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THE AUSTRALIAN ANTARCTIC EXPEDITION.

The arrival in this country of Captain J. K. Davis, Commander of the Australian Antarctic Exploration ship "Aurora," has called renewed attention to the magnificent results of the Expedition under Dr. Mawson, which has been carrying on systematic observations at two points of the Antarctic Continent, 1,500 miles apart, at neither of which had a landing ever previously been made. Dr. Mawson and a large party spent the winter of 1912 at Adelie Land, which was discovered by the French and American Expeditions in 1840, and had never been seen since. He made extensive journeys into the interior, and arrived at his base from the last of these, in which his two companions had perished, after a solitary journey of more than twenty days. He was a few hours too late to return to Australia by the ship, which, after waiting to the last moment, had to leave on its 1,500 mile journey to pick up the second portion of the expedition. This party, under Mr. Wild, had wintered near Wilkes' Termination Land. Probably no polar explorer has ever encountered worse weather, or escaped more dangers, than Captain Davis in rescuing this party, which had carried on excellent work. Before leaving Dr. Mawson's base, and in his absence, Captain Davis had landed a relief party with ample stores; and it is the most remarkable feature of the expedition that Dr. Mawson has since been able to keep up wireless communication with Australia through a station which was specially erected on Macquarie Island. We believe that funds are now being raised to enable next year's expedition for the relief of Dr. Mawson to be extended into an additional scientific campaign. Australian enterprise has never previously, we believe, been extended to scientific exploration beyond the limits of the Commonwealth, and it must be gratifying to the small body of Australian enthusiasts, and indeed to the whole Australian people to know that scientific men at home recognise that better work has never been done, nor higher courage shown, by any British expedition. The generous help which the Australian Government gave to the fund for a memorial to Captain Scott and his companions, who fell in the way, lays a moral duty on this country to contribute at least an equal amount to the renewed efforts of the Australian Expedition, and to secure to it, at least, ". . . the glory of going on and still to be."

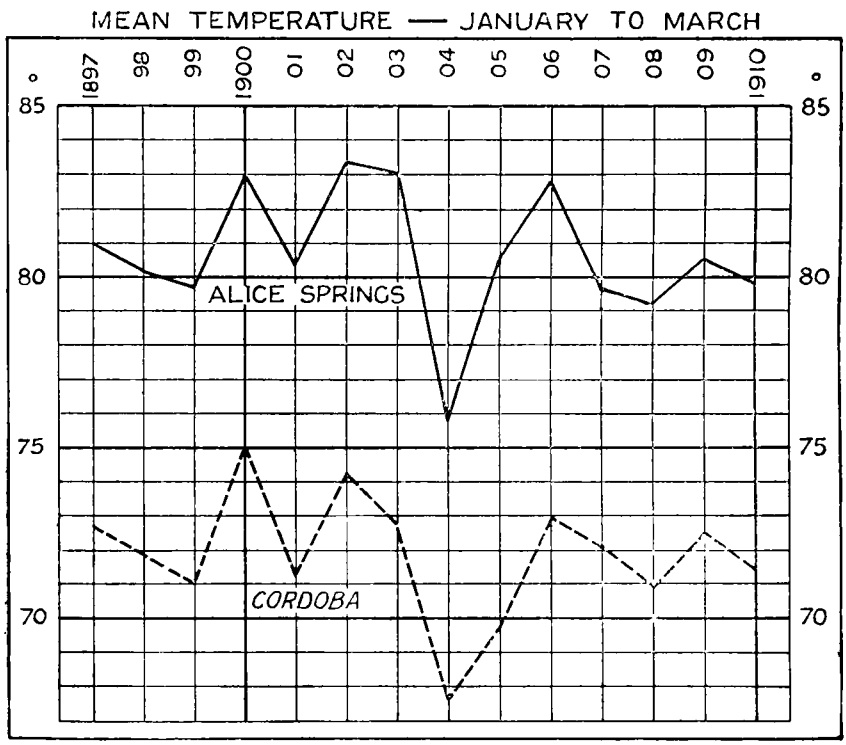
SOUTHERN HEMISPHERE SEASONAL CORRELATIONS.

By R. C. MOSSMAN, F.R.S.E.
(of the Argentine Meteorological Office).

(Third Article.)

AUSTRALIAN AND SOUTH AMERICAN CORRELATIONS.

DURING the three months January to March a remarkable parallelism is shown since 1897 in the curves of mean temperature at Alice Springs in the heart of Australia lat. 23° 38′ S., long. 133° 37′ E., height 1926 feet, and at Cordoba, Argentine Republic, lat. 31° 25′ S.,



long. 64° 12′ W., height 1437 feet, both stations being located in a strictly continental situation.*

The following table gives the mean temperatures, the departure of these from the normal, and the year-to-year change for the period 1897-1910 :—

Looking at the columns showing the departure from the normal it will be seen that the sign is the same in 11 of the 14 years discussed

* I am indebted to Mr. W. G. Davis, Director of the Argentine Meteorological Office for the Cordoba data, and to Mr. H. A. Hunt, Commonwealth Meteorologist for the Alice Springs values.

Year.	Mean Temperature.*		Departure from Normal.		Year to Year Change.	
	Alice Springs.	Cordoba.	Alice Springs.	Cordoba.	Alice Springs.	Cordoba.
	°	°	°	°	°	°
1897	81·0	72·7	+0·4	+0·9	...	...
1898	80·2	71·9	—0·4	+0·1	—0·8	—0·8
1899	79·7	71·1	—0·9	—0·7	—0·5	—0·8
1900	83·0	75·0	+2·4	+3·2	+3·3	+3·9
1901	80·3	71·2	—0·3	—0 6	—2·7	—3·8
1902	83·3	74·2	+2·7	+2·4	+3·0	+3·0
1903	83·0	72·7	+2·4	+0·9	—0·3	—1·5
1904	75·7	67·6	—4·9	—5·2	—7·3	—5·1
1905	80·5	69·7	—0·1	—2·1	+4·8	+2·1
1906	82·8	72·9	+2·2	+1·1	+2·3	+3·2
1907	79·7	72·1	—0·9	+0·3	—3·1	—0·8
1908	79·2	70·9	—1·4	—0·9	—0·5	—1·2
1909	80·5	72·5	—0·1	+0·7	+1·3	+1·6
1910	79·8	71·4	—0·8	—0·4	—0·7	—1·1
Mean.....	80·6	71·8	...	...	±2·4	±2·2

and the reverse in the other three. Further it will be observed that the very cold weather noted at Alice Springs in the year 1904 was also equally remarkable at Cordoba, while the years 1900, 1902, 1903, and 1906 notable for hot weather in the January to March period, were characterised by temperature excesses of much the same magnitude at both places, except in the year 1903 when the warmth was more pronounced in central Australia than in central Argentina. Previous to 1897 the records for the two places covering the 18 years 1879-1896 show no definite agreement.

During the same three months of the year an opposition is shown in the mean temperature curves at Perth, West Australia, on the one hand and at Valparaiso and Santiago (Chile) on the other. At Perth and Valparaiso conditions are strictly insular, but at Santiago the conditions are those that pertain to an inland, but not a continental, situation as is the case at Alice Springs and Cordoba.

The following table shows the mean temperature of the January to March period for the three stations.

The mean values at Perth are the average of the daily maxima and minima, at Santiago the means are from hourly values and at Valparaiso from tri-daily readings brought to the mean of the 24 hours by corrections supplied by hourly term-day observations.†

For the first two stations the data cover the 26 years 1886-1911, but for Valparaiso only the nine years 1901-1909 are available. The opposition, as in the case of the Cordoba-Alice Springs agreement, is not well marked previous to 1897, so that the data discussed refer to the same term of 14 years (1897-1910) as used for Alice Springs and Cordoba.

* The mean at Alice Springs is the average of the maxima and minima. At Cordoba the data refer to hourly values.

