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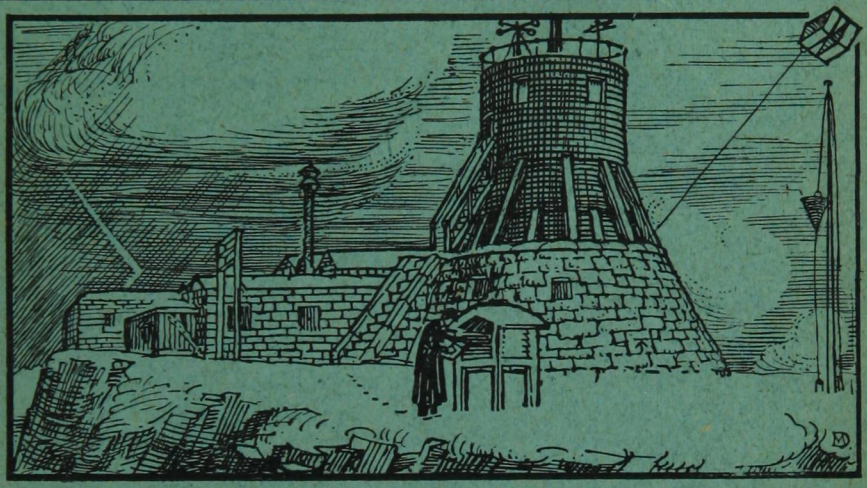
METEOROLOGICAL MAGAZINE

EDITED BY HUGH ROBERT MILL



JANUARY, 1912.

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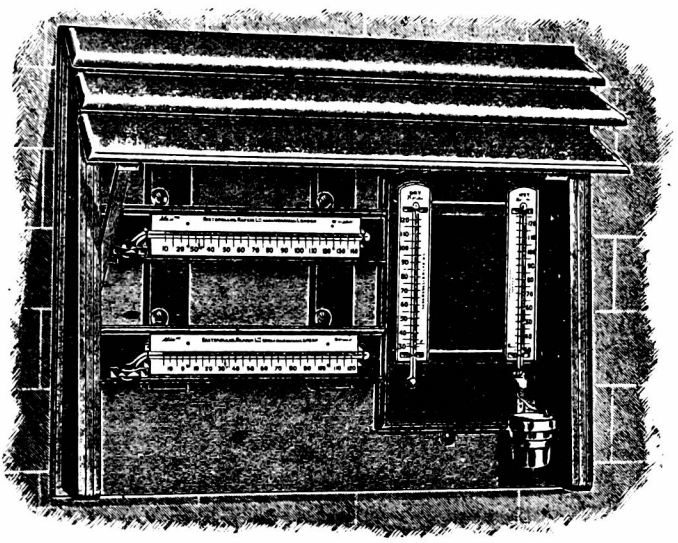

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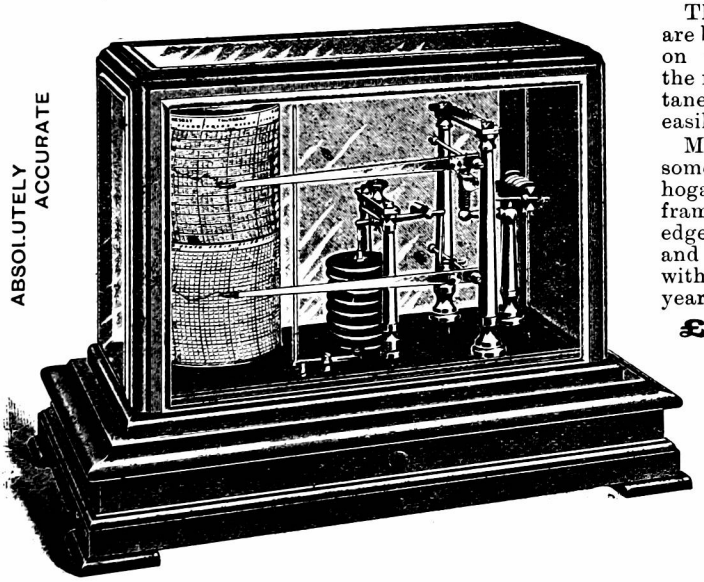

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Symons's
Meteorological Magazine.

No. 552. JANUARY, 1912. Vol. XLVI.

THE MEMORIAL BRONZES AT THE METEOROLOGICAL OFFICE.

It was a happy thought of the Director of the Meteorological Office to plan a series of bronze plaques for the entrance hall at the top of the main staircase in the new building, commemorating five distinguished meteorologists who have been intimately associated with official British Meteorology; and it was no less graceful to permit the names of unofficial meteorologists and men of science, who took pleasure in the history of the Meteorological Office, to be associated with the provision of the memorials.

We reproduce in the frontispiece to this volume a photograph of the three tablets, which were executed by the Bromsgrove Guild, which is to be congratulated on the simple effectiveness of the work. The actual size of each is about 21 inches in length and 8 inches in height. We understand that casts in bronze of any of the medallions can be obtained from the Guild, for the price of £2 2s. each.

First in date comes Admiral FitzRoy, who was the first Official Meteorologist in this country, and presided over the Meteorological Department of the Board of Trade from 1854 to 1865. No more enthusiastic pioneer in meteorology ever lived in this country, and no more fitting effigy than his could appear on the walls of the new Meteorological Office.

The next plaque commemorates the Meteorological Committee of the Royal Society, which was responsible for the Meteorological Office from 1867 to 1877, and bears the heads of Lieutenant-General Edward Sabine, Chairman of the Committee, and of Dr. R. H. Scott, Director of the Office during this period. Dr. Scott is thus placed in the proud position of being honoured in his lifetime by a monument if not "more durable than brass," at least as enduring.

The third records the Meteorological Council, with portraits of Professor Henry J. S. Smith, who was Chairman of the Council from 1877 to 1883 and of Sir Richard Strachey, perhaps the most successful of them all, who succeeded him and continued in office to the beginning of the new order in 1905.

ABNORMAL WEATHER IN SOUTH AMERICA DURING 1911.

By R. C. MOSSMAN, F.R.S.E.

WHILE the past summer in Europe and the United States has been remarkable for exceptional warmth, the same period in the greater part of South America has been equally notable for unusually cold weather. While it is not possible as yet to give a synopsis of the temperature conditions for the whole Continent, the following statement regarding the conditions prevailing in the Argentine Republic and part of Brazil may be of interest.

I have taken the mean maximum and mean minimum monthly temperature from June to September, for 46 stations in the Argentine Republic, 2 in Brazil (Curitaba and Rio de Janeiro), and 1 in Chile (Punta Arenas), and compared these data with the normals for the 10 years 1898—1907.

For the region north of latitude 40° S. we get the following values for the four months, June to September, 1911 :—

	Temperature below normal (1898—1907) Fahr.		
	Mean max.	Mean min.	Mean temp.
	°	°	°
June	1·8	4·1	3·0
July	0·7	2·2	1·4
August	2·1	2·2	2·2
September	5·3	3·6	4·4
Mean	2·5	3·0	2·7

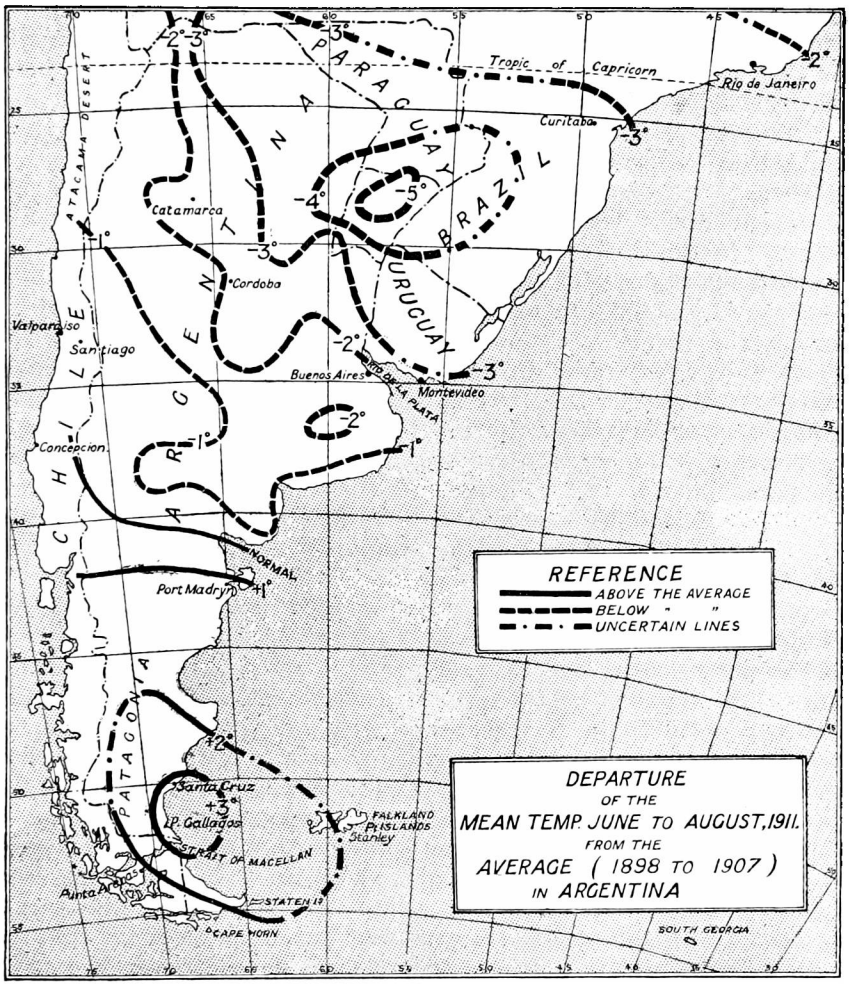
For the three winter months (June to August) the departures from the normal were as follows :—

		°
Brazil (Curitaba and Rio)		−2·7
Argentina, Litoral Zone		−2·5
,,	Mediterranean Zone	−2·0
,,	Andine Zone	−2·5
,,	Patagonian Zone	+2·5

In the accompanying map the temperature departures from the normal for the above three months are shown graphically, lines being drawn for each degree (F.) above or below the average.

