Symons's
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ABNORMAL RAINFALL IN CEYLON.

In this Magazine for March last we inserted a note on the heavy rainfall of January, 1913, in Ceylon. The information reached us through a correspondent who had it we understand from a private source; and we are glad now to be able to supplement it by some fuller details from official records, for which we are indebted to the courtesy of Mr. A. J. Bamford, Acting Superintendent of the Colombo Observatory.

The heavy rainfall appears not to have been confined to the central parts of the island, since, although the actual maximum occurred near Kandy, a larger area was affected on the east coast.

The Supplement to the Government Gazette, from which the following statistics were drawn, contains the records of the total amount of rainfall, the number of days on which rain fell, and the day of maximum precipitation in twenty-four hours, during January, at 234 stations. It is, of course, impossible in our limited space to print more than a small selection of this large mass of data, but the map which Mr. Bamford has constructed, and which we reproduce in a generalized form on a small scale, represents the distribution of total rainfall for the month in a much more concise manner. The table which we print contains the names of stations, and the total rainfall in cases where the amount reached 50 inches. The positions of the stations may be ascertained by means of the reference numbers which have been placed upon the map. The whole of these stations lie in the district between Kandy and the east coast. At the two wettest stations, the enormous amount of over 100 inches of rain was recorded during the month. These were the Ledgerwatta Estate, 4 miles north of Badulla, at an altitude of 4,000 ft., with 108·01 in., and St. Martin's Estate, Rangalla, 15 miles E.N.E. of Kandy, at 3,600 ft., with 109·55 in. of rain. The rainfall, as will be seen by the map, fell off uniformly towards the west coast, on the whole length of which less than 10 inches fell. The northern extremity of Ceylon had less than 5 inches during the month.

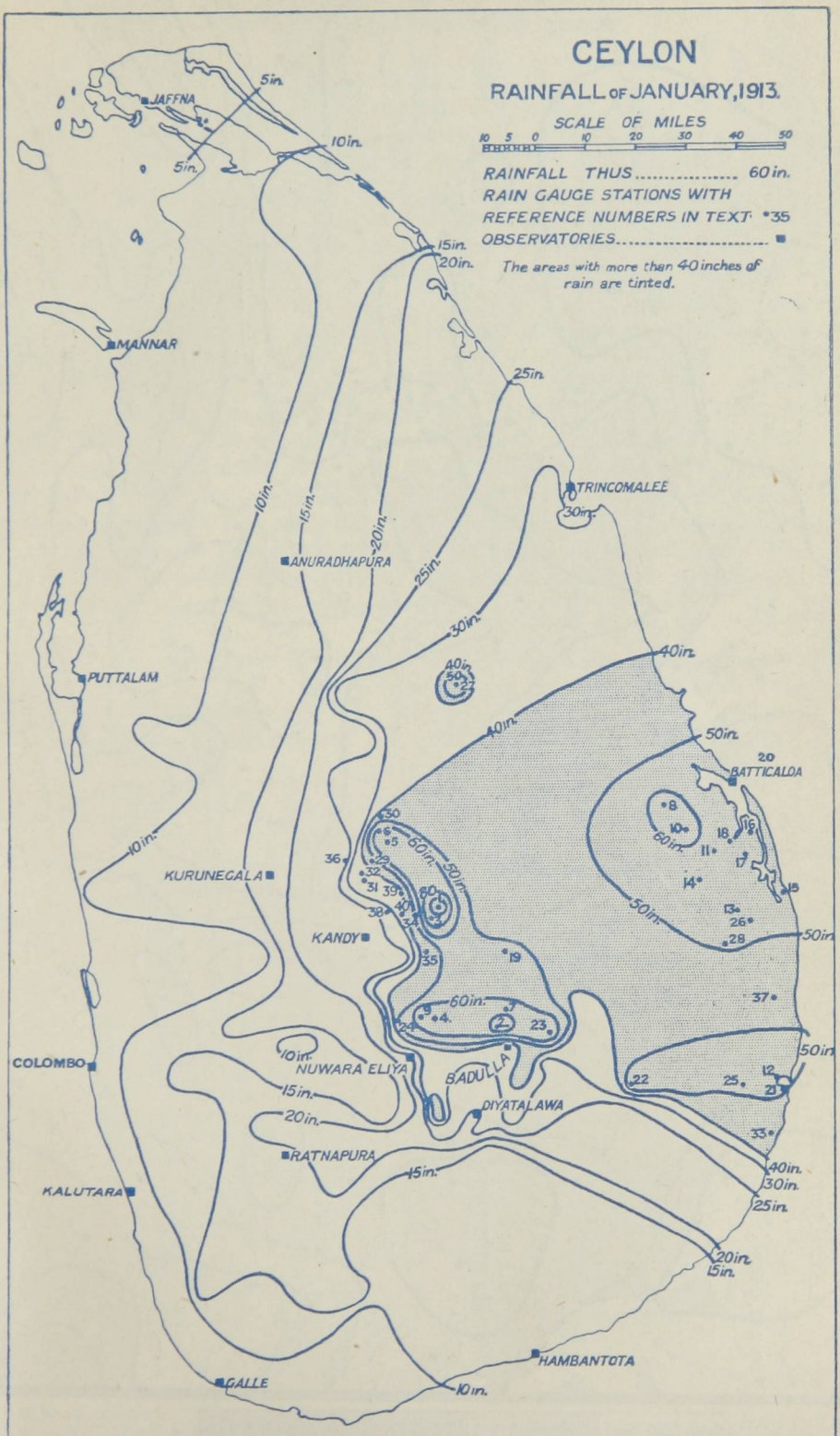
TABLE I.—*Rainfall, January, 1913.*

No. on Map.	STATION.	Altitude. feet.		Rainfall. in.
1	St. Martin's, Rangalla	3600	.....	109·55
2	Ledgerwatta, Badulla	4000	.....	108·01
3	Kobonella, Rangalla	3300	.....	81·85
4	Kurundu-oya, Maturata	5150	.....	78·36
5	Dooroomadella, Gammaduwa	2880	.....	69·82
6	Gammaduwa, Rattota	2400	.....	69·23
7	Taldena	1100	.....	65·12
8	Rugam	77	.....	63·40
9	Maturata	3226	.....	60·18
10	Unichchai	120	.....	60·13
11	Pullukannawa	—	.....	58·65
12	Rotawewa	30	.....	58·55
13	Veeragoda	99	.....	58·24
14	Devilana	136	.....	57·33
15	Kalmunai	12	.....	57·25
16	Kadukkamunai	—	.....	56·60
17	Thumpenkeni	—	.....	56·49
18	Manalpittyaar Anicut	21	.....	55·90
19	Kudawewa	250	.....	54·63
20	Batticaloa	26	.....	53·77
21	Pottuvil	10	.....	53·73
22	Maragalla, Monaragala	2200	.....	53·26
23	Madulsima	4500	.....	52·32
24	Kabaragalla, Maturata	4300	.....	51·56
25	Lahugalla	—	.....	51·45
26	Chadiyantalawa	63	.....	51·44
27	Minneriya	309	.....	51·06
28	Ampare	125	.....	50·06

The Island of Ceylon is, from its situation in the Indian Ocean, peculiarly liable to rainfalls of tropical intensity, and the relative importance of January, 1913, in its meteorological history may be

TABLE II.—*Highest Monthly Rainfall Recorded at First Class Stations in Ceylon.*

STATIONS.	Highest in any month.		Highest in any January.		Total for Jan., 1913.
	in.	Date.	in.	Year.	in.
Colombo	36·2	Oct., 1870	12·6	1878	8·34
Ratnapura	43·4	Sept., 1872	12·5	1870	15·64
Puttalam	29·0	Oct., 1891	10·4	1899	8·56
Anuradhapura	26·5	Dec., 1887	11·3	1871	12·68
Mannar	25·3	Oct., 1891	8·9	1871	8·58
Jaffna	38·1	Nov., 1906	9·9	1881	4·07
Trincomalee	35·2	Nov., 1893	23·9	1878	29·12
Batticaloa	51·7	Dec., 1898	26·9	1878	53·77
Hambantota	22·2	Oct., 1877	10·9	1899	10·70
Galle	32·5	Sept., 1877	12·8	1878	8·09
Kandy	25·3	June, 1889	16·7	1871	22·58
Nuwara Eliya	35·0	Sep.,1872, Jul.,1882	18·0	1892	24·75
Badulla	47·0	Jan., 1892	47·0	1892	40·43
Diyatalawa	21·5	Oct., 1902	11·4	1904	23·72
Kurunegala	33·4	Oct., 1891	9·5	1892	17·79
Kalutara	32·6	Sept., 1877	19·6	1878	8·96