† I am indebted to Mr. H. A. Hunt for the Perth data. The Santiago values are taken from the *Annuarios* of the Santiago Astronomical Observatory, and for Valparaiso from the annual publications of the Navy (*Servicio Meteorologico*).

The mean temperatures are as follows:—

MEAN TEMPERATURES, JANUARY TO MARCH.

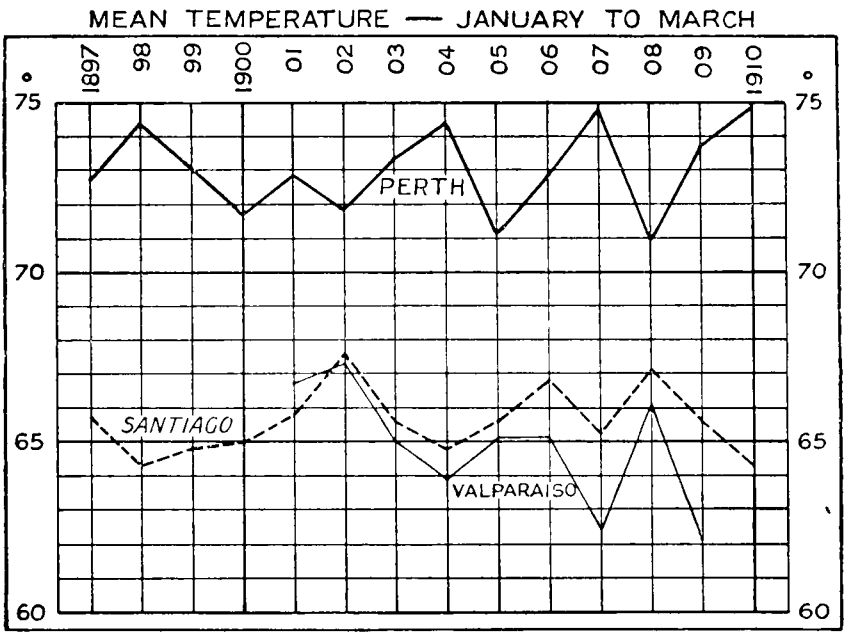
	1897.	1898.	1899.	1900.	1901.	1902.	1903.
Perth	72·7	74·4	73·0	71·7	72·8	71·8	73·3
Santiago	65·7	64·3	64·8	65·0	65·8	67·6	65·6
Valparaiso	—	—	—	—	66·7	67·3	65·0

	1904.	1905.	1906.	1907.	1908.	1909.	1910.	Mean 1897·1910.
Perth	74·4	71·1	72·8	74·8	70·9	73·7	74·8	73·0
Santiago	64·8	65·6	66·8	65·2	67·1	65·6	64·3	64·9
Valparaiso	63·9	65·1	65·1	62·4	66·6	62·1	—	—

	Lat. S.	Long.	Height ft.
Perth	31° 57′	115° 52′ E.	49
Santiago	33° 27′	70° 42′ W.	1703
Valparaiso	33° 1′	71° 38′ W.	135

The following table shows the departure from the normal during the nine years 1901-1909 for which we have data from all three stations:—

	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.
Perth	0°0	−1°0	+0°5	+1°6	−1°7	0°0	+2°0	−1°9	+0°9
Santiago	−0·2	+1·6	−0·4	−1·2	−0·4	+0·8	−0·8	+1·1	−0·4
Valparaiso	+1·8	+2·4	+0·1	−1·0	+0·2	+0·2	−2·5	+1·7	−2·8



Referring the Perth and Santiago values to the mean of the 14 years 1897-1910 we find 11 cases in which the signs are the reverse of each other and 3 in which they agree. For the 11 years 1886 1896 in only 4 years is there an opposition, while in 7 years there

is agreement, so that, as in the case of the Cordoba-Alice Springs observations, the correlation begins with the year 1897.

It is of interest to note that during the three months under review there is an opposition between the mean temperature at Santiago and the thickness of the ice at Duluth, Lake Superior, U.S.A.

The following are the values, those referring to Duluth being taken from the "Monthly Charts of the Great Lakes," issued by the U.S. Weather Bureau, and those for Santiago de Chile from the source already referred to:—

	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	Mean.
Ice at Duluth...	21·1	22·7	18·8	25·3	33·0	21·4	19·2	24·9	17·8	19·7	27·6	26·5	23·2 ins.
Santiago Temp..	65·0	65·8	67·6	65·6	64·8	65·6	66·8	65·2	67·1	65·6	64·3	64·0	65·6 deg.

Transforming the above values so as to show the departure from the normal of the 12 years under review we have the following:—

	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908	1909.	1910	1911.
Ice at Duluth ...	—2·1	—0·5	—4·4	+2·1	+9·8	—1·8	—4·0	+1·7	—5·4	—3·5	+4·4	+3·2 ins.
Santiago Temp.	—0·6	+0·2	+2·0	0·0	—0·8	0·0	+1·2	—0·4	+1·5	0·0	—1·3	—1·6 deg.

These results are of interest inasmuch as they indicate an interrelation between the action centres governing the conditions during the three months under consideration in Australia, South America, and the United States.

(To be continued.)

ROYAL METEOROLOGICAL SOCIETY.

An ordinary afternoon meeting of the Society was held at 70, Victoria Street, S.W., Mr. C. J. P. Cave, President, in the chair.

Mr. E. Gold described the methods adopted and the results obtained in his paper on the "Determination of Radiation of the Air from Meteorological Observations." The basis of the determination was a series of observations made at Potsdam. The temperature for hourly intervals, both at the summit and foot of a tower 40 metres high, was studied with regard to the rate of fall on a number of clear nights, and from the results radiation values were deduced. Attempts to reconcile these values with those obtained by laboratory experiments were disappointing; and the author suggested that convection must play a large part as a disturbing influence.

Dr. C. Chree considered that the tower at Potsdam was not satisfactorily situated for the experiment.

Mr. C. Salter drew attention to the fact of the difference in the amount of dust at a height of 2 metres and of 40 metres, and suggested that, given equal humidity, the radiation at the top and the bottom of the tower might well be different from that cause.

Mr. S. C. Russell read a paper on the "Results of Monthly and Hourly Cloud Form Frequencies at Epsom, 1903–1910." A series of personal observations by day and night was systematically studied,

and formed a unique record of great interest. Curves showing the monthly and hourly frequency for each type exhibited pronounced maxima and minima. Amongst these may be noticed the marked prevalence of the upper clouds for the summer months, with minima during the winter. Except in the case of cumulus and cumulo-nimbus, morning and evening maxima are usual. These two varieties have each one maximum, the former at noon, the latter at 3 p.m.

Mr. R. Inwards proposed automatic photographic observations of the sky; by a simple arrangement a camera could be mechanically directed to the windward, and exposures made as desired.

Mr. Gold said that the record provided the data necessary to apply corrections to 9 a.m. observations in order to arrive at the normal value for the day. The double diurnal maximum might be connected with the similar phenomenon in barometric pressure.

Mr. W. W. Bryant suggested that the midday maximum of cumulus might on account of the cumulus obscuring the upper clouds be responsible for the minimum in the latter at noon.

Mr. R. Strachan and Mr. Marriott also took part in the discussion.

The following new Fellows were elected :—Mr. A. E. Felton, J.P., Capt. L. B. Bennett-Gillman and Lieut. G. Rawson.

Dr. V. F. K. Bjerknes, Professor of Geophysics at the University, Leipzig, and Dr. Hugo Hergesell, President of the International Commission for Scientific Aeronautics, Strassburg, were elected honorary members of the Society.

The Biennial Dinner of the Royal Meteorological Society was held at the Trocadero Restaurant on Tuesday evening, May 20th.

