

COMMEMORATIVE BRONZE TABLETS IN THE HALL OF THE  
METEOROLOGICAL OFFICE, SOUTH KENSINGTON,  
LONDON. 1911.



SYMONS'S  
METEOROLOGICAL  
MAGAZINE.

---

Edited by HUGH ROBERT MILL, D.Sc., LL.D.

---

VOLUME THE FORTY-SIXTH.

~~~~~  
1911.  
~~~~~

LONDON:  
EDWARD STANFORD, 12, 13, 14, LONG ACRE, W.C.  
—  
1912.



**London :**  
**SHIELD AND SPRING, PRINTERS,**  
**LANCELOT PLACE,**  
**BROMPTON ROAD, S.W**

# INDEX.

	PAGE		PAGE
Abbe, Prof. Cleveland .....	252	— Climatology, Lt.-Col. H. Mellish	
Actinograph, A. W. Clayden on the	27	on the Present Position of.....	11
Aitken, J., F.R.S., Disappearance		— Rainfall, 1910.....	122, 143
of clouds at evening .....	156	Brodie, F. J., The Weather of the	
Anticyclone, The term .....	79	months of 1911...9, 25, 49, 67,	
April, 1911, The Weather of, by		90, 133, 134, 155, 177, 194, 221, 247	
F. J. Brodie .....	67	Brook, C. L., Damage by light-	
Arctic Spring, Our .....	75	ning.....	138
August, 1911, in London, High		Brown, W. Piffe, Black Haze .....	115
Temperature of July and, 153,		Bryant, W. W., The Greenwich	
173; The Weather of, by F. J.		temperature of 100° in the shade	159
Brodie.....	155	Buenos Aires, Flood Rains in.....	97
Australian Newspapers, Weather		Busk, H. G., What will the Wea-	
Charts in .....	226	ther be? (review).....	78
— Rainfall, Monthly Distribution		Chree, Dr. C., F.R.S., On the	
of (review).....	15	Diurnal Inequality of Baro-	
Bai-u, or Rainy Season in Japan,		metric Pressure at Castle O'er	119
by T. Okada (review).....	78	Clark, J. E., Sheet or Summer	
Balloon Ascents, International,		Lightning .....	74
122; by W. H. Dines, F.R.S.,		Clark, K. M., on Cloudiness	
5, 50, 68, 99, 118, 137,		Charts for the United States	27
163, 178, 198, 222,	249	Claydon, A., on the Actinograph	27
Barnes, C. A. A., C.E., Diurnal		Climatic Control, by L. C. W.	
range of barometer in Southern		Bonacina (review).....	182
Nigeria, 117; Climatology of		Climatological Tables for the	
Southern Nigeria.....	245	British Empire, 20, 40, 60, 84,	
Barometric depression, The distri-		104, 128, 148, 168, 188, 212, 236,	260
bution of Rain in a, by R.		Climatology of Southern Nigeria,	
Corless .....	85	by C. A. A. Barnes, C.E. ....	245
Begg, Rev. J. S., The "supposed"		Cloud, Curious Long-enduring....	115
cold of winter anticyclones ...	228	Cloudiness Charts for the United	
Black Haze.....	74, 115, 181	States, K. M. Clark on .....	27
Bonacina, L. C. W., Climatic Con-		Cobbold, P. A., The Supposed	
trol (review), 182; Cumulus		Cold of Anticyclones.....	71
Clouds on October 21st, 201;		Cold of Winter Anticyclones, The	
Monthly Pressure Gradients		"supposed".....	34, 52, 69, 71, 228
and Gale Frequency, 22; Our		Colliery Warnings .....	35
Arctic Spring, 75; Our hottest		Colombo, The New Observatory	
Summer, 181, 227; Tendency		at, by the Editor .....	1
for frost and snow around		Cooke, R., and S. C. Russell, on	
November 22nd, 251; The great		Well-depth compared with	
Thunderstorm of May 31, 1911	95	Rainfall .....	26
Boys, Rev. H. A., Effects of a		Corless, R., Distribution of Rain	
flash of lightning.....	73	in a Barometric Depression...	85
British Association, Meteorology		Cornish, Dr. Vaughan, Waves of	
at the, 149; by E. Gold,		the Sea and other Water	
174, 179, 195		Waves (review).....	28

	PAGE		PAGE
Cumulus Clouds on October 21st	201	Föhn Wind as it strikes one, The,	
Cyclones and the Sun's Rotation		by a Resident in Innsbruck ...	6
Period.....	33	Forecasting, Weather, R. G. K.	
Daily Weather Maps, The Use of	54	Lempfert on .....	32
Damage by Lightning .....	138	Frost Days in the Second Half	
Dansey, Rev. R. P., Our Perma-		Year .....	14
nent Snow-spots .....	160	Full Moon, The disappearance of	
December, 1911, The Weather of,		Cloud at, by W. Ellis, F.R.S.	
by F. J. Brodie.....	247	105, 140, 158, 180	
Denning, W. F., Curious Long-		Gale Frequency, Monthly Pressure	
enduring Cloud, 115; The		Gradients and, by L. C. W.	
Fall of Meteorites to the		Bonacina .....	22
Earth .....	53	Galton, Sir F., F.R.S. (obituary)...	21
Destruction of a Wind Vane by		Gaster, F., Gun-firing and Rainfall	35
Lightning.....	113	Godden, W., The Tale of—a Gust	54
Dines, W. H., F.R.S., Inter-		Gold, E., Meteorology at the	
national Balloon Ascents, 5,		British Association, 174, 179,	
50, 68, 99, 118, 137, 163, 178,		195; The use of Meteorological	
198, 222, 249; Planetary Rain-		observations in connexion with	
fall, 179; Supposed Cold of		Insurance .....	45
Winter Anticyclones.....	34, 69, 99	Granger, F. S., Black haze .....	181
Disappearance of Cloud at Full		Greenwich temperature of 100° in	
Moon, 140; by W. Ellis, F.R.S.,		the shade, The .....	159
105, 140, 180; at Evening.....	156	Guernsey, Heat and drought at ...	227
Distribution of Rain in Barome-		Gun-firing and Rainfall .....	35, 123
tric Depression, by R. Corless.	85	Gust, The tale of a .....	54
Dover, J., The October Rainfall,		Hall, Maxwell, Cyclones and the	
200; Our Arctic Spring.....	75	Sun's Rotation Period .....	33
Drought in India, 135; in the East		Halos, Complex system of.....	55
of Scotland, 114; January-		Hann, Dr. Julius, Handbuch der	
February, 1911, High Baro-		Klimatologie (review), 143;	
meter and, 23; of July, 1911.	130	The "supposed" cold of Win-	
Druce, F., The use of Daily Wea-		ter Anticyclones .....	52
ther Maps .....	54	Harding, C., on the Abnormal	
Dunlop, R. W., Weather Wisdom		Summer of 1911 .....	223
in Agriculture (review) .....	183	Heat in a Thunder Squall, Great.	201
Edwin, Capt. R. A., R.N. (obituary)	162	Hellmann, Prof. G., and Dr. v.	
Ellis, Hon. and Rev. W., Heavy		Elsner, Summer Floods of the	
Rainfall in the North of Eng-		Oder Valley (review) .....	253
land.....	116	Henkel, F. W., Is the Zodiacal	
Ellis, W., F.R.S., The disappear-		Light a Meteorological Pheno-	
ance of Cloud at Full Moon		menon? 190; Weather Science	
105, 140, 158, 180		(review) .....	142
English Climate, Variations in the,		Hepworth, Capt. Campbell, C.B.,	
W. Marriott on .....	76	The disappearance of clouds at	
Erratum.....	123	evening, 158; The Recurrence	
Fairgrieve, J., Movement of Rain		of Cold and Warm Periods, 12;	
on May 31st, 1911 .....	112	The Zodiacal Light.....	225
Fall of Meteorites to the Earth,		High Barometer and Drought,	
The .....	53	January—February, 1911 .....	23
— of Temperature in Bright Wea-		Hobbs, W. H., Characteristics of	
ther.....	106	existing Glaciers (review) .....	206
February, 1911, The Rainfall of,		Hopkinson, J., Destruction of a	
24; The Weather of, by F. J.		wind vane by lightning .....	113
Brodie.....	25	Horner, D. W., The October Rain-	
Finland, Atlas of (review).....	252	fall .....	199
Flash of Lightning, Effects of a ...	73	Hottest day on record in London,	
Fletcher, R., The October Rainfall	199	The .....	129
Flood Rains in Buenos Aires .....	97	— Summer on record, Our, 181, 200, 227	

# INDEX.

v.

	PAGE
Hunt, H. A., Monthly Distribution of Australian Rainfall (review), 15; Weather Charts in Australian newspapers .....	226
India, Serious drought in .....	135
Inequality of Barometric Pressure at Castle O'er, Dr. C. Chree, F.R.S., on the Diurnal .....	119
Innes, R. T. A., Millimetres or Inches .....	33
Insurance against Rain .....	41, 45, 92
— The use of Meteorological Observations in connexion with, by E. Gold .....	45
International Balloon Ascents, 122; by W. H. Dines, F.R.S., 5, 50, 68, 99, 118, 137, 163, 178, 198, 222, 249	
January, 1911, The Weather of, by F. J. Brodie, 9; and February, 1911, High Barometer and Drought .....	23
Johannesburg Observatory, The ...	72
Jones, J. R. Gethin, The latest Snow Spot in Wales .....	140
July Temperature in London, High 120, 153, 173	
—, 1911, The Drought of, 130; The Weather of, by F. J. Brodie	134
June, 1911, The Rainfall of, in the Thames Valley, 121; The Weather of, by F. J. Brodie ...	133
Koch, Felix J., A Visit to Medicine Hat .....	29
Lancashire Smoke, Black Haze and .....	74
Lecture and the Newspapers, A ...	202
Lempfert, R. G. K., on Weather Forecasting .....	32
Lewis, G. D., Black Haze and Lancashire Smoke .....	74
Lightning, Damage by, 138; Destruction of a Wind Vane by, 113; Effects of a Flash of, 73; Sheet or Summer, or neither?	74
Lippincott, R. C. Cann, The Paries Cloud .....	250
Lockwood, A., Heavy Rain in Snowdonia .....	201
MacDowall, A. B., Frost Days in the Second Half Year, 14; Rothesay Rainfall in Spring and Summer .....	116
McInroy, Col. C., C.B., Drought in the East of Scotland .....	114
March, 1911, The Weather of, by F. J. Brodie .....	49
Marriott, W., Hints to Meteorological Observers (review),	

	PAGE
143; on Variations in the English Climate, 1881-1910 .....	76
Mawley, E., on Phenological Observations for 1910 .....	93
May, 1911, The Thunderstorms of, 89; The Weather of, by F. J. Brodie, 90; Movement of Rain on 31st, 112; The Great Thunderstorm of 31st .....	95
Medicine Hat, 15, 35; A Visit to, by Felix J. Koch .....	29
Mellish, Lt.-Col. H., on The present position of British Climatology .....	11
Memorial Bronzes at the Meteorological Office .....	237
Meteorites to the Earth, The fall of	53
Meteorological Appointments .....	207
— Luncheon, The, by E. Gold ...	174
— News and Notes, 15, 35, 79, 122, 207, 252; Notes on the Months of 1911, 19, 39, 59, 83, 103, 127, 147, 167, 187, 211, 235, 259	
— Office, Memorial Bronzes at the	237
— Society, Royal, 11, 26, 47, 76, 92, 119, 223, 243; Council of the, 12; Dinner of the .....	93
— — Scottish .....	32
Meteorology at the British Association, 149; by E. Gold, 174, 179, 195	
Meteorite, The Tale of a .....	10
Mill, Dr. H. R., on "Rain," 149; and C. Salter on the Frequency and Grouping of Wet Days in London .....	92
Millimetres or Inches .....	33
Mossman, R. C., F.R.S.E., Abnormal Weather in South America during 1911, 238; Flood Rains in Buenos Aires, 97; The Probable Rainfall during the Summer .....	88
Movement of Rain on May 31st, 1911 .....	112
Newspapers, A Lecture and the ...	203
Nigeria, Southern, Diurnal range of barometer in, 117; Climatology of, by C. A. A. Barnes, C.E. ....	245
November, 1911, The Weather of, by F. J. Brodie .....	221
— 22nd, Tendency for frost and snow around .....	251
OBITUARY:—	
Galton, Sir Francis, F.R.S. ...	21
Edwin, Commander Robert Atherton, R.N. ....	162
Wind, Prof. Cornelius Harm..	241



	PAGE		PAGE
Observational Sciences, Prof. H. H. Turner, F.R.S., on the Characteristics of the.....	150	REVIEWS ( <i>continued</i> )—	
October, 1911, The Rainfall of, 199; The Weather of, by F. J. Brodie.....	194	Handbuch der Ozeanographie, von Dr. Otto Krümmel, Band II., Die Bewegungsformen des Meeres (Wellen, Gezeiten, Strömungen).....	97
Oder Valley, Summer floods of the (review).....	253	Weather Science, an Elementary Introduction to Meteorology, by F. W. Henkel.....	142
Paries cloud, The .....	250	Handbuch der Klimatologie, Band III., Klimatographie, von Dr. Julius Hann.....	143
Parkinson, F. B., Great heat in a thunder squall .....	201	Hints to Meteorological Observers, by W. Marriott.....	143
Phenological Observations for 1910, E. Mawley on .....	93	Climatic Control, by L. C. W. Bonacina .....	182
Planetary rainfall .....	161, 179	Weather Wisdom in Agriculture with Hints on Forecasting, by R. W. Dunlop.....	183
Pressure Gradients and Gale frequency, Monthly, by L. C. W. Bonacina .....	22	Characteristics of Existing Glaciers, by W. H. Hobbs ...	206
Rain, Dr. H. R. Mill on .....	149	Sixth Annual Report of the Meteorological Committee for the year ended March, 1911 ...	207
— drop experiments, S. C. Russell on .....	119	Atlas de Finlande, 1910.....	252
— Faking Foolishness .....	15	Meteorologische Untersuchungen über die Sommerhochwasser der Oder, von Prof. G. Hellmann und Dr. v. Elsner .....	253
— Insurance against .....	41, 45, 92	Rogers, H. K. G., Our Arctic Spring, 76; The Rainfall of 1826, 250; Small Range of Temperature.....	251
— Temperature of .....	199	Rothsay Rainfall in Spring and Summer .....	116
Rainfall of February, 1911, 24; of June, 1911, in the Thames Valley, 121; in October, 1911, 199; of the months of 1911, 16, 17, 18, 36, 37, 38, 56, 57, 58, 80, 81, 82, 100, 101, 102, 124, 125, 126, 144, 145, 146, 164, 165, 166, 184, 185, 186, 208, 209, 210, 232, 233, 234, 256, 257, 258; of 1911, 242; of 1826, 250; during the summer, The probable, by R. C. Mossman, F.R.S.E., 88; in Snowdonia, 201; in spring and summer, Rothsay, 116; in the North of England, Heavy.....	116	Rowswell, B.T., Heat and Drought at Guernsey.....	227
— Gun-firing and .....	35	Russell, S. C., Complex System of Halos, 55; On Rain-drop Experiments, 119; The Great Thunderstorm of May 31st, 1911, 96; and R. Cooke, on Well-depth compared with Rainfall .....	26
— Planetary.....	161, 179	Salter, Carle, Dr. H. R. Mill and, on the Frequency and Grouping of Wet Days in London ...	92
— Records, Prof. H. H. Turner, F.R.S., on What we can Learn from .....	47	Schuster, Dr. A., F.R.S.....	207
Range of Barometer in Southern Nigeria, Diurnal .....	117	Sedgwick, W., Weather in the Seventeenth Century, 61, 107, 169, 213	
Recurrence of Warm and Cold Periods, The .....	12	September, 1911, in London, Hot Weather of, 173; The Weather of, by F. J. Brodie.....	177
REVIEWS :—		Seventeenth Century, Weather in the, by W. Sedgwick, 61, 107, 169, 213	
Monthly Distribution of Australian Rainfall, issued under the direction of H. A. Hunt.....	15	Snow Spot in Wales, The Latest ..	139
Waves of the Sea, and other Water Waves, by Dr. Vaughan Cornish .....	28	— Spots, Our Permanent .....	160
What will the Weather be? By H. G. Busk .....	78		
On the Bai-u, or Rainy Season in Japan, by T. Okada .....	78		

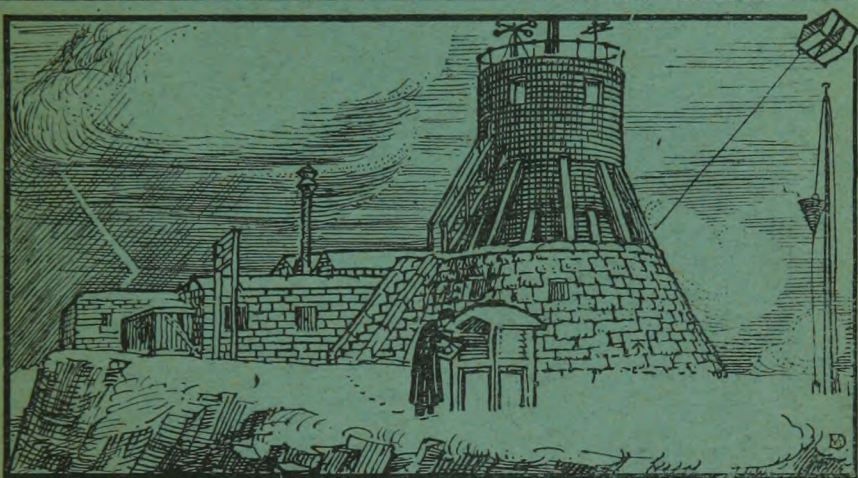
	PAGE		PAGE
Snowdonia, Heavy Rain in .....	201	Von Elsner, Dr., and Prof. G. Hellmann, Summer Floods of the Oder Valley (review) .....	253
South America, Abnormal Weather in, during 1911, by R. C. Mossman, F.R.S.E. ....	238	Walker, A. O., Fall of Temperature in Bright Weather... ..	106
Spring, Our Arctic .....	75	Warm and Cold Periods, The Recurrence of .....	12
Strachan, R., Disappearance of Cloud at Evening .....	157	Watersheds .....	73
Summer of 1911, The Abnormal... ..	223	Waves of the Sea, by Dr. Vaughan Cornish (review) .....	28
Sutton, J. R., Planetary Rainfall ..	161	Weather Charts in Australian Newspapers .....	226
Symons Gold Medal, The.....	252	— Forecasts, The Utility of .....	122
Tawney, Miss E. M., How our Hottest Summer on record would appear in the South of Europe .....	200	— in South America during 1911, Abnormal, by R. C. Mossman, F.R.S.E. ....	238
Temperature of July, 1911, in London, 120; of July and August, 1911, in London, 153; of July-September, 1911, in London, 173; of Rain, 199; of 100° in the shade at Greenwich, 159; Small range of ...	251	— in the Seventeenth Century, by W. Sedgwick .....	61, 107, 169, 213
Thames Valley, The Rainfall of June, 1911, in the .....	121	— Maps, The Use of Daily .....	54
Thunder Squall, Great Heat in a Thunderstorm of May 31st, 1911, 95; Movement of Rain in the ..	112	— Science, by F. W. Henkel (review) .....	142
Thunderstorms of May, 1911, The ..	89	— Wisdom in Agriculture, by R. W. Dunlop (review) .....	183
Turner, Prof. H. H., F.R.S., on The Characteristics of the Observational Sciences, 150; on What we can learn from Rainfall Records.....	47	Well-depth compared with Rainfall, R. Cooke and S. C. Russell on ..	26
United States Weather Bureau Library, The .....	251	Wet Days in London, Dr. H. R. Mill and C. Salter on the Frequency and grouping of.....	92
Vint, W. F., Heavy Rainfall in the North of England.....	116	Wind, Prof. C. H. (obituary) .....	241
		Winter Anticyclones, The supposed cold of.....	34, 52, 69, 71, 228
		Wireless Weather Telegrams .....	79
		Zodiacal Light, The, 225; by F. W. Henkel .....	189

## LIST OF ILLUSTRATIONS.

Memorial Tablets at the Meteorological Office .....	<i>Frontispiece</i>
Rainfall of the months of 1911 in the Thames Valley (maps) <i>face pp.</i> 10, 24, 49, 67, 89, 121, 131, 155, 177, 194, 221, 243	
Thermometers as set up at Colombo Observatory .....	<i>page</i> 2
Plan of the Colombo Observatory.....	„ 3
Meteorological Station at Medicine Hat.....	„ 31
Complex system of Halos seen from Epsom on March 8th, 1911 .....	„ 55
Diagram illustrating flow of Fluids .....	„ 87
Percentage of the Average Rainfall at Cordoba, January—March, and for N.E. England, July—September (diagram) .....	<i>face p.</i> 88
The Drought of July, 1911 (map) .....	„ 130
Chimney of Meltham Hall damaged by lightning.....	<i>page</i> 139
Australian Weather Chart (map) .....	„ 226
The Departure of Mean Temperature, June to August, 1911, from the Average in Argentina (map).....	„ 239
The Rainfall of 1911 in Relation to the Average .....	<i>face p.</i> 242
Rainfall at Lagos and Ibadan, 1907—1910 (diagram) .....	<i>page</i> 246
Average Maximum Shade Temperature in Southern Nigeria (map).....	„ 247



NO. 541 SYMONS'S VOL. 46  
METEOROLOGICAL  
• MAGAZINE •  
♦♦♦ EDITED BY HUGH ROBERT MILL ♦♦♦



FEBRUARY, 1911.

• CONTENTS •

	PAGE
The New Observatory at Colombo and its work. By THE EDITOR. (Illustrated.)	1
International Balloon Ascents in July, 1908. By W. H. DINES, F.R.S.	5
The Föhn Wind as it strikes one. By A RESIDENT IN INNSBRUCK	6
Map of January Rainfall in the Thames Valley .. ..	face p. 10
The Weather of January. By FRED. J. BRODIE .. ..	9
The Tale of a Meteorite .. ..	10
Royal Meteorological Society .. ..	11
CORRESPONDENCE :—	
The Recurrence of Warm and Cold Periods. By CAPTAIN CAMPBELL HEPWORTH, C.B. .. ..	12
Frost Days in the Second Half Year. By ALEX. B. MACDOWALL	14
Review .. ..	15
Meteorological News and Notes .. ..	15
Rainfall Table for January, 1911 .. ..	16
Supplementary Table of Rainfall, January, 1911, at 112 Stations..	18
Meteorological Notes on January, 1911 .. ..	19
Climatological Table for the British Empire, August, 1910..	20

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

Published on the 16th of each Month.]

[Price 4d., or 5s. per Annum, Post Free.



## NOTICES.

It is requested that all Books for Review and Communications for the Editor be addressed to 62, Camden Square, London, N.W.

The responsibility for all facts and opinions expressed in the signed articles and letters published in this Magazine rests with their respective authors.

---

Cloth 8vo. 428 pages. With Maps and Illustrations.

PRICE 10s.

## **BRITISH RAINFALL, 1909.**

THE FORTY-NINTH ANNUAL VOLUME.

COMPILED FROM THE RECORDS OF MORE THAN  
4600 OBSERVERS

BY

HUGH ROBERT MILL.

LONDON: EDWARD STANFORD, 12, 13 & 14 LONG ACRE, W.C.

---

## Royal Geographical Society's Publications.

### THE GEOGRAPHICAL JOURNAL.

Monthly. Illustrated. Edited by the Secretary. Price (to non-Fellows), 2s.

### HINTS TO TRAVELLERS.

Edited for the Council of the Royal Geographical Society by E. A. REEVES, F.R.G.S., F.R.A.S. Ninth Edition, revised and enlarged. In two volumes, illustrated. Price 15s. net. (To Fellows at the Office of the Society, 10s. net).

Vol. I.—Surveying and Practical Astronomy.

Vol. II.—Meteorology and Climate (by DR. H. R. MILL);  
Photography, Geology, Natural History, Anthropology, Industry and Commerce, Medical Hints, &c.

### THE DISTRIBUTION OF RAINFALL OVER THE LAND.

By DR. A. J. HERBERTSON. With monthly maps of Rainfall. Price 5s. net. (To Fellows, 2s. 6d.)

### ON THE RESULTS OF A DEEP-SEA SOUNDING EXPEDITION.

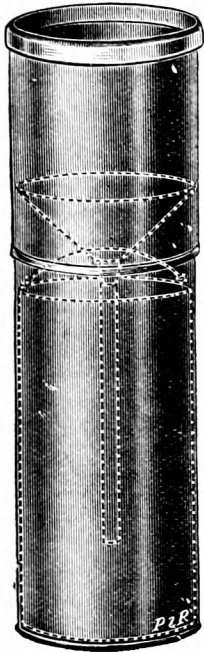
In the North Atlantic in the summer of 1899, by R. E. PEAKE, M Inst.C.E.; with notes on Temperature, Deep-Sea Deposits, &c., by SIR JOHN MURRAY, K.C.B., F.R.S. *Charts.* Price 5s. net. (To Fellows, 2s. 6d.)

### THE ANTARCTIC MANUAL,

For the use of the Expedition of 1901. Edited by GEORGE MURRAY, F.R.S., 1901. Pp. 586. *With a new chart of the Antarctic Regions.* Price, 15s. (To Fellows, 10s.)

ROYAL GEOGRAPHICAL SOCIETY, 1, Savile Row, W.  
AND ALL BOOKSELLERS.

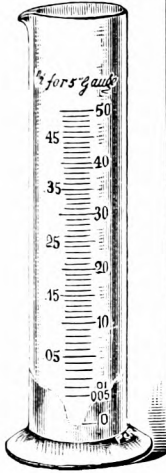
# RAIN GAUGES.



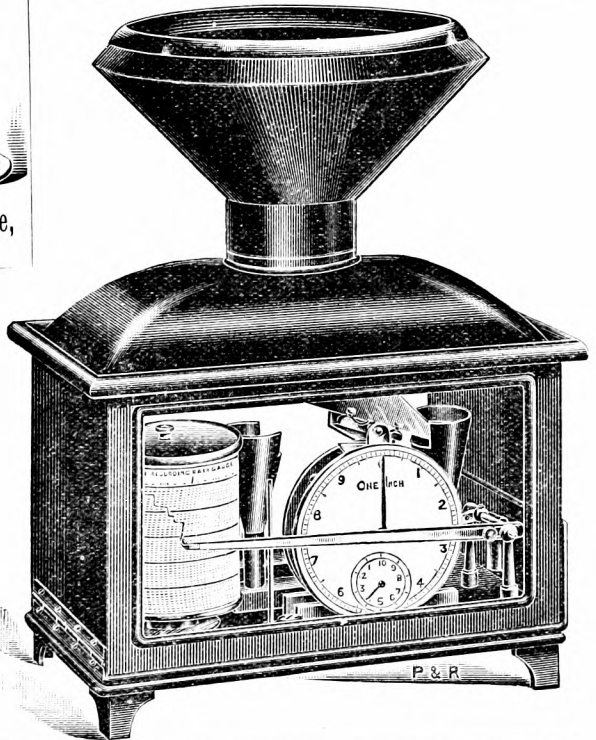
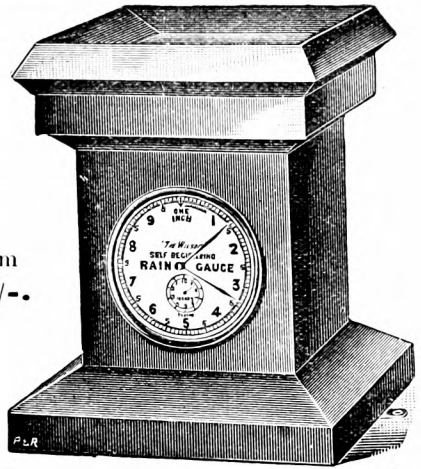
Standard "Snowdon" Rain Gauge,  
Stout Copper Body, with  
Extra Heavy Brass Rim,  
complete with  
Standard  
"Camden" Measure,  
21/-.

## The "Wilson" SELF-REGISTERING Rain Gauge.

With Improved Receiver to  
prevent splashing.



From  
60/-.



## The "Peandar" SELF-RECORDING Rain Gauge.

Records automatically on a  
Weekly Chart.

Totalising to 10 in. £9 7 6

" 200 " 9 15 0

Complete with one year's charts,  
pen and ink.

# PASTORELLI & RAPKIN, LTD. (ESTAB. 1750.)

46, HATTON GARDEN, LONDON, E.C.,

ACTUAL MAKERS of STANDARD, SELF REGISTERING, and  
SELF RECORDING METEOROLOGICAL INSTRUMENTS of ALL KINDS.

(WITH KEW, OR DR. MILL'S CERTIFICATES, IF DESIRED.)

✉ WRITE FOR ILLUSTRATED DESCRIPTIVE PRICE LISTS, POST FREE. ✉

\*\* We pay carriage and guarantee safe delivery within U.K. on all our Instruments.

( iii. )

# "THE MEASUREMENT OF RAINFALL."

---

## **C. F. CASELLA & Co., LTD.,**

have recently published a small pamphlet with this title ; it describes and illustrates all the principal rain-gauges made by them. both the ordinary forms and self-recording.

*Among the instruments described in it is*—————

### **Casella's Patent Rainfall Recorder**

— — — — — A QUITE NEW PATTERN — — — — —

in which all Rainfall Observers will be interested.

---

**A COPY WILL BE SENT POST FREE  
ON APPLICATION.**

---

**11-15, ROCHESTER ROW,  
LONDON, S.W.**

*Telegraphic Address:* "ESCUTCHEON, LONDON."

*Telephone:* WESTMINSTER 5599.

# Symons's Meteorological Magazine.

---

No. 541.

FEBRUARY, 1911.

VOL. XLVI.

---

## THE NEW OBSERVATORY AT COLOMBO AND ITS WORK.

BY THE EDITOR.

