Symons's Meteorological Magazine.

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THE ANTARCTIC EXPEDITIONS OF 1911-12.

Few of those who have followed recent polar exploration would be surprised by the news that Captain Roald Amundsen reached the South Pole on December 16th, 1911. He did so by keeping to the level surface of the great Ice Barrier for a greater distance to the south than Sir Ernest Shackleton did, and reached the surface of the great plateau at a point which left him only a short journey in the trying altitude of 10,000 feet above sea-level. The journey was made from near King Edward Land, and the detailed telegrams published by the *Daily Chronicle* on March 9th and 10th give a few notes of interest from the meteorological point of view. The lowest temperature at the base station was —74° F., but throughout the winter open water remained in sight of the Barrier. At the Pole in December the temperature was —9° F., which corresponds to a sea-level reading of +24° F.

The news of Captain Scott's expedition, received on the return of the "Terra Nova" to New Zealand on April 1st is incomplete, as the leader had not returned to his base camp when the ship left. Captain Scott had travelled southward from McMurdo Sound on the Barrier ice to the Beardmore Glacier (by which Sir Ernest Shackleton ascended to the great plateau in 1909, when he got to within 113 miles from the Pole); and he sent back a party from the Plateau 150 miles from the Pole on January 4th, 1912, stating that he was going on, and would spend a second season in the Antarctic regions. At the headquarters in latitude 77° 35′ S. very complete meteorological observations were carried on for a year under the charge of Dr. Simpson, who has returned in the ship; and observations were kept up simultaneously by the northern party at Cape Adare. These, together with the observations at Captain Amundsen's base camp near King Edward Land, will afford very interesting comparisons when the time comes to work them up. Meanwhile we note the following facts from the telegrams which appeared in *The Times* of April 2nd and 3rd, 1912. At the headquarters on McMurdo Sound the temperature during the four winter months was rarely below —40°, and at its lowest was —50° F., as compared with —58°·5 at the "Discovery's" winter quarters (78° S.) in 1903.

During a mid-winter journey to Cape Crozier, Dr. Wilson found the temperature rarely above —60° F., and the minimum was —77° F., the lowest temperature yet recorded in the Antarctic regions. When on the Ice-barrier in 83° S. on the southward march on December 4th the temperature suddenly shot up to +35° F., and the resulting thaw seriously impeded progress. Sir Ernest Shackleton observed the same phenomenon near the same place, and it may be attributed to a Föhn wind from the western mountains.

While no results of the systematic observations at the base station have arrived, we are informed that the self-recording instruments have given a continuous record of pressure, temperature, wind-velocity and direction, and that these were checked by eye-observations every four hours day and night. The upper air was investigated by means of *ballons sondes* to a height of 6 miles for direction of air current, and temperature records have been obtained from a height of 5 miles. This is the first instance of such records having been obtained in the Antarctic regions. Detailed magnetic observations were also made, and atmospheric electricity was studied. The meteorological work of previous Antarctic expeditions left several questions open for special investigation, and we do not doubt that Dr. Simpson's researches will have settled these.

INTERNATIONAL BALLOON ASCENTS.

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

November 4th, 1909.

Starting Point.	Country.	A miles.	B ° F.	C miles.	D ° F.	E miles.	F
Manchester....	England	8·1	—77	10·6	—71	56	E. by N.
Pyrton Hill....	,, ...	7·9	—89	10·9	—80	25	S. by E.
Paris.....	France	8·1	—97	10·6	—85	83	S.W.
Aachen.....	Germany....	?	?	7·1	—83	61	S. by W
Vienna.....	Austria	6·9	—62	9·5	—71	63	S.
Pavia.....	Italy.....	7·6	—77	8·5	—71	89	W. by S.
Tiflis.....	Russia	7·2	—76	9·6	—67	69	N.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 temperature of —97° F. over Paris is one of the lowest recorded in Europe, as values below —90° are very rare. The heights at which the isothermal column were found are much above the average, and the directions of the drift of the balloons very various.

On November 3rd high pressure areas lay over Russia and the Atlantic with a depression over Mid-Europe. On the 4th the high pressure areas had combined and the depression moved to the south-east.

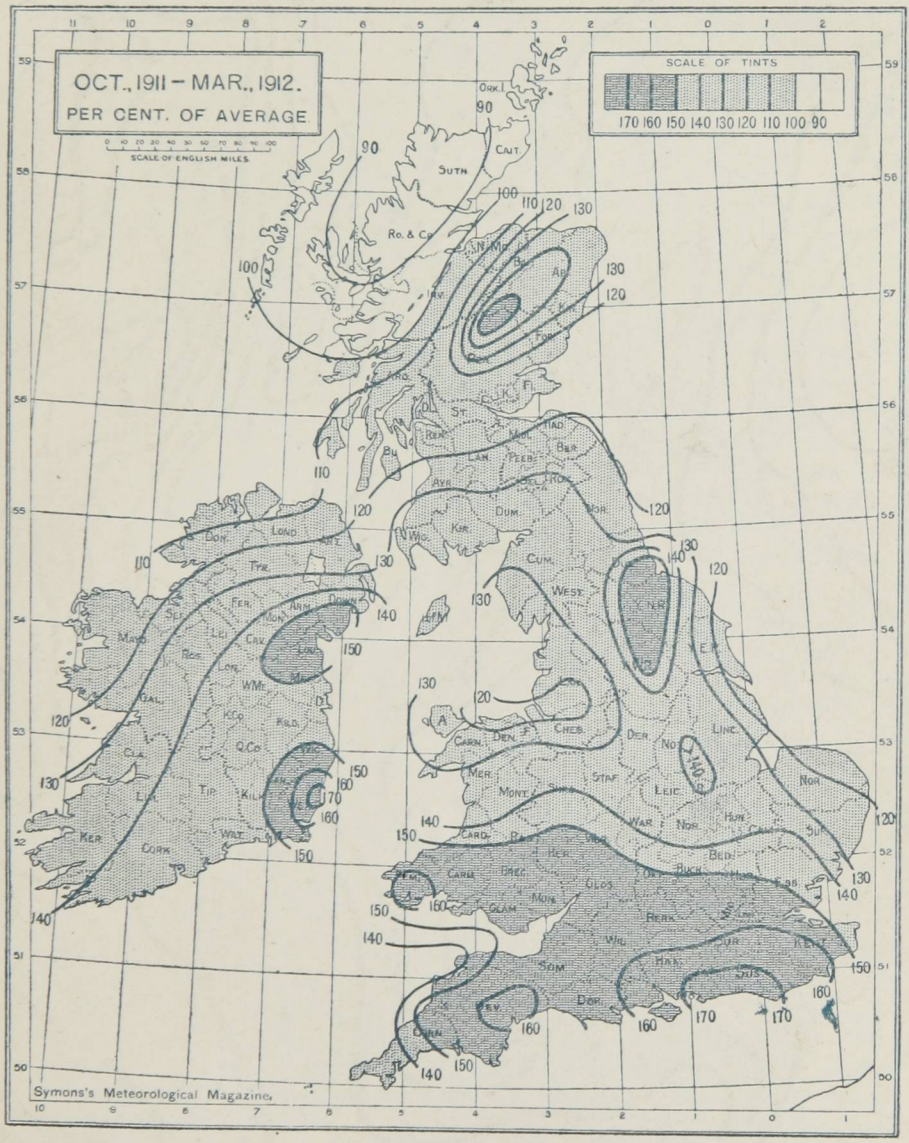
THE RAINFALL OF THE WINTER SIX MONTHS, 1911-1912.

THE remarkable drought of the summer of 1911 in the British Isles was followed by as remarkable a period of excessive rainfall, particulars of which are given in the accompanying Table and map, dealing with the winter 6 months, October, 1911—March, 1912.

The map is compiled from the percentage of the average six months' rainfall which fell at the stations quoted, supplemented by about 20 additional records for which an average is available. It shows that the rainfall was decidedly below the average in the part of Scotland which lies north and west of the Great Glen; but above the average everywhere else. In Scotland there was an excess of 40 per cent. or more only in the eastern mountain mass between Perthshire and Aberdeenshire, where a small area had an excess of over 50 per cent. In England, an excess of 40 per cent. or more occurred in two small isolated patches toward the east coast, and prevailed everywhere to the south of a line drawn across the middle of Wales through the midland counties to Suffolk. The great bulk of South Wales and the south of England showed an excess of more than 50 per cent.; the county of Sussex showing the greatest excess, over 70 per cent. for the most part, and 80 per cent. on a small area, while the greater part of Hampshire, Surrey and Kent, and patches in Pembroke and Devon, had an excess of more than 60 per cent. Comparison with the map showing the intensity of the drought of July, 1911, facing p. 130 of Vol. **46**, brings out the fact that the greatest excess of rainfall occurred to the east of the region of greatest deficiency in summer. The records of some of the stations in this region were very remarkable, though we are not in a position to say whether they are unprecedented or not. In Ireland, the same contrast of the north-west and south-east which appears in Great Britain is repeated—the extreme north-west had an excess of less than 10 per cent., while in the south-east a considerable area had more than 50 per cent., and a small patch more than 70 per cent. of excess.