CEYLON
RAINFALL OF JANUARY, 1913.
SCALE OF MILES
10 5 0 10 20 30 40 50
RAINFALL THUS..... 60 in.
RAIN GAUGE STATIONS WITH REFERENCE NUMBERS IN TEXT: *35
OBSERVATORIES.....
The areas with more than 40 inches of rain are tinted.
JAFFNA
MANNAR
PUTTALAM
KURUNEGALA
ANURADHAPURA
TRINCOMALEE
BATTICALOA
KANDY
NUWARA ELIYA
BADULLA
DIYATALAWA
RATNAPURA
KALUTARA
COLOMBO
GALLE
HAMBANTOTA
5in.
10in.
15in.
20in.
25in.
30in.
40in.
50in.
60in.

THAMES VALLEY RAINFALL —— APRIL, 1913.

judged to some slight extent from a list of the previous highest rainfall totals recorded at the stations of the first class. It will be observed that, whilst one station only has failed to record a wetter month, no fewer than eight out of the sixteen never recorded so wet a January. The period over which the comparison extends is unfortunately not stated. It should be borne in mind that in a country presenting such an extraordinary variation in distribution of rainfall from place to place, these stations can by no means take full account of its possibilities from the point of view of heavy downpours, and much heavier falls in individual months have been recorded on some of the estates.

The following Table comprises a list of maximum falls within twenty-four hours exceeding 10 inches. It will be observed that the day of heaviest rainfall in most cases seems to have been the 17th, the date to which the note on p. 26 of the March number specially referred. The fall of 17·24 in. at Clodagh has to be added to those in Mr. Bamford's list, as it does not appear in the official tables. This station lies some 13 miles due north of Kandy, whilst Kobonella is in the immediate vicinity of the St. Martin's Estate, where the heaviest fall for the whole month was reported.

TABLE III.—*Rainfalls of 10 in. or more in 24 hours, January, 1913.*

No. on Map.	STATION.	Altitude, feet.	in.	Date.
1	St. Martin's, Rangalla	3600	24·78	16th
3	Kobonella, ,,	3300	18·80	17th
6	Gammaduwa, Rattota	2400	16·40	17th
5	Dooroomadella, Gammaduwa	2880	15·63	17th
8	Rugam	77	15·10	9th
12	Rotawewa	30	14·71	6th
29	Crystal Hill, Matale	1400	14·07	17th
30	Sacumbe, Gammaduwa	1200	13·87	16th
10	Unichchai	120	13·82	9th
31	Wariapolla, Matale	1200	13·01	16th
32	Matale	1208	12·62	17th
33	Panawa	...	12·27	4th
11	Pollukannawa	...	12·09	9th
34	Duckwari, Rangalla	3300	12 08	16th
2	Ledgerwatta, Badulla	4000	12·00	6th
18	Manalpittyaar Anicut	21	11·68	9th
16	Kadukkamunai	...	11·35	9th
35	Woodside, Urugalla	3000	11·27	17th
36	Delwita, Kurunegala	490	11·20	18th
37	Sakamam	42	11·15	6th
—	Meeriatenne, Hanguranketa	4450	11·09	17th
13	Veeragoda	99	11·00	9th
38	Galphele, Wattegama	2300	10·82	17th
21	Pottuvil	10	10·67	6th
39	Elkaduwa	2800	10·10	17th
40	Waragalanda, Madulkele	2000	10·05	17th
7	Taldena	1100	10·00	17th

THE WEATHER OF APRIL.

DURING the early part of the month the conditions were dry generally, but with scanty sunshine except in Ireland. A deep depression moved in a southerly direction over Scotland and England during the 11th and this was accompanied by much rain, sleet and snow. Strong gales from some northerly point occurred in the north and eastern parts of the Kingdom and temperature remained low except in Ireland. In East Hertfordshire snow fell for 8 hours, and in East Essex it was by far the heaviest snowfall of the winter. Much damage was done to the young lambs, and all farm work was brought to a standstill. At Wirksworth snow was falling from 7.45 a.m. to 5.15 p.m. and the whole countryside was covered, while at Worstead (Norfolk) the fall lasted from about 4 p.m. to 11 p.m. In Glasgow and the west of Scotland shipyard and outdoor labour generally was interrupted while in the industrial areas of the north of England traffic was delayed and outdoor work suspended. Fair weather with low temperature followed for a few days but on the 15th a large and deep secondary depression appeared off the west coast and by evening caused strong winds and gales from the south over Ireland and the west of Scotland. Rain fell generally over the British Isles. During the latter half of the month rain fell almost daily in all parts excepting the extreme eastern counties, and local thunderstorms occurred in many places in the south of England. A considerable rise in temperature took place over Great Britain between the 22nd and 24th and most places recorded the highest temperature of the month on one of these days, although in Ireland temperature remained low. At Clifton and Cullompton the temperature rose to 68° on the 23rd and this was reached at Camden Square on the 24th. Along the North Sea coast 65° or above was reached and temperature was generally above 60° in Wales, the north-west of England and the west of Scotland. On the 25th snow fell to a depth of 2 inches at Cahir, Co. Tipperary. During the last few days the weather continued unsettled and temperature remained high, a reading of 70° being recorded at Margate on the 27th. On the 29th the temperature rose to 69° at Camden Square and in the evening severe thunderstorms occurred over the southern parts of England and the Midlands accompanied by heavy rain. The rainfall in the London area was rather less than ·50 in. and it increased to the westward, over 1·00 in. falling at many stations in Oxfordshire and the bordering counties. At Culham College the fall was 1·93 in., at Bloxham Grove 1·49 in., and at Coventry 1·20 in. The track of heaviest rainfall on this day may be detected in the map of the rainfall of April over the Thames Valley, where a number of stations in a line running due north and south of Oxford will be seen to have reached a total of 4 inches for the month. The general rainfall of the great divisions of the Kingdom expressed as a percentage of the average was as follows:—England and Wales 180; Scotland 138; Ireland 153; British Isles 161.

ROYAL METEOROLOGICAL SOCIETY.

An Ordinary Meeting of the Society was held at the Surveyors' Institution, Great George Street, on April 16th, Mr. C. J. P. Cave, President, in the Chair.

Mr. W. H. Dines, F.R.S., read a paper on "The Vertical Distribution of Temperature in the Atmosphere, and the Work required to alter it." At the outset he stated the scope of his subject as follows: "It seems likely that the vertical distribution of temperature as we know it is the result of two opposing tendencies, one, the effect of radiation, the other the forced mixing produced by the general circulation, aided perhaps by the convection currents caused by the heating of the earth by solar radiation and by the latest heat set free by condensation." He compared the actual distribution with the possible alternatives, isothermal and adiabatic; the former the probable result of undisturbed radiation, the latter the effect of mixing. By considering the atmosphere as divided into a number of equal layers, and calculating the mean temperature of each, he showed that the amount of work required to change the distribution from isothermal to actual is comparatively small; the condensation of ·16 in. of rain, supplies sufficient heat for the change. Col. Rawson initiated the discussion. Mr. Gold said that he did not agree that the result of undisturbed radiation would be an isothermal atmosphere; the amount of radiation absorbed and reflected was extremely indefinite.

Mr. J. E. Clark presented the Report of the Phenological Observations from December, 1911, to November, 1912, prepared by himself and Mr. R. H. Hooker. The flowers chosen as representative nearly all appeared before their average date except in the north and east of Scotland. The effect of the disastrous weather which was a feature of the latter half of the year was more apparent in the yield of farm crops, which was generally far below the average, both in quantity and quality.