THE opportunity of a holiday voyage made it possible to pay a visit to the recently established Central Observatory of the Ceylon Meteorological Service, the records of which, and of the earlier station which it has superseded, have appeared month by month in our Table of the Climatology of the British Empire for the last 30 years. All through the Red Sea on the outward voyage the weather was brilliant, the northerly gale of the northern half making the blue waves leap into dazzling plumes of foam : the steady glare and humid heat of the calm belt off Suakin, made doubly welcome the renewed dash and glitter of the sea in the southern part of the Sea in response to the southerly head wind. Dolphins played round the bows like sea-horses harnessed to the ship, and flights of flying fish sprang clattering from the sides, gleaming in the sun like gigantic dragon flies. But all this gave place to dull grey skies, and as leaden a sea as that around the British Isles on a winter day, before the Indian Ocean was crossed. Occasional showers of heavy rain shut out the horizon like a fog through which the steamer had to proceed slowly with whistle blowing and nothing but the heat to show that we were within the tropics and not on the Arctic circle. The glimpse of the rugged coast of southern India on the day before reaching Colombo revealed masses of cloud rolling through the mountain passes in the early morning, and a close covering of dense cloud during the forenoon shrouded the land in the last expiring rains of the south-west monsoon, which had reasserted itself after having apparently ceased for the season. The climate of Colombo was indicated by the palm trees which dominate the gardens, the arcades and deep verandahs which surround the houses and shops, and by the crowds of picturesquely clad and unclad natives of every country of the East. The deep red roads which ran in bewildering ramifications through the rich green of grass and trees were dustless on account of the recurring showers. The journey of three miles out to the Observatory in a rubber-tired rickshaw, was a continuous panorama of the rich and varied life of



the East. There were the great palm leaf woven covers of the bullock carts and the pathetically small oxen, the squatting coolies repairing the roads by filling the hollows with road-metal and earth out of small baskets, patting the mounds smooth with their hands in readiness for the steam-roller, the continuous ringing of rickshaw bells and now and then the hoot of a motor: the trimly kept gardens of the bungalows formed a background, the impudent dark blue scavenger crows were everywhere, and the great black clouds rolling overhead as a grim contrast to the occasional bursts of sunshine which called out all the unfamiliar colours of the scene.

We have seldom known two hours pass so quickly as those in which the kindness of Mr. H. C. Barnard, the superintendent of the Observatory, and of Mr. A. J. Bamford, the chief assistant, enabled us to see the new Observatory and the work done in it on the meteorology of Ceylon. At the present day, as our fellow passengers had been obliging enough to demonstrate by day and night throughout the three weeks' voyage, sport is better understood than science by the ruling race in the East. Curiously enough but for this fact we might very possibly never have reached the Observatory in our rickshaw, and the Observatory itself would have been much less favourably situated, for its eight acres of ground are surrounded on the west, north and east by the links of the Ladies' Golf Club which, of course, is known to every rickshaw coolie, and the golf links being secure against building provide a free horizon on three sides. We feel sure that it will not be Mr. Barnard's fault if the tables are not turned in a few years' time, so that the stranger seeking the golf links will be told that they lie next to the Observatory.

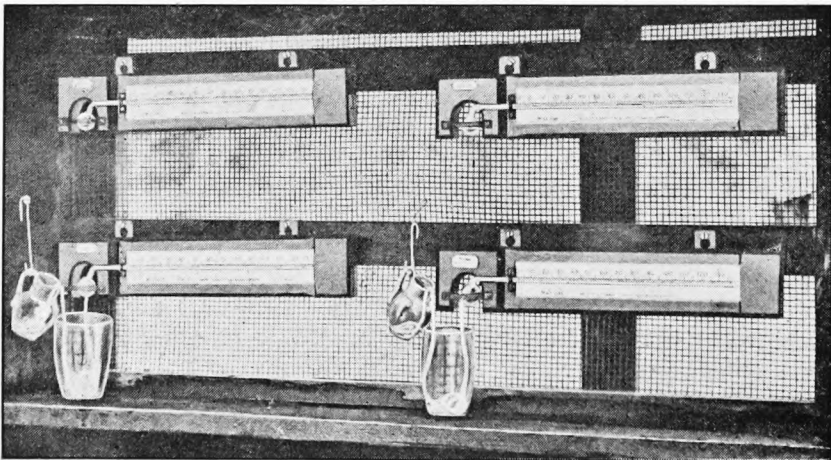


FIG. 1.—THERMOMETERS AS SET UP AT COLOMBO OBSERVATORY.

Although three miles from the sea the site of the Observatory is only 20 feet above sea level, and is fairly characteristic of Colombo. The few trees in the grounds do not interfere with the free movement

of the air. The main building of the Observatory is certainly unpretentious, but it is eminently practical, and has been designed to give as much accommodation as could be provided with the money available. It is one storey high, and consists, as shown in the plan, of three main rooms, with a verandah in front. The large room on the west has accommodation for ten clerks, the central room is a library, and the room on the east is the Superintendent's office, off which there opens a range of three smaller rooms running eastward, and consisting of a transit room, dark room and seismograph room, as the Observatory is so far astronomical as to be charged with the regulation of time. A 12½ in. equatorial reflecting telescope is sheltered in a temporary shed in the grounds, but a proper building with a revolving dome will probably soon be provided for it. The main building is constructed of reinforced concrete, and the transit and

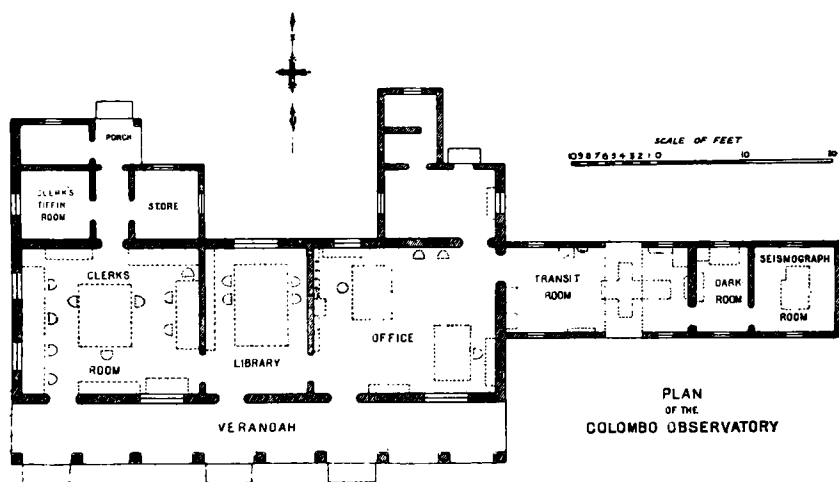


FIG. 2.—PLAN OF THE COLOMBO OBSERVATORY.

seismograph pillars of the same material are carried down, free of the concrete floors, from which they are separated by a two inch space filled with pitch, to foundations on the rock. The standard Fortin barometer is kept in the Superintendent's Office, to which it was transferred on April 27th, 1909, which may thus be taken as the date of opening of the new Observatory. A new form of barometer was devised by Mr. Barnard for use in the out-stations, where the setting of the ivory point in the cistern of the Fortin barometer proved to be an insuperable difficulty. Instead of adopting the narrow fixed cistern of the Kew barometer, which necessitates an arbitrary graduation of the scale, Mr. Barnard secures the absolute readings of the scale by making the cistern of great diameter as compared with the tube, so that in a country where the barometric range is so small as

in Ceylon\* the change of level in the cistern becomes negligible. The area of the cast-steel mercury cistern is about 200 times that of the cross section of the tube (it measures about 7 inches in diameter), and the instruments have been constructed by Messrs. Pastorelli & Rapkin. The recording instruments at present in use are of the Richard pattern, and except the recording rain gauge, which acts well, they are hardly worthy of such an observatory. The anemograph is of the Lander & Smith pattern.

The thermometer screen adopted for Ceylon is a square hut with a double roof, the ground plan being 8 feet square and the height 7 feet to the eaves. The sides are of wire netting, but a screen can be placed on the side on which the sun is shining. It must be remembered that in Colombo in latitude  $7^{\circ}$  N. the sun is for part of the year in the north at noon, though for most of the time it is in the south; but on account of the low latitude the noonday sun is always within  $30^{\circ}$  of the zenith, and it is vertical twice in the year. In these conditions of intense insolation the Stevenson screen could not give satisfactory results, and the free exposure of the instruments inside the open hut appears to be fully satisfactory. The ordinary wet and dry bulb thermometers for direct reading are not used, but instead there are maximum and minimum thermometers, both with dry and wet bulbs. The latter are provided with reservoirs always kept full of water, so that the distance from the water-surface to the bulb does not vary. This is done by means of a wick dipping to a little glass jug hung on the frame, which is so adjusted that it supplies exactly as much water to the cup as is evaporated from the bulb (Fig. 1). In an enclosure near the thermometer screen there are placed the 8-inch rain gauge at 1 foot, which is the standard pattern in the island, the Richard recording gauge and some experimental rain gauges, a series of earth thermometers and radiation thermometers. The Campbell-Stokes sunshine-recorder was found unsatisfactory, as the cards were so strongly burnt as to make the record illegible, but comparable results have been obtained by the use of a Lander and Smith photographic sunshine-recorder.

The "Report on the Colombo Observatory and the Meteorology of Ceylon for 1909," which was published in June, 1910, gives details of the observations at the sixteen meteorological stations in Ceylon situated at elevations varying from 11 to 6188 feet above sea-level, and at the 201 rainfall stations. Maps of the island show the mean rainfall and the rainfall of 1909 for the year and for the respective periods of the south-west and north-east monsoons. In the Observatory we saw a very neat presentation of the rainfall of the previous month on a map of Ceylon, with a glass-headed pin representing each station. The colour of the heads indicated the amount of monthly rainfall, and apart from the graphic representation of

---

\* The highest barometer ever recorded in Colombo was 30.096 in., on October 12th, 1904; the lowest ever recorded was 29.607 in., on June 24th, 1892, a total range of .489 in. The greatest range in any month was .243 in., in February, 1881.

rainfall distribution, this afforded a ready means of detecting errors in the returns. The Report contains short notices of several pieces of research; one of these is an interesting study by means of an electric fan and a relief model of the stream lines of air when wind blows against a cliff.

The proximity of India with its vast and highly organized meteorological system, sets a standard of comparison which may well be somewhat discouraging for the Government of Ceylon to contemplate; but bearing in mind the insularity of Ceylon and the supreme importance of an accurate knowledge of its climate with regard to its natural resources, we cannot but view with satisfaction the important step which has been taken in establishing the Colombo Observatory. After having inspected the Observatory and seen the way in which the instruments are kept and the records of the meteorology of the island preserved and discussed, we feel that the time has come for the Colonial Government to consider a complete equipment of first-class instruments, including photographic recorders for barometer, and wet and dry bulb thermometers as employed in the observatories under the Meteorological Office. While the photographic barometer could probably be set up in the Seismograph room, a special building would have to be provided for the photographic thermometers, the usual exposure of which, though suitable for the British Isles, would not be satisfactory in the tropics. Experiments on the subject might very well be made, and we feel sure that a judicious expenditure of public money would repay the Colony many times over, while there is so competent and enthusiastic a meteorologist as Mr. Barnard to deal with the climate of the island.

## INTERNATIONAL BALLOON ASCENTS, IN JULY, 1908.

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

*July 2nd, 1908.*

Starting Point.		A	B	C	D	E	F
		miles.	° F.	miles.	° F.	miles.	
Manchester....	England....	6·9	—49	7·8	—44	12	S.E.
Hamburg.....	Germany....	6·7	—67	10·0	?	74	S.S.E.
Lindenberg....	".....	6·8	—62	7·5	—58	29	S. by E.
Paris.....	France.....	6·6	—74	7·7	—63	138	N.W.?
Strassburg....	Germany....	7·3	—78	8·0	—62	20	S.E.
Munich.....	".....	7·3	—67	10·0	?	48	S.E. by S.
Pavia.....	Italy.....	7·7	—76	8·8	—69	10	S.E. by S.
Kuchino.....	Russia.....	8·1	—26	11·5	—24	19	N.

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 southern stations show the commencement of the isothermal to be rather above the average and the northern stations rather below. The values for Kuchino are very unusual. Similar values have been reported in England, but were perhaps due to instrumental errors. The barometer was well above its average and fairly uniform.



## THE FÖHN WIND AS IT STRIKES ONE.

By A RESIDENT IN INNSBRUCK.

THOSE destined by fate to live in a windy town accustom themselves by degrees to the discomfort it involves. With the optimism characteristic of human nature they dwell on its bracing qualities if the prevailing wind is north or east, and praise its mildness if it comes from the west or south, suppressing as much as possible the rain-bringing tendencies which in the latter case detract from these advantages.

There is a wind, however, experienced by dwellers in the Alps about which it is not so easy to be optimistic. That wind is the Föhn. The inhabitant of Innsbruck has good cause to be familiar with this wind. So familiar is it in fact, that no other wind counts but this. "Es geht wieder der Wind!" is the laconic greeting of the shopman who is serving you while Föhn gusts are striving to blow in his windows and clouds of dust are obscuring the passers-by. The Föhn is *the* wind par excellence, and though blasts from north, east and south may alternate with its appearance, these have no individuality in comparison with the Föhn.

Its precursors are well known and easily recognisable. The atmosphere becomes pure and limpid, distant hills are a marvellous transparent blue. Soft diaphanous clouds begin to gather in the southern sky; at a lower level, round the summits of the mountains, a few fleecy clouds collect, and at times these develop with incredible swiftness into an opaque wall blotting the southern horizon from view. But the most characteristic feature of this wind is the sudden rise in the temperature which accompanies it. If it is summer the atmosphere becomes stiflingly hot, if winter the keen frosty air turns mild and close. The Föhn blows at times with considerable force, sweeping northwards from the Brenner Valley as a warm, dry, sometimes burning wind, raising clouds of dust in its onrush. For the housewife it is the signal to close all her windows unless she wishes everything to be covered with a thick layer of dust.

If the Föhn only brought such discomforts in its train there would be little to say against it. Its chief drawback lies in its undoubtedly depressing influence on the nervous system. Many of the Innsbruck people, eager to defend the salubrity of their climate, deny that the Föhn exercises any such influence, but facts are against them. Head-ache, lassitude, depression—a general feeling of not being up to the mark—are the symptoms which in many individuals occur so regularly just before or during the coming of the Föhn, that it is safe to infer a causal connection between the two phenomena, even if allowance be made for the play of coincidence in some cases or of suggestion in others. Those susceptible to such influences are certainly affected by the Föhn, and those who deny such influences either ignore them or are so happily constituted that they do not feel them. Meteorologists admit the fact while declaring it to be overrated, but neither the

hypothesis of Trabert, which attributes it to the action of an approaching barometric depression, nor that of Czermak and others, which refers it to the electrical disturbance of the atmosphere produced by the Föhn, seem adequate to explain it.

Meteorological observations extending over a period of 25 years gives Innsbruck an average of 43 days of Föhn in the year. These are by no means equally distributed over the year as the following table shows :—

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	No. of Days.
3·1	3·4	6·0	5·9	5·1	1·5	2·2	1·4	2·0	4·6	4·3	3·0	42·5

From this it will be seen that Föhn is most frequent in spring and autumn. Though the average shows that no month is without a day of Föhn, yet within the 25 years under observation there were no less than 10 Julys and Augusts without one. To balance this boon of providence the same period shows a month of March with 17 days of Föhn, and an April and May with 15 each.

If the duration of the Föhn were confined to an hour or two of the day, or even to a single day, the complaints about it might be less frequent than they are. What makes it dreaded is the fact that it may continue for two or three days at a time. Here, however, statistics are rather comforting in so far as they show that in Innsbruck a one-day Föhn is far more frequent than one lasting a longer period. The following table records Pernter's observations for the same period of 25 years :—

Days of Föhn...	1	2	3	4	5	6	7	8
No. of times....	214	170	61	29	22	5	4	2

This means that 214 times in 25 years there was Föhn lasting a day, while twice in the same period there occurred a Föhn which lasted consecutively for eight days. The average for Innsbruck is, therefore, one or two days, though this does not exclude the possibility of an occasional five-day Föhn.

The frequent occurrence of this wind in spring has a sinister significance for Innsbruck and its neighbourhood as a winter sport place, for frost and snow disappear as if by magic at the touch of the Föhn, and if the great *Schneefresser*, "snow-devourer," is welcomed by the peasant in high alpine valleys as mitigating the rigours of winter and facilitating the coming of spring, it is with quite other feelings that the ski-runner watches the Föhn wiping the snowy cover off the slopes, or the skater sees the ice turning to water beneath his eyes. Recent researches by Dr. von Ficker show too, that the Föhn often lasts longer on the heights above Innsbruck like Igls, Heiligenwasser and Patscherkofel, than in the valley itself, that is in the very parts where the ski-runner is tempted to go if he chooses Innsbruck as a ski-ing centre at all. On the lower levels the Föhn can do little but spoil the ski-runners' sport, but in higher regions, by loosening the avalanche, it may prove his most deadly foe.

Despite the name it has got for Föhn, Innsbruck suffers from very

mild attacks of the wind compared with certain Swiss valleys where the extreme dryness of the wind by reducing all woodwork to the condition of matchwood, increases the danger of fire to such an extent that in certain localities fire of any kind, from that of the kitchen stove to that of a lighted cigarette is strictly prohibited during the Föhn. Again, there are regions where this wind blows with such fury as to uproot trees and leave a devastated track through the forest but such a Föhn never visits Innsbruck.

So far we have dwelt on the drawbacks of this wind, it is only fair to mention some of its advantages. These are, perhaps, most noticeable in its effects on vegetation. Innsbruck owes its crops of maize to the Föhn, which renders the temperature such that maize can thrive in it. Maize, however, is of comparatively late importation, but an interesting feature in connection with the Föhn is the survival in the Inn valley, near Innsbruck, of floral types from the inter-glacial period, which succeeded the great Ice Age. It is owing to the mild temperature set up by the Föhn that these relics of a semi-tropical vegetation have been enabled to continue their existence in their present environment.

One peculiarity of the Föhn is the certainty with which one may predict bad weather as its sequel. But the rain or snow which, according to the time of year, almost invariably follows the Föhn—so nearly invariably that in nine cases out of ten it would be safe to prophesy it—can only be welcomed as a wholesome finale to the action of the wind. After the rain comes sunshine again, and that cool, invigorating atmosphere which gives passing visitors the impression that Innsbruck must be as bracing a place as many at a higher altitude. It probably accounts too for the very different opinions one finds prevalent on the climate of Innsbruck. As the tourist is more frequent than the resident visitor he is apt to generalise from his own particular climatic experiences, with the result that such adjectives as—"bracing," "sunny," "exhilarating," "relaxing," "dull," "depressing," are equally used to describe the climate of the town. Only a longer residence can give the experience which justifies an authoritative statement on the subject. The truth lies as usual between the extremes. Neither those who laud the climate to the skies, nor those who execrate it, render the town a service. Unclouded bliss is rarely met with in this life, most of us have to be content with mixed blessings, every paradise has its serpent. The capital of Tyrol is no exception to this rule.

We are indebted to Dr. Heinz von Ficker for the meteorological data in the foregoing article.

---





Symons's Meteorological Magazine.

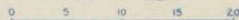
Watershed of River Thames above Teddington, and River Lee above Felldes Weir.

Rainfall Stations reporting  
in inches.

ALTITUDE  
SCALE

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

SCALE OF MILES





## THE WEATHER OF JANUARY.

By FRED. J. BRODIE.

THE old idea which associated the winter anticyclone with the almost invariable presence of long continued frost was rudely assailed many years ago by Mr. Dines, whose conclusions were regarded at the time as those of a veritable iconoclast. Since then the rule has been so often falsified by events that no one is surprised when a striking exception occurs, as it did last month. On January 18th, 1911, the barometer touched 30·8 in. at many places in the South of England, and on the night of the 31st it rose to very nearly the same height over the northern half of the country generally. In London the mean pressure for the month was a trifle above 30·3 in. being nearly three-tenths of an inch above the average. A higher monthly mean pressure has been recorded in the metropolis only ten times in the course of the past 40 years, the highest record of all occurring in February, 1891, when the value was 30·47 in.

Last month opened with cold northerly winds and showers of snow and sleet, and early on the 2nd a smart thunderstorm passed southwards in a narrow track across Norfolk. An anticyclone then extended temporarily over the country from northern Europe, and on the nights of the 2nd—4th sharp frosts were experienced in Ireland and Scotland, the sheltered thermometer falling from 10° to 12° below the freezing point in many places and touching 16° at Balmoral. On the grass the readings were as a rule not much lower than in the screen, but at many inland stations the thermometer sank below 20°, a minimum as low as 9° being recorded at Llangammarch Wells, and a reading of 14° at Balmoral. After the 4th the anticyclone receded to the eastward, and on the 6th a well-defined V-shaped depression passed in a similar direction across the United Kingdom, its disappearance over the North Sea being followed by a brief spell of mild winds from west and south-west. On the 8th and 9th the thermometer rose slightly above 50° in many places, and touched 54° at Killarney. An anticyclone which came in from the Atlantic on the 9th and 10th soon passed away in the face of another "V-shaped" depression, which moved down from the north-westward, and on the 12th a strong northerly gale was experienced very generally, with squalls of snow and sleet. The extension of a new anticyclone from the westward was followed by cold, quiet weather, and between the nights of the 12th and 15th sharp frosts were experienced in most districts, the sheltered thermometer falling 10° or more below the freezing point in several parts of Great Britain. On the grass the minimum readings about this time were as low as 12° at Newton Rigg, 13° at Tunbridge Wells, and 15° at Crathes, Aspatria and Llangammarch Wells. For the remainder of the month the conditions were almost continuously anticyclonic, but owing to the presence of much cloud and mist, which served to check the progress of terrestrial radiation, the nights were seldom very

cold, no further sharp frosts occurring until quite the end of the month. Between the 24th and 26th when the central area of the anticyclone was situated over France and Germany, a mild current of air from the south-westward swept across the United Kingdom, the thermometer rising well above  $50^{\circ}$  in all districts excepting the north of Scotland and exceeding  $55^{\circ}$  in several parts of England and Ireland; at Killarney the maximum reading on the 25th was as high as  $59^{\circ}$ . Early on the 31st a sharp frost was experienced in many parts of Great Britain.

The mean temperature of the month was below the normal in the south-west, including the south of Ireland and the Scilly and Channel Islands. Elsewhere there was a general excess, slight over England but rather large in Scotland. In the west and south the duration of bright sunshine was above the average. In London the excess was slight, while at most northern stations there was a trifling deficiency.

### THE TALE OF A METEORITE.

*The Times* of December 7th, 1910, published the following note:—

#### METEORITE AT HULL.

Considerable damage was caused at Hull in the early hours of yesterday by a meteorite which crashed through a building in the eastern quarter of the city and buried itself in the earth. One stable was demolished and the roofs of five others were shattered. Eight horses which were in the stables escaped injury.

In connection with this the Rev. C. W. Hony wrote us as follows:

“One gets a remarkable paragraph like this and nothing more is heard of it, and people will quote it as proof of the fall of a meteorite. In a lecture given some few years ago in Bath Sir Robert Ball stated that there was no known fall of a meteor to earth.”

The first point to ascertain was obviously the fact of the damage having been caused by a meteorite which buried itself in the earth, and it is one of the advantages of the British Rainfall Organization that there is an intelligent correspondent interested in meteorology within easy reach in almost every part of the British Isles who may be trusted to enquire into such an occurrence. We accordingly wrote to Mr. H. B. Witty, the Superintendent of Parks for the City of Hull, who visited the owner of the stables in question, and was informed by him that the reporter was under a misapprehension as to the cause of the damage done. The stables were old buildings, and it seemed probable that the collapse was brought about by the use of a gas engine for driving some machinery, the vibration presumably shaking the structure.

This is an excellent example of the danger of accepting statements made by those not expert in the subject of which they speak. Warned in time we express no opinion as to observations of the fall of meteorites having been made, but appeal to Mr. W. F. Denning for light on the subject he has studied so fully.

## ROYAL METEOROLOGICAL SOCIETY.

THE Annual General Meeting of this Society was held on Wednesday evening, January 18th, at the Institution of Civil Engineers, Westminster, Mr. H. Mellish, President, in the chair.

The Council in their report for the past year, expressed their pleasure that His Majesty The King had graciously consented to continue the patronage which he had accorded to the Society when Prince of Wales. They reported that the experiment had been tried for the first time of holding a meeting out of London, at Manchester, on February 22nd, 1910. The meeting was well attended, and led to a good discussion on the papers read, some of which were communicated by local Fellows. The increased number of applications for lectures on Meteorological subjects, showed that greater interest was now being taken by the general public in meteorological matters. The researches into the meteorological conditions of the upper atmosphere had been continued under the auspices of the joint Committee appointed by the Society and the British Association. The work of the Society in all its branches had been actively carried on, and there had been an increase of 21 in the number of Fellows on the roll during the year.

After the report had been adopted, the thanks of the Society were given to the Council for their services during the past year; to the Auditors; and also to the President and Council of the Institution of Civil Engineers, for allowing the meetings to be held in the rooms of the Institution.

The President then delivered an address on "The Present Position of British Climatology." He said that the third decade since the Society undertook the collection of climatological observations, suggested that the moment was opportune for taking stock of the data which have been collected in the British Isles, and of the progress which has been made in reducing and discussing them. After referring to the data collected and published by the Meteorological Office, the Royal Meteorological Society, the Scottish Meteorological Society, the British Rainfall Organization, &c., he proceeded to describe what had been done in the way of working up the data thus collected. The President mentioned the discussions which had been carried out by Dr. A. Buchan, Mr. F. C. Bayard, the Meteorological Office, Mr. G. J. Symons, Dr. H. R. Mill, Mr. R. H. Curtis, Dr. R. H. Scott, Mr. F. J. Brodie, Mr. W. Marriott, Dr. W. N. Shaw, and others. He concluded by saying: "For the larger question of the Climatology of the country, co-operation between the different organizations collecting and publishing data seems essential if the best results are to be attained. Agreement is necessary as to the form in which the summaries should be prepared, and the period which should be adopted for the determination of normal values. Different workers can then undertake their own branch of the work, knowing that it will fit into its proper place when all the results are



assembled together. Here again mere statistical results cannot be accepted as adequate, we must aim at representation on an adequate scale, by modern cartographical methods; the time seems ripe for such an undertaking, and it would be fitting that the Society should take a leading part in the work."

A hearty vote of thanks was accorded to Mr. Mellish for his Address and for his services as President.

The following gentlemen were elected the Officers and Council for the ensuing year:—*President*—Dr. H. N. Dickson, M.A.; *Vice-Presidents*—Mr. Francis Druce, M.A., Mr. H. Mellish, D.L., J.P., Mr. R. G. K. Lempfert, M.A., Colonel H. E. Rawson, R.E., C.B.; *Treasurer*—Dr. C. Theodore Williams, M.A.; *Secretaries*—Mr. F. C. Bayard, Commander W. F. Caborne, C.B.; *Foreign Secretary*—Mr. R. H. Scott, M.A., D.Sc., F.R.S.; *Councillors*—Mr. W. W. Bryant, B.A., Mr. C. J. P. Cave, M.A., Mr. F. W. Dyson, F.R.S., Mr. E. Gold, M.A., Mr. R. H. Hooker, M.A., Mr. R. Inwards, Capt. C. H. Ley, Mr. R. E. Middleton, M.Inst., C.E., Capt. M. W. C. Hepworth, C.B., Mr. Carle Salter, Mr. J. Wrench Towse, and Capt. R. C. Warden.

During the evening the following new Fellows were elected:—Mr. Bahar-ud-din Ahmed, Mr. J. M. G. Aldape, Mr. C. J. Balding, Mr. P. D. Booth, B.Sc., Mr. S. David, Mr. J. J. Hartley, Mr. B. E. D. Kilburn, M.A., Mr. L. G. de Lima, Mr. J. M. Machattie, Mr. G. H. Marshall, Mr. B. V. Pemberton, Mr. H. C. Rice, Dr. C. W. G. Rohrer, Miss Isolde Tower, Mr. G. J. Weldrick, and Mr. H. S. Wildeblood, M. Inst. C.E.

---

## Correspondence.

*To the Editor of Symons's Meteorological Magazine.*

---

### THE RECURRENCE OF WARM AND COLD PERIODS.

THE causes which lead to the recurrence in these islands and, for the most part, also in north-western Europe, of periods during which the temperature is considerably above or below the normal for the month, first called attention to by the late Dr. A. Buchan have, I believe, yet to be satisfactorily explained. The cold spells of April and May, which recur in about the second week in these months, may be connected, as they are associated, with the failure of the Gulf Stream Extension to reach our shores; the increase in the activity of the Greenland current at about the same time; and the consequent formation of a ridge of relatively high atmospheric pressure to the westward and north-westward of Ireland and Scotland, accompanied by winds from Polar regions. This correlation of changes in sea temperature and pressure distribution does not,

however, fully account for the yearly return of these periods of abnormally cold weather; and for the almost invariable recurrence of warm and cold periods in other months no causes have, so far as I know, been suggested.

Dr. Van Rijkevorsel, of Rotterdam, has shown that similar periods recur in other parts of the globe;\* and, from the curves of temperature he gives, some of these appear to synchronize with Buchan's periods.

I would ask those of your readers who are astronomers as well as meteorologists to consider whether their recurrence may not perhaps be attributable to cosmical causes: to local modifications in the structure of cosmic matter outside our atmosphere, such as that from which the zodiacal light and Gegenschein are reflected.

The literature in reference to these phenomena is limited, and little appears to be known in regard to the composition and distribution of the bodies which reflect the light or of the place in space their respective masses occupy. We are told that the zodiacal light is probably due to the reflection of solar light from a swarm of bodies, minute and possibly meteoric, which revolve round the sun; and that the Gegenschein is reflected light from meteorites that revolve, not round the Earth, but in an independent orbit, in the neighbourhood of the Earth.

On a number of voyages across the Pacific, between Australasia and British Columbia, during the years 1897—1900, careful observations of the zodiacal light were recorded by one of my officers and myself. On some occasions the light could be traced after sunset from the western horizon to a little beyond the zenith, and before sunrise on the morrow, from the eastern horizon almost to the zenith. Less frequently the zodiacal light could be traced from the western horizon after sunset to the zenith and faintly onward to the eastern horizon. For several successive nights it was visible from sunset to sunrise right across the sky, having a breadth of from  $18^{\circ}$  to  $20^{\circ}$ , and was distinct and clearly outlined.