The last column in the Table expresses the rainfall of the six months as a percentage of the average year's fall, and in one instance this average is actually exceeded. Speaking generally, we may say that for the south of England and Wales, the rainfall of the past six months amounted to more than the total rainfall recorded in more than one dry year. Indeed, for the British Isles, as a whole, the rainfall for the six months was greater than that for the whole year 1887, and in England, Wales and Ireland it was much greater. Because of our way of subdividing the year in the middle of winter, it may be that a succession of dry months in the coming summer will make 1912 like 1911 very nearly an average year for total rainfall; but, whether that be so or not, the remarkably wet character of the six months just past is worthy of note.

STATION	RAINFALL.			RAINFALL.	STATION.	RAINFALL.			RAINFALL.
	Oct., 1911, to Mar., 1912.	Average, October to March.	Oct., 1911, to Mar., 1912, as per cent. of Average	Oct., 1911, to Mar., 1912, as percentage of Annual Aver.		Oct., 1911, to Mar., 1912.	Average, October to March.	Oct., 1911, to Mar., 1912, as per cent. of Average	Oct., 1911, to Mar., 1912, as percentage of Annual Aver.
	in.	in.				in.	in.		
Camden Square	19·59	12·38	158	78	Cargen	35·28	24·49	144	81
Tenterden	25·02	15·31	163	91	Marchmont	22·00	17·06	129	65
Patching	30·99	17·17	181	102	Girvan	38·61	28·37	136	78
Cadland	29·21	17·89	163	92	Glasgow	22·76	19·78	115	63
Oxford	18·30	11·98	153	74	Inveraray	46·04	40·92	112	67
Wellingborough	15·51	12·24	127	62	Quinish	31·14	32·98	94	55
Shoeburyness	14·66	9·82	149	76	Dundee	15·59	14·08	111	54
Westley	17·51	12·26	143	69	Braemar	28·83	19·11	151	83
Geldeston	14·65	11·91	123	62	Aberdeen	23·12	17·32	134	71
Polapit Tamar	35·15	22·65	155	92	Cawdor	14·85	14·77	101	51
Rousdon	28·69	18·74	153	86	Fort Augustus	25·90	27·84	93	58
Stroud	23·81	15·15	157	80	Bendamph	42·82	51·06	84	51
Wolstaston	24·02	16·57	145	74	Dunrobin Castle	15·66	17·46	90	49
Coventry	20·07	14·59	138	69	Wick	14·96	16·15	93	50
Boston	15·08	11·22	134	65	**Scotland: Mean**	**26·97**	**24·39**	**111**	**63**
Hodsock Priory	16·60	11·96	139	68	Valencia	44·23	32·08	138	79
Macclesfield	18·48	17·34	107	53	Waterford	32·36	21·72	149	82
Southport	20·57	16·73	123	63	Castle Lough	30·05	21·46	140	76
Arncliffe	48·82	35·66	137	79	Miltown Malbay	31·11	23·98	130	69
Ribston Hall	20·23	13·31	152	75	Courtown House	32·84	18·80	175	94
Hull	15·25	13·17	116	58	Abbey Leix	26·23	18·51	142	73
Newcastle	16·85	13·92	121	60	Dublin	19·68	13·84	142	71
Seathwaite	97·72	76·47	128	75	Mullingar	27·28	18·37	149	75
Cardiff	35·25	23·26	152	83	Cong	32·82	27·33	120	67
Haverfordwest	43·73	27·12	161	93	Enniscoe	35·93	31·04	116	68
Gogerddan	33·32	24·58	136	73	Markree Observatory	29·89	22·97	130	70
Llandudno	18·99	16·56	115	63	Seaforde	31·24	20·34	154	80
					Dundarave	21·47	19·72	109	57
England & Wales: Mean	**26·60**	**18·89**	**141**	**76**	Omagh	25·96	20·45	127	66
					Ireland: Mean	**30·08**	**22·19**	**136**	**73**
					British Isles: Mean	**27·58**	**21·13**	**131**	**71**


OCT., 1911 – MAR., 1912.
PER CENT. OF AVERAGE
SCALE OF ENGLISH MILES
SCALE OF TINTS
170 160 150 140 130 120 110 100 90
Symons's Meteorological Magazine.

THAMES VALLEY RAINFALL — MARCH, 1912.

Symons's Meteorological Magazine.

Watershed of River Thames above Teddington, and River Lee above Feildes Weir.

Rainfall Stations reporting ● Isohyetals.

The monthly maps of the Thames Valley have shown the excessive rainfall of recent months in a very striking way, that for March, published in the present number, indicating the wide extent of rainfalls over 5 inches, and for the Thames Valley the rainfall of the winter six months, 1910-11, was greater than the annual rainfall of seven years out of the last twenty-nine.

THE WEATHER OF MARCH.

By FRED. J. BRODIE.

OWING partly to a large predominance of wind from a south westerly quarter, and partly to a general prevalence of cloudy weather, the mean temperature of March was above the average, and largely above it in the central and southern parts of England. In London the month was, in fact, the mildest March experienced for more than 40 years past. The effect of the cloudy skies, which were so frequently in evidence, was shown in two ways. In the daytime the ordinary rise of the thermometer was held in check, and while the mean of the maxima for the month was above the average, there was an entire absence of readings of anything like an abnormal character. Until very nearly the end of the period it seemed, in fact, extremely doubtful whether the thermometer would touch 60° in any part of the United Kingdom, but on the 25th or 26th that very moderate level was exceeded in most districts, a shade reading as high as 63° being recorded at several of the eastern, central, and southern stations. At night the cloudy weather acted as an effective hindrance to the progress of terrestrial radiation, frost being, therefore, rare, and seldom of any great severity. At only one station in the London district (Greenwich), did the sheltered thermometer at any time fall below the freezing point, a state of things without precedent in the March records of the previous 40 years. The lowest temperatures of the month occurred between the 20th and 23rd, when the thermometer in the screen fell to between 27° and 29° in many parts of England, and still lower in Scotland, the readings on the 23rd being as low as 23° at West Linton and 26° at Fort Augustus. On the surface of the grass the minimum readings about this time were as low as 19° at Rauceby and Newton Rigg, 20° at Worksop, and 21° at Durham, Burnley, and Buxton.

An almost equally sharp frost was experienced early on the 16th. In some parts of Scotland the readings on that date were rather lower than on the later occasion, the thermometer sinking to 21° at Balmoral and 25° at West Linton, but over the United Kingdom generally the frost was not so sharp. On the surface of the grass the thermometer on the 16th sank to 18° at Balmoral, 19° at Newton Rigg, and 22° at Marchmont, Durham and Worksop.

Owing to the frequent arrival of cyclonic disturbances from the Atlantic, the weather was usually in a more or less stormy condition,

with occasional heavy falls of rain, but an almost entire absence of snow. On two occasions a well-defined line squall passed swiftly from west to east across the southern parts of the country, the disturbance being accompanied in each instance by sharp thunderstorms. The first of these events occurred on the 4th, the squall passing over Valencia at 7.40 a.m. and reaching Yarmouth by 5.30 p.m. At Scilly the wind rose in gusts to a velocity of 68 miles per hour at 1.35 p.m., at Falmouth (Pendennis Castle), 89 miles at 2.15 p.m., at Pyrton Hill, 62 miles at 3.40 p.m., at Dover, 68 miles at 4 p.m., and at Kew, 60 miles at 4.30 p.m. In the evening further violent squalls were experienced along the south coast, the wind at Falmouth reaching a velocity of no less than 98 miles at 6 p.m., at Brighton, 54 miles at 6 p.m., and at Dover 71 miles in the course of the night. At several places a large amount of damage to trees and buildings was occasioned by these extremely heavy and sudden gusts. The second well-defined line squall arrived off the Cornish coast on March 21st at 7 a.m., and travelled eastward at the rate of about 50 miles per hour, the speed of the disturbance, as distinguished from the force of the accompanying winds, being much the same as in the earlier instance. London was reached at about 1 p.m., and Yarmouth at 3 p.m., sharp thunderstorms being experienced all along the route. In this case the squalls of wind were less severe than on the 4th, but a strong gale from the south-westward was experienced at most of the Channel stations.

ROYAL METEOROLOGICAL SOCIETY.

It has been the custom of the Council for some years past to arrange for a lecture to be given at the March meeting of the Society. This year they invited the eminent Swedish oceanographer, Professor Otto Pettersson, to deliver a lecture at the meeting on 20th March, and he chose for his subject "The Connection between Hydrographical and Meteorological Phenomena," the word "hydrographical" being used as equivalent to "oceanographical."