A third paper on "Meteorological, Electrical and Magnetic Observations during the Solar Eclipse of April 17th, 1912," by Messrs. R. Corless, G. Dobson and Dr. C. Chree, F.R.S., was taken as read, but Dr. Chree gave a short account of the disturbances observed during the eclipse, and discussed their relation to that phenomenon. Meteorological observations generally showed well-pronounced results; the comparison of the sun's phase at South Kensington with the radiation was particularly striking. The potential gradient, as traced by the electrograph, exhibited no feature which could positively be attributed to the eclipse; a slight abnormal rise has its counterpart at the same hour on other days of the month. Magnetic observations showed a slightly steadying effect on the normal oscillations and a tendency to a decrease in the western declination.

The following new fellows were elected to the Society:—Messrs. E. J. Bolton, B. P. Jagtap, and E. G. Lamb, M.A.

INTERNATIONAL BALLOON ASCENTS.

By W. H. Dines, F.R.S.

September, 1910.

Starting Point.	Country.	A miles.	B ° F.	C miles	D ° F.	E miles.	F
Manchester	England ...	8·1	—79	10·7	—70	161	S.E. by E.
Brussels	Belgium ..	6·6	—56	9·6	—62	74	S.E. by E.
Hamburg	Germany ..	6·0	—65	7·3	—54	25	E.N.E
Paris	France	7·7	—74	9·5	—72	100	S.E. by E.
Strassburg	Germany ..	6·3	—52	7·7	—53	29	E.S.E.
Munich	,, ..	6·5	—58	10·9	—60	14	S.S.E.
Vienna	Austria	6·6	—56	11·9	?	17	N.N.W.
Pavia	Italy	7·2	—51	10·7	—58	68	E.S.E.
Pavlovsk	Russia	6·9	—73	8·9	—64	23	W.S.W.
Nizhni Olchedaeff	,, ...	7·2	—63	10·6	—53	30	E.N.E.

A Height in miles of commencement of isothermal column.
B Temperature, F°., at bottom of column.
C Greatest height of reliable record in miles.
D Temperature, F°., at greatest height.
E Distance in miles of point where balloon fell.
F Bearing of falling point from starting point.

The temperatures are fairly high, but early autumn is the time when the air from 1 to 6 miles high is at its warmest. The usual tendency towards greater uniformity at the highest point is plainly shown. High pressure areas lay over Finland and the Bay of Biscay, separated by a trough of low pressure over Denmark and North Germany, with minima over Iceland and the Mediterranean.

MR. CAVE ON WINDS IN FREE AIR.

At the Royal Institution, on April 11th, Mr. C. J. P. Cave, President of the Royal Meteorological Society, lectured on "The Winds in the Free Air."

Investigations were first carried out by means of kites, but these have been almost superseded by small balloons, with or without the meteorographs attached. For the purpose of studying air currents, the movements of the balloons are traced by means of a specially designed theodolite, and from these observations the direction and velocity of the winds in different air strata are calculated.

By means of an ingenious series of models the various wind structures were clearly demonstrated.

Generally speaking, the wind increases in velocity from the earth's surface to the level of the stratosphere, and then rapidly decreases; but this is by no means always the case. The different constructions were divided broadly into five classes. The first, which may be called "solid current," consists of a wind of almost uniform velocity and constant direction for the whole depth of the troposphere. The second class is represented by winds increasing with height, the increase being sometimes very rapid. The third comprises chiefly

east winds, strong at the surface, but rapidly falling off and then giving way to a complete calm. The fourth is the ordinary case of reversal after a calm stratum. Sometimes the calm stratum is surmounted by a wind from the same direction as in the lower layers.

Mr. Cave said that he considered that possibly sustained thunderstorms could only take place when there was a wind reversal, so that masses of air of different electric potential were constantly being brought near together.

A reversal allows sounds to be heard at considerable distances in the direction of the upper wind, for the sound waves would be refracted downwards and reach the earth again at long distances from the point of origin. This possibly accounts for the idea that gun firing produces rain; the conditions favourable to the hearing of distant gun firing being also favourable to heavy rains.

In concluding, Mr. Cave said that it had been suggested by Dr. Shaw that the pressure changes which give rise to our weather, originate not near the earth's surface, as hitherto supposed, but just below the stratosphere; and that the study of the pressure distribution at that level might give most valuable results.

METEOROLOGICAL NEWS AND NOTES.

THE ROYAL METEOROLOGICAL SOCIETY propose to hold their usual biennial dinner at the Trocadero Restaurant, Shaftesbury Avenue, Piccadilly Circus, W., on Tuesday evening, May 20th. The Council hope that the Fellows will take advantage of this opportunity of meeting representatives of other branches of science and of the public services.

BRITISH RAINFALL, 1911. Owing to the unusual demand for copies of "*British Rainfall, 1911*," the volume has, unfortunately, gone entirely out of print. Several Observers are still requiring copies in order to complete their sets, and, in the circumstances, it would be a great favour if any readers who have copies for which they have no further use would care to return them to the Editor at 62, Camden Square, London, N.W., in order that they may be passed on to those who have been unable to obtain them.

ONE OF THE EARLIEST WEATHER NOTES for England, later by a few years however than the famous Merle's MSS. Observations, was referred to in a letter from the Dean of Lichfield in the issue of *The Guardian*, for August 30th.

"Anno 1348 pluebat a festo nativitatis Iohannis Bapt. ad natale Domini, ita ut omni die vel nocte plueret."

The note occurs in a MS. copy of William Whitlocke's *Continuatio Historiæ Lichfeldensis*, which is preserved in the Lichfield Cathedral Library.

Whether the memorandum may be taken as evidence of climatic change or not, it suggests forcibly that the human tendency to exaggeration was as active in the writer of the fourteenth century as in the journalist of the twentieth.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

THUNDERSTORMS ON APRIL 29th, 1913.

A THUNDERSTORM, of quite exceptional intensity, passed over this neighbourhood just after sunset on April 29th. The day throughout had been very close and humid with a marked diversity of air currents prevailing. Observations during the morning showed a high cirrus drift from S.E., with a second and lower drift from E., whilst cirro-cumulus and alto-stratus were travelling from S. and S.W. From 2 to 4 p.m. brilliant sunshine prevailed, but there was an ominous appearance of the sky to the S.E., inky blue black alto-stratus with cumulo-stratus (thunder heads), greatly intensified by the brilliant sunshine. Distant rolling thunder was first heard in S.E. at 5.55 p.m., the sky at this hour having become overcast with dense cirro-stratus, which had spread over rapidly from S.W., blue black alto-stratus still holding in S.E. Rolling thunder was heard at intervals of 3 to 5 minutes to 7.15 p.m., when the storm was moving up rapidly. At 7.25 p.m. vivid sheet lightning, red in colour, was first seen in S.E., the interval to thunder being 18 seconds. Fork lightning (white) was first seen at 7.29 p.m., being followed by thunder in 8 seconds. From 7.29 to 7.50 p.m. brilliant sheet and fork lightning prevailed, with time intervals to thunder varying between 8 and 5 seconds. Between 7.55 and 8 p.m. a count of the flashes yielded 35 sheet and 20 forked discharges, with 22 peals of thunder. At 8 p.m. cumulo-nimbus with a very extended range of front, accompanied by a heavy wind squall, and inky blackness, swept rapidly over the sky from a southerly point, the storm centre at this hour being practically at the zenith. At 8.2 p.m. lightning discharges were taking place at the rate of 15 per minute. The discharges were not of the nature of sudden flashes, but of quite appreciable duration, like a continuing flame, and lit up the landscape with a most weird effect. From 8.5 to 8.20 p.m. one incessant roll of thunder prevailed, the sheet and fork lightning flashes numbering 307 during this period, averaging 20 per minute. At 8.25 p.m. the storm was travelling away to the N. at a rapid rate, the time interval at this hour being 15 seconds, but with little, if any, decrease in the intensity of the lightning display. The last thunder was heard in N. at 8.50 p.m. At 10 p.m. there was still a bright display of sheet lightning to N., N.E. and N.W., averaging 10 flashes per minute, with an intermittent display prevailing to 12 p.m.