The fact that the zodiacal light can be traced at times from horizon to horizon through the zenith suggests the question: May not the matter reflecting it encompass, not the sun, but the Earth? Astronomers may reply: The matter extends beyond the earth's orbit. Even in that case is it not conceivable that its density varies in different parts of the ecliptic, and would not such variations in density give rise to corresponding variations in the condition of the Earth's atmosphere, thereby causing climatic changes at its surface of periodic occurrence?

CAMPBELL HEPWORTH.

2, Amherst Road, Ealing, W., 6th February, 1911.

---

\* Konstant auftretende secundäre Maxima und Minima in dem jährlichen Verlauf der Meteorologischen Erscheinungen.

## FROST DAYS IN THE SECOND HALF YEAR.

IN relation to the idea expressed in one of Bacon's essays, that the same kind of weather tends to come back in about thirty-five years (Brückner's period), the following group of facts is, I think, of interest. It may also, possibly, be useful in forecasting, but of this the reader must judge.

Taking the Greenwich record, from 1841 to 1875 (that being as far as we could go in 1910 with the method used), let us note the years in which the second half had less than the average number of frost days, viz., 18. There were 15. Then note how many frost days were in the second half of the 34th year after in each case. I give the table:—

	Frost days (under 18).	34th year after.	Difference from average.
1.....1842	9	9	- 9
2.....1843	13	15	- 3
3.....1845	13	38	+20
4.....1847	10	14	- 4
5.....1848	14	15	- 3
6.....1850	10	11	- 7
7.....1852	2	21	+ 3
8.....1857	7	14	- 4
9.....1861	15	14	- 4
10.....1862	11	18	0
11.....1863	10	8	-10
12.....1865	5	18	0
13.....1868	14	10	- 8
14.....1872	4	19	+ 1
15.....1873	17	6	-12
Average	10·3	15·3	

Thus it appears that where a second half has had less than the average, the 34th second half after has generally been mild, average or excess slight (+3 at most). There is one anomalous case, 1845, followed by 1879, with the coldest second half on record. With the second half of 1910 in prospect, there seemed to be a fair presumption that it would not have more than 21 frost days. For other reasons I thought it likely to have over 12.

When November brought forth 16 frost days, this forecast appeared to be doomed. But, to my surprise, it has been verified by an extremely mild December (adding only three frost days). Did the figures warrant expectation of this mild month?

Turning to the case of second halves with an excess of frost days, I may say that where there have been more than 22 frost days the 34th second half after has shown excess (over average) in 9 cases against 3.

In seeking light from all quarters on future weather, it is well, in some cases, I think, to go on with certain proved relations until they clearly fail us (which may seem a possible contingency with rather scant data); and this may be a case of the kind.

ALEX. B. MACDOWALL.

## REVIEW.

*Monthly Distribution of Australian Rainfall*, Bulletin No. 4 (issued December, 1909) . . . . under the direction of H. A. Hunt, Commonwealth Meteorologist, Melbourne. Size 12 × 9. Pp. 10. 2 plates and map.

THE pamphlet before us is hardly so lucid as those which have preceded it from the Commonwealth Bureau of Meteorology. The letterpress consists for the most part of general statements from other authorities, and the tables and curves hardly receive sufficient detailed discussion to bring out their value. We do not care for the notation which gives rainfall in hundredths of an inch without inserting the decimal point, *e.g.*, 2808 instead of 28·08, and we think a clearer warning should have been given of the danger of comparing average rainfalls when the periods vary from 8 to 42 years. A diagram of the hourly incidence of rainfall at Melbourne, Adelaide, Perth and Sydney for the year ending June 30th, 1909, shows that generally speaking for Melbourne and Adelaide least rain fell between 8 p.m. and 1 a.m., while for Sydney and Perth (between which one hardly expected to find parallelism) most rain fell between those hours. We feel that on the whole it would be wiser to separate general statements based largely on general principles from the discussion of data accumulated in Australia.

~~~~~  
METEOROLOGICAL NEWS AND NOTES.

RAIN-FAKING FOOLISHNESS is the phrase applied by the Editor of the *Evening Post* of Wellington, N.Z., to the way in which "poor Oamaru and the adjacent drought-stricken parts are about to make themselves a jest for the scientific world," and it deplores the fact that the New Zealand Government had ignored the advice of its own Meteorological Office, and voted a sum of money "towards the cost of explosives for the farce." In sending us the paper, from which we have quoted a few powerful phrases, the Rev. D. C. Bates observes that good rain fell in the thirsty region before the bombs were fired. It was a narrow escape, for if the rain had held off a little longer a far larger sum of public money would doubtless have been demanded on the strength of a successful demonstration. Our readers will remember Mr. Bates's able description of the earlier Oamaru experiments in vol. 43 (1908), pp. 107, 137, 156.

MEDICINE HAT, in Western Canada, a typical town of the Great Plains, is we learn from a chance reference in a newspaper of the United States credited with a unique reputation for the origin of blizzards, no doubt as baseless as the reputation of Comrie in Perthshire for earthquakes, if not as malicious as the heading "Notes from Markinch" which once figured in a Fifeshire newspaper for a column of statements which strained credulity. Markinch was, we understand, the place of publication of a rival sheet.

## RAINFALL TABLE FOR JANUARY, 1911.

| STATION.                           | COUNTY.              | Lat.<br>N. | Long.<br>W.<br>[°E.] | Height<br>above<br>Sea.<br>ft. | RAINFALL<br>OF MONTH           |              |
|------------------------------------|----------------------|------------|----------------------|--------------------------------|--------------------------------|--------------|
|                                    |                      |            |                      |                                | Aver.<br>1875—<br>1909.<br>in. | 1911.<br>in. |
| Camden Square.....                 | London.....          | 51 32      | 0 8                  | 111                            | 1'83                           | 1'38         |
| Tenterden.....                     | Kent.....            | 51 4       | *0 41                | 190                            | 2'14                           | 1'51         |
| Arundel (Patchling).....           | Sussex.....          | 50 51      | 0 27                 | 130                            | 2'59                           | ...          |
| Southampton (Cadland) ...          | Hampshire.....       | 50 50      | 1 22                 | 52                             | 2'75                           | 1'30         |
| Oxford (Magdalen College)...       | Oxfordshire.....     | 51 45      | 1 15                 | 186                            | 1'78                           | '68          |
| Wellingborough (Croyland Abbey)... | Northampton.....     | 52 18      | 0 41                 | 174                            | 1'89                           | '76          |
| Shoeburyness.....                  | Essex.....           | 51 31      | *0 48                | 13                             | 1'33                           | '90          |
| Bury St. Edmunds (Westley)...      | Suffolk.....         | 52 15      | *0 40                | 226                            | 1'70                           | 1'74         |
| Geldeston [Beccles].....           | Norfolk.....         | 52 27      | *1 31                | 38                             | 1'53                           | 1'77         |
| Polapit Tamar [Launceston]...      | Devon.....           | 50 40      | 4 22                 | 315                            | 3'59                           | 1'33         |
| Rousdon [Lyne Regis].....          | „.....               | 50 41      | 3 0                  | 516                            | 2'94                           | '98          |
| Stroud (Upfield).....              | Gloucestershire..... | 51 44      | 2 13                 | 226                            | 2'33                           | 1'32         |
| Church Stretton (Wolstaston)...    | Shropshire.....      | 52 35      | 2 48                 | 800                            | 2'51                           | '61          |
| Coventry (Kingswood).....          | Warwickshire.....    | 52 24      | 1 30                 | 340                            | 2'22                           | '86          |
| Boston.....                        | Lincolnshire.....    | 52 58      | 0 1                  | 25                             | 1'54                           | 1'57         |
| Workop (Hodsock Priory)...         | Nottinghamshire..... | 53 22      | 1 5                  | 56                             | 1'70                           | '89          |
| Macclesfield.....                  | Cheshire.....        | 53 15      | 2 7                  | 501                            | 2'66                           | 1'29         |
| Southport (Hesketh Park)...        | Lancashire.....      | 53 38      | 2 59                 | 38                             | 2'55                           | '80          |
| Wetherby (Ribston Hall)...         | Yorkshire, W.R.....  | 53 59      | 1 24                 | 130                            | 1'89                           | 1'35         |
| Arcliffe Vicarage.....             | „.....               | 54 8       | 2 6                  | 732                            | 6'26                           | 4'15         |
| Hull (Pearson Park).....           | „ E.R.....           | 53 45      | 0 20                 | 6                              | 1'70                           | 1'32         |
| Newcastle (Town Moor) ...          | Northumberland.....  | 54 59      | 1 38                 | 201                            | 1'90                           | 1'67         |
| Borrowdale (Seathwaite) ...        | Cumberland.....      | 54 30      | 3 10                 | 423                            | 13'44                          | 11'17        |
| Cardiff (Ely).....                 | Glamorgan.....       | 51 29      | 3 13                 | 53                             | 3'65                           | 1'90         |
| Haverfordwest.....                 | Pembroke.....        | 51 48      | 4 58                 | 95                             | 4'69                           | 3'00         |
| Aberystwyth (Gogerddan)...         | Cardigan.....        | 52 26      | 4 1                  | 83                             | 3'91                           | 2'26         |
| Llandudno.....                     | Caernarvon.....      | 53 20      | 3 50                 | 72                             | 2'51                           | '70          |
| Cargen [Dumfries].....             | Kirkcudbright.....   | 55 2       | 3 37                 | 80                             | 4'10                           | 2'54         |
| Marchmont House.....               | Berwick.....         | 55 44      | 2 24                 | 498                            | 2'40                           | 1'40         |
| Girvan (Pinmore).....              | Ayr.....             | 55 10      | 4 49                 | 207                            | 4'78                           | 3'42         |
| Glasgow (Queen's Park) ...         | Renfrew.....         | 55 53      | 4 18                 | 144                            | 3'53                           | 2'74         |
| Inveraray (Newtown).....           | Argyll.....          | 56 14      | 5 4                  | 17                             | 7'34                           | 7'48         |
| Mull (Quinish).....                | „.....               | 56 34      | 6 13                 | 35                             | 5'55                           | 5'02         |
| Dundee (Eastern Necropolis)...     | Forfar.....          | 56 28      | 2 57                 | 199                            | 2'01                           | '62          |
| Braemar.....                       | Aberdeen.....        | 57 0       | 3 24                 | 1114                           | 2'92                           | 1'44         |
| Aberdeen (Cranford).....           | „.....               | 57 8       | 2 7                  | 120                            | 2'36                           | 1'55         |
| Cawdor.....                        | Nairn.....           | 57 31      | 3 57                 | 250                            | 2'28                           | 1'19         |
| Fort Augustus (S. Benedict's)...   | E. Inverness.....    | 57 9       | 4 41                 | 68                             | 5'58                           | 3'02         |
| Loch Torridon (Bendamph)...        | W. Ross.....         | 57 32      | 5 32                 | 20                             | 9'26                           | 8'88         |
| Dunrobin Castle.....               | Sutherland.....      | 57 59      | 3 56                 | 14                             | 2'75                           | 2'14         |
| Wick.....                          | Caithness.....       | 58 26      | 3 6                  | 77                             | 2'48                           | 1'89         |
| Killarney (District Asylum)...     | Kerry.....           | 52 4       | 9 31                 | 178                            | 5'94                           | 1'76         |
| Waterford (Brook Lodge)...         | Waterford.....       | 52 15      | 7 7                  | 104                            | 3'78                           | 1'68         |
| Nenagh (Castle Lough).....         | Tipperary.....       | 52 54      | 8 24                 | 120                            | 3'88                           | 1'67         |
| Miltown Malbay.....                | Clare.....           | 52 52      | 9 26                 | 400                            | 4'01                           | 2'16         |
| Gorey (Courtown House) ...         | Wexford.....         | 52 40      | 6 13                 | 80                             | 3'19                           | 1'25         |
| Abbey Leix (Blandsfort)...         | Queen's County.....  | 52 56      | 7 17                 | 532                            | 3'15                           | 1'68         |
| Dublin (Fitz William Square)...    | Dublin.....          | 53 21      | 6 14                 | 54                             | 2'14                           | '64          |
| Mullingar (Belvedere).....         | Westmeath.....       | 53 29      | 7 22                 | 367                            | 3'10                           | 2'12         |
| Ballinasloe.....                   | Galway.....          | 53 20      | 8 15                 | 160                            | 3'35                           | 2'14         |
| Crossmolina (Enniscoe).....        | Mayo.....            | 54 4       | 9 18                 | 74                             | 5'35                           | 2'46         |
| Collooney (Markree Obsy.)...       | Sligo.....           | 54 11      | 8 27                 | 127                            | 3'87                           | 2'53         |
| Seaforde.....                      | Down.....            | 54 19      | 5 50                 | 180                            | 3'41                           | 1'12         |
| Bushmills (Dundarave).....         | Antrim.....          | 55 12      | 6 30                 | 162                            | 3'19                           | 1'55         |
| Omagh (Edenfel).....               | Tyrone.....          | 54 36      | 7 18                 | 280                            | 3'46                           | 2'71         |

## RAINFALL TABLE FOR JANUARY, 1911—continued.

| RAINFALL OF MONTH (con.) |          |                   |       |             | RAINFALL FROM JAN. 1. |       |                      |          | Mean Annual 1875-1909. | STATION.         |
|--------------------------|----------|-------------------|-------|-------------|-----------------------|-------|----------------------|----------|------------------------|------------------|
| Diff. from Av. in.       | % of Av. | Max. in 24 hours. |       | No. of Days | Aver. 1875-1909.      | 1911. | Diff. from Aver. in. | % of Av. |                        |                  |
|                          |          | in.               | Date. |             | in.                   | in.   |                      |          | in.                    |                  |
| — .45                    | 75       | .32               | 6     | 12          | ...                   | ...   | ...                  | ...      | 25.11                  | Camden Square    |
| — .63                    | 71       | .58               | 11    | 16          | ...                   | ...   | ...                  | ...      | 27.64                  | Tenterden        |
| ...                      | ...      | ...               | ...   | ...         | ...                   | ...   | ...                  | ...      | 30.48                  | Patching         |
| — 1.45                   | 47       | .43               | 6, 11 | 12          | ...                   | ...   | ...                  | ...      | 31.87                  | 2 Cadland        |
| — 1.10                   | 38       | .17               | 6, 11 | 12          | ...                   | ...   | ...                  | ...      | 24.58                  | Oxford           |
| — 1.13                   | 40       | .21               | 6     | 10          | ...                   | ...   | ...                  | ...      | 25.17                  | 1 Croylund Abbey |
| — .43                    | 68       | .21               | 4     | 12          | ...                   | ...   | ...                  | ...      | 19.28                  | Shoeburyness     |
| + .04                    | 102      | .39               | 2     | 13          | ...                   | ...   | ...                  | ...      | 25.40                  | Westley          |
| + .24                    | 116      | .40               | 11    | 18          | ...                   | ...   | ...                  | ...      | 23.73                  | Geldeston        |
| — 2.26                   | 37       | .37               | 5     | 14          | ...                   | ...   | ...                  | ...      | 38.27                  | Polapit Tamar    |
| — 1.96                   | 33       | .21               | 6     | 11          | ...                   | ...   | ...                  | ...      | 33.54                  | Rousdon          |
| — 1.01                   | 57       | .34               | 6     | 14          | ...                   | ...   | ...                  | ...      | 29.81                  | Stroud           |
| — 1.90                   | 24       | .15               | 6     | 9           | ...                   | ...   | ...                  | ...      | 32.41                  | Wolstaston       |
| — 1.36                   | 39       | .39               | 6     | 9           | ...                   | ...   | ...                  | ...      | 28.98                  | Coventry         |
| + .03                    | 102      | .35               | 6     | 17          | ...                   | ...   | ...                  | ...      | 23.35                  | Boston           |
| — .81                    | 52       | .24               | 11    | 9           | ...                   | ...   | ...                  | ...      | 24.46                  | Hodsock Priory   |
| — 1.37                   | 49       | .43               | 6     | 12          | ...                   | ...   | ...                  | ...      | 34.73                  | Macclesfield     |
| — 1.75                   | 31       | .34               | 5     | 9           | ...                   | ...   | ...                  | ...      | 32.70                  | Southport        |
| — .54                    | 71       | .34               | 2     | 14          | ...                   | ...   | ...                  | ...      | 26.87                  | Ribston Hall     |
| — 2.11                   | 66       | .56               | 24    | 21          | ...                   | ...   | ...                  | ...      | 61.49                  | Arneliffe        |
| — .38                    | 78       | .29               | 11    | 16          | ...                   | ...   | ...                  | ...      | 26.42                  | Hull             |
| — .23                    | 88       | .52               | 11    | 14          | ...                   | ...   | ...                  | ...      | 27.94                  | Newcastle        |
| — 2.27                   | 83       | 3.43              | 10    | 17          | ...                   | ...   | ...                  | ...      | 129.48                 | Seathwaite       |
| — 1.75                   | 52       | .60               | 5     | 15          | ...                   | ...   | ...                  | ...      | 42.28                  | Cardiff          |
| — 1.69                   | 64       | .91               | 5     | 18          | ...                   | ...   | ...                  | ...      | 46.81                  | Haverfordwest    |
| — 1.65                   | 58       | .96               | 8     | 16          | ...                   | ...   | ...                  | ...      | 45.46                  | Gogerddan        |
| — 1.81                   | 28       | .20               | 8     | 8           | ...                   | ...   | ...                  | ...      | 30.36                  | Llandudno        |
| — 1.56                   | 62       | .76               | 5     | 10          | ...                   | ...   | ...                  | ...      | 43.47                  | Cargen           |
| — 1.00                   | 58       | .54               | 11    | 14          | ...                   | ...   | ...                  | ...      | 33.76                  | Marchmont        |
| — 1.36                   | 72       | 1.10              | 5     | 18          | ...                   | ...   | ...                  | ...      | 49.77                  | Girvan           |
| — .79                    | 78       | .63               | 10    | 18          | ...                   | ...   | ...                  | ...      | 35.97                  | Glasgow          |
| + .14                    | 102      | 1.75              | 10    | 22          | ...                   | ...   | ...                  | ...      | 68.67                  | Inveraray        |
| — .53                    | 90       | 1.19              | 10    | 21          | ...                   | ...   | ...                  | ...      | 56.57                  | Quinish          |
| — 1.39                   | 31       | .17               | 11    | 12          | ...                   | ...   | ...                  | ...      | 28.64                  | Dundee           |
| — 1.48                   | 49       | ...               | ...   | ...         | ...                   | ...   | ...                  | ...      | 34.93                  | Braemar          |
| — .81                    | 66       | .26               | 5     | 16          | ...                   | ...   | ...                  | ...      | 32.73                  | Aberdeen         |
| — 1.09                   | 52       | .18               | 8     | 9           | ...                   | ...   | ...                  | ...      | 29.33                  | Cawdor           |
| — 2.56                   | 54       | .77               | 24    | 21          | ...                   | ...   | ...                  | ...      | 44.53                  | Fort Augustus    |
| — .38                    | 96       | 1.47              | 5     | 23          | ...                   | ...   | ...                  | ...      | 83.61                  | Bendamph         |
| — .61                    | 78       | .59               | 9     | 17          | ...                   | ...   | ...                  | ...      | 31.90                  | Dunrobin Castle  |
| — .59                    | 76       | .60               | 10    | 19          | ...                   | ...   | ...                  | ...      | 29.88                  | Wick             |
| — 4.18                   | 30       | .44               | 8     | 19          | ...                   | ...   | ...                  | ...      | 54.81                  | Killarney        |
| — 2.10                   | 44       | .48               | 5     | 11          | ...                   | ...   | ...                  | ...      | 39.57                  | Waterford        |
| — 2.21                   | 43       | .49               | 5, 21 | 12          | ...                   | ...   | ...                  | ...      | 39.43                  | Castle Lough     |
| — 1.85                   | 54       | .50               | 21    | 15          | ...                   | ...   | ...                  | ...      | 45.11                  | Miltown Malbay   |
| — 1.94                   | 39       | .58               | 5     | 8           | ...                   | ...   | ...                  | ...      | 34.99                  | Courtown Ho.     |
| — 1.47                   | 53       | .76               | 5     | 10          | ...                   | ...   | ...                  | ...      | 35.92                  | Abbey Leix       |
| — 1.50                   | 30       | .19               | 5     | 10          | ...                   | ...   | ...                  | ...      | 27.68                  | Dublin           |
| — .98                    | 68       | .79               | 5     | 17          | ...                   | ...   | ...                  | ...      | 36.15                  | Mullingar        |
| — 1.21                   | 64       | .84               | 21    | 17          | ...                   | ...   | ...                  | ...      | 36.64                  | Ballinasloe      |
| — 2.89                   | 46       | .61               | 22    | 18          | ...                   | ...   | ...                  | ...      | 52.87                  | Ennisceoe        |
| — 1.34                   | 65       | .39               | 21    | 17          | ...                   | ...   | ...                  | ...      | 42.71                  | Markree          |
| — 2.29                   | 33       | .34               | 5     | 11          | ...                   | ...   | ...                  | ...      | 38.91                  | Seaforde         |
| — 1.64                   | 49       | .61               | 5     | 12          | ...                   | ...   | ...                  | ...      | 37.56                  | Dundarave        |
| — .75                    | 78       | .52               | 5     | 18          | ...                   | ...   | ...                  | ...      | 39.38                  | Omagh            |



## SUPPLEMENTARY RAINFALL, JANUARY, 1911.

| Div.  | STATION.                   | Rain<br>inches | Div.   | STATION.                     | Rain<br>inches |
|-------|----------------------------|----------------|--------|------------------------------|----------------|
| II.   | Warlingham, Redvers Road   | 1.82           | XI.    | Douglas                      | ...            |
| "     | Ramsgate                   | 1.57           | XII.   | Stoneykirk, Ardwell House    | 1.95           |
| "     | Hailsham                   | 1.76           | "      | Dalry, The Old Garroch       | 5.21           |
| "     | Totland Bay, Aston House   | 1.16           | "      | Langholm, Drove Road         | 3.54           |
| "     | Stockbridge, Ashley        | 1.19           | "      | Beattock, Kinnelhead         | 4.06           |
| "     | Grayshott                  | 1.49           | XIII.  | St Mary's Loch, Cramilt Ldge | 2.98           |
| "     | Reading, Calcot Place      | 1.08           | "      | North Berwick Reservoir      | .98            |
| III.  | Harrow Weald, Hill House   | 1.56           | "      | Edinburgh, Royal Observty.   | .75            |
| "     | Pitsford, Sedgebrook       | .69            | XIV.   | Maybole, Knockdon Farm       | 3.15           |
| "     | Somersham Vicarage         | 1.10           | XV.    | Campbeltown, Witchburn       | 3.44           |
| "     | Woburn, Milton Bryant      | 1.03           | "      | Glenreaddell Mains           | 3.31           |
| IV.   | Colchester, Lexden         | 1.07           | "      | Holy Loch, Ardnadam          | 8.36           |
| "     | Newport                    | 1.47           | "      | Ballachulish House           | 8.60           |
| "     | Rendlesham                 | 1.56           | "      | Islay, Eallabus              | 3.95           |
| "     | Swaffham                   | 1.61           | XVI.   | Dollar Academy               | 2.01           |
| "     | Blakeney                   | 1.40           | "      | Balquhiddy, Stronvar         | 5.15           |
| V.    | Bishops Cannings           | 1.06           | "      | Coupar Angus                 | .55            |
| "     | Winterbourne Steepleton    | 2.21           | "      | Glenlyon, Meggernie Castle   | 3.83           |
| "     | Ashburton, Druid House     | 1.90           | "      | Blair Atholl                 | 1.24           |
| "     | Okehampton, Oaklands       | 2.05           | "      | Montrose, Sunnyside Asylum   | 1.31           |
| "     | Cullompton                 | ...            | XVII.  | Alford, Lynturk Manse        | 1.53           |
| "     | Hartland Abbey             | ...            | "      | Fyvie Castle                 | 1.52           |
| "     | Lynmouth, Rock House       | 2.04           | "      | Keith Station                | 1.93           |
| "     | Probus, Lamellyn           | 1.34           | XVIII. | Glenquoich, Loan             | 14.40          |
| "     | North Cadbury Rectory      | 1.17           | "      | Skye, Dunvegan               | 5.98           |
| VI.   | Clifton, Pembroke Road     | 1.23           | "      | N. Uist, Lochnaddy           | 4.14           |
| "     | Ross, The Graig            | .67            | "      | Alvey Manse                  | 1.07           |
| "     | Shifnal, Hatton Grange     | .55            | "      | Loch Ness, Drumnadrochit     | 1.83           |
| "     | Blockley, Upton Wold       | 1.18           | "      | Glencarron Lodge             | 8.39           |
| "     | Worcester, Boughton Park   | .57            | XIX.   | Invershin                    | 2.00           |
| VII.  | Market Overton             | 1.30           | "      | Loch Stack, Ardhullin        | 5.95           |
| "     | Market Rasen               | 1.72           | "      | Bettyhill                    | 1.86           |
| "     | Bawtry, Hesley Hall        | .77            | XX.    | Skibbereen Rectory           | 2.07           |
| "     | Derby, Midland Railway     | .77            | "      | Dunmanway, The Rectory       | 2.36           |
| VIII. | Nantwich, Dorfold Hall     | .53            | "      | Cork                         | .76            |
| "     | Chatburn, Middlewood       | 1.97           | "      | Mitchelstown Castle          | 1.62           |
| "     | Cartmel, Flookburgh        | 1.98           | "      | Darrynane Abbey              | 2.86           |
| IX.   | Langsett Moor, Up. Midhope | 2.43           | "      | Glenam [Clonmel]             | 1.60           |
| "     | Scarborough, Scalby        | 2.09           | "      | Newmarket-on-Fergus, Fenloe  | 1.80           |
| "     | Ingleby Greenhow           | 2.00           | XXI.   | Laragh, Glendalough          | 3.14           |
| "     | Mickleton                  | 1.38           | "      | Balbriggan, Ardgillan        | 1.07           |
| X.    | Bardon Mill, Beltingham    | 2.02           | "      | Moynalty, Westland           | 1.74           |
| "     | Ilderton, Lilburn Cottage  | 1.67           | XXII.  | Cong, The Glebe              | 4.10           |
| "     | Keswick, The Bank          | 3.21           | "      | Westport, St. Helens         | 2.37           |
| XI.   | Llanfrehfa Grange          | 1.46           | "      | Achill Island, Dugort        | 5.73           |
| "     | Treherbert, Tyn-y-waun     | 5.05           | "      | Mohill                       | 1.84           |
| "     | Carmarthen, The Friary     | 2.39           | XXIII. | Enniskillen, Portora         | 1.84           |
| "     | Castle Malgwyn [Llechryd]  | 1.99           | "      | Dartrey [Cootehill]          | 1.75           |
| "     | Plynlimon                  | 7.30           | "      | Warrenpoint, Manor House     | 1.84           |
| "     | New Radnor, Ednol          | .86            | "      | Banbridge, Milltown          | .60            |
| "     | Rhayader, Tyrmynydd        | 2.36           | "      | Belfast, Springfield         | 1.79           |
| "     | Lake Vyrnwy                | 2.72           | "      | Glenarm Castle               | 2.72           |
| "     | Llangyhanfal, Plâs Draw    | .81            | "      | Londonderry, Creggan. Res.   | 1.70           |
| "     | Dolgelly, Bryntirion       | 2.65           | "      | Killybegs                    | 3.93           |
| "     | Bettws-y-Coed, Tyn-y-bryn  | 2.49           | "      | Horn Head                    | 1.68           |
| "     | Lligwy                     | 1.51           |        |                              |                |

## METEOROLOGICAL NOTES ON JANUARY, 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.—The persistent R of December continued into January, falls being recorded on each of the first 12 days except the 3rd. Thereafter the month was dry but with scanty sunshine records. The unusual height of the bar. throughout the month was remarkable, the mean being 30.333 in., which has been exceeded in only eight months during the preceding 53 years' record. Duration of sunshine, 30.5\* hours, and of R 44.4 hours. Mean temp. 38°.6, or exactly the average. Shade max. 52°.1 on 26th; min. 25°.6 on 14th. F 8, f 16.

TENTERDEN.—Duration of sunshine, 59.5† hours. Shade max. 51°.5 on 26th; min. 25° 0 on 15th. F 10, f 16.

TOTLAND BAY.—Mean bar. 30.339 in. Duration of sunshine, 76.2\* hours. Shade max. 51° 0 on 28th; min. 27° 6 on 15th, F 5, f 13.

PITSFORD.—R .97 in. below the average. Mean temp. 37° 2. Shade max. 52° 4 on 26th; min. 24° 5 on 30th and 31st. F 16.

NORTH CADBURY.—High bar. almost throughout and very calm for a great part of the month, especially 14th to 24th. Shade max. 55° 0 on 28th. min. 24° 5 on 15th. F 10, f 17.

ROSS.—The least January R since 1896. Shade max. 54° 5 on 26th; min. 24° 6 on 31st. F 15, f 21.

HODSOCK PRIORY.—Shade max. 54° 7 on 26th; min. 18° 3 on 31st. F 12, f 26.

SOUTHPORT.—Bar. above the average on 29 days of the month. Duration of sunshine, 45.1\* hours, and of R 27.3 hours. Mean temp. 40° 1, or 1° 5 above the average. Shade max. 51° 8 on 28th; min. 26° 4 on 31st. F 6, f 15.

HULL.—Unsettled throughout, with much cloud and little sunshine. Mild periods at times, others cold and winterly, squally with S or H. Fogs prevailing. Shade max. 53° 0 on 25th and 26th; min. 27° 0 on 31st. F 8, f 19.

HAVERFORDWEST.—Duration of sunshine, 62.4\* hours. Shade max. 50° 9 on 26th.

LLANDUDNO.—Shade max. 53° 8 on 28th; min. 30° 5 on 31st. F 3.

EDINBURGH.—Shade max. 51° 0 on 25th; min. 26° 9 on 31st. F 7, f 15.

COUPAR ANGUS.—The lowest January R since 1882, excepting only 1905. The mean temp., 38° 3, has only been exceeded twice in the same period, in 1898 and 1906. Shade max. 53° 5 on 26th; min. 23° 5 on 31st.

FORT AUGUSTUS.—Shade max. 50° 0 on 26th; min. 23° 4 on 31st. F 7.

CORK.—Remarkably dry month, the R being 3.43 in. below the average. Shade max. 50° 0 on 25th; min. 27° 0 on 13th, 14th and 23rd. F 12, f 16.

DUBLIN.—A dry, generally mild month of anticyclonic S.W. winds. The bar. rose to 30.748 in. at 9 a.m. on 18th, and its mean height was 30.292 in. Mean temp. 41° 4. Shade max. 55° 4 on 25th; min. 28° 9 on 13th. F 5, f 13.

MARKREE.—The finest and driest January for many years. Shade max. 53° 9 on 25th; min. 24° 7 on 31st. F 14, f 18.

WARRENPOINT.—Fine and fairly dry month, but with a good deal of fog. Shade max. 53° 0 on 28th; min. 28° 0 on 31st. F 1, f 7.

---

\* Campbell-Stokes.

† Jordan.

## Climatological Table for the British Empire, August, 1910.

| STATIONS.<br><br>(Those in italics are<br>South of the Equator.) | Absolute. |       |          |       | Average. |      |               |           | Absolute.       |                   | Total Rain |       | Aver. |
|------------------------------------------------------------------|-----------|-------|----------|-------|----------|------|---------------|-----------|-----------------|-------------------|------------|-------|-------|
|                                                                  | Maximum.  |       | Minimum. |       | Max.     | Min. | Dew<br>Point. | Humidity. | Max. in<br>Sun. | Min. on<br>Grass. | Depth.     | Days. |       |
|                                                                  | Temp.     | Date. | Temp.    | Date. |          |      |               |           |                 |                   |            |       |       |
|                                                                  |           |       |          |       |          |      |               | 0-100     |                 |                   | inches     |       |       |
| London, Camden Square                                            | 77.7      | 12    | 48.9     | 7     | 70.9     | 54.2 | 55.4          | 82        | 125.0           | 44.6              | 1.64       | 21    | 7.1   |
| Malta ... ..                                                     | 89.2      | 1, 17 | 68.5     | 15    | 83.8     | 73.9 | 67.4          | 73        | 149.6           | ...               | .02        | 1     | 1.4   |
| Lagos ... ..                                                     | 86.0      | *     | 68.2     | 17    | 83.1     | 73.1 | 72.9          | 82        | 152.0           | 69.0              | 2.82       | 17    | ...   |
| Cape Town ... ..                                                 | 77.7      | 7     | 39.5     | 6     | 62.2     | 46.2 | 47.7          | 80        | ...             | ...               | 2.92       | 16    | 5.5   |
| Durban, Natal ... ..                                             | 94.3      | 15    | 47.5     | 4     | 72.3     | 55.9 | ...           | ...       | 130.3           | ...               | 1.04       | 3     | 3.7   |
| Johannesburg ... ..                                              | 79.4      | 24    | 32.9     | 31    | 67.6     | 45.8 | 40.4          | 63        | 129.9           | 32.0              | .00        | 0     | 1.3   |
| Mauritius ... ..                                                 | 78.1      | 24†   | 53.5     | 21    | 75.4     | 60.6 | 58.0          | 73        | 143.6           | 45.1              | 2.52       | 17    | 5.5   |
| Calcutta ... ..                                                  | 93.9      | 23    | 75.8     | 24    | 89.1     | 79.1 | 78.2          | 86        | ...             | 74.5              | 11.05      | 17    | 8.2   |
| Bombay ... ..                                                    | 86.9      | 19    | 75.4     | 1     | 83.7     | 77.2 | 76.1          | 87        | 129.6           | 73.0              | 16.89      | 27    | 8.6   |
| Madras ... ..                                                    | 96.9      | 13    | 72.7     | 17    | 91.2     | 77.4 | 73.8          | 77        | 139.4           | 70.8              | 5.13       | 14    | 6.3   |
| Kodaikanal ... ..                                                | 65.4      | 12    | 51.1     | 2     | 61.8     | 52.6 | 52.7          | 90        | 133.4           | 41.1              | 10.23      | 26    | 7.9   |
| Colombo, Ceylon ... ..                                           | 87.1      | 11    | 73.2     | 5     | 84.6     | 76.2 | 73.5          | 80        | 135.1           | 68.1              | .84        | 9     | 7.3   |
| Hongkong ... ..                                                  | 9.3       | 29    | 75.1     | 4     | 86.8     | 78.6 | 76.6          | 83        | 143.5           | ...               | 11.16      | 17    | 7.0   |
| Melbourne ... ..                                                 | 66.6      | 29    | 35.3     | 28    | 59.6     | 45.4 | 42.3          | 68        | 121.0           | 27.7              | .89        | 17    | 6.5   |
| Adelaide ... ..                                                  | 72.0      | 15    | 40.9     | 27    | 63.3     | 47.2 | 47.1          | 76        | 133.5           | 30.5              | 1.71       | 14    | 5.8   |
| Coolgardie ... ..                                                | 79.0      | 13    | 35.0     | 19    | 65.5     | 42.9 | 40.3          | 59        | 146.0           | 32.0              | .43        | 5     | 3.1   |
| Perth ... ..                                                     | 76.6      | 12    | 44.3     | 1     | 63.8     | 40.1 | 43.8          | 75        | 125.7           | 34.7              | 4.58       | 17    | 5.7   |
| Sydney ... ..                                                    | 74.0      | 30    | 42.9     | 28    | 65.5     | 49.1 | 43.8          | 70        | 123.1           | 30.1              | .25        | 12    | 3.9   |
| Wellington ... ..                                                | 59.2      | 20    | 35.2     | 2     | 54.2     | 45.2 | 41.1          | 72        | 104.0           | 28.0              | 4.65       | 19    | 7.0   |
| Auckland ... ..                                                  | 66.0      | 18‡   | 39.0     | 11    | 59.8     | 46.7 | 47.4          | 84        | 136.0           | 33.0              | 5.97       | 25    | 6.5   |
| Jamaica, Kingston ..                                             | 94.1      | 21    | 70.9     | 8     | 89.7     | 73.4 | 71.6          | 77        | ...             | ...               | 3.39       | 11    | 5.0   |
| Grenada ... ..                                                   | 88.6      | 26    | 71.0     | 5     | 84.3     | 74.9 | 72.6          | 78        | 140.0           | ...               | 14.32      | 26    | 4.5   |
| Toronto ... ..                                                   | 85.1      | 14    | 47.7     | 27    | 77.5     | 57.7 | ...           | ...       | 105.3           | 43.3              | 3.65       | 9     | ...   |
| Fredericton ... ..                                               | 83.6      | 25    | 37.8     | 31    | 75.0     | 51.2 | ...           | 79        | ...             | ...               | 4.55       | 9     | 5.9   |
| St. John, N.B. ... ..                                            | 78.0      | 15    | 47.7     | 30    | 68.0     | 55.4 | ...           | ...       | ...             | ...               | 2.53       | 11    | 4.4   |
| Victoria, B.C. ... ..                                            | 80.3      | 18    | 43.2     | 24    | 68.5     | 49.8 | ...           | 71        | ...             | ...               | .36        | 4     | 4.0   |
| Dawson ... ..                                                    | 74.0      | 6     | 25.0     | 29§   | 63.6     | 38.5 | ...           | ...       | ...             | ...               | 1.67       | 11    | 6.2   |

\* Various. † and 28. ‡ and 22. § and 7, 13. ¶ and 30.

MALTA.—Mean temp. of air 77°·9. Average bright sunshine 11·4 hours per day.

Johannesburg.—Bright sunshine 302·1 hours.

Mauritius.—Mean temp. of air 0°·8, of dew point 1°·4 below, and R ·21 in. above, averages. Mean hourly velocity of wind 10·5 miles, or 1·8 below average.

KODAIKANAL.—Bright sunshine 95 hours.

COLOMBO.—Mean temp. of air 77°·1 or 3°·5 below, of dew point 0°·2 above, and R 2·71 in. below, averages. Mean hourly velocity of wind 7·2 miles.

HONGKONG.—Mean temp. of air 82°·2. Bright sunshine 190·3 hours. R 3·04 in. below average. Mean hourly velocity of wind 7·8 miles.

Melbourne.—Mean temp. of air 1°·6 above, and R ·95 in. below, averages.

Adelaide.—Mean temp. of air 1°·5 above, and R ·68 in. below, averages.

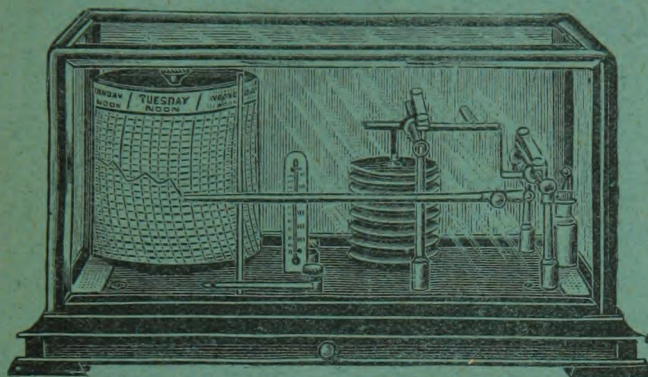
Coolgardie.—Mean temp. of air 1°·0 above, and R slightly below, averages.

Sydney.—Mean temp. of air 2°·4 above, and R 2·96 in. below, averages.

Wellington.—Mean temp. of air 1°·5 above, and R ·24 in. below, averages. Bright sunshine 143·4 hours.

Auckland.—Mean temp. of air slightly above, and rainfall considerably above, averages. Violent S.W. gale on 28th.

**AITCHISON & Co.,** OPTICIANS  
TO H.M. GOVT.  
BAROGRAPHS, SELF-RECORDING AND REGISTERING  
METEOROLOGICAL INSTRUMENTS OF ALL KINDS.



Standard  
Barometers,  
Thermometers,  
Rain Gauges,  
Hygrometers,  
&c., &c.

Call or write for our Catalogue of Meteorological Instruments, including Barometers, Thermometers, Compasses, Pedometers, etc. 90 pages, 150 Illustrations, Post Free.

**AITCHISON & Co.,**

*Opticians to British & U.S.A. Govts.,*

**428, STRAND, and Branches, LONDON.**

**LEEDS, 37, Bond Street.**

**MANCHESTER, 33, Market Street.**



**DARTON'S HYGROGRAPH**

(SELF-RECORDING HYGROMETER)



Showing at a glance on a revolving weekly chart the differences of temperature readings between the wet and dry bulbs, and the percentage of aqueous vapour held in suspense by the atmosphere.

The point of each pen of this instrument is set precisely on the same temperature-line and the same time-line on the chart—a great advantage over other Hygrometers.

This instrument has been approved of by the National Physical Laboratory, Colonial Observatories and others.

It is compact, self-contained, without any projections liable to injury, and very portable.

Complete, with One Year's supply of Charts, 10° to 110° F., and Hygrometrical Tables,

**£7 : 15 : 0**

This instrument is a Thermograph as well as a Hygograph.

ACCURACY GUARANTEED.

*Illustrated List of Standard Meteorological Instruments, post free.*

**F. DARTON & Co., 142, St. John Street, London, E.C.**

**RATES FOR ADVERTISEMENTS IN THIS MAGAZINE.**

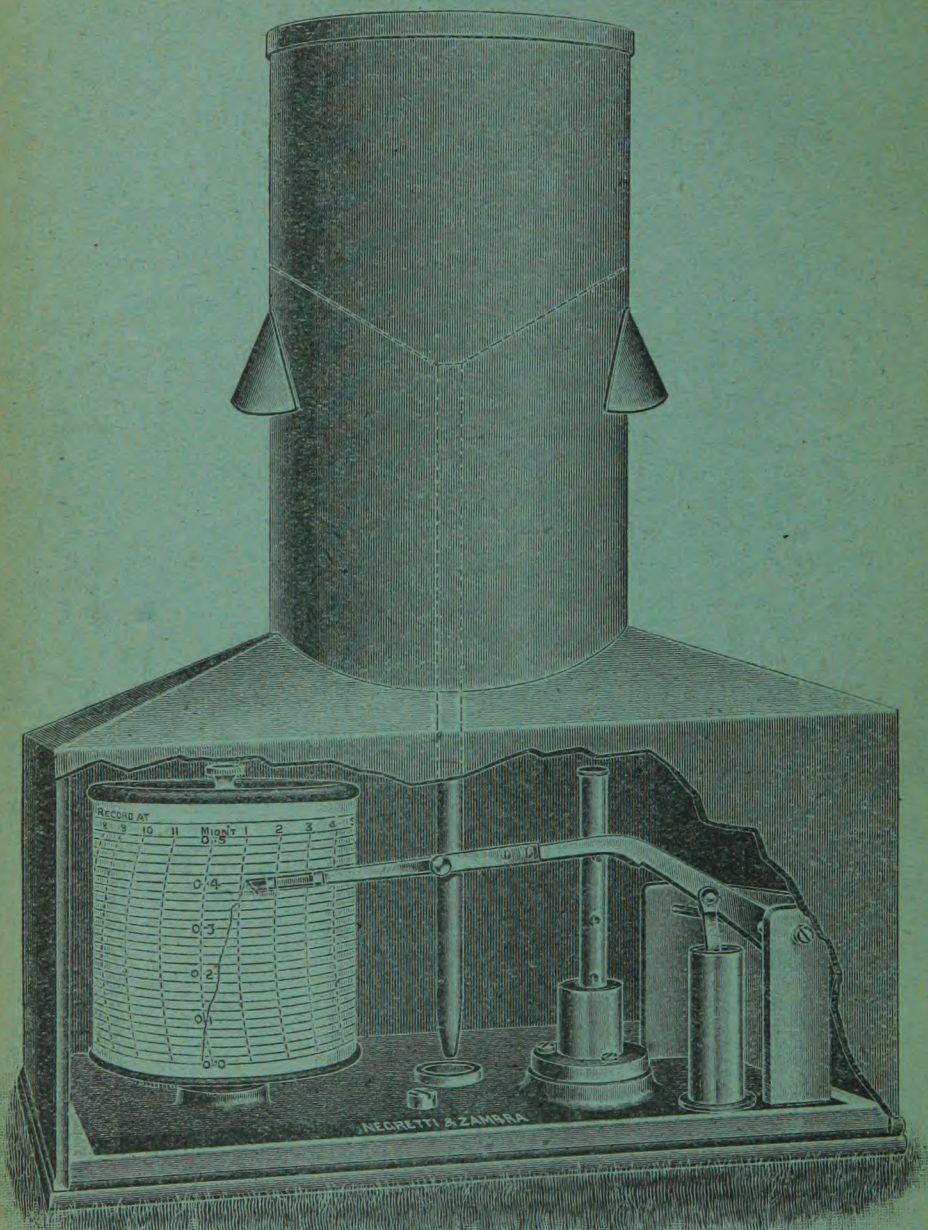
|            |     | One Insertion. | Six Insertions. | Twelve Insertions. |               |
|------------|-----|----------------|-----------------|--------------------|---------------|
| WHOLE PAGE | ... | 30/-           | ...             | 22/6               | } All<br>Net. |
| HALF       | ... | 16/6           | ...             | 12/6               |               |
| QUARTER    | ... | 9/-            | ...             | 7/-                |               |
| EIGHTH     | ... | 5/-            | ...             | 4/-                |               |

*All applications for space to be made to*

**Mr. H. A. COLLINS, 27, ST. PETER'S ROAD, CROYDON.**



# The "HYETOGRAPH."



Write for descriptive pamphlet and other Meteorological Instruments to the  
SOLE MAKERS,

**NEGRETTE & ZAMBRA,**  
SCIENTIFIC INSTRUMENT MAKERS,  
38, HOLBORN VIADUCT, E.C.,

Branches: 45, CORNHILL, E.C., and  
122, REGENT STREET, W., LONDON.

Telegraphic Address: "NEGRETTE, LONDON." Telephone No.: 583 HOLBORN.

SHIELD & SPRING, Lancelot Place, Brompton Road, S.W.

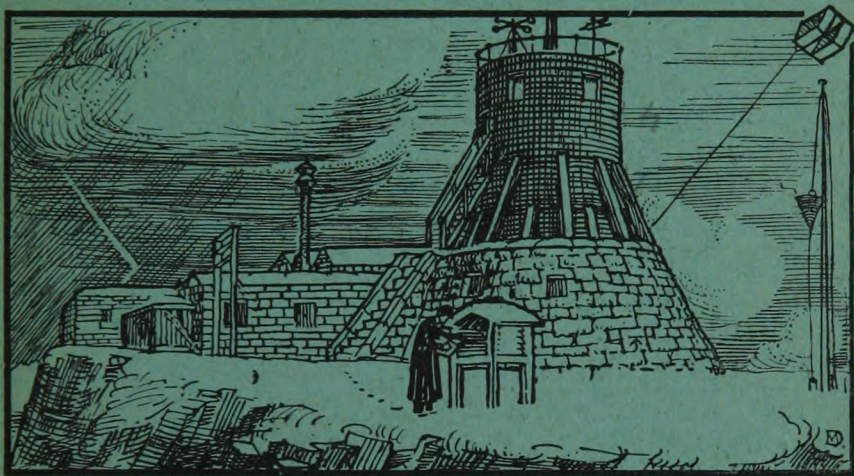


NO. 542 SYMONS'S VOL. 46

# METEOROLOGICAL



.... EDITED BY HUGH ROBERT MILL ....



MARCH, 1911.

## CONTENTS

|                                                                           | PAGE |
|---------------------------------------------------------------------------|------|
| Sir Francis Galton, F.R.S. .. .. .                                        | 21   |
| Pressure Gradients and Gale Frequency. By L. C. W. BONACINA..             | 22   |
| High Barometer and Drought, January—February, 1911 ..                     | 23   |
| The Rainfall of February, 1911. ( <i>Illustrated</i> ) .. .. .            | 24   |
| The Weather of February. By FRED. J. BRODIE .. .. .                       | 25   |
| Royal Meteorological Society .. .. .                                      | 26   |
| Review .. .. .                                                            | 28   |
| A Visit to Medicine Hat. By FELIX J. KOCH, of Cincinnati. ( <i>Ill.</i> ) | 29   |
| Scottish Meteorological Society .. .. .                                   | 30   |
| CORRESPONDENCE :—                                                         |      |
| Millimetres or Inches. By R. T. A. INNES .. .. .                          | 33   |
| Cyclones and the Sun's Rotation Period. By MAXWELL HALL                   | 33   |
| Supposed Cold of Winter Anticyclones. By W. H. DINES, F.R.S.              | 34   |
| Gun Firing and Rainfall. By FREDK. GASTER, F.R.Met.Soc.                   | 35   |
| Meteorological News and Notes .. .. .                                     | 35   |
| Rainfall Table for February, 1911 .. .. .                                 | 36   |
| Supplementary Table of Rainfall, February, 1911, at 112 Stations          | 38   |
| Meteorological Notes on February, 1911 .. .. .                            | 39   |
| Climatological Table for the British Empire, September, 1910 ..           | 40   |

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

Published on the 16th of each Month.]

[Price 4d., or 5s. per Annum, Post Free.



## NOTICES.

It is requested that all Books for Review and Communications for the Editor be addressed to 62, Camden Square, London, N.W.

The responsibility for all facts and opinions expressed in the signed articles and letters published in this Magazine rests with their respective authors.

---

Cloth 8vo. 428 pages. With Maps and Illustrations.

PRICE 10s.

### **BRITISH RAINFALL, 1909.**

THE FORTY-NINTH ANNUAL VOLUME.

COMPILED FROM THE RECORDS OF MORE THAN  
4600 OBSERVERS

BY

HUGH ROBERT MILL.

LONDON: EDWARD STANFORD, 12, 13 & 14 LONG ACRE, W.C.

---

## Royal Geographical Society's Publications.

---

### THE GEOGRAPHICAL JOURNAL.

Monthly. Illustrated. Edited by the Secretary. Price (to non-Fellows), 2s.

### HINTS TO TRAVELLERS.

Edited for the Council of the Royal Geographical Society by E. A. REEVES, F.R.G.S., F.R.A.S. Ninth Edition, revised and enlarged. In two volumes, illustrated. Price 15s. net. (To Fellows at the Office of the Society, 10s. net).

Vol. I.—Surveying and Practical Astronomy.

Vol. II.—Meteorology and Climate (by DR. H. R. MILL);  
Photography, Geology, Natural History, Anthro-  
pology, Industry and Commerce, Medical Hints, &c.

### THE DISTRIBUTION OF RAINFALL OVER THE LAND.

By DR. A. J. HERBERTSON. With monthly maps of Rain-  
fall. Price 5s. net. (To Fellows, 2s. 6d.)

### ON THE RESULTS OF A DEEP-SEA SOUNDING

#### EXPEDITION.

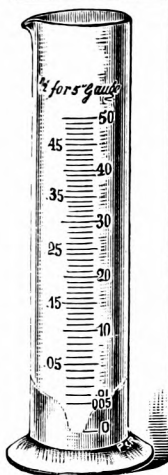
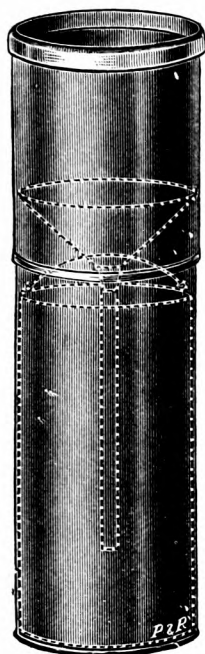
In the North Atlantic in the summer of 1899, by R. E. PEAKE, M.Inst.C.E.; with notes on Temperature, Deep-Sea Deposits, &c., by SIR JOHN MURRAY, K.C.B., F.R.S.  
*Charts.* Price 5s. net. (To Fellows, 2s. 6d.)

### THE ANTARCTIC MANUAL,

For the use of the Expedition of 1901. Edited by GEORGE MURRAY, F.R.S., 1901. Pp. 586. *With a new chart of the Antarctic Regions.* Price, 15s. (To Fellows, 10s.)