It will be seen that the greatest depression of temperature, viz., 5°, was in the Province of Corrientes and the borders of Paraguay, covering a small area ; the line of 4° embraces part of the Province of Santa Fè, the Paraguayan Chaco, and the southern part of Brazil ; while the line of 3° includes a large area extending from a little south of the tropic of Capricorn on the Atlantic coast to about latitude 20° S. on the 65th meridian, on the Bolivian border. South of the 35th parallel, except for a small patch in the interior of the Province of Buenos Aires, the depression of temperature for the period under review did not exceed 2°, while in about latitude 41° on the Atlantic coast normal conditions prevailed. South of this, temperature was in excess of the average, reaching a maximum of 3½ degrees at Santa Cruz and Gallegos, close to the Atlantic entrance to the Straits of

Magellan. The line showing an excess of 2° covers an area embracing Punta Arenas, New Year's Island (Staten Island near Cape Horn), apparently enclosing the Western Falklands, and covering most of the Patagonian territory. At South Georgia, to the far east, the winter months were 1°·3 warmer than the available seven years' average (1882-3, 1905-10), showing that the warmth extended into



the extreme south of the South Atlantic, which it may be remarked has been unusually free of ice during the present year, on the route from Buenos Aires to South Georgia.

A comparison of the values given in the *Monthly Weather Reports of the Meteorological Office*, for the three months June to August, shows that the warmth in the British Isles was more noteworthy than the cold in the Argentine Republic (north of lat. 40° S.), the mean departure being 3°·4 for the British Isles, and 2°·2 in the Argentine.

If September, which was remarkably cold in the north of the Argentine Republic, is included, however, the values work out for Britain + 2°·8, and for the Argentine Republic − 2°·7. During the first half of October the mean temperature in the Argentine Republic was exceptionally low. Means for the first ten days for 7 stations between the parallels of 25° and 30° S. and the meridians of 57° and 66° W. of Greenwich, where ten-day normals are available, show a mean depression of temperature of 12°·7; and at Catamarca the mean was as much as 16°·6 below the average, the cold was unequally partitioned between the day and night. At Cordoba, for example, where 10-day means based on 20 years' observations are available, the mean maxima for the first decade of October, 1911, were 13°·1 under the average, while the mean minima were 8°·5 below the normal.

There is little doubt that during the present year a marked displacement in the "centres of action" of both hemispheres has taken place. In South America the meteorology of the whole year has presented a sequence of abnormal features. Among the most prominent may be noted the following:—at Rio de Janeiro the rainfall during the month of March amounted to 17·40 inches being the greatest in any month during the past 61 years, with the single exception of April, 1872, when the precipitation was half an inch greater. At this station, July, 1911, was the wettest on record, with 6·42 inches, the next wettest being July, 1865, with 5·08 inches. In the three months, July to September this year, the precipitation was 10·32 inches, the greatest since 1858, when there fell 10·79 inches.

At Buenos Aires, March, with a rainfall of a tenth of an inch, was the driest during the last 50 years, the smallest downfall previously recorded for this month being 1·06 inch, in the year 1906. Thus, March, 1911, in Buenos Aires was as remarkable for extreme drought as it was for excessive precipitation at Rio de Janeiro. During this month the centre of an ante-cyclone covered Buenos Aires, whereas Rio de Janeiro was under the influence of the equatorial continental low pressure area, which was south and east of its normal position. In marked contrast to March, the months of April and May were the wettest in Buenos Aires since 1877, whilst September was the driest since 1879. Going to the far south we find that the past winter at South Georgia is the wettest during a record covering seven years, while at Punta Arenas (Sandy Point) the rainfall for the period January to September was the greatest (with one exception, 1899) in a 23 years' record. The mean wind velocity at this station has never been so high during any of the past 15 winters, September being the stormiest month on record, and August having the highest mean wind velocity of any winter month.*

* Since writing the above the October report from Punta Arenas has arrived. From it we find that October had a higher wind velocity than September, the mean hourly air movement being 15 miles against 13·4 miles in September. Only ·08 inch of rain fell, the month being the driest October in a 23 years' record, a marked contrast to the Argentine Republic, where north of lat. 40° the precipitation from October 20th to November 16th has been excessive.

Passing on to the Pacific coast of S. America, we may note the occurrence of a great rainstorm in the usually rainless nitrate zone of Chile, on June 22nd, accompanied by a heavy gale, and succeeded by a severe snowstorm in the pampa region in the Atacama desert and to the north and east. At Concepcion (lat. 37°S.) the rainfall in May, 16·41 inches, was 9·14 inches above the normal, and the maximum for this month in a record covering 32 years, while inland, at Santiago, 4° north, only half the average fell. At both places the rainfall for June and July was under half the normal amount.

These are only a few of some of the more prominent anomalies culled from the data kindly placed at my disposal by the Directors of the meteorological services of the Argentine Republic, Brazil and Chile. It is to be hoped that some enthusiast, with the requisite leisure and ready access to meteorological literature, will work up the abnormalities of this remarkable year from a world wide standpoint, and thus throw some light on the unusual inter-tropical conditions whose influence seems to have extended into high latitudes in both hemispheres, as shown by the poleward extension of the north and south Atlantic highs.

Cornelis Harm Wind.

GRONINGEN, 1867—UTRECHT, 7TH AUGUST, 1911.

WE learn with much regret of the death of Professor Wind, of Utrecht, with whom we were for several years closely associated on the International Council for the Study of the Sea, and whose friendship we valued greatly. We can never forget his surprise when he visited Camden Square and saw the magnitude of the work carried on by the British Rainfall Organization without State aid or scientific patronage. Professor Wind was by inclination and training a student of theoretical physics, and he was appointed Director of the Meteorological Institute at de Bilt in 1902 at a time when the Dutch Government was anxious to bring mathematical and physical methods to bear on meteorological problems. Although he only held this position for two years, retiring in 1904 in order to take up the congenial work of Professor of Theoretical Physics in the University of Utrecht, the bent it gave to his mind towards the study of the phenomena of Nature as they actually exist on the surface of the Earth, remained to the end. He continued to take an active interest in the oceanographical observations which on his initiative the Dutch Government carries on in the North Sea in great enlightenment and perseverance. Professor Wind never appeared robust, and his health was very unsatisfactory in recent years. In his early days he had done some brilliant work in thermodynamics and magneto-optics.

THE RAINFALL OF 1911.

THE year that has just run its course was, beyond a doubt, one likely to be memorable in meteorological annals, but a review of the records of rainfall for the year brings to light the fact that the drought of the summer was, in a very large measure, counterbalanced by the excessive rainfall which marked the closing months. Over about one third of the British Isles the rainfall of the year was in excess, and the last line of the following short table shows that in each of the three main divisions of the United Kingdom the general fall was within 2 per cent. of the average amount.

General Rainfall of 1911, expressed as a percentage of the Average.

MONTH.	England and Wales.	Scotland.	Ireland.	BRITISH ISLES.
January	61	75	49	62
February	116	147	110	124
March	93	66	68	78
April	100	135	99	109
May	70	102	89	84
June	121	112	92	112
July	19	83	103	58
August	71	68	59	67
September	87	71	78	80
October	94	69	107	91
November	137	138	132	136
December	191	148	176	175
YEAR 1911	98	101	98	99

January was a dry month everywhere, least so in Scotland, most so in Ireland where the fall was scarcely half the average. February was wet, especially in Scotland, and least so in Ireland. March was dry, but April, which was an average month for the other parts of the Kingdom, was wet in Scotland. May just exceeded the average in Scotland, but was dry elsewhere, especially in England. June was wet on the whole, except in Ireland. Throughout Great Britain July, August, September, and October were dry, but a deficiency of rainfall occurred for Ireland only in August and September. November was uniformly wet with an excess of about one-third in all parts of the British Isles, and December followed with a rainfall both absolutely and relatively heavier than that of any other month in each of the great divisions, and amounting to very nearly double the average in England. The year, as a whole, came out with a rainfall slightly above the average for Scotland, and with a very trifling deficiency in England and Wales and in Ireland.

The map which we reproduce herewith shows graphically the relation of the rainfall of the year to the average in the various parts

of the British Isles. It will be seen that whilst in Ireland the variation from place to place was not excessive, there was a marked contrast between the geographical distribution of rainfall in the northern and southern divisions of Great Britain. In Scotland a region of relatively high rainfall extended southwards from Ross-shire as far into England as Yorkshire; within this area two patches occurred where the rainfall was more than 10 per cent. in excess. On the other hand, the east coast of Scotland was dry, the percentage reaching a minimum at Dundee, and there are also indications of a falling off in the Western Islands. In England the conditions were the opposite to those in Scotland. In the Midlands the persistent dryness of the early and middle parts of the year left their mark very distinctly, and over a large area the rainfall fell short of the average by more than 20 per cent. The deficiency diminished on all sides towards the coast, turning to a moderate excess in Wales and Cornwall, and also in the south-east of England, where the last months of the year were very wet.

ROYAL METEOROLOGICAL SOCIETY.

THE Monthly Meeting of this Society was held on December 20th, at the Institution of Civil Engineers, Great George Street, Westminster, Dr. H. N. Dickson, President, in the chair.

A paper "Notes on Solar Halos and Brocken Spectres," by Mr. Walter Larden, was, in his absence, read by the Secretary. The author described some phenomena round the sun which he had observed at St. Moritz in the Engadine. These included brilliant colours not arranged in circles; a series of rings; the large halo of 22° radius; parhelia, etc. He gave a description of a complicated system of halos and parhelia which he had observed on one occasion at Silvaplana in the Engadine. With regard to the Brocken spectre the author said that the sun casts convergent cones of shadow down the mist. If the cloud or mist be near the person he looks down the tunnels of shadow; and so he sees in the mist his shadow in the mist, and the shadows of his legs appear to be very long, and to curve up and join that of the body. If a man stand near his companion he looks nearly down the latter's shadow tunnels and sees his shadow in the mist. If he stand some way off he looks across his friend's shadow-tunnels; and therefore, seeing a great thickness of illuminated, and a small thickness of unilluminated mist, he does not see a shadow corresponding to his friend. In no case can the full-shadow-tunnel, or *umbra*-tunnel, of a person exceed the person in breadth or height; the spectres are *not* "gigantic." But we invariably over-estimate size in a mist through over-estimating the distance.

Mr. J. E. Clark referred to the phenomena connected with the Krakatoa eruption, which were visible for about two years afterwards.

The President stated that many years ago at the Ben Nevis Observatory he had made some measurements of halos and other optical phenomena.