Steady rain fell from 7.40 to 8.10 p.m. amounting to ·13 in., and heavier rain from 8.50 to 9.10 p.m, giving ·22 in. The barograph showed a fall in pressure of 0·35 in. from 10 a.m. to 8 p.m., when there was a sudden increase amounting to 0·08 in. ; being followed by a gradual fall, equal to the sudden increase, by 10 p.m.

In this neighbourhood, as a general rule, the storms follow the higher ground of the hills surrounding the Wealden area, circling the place of observation, but those storms which travel from a S.E. quadrant, across the Weald plain, on a northerly course, freed, at any rate for a time, from the influence of the South Downs, are invariably of exceptional intensity. SPENCER C. RUSSELL, F.R.Met.Soc.

Southwater, Sussex, May 1st, 1913.

DURING the thunderstorm on the evening of April 29th, so rapidly did the flashes of lightning follow one another that we were induced to take note of their frequency. The storm reached here at about 7.20 p.m., but for some time previously we could hear it approaching from the S.W. In the five minutes, from 7.30 to 7.35 p.m., there were nineteen distinct flashes. Note was again taken from 7.43 till 8 p.m., during which period the storm was probably at its height, and 115 flashes of lightning were counted; the thunder being almost one continuous roar. Black clouds came up, their outer edge presenting an almost perfect line across the sky from S.E. to S.W., at 7.30 p.m., and gradually overspread the whole sky. In the fading daylight the effect of this and the vivid lightning was most weird. The rainfall was 0·54 in. E. J. PLATT.

The Gardens, Borden Wood, Liphook, Hants, May 7th, 1913.

WE had a very magnificent display of lightning here last night from 8 to 9 p.m. The thunder was nothing out of the way, but it was the finest lightning I have seen for years. Rain ·51 in.

Pyrton Hill, Oxon, April 30th, 1913. W. H. DINES.

WE had a very bad thunderstorm yesterday, or rather, I believe, several storms round us simultaneously. The first rain fell at 6.30 p.m. Soon after 7 p.m. it became continuous and very heavy. Thunder and lightning began about the same time, and continued for two hours. For one hour, 7.30 p.m. to 8.30 p.m., the thunder was incessant with hardly a break in the rumbling, and the lightning was very frequent. The storms never seemed to pass *over* us, as there were no crackling claps of thunder. Owing to the hour, I was unable to watch the storm, except at intervals, when I was struck with the red or pink colour of the lightning as it lit up the darkness with a shimmering glow, sometimes showing a white or yellow snaky streak on the clouds. I noticed one blue flash. The wind was, I think, from S.E., and very high and gusty at first. The rain ceased shortly before 10 p.m., but at 10.20 p.m. there was another very short and sharp fall. We measured 1·33 in. this morning, the

biggest fall in April that I have seen; though possibly 1·01 in. on April 16th, 1910, of which ·75 in. fell in one hour, may have been heavier. I do not think it rained again after 10.30 p.m.

62, Banbury Road, Oxford, April 30th, 1913. E. M. TAWNEY.

A HEAVY thunderstorm broke over this village last evening. The day had been cloudy with a south-east wind, changing to due east at about 3 p.m. About 6.40 p.m. a shower of rain came on, it then cleared for a few minutes, and at 7 p.m. it was falling fast again, and kept on till 9.30 p.m. Thunder was heard at 7.15 p.m., and died away about 9.20 p.m. From 7.55 p.m. to 8.10 p.m. there was no interval between the thunder claps, and there was a continual roar. The thunder all through the storm was loud and frequent, with an alarming clap right overhead at 8.25 p.m. The wind this morning is south-west and fresh. Rainfall registered this morning ·90 in.

Swerford, Oxford, April 30th, 1913. WM. HALL.

THUNDERSTORM AND BLACK RAIN.

WE had rather a severe thunderstorm just over us on May 2nd. It began at about 2 p.m. and remained overhead, or within about a mile, till about 3.15 p.m. It was not incessant, but stopped and seemed as if it was going away, and then began again. During the time we had ·45 in. of rain which fell very heavily at times. The peculiarity about the rain was that it was black and dirty, the water out of the gauge being sooty. I noticed also that the pool of water in front of the house, which had run down the hill, was quite black. The tubs of water, too, were the same. The cottage people thought it was dirt off their roofs; it was the same in some of the adjoining villages. The water this morning, after heavy rain, was all right.

Another peculiarity after the storm was the number of worms crawling about the roads and paths. This morning, too, the roads and paths were full of worms crawling about; I never saw such numbers before. Is this not very unusual? H. I. KILNER.

Little Saxham Rectory, Bury St. Edmunds, May 4th.

AN EXAMPLE OF PUBLIC SPIRIT.

IN a recent letter to a Torquay paper, it was suggested that Torquay should have a good public barograph, now an essential at watering places. On reading the letter, Sir Thomas Bazley, Bart., of Kilmorie, near here, promptly and generously presented a first-class instrument (of French make) to the town. An admirable example, deserving to be made widely known. *O si sic omnes!* A.B.M.

Hollocombe, Torre, 9th May, 1913.

METEOROLOGICAL NOMENCLATURE.

On page 53 of your April number, in the review of Mr. Lempfert's book your reviewer states that the term isothermal column is "ambiguous or even misleading." I cannot agree with this view. Isothermal layer is misleading, but isothermal column, applied as it always is, so far as I know, to the upper air over the place of observation, is perfectly accurate. In nearly all cases the change of temperature in a vertical direction is trifling. Dr. Shaw's statement is (M.O. 202, p. 48) "the thermal structure instead of being stratified is columnar." Now the term stratosphere appears to me to imply stratification, which as it happens prevails in the lower part called the troposphere, but does not occur in the so-called stratosphere. The term "stratosphere" is, therefore, more misleading than the term "isothermal layer," which does give a certain idea of the facts, and far more so than isothermal column, which, when applied locally, and the term column is essentially local, truly represents the facts.

"A rose by any other name would smell as sweet"; the terms troposphere and stratosphere are single words and, therefore, convenient, but the chief ground for adopting them seems to me to be that they were proposed by Teisserenc de Bort, who discovered the phenomena they represent.

Could anyone think of more truly descriptive words it would now be too late, but a single word is badly wanted to express the height for which the symbol H_c or H_i is commonly employed.

Pyrton Hill, Oxon, April 22nd, 1913. W. H. DINES.

SUNSHINE AND RAIN OF PAST TWELVE MONTHS.

The duration of sunshine and the rainfall here for the past twelve months seem sufficiently remarkable to be worthy of notice. During the Calendar Year 1912 only 944 hours of sunshine were recorded, which is 312 hours less than the average of the 30 years 1881-1910, and 121 hours less than in 1888, which was, up to then, the dullest year. The rainfall for the year was 33·45 in., which is 9·13 in., or 38 per cent. above the average of the 35 years 1876-1910 and was only exceeded in 1880, when the total was 34·94 in. But 1912 had one bright spot, the month of April, with a rainfall of only ·14 in. and an excess of sunshine of 55 hours. During the first four months of 1913 the general character of 1912 was continued, dull and wet, with the result that for the twelve months May, 1912, to April, 1913, the sunshine has only totalled 874 hours, a deficiency of 382 hours, while the rainfall amounts to 34·70 in., an excess of 10·38 in. No month of the period has had an average amount of sunshine; August and November were the dullest of their names in the record, while July, December, and January were the dullest, with one exception.

Hodsock Priory, Worksop, May 3rd, 1913. HENRY MELLISH.

THE MOON AND THE WEATHER.

By F. W. Henkel, B.A., F.R.A.S.

It has long been a popular notion that an intimate connection exists between the changes of appearance, or phases, of the moon and weather changes, and the literature of all nations abounds in allusions to this belief. Notwithstanding the progress of science and the evidence of countless observations tending to negative the existence of any but the most minute influence of our satellite upon terrestrial weather conditions, this belief is tenaciously held by many persons, sailors and travellers amongst others, who, by a free use of the argument *post hoc ergo propter hoc*, find reasons for the faith that is in them. It seems probable that the only basis for all this lies in the fact that the four "changes" of the moon, New, First Quarter, Full, and Last Quarter, recurring at intervals of rather less than $7\frac{1}{2}$ days, *all* changes of the weather must occur within three or four days on one side or the other of each of these changes, whilst many are bound to happen at shorter intervals of time. Then by noting only such changes and ignoring the rest it is easy to establish any desired relation, with the certainty that such a method will enable us to prove, if need be, that the moon brings rain here, thunder in North Africa, wind in India, snow in Japan, etc.