He began by saying that the mediæval age was characterised by violent climatic changes which seem to have culminated in the 13th and 14th centuries; when hot summers accompanied by droughts (which nearly dried up the rivers of Europe) alternated with cold summers and excessive rainfall. In illustration of this, reference was made to old chronicles in which it is recorded that in the years 1302 and 1324 the fruit trees in Germany blossomed in January, the vine in April, and the ripe corn was harvested in May, while the vintage began on July 25th. In winter violent storm floods occurred which entirely remoulded the coasts of the North Sea; or frost set in so severely that the entire Baltic and sometimes even the Kattegat and the Skagerak were frozen. Reference was made to the severe winters of 1048, 1224, 1294, 1394, 1407 and 1423, when the Skagerak was frozen. Hordes of wolves came over on the ice from

Norway, and in the year 1294 it was even possible to ride over the ice from Oslo (Christiania) to Denmark. The lecturer stated that such phenomena may be ascribed to alternations in the oceanic circulation caused by the influence of the moon and the sun. Experiments carried on during the last four years at Bornö, in the Gullmar fjord on the west coast of Sweden, have shown that the inflow of the undercurrent from the North Sea into the Kattegat—which brings the herring shoals in winter to the Swedish coast—is oscillatory, the boundary surface of the deep water rising and sinking from 50 to 80 feet about twice a month. The phenomenon is governed by the moon's declination and proximity to the Earth. From an examination of astronomical data, Prof. Pettersson was of opinion that the influence both of the sun and of the moon upon the waters of the ocean in winter, about the time of the solstice, must have been greater 600 to 700 years ago than at the present time. This must have caused a more intense circulation, of which we have conclusive evidence in the fact that the migrations of the herring—which now only reach as far as to the Kattegat—in those centuries extended into the Baltic. The bank water or deep water of the Kattegat in winter time must then have attained a higher level, and entered the Baltic through the Oresund. The surface layer must have been thinner; and as a thin surface layer is much more easily cooled in winter and heated in summer than a thicker one, it is evident that the controlling temperature influences of the ocean must have been different at least in northern and north-eastern Europe, whose climate in mediæval time must have had on the whole a more continental character than now.

The lecturer, in conclusion, showed that the hypothesis first proposed by A. W. Ljungman, in 1879, that the periodicity of the great secular herring fishery of Bohuslän should agree with that of the sunspots, is by no means incompatible with the phenomena here described, since the 14th century is noted in Chinese annals as an epoch of maximum solar activity, and since the sunspot frequency curve of Wolfer can be reconstructed by harmonic analysis using the moon's apside and nodal period as the basis of the analysis.

The President, Dr. H. N. Dickson, expressed the thanks of the Fellows to Professor Pettersson for his lecture.

The following gentlemen were elected Fellows of the Society, Mr. T. H. Dales, Rev. S. D. Dewey, M.A., and Dr. E. Walford.

POST-CARDS containing meteorological information in the form of tables, diagrams or maps, and with a space reserved for brief communications, are extensively utilized by the Meteorological Bureau of the Commonwealth of Australia. Several interesting specimens have been sent to us, in addition to that commented upon in a recent number of this Magazine. Their use should form a valuable means of arousing interest in the subject.

THE ARGENTINE METEOROLOGICAL OFFICE.

By WALTER G. DAVIS, Director.

THE meteorological service in the Argentine Republic was established in the year 1872, under the direction of Dr. B. A. Gould, who came to this country in 1870, to establish the National Astronomical Observatory. After two years' residence Dr. Gould was impressed with the necessity of obtaining meteorological data from as many points as possible throughout the Republic, as up to that time the climatology of the southern part—or in fact of all South America—was very little known. During the first years of the organization of this office, observations were made of the temperature, barometric pressure, direction and velocity of the wind, and the rainfall, at a limited number of stations, the work being conducted on those lines up to the time of Dr. Gould's retirement in the year 1884. The results of the observations up to that time were published in four volumes, being the results obtained from some 20 stations, so distributed as to give a general knowledge of the climatology throughout the Republic.

On the retirement of Dr. Gould the direction of the office passed to the present director. Up to the end of the year 1900 the service was carried on in the same conditions as under Dr. Gould's directorship. The number of stations at that time, that is to say, up to the year 1900, was 40 of the first order where the principal atmospheric elements were observed, and 165 rain stations. In the year 1901 the Government decreed the organization of the daily weather map, and on the 1st January, 1902, the first weather map was published, made up from the 2 p.m. observations. In September of the same year the hour was changed to 7 a.m., and on January 1st, 1904, the hour was changed to 8 a.m. Since September, 1904, two maps are made, one from the 8 a.m. observations and the other from those taken at 8 p.m., but only the former is published. From the evening observations, however, a synopsis of the weather is made, which is given to the newspapers for publication in their morning editions. The forecasts are made from the morning observations for the 36 hours following, and any change resulting from the variations during the day is noted in the evening synopsis.

At the present time the meteorological service consists of 35 stations of the first order, equipped with self-registering instruments; 156 of the second order, where observations are made at 8 a.m., 2 p.m. and 8 p.m.; 10 of the third order, being the same as those of the second order, less the barometer; and 1,600 rain gauge stations. All of these are within the limits of this Republic and of Paraguay. From Brazil observations from 12 stations are received, from Chile 10, and from Uruguay 6. Thus the daily weather map shows the meteorological conditions reigning from Para (Brazil), situated on the

Equator, to the southernmost limits of this Republic, extending over a distance of 55° of latitude, or 3,800 miles. The number of maps printed daily reaches 2,200 and is increasing almost daily. The 8 a.m. and 8 p.m. observations are sent telegraphically to this office, and the forecast is sent from the office, also by telegraph, to all parts of the Republic and the adjoining countries.

In addition to the central office in Buenos Aires there are two observatories where comparisons of instruments are made and where special meteorological observations are carried on. These are at Cordoba and at Chacarita, the latter on the outskirts of Buenos Aires; in the former, where there is a staff of forty, all the monthly observations are reduced.

At the South Orkney station, in 61° S., there is a fully equipped meteorological and magnetic station, occupied by a special commission consisting of four scientific men and a cook sent from this office and relieved every year during the month of January or February, the only season when a vessel can reach the station, as during the remaining months of the year it is ice-bound. Hourly observations have been made there, day and night, since the beginning of 1904, and the principal elements are registered by automatic instruments.

In 1903 the hydrometric service of the office was started, with the object of installing river-gauges on all the principal streams and lake outlets throughout the Republic, as well as for special studies for determining the practicability of irrigation of the contiguous lands as well as for the determination of the hydraulic power that can be developed from the water supply. At the present time there are upwards of 110 river-gauges installed at which daily observations are made. The depth of the water at the principal ports and shallow passes of the navigable rivers is published in the daily weather map, also timely warning is given of the approach of freshets in the rivers where damage is liable to be caused.

In 1904 the magnetic service was founded, with the central office at Pilar, Province of Cordoba, the office also being equipped with the necessary instruments for the observation of solar spots and spectroscopic observations of the corona, as well as for other studies of a like nature. The Observatory has also a full equipment for observations of atmospheric electricity and kite work. Determinations of the three principal magnetic elements have been made throughout the country and an isogonic chart has been published.

The office in Buenos Aires has under its charge the printing of all the publications of the different departments of the Ministry of Agriculture, employing from 80 to 100 men in the printing office.

The work of the Meteorological Office includes a seismological service, which at present is confined to the stations of Pilar and Chacarita, but will shortly embrace a line of stations from Salta to Santa Cruz, along what is practically the whole of the north to south extent of the Argentine Republic.

REVIEWS.

Home University Library of Modern Knowledge. Climate and Weather. By H. N. DICKSON, M.A., D.Sc., F.R.S.E. London, Williams and Norgate, 1911. Size 6½ × 4. Pp. viii.+256. Price 1s. net.

THIS little volume is more important than its size suggests. Dr. Dickson gives an account of climate and weather as fresh and original as his earlier book on Meteorology. He deals more with climate than weather, basing the discussion on fundamental meteorological principles. By these principles he deduces the planetary circulation of the atmosphere on the assumption that the surface of the Earth is uniform as far as thermal properties are concerned, and the forces acting on the atmosphere are simply the heat of the tropical belt, the cold of the polar area and the influence of the Earth's rotation on moving air streams. The influence of the fundamental distinctions between land and sea is then introduced, both as regards thermal effects and the action of the configuration of the land on air currents, and this leads directly to the classification of climates. The main divisions are taken as six only, based on the planetary circulation with one exception, which turns on the contrast of land and sea. They are (1) the equatorial belt; (2) the trade wind belts, north and south; (3) the high-pressure belts, north and south; (4) the west wind belts, north and south; (5) the circumpolar caps, and (6) the monsoon region of south-eastern and eastern Asia. These are broad divisions, and modifications have to be made in different localities, but Dr. Dickson does not attempt to lay down a hard and fast system of minor sub-divisions, preferring to deal with the broad types with reference to their local modifications.