The following Fellows and guests were present :—

Mr. F. Campbell Bayard, Mr. J. Bernard, *President, Scottish Meteorological Society*, Capt. H. A. Blake, *Deputy Master of Trinity House*, Mr. A. H. Brown, Mr. W. W. Bryant, Commander W. F. Caborne, C.B., Mr. C. J. P. Cave, *President*, in the Chair, Dr. C. Chree, F.R.S., Mr. Cyril Cobb, *Chairman, London County Council*, Mr. R. Cooke, Mr. F. Corry, Mr. Elliott Cooper, *President, Institution of Civil Engineers*, Rear-Admiral H. E. P. Cust, C.B., *Hydrographer of the Navy*, Dr. H. N. Dickson, Mr. F. Druce, Dr. F. W. Dyson, F.R.S., *Astronomer Royal*, Mr. W. Ellis, F.R.S., Mr. H. N. ffarington, Dr. R. T. Glazebrook, F.R.S., Mr. E. Gold, Mr. W. Vaux Graham, Major E. H. Hills, C.M.G., F.R.S., *President, Royal Astronomical Society*, Mr. R. H. Hooker, Mr. A. P. Jenkin, Dr. A. J. Jex-Blake, Sir Philip Burne Jones, Prof. F. Keeble, F.R.S., Mr. Baldwin Latham, C.E., Mr. G. B. Latham, C.E., Mr. R. G. K. Lempfert, Mr. A. Mallock, Mr. W. Marriott, Mr. T. McRow, Lt.-Col. H. Mellish, Mr. T. H. Middleton, Mr. R. L. Mond, Mr. G. R. Pember, Col. H. E. Rawson, C.B., Dr. E. J. Russell, Hon. Rollo Russell, Mr. C. Salter, Mr. W. Sedgwick, Dr. W. N. Shaw, F.R.S., *Director, Meteorological Office*, Mr. A. J. Sidgwick, Capt. A. Simpson, Sir Alexander Stenning, Hon. E. G. Strutt, *President, Surveyors' Institution*, Alderman H.

THAMES VALLEY RAINFALL — MAY, 1913.

Symons's Meteorological Magazine. Watershed of River Thames above Teddington, and River Lee above Feildes Weir. Rainfall Stations reporting. Isohyetals.

Lyon Thomson, *Mayor of the City of Westminster*, Mr. W. Tattersall, Rt. Hon. Earl Waldegrave, Mr. F. J. W. Whipple.

The President proposed the loyal toasts and was followed by Mr. Elliott Cooper, *President of the Institution of Civil Engineers*, who, in proposing the toast of the Royal Meteorological Society, spoke with enthusiasm of the utility of the work of meteorologists, more particularly rainfall observers, to engineers. In the course of his reply Mr. Cave announced the intention of the Society to prepare, in the not far distant future, a British meteorological atlas.

Major E. H. Hills and Hon. E. G. Strutt, replied to the toast of Kindred Institutions proposed by Mr. F. Druce; and Lord Waldegrave and Capt. H. A. Blake, replied to that of the Visitors proposed by Commander W. F. Caborne.

Dr. W. N. Shaw proposed "The President," and Mr. Cave replied.

C.S.

THE WEATHER OF MAY.

THE month opened in unsettled conditions, local thunderstorms being felt in almost all districts and rain and hail being of frequent occurrence. On the 8th a depression moved northward across Ireland and the wind increased to gale force on the north coast of Ireland and the north-east of Scotland. Rain fell generally, many stations in the north-east of Great Britain recording more than 1·00 inch and at Crathes the fall was 1·63 inch. Little change took place in the pressure distribution on the 9th and heavy rain continued to fall over the east of Scotland. At Crathes a further fall of 2·76 inches was measured, the rain having fallen continuously for 36 hours. The greater part of the week following was fair and dry, and temperature, which had been low, rose in all districts, the greatest rise taking place in the south-west of England. From the 17th to the 19th the wind was north-westerly and blew strongly in the north-west and north of the British Isles, and with gale force at Malin Head and over western Ireland. Cloudy or overcast conditions continued over the country generally and a thick sea fog set in on the 23rd on the coasts of the Irish Sea and the English Channel. A large anticyclonic system spread over the country from the Bay of Biscay on the 24th, and fine, bright weather set in with a rise in temperature, which, on the 25th, reached 76° at Leamington Spa, 77° at Margate, Nottingham and Bath, and 82° at Camden Square. This unusual warmth continued over the southern part of the kingdom for nearly a week, but in Scotland and Ireland the shade maxima were usually below 60° and in many places failed to reach 55°. A severe thunderstorm occurred over Shropshire on the afternoon of the 26th.

The rainfall of the month was generally in excess of the average, the greatest excess being in Ireland. The general fall expressed as a percentage of the average over the great divisions of the kingdom was as follows: England and Wales, 112; Scotland, 129; Ireland, 154; British Isles, 128.

HIGH MAY TEMPERATURES IN LONDON.

DURING the period of fine weather at the end of May, 1913, the maximum shade temperatures recorded at Camden Square exceeded 80° on each of the six consecutive days, May 25th to May 30th. Such a run of high temperatures had never previously been recorded in May. The nearest approach since Mr. Symons commenced the record in 1858 is to be found on three occasions when three consecutive days with temperatures over 80° were recorded in May. There were also 5 occasions with May temperatures exceeding 80° on two consecutive days, and 24 occasions when an isolated day in May had a maximum temperature above 80°. All the cases when such temperatures were recorded are set out in chronological order in the Table below. It will be observed that the highest May temperature was on May 19th, 1868, when it reached 87°·6.

Days in May with Temperature above 80°.

Year.	Day.	Shade max.	Year.	Day.	Shade max.	Year.	Day.	Shade max.
		°			°			°
1859 ...	31st	80·6	1870 ...	19th	81·0	1905 ...	29th	83·2
1861 ...	21st	80·8	,, ...	21st	85·1	1907 ...	12th	82·3
,, ...	23rd	80·5	,, ...	22nd	80·8	1909 ...	21st	83·2
1862 ...	6th	81·1	1875 ...	15th	82·0	,, ...	22nd	82·7
1864 ...	15th	80·4	1880 ...	26th	85·0	1910 ...	22nd	80·0
,, ...	18th	84·5	1881 ...	31st	80·7	1911 ...	28th	80·3
,, ...	19th	82·1	1884 ...	24th	81·3	,, ...	29th	81·4
,, ...	20th	83·0	1889 ...	23rd	80·8	,, ...	31st	81·7
1865 ...	21st	81·0	,, ...	24th	81·2	1912 ...	11th	81·2
1867 ...	6th	84·0	1891 ...	13th	80·2	1913 ...	25th	82·4
,, ...	7th	83·2	1892 ...	28th	82·2	,, ..	26th	84·4
,, ...	8th	82·0	,, ...	31st	84·7	,, ...	27th	83·8
,, ...	10th	80·1	1895 ...	12th	80·4	,, ...	28th	81·9
1868 ...	3rd	82·2	,, ...	30th	86·2	,, ...	29th	82·6
,, ...	19th	87·6	1903 ...	30th	80·9	,, ...	30th	80·3
			,, ...	31st	80·5			

The foregoing comparison is made possible only because the observations were all made in one locality, and by instruments exposed in exactly the same manner throughout the whole 56 years over which the record extended. It is impossible to compare extreme phenomena of any kind occurring in a given year with past observations at different stations, or taken by instruments exposed in different ways. This fact is frequently lost sight of, and records appear in the newspapers, and sometimes even in scientific publications, comparing weather conditions for one part of London with records taken in other parts of London without specifying the different conditions in which the observations were made. We ought to explain that the Camden Square record is not itself absolutely free from the possibility of criticism on this score, as the place of observation was moved about 200 yards at the end of 1865; but the exposure was similar, at the same height above the ground, and on the same pattern of stand, so that there appears to be little reason

to suspect differences in the readings. As to the difference between temperature in widely separated localities within London, and different methods of exposure of the thermometers to the air, we quote below the readings for the six days in question at all the stations the results of which are published in the Daily Weather Report of the Meteorological Office, supplemented by a second set of observations at Camden Square taken in the Stevenson screen, and two additional sets at the Royal Observatory, Greenwich, taken in different forms of thermometer screens, and communicated to us by the courtesy of the Astronomer Royal.

Shade Maximum Temperatures, May 25th—30th, 1913.