But the *total* amount of light and heat received by us from the moon is so small that only within recent years has it been possible to measure roughly these quantities at all. The late Lord Rosse, by the help of his telescopes and delicate instruments, approximately determined the fraction of heat sent by the full moon as about one *eighty-thousandth part* of that sent by the sun, whilst the most generous estimate for its light gives the fraction of $\frac{1}{300,000}$ that of sunlight. The estimate of Zöllner is only one-half this, *i.e.*, $\frac{1}{618,000}$ that is to say "if the whole visible hemisphere of the sky were packed with full moons we should receive from it about one-eighth part of the light of the sun." Such is the total amount, yet it is changes in this minute quantity which, according to some weather prophets, are potent in producing weather changes. The differential gravitational action of the moon produces atmospheric tides in the ocean of air, just as tides are produced in the waters, but the maximum effect of this action upon the barometer has been estimated at less than 0·003 in. of mercury, or about one ten-thousandth of an atmosphere, a quantity completely masked by almost every other cause of change. In every case the whole moon is always present, it is merely a question of the greater or less visibility of its surface turned towards us producing the gradual changes of appearance, four distinct stages of which are known by special names, New Moon, when none of the illuminated surface is visible; Full Moon when all is turned towards us; First and Last Quarters when exactly one half is illuminated, the other half in darkness.

There exist a number of prognostics, drawn from the position of the horns of the crescent moon when first seen after new, bearing upon the weather immediately following. It need hardly be said that the position of these cusps, as they are called, is absolutely definite and predictable in advance, being always perpendicular to the line joining the sun and moon, and so were it the case that this position had an influence on weather conditions we should possess an additional potent aid in forecasting.

The old saying, "moon lying on her back" followed always by wind, rain and other bad weather, is alluded to by an early writer in *Symons's Meteorological Magazine* many years ago (1867), so perhaps the repetition may be permitted now—

> "When the moon lies on her back
> Then the sou'-west wind will crack,
> When she rises up and nods
> Then north-easters dry the sods."

Lord Bacon, "wisest and meanest of mankind," to whose credit has been laid much of which he was entirely innocent, notwithstanding his enlightened love for science and the valuable aphorisms of the *Novum Organum*, appears to have been a firm believer in astrology, and quoted with approval weather-saws of scarcely greater value, says of the appearance of the moon, "if at her birth or within the first few days the lower horn of the moon appear obscure, dark or in any way discoloured, there will be foul and stormy weather before the full. If she be discoloured in the middle it will be stormy about the full, but if the upper horn is thus affected, about the wane." Very detailed information, but scarcely obtained by the "inductive method"! He says also, "An erect moon is almost always threatening and unfavourable, but principally denotes wind. If, however, she appears with blunt or shortened horns it is rather a sign of rain." (Inwards' "Weather Lore.")

A detailed list of weather changes following the phases of the moon has been compiled for the United States (it is not stated whether the same weather conditions are to be expected throughout the whole of that vast area, or perhaps the prophet meant only New York and its neighbourhood), wherein we are told, if the moon "changes" in summer between 12 and 2 a.m. the weather will be fair, if between 2 and 4 a.m. "cold and showery," if the change come between 4 and 6 a.m. there will be rain. For the same hours we learn that in winter the moon changing between 12 and 2 a.m. frost follows, unless the wind is S.W., if the change takes place between 2 and 4 a.m. there will be snow and stormy weather, if between 4 and 6 a.m. rain is to be expected. A Spanish proverb, "said to be correct nine times out of twelve," says, "If the weather on the sixth day (after new moon) is the same as that on the fourth day, the same weather will continue during the whole lunation," and a similar saying is stated to be current in France also.

The phenomenon of "earth shine," or "old moon in the new moon's arm," *i.e.*, the part of the disc unilluminated by direct sunlight being faintly visible by twice-reflected light from the Earth, often seen three or four days after new moon, has been variously regarded as a prognostic of bad weather or good, according to the district where the saying is current. Thus we learn that to see the old moon in the arms of the new one is a sign of bad weather to come.

"Late, late yestreen, I saw the new moone
Wi' the auld moone in her aim,
And I feir, I feir, my deir master,
That we will come to harme."—*Percy Reliques.*

On the other hand, the Suffolk proverb says, "To see the old moon in the new moon's arms is reckoned a sign of fair weather," and so is the turning up of the horns of the new moon. Swainson says:—"In this position it is supposed to retain the water which is in it."

With regard to the supposed clearing action of the full moon on clouds, alluded to by Dr. Shaw in his recent work, "Forecasting Weather" (p. 175), expressed by the nautical saying, "the full moon eats clouds," or its French equivalent, "la lune mange les nuages," though the late Sir John Herschel and other high authorities inclined to believe in its genuineness, most meteorologists are of opinion that this is an illusion. It does not seem easy to understand how the minute, almost infinitesimal, amount of heat radiated by the moon can *produce* any such effect. Dr. Shaw's explanation that it is *post hoc* but NOT *propter hoc* may here be given. "A single layer of drifting fleecy clouds—detached stratus—is *rendered visible* by the illumination of the moon not very long after sunset. The illumination not only shows the clouds, but shows that they are diminishing, and finally the moon is left in possession of an unusually clear sky."

The appearance of halos and coronæ round sun and moon stands on a somewhat higher level as a genuine weather sign, so that it need scarcely be alluded to here. From time to time, on the appearance of remarkable comets, attempts have been made to ascertain possible connections between these phenomena and weather.

Of a somewhat different character is the question of influence of sunspots upon terrestrial weather conditions, a subject upon which a good deal has been written from time to time, but unfortunately most of this has been too evidently coloured by personal feeling rather than by dispassionate scientific statement. The sun is so evidently the prime mover in almost every terrestrial phenomenon, and his connection with variations in terrestrial magnetism, auroral frequency, etc., has been so clearly shown as the result of direct observation, that it must seem *prima facie* highly probable that the disturbances on or within his surface indicated by the spottedness of the latter cannot be without effect upon terrestrial weather con-

ditions. The eleven-year cycle and longer periods suspected by Schuster and others, it is thought, must find their reflection in variations of temperature, rainfall, pressure, etc., at terrestrial stations.

Unfortunately, we are by no means certain, in the first place, whether the sun is hotter or no at the time of sunspot maximum than at the time of minimum, the intervals between one maximum and the next, though having the average value of 11 years, are sometimes as great as 16 years and sometimes shorter than 8 years apart; and though the spots are the most prominent and rapidly changing features of the surface, they are not necessarily signs of the perhaps more important internal changes. On the other side, so far as any comparison between solar spottedness and terrestrial weather conditions has yet been made, the results are most conflicting and contradictory for different stations. In one place it would seem that there is more rain at the time of maximum spottedness, at other the reverse is the case. Some meteorological records of Argentina appear to favour a connection between wind currents and the number of sunspots. But on the whole we may agree that the investigation of the late Editor of *Symons's Met. Mag.*, in the course of which he examined an immense number of rainfall statistics, and arrived at a negative result, have not been superseded (*Nature*, Vol. **7**, pp. 143-5). The attempts of some persons to establish a yet more intimate connection between sunspots and commercial crises, etc., may well be classed under the heading of fallacies even more inexcusable than those associated with the moon and weather, because their authors were men who should have known better. The institution and successful working of Solar Observatories, now in action or in course of erection all over the world, will supply material perhaps more than can be conveniently dealt with in the present state of meteorological science; but attempts to deal with it on preconceived hypotheses of connection with terrestrial phenomena may lead to almost any results the statisticians desire. The successful prediction of *future* weather conditions, however, is quite another matter.