~~~~~  
ROYAL GEOGRAPHICAL SOCIETY, 1, Savile Row, W.  
AND ALL BOOKSELLERS.

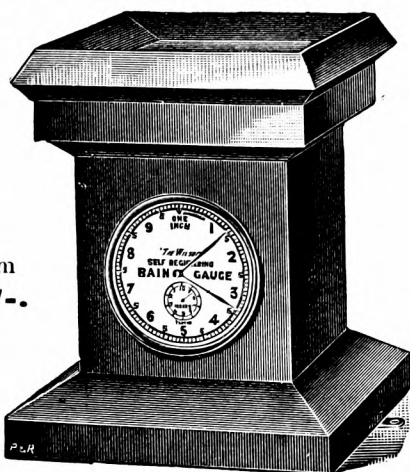
# RAIN GAUGES.



Standard "Snowdon" Rain Gauge,  
Stout Copper Body, with  
Extra Heavy Brass Rim,  
 complete with  
 Standard  
 "Camden" Measure,  
**21/-.**

## The "Wilson" SELF-REGISTERING Rain Gauge.

With Improved Receiver to  
 prevent splashing.



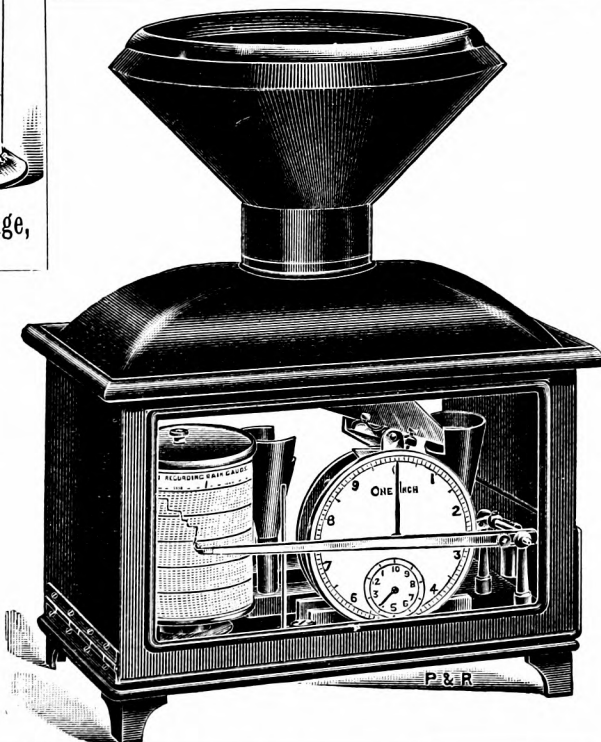
From  
**60/-.**

## The "Peandar" SELF-RECORDING Rain Gauge.

Records automatically on a  
 Weekly Chart.

Totalizing to 10 in. **£9 7 6**  
 " 200 " **9 15 0**

Complete with one year's charts,  
 pen and ink.



# PASTORELLI & RAPKIN, LTD. (ESTAB. 1750.)

**46, HATTON GARDEN, LONDON, E.C.,**

**ACTUAL MAKERS** of STANDARD, SELF REGISTERING, and  
 SELF RECORDING METEOROLOGICAL INSTRUMENTS of **ALL KINDS.**

(WITH KEW, OR DR. MILL'S CERTIFICATES, IF DESIRED.)

**WRITE FOR ILLUSTRATED DESCRIPTIVE PRICE LISTS, POST FREE.**

**\*\* We pay carriage and guarantee safe delivery within U.K. on all our Instruments.**

( iii. )

# "THE MEASUREMENT OF RAINFALL."

---

## **C. F. CASELLA & Co., LTD.,**

have recently published a small pamphlet with this title ; it describes and illustrates all the principal rain-gauges made by them, both the ordinary forms and self-recording.

*Among the instruments described in it is—*

### **Casella's Patent Rainfall Recorder**

— A QUITE NEW PATTERN —

in which all Rainfall Observers will be interested.

---

**A COPY WILL BE SENT POST FREE  
ON APPLICATION.**

---

**11-15, ROCHESTER ROW,  
LONDON, S.W.**

*Telegraphic Address: "ESCUTCHEON, LONDON."*

*Telephone: WESTMINSTER 5599.*

# Symons's Meteorological Magazine.

---

No. 542.

MARCH, 1911.

VOL. XLVI.

---

## Sir Francis Galton, F.R.S.

16th February, 1822—17th January, 1911.

THE name of Francis Galton is familiar in so many fields of science that the services he rendered to Meteorology in the early days of the recognition of the public utility of that science are apt to be forgotten. In later life Sir Francis Galton, who was a cousin of Charles Darwin, turned his attention mainly to anthropological and sociological studies; but we have reason to believe that he never ceased to follow with interest the developments of meteorology, and he remained to the end a representative of the best type of all-round amateur to whom science in the British Isles has always owed so much. His peculiar power seemed to lie in seizing the moment when some particular branch of science was ready to be advanced materially by the adoption of commonsense methods, breaking away from outgrown traditions, and introducing a new, simple and comprehensive classification and terminology. No one who ever met Sir Francis Galton in the course of his scientific work can forget the keenness with which he followed the unfolding of any new idea or the rapidity with which he grasped the kernel of it. For many years the affliction of deafness deprived him of the full enjoyment of intercourse with his fellows; but latterly the ingenuity which had served him so well in devising apparatus available for all the "shifts and expedients" of life in camp and council enabled him to recover, by an electrical arrangement, the power of following conversation. His outlook on life was as keen and full of interest until a few weeks of his death as it was when his "Art of Travel" and "Vacation Tourists" laid the foundation of modern scientific travel more than fifty years before.

As a meteorologist Galton will be remembered chiefly by the interesting experiment in meteorological mapping published in 1863 under the title of "Meteorographica," and by his long service on the Meteorological Council from 1868 to 1901, during which he did much to introduce and improve the methods on which the work of the British Meteorological Office is based. It is to him that we owe the convenient term "anticyclone," a word which familiarity has long since robbed of the uncouthness still occasionally urged against it by those who encounter it for the first time in a newspaper.

By his will Sir Francis Galton left the residue of his large fortune to the University of London to found a chair of Eugenics.

## MONTHLY PRESSURE GRADIENTS AND GALE FREQUENCY.

By L. C. W. BONACINA.