The two chapters which will be read with most interest are those on Climate and Vegetation, and Climate and Man, which may be looked upon as applied climatology. In treating of vegetation, climates are divided into hot, temperate, and cold, and each group is subdivided according as it has abundant, moderate, or deficient rainfall, giving nine divisions in all. The influence of climate on man is dealt with mainly from the point of view of food supply and special attention is given to the climatic conditions of wheat-growing, that being held to be the means by which climate exercises its greatest influence on modern civilized communities; and it is pointed out that by the elaboration of new varieties wheat has been adapted to a far greater range of climates than it could stand originally. Dr. Dickson concludes the discussion thus: "one point only is clear, that the ultimate controlling factor, the one which there is least hope of being able to modify in any way—and therefore the one we need to know most about—is climate."

We very heartily recommend this book to our readers.

Our Weather. By J. S. FOWLER, F.R.Met.Soc., and WM. MARRIOTT, F.R.Met.Soc. London, Dent & Sons, Ltd., *not dated.* 6 × 3½. Pp. xi. + 131. Price 1s.

A POPULARLY and pleasantly written little book, giving an outline of the rudiments of weather lore, and addressed to the beginner rather than to the more advanced student. Meteorological ideas are at the moment being to a large extent remoulded in the hands of the physicists, and in the present incomplete stage of the process the authors wisely abstain from attempting to carry their readers too far into the unsurveyed lands of promise, and prudently confine their subject matter to the observational aspects of the science which naturally appeal most strongly to the intelligent amateur. Viewed in this light the book presents a very readable account of the methods employed in meteorological research, and provides a useful insight into the primary meaning of the results obtained. Since this object, obviously the aim of the writers, is so admirably carried out, it is perhaps unkind to be critical of *obiter dicta* as to physical facts, but we wonder why it should be considered strange (p. 18) that the sun's rays "do not warm the space through which they pass."

In matters relating to rainfall measurement we are also possibly hypercritical, but we cannot pass without comment the statement (p. 58) that on July 14th, 1875, 5 inches of rain fell in 24 hours over the *whole* of Monmouthshire. So far as we aware only three stations within the county recorded that amount and two others somewhat less, but the number of observations available is so small that in the light of modern research into the distribution of heavy rainfalls the statement is a dangerous one.

The volume is fully illustrated by numerous photographs, diagrams and maps, and the attractive cover and artistic title page of the Temple Primers form a relief to the customary "drabness" of the small textbook. C.S.

The Sugar Industry of Mauritius: A Study in Correlation. Including a Scheme of Insurance of the Cane Crop against damage caused by Cyclones. By A. WALTER, F.R.A.S., Chief Assistant at the Royal Alfred Observatory. Maps, plates, and diagrams. London, 1910, Arthur L. Humphreys. Size 8½ × 5. Pp. xvi. + 228.

To witness the practical application of scientific knowledge and methods is always a pleasure, it being the high office of science to minister to the material advancement of man's life upon the globe, and the volume before us abundantly testifies to the importance of a knowledge of climatic laws and meteorological influences as they affect the agricultural and commercial prosperity of a fertile tropical island. The subject-matter of this semi-official publication is distinctly heterogeneous, and is divisible into a large Introductory

Part, dealing with Mauritian affairs as a whole, including a general climatic survey of the island; into Parts I. and II., discussing the relation between the meteorological elements and the staple sugar crop; and into a number of Appendices, one of which explains the mathematical methods of correlation, so indispensable in modern statistical work of any kind, by means of which the influence of rainfall, temperature, wind, etc., upon the yield and quality of the sugar crop has been studied.

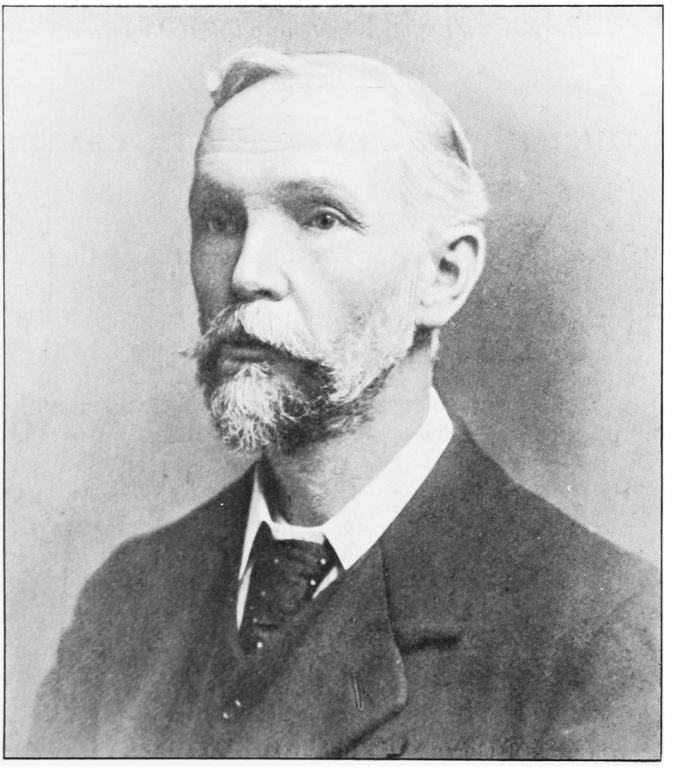
The chief climatic terror under which the Mauritians live is the dread of the "cyclone" which causes "hurricane bars" to be fitted to the doors and windows, and keeps the officials at the Royal Alfred Observatory ever on the alert. A most graphic description of the terrible devastation wrought by the unprecedented storm of April 29th, 1892, is given in several pages of text and some striking photographs. The correlation of the rainfall and sugar statistics has revealed the fact that the frequency of rain is of more importance in the formation of the crop than the amount, or, as we should put it, the raininess is of more importance than the rainfall. The "degree of wetness" of a month is represented by Mr. Walter by the combined effects of quantity and frequency of rainfall in the expression $\frac{R\,t'}{t}$, where R is the total rainfall in the month, t the number of days, and t' the number of rain days. Thus, if 5 inches fell on one day in one month, and during 20 days in another, the relative wetness of the two months is ·167 to 3·333. L.C.W.B.

The Great Star Map, being a brief general account of the international project known as the Astrographic Chart. By H. H. TURNER, D.Sc., D.C.L., F.R.S. London: John Murray, 1912. Size, 7½ × 5. Pp. viii. + 160. Price 2s. 6d. net.

SHOULD we review astronomical books? Stern Justice says, "No. Every line of your space given to Astronomy is a line stolen from Meteorology," and in general we bow to this decision. But Professor Turner is such a master of scientific irrelevance—which is a very different thing from irrelevant science—that we cannot resist the opportunity of referring to anything he writes which comes our way. Hence we allow ourselves the pleasure of welcoming his delightful little book on what is surely the greatest of all pieces of scientific work ever attempted—the mapping by photography of the stars of the whole heavens. We caught sight of the word *Fog* in the index, and hoped to find here a meteorological excuse to justify the breach of rule which we rejoice to make in this case; and on looking it up we find that we are excused, for Professor Turner uses experience in a fog happily "too thin to irritate our nostrils" to illustrate one of the most recondite properties of inter-stellar space.

RETIREMENT OF MR. R. H. CURTIS.

At the Meteorological Office, on March 30th, Mr. Richard H. Curtis, who has just retired after 51 years' service, was presented by his colleagues with a suitably inscribed silver tea service as a mark of esteem and a token of good wishes. By this retirement an interesting link in the history of the Meteorological Office was broken, Mr. Curtis being the last of the little band of workers who had been associated with Admiral Fitzroy in what was then known as the Meteorological Department of the Board of Trade. At the commencement of his career Mr. Curtis was employed in the Telegraph Room, a section of



the Office which has since developed into the Forecasting Branch. He afterwards worked in the Marine Department, side by side with the late Mr. G. J. Symons, and in 1870 he was entrusted with the charge of the Observatory Branch, a post he retained virtually until the end of his official career. In addition to his many other qualifications Mr. Curtis possessed a strong mechanical bent, and acquired an intimate acquaintance not only with the purposes but with the construction of all meteorological instruments with which

he had to deal; and his additional appointment two years ago as Superintendent of the Instruments Branch at the Meteorological Office was therefore regarded as singularly apt. Mr. Curtis was a valued Fellow of the Royal Meteorological Society, on the Council of which he served for many years. He has from time to time supplied valuable contributions to the pages of this Magazine, and we feel sure that our readers will be glad to see the excellent portrait with which we are able to illustrate this notice.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

WEATHER IN THE SEVENTEENTH CENTURY.

On looking through Mr. Sedgwick's "Weather in the Seventeenth Century" I was struck by the few references to Pepys. I think he must have taken his references from an incomplete edition. I enclose references to weather from Pepys for the winters 1663-4, and 1666-7. I have marked with a cross the references that come in Mr. Sedgwick's paper, though in several instances he has not given the whole of the reference to weather. I think that he would find in Pepys a good many more references to snow; he speaks of only 13 winters covered by the diaries of Pepys and Evelyn in which snow is mentioned; in the extracts I enclose there are two more, namely December, 1663, and December, 1666 (O.S.). By the way, the high tide given by Mr. Sedgwick as December 6th, 1663, was December 6th Old Style, not New Style, as would appear from his paper. I think the frost of January, 1666-7 should be described as certainly severe, if not very severe, seeing that there was ice on the Thames.