	25th.	26th.	27th.	28th.	29th.	30th.
Kew Observatory	79°	81°	77°	76°	79°	76°
Greenwich, Royal Observatory	81	84	84	81	81	80
Westminster, St. James's Park	78	80	80	77	77	77
South Kensington, Museum Grnds.	80	81	79	78	79	78
St. Pancras, Camden Square...	82	84	84	82	83	80
Hampstead Observatory.....	77	78	78	76	76	75
*Greenwich, Royal Obs., *Glaisher screen*	81·2	83·5	84·1	80·8	81·4	79·5
,, ,, *Stevenson screen*	79·8	81·0	81·0	78·1	78·5	77·3
,, ,, *New stand*	80·2	82·0	82·7	79·8	79·7	77·8
*Camden Square, *Glaisher screen*	82·4	84·4	83·8	81·9	82·6	80·3
,, ,, *Stevenson screen*	81·9	82·0	81·5	80·5	79·0	†

The Glaisher stand is open, and in the Camden Square pattern unprotected at the sides, but always kept turned in such a position that the sun is shining on the back, which is made of a double thickness of wood separated by a wide air space. This stand is periodically turned with the back to the sun, so that in no condition can the sunlight fall upon the bulbs. The Stevenson screen, as is well known, is a box with louvre boarded sides, through which the wind can blow, and a double roof with air circulation between. It will be observed that the readings on the Glaisher stand are the highest in every case, while those on the Stevenson screen are lower, though not to the same extent on every occasion. Comparing the Stevenson screen readings, one sees how much the maximum temperature varies from place to place, and how essential it is in speaking of the temperature in London to specify the point of observation. It may

* These observations are quoted to the nearest degree in the *Daily Weather Report.*

† The Stevenson screen reading at Camden Square was unfortunately not available on this date, as advantage was being taken of the fine weather to paint the screen.

be mentioned that the differences in the thermometer readings quoted are much in excess of any differences which could be ascribed to personal equation or to instrumental error. It is possible that they are due to small differences in the construction of the screens; but in the case of maximum temperatures, to which alone we refer, it seems more likely that gusts of air from heated surfaces in the neighbourhood which may hit or miss the screen are responsible for the extreme readings; and the public should bear in mind that extreme values, however interesting they may be, are those most subject to temporary or accidental variations, so that only differences of several degrees can be looked upon as indicating physical dissimilarities.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

THE MAGNIFICENT WEATHER OF MAY 23rd—30th.

THERE is no feature in the seasonal climatology of England so unfailing, perhaps, as a spurt of fierce thunder-breeding heat some time during the month of May, and when it occurs towards the end of the month, as in the present year, and as is more usually the case, the full glory of midsummer is seen to an advantage unknown after the solstice when the birds are silenced and the countryside is comparatively flowerless.

The superb weather of the recent May commenced on the 23rd with brilliant sunshine and a cool atmosphere. By the evening of the 24th a burst of severe heat was evidently at hand, and on Sunday, 25th, the terrific heat of the sun and the dazzling intensity of the light were such as are rather infrequent in England. Early next morning the heat threatened to be greater still, but it had engendered a partial cloudiness of the sky, and the temperature in the shade was not appreciably different from that on the 25th, but remained around 80°, at about which level it stood every afternoon following, till the 30th.

On the evening of Tuesday, 27th, a mass of overpoweringly grand cumulus clouds developed, with destructive hail and thunderstorms locally, whilst a most sultry evening on the 29th, with gorgeous sunset hues, was followed during the short hours of darkness by thunderstorms which, though rather severe, were not, on the whole, so violent as those in the famous May of 1911. The experience of each successive year tends to strengthen my conviction that though bad thunderstorms may occur at any period of the summer, there is no short period of the year so prolific of storms of the most malignant and dangerous type over the country generally as the week or ten days which mark the passing of May into June.

L. C. W. BONACINA.

June 2nd, 1913, Hampstead, N.W.

THUNDERSTORM ON MAY 27th, 1913.

A THUNDERSTORM extending from 3.30 p.m. till 8.10 p.m. occurred here on May 27th. Succeeding a morning of intense heat, highly developed electrical cumulus gathered to the N.W. and N. towards 2.30 p.m. Throughout the day there had been an exceptionally strong upper current from the S.W., judged by the rapidity of the movement of the cirrus. At 3 p.m. a most impressive range of cumulus and cumulo-nimbus, peaks of mountainous bubbling clouds, occupied the whole of the N. horizon, with pendulous hanks of false cirrus, extending very slowly, in fan-shape formation towards the zenith. Thunder was first heard at 3.30 p.m. in the N.W., continuous thunder taking place at intervals of three to five minutes to 5 p.m., when the rate rose to one to two minute intervals, with some increase in intensity. The rate of travel along the northern horizon was exceptionally slow, and the extension of the cloud area beyond the zenith appeared to be wholly retarded, the South Downs being bathed in sunshine with a cloudless sky area from S.E. round to W. At 5.30 p.m. it was apparent that a storm of exceptional severity was raging along the whole of the northern skyline, no propagation of the cloud area beyond the zenith taking place. The first lightning was seen at 6 p.m., the time interval to thunder being eleven seconds. The storm passed the point of observation between 6.5 and 6.13 p.m., accompanied by vivid discharges of sheet and fork lightning and loud rattling thunder peals, the time intervals varying between one and three seconds. At 6.12 p.m. a blinding flash of fork lightning took place, being followed by thunder in just under one second, and at this time a large elm tree was struck by lightning, and the bark of the trunk ten feet from the ground was stripped up for a distance of over eight feet by a foot broad, the stroke penetrating almost to the core of the tree, which was otherwise undamaged. At 6.17 p.m. the time interval had risen to 18 seconds, the storm travelling very rapidly in an easterly direction. At 6.9 p.m. large but very scattered lumps of clear cubes of ice fell, being followed by very heavy rain to 6.13 p.m., the amount measured in the four minutes totalling ·21 in. Less than a quarter of a mile distant no rain was recorded, the sky away to the southward being as at 5 p.m. entirely cloudless. Retardation in the rate of travel again set in, and the last thunder was not heard till 8.10 p.m., when the storm appeared to be lying due E., massive electrical cumulus still holding along the N. horizon. At 10 p.m. sheet lightning discharges were taking place to the N. and N.E. at the rate of five per minute. The barograph showed a gentle decrease in pressure between 9 a.m. and 3 p.m., when there was a sudden fall of ·02 in., then a steady curve with sudden pressure increases of ·03 in. at 6 and 8 p.m.

SPENCER C. RUSSELL, F.R.Met.Soc.

Southwater, Sussex, May 29th, 1913.

THUNDERSTORM OF 30th MAY, 1913.

LIGHTNING struck an elm tree in Carshalton Park about 30 ft. above the ground, then it divided, going down each side of the tree to the height of two horses standing underneath when the branches of lightning left the tree for the horses, killing each instantly. A house was also struck in Stanley Park Road and a considerable amount of damage was done. About 10 ft. of a chimney at the back was destroyed and fell through the roof, the remainder of the chimney being cut in half and the kitchen grate blown out.

Wallington, June 1st, 1913. F. CAMPBELL-BAYARD.

EXCEPTIONAL RAINFALL AT BISHOPS CASTLE, 26th MAY, 1913.

DURING a violent thunderstorm here on May 26th lasting one hour fifteen minutes, 1·25 in of rain fell, of which ·95 in. fell in twenty minutes. It is probable that of this amount ·50 in. fell in five minutes, so heavy was the fall of rain. Hail of the size of marbles fell in large quantities. The peculiarity of the storm was that it first passed to westward in a northerly direction and then returned over here with increased violence, travelling from north to south.

Bishops Castle, May 27th, 1913. E. GRIFFITHS.

THE WETTEST FIRST QUARTER ON RECORD.