IN the recent second edition of his "Meteorology, Practical and Applied," Sir John Moore discusses, on pages 392-394, the significance of the thirteen maps in the *Meteorological Atlas of the British Islands*, (1883), showing the distribution of mean barometric pressure over the United Kingdom for each month of the year and for the whole year during the twenty years 1861-1880. The mean monthly pressure differences, in inches, between the extreme north of Scotland and the extreme south of England are as follows :—

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
0·32	0·22	0·14	0·10	0·08	0·13	0·16	0·16	0·20	0·20	0·20	0·28

Dr. R. H. Scott's investigation of gale frequency for the fourteen years 1870-1883, revealed a strongly marked maximum in January, as the maximum pressure difference of 0·32 in. would lead us to expect, but also a decided minimum, not in May, when the minimum pressure difference of 0·08 in. occurs, but in June and July when the pressure difference is increasing. Always bearing in mind that the lack of coincidence between the times of minimum pressure difference and storm frequency is relatively slight, and may even be mainly due to the fact that there are only 14 years for storm frequency as against twenty for pressure gradients, the anomaly is nevertheless probably real, and if so, it admits, I think, of a very interesting and easy explanation. In January, rather than December, the gradient for S.W. winds over the British Isles is steepest as a direct consequence of the pressure over the large continents of the northern hemisphere, being highest in that month, the atmosphere over the North Atlantic being then necessarily left most rarified and favourable to violent cyclonic action; and so the mean January pressure difference of 0·32 in. between North and South Britain represents the month when the disastrous gales which annually take such melancholy toll of human life round our coasts are most frequent. During February, March and April the pressure difference decreases more rapidly than the storm frequency declines, for in March S.W. gales are still frequent, and in both April and May they are more frequent than in July, with a greater pressure difference. The only explanation for the anomaly, if it is real, and not due to insufficient data, is this: in April and May the gradients for S.W. winds on those occasions when they do occur, are steeper than in June and July, but, owing to the preponderance of winds from directions in the northern half of the compass in the former month, the resulting *mean monthly* pressure difference producing a gradient for S.W. winds is smaller than in the latter two months when the *actual* gradients for S.W. winds are slightest. In May the tendency is for northerly and north-westerly winds to prevail in the British Isles rather than for



easterly and north-easterly winds, the months for which are March and April; and if the mean pressure difference for S.W. winds is greater in March and April—the months when the very winds most efficient in tending to neutralize or reverse the mean monthly gradient are most frequent—than in May, it only shows that, at times, when the S.W. gradient actually prevails, the tendency for gales is still pronounced. It is true that gales from points in the northern half of the compass are more common in March, April and May than in June and July, in accordance with the greater prevalence of winds from those directions, but general observation, as well as theoretical considerations, seem to show that the same holds for westerly and south-westerly gales, and I should like to know whether records exist, at the Meteorological Office, of the mean monthly frequency of *south-westerly* or *westerly* gales alone, as I presume Dr. Scott's investigation, quoted by Sir John Moore in the above mentioned book, included storms from all directions.

~~~~~

### HIGH BAROMETER AND DROUGHT, JANUARY— FEBRUARY, 1911.

AFTER the first ten days of 1911, during which some rain fell generally in most parts of the country, a dry spell set in, lasting till the middle of February, which came under the definition of a partial drought over the greater part of England and Wales. A partial drought is defined as a period of more than 28 consecutive days, the mean rainfall of which does not exceed .01 in. per day. The most unusual feature of the meteorological conditions during this time lay in the barometric pressure. Throughout the whole period from the beginning of the year a belt of high pressure persisted over Western Europe, but the weather of the United Kingdom was disturbed more or less by shallow depressions until the 12th, after which the anti-cyclonic system continued to form the dominating influence without interruption until the middle of February, but with its centre shifted rather more to the north after the end of January. The trace of the Redier barograph at Camden Square shows that the pressure in London rose above 30.00 in. at midnight on January 12th, rose steadily to 30.50 in. by 5 a.m. on the 16th, after which it remained above 30.25 in., and for the most part above 30.50 in., until midnight on February 9th. The pressure was slightly below 30.00 in. for about eleven hours from 2 p.m. on the 10th, but quickly recovered, and was above 30.50 in. for a considerable time between the 13th and the evening of the 15th, after which it fluctuated wildly during the gales which characterised the following week. The mean of the 9 a.m. and 9 p.m. readings from January 13th to February 16th inclusive, a period of five weeks, was 30.48 in.

The partial drought which accompanied this unusually protracted spell of anticyclonic predominance extended over practically the whole



of England and Wales south of Yorkshire, and was most intense in the Midlands, where the duration exceeded 40 days at several stations. The area affected included the south-east of Ireland. Over the western midlands, in the Devon-Cornwall peninsula, in the south-east of Ireland and the south of Scotland there was an absolute drought or period of more than 14 days without rain from about January 12th to February 9th, but the area was more restricted than in the case of the partial drought.

At Camden Square no absolute drought was recorded, and the partial drought lasted for 33 days from January 12th to February 13th, during which time .25 in. of rain fell. It is interesting to compare this with previous droughts at the same season.

*Partial Drought in January at Camden Square, 1858-1911.*

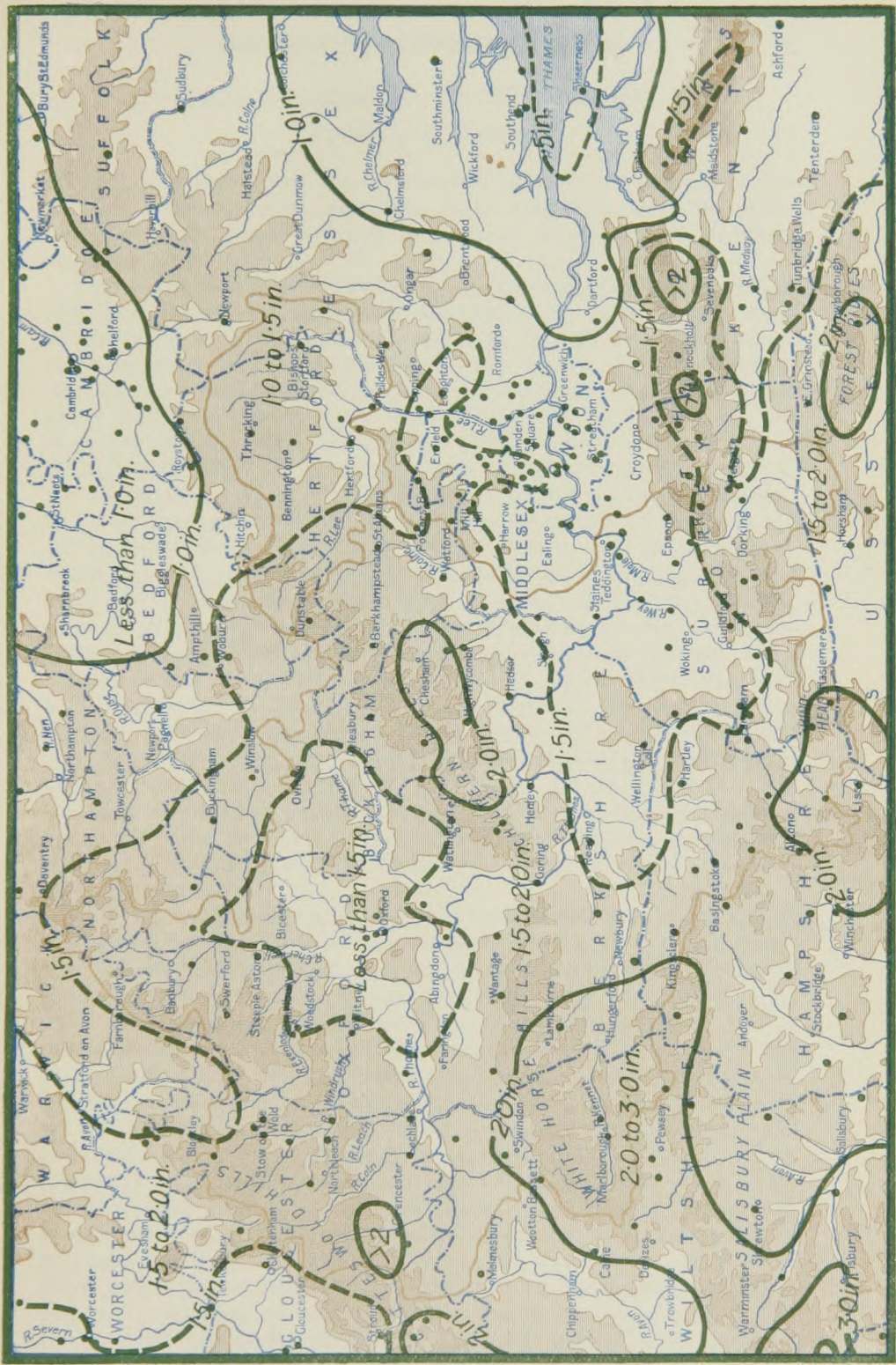
| Year.        | Began.           | Ended.            | Lasted. | Rainfall. |
|--------------|------------------|-------------------|---------|-----------|
|              |                  |                   | Days.   | in.       |
| 1863-4 ..... | December 9th ... | January 11th ...  | 34      | .33       |
| 1874 .....   | January 25th ... | February 24th ... | 31      | .31       |
| 1880 .....   | January 1st ...  | February 4th ...  | 35      | .31       |
| 1882 .....   | January 9th ...  | February 13th ... | 36      | .24       |
| 1887 .....   | January 20th ... | March 10th ...    | 50      | .49       |
| 1891 .....   | January 31st ... | March 6th ...     | 35      | .07       |
| 1896 .....   | January 28th ... | February 29th ... | 33      | .30       |
| 1905 .....   | January 17th ... | February 18th ... | 33      | .33       |
| 1909 .....   | January 16th ... | February 26th ... | 42      | .40       |
| 1911 .....   | January 12th ... | February 13th ... | 33      | .25       |

~~~~~

### THE RAINFALL OF FEBRUARY, 1911.

THE month proved dry in the south of England and along the whole east coast of Great Britain, where many places had less than one inch of rain, and very few had more than two inches. The Thames Valley map shows a low rainfall for the month. In the north and west of England and in Wales the rainfall was decidedly above the average; but the most remarkable feature of the rainfall of the month was the contrast between the east and west of Scotland. While a considerable area in Forfarshire and Kincardineshire had less than one inch of rain, a very large stretch of country in the west, reaching from the west of Ross-shire to the Firth of Clyde, had more than 10 inches, and the greater part of it more than 13 inches. Falls exceeding 24 inches were reported from one station in the west of Scotland and from several in the English Lake District. In Ireland there was no great excess of rain, except in the north-east. It is rare to find a month in which the inequality of the rainfall of our islands is so marked as in February, 1911, and the difficulty of mapping the distribution emphasizes the need for additional rainfall stations, especially in the north of Scotland and west of Ireland.

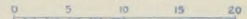
THAMES VALLEY RAINFALL — FEBRUARY, 1911.



ALTITUDE  
SCALE

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

SCALE OF MILES





## THE WEATHER OF FEBRUARY.

By FRED. J. BRODIE.

FEBRUARY included two clearly marked spells of weather, the first half of the month being cold, cloudy and exceedingly dry, the second half mild, stormy and wet, but with many long intervals of bright sunshine.

The earlier fortnight witnessed a prolongation of the anticyclonic conditions which had prevailed throughout so large a portion of January. During the opening week the central area of the high pressure system lay immediately over the United Kingdom, and on the 1st and 2nd the barometer in all our more northern districts rose above 30·80 in. Sharp frosts were experienced on these days, the sheltered thermometer falling below 20° in nearly all parts of the country, and below 15° at many northern and central stations. In the screen a reading of 11° was recorded at Balmoral and a reading of 13° at Llangammarch Wells; while on the surface of the grass the thermometer sank to within a degree of zero at Llangammarch Wells, to 6° at Birmingham, and to 7° at Newton Rigg. A temporary break in the anticyclone spell occurred on the 9th and 10th, when a "V-shaped" depression passed from west to east across the United Kingdom, and caused slight falls of rain in all districts. The old conditions were, however, soon restored, and between the 10th and 13th sharp frosts were again experienced over the country generally, the sheltered thermometer falling below 25° in many localities and below 20° in central Scotland, Balmoral reporting, for the second time in the month, a reading as low as 11°. On the grass the frost was generally less severe than on the earlier occasion, but readings below 15° were recorded at several northern stations, the exposed thermometer sinking to 8° at Balmoral and to 12° at Newton Rigg and Llangammarch.

After the middle of the month the weather was influenced almost exclusively by deep cyclonic disturbances, whose centres passed across the Iceland-Faeroe region and on to northern Europe. Strong south-westerly to westerly winds, rising frequently to the force of a gale, were therefore experienced very generally, and rain was of almost daily occurrence, the falls being exceedingly heavy in the west of Scotland. The prevalence of a vigorous equatorial current of air resulted in a decided change in temperature, the thermometer in the last fortnight being usually well above the average. On the 17th and 18th the maximum readings were above 55° in many districts, Aberdeen and Bawtry rising to 59°. Similarly high values were recorded over Ireland and North Britain on the 21st (when the thermometer at Dublin also touched 59°), and in several parts of England and Wales on the 25th, when 58° was reached at Raunds. Frost was, however, not entirely wanting. On the nights of the 19th and 20th, when an anticyclonic ridge was formed temporarily over the country, the sheltered thermometer fell below 25° in northern

and central Scotland; while on the night of the 26th a similar development in barometric pressure was accompanied by a more general frost, slight over England and Ireland, but rather sharp in Scotland. On the earlier occasion the thermometer at Balmoral fell to  $21^{\circ}$ , and on the latter to  $22^{\circ}$ .

Over the United Kingdom as a whole the mild weather of the last fortnight was sufficiently pronounced to counteract the effect of the previous cold, and the mean temperature of the month was therefore above the average. In the south of Ireland, the extreme south-west of England, and the Channel Islands, the mean values were slightly below the normal. The duration of bright sunshine was below the average at most places situated in the western half of the kingdom, but above it elsewhere. At Westminster scarcely any sunshine was recorded during the first nine days of the month, but on many subsequent occasions the daily amount was large, and as a result the total for February, 54 hours, was as many as 20 hours in excess of the normal.

---

### ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, February 15th, at the Institution of Civil Engineers, Great George Street, Westminster, Dr. H. N. Dickson, President, in the Chair.

A paper on the "Variation of the Depth of Water in a Well at Detling, near Maidstone, compared with the Rainfall, 1885—1909," by Mr. R. Cooke and Mr. S. C. Russell, was read by the latter. The well referred to is on the chalk formation on the southern slope of the range of the North Downs, 558 feet above sea level: its present depth is 118 feet. Weekly plumbings of the water in the well have been taken without interruption since 1885, and the authors have compared these plumbings with the rainfall of the previous week. The extreme variation of the water-level during the whole period was 30 ft. 3 in. Successive weeks of steady rainfall exercise a far greater effect upon raising the water-level than weeks of heavy, but intermittent, rainfall. As a rule, the effect of the autumn rains is not felt on the well until the month of December, but the winter rainfall penetrates most readily. Following a series of wet years a high limit of saturation is attained, and once this condition is thoroughly established the water remains at an almost constant level throughout the seasons, excess or deficiency of rain producing very little effect. With dry years the limit of saturation falls, the water in the well continuing at a low level. This fall in the limit of saturation may be so great as to pass beyond the depth of the well, which consequently becomes dry. The first rains following this condition of things is expended upon raising the level of saturation, and an appreciable time may elapse before there is any rise of water in the well.

Mr. Baldwin Latham said that he had found in measuring the wells

of a district that the water travelled from the highest to the lowest point. Wells on the top of the Downs would show a rise weeks before those in the lower part of the district. When the water began to rise in the high wells, it might be weeks before it got into the lower wells. The rainfall at the top of the hills was much greater than at the lowest point in the valley. The water in some of the high wells of the North Downs would fluctuate more than 100 feet, while near the Wandle, where the water escaped, it would not vary more than a few inches. He mentioned that there was a large increase in infant mortality when the water supply was low.

Mr. E. Gold suggested to the authors that they should take account not only of the rainfall, but also of the motion of the air, the mean temperature, the relative humidity, and the duration of bright sunshine, and find a numerical index of the effect of each of these quantities in a correlation coefficient.

The President observed that, in relation to the attempt to obtain correlation curves with such things as rainfall, humidity, &c., they had a geological problem to deal with, not merely in relation to the permeability of the soil, which would vary considerably, but also to the position of the well. In the case of an underground current subject to wave-like variation, they had to deal with the nature of the waves, the extent to which these waves diminished in amplitude from the upper to the lower levels, and also with the rate at which the actual current movement of water took place.

Mr. Carle Salter, Mr. W. B. Tripp and Mr. R. Inwards also took part in the discussion, to which Mr. Cooke and Mr. Russell replied.

Mr. A. W. Clayden read a paper on "The Actinograph: an instrument for observing and recording Changes in Radiation." He said that he had had a barograph at work for many years, and since January, 1908, had also issued a thermograph, in which the movements are derived from a metallic spiral. The latter instrument suggested the apparatus brought before the Society. It occurred to him that if it were possible to arrange two such coils in series, so that the expansion of the second should compensate for that of the first, the result of a mere change of temperature should be *nil*. But if one coil were left bright, and were shaded from radiation by a bright metal cover, while the second was blackened and freely exposed to radiation, there should generally be a difference of temperature which would be shown by the recording pen. He therefore obtained the working parts of a thermograph similar to the one he had been using, together with a duplicate coil, and after a few preliminary trials completed the instrument which had been working almost continuously ever since. He exhibited the instrument to the meeting, and showed a number of interesting records obtained from it.

Mr. W. W. Bryant, Mr. R. Inwards, Mr. J. E. Clark, Mr. E. Gold, and Mr. R. Corless took part in the discussion.

A paper on "A New Set of Cloudiness Charts for the United States" by Mr. K. M. Clark, of Harvard University, U.S.A., was, in



the absence of the author, read by the Secretary. This included a series of thirteen maps showing the mean monthly and annual cloudiness of the United States. The most marked features appeared over the Pacific Coast and the Great Lakes. On the North Pacific coast the combined effect of the coast ranges and the on-shore Westerly winds caused the high percentage of cloudiness, especially in winter, when the northern storm track swings down over this region. The Great Lakes region shows a similar large amount of cloudiness, especially in the winter, because of the location, on or near the northern cyclonic track and the presence of the water surface. The Californian valley, protected from moisture-bearing winds by the coast ranges, showed the minimum of cloudiness for the country. The local high cloudiness at Fresno, in this valley, in winter, was due to 'Tule fogs. During the late spring, summer, and early autumn, San Diego showed a cloudiness higher than that of adjacent stations. This was due to the occurrence, at these times, of the so-called "permanent Yuma low" over the Colorado River Valley, which produced an in-draft of moisture-laden air from the Pacific across San Diego, causing what was known as "high fog."

The following gentlemen were elected Fellows of the Society :—  
Mr. A. E. Brounger, Mr. M. E. Yorke Eliot, Assoc.M.Inst.C.E.,  
Mr. S. S. Elliott, Assoc.M.Inst.C.E., Mr. W. Howarth, Mr. H. K.  
Korgaokar, M.A., Mr. B. G. Pahlajaney, Mr. G. R. Pember,  
Raw Sahib G. N. Sahasrabudhe, Mr. G. C. Turner, F.L.S., and  
Mr. C. F. Webb, B.A.

### REVIEW.

*Waves of the Sea and other Water Waves* by VAUGHAN CORNISH,  
D.Sc. With 50 Photographs taken by the Author. London, 1910.  
T. Fisher Unwin. Size 9 × 6. Pp. 374. Price 10s. net.

DR. CORNISH enshrines in this handsome volume the researches of fifteen years on waves in water, including much data previously published by him, but bringing it into a more systematic and final form. He deals in Part I. with the size and speed of deep-sea waves, in Part II. with the transporting action of sea-waves on shingle, sand and mud, while in Part III. he goes on to the phenomena of stationary and progressive waves in rivers, including the discussion of bores and of cataracts. The first section is that which enters most intimately into relation with the phenomena, to the study of which this Magazine is devoted, and Chapter IV., which is concerned with the relation of waves to wind is naturally that to which we turn with most interest. The average velocity of the wind for certain periods during which the size of the waves had been observed is calculated, and an attempt made to connect the two. The character of the wave-front in a veering wind, and the influence of gusts and squalls on wave-forms, is dealt with, largely from data collected by the author.

The beautiful illustrations add much to the value of the book, and the style is eminently readable.



## A VISIT TO MEDICINE HAT.

By FELIX J. KOCH, of Cincinnati.

A RECENT dispatch out of Canada West is of interest, the world about, as detailing the passing of Medicine Hat. The editorial fraternity has taken up the item, and protested against such change.

"Every American," one scribe tells us, "is familiar with the popular josh at Medicine Hat—as the 'place the cold waves come from.' Apparently they are even more familiar with this josh in Western Canada. Apparently, too, it is taken quite seriously there; for a movement has sprung up in Medicine Hat to change that city's name.

"All Canada was angry when Kipling called the Dominion 'Our Lady of the Snows.' Canadians thought that sounded too cold for commercial advantage. It is for this same reason that Medicine Hat wants to change its title. The substitute chosen by its leading merchants, we presume, will be Pensacola, Tallahassee, or Vera Cruz.

"It is not yet finally settled, however, that the commercial boomers will be able to change the name of Medicine Hat. Some of the inhabitants of that town, who know a little of the early history of the plains, object; and no less a person than Rudyard Kipling has taken it upon himself to write to the citizens of Medicine Hat protesting against the change. He says, among other things:—

"To my mind the name of Medicine Hat has an advantage over all the names I have quoted. It echoes, as you so justly put it, the old Cree and Black-foot traditions of red mystery and romance, that once filled the prairies. Also, it hints, I venture to think, at the magic that under-lies the city, in the shape of your natural gas.

"Believe me, the very name is an asset, and, as years go on, will become more and more of an asset. It has no duplicate in the world. It makes men ask questions, and, as I know, more than twenty years ago, draws the feet of the young men toward it.

"Men do not think much of a family which has risen in the world, changing its name for social reasons. They think still less of a man who, because he is successful, repudiates his wife, who stood by him in the early struggles. I do not know what I should say, but I have the clearest notion of what I should think of a town that went back on itself."

"All of which is again focussing the eyes of the world on Medicine Hat.

"If there is one place that is perhaps the most feared spot of America, to the average newspaper reader, it is the town of Medicine Hat, where the blizzards come from. The very name has something far away in it, a sort of kinship to Indians and prairies, and then the association of the long, howling blizzards, which bring in their wake terrific snow storms. When the weather man from Medicine Hat sounds his warning, all the country well-nigh, sits up and takes notice."

We dropped into Medicine Hat the other day to see what the place might be like.

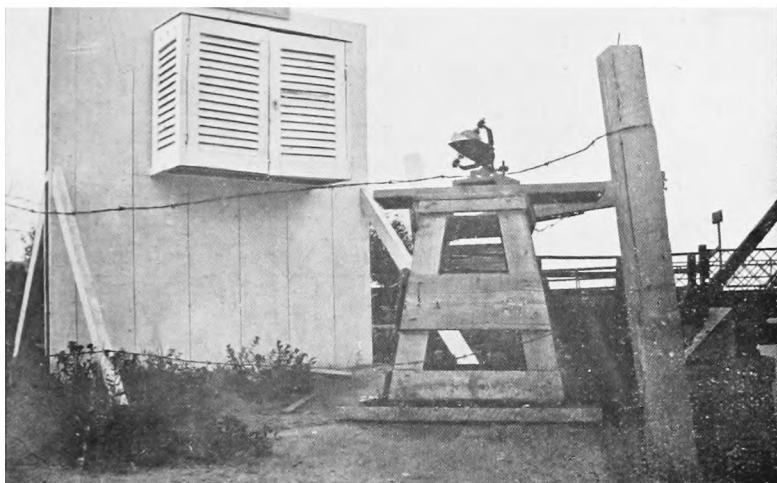
On the outskirts, the dry plains of Central Canada hemmed in the settlement. There was no end to them, seemingly. *Coulées*, or gulches, as we of the States call them, were likewise on the way, and then, on ahead, lay the town of Medicine Hat. On the nearer borders there was an Indian encampment. The wigwam-like arrangement for cooking and the old-time tepees stood out in the valley, as they did in here two or three centuries before. Then, too, there were some one-room shanties to which the noble red man had renegued. Out of the day of the red man, into the present, we passed by rapid transition, at the rate of sixty miles an hour, as the train was making up time. At nine we were out in the city. Right up at the railway's side there was a street of little stores. One hardly thought of them as one thought of the town—famous for being the one whence the weather comes. One or two-story little shops, built of brick or frame, and stretching off perhaps three squares were these. There was one business street trending away, too, and one noted a tailor and drug store. Romantic fellows these shopkeepers, undoubtedly—think of the material for a novel in "The Lone Tailor of Medicine Hat," or "The Romance of a Lone Land Druggist." A man comes out to the lonesome, sets up shop to hide some dark secret of his past, and lo, to-day, thousands of people are dragged past his doors by the steam cars? Over yonder the American hotel invites, its walls of a sort of cement blocks, and the roof of a black frame. Then there is the Board of Trade, in a little frame where men sit in caps, with pipes, English fashion, outside the door, and ponder on the weather. As the sun shines, so the wheat grows, as the wheat grows so smiles coy Fortune up here in the Northland. But we must be off sight-seeing. We open the note-book and jot down a few things. A harness-shop, a general store, an electric theatre. Yea, even the photographer is here at Medicine Hat.

All this West is very modern, withal it so very young. When its history comes to be written, there will be no stirring days of pioneering. Grandad of the future will tell, not of his ride on the Red River carts, across the plains, but, instead of buying a ticket from a scalper in Waterloo, Iowa, where they tell us the law is broken every day of the year, and hie him away to the far-away Northland. A new, two storey, fine stone Custom House is built here, or building, it has the red stone, with lighter shades at the corners, and again about the windows. Then there is the City Hall, of red brick, and in the same style; something about it makes one think of an exhibition building at home. Other buildings, just below, would be regarded as good in any place. There is a modern fire department installed in the City Hall; ahead is the great steel bridge across the river.

We pass on down the street between the two. They have even a park here along the river, densely set out with young trees. It is

balmy now at Medicine Hat, withal it is cloudy. At the end of the town is a ridge; from it we see a church. Over the river there roll away the desolate *coulées*. Here, on the bluff over the river, at the edge of the field, with more young trees, overlooking the same blue-gray river and the bridge, is the famous weather station.

There is a little area of sun-baked mud or earth enclosed by a barbed wire. At its centre, set diagonally across the space, is a board wall, of heavy planks, white painted. Two uprights at the rear sustain it; an old soap box, too, is nailed behind. By the side of the frame one can see that it is built double, to withstand the wind, the sheaths or walls being perhaps three inches apart. Against the frame, then, at its front, is the usual latticed box of weather bureaux



METEOROLOGICAL STATION AT MEDICINE HAT.

generally. This is locked, to safeguard against thieves. It, too, is white painted, and faces the river. Off at the front stands a little pedestal—on this is a stand, bearing a globe of glass. The glass concentrates the sunlight on a strip of blue paper, marked off in white hour lines. The sun burns its mark upon this, then, at it passes, serving to show the number of hours *per diem* which is shone here. It is daylight here from two in the morning till ten at night, someone tells you. Twilights are very long. At Edmonton, a few hundred miles further north, the twilights almost meet at times. We here are just ninety miles from the American border.

We “run foul” of the weather man and we interview him. He is a reticent fellow; undoubtedly the temperature has got on his nerves. “Yes, indeed, it gets cold here, the end of February and into March is the very coldest time.” Last winter, however, they did not have very cold weather at all.

What did he call very cold weather? “Ah, well, if it got to 10 or

15 degrees below, why, then, it was right smart cold." Things are comparative in travel one must remember. He preferred to talk of the natural gas—here there were limitless amounts of it; one need go down only 1,100 feet. We hail from a town where natural gas is talked till the ears sicken at taint of it. So we swerved again to the weather. This was reported daily at five o'clock p.m. The station belongs to the Canadian Government; the weather report is distributed, however, by the *Associated Press*.

Mr. Crosskill, the Observer, has been here several years, and is wont to stay considerable more, heralding the blizzards which have made notorious bustling Medicine Hat.

---

### SCOTTISH METEOROLOGICAL SOCIETY.

A MEETING of the Society was held on Monday evening, February 27th, in St. Andrew's Hall, Edinburgh, Professor A. Crum Brown, F.R.S., President, in the Chair. Mr. R. G. K. Lempfert, Superintendent of the Forecast Division of the Meteorological Office, London, delivered a lecture on "Weather Forecasting." The lecture covered a wide field. The routine work of the Forecasting Division of the Office was first described in detail, and the importance of such recent developments as the extension of the cable from the Shetlands to Faeroe and Iceland, and the co-operation of the Atlantic Shipping Companies by means of wireless telegraphy, was discussed. Thereafter researches made by the lecturer, along with Dr. Shaw, were dealt with, and an effort made, very successfully, to explain the general principles on which the art and practice of forecasting were based.

The lecture was freely illustrated with lantern slides, many of them showing the weather distribution on days which had been more or less memorable. Indeed the occasion was, in a way, a historic one. The numerous messages received in the morning at the Meteorological Office had been re-telegraphed to Edinburgh, and Mr. Lempfert had prepared in the Society's rooms a map showing the weather conditions over our islands and Western Europe for the actual morning of the day of his lecture. This was the first time on which a weather map for the current day had been prepared in Scotland; a lantern slide of the map was thrown on the screen. The lecture was greatly appreciated by a large audience.

Apart from meetings on the usual lines, the Society has recently made the experiment of holding quite informal evening meetings for discussion. Two such meetings have been held, with considerable success; (1) on the evening of 8th December, 1910, jointly with the Physical Research Club, in the Natural Philosophy Department of Edinburgh University, when Dr. G. A. Carse opened a discussion on "Atmospheric Electricity"; (2) in the Society's Rooms on 18th January, when Mr. Fairgrieve opened a discussion on "The Upper Air."

## Correspondence.

*To the Editor of Symons's Meteorological Magazine.*

---

## MILLIMETRES OR INCHES.

I HAVE just read a letter signed "Contributor" in your issue for January. It directs attention to a very obvious misprint, viz., 30° F., instead of 32° F., in two places in the Report of the Transvaal Meteorological Department for 1908-09. This mistake, I am glad to say, is not to be found in earlier or later reports, but I do not for one moment think that it would deceive any meteorologist into supposing that some new method of reducing barometer readings had been adopted. "Contributor's" statement that four different systems of reduction are employed is thus rather frivolous.

The general question as to whether pressures should be measured by inches or millimetres has also been raised in this correspondence. The practice at this observatory is, until such time as a uniform system has been adopted, to print pressures both in inches and millimetres. I have a strong expectation that, in the future, it will not be necessary to use inches in this respect. In the Weekly Weather Report of the London Meteorological Office an absolute (metric) unit has been already adopted for observations in the Upper Air. Also in Appendix III. of the Observer's Handbook, 1909, issued by the same office, the use of the "degree of pressure" (1 "degree of pressure" =  $2 \times 10^3$  dynes per sq. cm.) is suggested as a pressure unit, and tables are given for the conversion of barometric readings in millimetres and English inches into "degrees of pressure" and megadynes per square centimetre.

Thus it appears to me that by publishing barometric readings in millimetres and English inches, the Transvaal Meteorological Department is not only keeping step with other British Meteorological Observatories, but is also attending to the interests of future generations of investigators.

R. T. A. INNES, *Director.*

*Johannesburg, 13th February, 1911.*

---

## CYCLONES AND THE SUN'S ROTATION PERIOD.

I HAVE read Mr. Henkel's article in your number for January, 1911, with great interest.