The "fixed" stars, notwithstanding their remoteness, have also been associated with changes of weather. We learn from Aratus that:—

> "The prudent mariner oft marks afar
> The coming tempest by Boötes star" (Arcturus).

and Theophrastus says that, if it does not rain at the rising of Sirius and Arcturus, there will generally be *rain or wind about the equinox*, a prediction not wanting in its generality with regard to time and place.

Bacon says: "Rain and showers follow upon the rising of the Pleiades and Hyades, but without wind; storms upon the rising of Orion and Arcturus."

[NOTE.—For some of the quotations given we are indebted to Mr. R. Inward's "Weather Lore."]

RAINFALL TABLE FOR APRIL, 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	1·74	2·72
Tenterden	*Kent*	51 4	*0 41	190	1·77	2·87
Arundel (Patching)	*Sussex*	50 51	0 27	130	1·82	3·10
Fawley (Cadland)	*Hampshire*	50 50	1 22	52	1·98	3·55
Oxford (Magdalen College).	*Oxfordshire*	51 45	1 15	186	1·67	3·06
Wellingborough (Croyland Abbey).	*Northampton*	52 18	0 41	174	1·78	2·37
Shoeburyness	*Essex*	51 31	*0 48	13	1·25	2·19
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	1·62	2·33
Geldeston [Beccles]	*Norfolk*	52 27	*1 31	38	1·55	1·88
Polapit Tamar [Launceston]	*Devon*	50 40	4 22	315	2·34	5·12
Rousdon [Lyme Regis]	,,	50 41	3 0	516	2·39	3·17
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	2·09	3·78
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	2·20	5·49
Coventry (Kingswood)	*Warwickshire*	52 24	1 30	340	1·96	3·70
Boston	*Lincolnshire*	52 58	0 1	11	1·57	1·90
Worksop (Hodsock Priory).	*Nottinghamshire*	53 22	1 5	56	1·62	2·34
Macclesfield	*Cheshire*	53 15	2 7	501	2·02	3·84
Southport (Hesketh Park)	*Lancashire*	53 38	2 59	38	1·84	3·06
Arncliffe Vicarage	*Yorkshire, W.R.*	54 8	2 6	732	3·73	7·76
Wetherby (Ribston Hall)	,, ,,	53 59	1 24	130	1·85	2·81
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	1·69	1·69
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	1·84	2·59
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	6·91	14·11
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	2·50	5·53
Haverfordwest	*Pembroke*	51 48	4 58	90	2·82	4·84
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	2·48	6·80
Llandudno	*Carnarvon*	53 20	3 50	72	1·79	3·16
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	2·50	6·02
Marchmont House	*Berwick*	55 44	2 24	498	2·28	2·55
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	2·81	4·49
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	1·86	2·93
Inveraray (Newtown)	*Argyll*	56 14	5 4	17	3·69	4·83
Mull (Quinish)	,,	56 34	6 13	35	2·98	5·16
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	1·93	1·96
Braemar	*Aberdeen*	57 0	3 24	1114	2·30	3·46
Aberdeen (Cranford)	,,	57 8	2 7	120	2·23	3·00
Cawdor	*Nairn*	57 31	3 57	250	1·62	1·20
Fort Augustus (S. Benedict's)	*E. Inverness*	57 9	4 41	68	2·22	2·76
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	4·70	6·40
Dunrobin Castle	*Sutherland*	57 59	3 56	14	2·02	2·00
Wick	*Caithness*	58 26	3 6	77	1·89	1·43
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	3·46	4·43
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	2·68	4·61
Nenagh (Castle Lough)	*Tipperary*	52 54	8 24	120	2·54	...
Ennistymon House	*Clare*	52 57	9 18	37	2·81	3·73
Gorey (Courtown House)	*Wexford*	52 40	6 13	80	2·37	3·09
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	2·54	4·52
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	2·03	2·76
Mullingar (Belvedere)	*Westmeath*	53 29	7 22	367	2·37	4·33
Crossmolina (Enniscoe)	*Mayo*	54 4	9 16	74	3·13	4·82
Cong (The Glebe)	,,	53 33	9 16	112	2·98	3·99
Collooney (Markree Obsy.)	*Sligo*	54 11	8 27	127	2·52	4·27
Seaforde	*Down*	54 19	5 50	180	2·76	3·78
Bushmills (Dundarave)	*Antrim*	55 12	6 30	162	2·08	3·46
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	2·50	4·44

RAINFALL TABLE FOR APRIL, 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.
+ ·98	156	·48	11	21	6·93	8·37	+1·44	121	25·11	Camden Square
+1·10	162	·54	3	19	7·76	11·05	+3·29	142	27·64	Tenterden
+1·28	170	·45	11	17	8·53	13·08	+4·55	153	30·48	Patching
+1·57	179	1·35	30	18	9·18	13·07	+3·89	142	31·87	Cadland
+1·39	183	1·10	29	19	6·52	8·72	+2·20	134	24·58	Oxford
+ ·59	133	·56	29	18	7·05	9·31	+2·26	132	25·17	Croyland Abbey
+ ·94	175	·50	11	14	4·96	6·49	+1·53	131	19·28	Shoeburyness
+ ·71	144	·57	29	15	6·62	7·57	+ ·95	114	25·40	Westley
+ ·33	122	·52	30	16	6·06	7·03	+ ·97	116	23·73	Geldeston
+2·78	218	1·11	26	22	11·62	19·28	+7·66	166	38·27	Polapit Tamar
+ ·78	133	·42	20	18	10·13	13·85	+3·72	137	33·54	Rousdon
+1·69	181	·64	15	17	8·55	13·66	+5·11	160	29·81	Stroud
+3·29	249	1·13	26	21	9·07	16·44	+7·37	181	32·41	Wolstaston
+1·74	189	1·20	29	16	8·08	13·22	+5·14	164	28·98	Coventry
+ ·33	121	·50	11	20	6·11	7·64	+1·53	125	23·35	Boston
+ ·72	144	·49	11	17	6·66	8·80	+2·14	132	24·46	Hodsock Priory
+1·82	190	·76	29	17	9·48	12·91	+3·43	136	34·73	Macclesfield
+1·22	166	·69	15	18	8·57	11·43	+2·86	134	32·70	Southport
+4·03	208	1·33	15	18	20·04	30·80	+10·76	154	61·49	Arncliffe
+ ·96	152	·47	30	19	7·37	9·06	+1·69	123	26·87	Ribston Hall
·00	100	·50	11	18	7·01	8·55	+1·54	122	26·42	Hull
+ ·75	141	·51	28	13	7·47	10·98	+3·51	147	27·94	Newcastle
+7·20	204	3·58	15	19	41·94	56·54	+14·60	135	129·48	Seathwaite
+3·03	222	1·63	15	18	12·11	20·63	+8·52	170	42·28	Cardiff
+2·02	172	1·25	15	20	14·09	21·39	+7·30	152	46·81	Haverfordwest
+4·32	274	1·33	15	19	12·52	21·27	+8·75	170	45·46	Gogerddan
+1·37	177	·47	29	19	8·54	11·35	+2·81	133	30·36	Llandudno
+3·52	241	1·66	15	19	13·35	21·00	+7·65	157	43·47	Cargen
+ ·27	112	·44	28	14	9·47	10·13	+ ·66	107	33·76	Marchmont
+1·68	160	·68	11, 26	19	15·08	17·59	+2·51	117	49·77	Girvan
+1·07	157	·59	15	18	10·70	13·80	+3·10	129	35·97	Glasgow
+1·14	131	·61	26	22	22·15	25·93	+3·78	117	68·67	Inveraray
+2·18	173	·71	24	17	17·26	22·45	+5·19	130	56·57	Quinish
+ ·03	102	·41	29	12	7·91	9·63	+1·72	122	28·64	Dundee
+1·16	150	·61	15	15	10·64	14·94	+4·30	140	34·93	Braemar
+ ·77	134	·70	28	14	9·60	10·70	+1·10	111	32·73	Aberdeen
— ·42	74	·32	11	9	8·31	7·26	—1·05	87	29·33	Cawdor
+ ·54	124	·60	16	16	15·79	18·19	+2·40	115	44·53	Fort Augustus
+1·70	136	1·22	15	15	28·94	31·78	+2·84	110	83·93	Bendamph
— ·02	99	·40	11	12	9·99	6·35	—3·64	64	31·90	Dunrobin Castle
— ·46	76	·51	28	16	8·84	7·07	—1·77	80	29·88	Wick
+ ·97	128	·91	15	22	18·90	23·95	+5·05	127	54·81	Killarney
+1·93	172	1·04	29	17	12·28	17·72	+5·44	144	39·57	Waterford
...	...	...	...	...	12·30	...	...	...	39·43	Castle Lough
+ ·92	133	·61	15	21	13·79	18·70	+4·91	136	46·52	Ennistymon
+ ·72	130	·59	29	15	10·59	14·96	+4·37	141	34·99	Courtown Ho.
+1·98	178	1·00	29	22	10·83	16·47	+5·64	152	35·92	Abbey Leix
+ ·73	136	·85	29	19	8·08	11·10	+3·02	137	27·68	Dublin
+1·96	183	·78	29	20	10·78	16·05	+5·27	149	36·15	Mullingar
+1·69	154	1·07	15	22	17·04	24·23	+7·19	142	52·87	Enniscoe
+1·01	134	·71	15	21	15·29	22·45	+7·16	147	48·90	Cong
+1·75	169	·50	15	21	12·92	18·43	+5·51	143	42·71	Markree
+1·02	137	·77	29	18	11·82	15·02	+3·20	127	38·91	Seaforde
+1·38	166	·48	18	20	10·56	10·32	— ·24	98	37·56	Dundarave
+1·94	177	·65	18	22	11·62	15·65	+4·03	135	39·38	Omagh