Mr. W. H. Dines, F.R.S., read a paper on "The Statical Changes of Pressure and Temperature in a Column of Air that accompany changes of Pressure at the Bottom." He pointed out that during recent years a very fair knowledge of the temperature of the air over England and Europe has been obtained up to a level of 15 to 20 kilometres. Also, by means of correlation, it has been found that the pressure at various heights, including the surface, the temperatures, and the height of the isothermal, are all most closely interrelated: if one of these is changed, the others are changed in certain fairly determinate ways; but which is cause, and which is effect, is not so clear. The author believes that the pressure in the strata lying just below the isothermal is the dominant factor on which the temperature down to one or two kilometres' height depends. However that may be, he says that since we know that in a cyclone of a certain intensity certain definite temperatures in the strata between 2 and 20 kilometres will be found, it seems desirable to ascertain from the theoretical side how such temperatures might be produced, the cyclone being looked upon as a disturbance of the average conditions. It appears, on investigation, that the changes will depend on the manner in which the change at the earth's surface is produced, and also upon the initial vertical distribution of temperature. Furthermore, it is necessary to assume that the air column is bounded laterally by some rigid boundary, otherwise the pressure produced at any given height could not be maintained. The place of such a boundary is probably taken in nature by the lateral acceleration of strong winds, but we do not know how such winds are originated. We do know, however, that in the lower strata the differences of pressure that occur are on the average just balanced by this acceleration, and we may reasonably infer that it is also the same at higher levels. Mr. Dines stated that the term "ascending current of a cyclone" has been used, but it appears to be incorrect. The actual phenomena seem rather to be a bulging upward of the strata between 1 or 2 kilometres and the isothermal, and a bulging downward of the strata above the isothermal, accompanied by a lateral expansion of the strata below the isothermal.

Dr. W. N. Shaw said that the questions raised by Mr. Dines's diagrams were very significant, as indicating the sources to which we must look for the causes of the differences of pressure which formed the key to weather changes.

Colonel H. E. Rawson, Mr. R. Strachan, Mr. R. G. K. Lempfert, Mr. C. J. P. Cave, Mr. R. Corless, and the President took part in the discussion, and Mr. Dines replied.

The following gentlemen were elected Fellows of the Society:—Mr. T. D. Evans, Capt. W. E. Maddocks, F.R.A.S., and Mr. G. I. Pocock, M.A.

CLIMATOLOGY OF SOUTHERN NIGERIA.

By CHARLES A. ALBERT BARNES, Assoc. M. Inst. C.E.

Seasons.—The Climate of Southern Nigeria may be arranged into two Sections or Seasons; the "dry" season, and that of the "rains." The former occurs from about the middle of October to the middle of the following March, whilst the latter takes up about seven months of the year, correctly speaking. The rainy season is again sub-divisible into "heavy" and "light" rains; the heavy rains being during the months of April, May, June, and July; and the light, or latter rains, during August, September, and October. The weather generally, throughout the heavy rains, is cloudy and dull, with occasional sunshine. At times, however, the incessant damp, together with fog and mists in many places, affects, no doubt, not only health, but the general industries of the country. Much thunder and lightning accompany the rains, with sometimes terrific claps of thunder like the firing of big cannon. During the dry season the weather is clear and fine, with occasional slight showers. The force of the wind is also excessive at times, and roots up trees of great size, especially in exposed places. The general direction of the wind is from the south-west. The "harmattan" winds blow from about the middle of November to the beginning of February. These winds cause much coldness of temperature, and also dryness in the air.

Rainfall.—From official statistics it has been found that the rainfall of the Colony is considerable, as the subjoined details will show. The Colony itself is divided into three Provinces, viz.: the Western, Central and Eastern; in each of which meteorological stations have been established for the purpose of ascertaining information as regards the climate. The following particulars (which represent meteorological records from some 33 different stations, distributed in various parts of the Colony), are the averages of the four years—1907 to 1910—and give a fair idea of the rainfall throughout each year:—

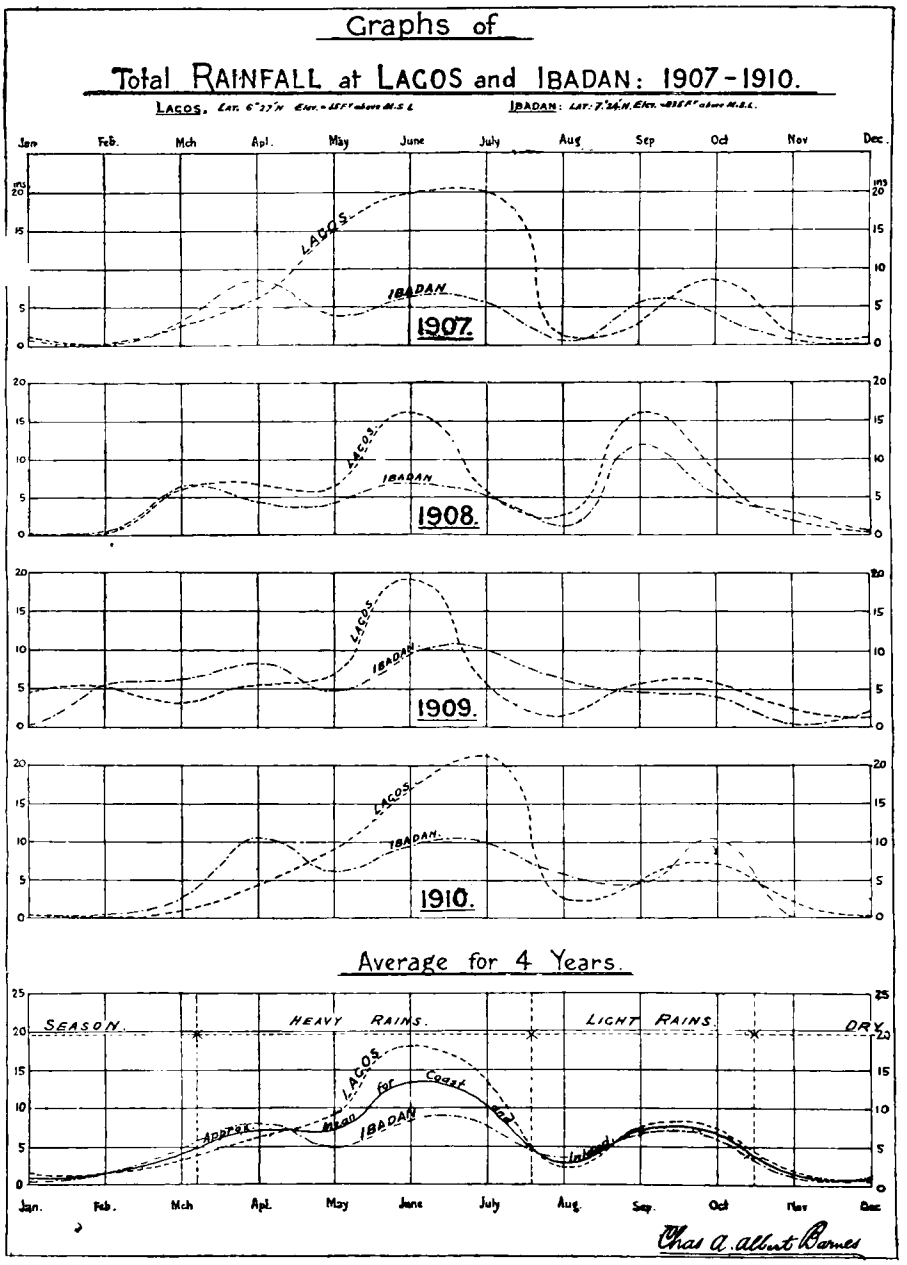
Western Province	.....	58·47 ins.	per annum.
Central ,,	.....	82·37 ,,	,,
Eastern ,,	.....	105·10 ,,	,,

In the Western province the average maximum rainfall for any one year is about 77·50 ins., and the average least about 27·02 ins. The Central province shows, similarly, the average maximum as 120·49 ins., and least as 40·11 ins. The average maximum in the Eastern province is 142·22 ins. and least is 67·96 ins.

The average maximum yearly rainfall throughout the Colony is, therefore, about 113·40 ins., and average minimum 45·03 ins.

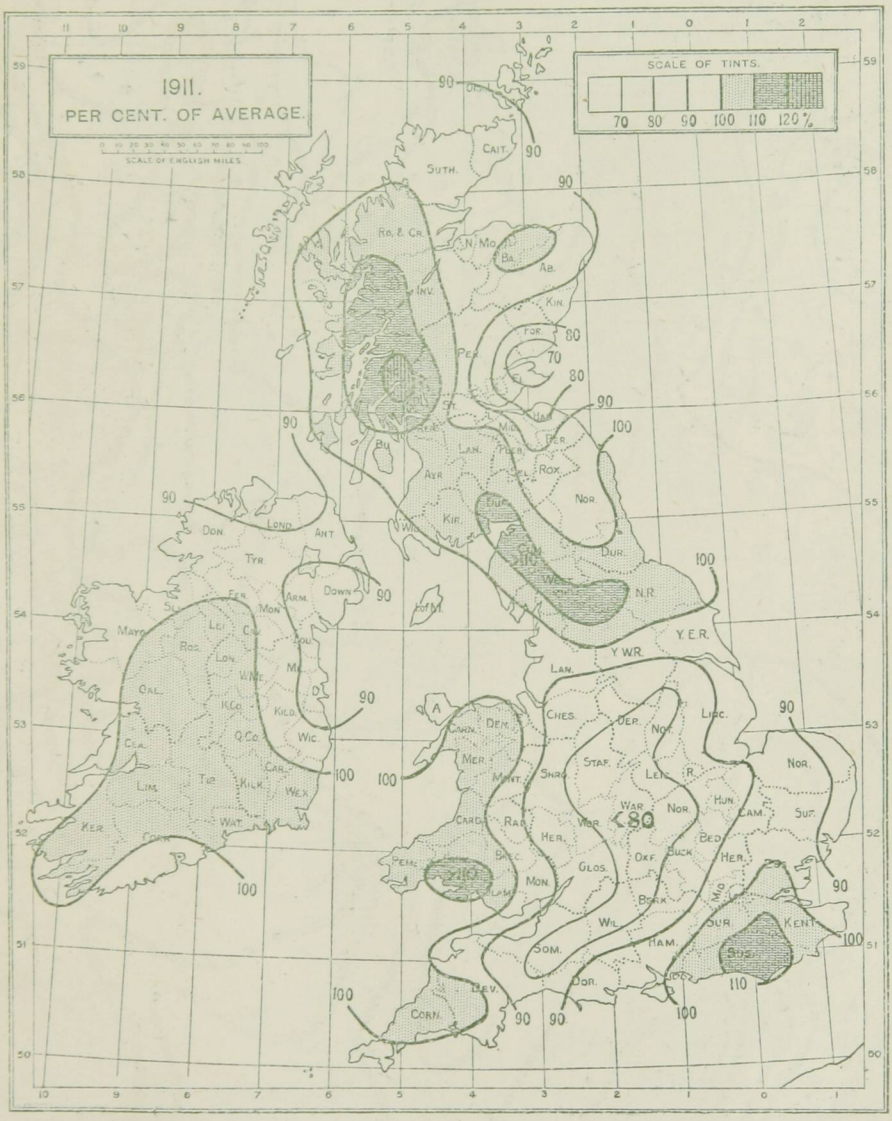
Temperature.—The temperature in the shade is not excessive, speaking generally, the average maximum temperature being about 91°·45, the average minimum 65°·47; giving a mean of about 78°·5, with a daily range of about 26°. The average mean on the sea-coast

is about 84°. The highest average of maximum shade temperature was 94°·9 at Olokemeji, Western province; and the lowest 61°·2 at Oshogbo, Western province.