Some definition is wanted as to the "date of origin." In the Jamaica Meteorological Reports a complete list of cyclones between 1881 and 1901 will be found; the dates are given on which the barometers began to fall, and also the dates, when having increased in strength, the cyclones swept over or near any island or vessel which may have subsequently reported them. There may be several days between these dates, and I suggest that the first dates should

be adopted. The sudden drop of the barometer, due to a cyclone generating at a distance of 800 miles or so, I have long used as a "wireless message"; so that all places in the West Indies would record the same "date of origin" for any cyclone.

With reference to the sunspot period and terrestrial temperatures, the Jamaica observations confirm those of Mr. Stone at the Cape and Dr. Gould at Cordoba, only that the difference between maximum and minimum temperatures in Jamaica is  $2^{\circ}$  F., instead of  $1\frac{3}{4}^{\circ}$  F. as found at Cordoba (see Weather Report, No. 275, pp. 9, 10). With reference to the sunspot period and the Jamaica rainfall, I believe that the recent reduction of 40 years' observations have proved that a rainfall minimum occurs regularly two years after every sunspot maximum and minimum. The rainfall maxima are more irregular, depending on "flood rains," etc., but of course they fall between two minima. This may remove the contradictory results obtained in different parts of the world.

MAXWELL HALL,

*Jamaica, February 11th, 1911.*

*Government Meteorologist.*

## THE SUPPOSED COLD OF WINTER ANTICYCLONES.

SINCE Mr. Brodie has mentioned my name in connection with the supposed cold of the winter anticyclone, it may interest your readers if I state the facts on which my objection was founded; since the matter is not one of opinion, but one that can easily be settled by a search through existing records, which are ample for the purpose.

During the 50 years, 1841—1890, the Greenwich records show 74 periods of frost. Out of these 20, which between them gave 216 days of frost, occurred with the mean of the barometer during their continuance below 29.80 in., and 13, giving 93 days, with a mean above 30.20 in. Moreover nearly every frost in the period noted for severity or length, had occurred in the low pressure series. Also for the same period the mean temperature on all the days on which the barometer was above 30.20 in., was  $38^{\circ}3$  F., which is close to the mean winter temperature, the percentage of frosty days (mean below  $32^{\circ}0$  F.) was 15, which is also the percentage for the whole 150 winter months included in the period.

Further, at Christiania, Berlin, and Geneva, no connection between the monthly winter means of the height of the barometer, and of the temperature is shown,—*Royal Met. Soc. Quarterly Journal*, Jan., 1897. Vol. 23, No. 101, and Vol. 25, No. 109.

It is curious how, in the face of this statistical evidence, the "rule" can ever have been formulated. I call it "rule" for I see Mr. Brodie still does so, although he was never one of its warm advocates. The statement is still made in the text books, copied probably one from another, without investigation. Perhaps it is true in drier countries, Asia and North America for instance, but I often wonder if it is. Possibly it arose from the old lettering on the

barometer faces, "rise for north-east winds," for if an anticyclone is another term for a north-east wind, it is doubtless true. Possibly though it may have come from the mistaken notion that an anticyclonic brought down cold air from the upper strata, and therefore ought to be cold. The descending air does occur, but the temperature during an anticyclone a few thousand feet high is unduly warm.

W. H. DINES.

*Pyrton Hill, Oxon., 1st March, 1911.*

---

### GUN-FIRING AND RAINFALL.

WITH reference to the question of the firing of guns causing rain, may I point out that at Shoeburyness, where great guns are being fired almost daily, and very frequently in the day, the average rainfall is, I think, the smallest in the United Kingdom, viz., below 20 inches.

FREDK. GASTER, F.R. Met.Soc.

*Tankerton, 25th February, 1911.*

---

### METEOROLOGICAL NEWS AND NOTES.

THE ARTICLE ON MEDICINE HAT which we publish this month comes to us as an unsolicited contribution from an American writer. We retain pleasant recollections of Medicine Hat in its earlier days, passing through it some fourteen years ago, and its rapid growth from the wooden abodes of those days to the fine stone structures of the present is a striking example of the prosperity accruing from the utilization of the wonderful soil and climate of the western plains. The passing of the old names, Rat Portage, Moose Jaw, Medicine Hat, which gave an air of romance and a glimpse of historical vistas to the railway journey across Canada, is a source of lively regret to all who appreciate the flickering of the old northern lights on commonplace modern prosperity. But we are inclined to doubt the American editor's opinion that Medicine Hat wishes to change its name in order to escape from the reproach of breeding blizzards.

COLLIERY WARNINGS based on the probability of the rapid escape of gas from the cold seams in certain conditions of weather have been made the subject of some unusually severe criticism in *The Times* and *Nature*, to which a very spirited rejoinder has been made by the anonymous author of the warnings. It is not a little surprising that no one should know who is responsible for warnings which have been issued through the Press Association for many years; but the anonymity and absence of authority at least give a good opportunity for judging the whole matter on its merits. We should value the views of any of our readers who may have consulted these warnings.



## RAINFALL TABLE FOR FEBRUARY, 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	1'66	1'48
Tenterden.....	Kent.....	51 4	*0 41	190	1'90	1'33
Arundel (Patching).....	Sussex.....	50 51	0 27	130	2'17	1'68
Southampton (Cadland) ..	Hampshire.....	50 50	1 22	52	2'28	1'84
Oxford (Magdalen College).....	Oxfordshire.....	51 45	1 15	186	1'62	1'29
Wellingborough (Croyland Abbey).....	Northampton.....	52 18	0 41	174	1'69	1'17
Shoeburyness.....	Essex.....	51 31	*0 48	13	1'19	'65
Bury St. Edmunds (Westley).....	Suffolk.....	52 15	*0 40	226	1'59	'96
Geldeston [Beccles].....	Norfolk.....	52 27	*1 31	38	1'41	1'24
Polapit Tamar [Launceston].....	Devon.....	50 40	4 22	315	2'95	1'98
Rousdon [Lyme Regis].....	„.....	50 41	3 0	516	2'50	1'88
Stroud (Upfield).....	Gloucestershire..	51 44	2 13	226	2'12	1'42
Church Stretton (Wolstaston).....	Shropshire.....	52 35	2 48	800	2'17	2'44
Coventry (Kingswood).....	Warwickshire ..	52 24	1 30	340	2'01	1'38
Boston.....	Lincolnshire.....	52 58	0 1	25	1'53	1'29
Workshop (Hodsock Priory).....	Nottinghamshire	53 22	1 5	56	1'64	'78
Macclesfield.....	Cheshire.....	53 15	2 7	501	2'30	2'59
Southport (Hesketh Park).....	Lancashire.....	53 38	2 59	38	2'07	2'85
Wetherby (Ribston Hall) ..	Yorkshire, W.R.	53 59	1 24	130	1'71	1'85
Arnccliffe Vicarage.....	„.....	54 8	2 6	732	4'88	11'87
Hull (Pearson Park).....	„.....	53 45	0 20	6	1'78	1'35
Newcastle (Town Moor) ..	Northumberland	54 59	1 38	201	1'63	'66
Borrowdale (Seathwaite) ..	Cumberland.....	54 30	3 10	423	10'96	20'57
Cardiff (Ely).....	Glamorgan.....	51 29	3 13	53	3'07	4'56
Haverfordwest.....	Pembroke.....	51 48	4 58	95	3'42	3'01
Aberystwyth (Gogerddan).....	Cardigan.....	52 26	4 1	83	3'09	3'78
Llandudno.....	Carnarvon.....	53 20	3 50	72	2'11	2'10
Cargen [Dumtries].....	Kirkcudbright...	55 2	3 37	80	3'42	5'42
Marchmont House.....	Berwick.....	55 44	2 24	498	2'15	1'90
Girvan (Pinmore).....	Ayr.....	55 10	4 49	207	3'87	6'29
Glasgow (Queen's Park) ..	Renfrew.....	55 53	4 18	144	2'70	5'89
Inveraray (Newtown).....	Argyll.....	56 14	5 4	17	5'71	12'43
Mull (Quinish).....	„.....	56 34	6 13	35	4'45	6'80
Dundee (Eastern Necropolis).....	Forfar ..	56 28	2 57	199	1'91	1'10
Braemar.....	Aberdeen.....	57 0	3 24	1114	2'55	3'10
Aberdeen (Cranford).....	„.....	57 8	2 7	120	2'36	1'31
Cawdor.....	Nairn.....	57 31	3 57	250	2'06	2'89
Fort Augustus (S. Benedict's).....	E. Inverness ..	57 9	4 41	68	4'20	6'81
Loch Torridon (Bendamph).....	W. Ross.....	57 32	5 32	20	7'53	10'87
Dunrobin Castle.....	Sutherland.....	57 59	3 56	14	2'58	2'87
Wick.....	Caitness.....	58 26	3 6	77	2'23	2'75
Killarney (District Asylum).....	Kerry.....	52 4	9 31	178	4'99	3'47
Waterford (Brook Lodge).....	Waterford.....	52 15	7 7	104	3'18	2'61
Nenagh (Castle Lough).....	Tipperary.....	52 54	8 24	120	2'89	3'64
Miltown Malbay.....	Clare.....	52 52	9 26	400	3'21	3'25
Gorey (Courtown House) ..	Wexford.....	52 40	6 13	80	2'75	2'00
Abbey Leix (Blandsfort).....	Queen's County..	52 56	7 17	532	2'55	2'88
Dublin (Fitz William Square).....	Dublin.....	53 21	6 14	54	1'93	'99
Mullingar (Belvedere).....	Westmeath.....	53 29	7 22	367	2'67	3'60
Ballinasloe.....	Galway.....	53 20	8 15	160	2'50	3'83
Crossmolina (Enniscoie).....	Mayo.....	54 4	9 18	74	4'20	4'19
Collooney (Markree Obsy.).....	Sligo.....	54 11	8 27	127	3'20	3'77
Seaforde.....	Down.....	54 19	5 50	180	2'81	3'78
Bushmills (Dundarave).....	Antrim.....	55 12	6 30	162	2'56	3'98
Omagh (Edenfel).....	Tyrone.....	54 36	7 18	280	2'68	4'01

## RAINFALL TABLE FOR FEBRUARY, 1911—continued.

RAINFALL OF MONTH (con.)					RAINFALL FROM JAN. I.				Mean Annual 1875-1909.	STATION.
Diff. from Av. in.	% of Av.	Max. in 24 hours.	No. of Days		Aver. 1875-1909.	1911.	Diff. from Aver. in.	% of Av.		
		in.	Date.	Days	in.	in.			in.	
— 18	89	39	27	14	3'49	2'86	— 63	82	25'11	Camden Square
— 57	70	30	28	15	4'04	2'84	—1'20	70	27'64	Tenterden
— 49	77	48	27	12	4'76	3'17	—1'59	67	30'48	Patching
— 44	81	46	27	11	5'03	3'14	—1'89	63	31'87	Cadland
— 33	80	29	27	14	3'40	1'97	—1'43	58	24'58	Oxford
— 52	69	19	18†	14	3'58	1'93	—1'65	54	25'17	Croyland Abbey
— 54	55	21	27	14	2'52	1'55	— 97	61	19'28	Shoeburyness
— 63	60	26	27	12	3'29	2'70	— 59	82	25'40	Westley
— 17	88	24	11	20	2'94	3'01	+ 07	102	23'73	Geldeston
— 97	67	47	27	16	6'54	3'31	—3'23	51	38'27	Polapit Tamar
— 62	75	39	27	14	5'44	2'86	—2'58	53	33'54	Rousdon
— 70	67	29	18	13	4'45	2'74	—1'71	62	29'81	Stroud
+ 27	112	43	18	15	4'68	3'05	—1'63	65	32'41	Wolstaston
— 63	69	38	18	9	4'23	2'24	—1'99	53	28'98	Coventry
— 24	84	34	21	16	3'07	2'86	— 21	93	23'35	Boston
— 86	48	16	18	12	3'34	1'67	—1'67	50	24'46	Hodsock Priory
+ 29	113	43	21	14	4'96	3'88	—1'08	78	34'73	Macclesfield
+ 78	138	59	21	17	4'62	3'65	— 97	79	32'70	Southport
+ 14	108	42	21	17	3'60	3'20	— 40	89	26'87	Ribston Hall
+6'99	243	2'05	21	19	11'14	16'02	+4'88	144	61'49	Arneliffe
— 43	76	26	21	16	3'48	2'67	— 81	77	26'42	Hull
— 97	40	12	23	13	3'53	2'33	—1'20	66	27'94	Newcastle
+9'61	188	3'65	18	19	24'40	31'74	+7'34	130	129'48	Seathwaite
+1'49	149	1'25	27	17	6'72	6'46	— 26	96	42'28	Cardiff
— 41	88	47	26	16	8'11	6'01	—2'10	74	46'81	Haverfordwest
+ 69	122	74	10	15	7'00	6'04	— 96	86	45'46	Gogerddan
— 01	100	35	28	14	4'62	2'80	—1'82	61	30'36	Llandudno
+2'00	158	1'14	18	16	7'52	7'96	+ 44	106	43'47	Cargen
— 25	88	52	22	12	4'55	3'30	—1'25	73	33'76	Marchmont
+2'42	162	1'60	18	20	8'65	9'71	+1'06	112	49'77	Girvan
+3'19	218	1'42	17	19	6'23	8'63	+2'40	139	35'97	Glasgow
+6'72	218	2'41	17	21	13'05	19'91	+6'86	152	68'67	Inveraray
+2'35	153	98	17	21	10'00	11'82	+1'82	118	56'57	Quinish
— 81	58	20	21	18	3'92	1'72	—2'20	44	28'64	Dundee
+ 55	122	...	...	...	5'47	4'54	—1'03	83	34'93	Braemar
—1'05	55	20	13‡	14	4'72	2'86	—1'86	61	32'73	Aberdeen
+ 83	140	60	17	12	4'34	4'08	— 26	94	29'33	Cawdor
+2'61	162	1'14	21	19	9'78	9'83	+ 05	101	44'53	Fort Augustus
+3'34	144	1'45	21	21	16'79	19'75	+2'96	118	83'61	Bendamp
+ 29	111	36	19§	16	5'33	5'01	— 32	94	31'90	Dunrobin Castle
+ 52	123	50	23	18	4'71	4'64	— 07	99	29'88	Wick
—1'52	70	67	22	17	10'93	5'23	—5'70	48	54'81	Killarney
— 57	82	48	14	15	6'96	4'29	—2'67	62	39'57	Waterford
+ 75	126	52	18	18	6'77	5'31	—1'46	78	39'43	Castle Lough
+ 04	101	64	26	17	7'22	5'41	—1'81	75	45'11	Miltown Malbay
— 75	73	52	26	13	5'94	3'25	—2'69	55	34'99	Courtown Ho.
+ 33	113	44	18	17	5'70	4'56	—1'14	80	35'92	Abbey Leix
— 94	51	21	18	17	4'07	1'63	—2'44	40	27'68	Dublin
+ 93	135	75	18	15	5'77	5'72	— 05	99	36'15	Mullingar
+1'33	153	65	26	19	5'85	5'97	+ 12	102	36'64	Ballinasloe
— 01	100	68	23	19	9'55	6'65	—2'90	70	52'87	Enniscoie
+ 57	118	45	18	19	7'07	6'30	— 77	89	42'71	Markree
+ 97	134	1'38	18	16	6'22	4'90	—1'32	79	38'91	Seaforde
+1'42	155	54	18	21	5'75	5'53	— 22	96	37'56	Dundarave
+1'33	150	64	18	19	6'14	6'72	+ 58	109	39'38	Omagh

† and 27 ‡ and 21. § and 25. || 26 and 27.

## SUPPLEMENTARY RAINFALL, FEBRUARY, 1911.

Div.	STATION.	Rain inches	Div.	STATION.	Rain inches
II.	Warlingham, Redvers Road	1.85	XI.	Douglas	4.64
„	Ramsgate	.89	XII.	Stoneykirk, Ardwell House	3.31
„	Hailsham	1.92	„	Dalry, The Old Garroch	9.25
„	Totland Bay, Aston House.	1.40	„	Langholm, Drove Road	7.76
„	Stockbridge, Ashley	1.56	„	Beattock, Kinnelhead	8.53
„	Grayshott	2.03	XIII.	St Mary's Loch, Cramilt Ldge	5.90
„	Reading, Calcot Place	1.43	„	North Berwick Reservoir	1.18
III.	Harrow Weald, Hill House.	1.61	„	Edinburgh, Royal Observty.	1.87
„	Pitsford, Sedgebrook	1.10	XIV.	Maybole, Knockdon Farm	5.77
„	Somersham Vicarage	.55	XV.	Campbeltown, Witchburn	5.59
„	Woburn, Milton Bryant	1.65	„	Glenreassdell Mains	5.99
IV.	Colchester, Lexden	1.00	„	Holy Loch, Ardnadam	14.06
„	Newport	1.20	„	Ballachulish House	12.81
„	Rendlesham	.70	„	Islay, Fallabus	6.00
„	Swaffham	1.56	XVI.	Dollar Academy	5.67
„	Blakeney	1.65	„	Balquhiddy, Stronvar	12.31
V.	Bishops Cannings	1.71	„	Coupar Angus	1.69
„	Winterbourne Steepleton	2.75	„	Glenlyon, Meggernie Castle	8.92
„	Ashburton, Druid House	2.94	„	Blair Atholl	2.87
„	Okehampton, Oaklands	3.37	„	Montrose, Sunnyside Asylum	.79
„	Cullompton	2.34	XVII.	Alford, Lynturk Manse	1.05
„	Hartland Abbey	1.72	„	Fyvie Castle	...
„	Lynmouth, Rock House	3.01	„	Keith Station	2.71
„	Probus, Lamellyn	1.71	XVIII.	Glenquoich, Loan	2.46
„	North Cadbury Rectory	1.98	„	Skye, Dunvegan	8.73
VI.	Clifton, Pembroke Road	2.74	„	N. Uist, Lochmaddy	4.07
„	Ross, The Graig	1.13	„	Alvey Manse	2.97
„	Shifnal, Hatton Grange	1.51	„	Loch Ness, Drumnadrochit	5.31
„	Blockley, Upton Wold	1.49	„	Glencarron Lodge	12.99
„	Worcester, Boughton Park	1.58	XIX.	Invershin	3.02
VII.	Market Overton	1.59	„	Loch Stack, Ardochullin	8.12
„	Market Rasen	1.20	„	Melvich	3.78
„	Barwry, Hesley Hall	.70	XX.	Skibbereen Rectory	4.61
„	Derby, Midland Railway	1.70	„	Dunmanway, The Rectory	6.25
VIII.	Nantwich, Dorfold Hall	1.93	„	Cork	2.37
„	Chatburn, Middlewood	6.65	„	Mitchelstown Castle	3.47
„	Cartmel, Flookburgh	5.46	„	Darrynane Abbey	4.33
IX.	Langsett Moor, Up. Midhope	5.38	„	Glenam [Clonmel]	3.00
„	Scarborough, Scalby	1.58	„	Newmarket-on-Fergus, Fenloe	3.09
„	Ingleby Greenhow	1.15	XXI.	Laragh, Glendalough	...
„	Mickleton	3.11	„	Balbriggan, Ardgillan	2.39
X.	Bardon Mill, Beltingham	2.93	„	Moyalty, Westland	3.67
„	Ilderton, Lilburn Cottage	1.07	XXII.	Cong, The Glebe	6.08
„	Keswick, The Bank	6.64	„	Westport, St. Helens	4.72
XI.	Treherbert, Tyn-y-waun	3.92	„	Achill Island, Dugort	6.86
„	Carmarthen, The Friary	10.46	„	Mohill	3.63
„	Castle Malgwyn [Llechryd]	3.47	XXIII.	Enniskillen, Portora	4.04
„	Plynlimon	1.93	„	Dartrey [Cootehill]	3.73
„	New Radnor, Ednol	9.50	„	Warrenpoint, Manor House	3.68
„	Rhayader, Tyrmynydd	3.45	„	Banbridge, Milltown	2.13
„	Lake Vyrnwy	5.11	„	Belfast, Springfield	3.60
„	Llangyhanfal, Plâs Draw	6.19	„	Glenarm Castle	4.61
„	Dolgelly, Bryntirion	1.43	„	Londonderry, Creggan. Res.	3.63
„	Bettws-y-Coed, Tyn-y-bryn	4.57	„	Killybegs	5.87
„	Lligwy	5.75	„	Horn Head	4.04
„		2.42			

## METEOROLOGICAL NOTES ON FEBRUARY, 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.—The first half was unusually dry, only .14 in. of R having fallen by the 13th, on which day a partial drought of 33 days with .25 in. of R ended. Frequent showers occurred in the latter half, alternating with brilliant sunshine except on the last two days, which were wet and inclement. Duration of sunshine, 65.5\* hours, and of R 39.2 hours. Mean temp. 41°·2, or 1°·5 above the average. Evaporation .32 in. Shade max. 55°·6 on 18th; min. 20°·5 on 1st. F 8, f 15.

TENTERDEN.—Generally dry until the last week. Duration of sunshine, 87.0† hours. Shade max. 55°·0 on 17th; min. 22°·0 on 14th. F 9, f 14.

TOTLAND BAY.—Almost an entire absence of wind in the first half. Duration of sunshine, 88.9\* hours. Shade max. 54°·0 on 25th; min. 27°·0 on 2nd. F 4, f 7.

PITSFORD.—R .89 in. below the average. Mean temp. 40°·1. Shade max. 57°·6 on 18th; min. 13°·5 on 2nd. F 9.

NORTH CADBURY.—Quiet anticyclonic weather prevailed up to 17th. Hardly any wind in the first 8 days save on 4th, but afterwards a high wind average. There was an absolute drought of 17 days ending on 9th, and 33 days' partial drought ending on 13th. Shade max. 56°·0 on 25th; min. 20°·0 on 2nd. F 9, f 13.

ROSS.—Shade max. 56°·5 on 18th and 25th; min. 18°·3 on 1st.

HODSOCK PRIORY.—An absolute drought of 25 days ended on 13th, and a partial drought of 39 days with .29 in. of R on 20th. Shade max. 60°·3 on 18th; min. 15°·9 on 1st. F 9, f 16.

SOUTHPORT.—Duration of sunshine, 63.1\* hours, and of R 62.1 hours. Mean temp. 40°·8, or 1°·2 above the average. Shade max. 53°·9 on 28th; min. 20°·0 on 1st. F 4, f 17.

HULL.—Dull and light generally with light R to 13th. Then more frequent R and squally and stormy periods to the end. Shade max. 58°·0 on 18th; min. 21°·0 on 1st. F 6, f 16.

HAVERFORDWEST.—Fine and cold to 12th, then wet, mild and stormy. Duration of sunshine, 69.2\* hours. Shade max. 53°·3 on 25th.

LLANDUDNO.—Shade max. 57°·5 on 21st; min. 25°·5 on 2nd. F 3.

CARGEN.—The first 10 days were rainless, but thereafter R fell frequently and copiously. Strong W. winds prevailed during the latter half, and there was a severe gale on 23rd. Shade max. 51°·0 on 17th, 18th and 28th; min. 18°·0 on 2nd. F 7.

EDINBURGH.—Shade max. 56°·9 on 21st; min. 21°·3 on 3rd. F 6, f 12.

COUPAR ANGUS.—An ideal month with light R and a high mean temp. Shade max. 55°·0 on 16th; min. 15°·0 on 2nd.

FORT AUGUSTUS.—Shade max. 53°·0 on 16th; min. 13°·7 on 1st. F 9.

CORK.—An absolute drought of 16 days, and a partial drought of 29 days, both ended on 8th. Shade max. 53°·0 on 25th; min. 22°·0 on 2nd. F 10, f 12.

DUBLIN.—The first part was calm, dry and cold owing to an anticyclonic distribution of pressure. From 12th to the close the weather was stormy, with frequent but not heavy R. Mean temp. 43°·3, or 0°·9 above the average. Shade max. 59°·1 on 21st; min. 26°·8 on 1st. F 4, f 9.

MARKREE.—The first part was dry, with severe frosts on each night, but from 12th to the close R, H and high winds prevailed. Shade max. 55°·9 on 21st; min. 17°·6 on 1st. F 10, f 14.

WARRENPOINT.—The first half was fine, but the latter half mild and wet. Northerly winds prevailed in the first half and westerly in the latter half. Shade max. 54°·0 on 17th, 18th and 21st; min. 28°·0 on 1st. F 7, f 6.

## Climatological Table for the British Empire, September, 1910.

STATIONS.  (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
								0-100			inches		
London, Camden Square	76·3	28	40·0	21	66·2	49·6	50·6	82	114·7	36·2	·58	5	5·9
Malta ... ..	93·7	21	62·0	26†	75·5	67·2	63·2	77	147·3	...	2·45	5	4·7
Lagos ... ..	86·2	7	70·0	21	84·2	73·2	73·4	77	154·0	74·0	4·92	12	...
Cape Town ... ..	79·0	13	37·5	6	66·4	51·1	50·1	71	...	...	1·38	5	3·3
Durban, Natal ... ..	89·5	3	48·4	1	72·6	57·8	...	...	136·2	...	3·84	9	5·0
Johannesburg ... ..	82·0	27	35·1	4	68·9	46·8	39·5	67	139·6	26·8	2·71	6	2·5
Mauritius ... ..	79·3	19*	55·3	2	77·7	62·6	59·6	72	150·3	47·1	1·13	16	6·3
Calcutta... ..	93·3	2	74·6	27	89·1	78·3	77·8	86	...	73·8	12·95	13	7·6
Bombay... ..	87·1	9	73·8	19	83·8	76·7	75·2	86	130·2	71·7	18·84	23	7·7
Madras ... ..	95·1	7	71·7	13	91·9	77·1	73·7	77	143·5	71·8	3·79	14	6·2
Kodaikanal ... ..	65·6	16	48·7	6	62·0	51·6	51·6	86	136·9	41·3	4·32	15	7·2
Colombo, Ceylon ... ..	86·3	8, 13	72·2	22	84·8	75·9	73·0	79	149·5	70·0	2·15	13	6·6
Hongkong ... ..	90·1	5	72·1	28	84·1	76·3	73·6	82	140·1	...	15·95	19	7·5
Melbourne ... ..	75·0	24	36·6	14	63·0	47·0	45·0	69	130·4	33·2	4·20	16	6·6
Adelaide ... ..	81·3	24	41·7	27	65·4	49·6	48·5	72	140·5	35·7	2·81	12	5·5
Coolgardie ... ..	91·8	23	35·2	15	71·8	46·8	32·7	59	156·0	33·0	·29	6	3·4
Perth ... ..	84·9	21	42·9	9	67·3	51·7	41·6	72	137·8	37·0	3·55	14	4·2
Sydney ... ..	74·8	19	45·5	3	67·2	53·8	50·5	72	124·6	34·9	2·41	23	4·0
Wellington ... ..	62·0	8	37·0	25	57·9	46·3	39·6	62	110·0	31·0	·60	7	5·0
Auckland ... ..	63·0	22	44·0	28	60·4	48·6	48·4	79	149·0	41·0	2·49	16	6·0
Jamaica, Kingston ..	91·8	1	70·7	30	89·3	72·5	72·0	80	...	...	5·12	12	5·3
Grenada ... ..	88·6	17+	73·0	1, 28	85·2	75·3	72·5	77	141·0	...	7·05	24	4·0
Toronto ... ..	81·3	6	38·7	22	69·8	50·0	...	...	96·8	34·2	3·89	7	...
Fredericton ... ..	75·0	5	32·5	30	65·3	43·7	...	86	...	...	2·50	7	5·5
St. John, N.B. ... ..	73·0	18	44·5	10	...	...	...	...	...	...	1·62	11	...
Victoria, B.C. ... ..	77·4	19	41·2	25	64·9	48·2	...	74	...	...	1·59	6	5·0
Dawson ... ..	71·0	12	14·0	21	54·6	34·0	...	...	...	...	1·34	12	6·5

\* and 23. † and 18. ‡ and 27.

MALTA.—Mean temp. of air 71·3. Average bright sunshine 8·7 hours per day.

Johannesburg.—Bright sunshine 274·9 hours.

Mauritius.—Mean temp. of air 0°·4, of dew point 0°·6, and R ·31 in., below averages. Mean hourly velocity of wind 10·4 miles, or 1·6 miles below average.

KODAIKANAL.—Bright sunshine 137 hours.

COLOMBO.—Mean temp. of air 76°·8 or 3°·9 below, of dew point 0°·3 below, and R 2·53 in. below, averages. Mean hourly velocity of wind 7·6 miles.

HONGKONG.—Mean temp. of air 79°·7. Bright sunshine 161·3 hours, or 35 below average. Mean hourly velocity of wind 13·1 miles. R 6·30 in. above average.

Melbourne.—Mean temp. of air 1°·1, and R 1·90 in. above, averages.

Adelaide.—Mean temp. of air 0°·5, and R 1·05 in. above, averages.

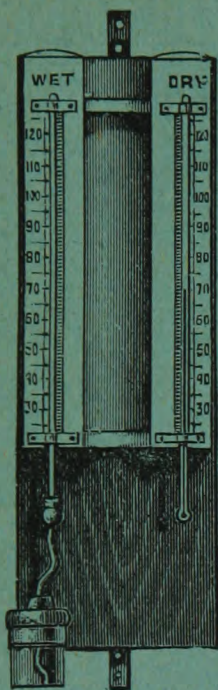
Coolgardie.—Mean temp. of air 1°·1 above, and R ·39 in. below, averages.

Perth.—Mean temp. of air 1°·5 above, and R ·23 in. below, averages.

Sydney.—Mean temp. of air 1°·7 above, and R ·49 in. below, averages.

Wellington.—Mean temp. of air 0°·8 above, and R 3·66 in. below, averages. Bright sunshine 227·2 hours.

Auckland.—Temp. slightly above, and R quite one inch above, averages.



# AITCHISON'S

STANDARD

HYGROMETERS,  
RAIN GAUGES,  
BAROMETERS,  
THERMOMETERS,  
AND SELF-REGISTERING

Meteorological Instruments of all kinds

ILLUSTRATED PRICE LIST  
POST FREE.