The dates of my references are Old Style.

In the *Quarterly Journal* of the Royal Meteorological Society for 1904, Vol. **30**, p. 264, is a paper by Mr. R. Sherward, giving weather extracts from Pepys's Diary, but his list is even more meagre than Mr. Sedgwick's.

CHARLES J. P. CAVE.

Ditcham Park, Petersfield, Dec. 16th, 1911.

1663—4.

December 4.—Cold, wet, and windy.

,, 6.—A cold day, and it began to snow (the first snow we have seen this year).

× ,, 7.—A frosty morning. Last night the greatest tide . . .

,, 8.—The very cold weather which we have.

,, 10.—The weather being become pretty warm again.

December 24.—A most foggy morning and cold, yet with a galley down to Erith, several times being at a loss whither we went.
January 18.—Played cards till 12 at night and went home in a great shower of rain, it not having rained a great while before.
,, 20.—The weather is now very warm.
,, 28.—Very cold.
February 5.—Down by water, a brave morning, to Woolwich.
,, 10.—The weather being warm.
,, 20.—A very fine evening.
,, 24.—A very fine morning.
,, 28.—Walked in the garden by brave moonshine with my wife above two hours till past 8 o'clock.

1666—7.

December 1.—I did see a cellar in Tower Street in a very fresh fire, the late great winds having blown it up.
,, 10.—A cold day.
,, 17.—It being cold.
,, 23.—It being cold and the ground all snow.
× ,, 24.—Frost and dry . . . . the snow upon the grounnd all day.
,, 25.—A fine frost.
,, 26.—It being a most fine frost.
× ,, 28.—A very fine walk in the frost. A most horrid cold night it was, and frosty, and moonshine.
,, 29.—Very cold.
,, 31.—It being still a very great frost and good walking.
January 1.—A bitter cold frosty day, the frost being now grown old and the Thames covered with ice.
,, 2.—Mighty cold, but dry yet bad walking because very slippery with the frost.
,, 3.—The frost continuing hard.
× ,, 6.—An excellent frosty day.
× ,, 9.—The way being most horribly bad upon the breaking up of the frost, so as not to be passed almost.
,, 24.—It proved dark, and a misly night, and very windy.
,, 27.—A fine moonshine and warm night, it having been also a very summer's day for warmth.
,, 30.—Moonshine and fair weather.
February 1.—A thick, misty, and rainy day.
,, 13.—A foul evening.
,, 17.—Fine moonshine.
,, 27.—Bitter cold weather again after all our warm weather.
,, 28.—The weather for three or four days being come to be exceeding cold again as any time this year.

[We understand that Mr. Sedgwick used an abridged edition of the famous diary—his purpose being rather to be representative than exhaustive; but it is interesting to have the more numerous references brought together by Mr. Cave in a convenient form for reference.—Ed. *S.M.M.*]

WINTER IN THE SEVENTEENTH CENTURY.

I CANNOT agree with the opinion expressed by Mr. Sedgwick and Mr. Vaux Graham that the winter climate of England is as severe as it used to be, the evidence for the opposite view seems to me clear and unmistakable.

In your December number Mr. Sedgwick states that because the roads in the winter in the seventeenth century were as a rule impassable, a fall of snow then would cause more inconvenience than now. I draw an exactly opposite conclusion. Since it was known that the roads would be impassable, stores were laid in to meet the case, and it was a matter of indifference whether the roads were blocked by snow-drifts or quagmires, neither event would call for special notice. Then Mr. Sedgwick refers to "slight falls of snow which would scarcely be noticed by town dwellers of to-day." It is town dwellers and not country folk who make an undue fuss about the weather; and surely the exaggerations and sensational headings of the daily press border on the ludicrous. A few flakes of wet snow and a moderate breeze figure as a "blizzard," and quite lately a paper not as a rule given to exaggeration reported a heavy fall of snow in London, when, on reference to the official report, it appeared that "heavy fall" was the correspondent's equivalent for ·01 inch.

I fully admit the force of the statement that Evelyn's "frozen" did not necessarily mean frozen right across, but I do not see why Mr. Sedgwick should exclude the winter of 1683-4 on the ground that it was so exceptional, especially when it is known that a somewhat similar winter occurred in 1740. That such a winter could occur at all is surely good evidence for a different set of conditions at that period.

I do not think Old London Bridge had much to do with the freezing of the river, and it is ruled out by the fact that the old records often have the words frozen both above and *below* the bridge, neither do I think the river would have frozen had the old bridge been present either in 1891 or 1895. In 1895 the river is said to have been frozen at Kingston; it undoubtedly was frozen at Oxford, but at Kingston it could not be crossed without the aid of a thick plank laid across an open channel, and half a mile up towards Hampton Court the whole expanse of water was practically free from ice. If Teddington Weir did not suffice for the complete freezing at Kingston, it is not likely that Old London Bridge would have caused the tidal portion to set at Westminster.

We have further evidence about the matter in Gilbert White's well-known Natural History of Selborne.

White gives a summary of the weather from 1768 to 1792, in which I may remark in passing snow is frequently mentioned, at least three very heavy falls occurred. The dates in the summary are not precise in the last two years, and hence I take the period of 23 years, 1768 to 1790. During these years White credits 81 weeks

with the term frost, and 48 weeks with "hard" or "severe" frost. Weeks credited with frost and rain, or weeks in April or October described as "frosty," are not included. This gives four weeks frost and two weeks hard frost as the average per winter, an amount certainly in excess of what can be fairly ascribed to any 23 consecutive winters since 1840. The question is, what did Gilbert White mean by frost? In one of his letters he describes the frost of January, 1776, and says:—"The Thames was at once so frozen over, both above and below the bridge, that crowds ran about on the ice." In his summary the words are: "Jan., 1776. To Jan. 24th dark frosty weather." In another letter he describes the damage done to plants by the frost of January, 1768. Seemingly it commenced at the end of December, and his words in the letter are: "was, for the short time it lasted, the most severe that we have known for many years." In the summary the words are: "1768. Begins with a fortnight's frost and snow." Hence it is plain that Gilbert White was not given to exaggeration. A fortnight's frost is described as "short," a frost that froze the Thames below the bridge as "dark frosty weather." Would these descriptions be used at the present time, when a couple of day's skating is considered quite an event?

W. H. DINES.

FEBRUARY STORMS IN THE UNITED STATES.

FEBRUARY of this year was one of the severest of recent years in this city and generally over the United States. The highest minimum shewn by my thermometer (made by Hicks, London) was 39°. A remarkable storm was recorded on the 21st, and 22nd. At about 3 a.m. on the 22nd, my Richard Barograph stood at 28·76 inches, while a wind of over 100 miles an hour was registered by the instruments of the Weather Bureau, which is the highest since the establishment of the Bureau in this city.

It would be interesting to know how this wind speed and the low barometer compares with the same data of the great storms experienced in Great Britain.

C. DECKER.

65, West 50th Street, New York City.

EARLY AND LATE SPRINGS.

THE following is a striking illustration of the variability of seasons. On Passion Sunday, April 4th, 1909, there were no "Palms" (willow catkins), to be had here for Church decoration because they were not yet in bloom. To-day, four days earlier, there are none to be had because the bloom is over!

ALFRED O. WALKER.

Ulcombe Place, Nr. Maidstone, Palm Sunday, March 31st, 1912.

CYCLONIC RAIN SMEARS.

THE occurrence of patches of heavy rain in cyclones as referred to by Mr. Wardale in the February number deserves more than passing mention. This patchiness has been noted by the writer in the case of many of the cyclones in the United States the smears of which have been plotted. It is interesting to note that the same conditions are found in Great Britain. A choice of isohyets for the United States could not be made which would show this patchy condition to its full extent; and the same seems to have been the case in Great Britain, as it is not brought out in the maps published in *British Rainfall.*

The study of the smears for the United States by the writer covers a period from January 1st, 1910, to October 1st, 1911, the results having been published in the October number of the *Monthly Weather Review* of the United States Weather Bureau. Smears for October and November have been drawn but no new relations have as yet appeared. The relation of the patches of heavy rainfall to the path of the cyclone and to each other, in the United States at least, is very obscure. These areas seem to be much more dependent upon the topography and the relation to large bodies of water than upon the general cyclonic motion.

In a journey from Baltimore to New York City during a cyclone the rainfall was seen to occur with the greatest irregularity. At the time the writer supposed that this was due to a slight difference between the motion of the train and that of the cyclone, the train running ahead of and falling back into the area of heavy rain. It has since seemed that the irregularity may have been due to the occurrence of the rain in patches, but the data are not complete enough to show whether this is the case.

The explanation given by Mr. Wardale that the patches are due to the formation of eddies which move around the main cyclone may be tested for cyclones which pass through regions where the data are sufficient in number and where the times of occurrence of the areas of heavy rainfall are more or less accurately known. The mode of occurrence of rainfall is of such interest and importance to the public that all studies which help to throw light upon the problem should be encouraged.