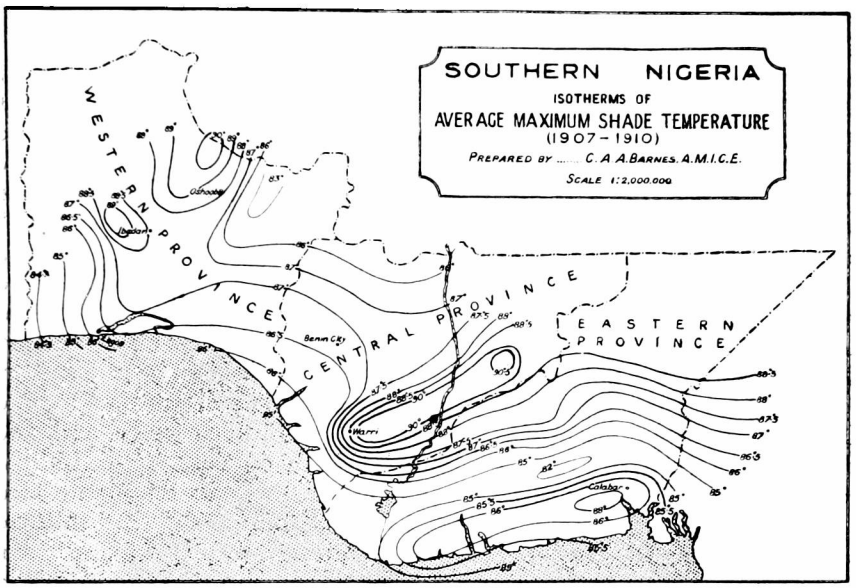
The chart reproduced on page 247 is an attempt to represent graphically the average maximum shade temperature throughout the Colony for the period 1907-1910.

RAINFALL OF 1911 IN RELATION TO THE AVERAGE.



THAMES VALLEY RAINFALL — DECEMBER, 1911.

The isotherms are drawn generally for every half degree; owing, however, to the unsatisfactory conditions at present existing for the proper collection of meteorological data, the result can be considered only as a rough idea.



The maximum temperature by the thermometer exposed to the full effect of the sun, is about 146° upon the average, whilst the thermometer at ground level gives about 65° as the average minimum or "grass" temperature.

There is a considerable amount of moisture in the atmosphere, giving an average relative humidity of about 76 per cent. throughout the year.

Barometer.—The mean height of the barometer at sea-level stands at about 30 ins., with a total range of about ·10 in. between highest and lowest readings, during the daytime.

THE WEATHER OF DECEMBER.

By FRED. J. BRODIE.

AN almost ceaseless passage of cyclonic systems along our western and northern coasts resulted last month in an abnormal prevalence of winds from between south and west, and in one of the mildest, and certainly one of the wettest, Decembers on record. Gales were notable rather for frequency than for violence, most of the storms expending their main energy over the Atlantic, where the weather was unusually severe. Between the departure and arrival of the

various disturbances there were many intervals of brilliant sunshine, and, as is frequently the case in the winter time, an excess of rain was therefore accompanied in many places by an unusual allowance of fine weather.

Although the mean temperature of the month was everywhere in excess of the average, the thermometer failed to rise to any abnormally high level for the time of year, the absolute maxima being such as are experienced in most ordinary Decembers. The principal touches of warmth occurred respectively on the 2nd and 3rd, between the 16th and 18th, on the 24th, and between the 28th and 30th, the thermometer rising on each occasion to 50° or upwards over a large portion of the United Kingdom. On the 2nd and 3rd a reading of 55° was recorded at several places in the west, and a reading of 57° at Pembroke. Between the 16th and 18th, when a very strong current of mild air swept up from the southward, the readings were a trifle higher, some of the highest values being recorded in the north. At Nairn and Leith the thermometer rose to 56°, at Glencarron, Fort Augustus and Dublin to 57°, and at Hawarden Bridge, near Chester, to 58°. On the 24th a reading as high as 55° was recorded at some English stations, and between the 27th and 30th in Ireland, the thermometer at Killarney touching 56° both on the 27th and 28th. Over the United Kingdom generally there was an almost entire absence of severe frost, the records of more than 100 stations scattered over the whole country containing only one instance in which the sheltered thermometer fell as much as 10° below the freezing point. During the sharp night frosts which were experienced in various districts between the 6th and 8th a reading slightly below 25° was recorded in a few isolated places, and on the 8th the sheltered thermometer at Balmoral fell to 21°. On the surface of the grass the minima at places as far south as Kew and Tunbridge Wells were at about the same time as low as 20° or less, the thermometer at Wisley sinking to 17°, and at Llangammarch Wells to 12°. On the nights of the 22nd and 23rd rather sharp frosts were again experienced, but in very few places did the sheltered thermometer fall more than 5° below the freezing point, the grass readings being only a few degrees lower. At the close of the month a mild south-westerly breeze prevailed, and up to very nearly the middle of January there were no signs of the arrival of seasonable wintry weather.

The mean temperature of the month was, as already noted, considerably above the normal, the excess being greatest over central and southern England, where it amounted to between 4° and 5°. On several parts of our western and southern coasts there was a deficiency in the amount of bright sunshine, but in most other districts the total duration was in excess of the average. In London (at Westminster) rather over 26 hours were recorded, the aggregate being equal to more than twice as much as the average, and greater than in any December of the previous 28 years, excepting those of 1893 and 1909, when the totals were respectively 30 and 29 hours.

INTERNATIONAL BALLOON ASCENTS.

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

June 30th, 1909.

Starting Point.	Country.	A miles.	B ° F.	C miles.	D ° F.	E miles.	F
Pyrton Hill....	England	6·6	—62	10·2	—49	53	S.
Brussels	Belgium	6·7	—65	14·6	—52	27	S.S.W.
Hamburg.....	Germany....	6·8	—69	8·1	—52	15	S.S.E.
Lindenberg....	,, ...	6·6	—78	10·6	—54	8	N.E. by E.
Paris.....	France	5·6	—45	7·1	—61	59	S.E.
Strassburg	Germany....	5·1	—40	12·6	—48	7	S.S.E.
Vienna.....	Austria	6·5	—63	8·8	—53	26	N.E.by N.
Pavlovsk	Russia	7·1	—67	10·1	—47	14	N.E. by E.
Nizhni Olchadaeff	,, ...	6·1	—64	9·1	—53	21	S.
Ekaterinburg ..	,, ...	7·0	—68	8·1	—56	53	E.N.E.
July 1st.							
Brussels	Belgium	7·1	—56	12·9	—48	52	S.E.
Lindenberg....	Germany....	6·7	—67	7·7	—56	6	W. by N.
Paris	France.....	6·6	—66	8·8	—50	65	S.E. by E.
Strassburg	Germany....	6·9	—67	12·8	—54	38	S.E.
Munich.....	,, ...	6·6	—74	7·4	?	35	S.S.E.
Vienna.....	Austria.....	6·2	—65	10·8	—51	12	S.E.
Pavlovsk	Russia	6·1	—63	9·5	—51	24	E.N.E.
Nizhni Olchadaeff	,, ...	6·5	—62	7·2	—58	21	E.
July 2nd.							
Manchester....	England	6·9	—49	9·4	—39	69	S. by E.
Brussels	Belgium	6·6	—67	10·5	—60	46	S.W.
Hamburg.....	Germany....	7·4	—74	17·1	—33	15	S. by W.
Lindenberg....	,, ...	6·8	—93	12·4	?	14	S.W.byW.
Strassburg	,, ...	5·9	—60	10·9	—49	40	S.W. by S.
Pavia.....	Italy.....	5·5	—68	12·8	—67	46	S.E. by E.
Pavlovsk	Russia	6·7	—55	11·4	—48	18	S.E. by 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 figures show considerable irregularity both as to temperature and the falling place of the balloons. The value of —93° on July 2nd at Lindenberg is very remarkable for the summer, and it is most unusual to find so low a temperature associated with a low height of the isothermal. The temperatures at the highest points reached are mostly very high, thus showing a large inversion.

On June 30th an extensive anticyclone lay to the west of Norway, with another over Spain, and the pressure was very irregular, with thunderstorms and rain over central and eastern Europe. The whole system moved to the east and south-east, and on July 2nd the rapid advance of a cyclone from the Icelandic region had obliterated the north-westerly anticyclone.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

THE RAINFALL OF 1826.

In your August number mention is made of the remarkably small rainfall in 1826, at South Kyme, viz. :—8·79 inches.

The following figures for that year may be of interest, being the records for Stratford, Essex, and Cobham, Surrey. The former was taken by Luke Howard, and the other by Miss Molesworth, evidently a careful observer, and the first lady Fellow of the Royal Meteorological Society.

	Stratford.		Cobham.
January.....	0·20	.....	0·38
February	1·54	.....	2·09
March.....	1·46	.....	1·94
April	1·12	.....	0·45
May	2·77	.....	2·48
June	1·18	.....	0·48
July	2·61	.....	2·38
August	1·87	.....	1·67
September.....	3·43	.....	4·88
October	2·05	.....	1·65
November.....	2·72	.....	3·33
December	1·61	.....	1·81
Totals.....	22·56	.....	23·54

Glenart, Weybridge, 20th August, 1911. H. K. G. ROGERS.