## AITCHISON & Co.,

Opticians to H.M. Govt.,

428, STRAND, W.C.

LONDON.

And Branches:—

LEEDS, 37, Bond Street.

MANCHESTER, 33, Market Street.



TRADE MARK.

# DARTON'S HYGROGRAPH

(SELF-RECORDING HYGROMETER)

Showing at a glance on a revolving weekly chart the differences of temperature readings between the wet and dry bulbs, and the percentage of aqueous vapour held in suspense by the atmosphere.



The point of each pen of this instrument is set precisely on the same temperature-line and the same time-line on the chart—a great advantage over other Hygrophographs.

This instrument has been approved of by the National Physical Laboratory, Colonial Observatories and others.

It is compact, self-contained, without any projections liable to injury, and very portable.

Complete, with One Year's supply of Charts, 10° to 110° F., and Hygrometrical Tables,

**£7 : 15 : 0**

This instrument is a Thermograph as well as a Hygrophograph.

ACCURACY GUARANTEED.

Illustrated List of Standard Meteorological Instruments, post free.

## F. DARTON & Co., 142, St. John Street, London, E.C.

### RATES FOR ADVERTISEMENTS IN THIS MAGAZINE.

	One Insertion.	Six Insertions.	Twelve Insertions.	
WHOLE PAGE	30/-	26/-	22/6	} All Net.
HALF	16/6	14/6	12/6	
QUARTER	9/-	8/-	7/-	
EIGHTH	5/-	4/6	4/-	

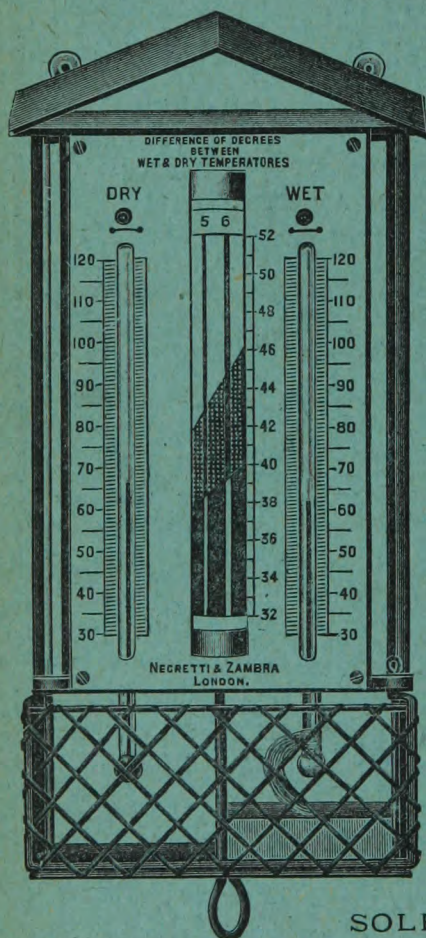
All applications for space to be made to

Mr. H. A. COLLINS, 27, ST. PETER'S ROAD, CROYDON.



# NEGRETTI & ZAMBRA'S HORTICULTURAL HYGROMETER

(REGISTERED DESIGN.)



An Instrument for ascertaining in a Simple manner, the likelihood of a Frost During the Night.

The object of the Horticultural Hygrometer is to show in a simple manner, without the use of tables, whether the dew point is below freezing, and consequently whether frost may be expected.

We need hardly point out to Horticulturists and Agriculturists the importance of detecting the arrival of frost, whether it be an **Early Winter Frost** or a **Late Spring Frost**. One should have some means of knowing whether to take the necessary steps for the protection of valuable plants, crops, fruit trees, etc

*Descriptive Pamphlet Post Free on application to the*

SOLE MAKERS,

**NEGRETTI & ZAMBRA,**  
*Scientific Instrument Makers,*  
**38, HOLBORN VIADUCT, E.C.**

Branches: 45, CORNHILL, E.C., and  
122, REGENT STREET, W., LONDON.

Telegraphic Address: "NEGRETTI, LONDON."

Telephone No. 583 HOLBORN.

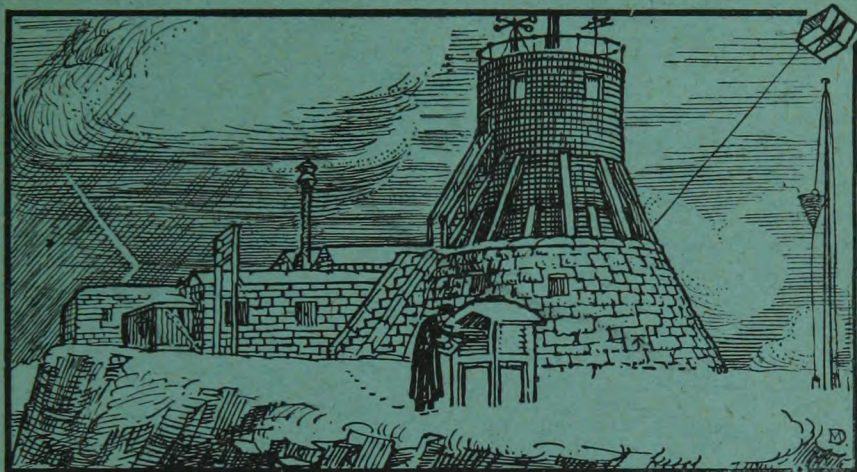
**BRUSSELS INTERNATIONAL EXHIBITION, 1910.**

Awarded Grand Prix and Gold Medal for Scientific Instruments.

SHIELD & SPRING, Lancelot Place, Brompton Road, S.W.



NO. 543 SYMONS'S VOL. 46  
 METEOROLOGICAL  
 ❄️ • MAGAZINE • ❄️  
 .... EDITED BY HUGH ROBERT MILL ....



APRIL, 1911.

• CONTENTS •

	PAGE
Insurance Against Rain .. .. .	41
The use of Meteorological Observations in connection with Holiday Insurance. By E. GOLD, M.A. .. .. .	45
Royal Meteorological Society .. .. .	47
Map of March Rainfall in the Thames Valley .. .. .	face p. 49
The Weather of March. By FRED. J. BRODIE .. .. .	49
International Balloon Ascents in July and August, 1908. By W. H. DINES, F.R.S. .. .. .	50
CORRESPONDENCE :—	
The "Supposed" Cold of Winter Anticyclones. By PROF. J. HANN .. .. .	52
Fall of Meteorites to the Earth. By W. F. DENNING .. .. .	53
The Tale of—a Gust. By WILLIAM GODDEN .. .. .	54
The use of Daily Weather Maps. By F. DRUCE .. .. .	54
Complex System of Halos. (Illus.) By SPENCER C. RUSSELL .. .. .	55
Rainfall Table for March, 1911 .. .. .	56
Supplementary Table of Rainfall, March, 1911, at 112 Stations .. .. .	58
Meteorological Notes on March, 1911 .. .. .	59
Climatological Table for the British Empire, October, 1910 .. .. .	60

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

Published on the 16th of each Month.]

[Price 4d., or 5s. per Annum, Post Free.



## NOTICES.

It is requested that all Books for Review and Communications for the Editor be addressed to 62, Camden Square, London, N.W.

The responsibility for all facts and opinions expressed in the signed articles and letters published in this Magazine rests with their respective authors.

---

Cloth 8vo. 428 pages. With Maps and Illustrations.

PRICE 10s.

## **BRITISH RAINFALL, 1909.**

THE FORTY-NINTH ANNUAL VOLUME.

COMPILED FROM THE RECORDS OF MORE THAN  
4600 OBSERVERS

BY

HUGH ROBERT MILL.

LONDON: EDWARD STANFORD, 12, 13 & 14 LONG ACRE, W.C.

---

## Royal Geographical Society's Publications.

### THE GEOGRAPHICAL JOURNAL.

Monthly. Illustrated. Edited by the Secretary. Price (to non-Fellows), 2s.

### HINTS TO TRAVELLERS.

Edited for the Council of the Royal Geographical Society by E. A. REEVES, F.R.G.S., F.R.A.S. Ninth Edition, revised and enlarged. In two volumes, illustrated. Price 15s. net. (To Fellows at the Office of the Society, 10s. net).

Vol. I.—Surveying and Practical Astronomy.

Vol. II.—Meteorology and Climate (by DR. H. R. MILL);  
Photography, Geology, Natural History, Anthropology, Industry and Commerce, Medical Hints, &c.

### THE DISTRIBUTION OF RAINFALL OVER THE LAND.

By DR. A. J. HERBERTSON. With monthly maps of Rainfall. Price 5s. net. (To Fellows, 2s. 6d.)

### ON THE RESULTS OF A DEEP-SEA SOUNDING EXPEDITION,

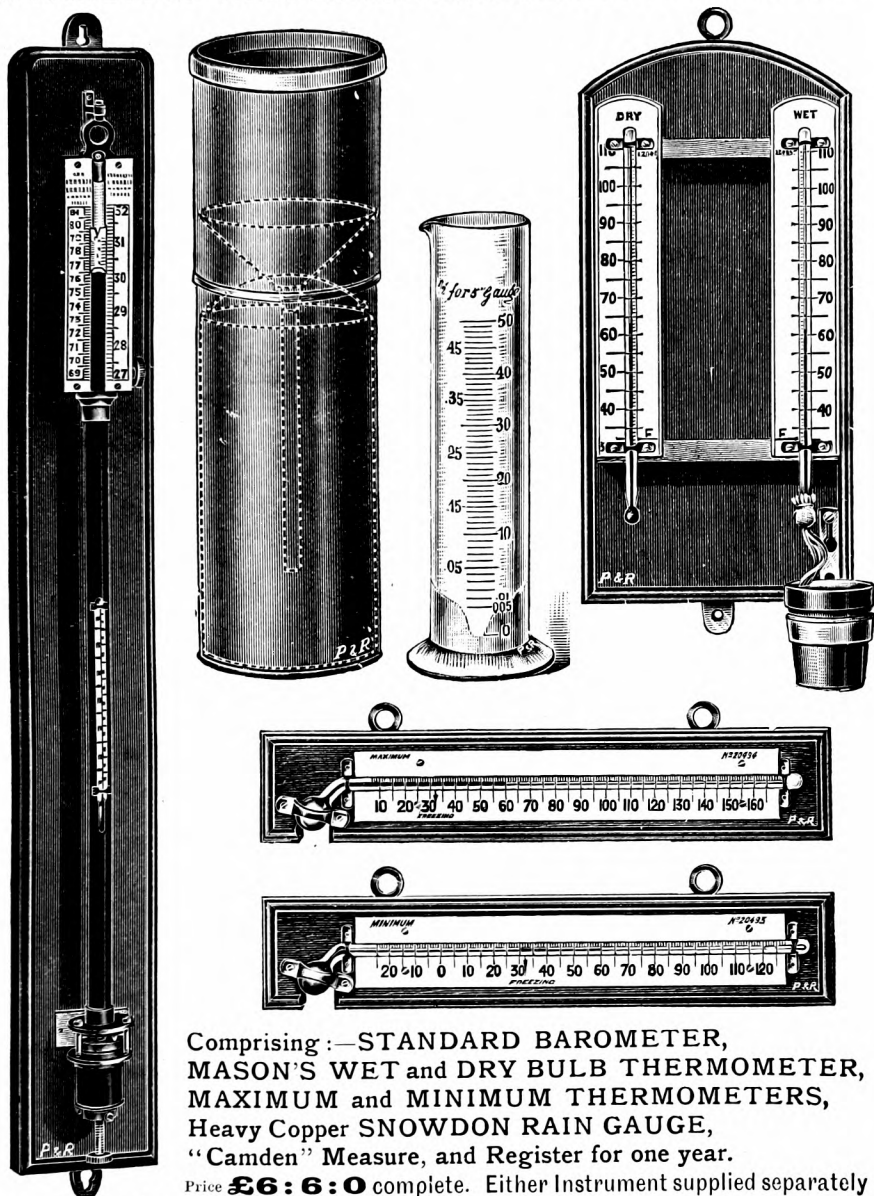
In the North Atlantic in the summer of 1899, by R. E. PEAKE, M.Inst.C.E.; with notes on Temperature, Deep-Sea Deposits, &c., by SIR JOHN MURRAY, K.C.B., F.R.S. *Charts.* Price 5s. net. (To Fellows, 2s. 6d.)

### THE ANTARCTIC MANUAL,

For the use of the Expedition of 1901. Edited by GEORGE MURRAY, F.R.S., 1901. Pp. 586. *With a new chart of the Antarctic Regions.* Price, 15s. (To Fellows, 10s.)

ROYAL GEOGRAPHICAL SOCIETY, 1, Savile Row, W.  
AND ALL BOOKSELLERS.

# THE "PEANDAR" (P. AND R.) SET OF STANDARD METEOROLOGICAL INSTRUMENTS



Comprising:—STANDARD BAROMETER,  
MASON'S WET and DRY BULB THERMOMETER,  
MAXIMUM and MINIMUM THERMOMETERS,  
Heavy Copper SNOWDON RAIN GAUGE,  
"Camden" Measure, and Register for one year.

Price **£6:6:0** complete. Either Instrument supplied separately

*Packed and safely delivered free to any Address in the United Kingdom.*

N.B.—All the above Instruments will pass the Kew Observatory test. Kew Certificates, if desired, **£1 2s. extra.**

Particulars of more expensive also of cheaper Sets on application.

**SOLE MAKERS, PASTORELLI & RAPKIN, LTD.** (Estab. 1750)  
**46, HATTON GARDEN, LONDON, E.C.,**

**ACTUAL MAKERS of ALL KINDS of METEOROLOGICAL INSTRUMENTS.**

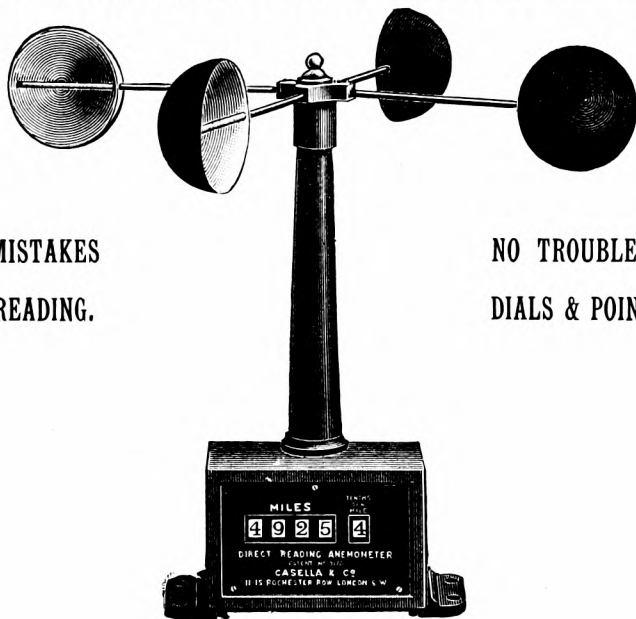
Write for Illustrated Descriptive Lists of Standard, Self Registering, and Self Recording Instruments, Post Free.

Telephone: 1981 Holborn. **CONTRACTORS TO H.M. GOVT.** Telegrams: Rapkin, London.

**C. F. CASELLA & Co., LTD.,**  
MAKERS OF  
**Meteorological, Surveying and Scientific Instruments**

To the Admiralty, Ordnance and other Home Departments, and to the  
Indian, Canadian, and all Foreign Governments.

**AN IMPROVED ROBINSON ANEMOMETER.**



**NO MISTAKES  
IN READING.**

**NO TROUBLESOME  
DIALS & POINTERS.**

PATENT No. 7170 07

In CASELLA'S PATENT TOTALIZING ANEMOMETER the amount of wind is clearly indicated in black figures on a white ground.

The readings can be taken by an inexperienced observer as mistakes are impossible.

*For price and full particulars see our ANEMOMETER LIST,  
Post Free on application.*

**11-15 ROCHESTER ROW, VICTORIA STREET,  
LONDON, S.W.**

*Telegraphic Address: "ESCUTCHEON, LONDON." Telephone: WESTMINSTER 5599.*

# Symons's Meteorological Magazine.

---

No. 543.

APRIL, 1911.

VOL. XLVI.

---

## INSURANCE AGAINST RAIN.

THE Excess Insurance Company has put forward a scheme of insurance against rain risks which has received a great deal of attention in the press. We are not in possession of any direct information and perhaps we ought not to call attention to such a matter at second hand; but we see no reason to doubt the substantial accuracy of the newspaper reports from which we derive our knowledge of the plan. In order to distinguish the outline of the scheme itself from our comments upon it, we give first in small type an abstract of the articles and notices which appeared in the financial pages of *The Times* in March, 1911, though we cannot, of course, say whether these are official intimations on the part of the company or not.

The scheme depends on the rainfall of 24 hours as recorded by the observer at a rain gauge agreed upon by the insurers and assured, and mentioned in the policy. In the greater number of cases the records will be supplied to the Company by the Town Clerk when there is a municipal rain-gauge; in other cases by observers on the list of the Meteorological Office. Each policy runs for a definite period, at the end of which all claims under it are paid directly to the assured without demand.

At present the scheme applies only to sixty-three seaside towns on the south and east coasts of England, at twenty-three of which there is no municipal or Meteorological Office rain gauge, and the claims arising at these are to be settled by the rain gauge of a neighbouring town, which is named. The most westerly town named is Plymouth on the south coast; the most northerly is Scarborough on the east coast. The specimen form of Policy given in *The Times* is reproduced here:—

### THE EXCESS INSURANCE COMPANY, LIMITED.

No..... PLUVIUS POLICY "A."

WHEREAS ..... of  
hereinafter called the Assured has paid £ ..... as Premium or Consideration to THE EXCESS INSURANCE COMPANY, LIMITED, hereinafter called the Company.





the transaction into line with the "P.P.I." insurance on ships, of which a great deal was heard some time ago; and it has been denounced as giving opportunities for gambling. It was stated, however, by "A Director of the Excess Insurance Company (Ltd.)," in *The Times* of April 7th, that holiday insurance was similar to the insurance of a valuable picture, and he added, "But neither in the case of the 'Pluvius' policy holder nor in that of the picture owner can the insurance be valid unless the insurer has an insurable interest. This is clearly stated in our policy. It is of no use to anybody who might wish to sit at home and gamble on the weather." A method of gambling by rain gauge was referred to in this Magazine, Vol. 37 (1902), p. 181, where it was stated to have been prohibited by the Government of India. The premiums, however, are fixed at such a substantial fraction of the maximum return, that there may not be so much likelihood of an improper use being made of this remarkable development in insurance methods as might appear at first, apart from the Director's disclaimer, unless, indeed, a run of wet weather should create a "boom."

Assuming that a Pluvius policy is taken out, as the Company intends it to be, with the view of securing compensation for a holiday spoiled by rain, the assured should not expect to be recompensed if he is not damaged; and he will expect to be compensated if he is. Now it is plain that a rainfall less than .20 in., or even .15 in., could entirely spoil a holiday if it fell gently at a uniform rate for eight or ten hours in the daytime; while a rainfall much greater than .20 in. might only take the form of a heavy shower, lasting for a quarter of an hour, and if it occurred at night or at any time when the assured was not out of doors, its only effect upon him would be to enhance the pleasure of his holiday. Again, summer showers, especially those associated with thunderstorms, are extremely irregular in their outlines, and it might very easily happen that the assured was a victim of very heavy rain, while the rain gauge, which is the sole arbiter of the compensation he has paid for, registers less than the critical quantity. The reverse is just as likely to happen, and a well-directed thundershower might secure a handsome bonus to a crowd of holiday makers who remained all the time in sunshine. In these cases the Insurance Company is exposed to a more serious risk than the assured, as a local shower central over the rain gauge would require it to pay compensation to every individual in whose policy that gauge was named, while an individual subjected to un-recorded rain merely loses the fraction of his premium representing the single day.

The crudity of the present system lies in the impossibility of awarding compensation in certain cases of actual damage, or of withholding compensation in certain cases where no damage accrues. This is inevitable in the present condition of rainfall observing, though it could be largely obviated if the municipalities concerned would instal several rain gauges within their boundaries

and supplement them by carefully kept self-recording instruments. Much credit must be given to the Company for the clear way in which they have defined the risks against which they provide, and the method of determining liability. Members of the public unfamiliar with the ways of rain and the manner of its measurement may, however, form wrong impressions and suffer disappointments which, we hope, will turn their minds towards the study of meteorology.

So far we have looked at some of the difficulties connected with the natural history of rain; there are others of a more serious character, involving the human element. Granted that no error is made in transcribing the daily figures, and this in the case of official observers may be done pretty safely, and granted that the hours of which the rainfall day is composed are correctly set out—*i.e.*, 9 a.m. to 9 a.m. or 7 a.m. to 7 a.m., local or Greenwich time, as the case may be—the questions of time and manner of observation have to be considered. When rain is falling at the hour of observation it is quite possible that if the rain gauge is emptied a minute or so before the hour, or a minute or so after the hour, the Insurance Company or the assured may stand to lose or win. It will therefore be the interest of both to secure punctuality on the part of the observer, and, incidentally, correctly regulated public clocks by which the observers' watches may be checked. Again, the honest observer, knowing that the critical values  $\cdot 20$  and  $\cdot 15$  may lead to a considerable sum of money changing hands, will naturally take special care in reading quantities near those points, and should see to it that the measuring glass has been certified as correct, and that a reserve certified glass is available in case the glass in ordinary use meets with an accident. An error of more than  $\cdot 01$  is by no means uncommon in glasses which have not been tested, even when sold by respectable tradesmen who have bought them in good faith, and even a certified glass as at present tested is not required to have a higher degree of accuracy than  $\cdot 01$  in. A special glass of high accuracy might reasonably be demanded for so critical a determination.

Some observers habitually read to three places of decimals, though probably for the purpose of deciding a claim the register used will be in the form usually published, in which the result is entered to two decimal places only. An observer reading to three places would distinguish between  $\cdot 199$  and  $\cdot 201$ , but all readings between  $\cdot 196$  and  $\cdot 204$  would be entered in the ordinary way as  $\cdot 20$ . Should the reading be  $\cdot 205$  the observer would be justified in giving it either as  $\cdot 20$  or as  $\cdot 21$ , and in the ordinary course of transposing to hundredths a daily rain record kept to thousandths of an inch, the computer would keep his total right by raising and lowering alternate entries ending in 5. Thus when he gave  $\cdot 205$  the value of  $\cdot 21$ , the next time he met an entry ending in 5 (say  $\cdot 205$  again) he would give it the value of  $\cdot 20$ . As a matter of statistics this is perfectly clear, but when he knows that the ownership of an unknown and perhaps large sum of money (there might be a hundred insured excursionists in the

place, or a thousand insured speculators in the country) depends on whether the last .005 was "tossed up or down," he is very apt to try and avoid the reading of .005 altogether, and give it as .204 or .206. The observer reading to hundredths has to face the same alternative every time the surface of the liquid comes between two marks on the scale, and his custom, if he follows the rule, is to refer the surface to what he takes to be the nearest hundredth line above or below. When the surface comes just half-way he may with equal honesty enter the figure as .20, and the insurance office saves the premium, or as .21, and the insurance office has to pay compensation. If the observer knows that a friend of his is insured under a Pluvius policy, what ought he to do in such a dilemma? Again, the personal equation is such that it is quite easy for two equally conscientious observers to differ in reading the same quantity by .01 in. or more, one observer habitually reading higher than another. In this case the gain or loss might depend on whose turn it was to take the readings on a particular day. The reading of a rain gauge cannot be made with the exactness of the number indicated by the ball in roulette.

In the foregoing we have assumed honesty and freedom from error on the part of the observer and transcriber of the records, and immunity from interference on the part of the rain gauge. The Excess Insurance Company will doubtless exercise its influence with the Municipalities of those resorts which its policies place in a favoured position above their rivals to induce them to use the most accurate instruments, secured against any possible interference, and to employ the most punctual and trustworthy observers. Permanent residents will also, we hope, start new records in various parts of the district, so that the variation of rainfall from place to place may be ascertained each day, and the public interested in the possibilities of the new insurance may in time come to know something of the vast amount of enthusiasm, perseverance, care and skill which has been expended during the last fifty years in the acquisition of data for the scientific study of rainfall in the British Isles by thousands of voluntary observers.

## THE USE OF METEOROLOGICAL OBSERVATIONS IN CONNEXION WITH HOLIDAY INSURANCE.

By E. GOLD, M.A.

THE following note was written some time ago, but it may be of interest in connexion with recent developments in indicating the lines along which holiday insurance must proceed if it is to become an enterprise of permanent value to the community. The assumption at the basis of such assurance is that the benefit which a person derives from a holiday depends on the weather during the period of the holiday, and that the benefit is indirectly translatable into material wealth, either by preventing illness in the working period, or by improving the quality of the work done. If this assumption is

unsound, holiday insurance becomes a pure gamble, and must either fail or do harm. Hitherto meteorological observations have been, on the whole, subject only to personal and chance errors, and there has been little temptation to induce unscrupulous persons to interfere with them in any way. Holiday insurance would introduce a new factor, which might cause fluctuations of importance from the meteorologist's point of view, and against which he would prefer to be protected.

Schemes for holiday insurance appear to be based on rainfall returns alone, and in practice on total daily amount of rainfall. A little consideration shows that this is bound to prove unsatisfactory, although the scheme may be so arranged that the Insurance Company makes only a reasonable profit. "Compensation" will be paid to the man who has had brilliant weather with, perhaps, thunderstorms or sharp rain during a single night or nights, while the man who has spent a wet week shivering over no fire may be quite uncompensated, because the daily total did not exceed a more or less arbitrary limit.

It may be taken as essential that the insurance should be against weather and not against a single element so variable in its character as rainfall. The elements next in importance to rainfall are duration of sunshine, temperature and wind, and the problem may be taken to be to arrange combinations of limits for the values of these elements which shall pass by reasonable steps from good weather to "really bad" weather. We must fix a limit to the mean temperature, combined perhaps with a limit to the mean maximum temperature, at which compensation ought to begin as regards that element, and similarly limits to the duration of sunshine, to the wind velocity, and to the number of days of rainfall must be chosen. Of course the duration of rainfall during holiday hours would be preferable to the total amount of rainfall if it were generally available.

A suitable period to take as unit would be the week, and it might be assumed as fundamental that unless one of the limits were passed no compensation would be payable. Suppose for example the limits for mean temperature were 60° F. for wind 2 days of occurrence of forces higher than 4, for sunshine a total duration of 30 hours for the week, for rainfall 2 rain days, then compensation would begin as soon as one of these limits was passed. The appropriate amount of compensation would be represented by—

$$ax + by + cz + dw$$

where  $x$  is the number of degrees by which the temperature falls short of 60° F.,  $y$  the excess of the number of rain days above 2,  $z$  the excess above 2 of the number of days of wind of Force 5 and upwards,  $w$  the number of hours of sunshine below 30. It might be desirable to adopt the idea, suggested by the formula, to take negative values of  $x$ ,  $y$ ,  $z$  or  $w$  as representing to the holiday-maker compensating advantages which should appropriately diminish the amount otherwise payable for the disadvantages arising from the

positive values of the remaining elements. [It might even be eventually arranged that insurance should be compulsory, and that holiday-makers should pay according to the same formula as that devised for compensation, with a small allowance for working expenses. A large reserve fund or a series of good years at the outset would be necessary for such a consummation.] For the information of insurers the statement would be of the simple form. "For each degree of temperature below  $60^{\circ}$  F.,  $a$  shillings compensation will be paid; for each rain day above 2,  $b$  shillings; for each windy day above 2,  $c$  shillings, and for each hour by which the duration of sunshine falls short of 30 hours,  $d$  shillings [but the total amount payable in any case is to be reduced by  $a$  shillings for each degree of temperature above  $60^{\circ}$ , by  $b$  shillings for the difference of the number of rain days from 2, &c.]"

The reduction for excess of sunshine would partly diminish the unfairness arising from short showers or night rain.

I think if compensation is paid to those whose holidays have been spoiled at the expense of those who have come off better [or at their own expense from previous occasions], meteorological results will be serving a useful and economic purpose. The important thing is to arrange for the compensation to be an indemnity against real loss, and this cannot be satisfactorily attained except by taking into account the different elements which make up weather.

The limits suggested are merely for example. The appropriate values could only be found by investigation.

### ~~~~~ ROYAL METEOROLOGICAL SOCIETY.

At the meeting of this Society on March 15th, Professor H. H. Turner, F.R.S., Savilian Professor of Astronomy at Oxford, gave a lecture entitled "What can we learn from Rainfall Records?" He began by saying that the origins of a large number of phenomena of the most diverse kinds are indicated by the periods of certain vibrations or oscillations. The familiar advertisement of a terrier hearing "his master's voice" in a gramophone, and the identification of the substance causing the light of a nebula far away in the depths of space, provide us with two examples. In the first the periodicities are those of waves of sound, in the second of waves of light. The periods of vibration are very different, that of sound being, roughly, a billion times that of light. If we lengthen that of sound in a similar ratio, we come to the longest periodicities hitherto studied by our limited experience, viz., those of the planets and variable stars. Here, again, we can recognise causes by their periods; but the machinery for recognition is very different. In the case of light-waves a simple apparatus (viz., a prism) performs the analysis for us; in the case of sound we have the proper delicate apparatus in our own ears; in the case of the longer periods we must use calculation, but the underlying principles are the same; in the calculations there are strict analogies to the "resonance" which the ear employs and to the "bright lines" of a spectrum.



The method of calculation was indicated long ago by Fourier ; but a noteworthy new departure was taken some years ago by Professor Schuster in insisting that the calculations must be made, not merely for specially selected or suspected periods, but for *all* periods between certain obvious limits. The result can then be displayed as a "periodogram" which is strictly analogous to a spectrum. This method has been applied under the superintendence of Professor Schuster and the lecturer to the rainfall records of Padua (175 years) and Greenwich (90 years), besides Klagenfurt and Oxford (50 years), all periods between 20 months and five months having been examined, as well as some others. The resulting indications are not very positive, but include several features well worth further study, especially in the Greenwich rainfall, where periodicities of 597 days and 150 days (possibly a quarter of the former) seem to be fairly persistent, as well as a short one of 25 days ; but these are not reproduced in the Padua records, at any rate not exactly. There are doubtful periods of 591 days and 147 days, which again are possibly related by the ratio 4 to 1. (The shorter periods near 25 days have not been investigated, as daily records are required.) It is possible that the periodicities change slowly with the latitude, in a manner suggested by the cloud belts on Jupiter.

