86	121	27.68	Dublin
+2.45	172	.85	31	23	36.15	41.52	+5.37	115	36.15	Mullingar.
+4.14	168	1.96	31	30	52.87	54.83	+1.96	104	52.87	Ennisceoe
+2.79	152	1.31	31	25	48.90	50.24	+1.34	103	48.90	Cong
+3.05	170	.68	31	30	42.71	46.50	+3.79	109	42.71	Markree
+3.52	193	1.18	26	28	38.91	40.26	+1.35	103	38.91	Seaforde
...	...	...	...	...	37.56	...	...	...	37.56	Dundarave
+1.88	148	.60	31	27	39.38	39.03	— .35	99	39.38	Omagh

SUPPLEMENTARY RAINFALL, DECEMBER, 1915.

Div.	STATION.	Rain inches	Div.	STATION.	Rain inches.
II.	Warlingham, Redvers Road .	7·65	XI.	Lligwy	6·32
„	Ramsgate	5·19	„	Douglas	8·11
„	Hailsham	9·62	XII.	Stoneykirk, Ardwell House...	7·08
„	Totland Bay, Aston House...	8·88	„	Carsphairn Shiel	10·45
„	Stockbridge, Ashley..	7·46	„	Beattock, Kinnelhead	8·95
„	Grayshott	8·39	„	Langholm, Drove Road	8·83
III.	Harrow Weald, Hill House...	5·51	XIII.	Meggat Water, Cramilt Lodge	7·04
„	Caversham, Rectory Road ...	5·64	„	North Berwick Reservoir.....	4·20
„	Pitford, Sedgebrook.....	3·75	„	Edinburgh, Royal Observat'y.	4·34
„	Woburn, Milton Bryant.....	3·98	XIV.	Maybole, Knockdon Farm ...	6·29
„	Chatteris, The Priory.....	3·24	XV.	Ballachulish House	9·30
IV.	Elsenham, Gaunts End	4·63	„	Campbeltown, Witchburn ..	7·22
„	Colchester, Hill Ho., Lexden	4·27	„	Holy Loch, Ardnadam	9·23
„	Ipswich, Rookwood, Copdock	5·09	„	Islay, Eallabus	6·19
„	Blakeney	3·67	„	Tiree, Cornaigmore	6·55
„	Swaffham	4·07	XVI.	Dollar Academy	6·63
V.	Bishops Cannings	5·76	„	Balquhiddier, Stronvar	7·44
„	Wimborne, St. John's Hill ...	9·56	„	Glenlyon, Meggernie Castle..	8·75
„	Ashburton, Druid House.. ...	15·51	„	Blair Atholl	5·57
„	Cullompton	8·06	„	Coupar Angus	6·06
„	Lynmouth, Rock House	8·96	„	Montrose, Sunnyside Asylum.	6·72
„	Okehampton, Oaklands.. ...	10·48	XVII.	Alford, Lynturk Manse	8·57
„	Hartland Abbey.....	7·84	„	Fyvie Castle	8·47
„	Probus, Lamellyn	7·99	„	Keith Station	6·90
„	North Cadbury Rectory.....	6·34	XVIII.	Rothiemurchus	3·05
VI.	Clifton, Pembroke Road.....	7·18	„	Loch Quoich, Loan	12·90
„	Ross, The Graig	5·29	„	Drumadrochit	5·32
„	Shifnal, Hatton Grange.....	4·37	„	Skye, Dunvegan	8·28
„	Droitwich	4·62	„	Lochmaddy, Bayhead	4·38
„	Blockley, Upton Wold.....	5·18	„	Glencarron Lodge	6·59
VII.	Market Overton	5·64	XIX.	Invershin	5·29
„	Market Rasen	3·99	„	Melvich	7·51
„	Bawtry, Hesley Hall	5·50	„	Loch Stack, Achfary	8·36
„	Derby, Midland Railway.....	4·85	XX.	Dunmanway, The Rectory ..	10·30
„	Buxton	8·96	„	Glanmire, Lota Lodge.....	6·74
VIII.	Nantwich, Dorfold Hall	5·06	„	Mitchelstown Castle	5·71
„	Chatburn, Middlewood	6·77	„	Darrynane Abbey.....	6·59
„	Lancaster, Strathspey	6·95	„	Clonmel, Bruce Villa	5·17
IX.	Langsett Moor, Up. Midhope	9·04	„	Newmarket-on-Fergus.Fenloe	4·63
„	Scarborough, Scalby	6·43	XXI.	Laragh, Glendalough .....	...
„	Ingleby Greenhow	5·24	„	Ballycumber, Moorrock Lodge	4·37
„	Mickleton	6·40	„	Balbriggan, Ardgillan	4·29
X.	Bellingham, High Green Manor	5·73	XXII.	Ballynahinch Castle.....	8·80
„	Ilderton, Lilburn Cottage ...	5·15	„	Woodlawn	5·90
„	Keswick, The Bank.....	10·40	„	Westport, St. Helens ...	8·64
XI.	Llanfrechfa Grange	9·87	„	Dugort, Slievemore Hotel ...	8·02
„	Treherbert, Tyn-y-waun	19·74	„	Mohill Rectory	6·74
„	Carmarthen, The Friary	10·11	XXIII.	Enniskillen, Portora.....	6·08
„	Fishguard, Goodwick Station.	8·13	„	Dartrey [Cootehill]	5·74
„	Crickhowell, Tal-y-maes.....	11·50	„	Warrenpoint, Manor House ..	6·77
„	New Radnor, Ednol	6·35	„	Banbridge, Milltown	5·17
„	Birmingham WW., Tyrmynydd	13·45	„	Belfast, Cave Hill Road	4·54
„	Lake Vyrnwy .....	...	„	Ballymena Harryville	6·21
„	Llangynhafal, Plas Draw.....	5·48	„	Londonderry, Creggan Res...	5·75
„	Dolgelly, Bryntirion.....	13·96	„	Dunfanaghy, Horn Head ...	7·79
„	Bettws-y-Coed, Tyn-y-bryn...	9·95	„	Killybegs	9·90