THE PARIES CLOUD.

Mr. Bonacina's interesting description in the November number of *Symons's Meteorological Magazine* of cumulus clouds seen by him on October 21st, affords a striking example of the modification of cloud form, for which Goethe in his essay "On Cloud Modification according to Howard" suggests the name of "Paries."

After describing the seven principal cloud forms as distinguished and named by Luke Howard, Goethe adds the following remarks :—

"So far Howard.

"If now in the next place I were to propose a Terminus, which still seems to be wanting, it would be Paries, the Wall. Paries is seen when streaky layers of cloud lie on the very end of the Horizon so closely pressed down over one another that no interval can be observed between them, shutting in the Horizon up to a certain level and leaving the upper sky free. Sometimes their outline resembles a range of mountains, so that we fancy we see a distant chain of mountains, at other times their contour moves away as a cloud, and then a kind of Cumulo-stratus is formed from them."—*Goethe's Complete Works.* Edition of 1868. Vol. **36**, pp. 142-145.

More or less characteristic examples of Paries have often been seen lately. R. C. CANN-LIPPINCOTT.

Clifton Down Hotel, Bristol, 4th December, 1911.

SMALL RANGE OF TEMPERATURE.

THE maximum and minimum temperatures in the screen for the 24 hours ending 9 a.m. to-day were 40°·5 and 39°·7 respectively, showing a range of only 0°·8 in 24 hours. Thermometers have Kew certificates.

Glenart, Weybridge, 25th November, 1911. H. K. G. ROGERS.

THE TENDENCY FOR FROST AND SNOW AROUND NOVEMBER 22nd.

NOVEMBER is the first month of the depth of winter or of the mid-winter season—a period correctly and logically defined by the altitude of the sun between the dates November 8th and February 8th. But whilst the general meteorological character of this month of raw dismal cold is proverbially foul, the average temperature of the air is in our insular climate higher in November than in any of the four following months. Nevertheless, when a spell of ice and snow does occur in November it is sometimes very severe, as for instance, to quote recent years, that of 1904 all over the kingdom, and that of 1909 in Scotland, where a frost of extreme rigour gave about a week's skating in the middle of the month more or less all over the country. Apart, however, from such marked occurrences of cold as these, a brief but sharp spell of cold weather more often than not prevails around the 22nd of the month. I suggest that this cold spell of mine is as reliable as any of Buchan's hot or cold periods, which I admit is not saying much for it. This year it hasn't failed, and I am writing during it.

L. C. W. BONACINA.

November 22nd, 1911.

METEOROLOGICAL NEWS AND NOTES.

THE UNITED STATES WEATHER BUREAU is forming in its library at Washington a collection of meteorological photographs, and will welcome additions thereto from all parts of the world. The following classes of pictures are among those desired :—

1. Views of meteorological offices, observatories and stations.
2. Pictures of meteorological apparatus.
3. Portraits of meteorologists; views of their homes and birth places.
4. Views showing the effects of storms, inundations, freezes, heavy snowfall, etc.
5. Cloud photographs.
6. Photographs of optical phenomena (rainbows, halos, Brocken spectre, mirage, etc.).
7. Photographs of lightning and its effects.
8. Photographs of meteorologically interesting pictures in old books, or of early prints and paintings (*e.g.*, contemporary pictures of the damage wrought by the great storm of 1703 in England).

Persons who are willing to present such pictures to the Weather Bureau, or who will furnish them in exchange for Weather Bureau publications, are requested to address:

Chief U.S. Weather Bureau,
(Library.) Washington, D.C.

It will add much to the value of these pictures if the sender will kindly note on the back of each as much pertinent information as practicable. On pictures of classes 4-7, inclusive, should be stated at least the date, hour, and place at which each picture was taken, and the direction toward which the camera was pointed.

THE SYMONS GOLD MEDAL has been awarded by the Council of the Royal Meteorological Society to Professor Cleveland Abbe, of the United States Weather Bureau, in recognition of the valuable work which he has done for meteorological science. The medal will be presented at the annual meeting of the Society on January 17th, 1912, when we are glad to learn Professor Abbe will be able to be present.

REVIEWS.

Atlas de Finlande, 1910. Société de Géographie de Finlande. 3 vols. Helsingfors, 1911. Size (2 vols. text) 10 × 7. Pp. vi. + 760; vi. + 756; (Atlas) size 17 × 12. Plates 55.

THE Geographical Society of Finland has produced an entirely new edition of its famous Atlas of Finland, which is probably the most varied cartographic representation of any country which has ever been compiled. The plates are described in two volumes of text, one devoted to the 23 plates of physical maps, the other to the 32 plates of maps referring to "population and civilisation." While desirous of paying a tribute to the completeness of the work, its admirable plan and fine execution, we are limited here to the more particular consideration of the plates devoted to meteorology and the more immediately allied subjects. Amongst the more uncommon maps there is one of the waterfalls of Finland, each fall distinguished by a special mark according to the horse-power available in average conditions; this, of course, depends on the rainfall. The meteorological plates, in the strict sense, include a sheet of monthly isothermal maps so grouped on the plate that the two adjoining months are always together for comparison. This is done by having the four months January to April from left to right along the top, the four months April to July down the right hand side, the four months July to October along the bottom from right to left, and the four months October to January up the left hand side—the months occupying the corners, of course, belong to both series. The middle of the plate is occupied by the annual map on a larger scale, and maps showing the observing stations and the annual range of

temperature. Pressure and winds are less fully dealt with, the isobaric maps and wind-roses being shown only for the four seasons. A peculiarly interesting pair of maps shows the monsoon winds over Lake Ladoga, the wind blowing from land to lake in winter and from lake to land in summer. A special map is devoted to snowfall. One small map shows the average date of the first snowfall in autumn, and separate maps give the mean depth of snow in each month from November to May, the maximum occurring in March. One rainfall map only appears, the annual average, and it shows a fairly uniform diminution of total precipitation from south to north. There is an interesting map of the average date of the breaking up of the frozen lakes and rivers in spring. Other maps show the number of stormy days and of storms, and two maps represent the isochronic lines and other particulars of two individual storms. The text descriptive of the meteorological maps is written by Dr. O. V. Johansson, of the Central Meteorological Institute, and extends to 62 pp. The study of climatology became systematic after the foundation of the Society of Sciences of Finland in 1838. This Society took over the Magnetic and Meteorological Observatory of the University of Helsingfors in 1880, and made it a central Meteorological Institute, which now has associated with it 42 complete stations with automatic instruments, 18 additional stations where temperature and rainfall only are measured, and about 100 extra rainfall stations. Reports on snow, frost, storms, &c., are received from fully 500 voluntary observers. A branch of the Institute has just been founded at Fredriksberg, near Helsingfors, for conducting observations in the upper atmosphere by means of kites.

Veröffentlichen des Königlich Preussischen Meteorologischen Instituts. No. 230. Meteorologische Untersuchungen über die Sommerhochwasser der Oder, von G. HELLMANN *und* G. v. ELSNER. *Mit einem Atlas von 55 Foliotafeln.* [Publications of the Royal Prussian Meteorological Institute. No. 230. Meteorological Investigations into the Summer Floods of the Oder, by G. Hellmann and G. v. Elsner. With an Atlas of 55 folio plates.] Berlin: Behrend & Co., 1911. Size (Text) $11\frac{1}{2} \times 8\frac{1}{2}$, pp. xii. + 236; (Atlas) 22 × 17. Plates 55. Price 50 marks.

THIS is the most elaborate study of daily rainfall in relation to atmospheric pressure and temperature that has ever been undertaken, and we congratulate Professor Hellmann and Dr. v. Elsner on the admirable manner in which their laborious work has been accomplished, and on the clear and concise way in which the bewildering array of facts has been brought together so as to give a picture of the actual conditions and a plain statement of their immediate cause.

The work is so closely akin to that in which we have long been engaged, that we have had the greatest pleasure in making a careful

study of the text and maps, and we cannot allow so important a contribution to meteorology, and we may say to geography also, to pass without some attempt to bring its contents before English readers.

The year 1903 was characterised by summer rains of the cyclonic type in Germany, as in England, and the floods produced in the Oder by the rain of July 4th—13th were so disastrous as to cause the Prussian government to refer the matter for study to the Meteorological Institute, with the view of finding whether useful forecasts could be made of the meteorological conditions in Silesia which caused the river to rise uncontrollably. Professor Hellmann created a special "Silesian Department" of his Meteorological Office, and for nearly five years he kept two, and latterly three, assistants continuously at the work of discussing typical summer floods of the Oder. Nineteen such floods had occurred since 1888, when the rainfall system of Silesia had been organized, and two earlier cases were also dealt with. The rainfall preceding each of the 21 floods, often for several days, was mapped on the scale of 16 miles to an inch, from the data of 1500 to 2400 stations, over an area embracing the whole of Central Europe from the Baltic to the Mediterranean, and from the east of France to the west of Russia. The temperature and atmospheric pressure were mapped for two or three periods in each day dealt with, on a scale of about 50 miles to an inch, from about 400 stations. The pressure maps have isobars at intervals of 1 mm. or ·04 in., the result showing the pressure distribution in much greater detail than the synoptic charts in the daily weather reports can do with their generalized isobars based on a few stations and drawn for greater intervals of pressure. The maps were as a rule prepared for 7 a.m., 2 p.m. and 9 p.m. daily. The temperature maps were constructed with isotherms at intervals of 2° C.

In addition to the large rainfall maps, of which only a small selection is printed, the rainfall data are shown upon the pressure map, the 24 hours' rainfall being entered on the pressure map which most nearly represents the time when the greater part of the rain was believed to have fallen.

The plan of the work includes, after the general introduction on methods, a short account of the rainfall and pressure conditions of each of the 21 summer floods which were studied in detail, and abundant references to earlier literature on the subject. This part of the work occupies nearly one-third of the volume. Although the conditions of each flood were in many ways peculiar to itself, and no two cases were precisely similar, there were resemblances which made it possible to generalize, though in doing so some of the instances had to be viewed as exceptions to the rules that could be laid down.