WM. GARDNER REED

University of California, Berkeley, March 7th, 1912.

[The suggestion that the patches of heavy rain in cyclones are conditioned in some way by the configuration of the country and the neighbourhood of water surfaces suggests a difference in the action of cyclones moving over an extended land surface as in the United States and across a narrow strip of land between two seas as in the British Isles. The maps of heavy rains in *British Rainfall* seem to show that the heavy rains there dealt with are independent of surface features, except in cases where the isobars are straight and parallel, *i.e.*, when the conditions are not cyclonic.—ED. *S.M.M.*]

CORRELATION—A CORRECTION.

I THINK Mr. Sutton is mistaken in supposing that a correlation coefficient is dependent upon the units adopted. If x and y be the corresponding departures of the two quantities from their mean values, to calculate the coefficient we find the value of the expression $\frac{\Sigma x y}{\sqrt{(\Sigma x^2)(\Sigma y^2)}}$. If now we express one quantity in inches say, instead of feet, we simply multiply the top and the bottom of the fraction by 12 and leave its value unaltered. Similarly for the other quantity. Hence the units are of no consequence whatever. Inches, millimetres, percentages, will serve equally well, and give the same result.

W. H. DINES.

METEOROLOGICAL NEWS AND NOTES.

OBSERVERS REPORTING TO THE METEOROLOGICAL OFFICE have been instructed by a circular recently issued to return readings of the maximum and minimum thermometers to the nearest whole degree, and when the reading happens to come to a half degree, to give the higher value in all cases. It is very properly added that no relaxation of accuracy in reading the thermometers is suggested, and that the Observer's record should continue to be entered to tenths of a degree. Another circular asks for the return of barometric pressure to hundredths of an inch only, and requires the inclusion of the correction for gravity. We hope that care will be taken to distinguish records corrected for gravity as well as temperature and altitude from those without the gravity correction as usually employed in the past.

PHILIPS' MONTHLY WEATHER CHART, which has been sent us for notice, is convenient for the plotting of daily Meteorological Observations in schools. There are four ruled forms for "Hygrometer," "Thermometer," "Rainfall" (why not Rain Gauge?), and "Barometer," and a summary for "Wind" and "Weather." The scale for temperature would not take account of our coldest winters, nor would that of rainfall accommodate our wettest days; but these facts could be utilized by the intelligent teacher to drive home the unusualness of extreme values.

TORRENTIAL RAINFALL is reported as having occurred in West Luzon, in the Philippines, in July and August, 1911. Between July 11th and August 2nd there were three typhoons, during the heaviest of which, 88 inches of rainfall were recorded at Bagnio in three days, and 32 inches within 24 hours. The mountain road leading to the town, built a few years ago at great expense, was considerably damaged by floods.

RAINFALL TABLE FOR MARCH, 1912.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea.	RAINFALL OF MONTH.	
					Aver. 1875—1909.	1912.
		° ′	° ′	ft.	in.	in.
Camden Square	*London*	51 32	0 8	111	1·70	2·84
Tenterden	*Kent*	51 4	*0 41	190	1·95	3·83
Arundel (Patching)	*Sussex*	50 51	0 27	130	1·95	4·31
Fawley (Cadland)	*Hampshire*	50 50	1 22	52	2·17	4·00
Oxford (Magdalen College).	*Oxfordshire*	51 45	1 15	186	1·45	2·80
Wellingborough (Croyland Abbey).	*Northampton*	52 18	0 41	174	1·69	2·30
Shoeburyness	*Essex*	51 31	*0 48	13	1·19	1·75
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	1·71	3·06
Geldeston [Beccles]	*Norfolk*	52 27	*1 31	38	1·57	2·67
Polapit Tamar [Launceston]	*Devon*	50 40	4 22	315	2·74	5·95
Rousdon [Lyme Regis]	,,	50 41	3 0	516	2·30	5·23
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	2·01	4·71
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	2·19	5·27
Coventry (Kingswood)	*Warwickshire*	52 24	1 30	340	1·89	3·24
Boston	*Lincolnshire*	52 58	0 1	25	1·47	1·88
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	1·70	2·56
Macclesfield	*Cheshire*	53 15	2 7	501	2·50	4·43
Southport (Hesketh Park)	*Lancashire*	53 38	2 59	38	2·11	4·79
Arncliffe Vicarage	*Yorkshire, W.R.*	54 8	2 6	732	5·17	11·63
Wetherby (Ribston Hall)	,, ,,	53 59	1 24	130	1·92	3·72
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	1·84	2·76
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	2·10	1·55
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	10·63	21·26
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	2·89	6·96
Haverfordwest	*Pembroke*	51 48	4 58	95	3·16	7·51
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	3·04	9·02
Llandudno	*Carnarvon*	53 20	3 50	72	2·13	3·44
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	3·33	5·64
Marchmont House	*Berwick*	55 44	2 24	498	2·64	2·51
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	3·62	5·67
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	2·61	3·74
Inveraray (Newtown)	*Argyll*	56 14	5 4	17	5·41	7·52
Mull (Quinish)	,,	56 34	6 13	35	4·28	4·44
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	2·06	2·05
Braemar	*Aberdeen*	57 0	3 24	1114	2·87	1·96
Aberdeen (Cranford)	,,	57 8	2 7	120	2·65	2·37
Cawdor	*Nairn*	57 31	3 57	250	2·35	1·57
Fort Augustus (S. Benedict's)	*E. Inverness*	57 9	4 41	68	3·79	4·02
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	7·29	6·92
Dunrobin Castle	*Sutherland*	57 59	3 56	14	2·64	3·19
Wick	*Caithness*	58 26	3 6	77	2·24	2·98
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	4·51	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	2·64	4·82
Nenagh (Castle Lough)	*Tipperary*	52 54	8 24	120	2·99	4·57
Miltown Malbay	*Clare*	52 52	9 26	400	3·11	7·10
Gorey (Courtown House)	*Wexford*	52 40	6 13	80	2·28	4·26
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	2·59	4·23
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	1·98	2·73
Mullingar (Belvedere)	*Westmeath*	53 29	7 22	367	2·64	4·95
Cong (The Glebe)	*Mayo*	53 33	9 16	112	3·80	5·43
Crossmolina (Enniscoe)	*Mayo*	54 4	9 16	74	4·36	5·99
Collooney (Markree Obsy.)	*Sligo*	54 11	8 27	127	3·33	5·79
Seaforde	*Down*	54 19	5 50	180	2·84	4·65
Bushmills (Dundarave)	*Antrim*	55 12	6 30	162	2·73	4·03
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	2·98	4·87