ALTITUDE
SCALE

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

SCALE OF MILES

0 5 10 15 20

THE WEATHER OF DECEMBER.

SAVE for brief spells of anticyclonic weather about the 13th, 19th and 20th, the weather of December was dominated by a procession of Atlantic depressions, which brought prolonged rough weather and almost daily rain over a very wide area. The conditions were, in fact, very similar to those of December, 1914, the rainiest month of the preceding winter, and it is noteworthy that the distribution of rainfall also was of the same character, being most excessive in relation to the average in the east of Great Britain, and about half the country receiving more than twice its normal rainfall. Only limited areas in the least rainy districts of Ireland, Scotland and England had a smaller total rainfall than 5 inches during the month. More than 6 inches fell everywhere in the south-west of England and Wales, over the whole of the Pennine area, and very nearly the whole of Scotland, but in Ireland the eastern half generally had rather less. Large areas in the south of England extending as far east as Dover had more than 8 inches, and more than 10 inches fell over all the mountain districts in the west of Great Britain, as well as over a small part on the west coast of Ireland, but in the west Highlands these areas occupied only their normal position for December. More than 20 inches fell in the rainiest part of the English Lakes, South Wales and Dartmoor, and more than 30 inches at some Snowdon stations. The map of the distribution of rainfall in December in the Thames Valley on the opposite page is a good example of the normal winter type of rainfall distribution in a very wet month. It will be observed that the heaviest rainfall, exceeding 7 inches, and in some places reaching 10 inches, fell just south of the Valley, and the least, rather less than 4 inches, outside the Valley in the north-east. In the Thames estuary nearly 5 inches fell.

The general rainfall of the great divisions of the British Isles was as follows: England and Wales, 198 per cent; Scotland, 135 per cent; and Ireland, 158 per cent. For the British Isles as a whole the rainfall was 169 per cent. of the average.

The temperature was abnormally high in England and Wales during the first fortnight. Temperatures above 50° were recorded at many stations, and on the 9th and 10th the maximum exceeded 55° over a large area in the south of England. In Scotland, however, colder conditions prevailed, and minima below 20° were common about the 4th, 5th and 9th. The amount of sunshine was small during this period, except in Ireland. With a change from south-westerly to northerly winds about the 12th, colder and more sunny weather was experienced over the country generally, especially in the south of Ireland, where several sharp frosts occurred. Colder weather also accompanied the anti-cyclone of the 19th, the lowest temperatures being observed in Scotland and Ireland, but from this period till the end of the month the weather over the United Kingdom generally was again abnormally mild, with little sunshine and much rain.

In London (Camden Square) the rainfall of December was 5·64 in., being 3·51 in., or 165 per cent. above the average of 50 years. This fall had been exceeded in December only twice in the previous 58 years, viz., in 1876 and 1914, when 6·25 in. and 6·34 in. fell respectively. The mean shade temperature was 43°·9, or 4°·2 above the average. This figure had been reached in six previous Decembers, the highest being 46·8 in. December, 1868. The duration of rainfall was 98·2 hours, or 19·3 hours less than in December, 1914. The total evaporation was ·00 in. the depth of water in the tank actually showing a net condensation of ·03 in. during the month.

The duration of bright sunshine at Camden Square was 19 hours, no fewer than 16 days being sunless, and only 7 having as much as 1 hour. The total duration recorded at other stations was as follows: Totland Bay, 43 hours; Copdock, 46 hours; Sidmouth, 39 hours; Weymouth, 30 hours; Ashbourne, 26 hours; Southport, 34 hours; Bolton, 12 hours; Hull, 27 hours; Haverfordwest, 39 hours; Swinton (Berwickshire), 19 hours; Paisley, 21 hours; Perth, 19 hours.

Climatological Table for the British Empire, July, 1915.