A LETTER, entitled the above, appeared in your columns in August last, and if the word "Quarter" be changed into "Third of a Year," the heading holds good for this year. Up to the end of September, 1912 was the wettest year in 18 years' observations, but the year, as a whole, was the the third wettest. This year the 1912 record was overtaken in April with a fall of 5·20 in., against ·20 in. in 1912. In the five days, April 25th–29th, the fall was 2·97 in. Over half the year's average fall has descended in the first four months.

1912.	Rainfall.	Departure from 7 years' average.	1913.	Rainfall.	Departure from 7 years' average.
January	5·45	+2·73	January	5·55	+2·83
February.....	2·85	+ ·79	February.....	1·67	— ·39
March	6·32	+2·94	March	5·83	+2·45
April	0·20	—2·59	April	5·20	+2·41
	14·82	+3·87		18·25	+7·30

This year, therefore, the first four months have broken the record (since 1895 inclusive) by no less than 3·43 in., and May is continuing this deplorable record, 2·27 in. having fallen in the first eleven days, which is ·16 in. more than the fall for the whole of May last year. Prayers for fair weather have been offered in the churches for several weeks.

R. P. DANSEY.

Kentchurch Rectory, Hereford, May 12th, 1913.

RAIN DAYS IN 1913.

For the first five months of 1913 I have registered no less than 82 wet days. I have taken meteorological observations here for the past 27 years. The following is the greatest total number of wet days and the rainfall for the first five months :—

	Wet Days.		Rainfall. in.
January–May, 1889.....	79	.....	8·36
,, 1897.....	78	.....	14·85
,, 1906.....	75	.....	15·26
,, 1913.....	82	.....	13·90
27 years' average (1st January—May 31st)...	67	.....	9·62

JOHN DOVER.

Aston House, Totland Bay, Isle of Wight, June 3rd, 1913.

A WHITE RAINBOW.

An atmospheric effect, quite new to me, appeared here last evening, May 25th, and I write thinking its description may be of interest to your readers.

The day had been densely foggy, thick sea fog, with no wind. Towards evening a light air from the north drifted the fog towards the sea, the sun shone out brilliantly, and a complete bow of light, practically white but with traceable rainbow tints, appeared in the S.E. against the grey fog. A most beautiful and delicate effect.

The time was 5.30 p.m., and the appearance lasted perhaps half an hour. The upper sky was intensely blue at the time.

HERBERT E. BUTLER.

The Orchard, Polperro, Cornwall, May 26th, 1913.

THE SCOTTISH WINTER.

I was interested by Mr. Bonacina's reflections on weather in the March number, but is not the greater instability of temperature in Scottish winter rather due to the circumstance that cyclonic centres more often pass to the *south* than in our southern counties? This gives east gales and snow while we get west gales and rain. The reason in the article referred to seems to be greater proximity to North Atlantic low pressure—not quite the same thing.

STANLEY SINGLE.

Park View, Leopold Road, Wimbledon, April 8th.

REVIEWS.

La Pluie en Chine duront une Periode de onze anneés, 1900-10. Par [Rainfall in China during a period of eleven years, by] LOUIS FROC, S.J. (Observatoire de Zi-ka-wei. Appendice au Bulletin Meterologique de 1910). Chang-hai, 1912. Size 12 × 9½, pp. 62, plates.

THE Jesuits have always been distinguished among religious Orders for the assiduity with which they have cultivated astronomical and meteorological observation in the various parts of the world where they have established themselves, and the Observatory of Zi-ka-wei, China, is, we believe, far from least in importance among those under their direction. The present publication embodies fairly full statistics of the rainfall of about a hundred stations in China proper. At Zi-ka-wei, in lat. 31° N., the average rainfall for the eleven years is 45·7 inches, and at Hong Kong 80·1 inches, whilst at Tche-fou, in lat. 37° N., it is 23·1 inches, which is the lowest amount among the 34 stations with a complete record for the whole period. China is under the meteorological régime of the Pacific monsoon system of weather, and accordingly we find that the rainfall is heaviest during the hot period, May to September. Thus at Zi-ka-wei the July rainfall amounts to 7·4 inches, whilst the December fall is only 1·2 inches on the average of the eleven years. The 80 inches of rain at Hong Kong, in lat. 22½° N., fall on 151 days in the year, as compared with the 25 inches of London, in lat. 51½° N., spread over 170 days. One of the stations whose records are discussed failed, apparently, to furnish a record of the snowfall of the winter months, either as such or the water equivalent—which is the more remarkable, since the snowfall of China proper is heavy for so low a latitude. As regards summer deluges it may be noted that at Chang-hai, on the 5th of July, 1906, there fell during a tornado as much as 1·8 inches of rain in less than a quarter of an hour. L.C.W.B.

Ergebnisse zehnjähriger Registrierungen des Regenfalls in Norddeutschland. Von [Results of ten years' Rainfall Registration in North Germany] G. HELLMANN. (Veröffentlichungen des Königlich Preussischen Meteorologischen Instituts, Nr. 252.) Berlin, 1912. Size 13½ × 10, pp. 36. Price 3 marks.

THIS publication discusses in numerous curves and tables, together with explanatory text, the rainfall at various places in North Germany, more especially during the five summer months, May to September.

Dr. Hellmann distinguishes two classes of summer rains—the widespread and long-continued precipitation produced by the condensation of water vapour, which has for the most part been transported in a barometric depression from the sea by wind, and the shorter

thunder rains which proceed mainly or considerably from water evaporated *in situ*, or in the same neighbourhood as that in which it falls again. He is careful, of course, to point out that one type may merge into the other, so that no rigid separation of the two is possible, and we know in England how impossible it often is to decide whether a given June downpour should be called "cyclonic" or "thunderstorm," only the more extreme forms of each being readily distinguishable. Falls of soft hail appear to be common in Germany, as in England, in April and May; whilst the thunderstorms that occur in May and June are more often accompanied by true hail than those which occur during the later summer months.

Thunderstorm rains are responsible for half the quantity of rain falling from May to September. On the coast the percentage is less, but in the mountain regions of central Germany it rises to seventy-five.

Thunderstorm rains of great intensity are especially frequent in the dry regions of eastern Germany, where the summer heat is very great, and "cloud-bursts" may precipitate 9 centimetres (between 3 and four inches) in an hour. More than a decade, however, may elapse before so violent a fall is repeated at the same spot, and it would not appear that the thunder rains of Germany are any more severe than those which occur in the same latitude of England, where a balance may be struck by the circumstance that if the summer temperature is less than in Germany the vapour supply necessary for heavy rain is greater. L.C.W.B.

Die Eiszeiten und Polschwankungen der Erde. Von [The Ice-Age and Variations of Latitude over the Earth's Surface] Prof. RUDOLF SPITALER. (Aus den Sitzungsberichten der kaiserl. Akademie der Wissenschaften in Wien. Mathem.-naturaw.-klasse. Bd. cxxi. Abt. IIa. November, 1912). Vienna, 1912. Size $9\frac{1}{2} \times 6$, pp. 49.

THIS is a mathematical treatise discussing the effects of accumulations of ice in past ages upon the Earth's polar movements. Certain geologic processes, like extensive glaciation over the continents, and the uplifting of mountain masses, cause an alteration in the lie of the axis of inertia of the Earth (Trägheitspol), and as the Earth, with the rigidity of steel, is only slightly adaptable to changes of form, the pole of inertia becomes in consequence separated a little from the pole of rotation (Rotationspol), which then describes a cycloidal movement round the former with a period of over 400 days, so long as the process of adaptation continues. The author calculates that the glaciation of Europe and North America in the Quaternary epoch caused the pole of inertia to move 1′ or 1852 metres towards the meridian of 115° E. These disturbances in equilibrium set up stresses and strains in the crust of the Earth involving important tectonic changes, and the independent testimony of geologists supports the author's conclusions that the Ice ages were periods of greater crust folding than the genial periods. L.C.W.B.