SUPPLEMENTARY RAINFALL, APRIL, 1913.

Div.	STATION.	Rain inches	Div.	STATION.	Rain inches
II.	Warlingham, Redvers Road..	3·50	XI.	Lligwy	2·98
,,	Ramsgate	2·14	,,	Douglas	...
,,	Hailsham	4·20	XII.	Stoneykirk, Ardwell House...	3·13
,,	Totland Bay, Aston House...	2·68	,,	Dalry, The Old Garroch.....	5·50
,,	Stockbridge, Ashley..	3·00	,,	Beattock, Kinnelhead	7·32
,,	Grayshott	3·45	,,	Langholm, Drove Road	5·99
,,	Caversham, Rectory Road ...	2·68	XIII.	Meggat Water, Cramilt Lodge	6·25
III.	Harrow Weald, Hill House...	2·80	,,	North Berwick Reservoir.....	1·66
,,	Pitsford, Sedgebrook.....	2·50	,,	Edinburgh, Royal Observaty.	1·79
,,	Woburn, Milton Bryant.....	2·52	XIV.	Maybole, Knockdon Farm ...	2·63
,,	Chatteris, The Priory.....	1·57	XV.	Ballachulish House	7·72
IV.	Colchester, Hill Ho., Lexden	2·20	,,	Campbeltown, Witchburn ..	4·76
,,	Newport, Belmont House ...	1·94	,,	Holy Loch, Ardnadam.....	5·41
,,	Ipswich, Rookwood, Copdock	2·15	,,	Islay, Eallabus	4·70
,,	Blakeney.....	1·39	,,	Tiree, Cornaigmore	4·76
,,	Swaffham	2·39	XVI.	Dollar Academy	2·86
V.	Bishops Cannings	3·13	,,	Balquhidder, Stronvar.....	7·16
,,	Winterbourne Steepleton.....	...	,,	Glenlyon, Meggernie Castle..	6·92
,,	Ashburton, Druid House.....	7·53	,,	Blair Atholl	3·15
,,	Cullompton	4·19	,,	Coupar Angus	2·22
,,	Lynmouth, Rock House	5·82	,,	Montrose, Sunnyside Asylum.	2·88
,,	Okehampton, Oaklands.....	5·73	XVII.	Alford, Lynturk Manse	2·22
,,	Hartland Abbey.....	4·55	,,	Fyvie Castle	1·58
,,	Probus, Lamellyn.....	3·26	,,	Keith Station	2·07
,,	North Cadbury Rectory.....	2·76	XVIII.	Alvey Manse.....	1·79
VI.	Clifton, Pembroke Road.....	3·10	,,	Loch Quoich, Loan	10·85
,,	Ross, The Graig	4·02	,,	Drumnadrochit.....	2·07
,,	Shifnal, Hatton Grange.....	3·17	,,	Skye, Dunvegan	5·83
,,	Droitwich.....	3·31	,,	N. Uist, Lochmaddy	...
,,	Blockley, Upton Wold.....	3·69	,,	Glencarron Lodge	5·54
VII.	Market Overton.....	2·59	XIX.	Invershin	1·84
,,	Market Rasen.....	2·18	,,	Melvich	1·21
,,	Bawtry, Hesley Hall	2·07	,,	Loch Stack, Ardchullin	2·68
,,	Derby, Midland Railway.....	3·21	XX.	Skibbereen Rectory	5·84
,,	Buxton	5·65	,,	Dunmanway, The Rectory ..	5·94
VIII.	Nantwich, Dorfold Hall	3·55	,,	Glanmire, Lota Lodge, No. 1	3·46
,,	Chatburn, Middlewood	4·97	,,	Mitchelstown Castle.....	3·61
,,	Cartmel, Flookburgh	5·35	,,	Darrynane Abbey.....	4·86
IX.	Langsett Moor, Up. Midhope	3·72	,,	Clonmel, Bruce Villa	3·51
,,	Scarborough, Scalby	2·24	,,	Newmarket-on-Fergus, Fenloe	...
,,	Ingleby Greenhow	3·69	XXI.	Laragh, Glendalough	7·64
,,	Mickleton	3·80	,,	Ballycumber, Moorock Lodge	3·97
X.	Bellingham, High Green Manor	2·88	,,	Balbriggan, Ardgillan	3·33
,,	Ilderton, Lilburn Cottage ...	2·95	XXII.	Woodlawn	3·65
,,	Keswick, The Bank.....	6·56	,,	Westport, St. Helens	3·66
XI.	Llanfrechfa Grange	6·10	,,	Dugort, Slievemore Hotel ...	5·33
,,	Treherbert, Tyn-y-waun	15·27	,,	Mohill Rectory	4·60
,,	Carmarthen, The Friary	6·03	XXIII.	Enniskillen, Portora.....	4·31
,,	Castle Malgwyn [Llechryd]...	5·87	,,	Dartrey [Cootehill]	4·06
,,	Crickhowell, Tal-y-maes.....	7·30	,,	Warrenpoint, Manor House ..	4·60
,,	New Radnor, Ednol	5·42	,,	Banbridge, Milltown	2·52
,,	Birmingham WW., Tyrmynydd	8·31	,,	Belfast, Cave Hill Road	3·79
,,	Lake Vyrnwy	5·61	,,	Glenarm Castle..... ...	5·08
,,	Llangyhanfal, Plâs Draw.....	3·64	,,	Londonderry, Creggan Res...	3·61
,,	Dolgelly, Bryntirion.....	6·87	,,	Dunfanaghy, Horn Head ...	5·95
,,	Bettws-y-Coed, Tyn-y-bryn...	6·36	,,	Killybegs	5·41

METEOROLOGICAL NOTES ON APRIL, 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.—Dull, showery weather generally, alternating with occasional fine sunny days. Temp. below the average in the first three weeks, but high during the last week. Sharp TS with heavy R and very vivid L in evening of 29th. Mean temp. 48°·0 or 0°·1 below the average. Duration of sunshine 112·3* hours, and of R 54·4 hours. Evaporation 1·25 in. Shade max. 68°·5 on 29th; min. 26°·0 on 13th. F 2, f 8.

TENTERDEN.—Duration of sunshine 135·0† hours. Shade max. 66°·5 on 29th; min. 27°·5 on 13th. F 2, f 9.

TOTLAND BAY.—Duration of sunshine 134·5* hours or 46·5 hours below the average. Shade max. 64°·9 on 23rd; min. 28°·9 on 13th. F 1, f 4.