RAINFALL TABLE FOR MARCH, 1912—*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.	1912. in.	Diff. from Aver. in.	% of Av.	Mean Annual 1875–1909. in.	STATION.
+1·14	167	·56	4	20	5·19	8·63	+3·44	166	25·11	Camden Square
+1·88	196	·83	4	21	5·99	9·05	+3·06	151	27·64	Tenterden
+2·36	221	·71	4	21	6·71	11·17	+4·46	166	30·48	Patching
+1·83	185	·74	5	25	7·20	11·12	+3·92	154	31·87	Cadland
+1·35	193	·44	4	22	4·85	9·17	+4·32	189	24·58	Oxford
+ ·61	136	·59	4	19	5·27	7·16	+1·89	136	25·17	Croyland Abbey
+ ·56	147	·31	4	17	3·71	5·79	+2·08	156	19·28	Shoeburyness
+1·35	179	·59	4	19	5·00	6·83	+1·83	137	25·40	Westley
+1·10	170	·50	21	21	4·51	5·76	+1·25	128	23·73	Geldeston
+3·21	217	·81	4	24	9·28	14·40	+5·12	155	38·27	Polapit Tamar
+2·93	227	·74	4	23	7·74	13·31	+5·57	172	33·54	Rousdon
+2·70	235	1·14	4	26	6·46	11·68	+5·22	181	29·81	Stroud
+3·08	240	·98	4	29	6·87	10·75	+3·88	156	32·41	Wolstaston
+1·35	171	·64	4	22	6·12	10·38	+4·26	169	28·98	Coventry
+ ·41	128	·32	4	23	4·54	5·64	+1·10	124	23·35	Boston
+ ·86	150	·40	21	25	5·04	7·41	+2·37	147	24·46	Hodsock Priory
+1·93	177	·79	14	23	7·46	8·03	+ ·57	108	34·73	Macclesfield
+2·68	227	·71	4	25	6·73	9·95	+3·22	148	32·70	Southport
+6·46	225	1·98	30	22	16·31	20·82	+4·51	128	61·49	Arncliffe
+1·80	194	·63	4	22	5·52	9·79	+4·27	177	26·87	Ribston Hall
+ ·92	150	·52	15	23	5·32	6·99	+1·67	131	26·42	Hull
— ·55	74	·30	21	19	5·63	7·46	+1·83	132	27·94	Newcastle
+10·63	200	2·62	12	28	35·03	40·48	+5·45	116	129·48	Seathwaite
+4·07	241	·78	4	30	9·61	15·64	+6·03	162	42·28	Cardiff
+4·35	238	·87	16	28	11·27	18·05	+6·78	160	46·81	Haverfordwest
+5·98	296	1·06	4	28	10·04	14·62	+4·58	146	45·46	Gogerddan
+1·31	161	·61	4	22	6·75	7·38	+ ·63	109	30·36	Llandudno
+2·31	169	·93	2	21	10·85	14·32	+3·47	132	43·47	Cargen
— ·13	95	·56	21	21	7·19	7·77	+ ·58	108	33·76	Marchmont
+2·05	157	·65	29	25	12·27	16·83	+4·56	137	49·77	Girvan
+1·13	143	·43	4	24	8·84	8·98	+ ·14	102	35·97	Glasgow
+2·11	139	·94	29	27	18·64	18·76	+ ·30	102	68·67	Inveraray
+ ·16	104	·54	12	25	14·28	12·22	—2·06	86	56·57	Quinish
— ·01	100	·28	17	24	5·98	7·02	+1·04	117	28·64	Dundee
— ·91	68	...	...	...	8·34	11·30	+2·96	136	34·93	Braemar
— ·28	89	·71	18	18	7·37	9·15	+1·78	124	32·73	Aberdeen
— ·78	67	·40	28	11	6·69	3·90	—2·79	58	29·33	Cawdor
+ ·23	106	·68	20	25	13·57	9·30	—4·27	69	44·53	Fort Augustus
— ·37	95	·78	26	26	24·24	19·86	—4·38	82	83·93	Bendamph
+ ·55	121	·35	19	23	7·97	6·72	—1·25	84	31·90	Dunrobin Castle
+ ·74	133	·41	30	22	6·95	6·96	+ ·01	100	29·88	Wick
...	...	...	...	...	15·44	...	...	...	54·81	Killarney
+2·18	182	·74	3	25	9·60	14·65	+5·05	153	39·57	Waterford
+1·58	153	·49	27	30	9·76	11·53	+1·77	118	39·43	Castle Lough
+3·99	228	1·21	25	31	10·33	13·44	+3·11	130	45·11	Miltown Malbay
+1·98	187	·57	4	23	8·22	14·87	+6·65	181	34·99	Courtown Ho.
+1·64	163	·50	20	26	8·29	11·19	+2·90	135	35·92	Abbey Leix
+ ·75	138	·44	20	24	6·05	8·80	+2·75	145	27·68	Dublin
+2·31	187	·53	27	29	8·41	12·93	+4·52	154	36·15	Mullingar
+1·63	143	·67	30	30	12·31	13·02	+ ·71	106	48·90	Cong
+1·63	137	·70	19	31	13·91	14·04	+ ·13	101	52·87	Enniscoe
+2·46	174	1·06	19	29	10·40	12·86	+2·46	124	42·71	Markree
+1·81	164	·57	20	19	9·06	14·99	+5·93	165	38·91	Seaforde
+1·30	148	·52	19	23	8·48	9·63	+1·15	114	37·56	Dundarave
+1·89	163	·55	20	30	9·12	11·49	+2·37	126	39·38	Omagh

SUPPLEMENTARY RAINFALL, MARCH, 1912.

Div.	STATION.	Rain inches	Div.	STATION.	Rain inches.
II.	Warlingham, Redvers Road..	4·69	XI.	Lligwy	4·99
,,	Ramsgate	2·64	,,	Douglas	4·39
,,	Hailsham	4.43	XII.	Stoneykirk, Ardwell House...	4·21
,,	Totland Bay, Aston House...	3·41	,,	Dalry, The Old Garroch.....	8·01
,,	Stockbridge, Ashley..	4·93	,,	Langholm, Drove Road	7·27
,,	Grayshott	4·76	,,	Beattock, Kinnelhead	8·34
,,	Reading, Caversham Lock ...	3·55	XIII.	St. Mary's Loch, Cramilt Ldge	5·58
III.	Harrow Weald, Hill House...	3·55	,,	North Berwick Reservoir.....	2·17
,,	Pitsford, Sedgebrook.....	2·45	,,	Edinburgh, Royal Observaty.	1·77
,,	Woburn, Milton Bryan	2·75	XIV.	Maybole, Knockdon Farm ...	5·34
,,	Chatteris, The Priory.....	2·06	XV.	Campbeltown, Witchburn ..	7·15
IV.	Colchester, Lexden	2·72	,,	Glenreasdell Mains	5·79
,,	Newport.....	3·16	,,	Holy Loch, Ardnadam.....	9·56
,,	Ipswich, Copdock	3·11	,,	Ballachulish House	9·82
,,	Blakeney.....	2·09	,,	Islay, Eallabus	5·25
,,	Swaffham	3·23	XVI.	Dollar Academy	4·10
V.	Bishops Cannings	4·68	,,	Balquhidder, Stronvar.....	8·23
,,	Winterbourne Steepleton.....	6·71	,,	Coupar Angus	2·17
,,	Ashburton, Druid House.....	8·62	,,	Glenlyon, Meggernie Castle..	6·31
,,	Cullompton	7·38	,,	Blair Athol	3·65
,,	Lynmouth, Rock House	7·00	,,	Montrose, Sunnyside Asylum.	2·16
,,	Okehampton, Oaklands.....	7·24	XVII.	Alford, Lynturk Manse	2·88
,,	Hartland Abbey.....	5·73	,,	Fyvie Castle	3·30
,,	Probus, Lamellyn.....	5·45	,,	Keith Station	2·43
,,	North Cadbury Rectory.....	5·11	XVIII.	Skye, Dunvegan	6·90
VI.	Clifton, Pembroke Road.....	5·07	,,	N. Uist, Lochmaddy	4·72
,,	Ross, The Graig	4·34	,,	Glenquoich, Loan.....	16·10
,,	Shifnal, Hatton Grange.....	3·53	,,	Alvey Manse.....	1·72
,,	Droitwich.....	3·54	,,	Loch Ness, Drumnadrochit...	2·53
,,	Blockley, Upton Wold.....	4·95	,,	Glencarron Lodge	8·08
VII.	Market Overton.....	2·81	XIX.	Invershin	4·01
,,	Market Rasen.....	2·86	,,	Loch Stack, Ardchullin	7·94
,,	Bawtry, Hesley Hall	2·80	,,	Melvich	4·97
,,	Derby, Midland Railway.....	2·67	XX.	Skibbereen Rectory	6·27
,,	Buxton	6·54	,,	Dunmanway, The Rectory ..	6·84
VIII.	Nantwich, Dorfold Hall	3·81	,,	Cork	...
,,	Chatburn, Middlewood	6·10	,,	Mitchelstown Castle.....	4·70
,,	Cartmel, Flookburgh	6·37	,,	Darrynane Abbey.....	7·39
IX.	Langsett Moor, Up. Midhope	4·74	,,	Clonmel, Bruce Villa	4·35
,,	Scarborough, Scalby	3·48	,,	Newmarket-on-Fergus, Fenloe	4·24
,,	Ingleby Greenhow	3·71	XXI.	Laragh, Glendalough	8·79
,,	Mickleton	2·77	,,	Ballycumber, Moorock Lodge	3·93
X.	Bellingham, High Green Manor	3·72	,,	Balbriggan, Ardgillan	3·08
,,	Ilderton, Lilburn Cottage ...	2·09	XXII.	Woodlawn	4·41
,,	Keswick, The Bank.....	6·44	,,	Westport, St. Helens	5·20
XI.	Llanfrechfa Grange	7·87	,,	Achill Island, Dugort	9·16
,,	Treherbert, Tyn-y-waun	16·97	,,	Mohill, The Rectory	5·04
,,	Carmarthen, The Friary	7·30	XXIII.	Enniskillen, Portora.....	5·32
,,	Castle Malgwyn [Llechryd]...	6·34	,,	Dartrey [Cootehill]	5·14
,,	Crickhowell, Tal-y-maes.....	8·80	,,	Warrenpoint, Manor House ..	6·65
,,	New Radnor, Ednol	3·99	,,	Banbridge, Milltown	2·93
,,	Rhayader, Tyrmynydd	10·91	,,	Belfast, Cave Hill Road	4·43
,,	Lake Vyrnwy	7·17	,,	Glenarm Castle.....	5·93
,,	Llangyhanfal, Plâs Draw.....	3·03	,,	Londonderry, Creggan Res...	4·80
,,	Dolgelly, Bryntirion.....	11·93	,,	Killybegs	7·34
,,	Bettws-y-Coed, Tyn-y-bryn...	7·35	,,	Horn Head	4·08

METEOROLOGICAL NOTES ON MARCH, 1912.