RAINFALL TABLE FOR MAY, 1913.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	RAINFALL OF MONTH. Aver. 1875—1909. in.	1913. in.
		° ′	° ′			
Camden Square	*London*	51 32	0 8	111	1·75	1·72
Tenterden	*Kent*	51 4	*0 41	190	1·65	·84
Arundel (Patching)	*Sussex*	50 51	0 27	130	1·80	2·90
Fawley (Cadland)	*Hampshire*	50 50	1 22	52	1·96	2·72
Oxford (Magdalen College)	*Oxfordshire*	51 45	1 15	186	1·81	2·21
Wellingborough (Croyland Abbey)	*Northampton*	52 18	0 41	174	1·99	1·66
Shoeburyness	*Essex*	51 31	*0 48	13	1·27	1·30
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	1·93	2·17
Geldeston [Beccles]	*Norfolk*	52 27	*1 31	38	1·78	1·49
Polapit Tamar [Launceston]	*Devon*	50 40	4 22	315	2·08	3·15
Rousdon [Lyme Regis]	,,	50 41	3 0	516	2·02	2·85
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	2·10	2·51
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	2·64	3·56
Coventry (Kingswood)	*Warwickshire*	52 24	1 30	340	2·15	2·06
Boston	*Lincolnshire*	52 58	0 1	11	1·80	2·12
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	2·08	1·73
Macclesfield	*Cheshire*	53 15	2 7	501	2·43	2·97
Southport (Hesketh Park)	*Lancashire*	53 38	2 59	38	2·13	2·24
Arncliffe Vicarage	*Yorkshire, W.R.*	54 8	2 6	732	3·55	2·72
Wetherby (Ribston Hall)	,, ,,	53 59	1 24	130	2·09	1·57
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	1·98	2·30
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	2·04	2·09
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	7·50	7·18
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	2·56	3·16
Haverfordwest	*Pembroke*	51 48	4 58	90	2·62	4·06
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	2·63	4·60
Llandudno	*Carnarvon*	53 20	3 50	72	1·86	2·11
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	2·87	4·88
Marchmont House	*Berwick*	55 44	2 24	498	2·53	2·48
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	2·98	3·95
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	2·40	2·68
Inveraray (Newtown)	*Argyll*	56 14	5 4	17	3·53	6·32
Mull (Quinish)	,,	56 34	6 13	35	2·99	3·83
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	2·05	3·55
Braemar	*Aberdeen*	57 0	3 24	1114	2·33	4·11
Aberdeen (Cranford)	,,	57 8	2 7	120	2·40	3·65
Cawdor	*Nairn*	57 31	3 57	250	2·07	1·07
Fort Augustus (S. Benedict's)	*E. Inverness*	57 9	4 41	68	2·36	2·57
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	4·54	5·22
Dunrobin Castle	*Sutherland*	57 59	3 56	14	2·19	2·07
Wick	*Caithness*	58 26	3 6	77	2·04	1·70
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	3·05	4·91
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	2·33	4·19
Nenagh (Castle Lough)	*Tipperary*	52 54	8 24	120	2·51	3·94
Ennistymon House	*Clare*	52 57	9 18	37	2·70	3·81
Gorey (Courtown House)	*Wexford*	52 40	6 13	80	2·24	3·35
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	2·43	4·16
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	2·07	2·80
Mullingar (Belvedere)	*Westmeath*	53 29	7 22	367	2·51	3·52
Crossmolina (Enniscoe)	*Mayo*	54 4	9 16	74	3·17	5·29
Cong (The Glebe)	,,	53 33	9 16	112	2·94	4·64
Collooney (Markree Obsy.)	*Sligo*	54 11	8 27	127	2·80	4·25
Seaforde	*Down*	54 19	5 50	180	2·72	3·54
Bushmills (Dundarave)	*Antrim*	55 12	6 30	162	2·37	2·75
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	2·66	4·15

RAINFALL TABLE FOR MAY, 1913—*continued.*

RAINFALL OF MONTH (*con.*)					RAINFALL FROM JAN. 1.					
Diff. from Av. in.	% of Av.	Max. in 24 hours. in.	Max. in 24 hours. Date.	No. of Days	Aver. 1875–1909. in.	1913. in.	Diff. from Aver. in.	% of Av.	Mean Annual 1875–1909. in.	STATION.
— ·03	98	·60	29	11	8·68	10·09	+1·41	116	25·11	Camden Square
— ·81	51	·20	3	10	9·41	11·89	+2·48	126	27·64	Tenterden
+1·10	161	·96	12	11	10·33	15·98	+5·65	155	30·48	Patching
+ ·76	139	·64	30	12	11·14	15·79	+4·65	142	31·87	Cadland
+ ·40	122	·53	3	15	8·33	10·93	+2·60	131	24·58	Oxford
— ·33	83	·61	3	11	9·04	10·97	+1·93	121	25·17	Croyland Abbey
+ ·03	102	·38	27	9	6·23	7·79	+1·56	125	19·28	Shoeburyness
+ ·24	112	·80	3	7	8·55	9·74	+1·19	114	25·40	Westley
— ·29	84	·47	29	11	7·84	8·52	+ ·68	109	23·73	Geldeston
+1·07	151	·80	7	19	13·70	22·43	+8·73	164	38·27	Polapit Tamar
+ ·83	141	·50	7	17	12·15	16·70	+4·55	137	33·54	Rousdon
+ ·41	120	·43	4	13	10·65	16·17	+5·52	152	29·81	Stroud
+ ·92	135	·67	3	18	11·71	20·00	+8·29	170	32·41	Wolstaston
— ·09	96	·81	3	12	10·23	15·28	+5·05	149	28·98	Coventry
+ ·32	118	·47	3, 8	15	7·91	9·76	+1·85	123	23·35	Boston
— ·35	83	·62	6	9	8·74	10·53	+1·79	120	24·46	Hodsock Priory
+ ·54	122	·76	3	18	11·91	15·88	+3·97	133	34·73	Macclesfield
+ ·11	105	·66	3	19	10·70	13·67	+2·97	128	32·70	Southport
— ·83	77	·56	3	16	23·59	33·52	+9·93	142	61·49	Arncliffe
— ·52	75	·42	7	11	9·46	10·63	+1·17	112	26·87	Ribston Hall
+ ·32	116	·58	8	15	8·99	10·85	+1·86	121	26·42	Hull
+ ·05	102	·69	6	15	9·51	13·07	+3·56	137	27·94	Newcastle
— ·32	96	1·01	3	21	49·44	63·72	+14·28	129	129·48	Seathwaite
+ ·60	123	·39	11	18	14·67	23·79	+9·12	162	42·28	Cardiff
+1·44	155	1·20	7	18	16·71	25·45	+8·74	152	46·81	Haverfordwest
+1·97	175	·71	3	21	15·15	25·87	+10·72	171	45·46	Gogerddan
+ ·25	113	·40	3	21	10·40	13·46	+3·06	130	30·36	Llandudno
+2·01	170	1·00	13	21	16·22	25·88	+9·66	159	43·47	Cargen
— ·05	98	·56	8	14	12·00	12·61	+ ·61	105	33·76	Marchmont
+ ·97	132	·65	6	22	18·06	21·54	+3·48	119	49·77	Girvan
+ ·28	112	·63	8	22	13·10	16·48	+3·38	126	35·97	Glasgow
+2·79	179	1·00	6	24	25·68	32·25	+6·57	125	68·67	Inveraray
+ ·84	128	·85	20	22	20·25	26·28	+6·03	130	56·57	Quinish
+1·50	173	·95	9	15	9·96	13·18	+3·22	132	28·64	Dundee
+1·78	176	1·41	8	15	12·97	19·05	+6·08	147	34·93	Braemar
+1·25	152	1·35	9	14	12·00	14·35	+2·35	120	32·73	Aberdeen
—1·00	52	·25	3	9	10·38	8·33	—2·05	80	29·33	Cawdor
+ ·21	109	·52	3	21	18·15	20·76	+2·61	114	44·53	Fort Augustus
+ ·68	115	·92	20	17	33·48	37·00	+3·52	110	83·93	Bendamph
— ·12	95	·47	9	18	12·18	8·42	—3·76	69	31·90	Dunrobin Castle
— ·34	83	·27	23	18	10·88	8·77	—2·11	81	29·88	Wick
+1·86	161	·98	7	22	21·95	28·86	+6·91	131	54·81	Killarney
+1·86	180	·73	7	15	14·61	21·91	+7·30	150	39·57	Waterford
+1·43	157	·76	7	20	14·81	21·78	+6·97	147	39·43	Castle Lough
+1·11	141	·61	2	22	16·49	22·51	+6·02	137	46·52	Ennistymon
+1·11	150	·61	5	16	12·83	18·31	+5·48	142	34·99	Courtown Ho.
+1·73	171	·70	7	18	13·26	20·63	+7·37	155	35·92	Abbey Leix
+ ·73	135	·67	5	17	10·15	13·90	+3·75	137	27·68	Dublin
+1·01	140	·52	2, 7	23	13·29	19·57	+6·28	147	36·15	Mullingar.
+2·12	167	·64	10	22	20·21	29·52	+9·31	146	52·87	Enniscoe
+1·70	158	·56	8	25	18·23	27·09	+8·86	148	48·90	Cong
+1·45	152	·64	8	25	15·72	22·68	+6·96	144	42·71	Markree
+ ·82	130	·61	5	21	14·54	18·56	+4·02	128	38·91	Seaforde
+ ·38	116	·50	6	17	12·93	13·07	+ ·14	101	37·56	Dundarave
+1·49	156	·52	5	22	14·28	19·80	+5·52	139	39·38	Omagh