MILTON BRYAN.—Damp and dull, and a disappointing month for the agriculturalist. Heavy TS from 8 to 10 p.m. on 29th, with magnificent L display. Shade max. 69°·0 on 23rd; min. 25°·0 on 13th. F 6.

IPSWICH, COPDOCK.—Wet and very dull. Heavy S storm on 11th. Mean temp. 46°·8. Duration of sunshine 138·0† hours. Shade max. 64°·9 on 29th; min. 29°·7 on 12th. F 2, f 12.

POLAPIT TAMAR.—Rough, wet, cold and sunless. Shade max. 65°·8 on 23rd; min. 30°·5 on 20th. F 2, f 8.

NORTH CADBURY.—Cloudy, cool and windy April, with a marked absence of extreme temp. Shade max. 74°·0 on 23rd; min. 32°·0 on 13th. F 1, f 7.

MACCLESFIELD.—Violent TS from 9 to 11 p.m. on 29th, with very vivid L and loud T. Shade max. 65°·0 on 21st; min. 30°·0 on 8th and 13th.

SOUTHPORT.—Duration of sunshine 117·2* hours, and the least in April in 22 years' record. Duration of R 73·2 hours. Evaporation 1·46 in. Mean temp. 46°·4 or 0°·9 above the average. Shade max. 64°·0 on 24th; min. 31°·0 on 13th. F 1, f 10.

HULL.—Cloudy and fairly mild to 10th; wintry, with S on 11th and 12th; afterwards brighter and milder. Duration of sunshine 81·5* hours. Shade max. 63°·0 on 29th; min. 28°·0 on 13th. F 1, f 10.

HAVERFORDWEST.—Duration of sunshine 130·2* hours. Shade max. 54°·7 on 19th; min. 30°·4 on 12th.

BETTWS-Y-COED.—Shade max. 64°·0 on 23rd; min. 30°·0 on 8th and 13th. F 2, f 3.

CARGEN.—Wettest and dullest April since observations commenced 54 years ago. S fell for 7 hours on 11th. Shade max. 62°·0 on 23rd; min. 28°·0 on 2nd. F 2.

MARCHMONT.—Duration of sunshine 122·7 hours. S fell to a depth of 4 inches on 11th. Shade max. 62°·0 on 24th; min. 28°·0 on 13th. F 5, f 13.

ARDNADAM.—Shade max. 63°·8 on 8th; min. 29°·0 on 1st. F 4, f 15.

LYNTURK.—S storm began in forenoon of 11th, continuing until night; depth 2 to 3 inches. Shade max. 65°·5 on 24th; min 17°·0 on 12th. F 16.

FORT AUGUSTUS.—Shade max. 60°·2 on 24th; min. 25°·0 on 2nd. F 5.

LOCH STACK.—Duration of sunshine 138·8* hours.

DUNMANWAY.—From 2nd to 14th fine and bright, with strong E. and N. winds; from 15th to end, unsettled weather; fine, bright days alternating with wet, cold days.

CLONMEL.—Heavy R on 25th, which changed to S, and from 1 to 3 p.m. 2½ inches of S fell. Temp. 33° at 3 p.m.

DUBLIN.—First 10 days mostly dry with prevalent N.E. winds; the rest of the month, excepting 21st to 23rd, was unsettled and showery with frequent high winds from S. and W. Mean temp. 47°·6, and exactly the average. Shade max. 58°·2 on 30th; min. 35°·7 on 26th. F 0, f 0.

WARRENPOINT.—Cold and wet, with high winds and a good deal of fog and mist.

* Campbell-Stokes. † Jordan.

Climatological Table for the British Empire, November, 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	56·3	9	27·7	3	48·6	38·7	39·9	86	76·7	23·5	1·59	16	8·3
Malta	72·5	16	51·0	24	64·0	56·3	50 6	74	136·3	.	·65	17	4·9
Lagos	98·0	19	72·0	3	88·7	75·1	73·5	73	155·0	69·0	1·15	4	5·4
Cape Town	83·8	6	43·9	1	71·5	55·1	52·5	68	...	...	1·44	8	4·8
Johannesburg	88·0	13, 21	44·1	17	81·8	57·2	42·1	44	155·0	43·2	1·51	9	3·4
Mauritius	83·5	22	60·9	7	81·4	66·8	63·4	71	154·0	54·3	1·05	15	...
Bloemfontein	96·0	12	42·7	25	85·8	58·9	41·8	33	...	...	·30	1	4·4
Calcutta	87·1	10	56·7	29	81·7	64·1	62·6	72	...	50·5	3·34	2	2·3
Bombay	92·4	17	68·4	25	86·9	74·0	68·5	69	137·2	62·4	3·62	2	2·0
Madras	92·2	1	67·6	10	85·3	72·3	72·1	85	140·2	70·0	21·81	18	4·9
Kodaikanal	70·3	13	43·9	7	61·0	49·1	50·8	89	139·9	30·0	11·29	16	6·8
Colombo, Ceylon ...	89·4	6	72·4	7	86·3	74·3	72·2	77	151·0	64·5	12·70	16	5·4
Hongkong	84·4	4	56·1	23	74·7	64·9	57·8	65	133·5	...	·29	2	5·2
Sydney	99·1	15	54·0	7	75·9	60·6	55·0	61	153·4	43·7	2·56	19	5·7
Melbourne	99·6	14	39·3	9	69·6	52·3	47·9	61	152·9	34·3	2·37	13	6·7
Adelaide	95·0	21	44·3	25	73·7	55·0	48·7	55	153·7	37·8	2·01	11	6·0
Perth	93·1	25	44·7	14	75·8	56·0	51·2	56	158·9	40·0	·56	6	3·0
Coolgardie	102·0	26	41·6	15	83·1	54·1	44·8	37	171·0	37·2	·10	4	3·1
Hobart, Tasmania ..	76·5	14	42·0	1, 3	63·9	48·4	44·8	63	149·0	36·3	2·02	16	6·7
Wellington ...	66·2	26	43·0	10, 30	60·9	50·7	48·2	76	141·2	35·2	5·87	20	7·7
Auckland	69·0	4*	45·0	20	63·9	52·2	51·6	79	135·0	41·0	1·97	17	7·2
Jamaica, Kingston ..	90·5	4	69·8	30	85·9	72·6	71·8	86	...	...	10·68	14	5·8
Grenada	90·0	2	72·0	12	84·9	74·9	...	79	140·0	...	6·11	21	3·5
Toronto	59·2	5	22·8	28	46·8	34·1	...	82	102·7	16·3	2·46	11	6·3
Fredericton	64·2	7	11·5	17	40·8	26·1	29·9	86	...	...	4·60	9	6·4
St. John, N.B. ...	57·5	8	21·7	29	42·9	32·1	32·0	81	...	...	3·93	15	6·1
Edmonton, Alberta ...	53·0	17	16·9	30	37·3	22·2	...	79	99·6	7·8	·31	5	4·9
Victoria, B.C.	55·4	16	30·3	28	49·5	41·1	42·0	88	...	...	5·04	22	7·7

* 17 and 26.

MALTA.—Mean temp. of air 59°·6. Average daily sunshine 5·6 hours.

Johannesburg.—Bright sunshine 291·5 hours.

Mauritius.—Mean. temp. of air 1°·4 and R ·68 in. below averages. Mean hourly velocity of wind 10·8 miles or 1·1 miles above average.

Bloemfontein.—Very dry, no grass for cattle.

KODAIKANAL.—Bright sunshine 113 hours.

COLOMBO.—Mean temp. of air 80°·3 or 0°·6 above, of dew point 0°·1 below, and R ·87 in. above, averages. Mean velocity of wind 3·9 miles per hour. TSS on 9 days.

HONGKONG.—Mean temp. of air 69°·3. Mean hourly velocity of wind 12·7 miles. Bright sunshine 184·7 hours.

Sydney.—R ·55 in. below average.

Adelaide.—Mean temp. of air 2°·7 below, and R ·88 in. above, averages.

Hobart.—Mean temp. of air 1°·2 below, and R ·50 in. below, 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.

JAMAICA, KINGSTON.—Very heavy rains due to storms and hurricane from the 10th to the end of the month.