The rains in question were all due to cyclonic disturbances, and the first question to be discussed was the direction of the tracks of the depressions which produced them. As a general rule these depressions came from the south, following more or less closely the

track charted by Van Bebber as Vb, and taking their origin in the plain of northern Italy or in the Balkan peninsula, they pursued a nearly straight path to the middle of northern Prussia, and thence usually turned westward on their way to the Baltic. On a very few occasions the floods were produced by cyclones travelling eastward from the North Sea. The depth of the depressions coming from the south is inconsiderable, the lowest pressure observed having been 29·28 in. In all cases an area of low pressure occurred in the Baltic before a depression travelled from the south, and a belt of low pressure was usually formed along which the cyclone centre progressed. In every instance a region of high pressure lay to the west of the track, and the most characteristic feature of this was a wedge of high pressure stretching across France and sometimes reaching the Balkan Peninsula, but never extending southward across the Alps, the pressure on the south side of the range being always much lower.

In two instances maps were prepared by Köppen's method of the distribution of pressure at 2,500 metres (8,200 feet), and in each case it was found that the cyclone developed first in the lower atmosphere, but as it extended in area on the surface it also developed in height, and in one instance ultimately became more marked at the higher level than at the lower; in both instances the axis of the cyclone was inclined from the vertical backwards with regard to the direction of motion. The conditions favouring the advance of a depression from south to north often led to movement along a trough of low pressure, when the temperature on the right kept higher than that on the left, which corresponds to the high pressure on the left being higher than that on the right. The heaviest precipitation was always on the west side of a depression moving from south to north. Although the authors do not refer to it, this is one case of the larger generalization to which the maps of wet days in the last ten volumes of *British Rainfall* point, that the maximum precipitation occurs on the left of the track of the centre of low pressure. An abrupt change in the direction in the path was accompanied by an increase in intensity of rainfall, a fact which may be associated with the origin of the heavy rain, less from the main depression than from secondaries forming on its margin, and frequently accompanied by thunderstorms. The rain was heavier on the mountains than on the plains during the passage of the depression, but the authors doubt whether the mountain rain alone would suffice to produce a really great flood in the river. No clear relation of intensity of rainfall to the depth or the gradient of the depressions has been made out, and although very important suggestions as to the effect of various combinations of conditions are thrown out, the investigation cannot be said to have reached a definite conclusion. It shows, however, the importance of concentrating attention on the ascensional movements in the atmosphere as the immediate cause of heavy rain, and on upper air research as a probable means of elucidating such movements.

RAINFALL TABLE FOR DECEMBER, 1911.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	RAINFALL OF MONTH. Aver. 1875—1909. in.	1911. in.
		° ′	° ′			
Camden Square	*London*	51 32	0 8	111	2·13	4·22
Tenterden	*Kent*	51 4	*0 41	190	2·77	6·13
Arundel (Patching)	*Sussex*	50 51	0 27	130	2·91	7·24
Southampton (Cadland)	*Hampshire*	50 50	1 22	52	3·23	8·59
Oxford (Magdalen College)	*Oxfordshire*	51 45	1 15	186	2·06	4·68
Wellingborough (Croyland Abbey)	*Northampton*	52 18	0 41	174	2·13	3·55
Shoeburyness	*Essex*	51 31	*0 48	13	1·71	3·13
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	2·14	3·94
Geldeston [Beccles]	*Norfolk*	52 27	*1 31	38	2·07	3·79
Polapit Tamar [Launceston]	*Devon*	50 40	4 22	315	4·46	11·29
Rousdon [Lyme Regis]	,,	50 41	3 0	516	3·68	7·70
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	2·71	6·51
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	2·99	5·80
Coventry (Kingswood)	*Warwickshire*	52 24	1 30	340	2·66	4·69
Boston	*Lincolnshire*	52 58	0 1	25	1·88	3·83
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	2·17	4·36
Macclesfield	*Cheshire*	53 15	2 7	501	3·35	4·94
Southport (Hesketh Park)	*Lancashire*	53 38	2 59	38	3·10	5·06
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	2·27	4·19
Arncliffe Vicarage	,, ,,	54 8	2 6	732	6·75	11·76
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	2·32	3·16
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	2·46	3·16
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	15·14	27·00
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	4·70	8·37
Haverfordwest	*Pembroke*	51 48	4 58	95	5·18	12·31
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	4·66	6·18
Llandudno	*Carnarvon*	53 20	3 50	72	2·84	5·14
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	4·84	10·25
Marchmont House	*Berwick*	55 44	2 24	498	2·83	4·74
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	5·48	11·75
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	3·95	4·93
Inveraray (Newtown)	*Argyll*	56 14	5 4	17	8·57	12·41
Mull (Quinish)	,,	56 34	6 13	35	6·59	9·60
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	2·67	4·38
Braemar	*Aberdeen*	57 0	3 24	1114	3·13	8·15
Aberdeen (Cranford)	,,	57 8	2 7	120	3·43	6·13
Cawdor	*Nairn*	57 31	3 57	250	2·53	1·83
Fort Augustus (S. Benedict's)	*E. Inverness*	57 9	4 41	68	5·62	5·48
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	9·86	11·11
Dunrobin Castle	*Sutherland*	57 59	3 56	14	3·09	2·71
Wick	*Caithness*	58 26	3 6	77	3·11	2·98
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	6·92	12·16
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	4·32	9·22
Nenagh (Castle Lough)	*Tipperary*	52 54	8 24	120	4·34	7·91
Miltown Malbay	*Clare*	52 52	9 26	400	4·84	7·91
Gorey (Courtown House)	*Wexford*	52 40	6 13	80	3·42	9·35
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	3·41	6·98
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	2·27	4·07
Mullingar (Belvedere)	*Westmeath*	53 29	7 22	367	3·39	4·85
Ballinasloe	*Galway*	53 20	8 15	160	3·69	5·66
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	6·11	8·16
Collooney (Markree Obsy.)	*Sligo*	54 11	8 27	127	4·34	7·27
Seaforde	*Down*	54 19	5 50	180	3·77	7·99
Bushmills (Dundarave)	*Antrim*	55 12	6 30	162	3·87	5·09
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	3·91	6·38

RAINFALL TABLE FOR DECEMBER, 1911—*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.	1911. in.	Diff. from Aver. in.	% of Av.	Mean Annual 1875-1909. in.	STATION.
+2·09	198	·48	20	23	25·11	24·79	— ·32	99	25·11	Camden Square
+3·36	221	·77	10	25	27·64	28·45	+ ·81	103	27·64	Tenterden
+4·33	249	·74	6	25	30·48	33·23	+2·75	109	30·48	Patching
+5·36	266	·76	6	26	31·87	31·05	— ·82	97	31·87	Cadland
+2·62	227	·59	22	27	24·58	19·52	—5·06	79	24·58	Oxford
+1·42	166	·50	20	27	25·17	20·21	—4·96	80	25·17	Croyland Abbey
+1·42	183	·49	20	24	19·28	18·76	— ·52	97	19·28	Shoeburyness
+1·80	184	·54	20	24	25·40	24·75	— ·65	97	25·40	Westley
+1·72	183	·49	10	29	23·73	21·09	—2·64	89	23·73	Geldeston
+6·83	253	1·29	17	29	38·27	39·42	+1·15	103	38·27	Polapit Tamar
+4·02	209	·94	14	26	33·54	27·17	—6·37	81	33·54	Rousdon
+3·80	240	·73	14	28	29·81	25·63	—4·18	86	29·81	Stroud
+2·81	194	·61	10	25	32·41	28·33	—4·08	87	32·41	Wolstaston
+2·03	176	...	...	...	28·98	20·92	—8·06	72	28·98	Coventry
+1·95	204	·43	14	29	23·35	22·78	— ·57	98	23·35	Boston
+2·19	201	·65	6	24	24·46	19·29	—5·17	79	24·46	Hodsock Priory
+1·59	147	·70	8	28	34·73	29·96	—4·77	86	34·73	Macclesfield
+1·96	163	·54	8	28	32·70	30·38	—2·32	93	32·70	Southport
+1·92	185	·56	14	25	26·87	25·90	— ·97	96	26·87	Ribston Hall
+5·01	174	·95	10	25	61·49	72·74	+11·25	118	61·49	Arncliffe
+ ·84	136	·47	10	26	26·42	24·41	—2·01	92	26·42	Hull
+ ·70	128	·46	13	22	27·94	27·81	— ·13	100	27·94	Newcastle
+11·86	178	3·19	10	28	129·48	148·14	+18·66	114	129·48	Seathwaite
+3·67	178	·72	8	28	42·28	40·21	—2·07	95	42·28	Cardiff
+7·13	238	1·23	14	30	46·81	50·49	+3·68	108	46·81	Haverfordwest
+1·52	133	·74	19	30	45·46	46·45	+ ·99	102	45·46	Gogerddan
+2·30	181	·69	6	27	30·36	30·57	+ ·21	101	30·36	Llandudno
+5·41	212	1·39	10	28	43·47	49·86	+6·39	115	43·47	Cargen
+1·91	167	·68	10	23	33·76	31·69	—2·07	94	33·76	Marchmont
+6·27	215	1·25	6	31	49·77	51·52	+1·75	104	49·77	Girvan
+ ·98	125	·80	9	28	35·97	37·13	+1·16	103	35·97	Glasgow
+3·84	145	1·20	6	31	68·67	83·62	+14·95	122	68·67	Inveraray
+3·01	146	1·19	23	31	56·57	57·74	+1·17	102	56·57	Quinish
+1·71	164	·73	10	24	28·64	17·08	—11·56	60	28·64	Dundee
+5·02	260	...	...	...	34·93	33·96	— ·97	97	34·93	Braemar
+2·70	179	·92	15	26	32·73	28·50	—4·23	87	32·73	Aberdeen
— ·70	72	...	...	...	29·33	28·25	—1·08	96	29·33	Cawdor
— ·14	98	·48	29	29	44·53	44·78	+ ·25	101	44·53	Fort Augustus
+1·25	113	1·37	24	28	83·93	90·96	+7·03	108	83·93	Bendamph
— ·38	88	·38	24	14	31·90	26·35	—5·55	83	31·90	Dunrobin Castle
— ·13	96	·46	24	22	29·88	27·41	—2·47	92	29·88	Wick
+5·24	176	1·93	6	30	54·81	56·14	+1·33	102	54·81	Killarney
+4·90	214	1·20	14	27	39·57	42·04	+2·47	106	39·57	Waterford
+3·57	182	·88	22	30	39·43	41·97	+2·54	106	39·43	Castle Lough
+3·07	164	1·01	9	31	45·11	42·68	—2·43	95	45·11	Miltown Malbay
+5·93	273	1·04	6	25	34·99	35·83	+ ·84	102	34·99	Courtown Ho.
+3·57	205	1·21	14	26	35·92	37·49	+1·57	104	35·92	Abbey Leix
+1·80	179	·82	14	26	27·68	23·48	—4·20	85	27·68	Dublin
+1·46	143	·85	14	27	36·15	36·84	+ ·69	102	36·15	Mullingar
+1·97	153	·71	6	26	36·64	38·45	+1·81	105	36·64	Ballinasloe
+2·05	133	1·20	23	31	52·87	51·36	—1·51	97	52·87	Enniscoe
+2·93	167	1·04	14	28	42·71	42·30	— ·41	99	42·71	Markree
+4·22	212	1·04	14	23	38·91	34·14	—4·77	88	38·91	Seaforde
+1·22	132	·55	10	26	37·56	31·16	—6·40	83	37·56	Dundarave
+2·47	163	·70	6	28	39·38	38·80	— ·58	99	39·38	Omagh

SUPPLEMENTARY RAINFALL, DECEMBER, 1911.