SUPPLEMENTARY RAINFALL, MAY, 1913.

Div.	STATION.	Rain inches	Div.	STATION.	Rain inches.
II.	Warlingham, Redvers Road..	1·50	XI.	Lligwy	2·08
,,	Ramsgate	1·16	,,	Douglas	2·90
,,	Hailsham	·86	XII.	Stoneykirk, Ardwell House...	3·63
,,	Totland Bay, Aston House...	2·81	,,	Dalry, The Old Garroch.....	5·57
,,	Stockbridge, Ashley..	2·25	,,	Beattock, Kinnelhead	4·43
,,	Grayshott	3·44	,,	Langholm, Drove Road	3·14
,,	Caversham, Rectory Road ...	3·19	XIII.	Meggat Water, Cramilt Lodge	3·70
III.	Harrow Weald, Hill House...	1·49	,,	North Berwick Reservoir...	2·27
,,	Pitsford, Sedgebrook...	1·57	,,	Edinburgh, Royal Observaty.	1·18
,,	Woburn, Milton Bryant.....	2·07	XIV.	Maybole, Knockdon Farm ...	3·00
,,	Chatteris, The Priory.....	2·05	XV.	Ballachulish House	6·02
IV.	Colchester, Hill Ho., Lexden	1·56	,,	Campbeltown, Witchburn ..	4·08
,,	Newport, Belmont House ...	1·39	,,	Holy Loch, Ardnadam.....	5·63
,,	Ipswich, Rookwood, Copdock	1·53	,,	Islay, Eallabus	3·80
,,	Blakeney	1·46	,,	Tiree, Cornaigmore	3·71
,,	Swaffham	2·00	XVI.	Dollar Academy	3·26
V.	Bishops Cannings	2·65	,,	Balquhidder, Stronvar.....	6·64
,,	Winterbourne Steepleton.....	...	,,	Glenlyon, Meggernie Castle..	7·66
,,	Ashburton, Druid House.....	4·12	,,	Blair Atholl	4·01
,,	Cullompton	3·65	,,	Coupar Angus	5·20
,,	Lynmouth, Rock House	2·66	,,	Montrose, Sunnyside Asylum.	3·52
,,	Okehampton, Oaklands.. ...	2·43	XVII.	Alford, Lynturk Manse	4·76
,,	Hartland Abbey.....	2·82	,,	Fyvie Castle	4·36
,,	Probus, Lamellyn.....	3·29	,,	Keith Station	4·61
,,	North Cadbury Rectory.....	2·79	XVIII.	Alvey Manse.....	1·54
VI.	Clifton, Pembroke Road.....	2·70	,,	Loch Quoich, Loan	11·05
,,	Ross, The Graig	2·19	,,	Drumnadrochit	1·42
,,	Shifnal, Hatton Grange.....	2·37	,,	Skye, Dunvegan	5·14
,,	Droitwich.....	2·52	,,	N. Uist, Lochmaddy	3 08
,,	Blockley, Upton Wold.....	2·68	,,	Glencarron Lodge	5·37
VII.	Market Overton.....	2·20	XIX.	Invershin	2·76
,,	Market Rasen	1·89	,,	Melvich	2·21
,,	Bawtry, Hesley Hall	1·59	,,	Loch Stack, Ardchullin	5·48
,,	Derby, Midland Railway.....	2·11	XX.	Skibbereen Rectory	5·12
,,	Buxton	3·09	,,	Dunmanway, The Rectory ..	5·55
VIII.	Nantwich, Dorfold Hall	1·83	,,	Glanmire, Lota Lodge, No. 1	4·56
,,	Chatburn, Middlewood	3·38	,,	Mitchelstown Castle.....	4·34
,,	Cartmel, Flookburgh	3·08	,,	Darrynane Abbey.....	6·65
IX.	Langsett Moor, Up. Midhope	2·58	,,	Clonmel, Bruce Villa	4·47
,,	Scarborough, Scalby	2·74	,,	Newmarket-on-Fergus, Fenloe	3·72
,,	Ingleby Greenhow	1·92	XXI.	Laragh, Glendalough	6·87
,,	Mickleton	2·80	,,	Ballycumber, Moorock Lodge	3·05
X.	Bellingham, High Green Manor	2·79	,,	Balbriggan, Ardgillan	3·04
,,	Ilderton, Lilburn Cottage ...	3·18	XXII.	Woodlawn	4·02
,,	Keswick, The Bank.....	1·75	,,	Westport, St. Helens	4·97
XI.	Llanfrechfa Grange	...	,,	Dugort, Slievemore Hotel ...	5·34
,,	Treherbert, Tyn-y-waun	5·56	,,	Mohill Rectory	4·90
,,	Carmarthen, The Friary	3·88	XXIII.	Enniskillen, Portora.....	3·66
,,	Castle Malgwyn [Llechryd]...	3·94	,,	Dartrey [Cootehill]	3·84
,,	Crickhowell, Tal-y-maes.....	5·20	,,	Warrenpoint, Manor House ..	...
,,	New Radnor, Ednol	4·18	,,	Banbridge, Milltown	3·27
,,	Birmingham WW., Tyrmynydd	3·23	,,	Belfast, Cave Hill Road	4·01
,,	Lake Vyrnwy	2·71	,,	Glenarm Castle..... ...	2·32
,,	Llangyhanfal, Plâs Draw.....	2·92	,,	Londonderry, Creggan Res...	3 04
,,	Dolgelly, Bryntirion.....	3·81	,,	Dunfanaghy, Horn Head ...	3·20
,,	Bettws-y-Coed, Tyn-y-bryn...	2·05	,,	Killybegs	4·50

METEOROLOGICAL NOTES ON MAY, 1913.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow; F for number of days Frost in Screen; f on Grass.

LONDON, CAMDEN SQUARE.—Changeable weather throughout the early part, showery conditions alternating with fine, sunny weather. Brilliant weather in the latter part, with unprecedented warmth in the last week (see p. 88). Heavy TS in early morning of 30th with ·27 in. of R in 10 minutes. Mean temp. 56°·7 or 2°·7 above the average. Duration of sunshine 189·0* hours, and of R 25·5 hours. Evaporation 2·49 in. Shade max. 84°·4 on 26th; min. 35°·3 on 7th. F 0, f 0.

TENTERDEN.—A dry month, and the last week fine and hot. Temp. above 74° each day from 24th to 30th. Duration of sunshine 233·0† hours. Shade max. 79°·7 on 27th; min. 35°·0 on 7th. F 0, f 3.