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.									
London, Camden Square	86°·2	4	48°·0	+13	71°·3	53°·4	52°·9	⁰⁻¹⁰⁰ 74	135°·1	44°·8	inches 4·10	14	6·6
Malta	91°·0	13	66°·5	4	83°·2	71°·5	...	85	140°·0	...	·00	0	2·5
Lagos	84°·0	*8	71°·0	+10	82°·0	73°·8	72°·3	83	154°·0	70°·0	15·51	21	9·2
Cape Town	65°·1	20	35°·3	15	58°·2	45°·8	47°·0	84	...	...	6·68	18	5·8
Natal, Durban ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Johannesburg	67°·7	27	27°·4	23	55°·7	40°·4	35°·3	75	...	27°·1	2·76	10	4·6
Mauritius	77°·6	7	54°·8	23	75°·0	62°·4	60°·7	78	...	48°·2	2·75	19	4·9
Bloemfontein	66°·7	12	21°·0	2	55°·9	31°·1	34°·4	86	..	...	1·44	6	5·8
Calcutta... ..	96°·6	11	74°·2	12	90°·5	79°·7	78°·4	84	...	70°·8	10·52	10	8·5
Bombay... ..	89°·1	14	75°·4	28	86°·4	79°·1	77°·5	84	132°·8	64°·7	14·39	26	7·7
Madras	105°·8	3	70°·6	15	94°·2	78°·7	74°·1	74	155°·2	70°·8	8·80	11	6°·2
Colombo, Ceylon ...	87°·4	5	72°·1	30	84°·6	75°·5	74°·0	85	153°·8	68°·9	12·63	28	7·7
Hongkong	93°·4	28	74°·8	17	88°·1	79°·3	76°·7	81	...	...	15·41	18	6·6
Sydney	65°·8	20	41°·0	5	60°·9	46°·8	45°·2	75	109°·8	31°·9	5·40	13	5·3
Melbourne	63°·8	27	32°·7	15	58°·3	45°·1	43°·6	73	108°·9	25°·6	1·72	18	5°·9
Adelaide	66°·8	30	37°·9	15	60°·0	46°·8	46°·2	77	118°·3	28°·4	2·73	16	5°·9
Perth	69°·2	2	39°·2	19	63°·5	49°·2	49°·1	76	133°·2	35°·0	7·70	22	6°·2
Coolgardie	68°·6	2	35°·0	21	59°·7	43°·9	42°·6	69	127°·4	30°·4	2·07	12	6°·4
Hobart, Tasmania ..	62°·4	1	30°·1	9	52°·7	40°·1	37°·6	68	105°·6	22°·8	·62	22	6°·1
Wellington	59°·8	21	33°·2	16	55°·1	44°·6	44°·7	83	111°·4	24°·0	3·88	13	7°·3
Auckland	62°·5	25	36°·5	31	58°·3	47°·1	48°·3	85	113°·0	34°·0	7·32	20	6°·5
Jamaica, Kingston ..	92°·8	16	69°·5	11	90°·8	74°·3	72°·4	74	...	...	·42	3	...
Grenada	90°·0	26	70°·0	3	85°·0	74°·0	...	78	136°·0	...	12·22	21	4°·0
Toronto	86°·5	16	50°·9	6	77°·5	59°·3	60°·8	80	143°·8	48°·3	4·50	13	5°·4
Fredericton	84°·3	28	44°·0	7, 22	76°·0	53°·7	58°·0	77	...	...	4·56	10	5°·3
St. John, N.B.	80°·0	13	49°·5	5	68°·5	53°·3	54°·6	79	...	...	4·45	11	6°·0
Alberta, Edmonton ...	80°·4	21	39°·6	3	69°·7	49°·2	...	73	139°·8	30°·0	3·62	19	5°·4
Victoria, B.C.	87°·4	20	50°·0	23	67°·2	52°·6	51°·7	76	144°·0	45°·5	·84	9	4°·5

* 18, 29.

† 18.

‡ 11.

Johannesburg—Bright sunshine, 210.3 hours.*Mauritius*—Mean temp. 0°·5, dew point 1°·0, and R .11 in., above averages. Mean hourly velocity of wind 1.59 miles below average.*Bloemfontein*—Coldest and wettest July on record. The snowstorm on the 19th was the first since 1880.

COLOMBO, CEYLON—Mean temp. 80°·0, or 0°·9 below, dew point 0°·2 below, and R 6.28 in. above, averages.

HONGKONG—Mean temp. 83°·2, mean hourly velocity of wind 10.4 miles. Bright sunshine 219.3 hours.

Melbourne—Mean temp. 51°·7, the highest for 60 years and 3°·2 above the average. R .12 in. below average. Bright sunshine, 95.0 hours.*Adelaide*—Mean temp. 1°·9 above, and R .11 in. above, averages. Mean. temp., with one exception, highest on record.*Coolgardie*—Temp. 0°·8 above, and R about one inch above, averages.*Hobart*—Temp. 1°·1 above, and R 1.48 in. below, averages.*Wellington*—Mean temp 2°·3 above, and R 1.96 in. below, averages. Bright sunshine 84.4 hours. Frost on eight days.*Auckland*—Unusually wet, R 2.37 in. above, mean temp. slightly above, averages.

ALBERTA, EDMONTON—Cold and wet month. TSS on 5 days.