Div.	STATION.	Rain inches	Div.	STATION.	Rain inches
II.	Warlingham, Redvers Road	8·00	XI.	Lligwy	5·13
,,	Ramsgate	3·69	,,	Douglas	5·47
,,	Hailsham	7·51	XII.	Stoneykirk, Ardwell House	8·59
,,	Totland Bay, Aston House.	6·68	,,	Dalry, The Old Garroch	14·46
,,	Stockbridge, Ashley	8·94	,,	Langholm, Drove Road	9·07
,,	Grayshott	10·36	,,	Beattock, Kinnelhead	10·43
,,	Reading, Calcot Place	...	XIII.	StMary'sLoch,CramiltLdge	8·91
III.	Harrow Weald, Hill House.	4·97	,,	North Berwick Reservoir	2·88
,,	Pitsford, Sedgebrook	4·14	,,	Edinburgh, Royal Observty.	2·08
,,	Woburn, Milton Bryant	4·62	XIV.	Maybole, Knockdon Farm..	5·87
,,	Chatteris, The Priory	3·88	XV.	Campbeltown, Witchburn	9·43
IV.	Colchester, Lexden	3·73	,,	Glenreasdell Mains	8·14
,,	Newport	4·14	,,	Holy Loch, Ardnadam	12·36
,,	Rendlesham	3·72	,,	Ballachulish House	16·47
,,	Swaffham	3·48	,,	Islay, Eallabus	8·46
,,	Blakeney	2·55	XVI.	Dollar Academy	4·49
V.	Bishops Cannings	5·68	,,	Balquhidder, Stronvar	14·24
,,	Winterbourne Steepleton	9·00	,,	Coupar Angus	5·48
,,	Ashburton, Druid House	16·78	,,	Glenlyon, Meggernie Castle.	12·39
,,	Okehampton, Oaklands	12·43	,,	Blair Atholl	6·79
,,	Cullompton	8·62	,,	Montrose,SunnysideAsylum	5·19
,,	Hartland Abbey	6·39	XVII.	Alford, Lynturk Manse	6·40
,,	Lynmouth, Rock House	10·08	,,	Fyvie Castle	7·24
,,	Probus, Lamellyn	9·28	,,	Keith Station	4·77
,,	North Cadbury Rectory	8·65	XVIII.	Glenquoich, Loan	21·50
VI.	Clifton, Pembroke Road	7·34	,,	Skye, Dunvegan	11·71
,,	Ross, The Graig	7·57	,,	N. Uist, Lochmaddy	7·74
,,	Shifnal, Hatton Grange	4·68	,,	Alvey Manse	2·40
,,	Blockley, Upton Wold	7·27	,,	Loch Ness, Drumnadrochit.	3·01
,,	Droitwich	5·19	,,	Glencarron Lodge	10·18
VII.	Market Overton	4·84	XIX.	Invershin	2·87
,,	Market Rasen	4·12	,,	Loch Stack, Ardchullin	5·94
,,	Bawtry, Hesley Hall	4·01	,,	Melvich	3·80
,,	Derby, Midland Railway	3·96	XX.	Skibbereen Rectory	9·40
,,	Buxton	8·94	,,	Dunmanway, The Rectory..	12·41
VIII.	Nantwich, Dorfold Hall	4·42	,,	Cork	8·72
,,	Chatburn, Middlewood	6·68	,,	Mitchelstown Castle	7·92
,,	Cartmel, Flookburgh	7·75	,,	Darrynane Abbey	10·56
IX.	Langsett Moor, Up. Midhope	7·36	,,	Clonmel, Bruce Villa	9·16
,,	Scarborough, Scalby	4·10	,,	Newmarket-on-Fergus,Fenloe	6·77
,,	Ingleby Greenhow	6·50	XXI.	Laragh, Glendalough	11·56
,,	Mickleton	4·14	,,	Balbriggan, Ardgillan	4·51
X	Bellingham, High Green Manor	4·03	,,	Moynalty, Westland	5·75
,,	Ilderton, Lilburn Cottage	3·50	XXII.	Cong, The Glebe	8·23
,,	Keswick, The Bank	12·53	,,	Westport, St. Helens	10·01
XI.	Llanfrechfa Grange	10·45	,,	Achill Island, Dugort	10·77
,,	Treherbert, Tyn-y-waun	24·23	,,	Mohill, The Rectory	6·65
,,	Carmarthen, The Friary	10·10	XXIII.	Enniskillen, Portora	7·65
,,	Castle Malgwyn [Llechryd].	11·33	,,	Dartrey [Cootehill]	6·67
,,	Plynlimon	13·00	,,	Warrenpoint, Manor House	8·05
,,	New Radnor, Ednol	11·28	,,	Banbridge, Milltown	4·29
,,	Rhayader, Tyrmynydd	14·24	,,	Belfast, Cave Hill Road	5·61
,,	Lake Vyrnwy	7·44	,,	Glenarm Castle	8·11
,,	Llangyhanfal, Plâs Draw	3·66	,,	Londonderry, Creggan. Res.	5·86
,,	Dolgelly, Bryntirion	10·70	,,	Killybegs	8·65
,,	Bettws-y-Coed, Tyn-y-bryn	8·84	,,	Horn Head	7·40

METEOROLOGICAL NOTES ON DECEMBER, 1911.

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.—Very dull and wet, with a remarkable absence of frosts throughout, and singularly like December, 1910. The mean temp., 44°·7, was 5°·0 above the average, and excepting only 1868, 1898 and 1900, the highest for December in the 54 years' record. The duration of R, 90·4 hours, was the greatest recorded in December in the past 32 years. Duration of sunshine, 19·2* hours. Shade max. 55°·2 on 19th; min. 27°·6 on 8th. F 3, f 7.

TENTERDEN.—The wettest December for 35 years, and only exceeded by 1868, 1872 and 1876. Duration of sunshine, 43·0† hours. Shade max. 54°·0 on 19th; min. 30°·0 on 8th. F 2, f 13.

TOTLAND BAY.—The wettest December in 26 years' record, and the windiest month since March, 1903. Duration of sunshine, 58·9* hours. Shade max. 54°·9 on 19th; min. 33°·0 on 6th. F 0, f 4.

PITSFORD.—Mean temp. 41°·1. R 4·13 in. above the average. Shade max. 51°·2 on 17th; min. 28°·3 on 8th and 9th. F 8.

ASHBURTON.—With the exception of 1876, when 16·92 in. was recorded, it was the wettest December for 46 years. Shade max. 52°·1 on 29th; min. 34°·7 on 8th. F 0.

ROSS.—The wettest December for 94 years. Shade max. 53°·5 on 30th; min. 28°·6 on 8th. F 3.

HODSOCK PRIORY.—Shade max. 53°·2 on 17th; min. 29°·6 on 8th. F 6, f 21.

SOUTHPORT.—Duration of sunshine 40·7* hours, or 8·1 hours above the average. Duration of R 106·7 hours. Mean temp. 43°·4, or 4°·1 above the average. The number of rain days was the greatest in December during the 41 years' record. Shade max. 53°·9 on 18th; min. 32°·3 on 8th. F 0, f 10.

HULL.—Great amount of cloud and little sunshine. Frequent but not heavy R, and very mild throughout. Shade max. 54°·0 on 18th; min. 31°·0 on 8th. F 1, f 17.

HAVERFORDWEST.—Duration of sunshine 59·0* hours. Shade max. 62°·2 on 13th; min. 29°·8 on 7th and 9th. F 4.

LLANDUDNO.— Shade max. 55°·8 on 17th; min. 36°·2 on 8th.

CARGEN.—Only twice during the last 52 years has the R in December exceeded that of this month, viz., in 1868 and 1897. Mean temp. 3°·0 above the average. Shade max. 53°·3 on 18th; min. 28°·0 on 25th. F 7.

EDINBURGH.—Shade max. 53°·3 on 18th; min. 31°·9 on 5th. F 1, f 11.

COUPAR ANGUS.—The R was more persistent than heavy. The three days following the 13th resulted in the flooding of the Islay, which burst the flood dyke and submerged the land. Shade max. 53°·0 on 18th; min. 25°·0 on 5th.

FORT AUGUSTUS.—Shade max. 57°·2 on 18th; min. 26°·3 on 4th. F 4.

LOCH STACK.—Duration of sunshine, 20·6 hours.

CORK.—The R was the greatest for any month since December, 1899. Shade max. 49°·0 on 26th; min. 27°·0 on 6th. F 7, f 13.

DUBLIN.—An open, stormy, very wet month. The mean temp., 44°·5, was actually above that of November. Shade max. 57°·2 on 18th; min. 33°·9 on 23rd. F 0, f 5.

MARKREE.—The wettest month of the year. Temperature was mild; there were slight H showers and frequent gales. T and L very frequent. Shade max. 58°·2 on 18th; min. 27°·7 on 25th. F 14, f 17.

WARRENPOINT.—A month of continued R and with high winds on many days. Shade max. 52°·0 on 18th and 31st; min. 37°·0 on 5 days. F 0, f 1.

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* Campbell-Stokes. † Jordan.

Climatological Table for the British Empire, July, 1911.