TOTLAND BAY.—Duration of sunshine 239·1* hours or 14·8 hours above the average. Shade max. 76°·2 on 26th; min. 38°·9 on 4th. F 0, f 0.

MILTON BRYAN.—A very drying month with cold E. winds which blew strongly from 14th to 19th. Hot from 24th to 30th.

IPSWICH, COPDOCK.—Dull, wet and chilly until 11th, after which a week of N. and E. winds dried everything up. The last week was brilliant and warm. Mean temp. 54°·7. Duration of sunshine 217·6† hours. Shade max. 79°·5 on 26th; min. 37°·4 on 6th. F 0, f 2.

POLAPIT TAMAR.—The first fortnight was excessively wet and cold as well as sunless. Of the total R 2·66 in. fell in the first 13 days. Shade max. 77°·3 on 26th; min. 36°·9 on 2nd. F 0, f 1.

ROSS.—A long spell of wet weather gave way on 12th, and the rest of the month was generally dry, fine and hot. Unusually hot from 25th to 27th. Shade max. 81°·3 on 26th; min. 34°·2 on 2nd.

HODSOCK PRIORY.—A mild but cloudy month, with a warm week at the end. The dry weather after the 8th was very welcome, and corn and grass crops have much improved. Shade max. 77°·8 on 30th; min. 33°·9 on 7th. F 0, f 8.

SOUTHPORT.—Duration of sunshine 152·2* hours or 66·0 hours below the average. Duration of R 53·7 hours. Evaporation 2·43 in. Mean temp. 51°·2. Shade max. 74°·0 on 30th; min. 34°·0 on 7th and 16th. F 0, f 6.

HULL.—Dull, with persistent R at beginning; fine from 11th and 17th; again unsettled but warmer to the end. TS on night of 29th. Shade max. 80°·0 on 30th; min. 36°·0 on 17th. F 0, f 2.

CARMARTHEN.—Cold and wet. Corn sowing unusually late owing to continued wet. Hay prospects good, but fruit crop very poor.

LLANDUDNO.—Shade max. 74°·0 on 30th; min. 38°·0 on 7th and 16th.

EDINBURGH.—Shade max. 73°·7 on 30th; min. 36°·1 on 19th. F 0, f 2.

ARDNADAM.—Disagreeably wet, with cold winds and very chilly evenings. Only 8 days with shade temp. above 60°. Shade max. 65°·2 on 13th; min. 36°·8 on 2nd. F 0, f 0.

COUPAR ANGUS.—Heavy floodings, the flood mark being higher than previously known. Shade max. 70°·0 on 30th; min. 34°·0 on 13th.

LOCH STACK.—Duration of sunshine 114·6* hours.

DARRYNANE ABBEY.—The wettest May in 34 years.

WATERFORD.—The wettest May since 1878. Shade max. 69°·5 on 26th; min. 34°·0 on 7th.

ARDGILLAN.—R 1·16 in. above the average. Shade max. 67°·9 on 24th; min 35°·3 on 5th. F 0, f 1.

BANBRIDGE, MILLTOWN.—R ·99 in. above the average of 50 years.

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* Campbell-Stokes. † Jordan.

Climatological Table for the British Empire, December, 1912.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	56·8	14	23·4	1	50·8	40·1	43·1	89	69·6	18·8	2·80	18	8 8
Malta	65·7	1	49·5	4	60·7	53·7	50·1	82	128·0	..	·98	9	5·6
Lagos	90·3	5	70·0	20	88·3	74·4	72·5		148·0	68·0	·00	0	3·7
Cape Town	93·4	24	50·1	9	79·3	60·2	57·3	3	...	...	·06	2	2·2
Natal, Durban ...	87·0	28	57·2	21	77·4	66·1	67·1	82	161·0	...	9·77	16	·61
Johannesburg	85·4	11	45·4	24	75·7	54·3	55·8	79	153·9	45·5	4·81	15	4·7
Mauritius	89·6	22	61·7	6	85·5	68·5	67·0	74	158·5	57·2	4·82	16	6·4
Bloemfontein	93·8	17	45·5	20	85·2	59·3	50·6	64	...	...	2·87	11	3·5
Calcutta...	81·9	20	52·5	16	77·1	55·2	54·6	69	...	45·9	·00	0	0·7
Bombay...	87·1	3	67·3	27	85·0	70·7	65·9	69	130·6	59·7	·00	0	1·3
Madras	84·8	23, 29	63·9	26	83·4	68·4	66·6	76	138·4	63·5	·30	2	3·4
Kodaikanal	70·8	24	40·9	11	64·2	47·8	42·1	63	133·1	29·8	5·25	11	4·6
Colombo, Ceylon ...	87·5	14*	71·3	27	85·3	73·5	70·8	76	151·0	64·3	4·21	11	5·5
Hongkong	75·3	14	45·3	28	66·2	57·2	53·3	74	117·5	...	4·90	8	6·7
Sydney	92·9	18	52·1	13	77·2	63·3	57·6	64	149·9	44·0	2·11	19	6·3
Melbourne	102·0	22	44·0	11	72·5	53·9	49·8	61	151·2	39·2	3·56	12	5·1
Adelaide	105·4	17	49·8	4	82·2	58·6	52·0	47	159·0	41·7	1·60	8	3·3
Perth	104·1	11	48·3	1	80·6	60·8	55·7	59	167·1	43·9	·43	9	4·1
Coolgardie	111·0	16	50·7	22	95·5	63·7	49·6	31	175·8	48·4	·24	5	3·4
Hobart, Tasmania ..	90·2	14	41·9	12	69·7	51·5	47·3	60	153·0	39·0	2·07	12	6·4
Wellington	66·2	26	43·0	10	60·9	50·7	48·2	76	141·2	35·2	5·87	20	7·7
Auckland	75·5	26	49·5	6	69·4	56·3	55·1	78	133·6	45·0	·81	7	5·8
Jamaica, Kingston ..	90·1	30	7·3	31	87·3	69·8	68·6	81	...	...	·08	1	1·1
Grenada	85·0	15	71·0	13	83·0	73·5	...	78	139·0	...	9·04	24	4·0
Toronto	56·4	6	11·2	9	38·8	26·5	...	81	103·7	6·0	1·85	17	7·0
Fredericton	48·0	2, 3	—7·0	13	31·5	13·0	18·8	85	...	...	4·74	12	5·6
St. John, N.B. ...	52·5	19	3·7	13	35·9	21·1	22·0	74	...	...	7·38	14	4·7
Edmonton, Alberta ...	55·0	8	-15·8	1	32·1	13·8	...	75	92·9	-16·7	·10	5	4·9
Victoria, B.C.	49·6	13	31·4	19	44·8	38·1	39·0	90	...	...	5·84	19	8·1

* 15 and 29.

MALTA.—Mean temp. of air 56°·0. Average daily sunshine 5·1 hours.

Johannesburg.—Bright sunshine 245·9 hours.

Mauritius.—Mean. hourly velocity of wind 8·6 miles or 0·9 miles below average.

KODAIKANAL.—Bright sunshine 217 hours.

COLOMBO.—Mean temp. of air 79°·4 or 0°·4 above, and R 1·03 in. below, averages. Mean velocity of wind 7·3 miles per hour. TSS on 11 days.

HONGKONG.—Mean temp. of air 61°·4. Mean hourly velocity of wind 12·0 miles. Bright sunshine 143·9 hours.

Sydney.—Mean temp. of air 0°·1 above, and R ·49 in. below, averages.

Melbourne.—Mean temp. of air 1°·3 below, and R 1·28 in. above, averages.

Adelaide.—Mean temp. of air 0°·7 below, and R ·67 in. above, averages.

Coolgardie.—Mean temp. of air 3°·6 above average.

Hobart.—Mean temp. of air 0°·8 below, and R ·15 in. above, averages.

Wellington.—Mean temp. of air 2°·6 below, and R 2·42 in. above, averages. Bright sunshine 170·9 hours. H on 2 days.