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.—The weather throughout was remarkably changeable, dull wet periods alternating in rapid succession with bright sunshine and clear skies. The conditions were always mild, and mean temp., 46°·5, was 4°·4 above the average, and the highest recorded for March in 55 years' record. The high nocturnal temp. was very remarkable, the mean shade min., 40°·5, being the highest on record for March. There were no frosts on the screen, which also constitutes a record for March. Duration of sunshine 91·5* hours, and of R 59·8 hours. Evaporation ·79 in. Shade max. 62°·3 on 25th; min. 32°·6 on 21st. F 0, f 7.

TENTERDEN.—A warm, wet month, with a good deal of wind but none from E. Duration of sunshine, 110·0† hours. Shade max. 60°·0 on 26th and 27th; min. 31°·5 on 11th. F 2, f 12.

TOTLAND BAY.—The warmest March in 26 years. Duration of sunshine, 111·0* hours. Shade max. 55°·5 on 27th; min. 36°·0 on 20th. F 0, f 3.

MILTON BRYAN.—A showery month until the last few days. Quite a whirlwind at 4 p.m. on 4th, when trees were uprooted and many branches torn from trees in adjoining villages. Shade max. 61°·0 on 25th; min. 23°·0 on 12th. F 8.

NORTH CADBURY.—Both the R and number of rain days were the highest for March in 16 years. Abnormally warm March. Shade max. 60°·0 on 11th; min. 32°·3 on 20th. F 0, f 11.

WOLSTASTON.—Very wet, though mild, and bad for tillage. Heavy T with H at 1.20 p.m. on 4th. Heavy H and S storm on 3rd at midday. Shade max. 56°·5 on 25th; min. 31°·0. on 21st. F 1.

HODSOCK PRIORY.—The highest mean temp. ever recorded for March, and just equal to the normal for April. The nights were especially mild. Shade max. 58°·5 on 14th; min. 30°·2 on 23rd. F 3, f 15.

SOUTHPORT.—R 1·07 in. above the fall in the previous wettest March (1896) in 41 years' record. Duration of sunshine, 93·3* hours, and of R 115·7 hours. Mean temp. 45°·2, or 3°·9 above the 40 years' average. Shade max. 56°·0 on 26th; min. 33°·0 on 21st and 23rd. F 0, f 8.

HULL.—A mild month generally. Squally at times. Shade max. 61°·0 on 25th and 26th; min. 32°·0 on 21st and 23rd. F 2, f 11.

HAVERFORDWEST.—Mild and wet. Stormy at times. Duration of sunshine 105·1* hours.

LLANDUDNO.—Shade max. 56°·0 on 26th; min. 35°·0 on 21st. F 0.

CARGEN.—The R has only been exceeded in March in 1868, 1897 and 1903. Farm work was hindered by wet, the land being unfit for sowing. Shade max. 56°·0 on 25th; min. 27°·5 on 16th. F 5.

EDINBURGH.—Shade max. 58°·9 on 25th; min. 31°·9 on 21st. F 1, f 12.

MEGGERNIE CASTLE.—Wet and cold month, and very stormy near the end. A lot of fresh S on the hills. The S flakes in a very short shower on 20th were very large, some measuring 3 by 2½ inches.

FORT AUGUSTUS.—Shade max. 53°·4 on 1st; min. 26°·4 on 23rd. F 4.

LOCH STACK.—Duration of sunshine, 105·0 hours.

DARRYNANE ABBEY.—Very wet month and no day without R. The wettest March, except 1905, in 33 years.

DUBLIN.—The unsettled weather which began in October continued throughout March. Mean temp. 46°·3, or 2°·9 above the average. Shade max. 60°·2 on 25th; min. 33°·7 on 11th. F 0, f 0.

MARKREE.—Wet and mild, with a fair amount of bright sunshine. Shade max. 57°·0 on 25th; min. 32°·0 on 15th. F 2, f 15.

WARRENPOINT.—Shade max. 56°·0 on 25th; min. 36°·0 on 31st. F 0, f 0.

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* Campbell-Stokes. † Jordan.

Climatological Table for the British Empire, October, 1911.

STATIONS (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity. 0-100	Absolute. Max. in Sun.	Min. on Grass.	Total Rain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°		°	°	inches		
London, Camden Square	63·2	18	28·5	29	58·1	43·9	46·7	89	97·6	27·0	3·12	14	6·5
Lagos	89·3	31	69·0	8	85·3	73·5	72·5	75	157·0	65·0	7·98	13	...
Cape Town	84·2	3	47·4	9	71·2	55·5	56·4	79	...	...	·97	7	4·7
Durban, Natal ...	98·8	18	56·0	8	78·7	63·8	...	...	146·9	...	15·33	16	6·7
Johannesburg	86·7	20	42·8	8	74·6	51·4	49·8	68	146·2	36·6	1·73	12	3·7
Mauritius	84·4	31	55·7	6	80·1	62·8	59·1	67	154·0	47·8	·32	6	4·6
Blœmfontein	93·4	17	42·6	14	78·7	51·8	46·4	52	...	...	2·20	9	4·0
Calcutta...	90·9	3,15	68·2	31	88·0	74·8	73·7	79	...	62·7	3·45	7	3·9
Bombay...	93·0	17	73·5	29	88·7	78·0	75·0	78	136·9	66·9	·00	0	3·5
Madras	99·5	7	66·7	28	90·6	75·2	74·1	80	145·7	63·6	5·91	9	4·1
Kodaikanal	67·8	2	43·3	29	62·1	50·7	51·0	85	141·5	40·3	13·72	22	7·0
Colombo, Ceylon ...	87·4	29*	69·8	15	85·5	73·2	73·6	84	156·6	67·4	10·22	23	6·4
Hongkong	85·5	21	61·6	14	78·2	70·8	65·6	74	139·6	...	5·69	11	5·1
Sydney	88·5	23	49·1	18	70·7	55·8	50·8	63	149·1	38·0	·74	22	5·2
Melbourne	85·8	30	35·7	19	66·1	48·1	45·3	64	142·4	30·4	2·54	15	5·9
Adelaide	95·7	29	42·4	26	71·0	50·5	47·1	61	148·9	31·7	·55	7	4·2
Perth	85·7	27	43·8	1,30	72·9	51·8	48·9	61	144·7	34·2	1·01	9	3·1
Coolgardie	101·6	28	37·0	30	77·8	49·9	43·2	47	169·0	35·4	·24	2	2·9
Hobart, Tasmania ..	82·8	30	37·8	13	63·0	46·2	42·1	63	139·8	34·0	2·44	18	7·0
Wellington	64·8	7	39·2	15	59·4	48·0	42·7	67	118·0	30·0	1·97	12	5·6
Auckland	67·0	26	42·5	1	62·3	50·1	47·9	73	110·0	35·0	4·67	20	6·6
Jamaica, Kingston ..	94·9	2	71·9	9	91·7	73·5	72·4	78	...	...	1·63	7	6·3
Grenada	90·0	sev.	73·0	19	86·6	78·6	...	76	141·0	...	3·15	16	3·0
Toronto	74·6	4	27·4	28	57·7	41·3	...	...	86·0	18·7	3·57	12	4·5
Fredericton	71·0	11	23·0	15	53·9	31·5	...	77	...	...	·85	4	4·8
St. John, N.B. ...	65·5	11	27·5	28	53·0	40·1	...	...	...	...	1·08	10	5·0
Edmonton, Alta. ...	75·4	9	11·0	31	50·9	29·3	...	73	126·4	6·1	·52	2	5·3
Victoria, B.C.	66·5	7	33·5	29	57·3	42·8	...	83	...	...	·61	7	6·0
Dawson	55·0	10	4·0	30*	35·6	23·9	...	...	...	...	1·60	7	6·2

* and 31.

DURBAN.—The R is about 11 inches above the average for 35 years.

Johannesburg.—Bright sunshine, 275·6 hours.

Mauritius.—Mean temp. of air 1°·1, of dew point 2°·5, and R ·96 in. below averages. Mean hourly velocity of wind 9·1 miles, or 1·7 below the average.

KODAIKANAL.—Bright sunshine, 130 hours. TS on 17 days.

COLOMBO.—Mean temp. of air 79°·4 or 0°·6 below, of dew point 0°·4 above, and R 4·26 in. below, averages. Mean hourly velocity of wind 6·1 miles. TS on 5 days.

HONGKONG.—Mean temp. of air 74°·3, or 2°.0 below, R 1·12 in. above averages. Bright sunshine 214·1 hours. Mean hourly velocity of wind 13·2 miles.

Sydney.—Mean temp. of air 0°·1 below, and R 2·07 in. below, averages.

Melbourne.—Mean temp. of air 0°·4 below, and R ·12 in. below, averages.

Adelaide.—Mean temp. of air 60°·8, or 1°·1 below, and R 1·25 in. below, averages.

Perth.—Mean temp of air 1°·6 above, and R about 50 per cent. below, averages.

Coolgardie.—Mean temp. of air slightly above, R about 66 per cent. below averages.

Hobart.—Mean temp of air slightly above, and R slightly above, averages.

Wellington.—Mean temp. of air 0°·4 below, and R 1·82 in. below, averages. Bright sunshine 245·2 hours.