STATIONS (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Total Rain Depth.	Days.	Aver. Cloud.
								0-100			inches		
London, Camden Square	92°6	22	48°5	3	81°7	56°9	55°5	64	135°4	43°9	1·17	5	3·1
Malta	92·7	29	66·2	1	83·4	72·5	65·8	72	148·6	...	...	...	1·8
Lagos	93·3	26	70·0	1	86·0	73·0	71·3	78	150·0	67·0	1·39	15	...
Cape Town	77·7	10	36·1	28	63·3	45·1	46·3	76	...	...	4·06	13	4·4
Johannesburg	68·7	5	26·5	15	59·6	40·1	33·7	64	118·0	24·5	·24	2	2·6
Calcutta...	95·4	21	74·8	24*	90·5	79·4	77·9	82	...	71·5	5·45	8	8·1
Bombay...	89·4	2	74·6	9	85·6	78·9	76·4	83	129·5	72·2	15·89	24	8·1
Madras	103·5	30*	74·1	10	98·2	79·7	71·9	66	150·5	73·4	1·14	11	5·6
Kodaikanal	65·8	31	50·2	15	60·5	52·0	51·5	87	142·8	42·9	5·73	23	8·3
Colombo, Ceylon ...	87·1	20	72·0	9	85·4	76·1	73·9	80	145·8	70·1	1·21	12	7·5
Hongkong	91·2	16	75·0	3	86·7	78·6	75·4	81	143·8	...	8·06	15	7·0
Sydney	67·1	18	39·5	28	59·2	47·0	43·0	76	108·2	29·1	7·71	29	5·2
Melbourne	63·0	16	29·5	26	54·9	40·4	40·4	76	111·2	23·2	2·26	15	5·2
Adelaide	66·0	7	34·9	25	59·6	44·8	44·1	78	127·3	23·3	1·97	16	5·0
Perth	67·9	3	37·4	6	61·6	48·1	48·7	81	120·8	27·6	7·14	22	6·6
Coolgardie	70·0	14	34·2	20	60·9	41·8	42·0	71	139·4	30·0	1·28	11	4·8
Hobart, Tasmania ...	61·4	16	33·3	29	51·8	39·2	37·3	74	104·7	27·5	·98	17	6·2
Wellington	59·6	22	35·8	29	53·5	43·3	34·4	59	94·0	28·0	7·42	17	6·0
Auckland	61·0	11†	37·5	8	57·5	45·1	..	...	88·0	32·0	1·63	18	5·9
Jamaica, Kingston ..	94·7	19	70·6	19	91·6	73·7	70·8	72	...	...	·35	1	4·8
Grenada	86·0	8	72·0	15‡	83·9	75·0	...	77	141·0	...	5·52	24	4·5
Toronto	103·2	3	47·7	27	82·6	60·6	...	...	121·0	43·7	2·61	11	3·2
Fredericton	95·3	6	49·0	24	82·6	58·2	...	73	...	...	3·52	11	5·6
St. John, N.B. ...	81·5	10	53·5	26*	72·6	57·4	...	...	...	...	2·65	9	5·2
Victoria, B.C.	89·5	16	44·7	4	73·5	51·1	...	65	...	...	·14	3	4·0
Dawson	83·0	3,5	37·0	21	74·1	46·2	...	...	...	...	1·37	9	5·5

* and 27. † and 25. ‡ and 16.

MALTA.—Mean temp. of air 78°·2. Average bright sunshine 12·2 hours per day.

Johannesburg.—Bright sunshine, 271·6 hours.

KODAIKANAL.—Bright sunshine, 94 hours.

COLOMBO.—Mean temp. of air 80°·8, or 0°·3 above, of dew point 0°·5 above, and R 3·27 in. below, averages. Mean hourly velocity of wind 8·0 miles.

HONGKONG.—Mean temp. of air 82°·0; R 4·70 in. below, and bright sunshine 48 hours, above, averages. Mean hourly velocity of wind 13·7 miles. Strong gales on 4th and 27th.

Sydney.—Mean temp. of air 0°·8 above, and R 3·04 in. above, averages.

Melbourne.—Mean temp. of air 0°·8 below, and R ·41 in. above, averages.

Adelaide.—Mean temp. of air 0°·7 above the average. Temp. on grass 23°·3, absolutely the lowest for any month for 50 years. R ·62 in. below average.

Perth.—Mean temp. of air normal, and R ·78 in. above average.

Coolgardie.—Mean temp. of air 0°·5 above, and R ·46 in. above, averages.

Hobart, Tasmania.—Mean temp. of air slightly below, and R 1·15 in. below, averages.

Wellington.—Mean temp. of air 0°·9 above, and R 1·61 in. above, averages. Bright sunshine 132·6 hours.

Auckland.—Rainfall less than a third of the average for 45 years, and with the exception of July, 1877, the smallest ever recorded here.

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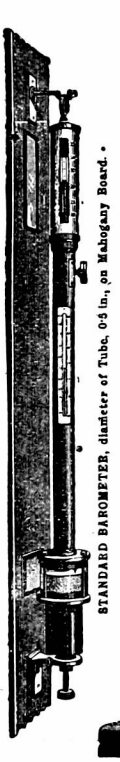

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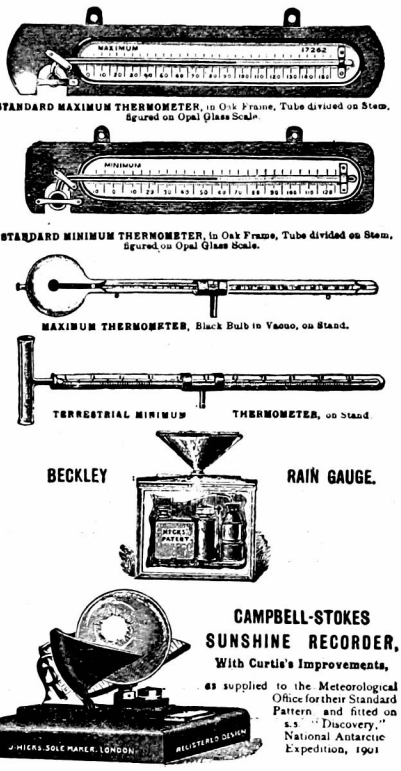

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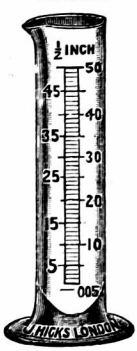

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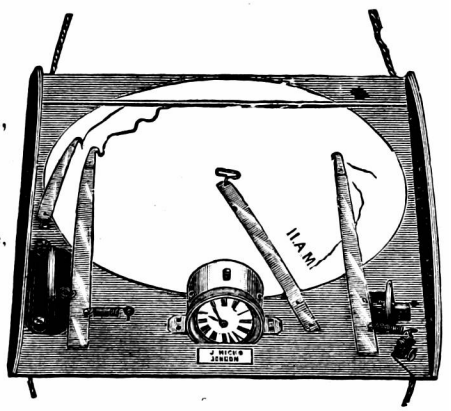

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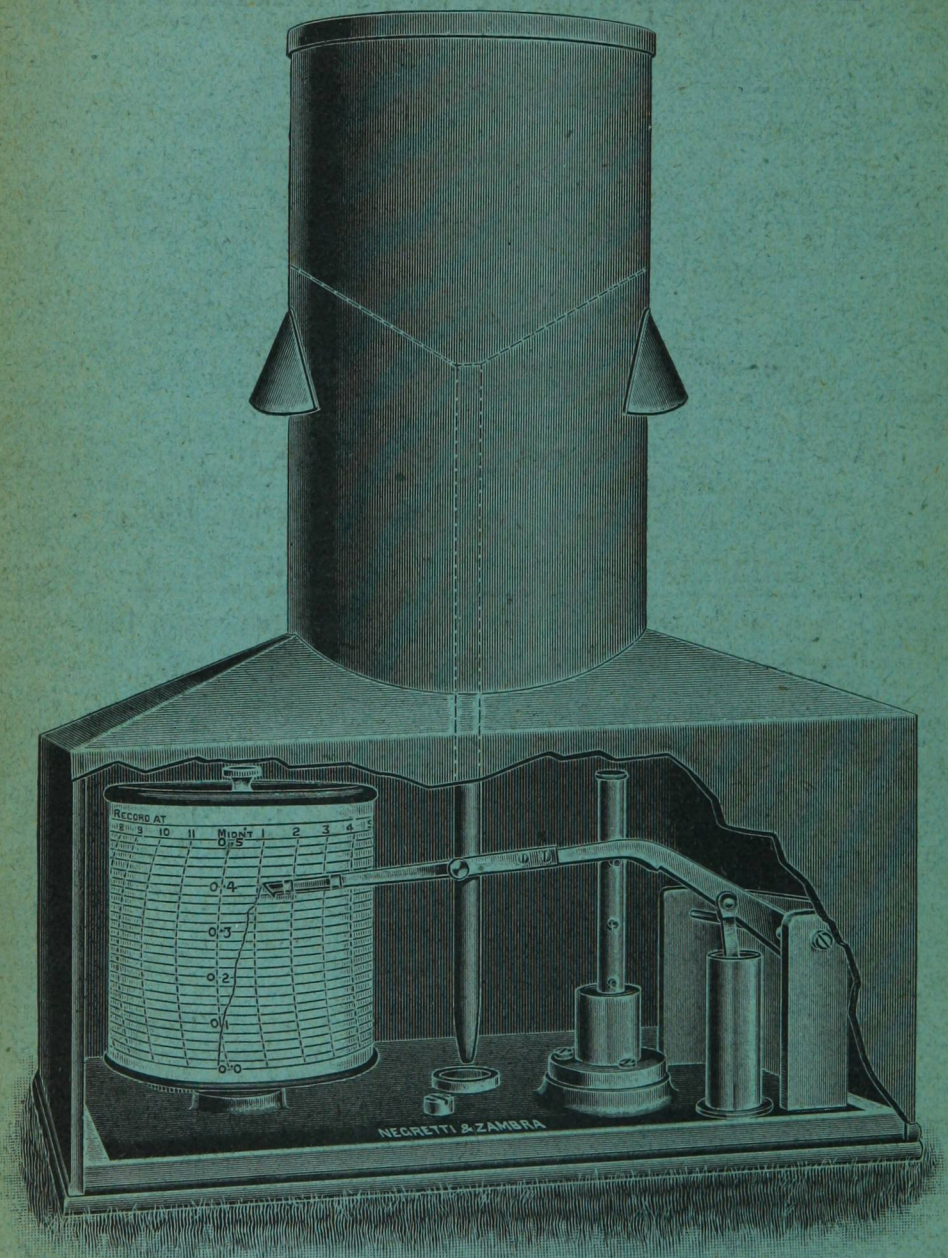

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