Dr. W. N. Shaw, in proposing a vote of thanks to Professor Turner for his lecture, said that it was a matter of congratulation that astronomers should have taken the trouble to apply methods, originally astronomical, to the study of rainfall data. Professor Schuster had almost translated the work of the spectroscope into figures ; and examination of these had led to the unsuspected period of 33 years in astronomical statistics being detected. Nobody could help regretting that rainfall statistics were so meagre. On looking at the rainfall periods for Greenwich it was perfectly clear that the rainfall data varied, and it was absolutely necessary to ask for data from the western and southern hemispheres, so that they might be able to trace out these variations. They were now concerned with building up the future ; looking forward to the foundation and continuation of colonial observations and data from all parts of the world, sufficient to enable astronomers and meteorologists to carry out the subject to a satisfactory conclusion.

Mr. H. Mellish seconded the resolution, and said that they had brought to their notice a method of dealing with meteorological observations which was quite new to most of them, and this had been illustrated with examples from the sister science which had kept their attention rivetted on the screen.

During the evening the following new Fellows were elected :—Mr. G. G. Becher, B.A., Professor S. Bhattacharya, M.A., Señor José Galbis y Rodriguez, Mr. J. W. Gardner, Mr. A. L. S. Gibb, Assoc. M.Inst.C.E., Mr. M. Kasin, Mr. H. T. McLeod, Mr. V. J. Martin, Assoc.M.Inst.C.E., Mr. M. Spartali, B.Sc., Assoc.M.Inst.C.E., and Mr. Lance Webb.



MARCH, 1911.



## THE WEATHER OF MARCH.

By FRED. J. BRODIE.

THE month under review was singularly lacking in features of striking meteorological interest.

The opening days of the month lent no support whatever to the old weather proverb, "March comes in like a lion." With a brisk breeze blowing from the south-westward and an abundance of bright sunshine, the thermometer on the 2nd and 3rd rose well above its average level, shade readings of  $55^{\circ}$  and upwards being recorded over a large portion of the United Kingdom, and a reading of  $60^{\circ}$  on the 2nd at Westminster and Raunds. On the 5th and 6th a "V-shaped" depression passed eastwards across the country, and in its rear an anticyclone extended temporarily from the south-westward, a rather sharp frost occurring early on the 7th in many western and northern districts. Other "V-shaped" disturbances came over respectively on the 8th-9th and 10th-11th, and occasioned brisk fluctuations in temperature, but no extremes of any importance. Between the 12th and 15th, when low pressure systems appeared over various parts of the continent, a strong wind from north and north-west swept over these islands with showers of sleet or snow. Temperature now fell to a lower level than at any other time of the month, and occasional night frosts were experienced in most places. The sharpest frost occurred rather generally early on the 17th, when the sheltered thermometer fell to  $25^{\circ}$  or less in several parts of England, Wales and Ireland, and to  $22^{\circ}$  at Llangammarch Wells. On the surface of the grass readings of  $20^{\circ}$  or less were registered as far south as Kew, Portsmouth and Guernsey.

During the latter half of the month the type of weather was almost constantly easterly or north-easterly. Over the western half of the kingdom the conditions were influenced mainly by an anticyclone, which lay at first over Iceland, and afterwards between Scotland and the Faeroes, and in some parts of North Britain an absolute drought was experienced, lasting for periods of from 16 to 18 days. Further to the southward the weather was affected by depressions which advanced from the westward over the Bay of Biscay and Spain, and on our south and south-west coasts the easterly wind occasionally increased to the force of a gale. Temperature was usually below its average level, but on the 21st and 22nd a mild air extended westwards from France and occasioned a burst of seasonable warmth over the south-eastern quarter of England, maximum readings of  $60^{\circ}$  and upwards being recorded in several places. At Greenwich and Margate the thermometer on the 21st rose to  $62^{\circ}$ , and at Tottenham on the 22nd to  $63^{\circ}$ . The change was, however, purely temporary, and during the closing week temperature was again below the average, with sharp frosts in the north on the early mornings of the 21st and 22nd, and more generally on the 25th and 26th. Over central and southern England the sheltered thermometer fell only a trifle below

the freezing point, but in many western and northern districts it sank below  $25^{\circ}$ , a reading as low as  $22^{\circ}$  being recorded at Balmoral on the 21st, at Fort Augustus on the 22nd, and at Markree Castle on the 26th. On the grass the thermometer sank below  $20^{\circ}$  in several parts of Scotland and the north of Ireland, to  $18^{\circ}$  at Balmoral and Armagh.

The mean temperature of the month differed but little from the average. Over the United Kingdom generally there was a slight deficit, but in London, and at a few other places both in the east and south-east of England and in the north and north-east of Scotland, the mean values were above the normal. The duration of sunshine was, as a rule, a little below the average, but in parts of Ireland and the west of Scotland it was in excess. At Stornoway the aggregate of 172 hours exceeded the normal by as many as 69 hours.

### INTERNATIONAL BALLOON ASCENTS, IN JULY AND AUGUST, 1908.

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

#### *July 27th.*

Starting Point.	Country	A miles.	B ° F.	C miles.	D ° F.	E miles.	F
Limerick .....	Ireland.....	6.2	-38	11.8	-42	57	E. by N.
Crinan .....	Scotland ....	6.6	-49	13.7	-49	103	N.E.
Pyrton Hill....	England ....	7.1	-76	8.1	-71	98	N.E.
Petersfield ....	" .....	8.1	-72	9.2	-65	114	N.E.
Hamburg.....	Germany....	7.3	-74	9.3	-62	6	E.N.E.
Lindenberg....	" .....	7.8	-78	11.8	-58	9	S.S.W.
Strassburg ....	" .....	8.0	-76	10.8	-58	37	S.
Munich.....	" .....	7.5	-69	7.7	-65	16	S.S.W.
Pavia.....	Italy.....	7.5	-78	14.3	-58	21	S. by W.

#### *July 28th.*

Crinan .....	Scotland ....	6.4	-76	10.7	-58	62	E.S.E.
Manchester....	England ....	7.1	-72	8.4	-67	50	S.E.
Petersfield ....	" .....	7.1	-74	9.4	-67	90	E. by S.
Paris .....	France.....	8.0	-71	9.2	-71	140	N.E.
Strassburg ....	Germany....	8.1	-78	9.9	-69	12	E.
Zurich .....	Switzerland..	8.1	-80	9.8	-65	37	S.E.
Munich.....	Germany....	—	—	7.8	-58	16	S.S.W.
Vienna .....	Austria ....	—	—	6.8	-62	68	S.S.W.
Pavlovsk ....	Russia .....	7.1	-69	10.5	-53	36	W.

#### *July 29th.*

Limerick .....	Ireland.....	8.0	-76	10.6	-56	66	E.
Crinan .....	Scotland ....	8.1	-65	9.9	-60	86	E.N.E.
Manchester....	England ....	7.5	-81	10.6	-71	65	E.S.E.
Pyrton Hill....	" .....	8.5	-92	14.3	-62	53	S.
Hamburg.....	Germany....	7.5	-65	9.9	-58	7	E.
Paris.....	France.....	6.8	-62	9.9	-65	168	E. by S.
Strassburg ....	Germany....	6.8	-65	11.1	-53	32	N.W. by W.
Munich .....	" .....	7.5	-72	8.7	-63	12	N.W.
Pavia .....	Italy .....	7.0	-76	8.4	-74	44	N.E. by E.
NizhniOlchidaeff	Russia .....	7.4	-51	—	—	14	N. by E.

*July 30th.*

Starting Point.	Country.	A miles.	B ° F.	C miles.	D ° F.	E miles.	F
Pyrton Hill....	England ....	9.5	-92	10.3	-78	70	E.S.E.
Brussels .....	Belgium ....	8.1	-90	9.4	-74	37	S.S.W.
Paris .....	France.....	7.5	-76	8.6	-69	62	S.W.
Strassburg ....	Germany ....	7.8	-78	8.9	-71	27	S.W.
Zurich .....	Switzerland .	8.1	-69	11.2	-72	18	W.S.W.
Munich .....	Germany....	7.5	-69	8.5	-60	11	S.W. by S.
Pavia .....	Italy .....	7.0	-78	8.1	-72	21	N.W. by W
Pavlovsk ....	Russia .....	7.2	-76	9.5	-62	11	E.S.E.
Kuchino .....	" .....	7.3	-63	10.1	-53	16	S.E.
Nizhni Olchidaeff	" .....	6.8	-63	9.1	-51	34	N. by W.
Omsk .....	" .....	6.5	-56	8.3	-40	—	—
Ekaterinburg..	" .....	5.5	-51	6.6	-42	53	S.E.

*July 31st.*

Crinan .....	Scotland ....	7.3	-56	9.9	-51	137	S.E.
Manchester....	England ....	7.8	-58	10.6	-53	111	S.E.
Paris.....	France.....	7.2	-85	8.1	-71	106	S.
Zurich .....	Switzerland .	8.3	-89	11.3	-65	19	S.S.W.
Munich .....	Germany....	8.1	-83	8.7	-71	32	S.
Pavia .....	Italy .....	7.5	-78	10.7	-53	32	W.S.W.
Pavlovsk ....	Russia .....	7.6	-72	10.2	-54	11	E.
Nizhni Olchidaeff	" .....	6.8	-56	10.0	-54	24	N. by E.
Kuchino .....	" .....	6.6	-80	9.9	-60	13	S.E.

*August 1st.*

Limerick .....	Ireland.....	6.2	-58	—	—	38	S. by E.
Manchester....	England ....	8.1	-65	10.9	-56	117	S.S.E.
Hamburg.....	Germany....	6.9	-51	9.8	-45	99	S.E.
Strassburg ....	" .....	7.5	-80	11.0	-53	64	S.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 several points of interest and would repay a careful analysis, for which however there is not space in this Magazine. No large changes of pressure occurred during the week. On the 27th there was an area of high pressure over the Azores and over Lapland. By the 29th the anticyclone over Lapland had disappeared, but the one over the Azores had increased in intensity, and moved to the south of Ireland, and a trough of low pressure extending from S.W. to N.E. lay over Iceland. On the 30th and 31st the high pressure had decreased again in intensity, but still lay over England, with a low pressure area on the 31st over the Gulf of Bothnia. There was little change on August 1st, but a depression was forming over Italy.



Correspondence.

To the Editor of Symons's Meteorological Magazine.

THE "SUPPOSED" COLD OF WINTER  
ANTICYCLONES.

MR. DINES hardly does justice to the text-books of Meteorology when he says, on p. 34 of the March number of your Magazine, that they probably copy one from another, without investigation, the statement that winter anticyclones are cold. *The centre of an anticyclone in winter is, in fact, cold*, a focus of cold. That has been proved statistically often enough, and I need only recall the investigations of Hildebrandsson on temperature in cyclones and anticyclones (Upsala, 1883). These have frequently been repeated since, and the coldness of the central part of anticyclones is fully established. (Mean temperature variation in the centre of barometric minima in winter: Upsala,  $-2^{\circ}9$ ; Swinemünde,  $-2^{\circ}2$ ; St. Petersburg,  $-4^{\circ}3$ , and similarly in Vienna, St. Louis, Mo., &c.). This fact rests on a complete physical foundation. The cold areas arise in winter in anticyclonic regions as a result of radiation favoured, in a high degree, by the clear skies and the dry air of the anticyclonic centre. One can say definitely that the cooling of the Earth in the winter half-year is accomplished mainly in the anticyclonic areas of the land surface. Nocturnal radiation is very intense in the dry air, especially when the surface of the ground is covered with snow.

The apparently contradictory results quoted by Mr. Dines rest on a misunderstanding. It is not the absolute height of the barometer which is determinative, but the relative height of the barometer compared with that in the surrounding districts; in short, the state of matters in a barometric maximum. High winter temperatures certainly do occur during periods of high barometer and *vice versa*. Thus, for example, I have investigated the 12 coldest and 12 warmest years in Central Europe during the 30 winters, 1851-1880, in relation to the simultaneous pressure variations from the normal. The pressure variations of the cold winters were positive on seven occasions and negative on five, "very cold winter months occurred with almost equal frequency during high as during low pressure." The extreme winter months in Central Europe show no constant relation to the variations of pressure in Central Europe itself, though it is characteristic of such extreme months that the pressure is abnormally high in the north and north-east.\* The cold thus comes mostly by "advection" from the north and north-east, as can easily be understood from the relation of Europe to the focus of cold in northern Asia, for it is there that the cold centres originate in the region of the great continental anticyclones. It is only in exceptional cases,

\* Hann, "Die Verteilung des Luftdruckes über Mittel- und Sudeuropa," Vienna, 1887, pp. 59-61.

such as the winter of 1879-80, that Central Europe itself is the seat of a great persistent anticyclone, but when this occurs we experience an altogether abnormally cold winter.

As the British Isles usually remain on the western side of the European anticyclones, and thus have southerly and south-easterly winds with the high barometer, it follows that high temperatures quite often accompany the higher barometer; but at the same time it is cold on the continent in the centre of the European anticyclone.

J. HANN.

*Vienna, 20th March, 1911.*

---

### FALL OF METEORITES TO THE EARTH.

IN your February number reference is made to the reported fall of a meteorite at Hull on December 6th, 1910. False reports of this character frequently get into the newspapers, and induce scepticism as to the genuine meteorites which sometimes descend upon the Earth's surface.

Meteorites have frequently been seen to fall, accompanied with loud detonations, and they have been immediately afterwards dug out of the holes made, while still in a heated condition. To give details of individual cases would make serious inroads upon your limited space, so I must ask those interested in the subject to consult scientific books in which the information is given.

"An Introduction to the Study of Meteorites," by Mr. L. Fletcher, is a sixpenny pamphlet of about 120 pages, giving a large array of facts concerning meteoric stones and irons, and particularly those in the mineral department of the British Museum. There are about 600 specimens here weighing from a few grains to several tons.

The evidence collected during the last century conclusively proved once for all that stones occasionally, and irons more rarely, fall from the sky. The earliest undoubted phenomenon of the kind occurred on November 16th, 1492, in Alsace, when a stone of 262 pounds descended with a loud noise, and was thereafter suspended in the church of Ensisheim as an object of curiosity and veneration.

Many statements as to falling meteors, aerolites or thunderbolts, are published in the press on mere hearsay evidence, and before suitable investigation has been made as to the facts. Chimerical stories of this kind are easily disproved when proper enquiries are instituted, but they furnish no negative to veritable meteorites such as those which fell at Rowton, Shropshire, on April 20th, 1876, at Middlesbrough, Yorks, on March 14th, 1881, at Crumlin, Ireland, on September 13th, 1902, and at many other places and dates. We have not only the evidence of those who witnessed the events, but the objects themselves attest the reality of the phenomena.

W. F. DENNING.

*Bristol, February 18th, 1911*

### THE TALE OF—A GUST.

IN connection with *The Times* report of the fall of a meteorite at Hull on December 6th, 1910, your determination, and the outcome thereof, as described on page 10 of your February issue, deserve sincere congratulations.

I hope you will see your way to take a similar course with reference to a report from Bradford, which appeared in the daily papers recently. A gust of wind is said to have carried a girl to a height of twenty feet or so, whence she fell with fatal result. Onlookers seem to have experienced no inconvenience at all. Surely on the face of it a more preposterous story never appeared in print. What was the strength of the gale: and did nothing else of consequence happen owing to the wind at Bradford on the morning of 23rd February?

WILLIAM GODDEN.

143, Chapter Road, Cricklewood, N. W., 26th February, 1911.

[Acting on this suggestion, we communicated with Mr. H. Lander, the rainfall observer at Lister Park, Bradford, who kindly sent us a copy of the *Yorkshire Observer* for February 25th, in which there was a fairly full report of the inquest on the school-girl who was undoubtedly killed by a fall from a great height in an extremely exposed playground during very gusty weather. One witness saw the girl enter the playground from the school at 8.40 a.m., and saw her carried in three minutes later. Another witness saw the girl in the air parallel with the balcony of the school 20 feet above the ground, her arms extended, and her skirts blown out like a balloon. He saw her fall with a crash. The jury found a verdict, "Died as the result of a fall caused by a sudden gust of wind."—Ed. *S.M.M.*]

### THE USE OF DAILY WEATHER MAPS.

DAILY weather maps, such as those of the Meteorological Office, are of special interest to travellers who can note weather conditions in different parts of the area covered by them.

I have just returned after a short stay in the south of France. On March 3rd, my starting date, an anticyclone covered the Bay of Biscay, and the wind in London was W. and the weather cloudy. On arriving near the Mediterranean coast the next day the weather was found to be brilliantly fine and the wind N.E.

This state of things lasted practically the whole of the fortnight I was at Mentone, with, however, some variations, the reasons for which it is easy to discover on reference to the maps—*e.g.*, light rain fell on the 13th, under the influence of a depression over Belgium, and a thunderstorm, with a beautiful display of lightning, on the night of the 14th, due to a depression secondary to the one mentioned. Rain fell at Mentone in this storm, and after it snow lay some inches deep on the hills at the back, with almost cloudless weather.

On the 17th conditions set in which may be described as practically

the reverse of those prevailing on the 3rd. The Bay was covered by a depression which lay over that and the near regions during the remainder of the time I was abroad. Rain did not set in over the Littoral until the 19th. I was crossing France from that day to the 22nd, and rain fell during parts of the 19th, 20th, and 21st, with a very warm southerly current of air. On reaching Paris on the 22nd, the wind was about S.E., and between there and the coast were evident signs in the clouds of thunderstorms. The wind was N.E. in the Channel and the weather fair.

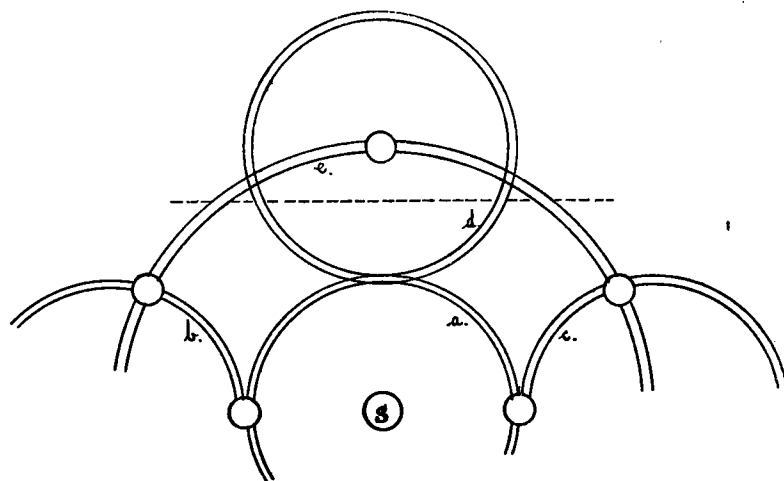
Certainly the weather conditions at Mentone were those generally associated with the "South of France"—brilliant sun, clear skies, and an azure sea.

F. DRUCE.

65, Cadogan Square, S.W., 26th March, 1911.

### COMPLEX SYSTEM OF HALOS, MARCH 8th.

A VERY perfect system of halos was visible here on March 8th, reaching its greatest degree of completeness about 8.30 a.m. The time of sunrise at Greenwich was 6.54 a.m., but the portion of halos beyond the dotted line was first seen at 6.45 a.m. The sky was covered with fibrous cirrus, tending to cirro-stratus, and radiating from a V point at S. The halo (a), round the true sun, was brilliantly



prismatic, the halos (b and c), to the left and right, of a pure white colour. The whole was surmounted by a further halo (d), which, like the primary one, was prismatic, being again cut by a further very broad halo (e), of a yellowish colour. Very pronounced rainbow tints were visible in the neighbourhood of the mock suns. The sketch illustrates the phenomenon at 8.28 a.m.. By 9 a.m. only a typical halo, white in colour, was visible round the sun.

SPENCER C. RUSSELL.

Parkside, Ashley Road, Epsom, March 8th, 1911.

## RAINFALL TABLE FOR MARCH, 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	1'70	1'73
Tenterden.....	Kent.....	51 4	*0 41	190	1'95	2'30
Arundel (Patching).....	Sussex.....	50 51	0 27	130	1'95	2'02
Southampton (Cadland) ...	Hampshire.....	50 50	1 22	52	2'17	2'01
Oxford (Magdalen College).	Oxfordshire.....	51 45	1 15	186	1'45	1'51
Wellingborough (Croyland Abbey).	Northampton.....	52 18	0 41	174	1'69	1'84
Shoeburyness.....	Essex.....	51 31	*0 48	13	1'19	1'58
Bury St. Edmunds (Westley)	Suffolk.....	52 15	*0 40	226	1'71	2'42
Geldeston [Beccles].....	Norfolk.....	52 27	*1 31	38	1'57	2'26
Polapit Tamar [Launceston]	Devon.....	50 40	4 22	315	2'74	2'22
Rousdon [Lyme Regis].....	„.....	50 41	3 0	516	2'30	2'74
Stroud (Upfield).....	Gloucestershire..	51 44	2 13	226	2'01	2'27
Church Stretton (Wolstaston)..	Shropshire.....	52 35	2 48	800	2'19	1'82
Coventry (Kingswood).....	Warwickshire...	52 24	1 30	340	1'89	1'92
Boston.....	Lincolnshire.....	52 58	0 1	25	1'47	1'62
Workop (Hodsock Priory).	Nottinghamshire	53 22	1 5	56	1'70	1'13
Macclesfield.....	Cheshire.....	53 15	2 7	501	2'50	2'15
Southport (Hesketh Park)..	Lancashire.....	53 38	2 59	38	2'11	1'16
Wetherby (Ribston Hall) ...	Yorkshire, W.R.	53 59	1 24	130	1'92	1'34
Arnccliffe Vicarage.....	„.....	54 8	2 6	732	5'17	5'11
Hull (Pearson Park).....	„ E.R.	53 45	0 20	6	1'84	2'19
Newcastle (Town Moor) ...	Northumberland	54 59	1 38	201	2'10	2'32
Borrowdale (Seathwaite) ...	Cumberland.....	54 30	3 10	423	10'63	6'15
Cardiff (Ely).....	Glamorgan.....	51 29	3 13	53	2'89	2'40
Haverfordwest.....	Pembroke.....	51 48	4 58	95	3'16	3'91
Aberystwyth (Gogerddan)..	Cardigan.....	52 26	4 1	83	3'04	2'59
Llandudno.....	Carnarvon.....	53 20	3 50	72	2'13	1'58
Cargen [Dumfries].....	Kirkcudbright...	55 2	3 37	80	3'33	85
Marchmont House.....	Berwick.....	55 44	2 24	498	2'64	2'53
Girvan (Pinmore).....	Ayr.....	55 10	4 49	207	3'62	1'33
Glasgow (Queen's Park) ...	Renfrew.....	55 53	4 18	144	2'61	1'34
Inveraray (Newtown).....	Argyll.....	56 14	5 4	17	5'41	2'85
Mull (Quinish).....	„.....	56 34	6 13	35	4'28	2'17
Dundee (Eastern Necropolis)	Forfar.....	56 28	2 57	199	2'06	1'14
Braemar.....	Aberdeen.....	57 0	3 24	1114	2'87	2'70
Aberdeen (Cranford).....	„.....	57 8	2 7	120	2'65	1'92
Cawdor.....	Nairn.....	57 31	3 57	250	2'35	1'50
Fort Augustus (S. Benedict's)	E. Inverness ...	57 9	4 41	68	3'79	3'13
Loch Torridon (Bendamph)	W. Ross.....	57 32	5 32	20	7'29	6'42
Dunrobin Castle.....	Sutherland.....	57 59	3 56	14	2'64	2'01
Wick.....	Caithness.....	58 26	3 6	77	2'24	1'77
Killarney (District Asylum)	Kerry.....	52 4	9 31	178	4'51	3'28
Waterford (Brook Lodge)...	Waterford.....	52 15	7 7	104	2'64	2'32
Nenagh (Castle Lough).....	Tipperary.....	52 54	8 24	120	2'99	1'53
Miltown Malbay.....	Clare.....	52 52	9 26	400	3'11	2'21
Gorey (Courtown House) ..	Wexford.....	52 40	6 13	80	2'28	1'39
Abbey Leix (Blandsfort)....	Queen's County..	52 56	7 17	532	2'59	1'82
Dublin (Fitz William Square)	Dublin.....	53 21	6 14	54	1'98	1'66
Mullingar (Belvedere).....	Westmeath.....	53 29	7 22	367	2'64	2'01
Ballinasloe.....	Galway.....	53 20	8 15	160	2'66	1'94
Crossmolina (Enniscoe).....	Mayo.....	54 4	9 18	74	4'36	3'27
Collooney (Markree Obsy.).	Sligo.....	54 11	8 27	127	3'33	2'31
Seaforde.....	Down.....	54 19	5 50	180	2'84	1'62
Bushmills (Dundarave).....	Antrim.....	55 12	6 30	162	2'73	1'31
Omagh (Edenfel).....	Tyrone.....	54 36	7 18	280	2'98	1'78

RAINFALL TABLE FOR MARCH, 1911—*continued.*

RAINFALL OF MONTH ( <i>con.</i> )					RAINFALL FROM JAN. 1.				Mean Annual 1875-1909.	STATION.		
Diff. from Av. in.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1875-1909.	1911.	Diff. from Aver. in.	% of Av.				
		in.	Date.			in.	in.			in.		
+	03	102	47	12	18	5'19	4'59	—	60	88	25'11	Camden Square
+	35	118	71	12	17	5'99	5'14	—	85	86	27'64	Tenterden
+	07	104	93	12	16	6'71	5'19	—	152	77	30'48	Patching
—	16	93	95	12	11	7'20	5'15	—	205	72	31'87	Cadland
+	06	104	45	12	15	4'85	3'48	—	137	72	24'58	Oxford
+	15	109	47	12	17	5'27	3'77	—	150	72	25'17	Croyland Abbey
+	39	132	43	12	16	3'71	3'13	—	58	84	19'28	Shoeburyness
+	71	142	47	12	17	5'00	5'12	+	12	102	25'40	Westley
+	69	144	37	12	19	4'51	5'27	+	76	117	23'73	Geldeston
—	52	81	55	10	20	9'28	5'53	—	375	60	38'27	Polapit Tamar
+	44	119	1'04	12	13	7'74	5'60	—	214	72	33'54	Rousdon
+	26	113	61	12	21	6'46	5'01	—	145	78	29'81	Stroud
—	37	83	38	12	20	6'87	4'87	—	200	71	32'41	Wolstaston
+	03	102	48	12	13	6'12	4'16	—	196	68	28'98	Coventry
+	15	110	29	23	19	4'54	4'48	—	06	99	23'35	Boston
—	57	66	17	13	19	5'04	2'80	—	224	56	24'46	Hodsock Priory
—	35	86	39	12	15	7'46	6'03	—	143	81	34'73	Macclesfield
—	95	55	23	10	11	6'73	4'81	—	192	71	32'70	Southport
—	58	70	21	13	18	5'52	4'54	—	98	82	26'87	Ribston Hall
—	06	99	1'73	1	21	16'31	21'13	+	482	130	61'49	Arneliffe
+	35	119	48	13	22	5'32	4'86	—	46	91	26'42	Hull
+	22	110	37	16	22	5'63	4'65	—	98	83	27'94	Newcastle
—	48	58	2'41	1	15	35'03	37'89	+	286	108	129'48	Seathwaite
—	49	83	64	10	17	9'61	8'86	—	75	92	42'28	Cardiff
+	75	124	1'01	10	19	11'27	9'92	—	135	88	46'81	Haverfordwest.
—	45	85	67	12	19	10'04	8'63	—	141	86	45'46	Gogerddan
—	55	74	53	12	14	6'75	4'38	—	237	65	30'36	Llandudno
—	48	26	36	3	4	10'85	8'81	—	204	81	43'47	Cargen
—	11	96	32	17	20	7'19	5'83	—	136	81	33'76	Marchmont
—	29	37	38	3	14	12'27	11'04	—	123	90	49'77	Girvan
—	27	51	48	1	14	8'84	9'97	+	113	113	35'97	Glasgow
—	56	53	78	1	15	18'46	22'76	+	430	123	68'67	Inveraray
—	21	51	52	5	13	14'28	13'99	—	29	98	56'57	Quinish
—	92	55	31	18	17	5'98	2'86	—	312	48	28'64	Dundee
—	17	94	...	...	...	8'34	7'24	—	110	87	34'93	Braemar
—	73	72	28	13	22	7'37	4'78	—	259	65	32'73	Aberdeen
—	85	64	28	12, 16	13	6'69	5'58	—	111	83	29'33	Cawdor
—	66	83	68	1	18	13'57	12'96	—	61	95	44'53	Fort Augustus
—	87	88	1'26	10	14	24'08	26'17	+	209	109	83'61	Bendamph
—	63	76	36	12	12	7'97	7'02	—	95	88	31'90	Dunrobin Castle
—	47	79	30	1	21	6'95	6'41	—	54	92	29'88	Wick
—	23	73	48	31	22	15'44	8'51	—	693	55	54'81	Killarney
—	32	88	51	10	19	9'60	6'61	—	299	69	39'57	Waterford
—	46	51	30	10	16	9'76	6'84	—	292	70	39'43	Castle Lough
—	90	71	51	3	18	10'33	7'62	—	271	74	45'11	Miltown Malbay
—	89	61	35	10	16	8'22	4'64	—	358	57	34'99	Courtown Ho.
—	77	70	26	10	16	8'29	6'38	—	191	77	35'92	Abbey Leix
—	32	84	27	30	17	6'05	3'29	—	276	54	27'68	Dublin
—	63	76	45	3	19	8'41	7'73	—	68	92	36'15	Mullingar
—	72	73	63	3	19	8'51	7'91	—	60	93	36'64	Ballinasloe
—	09	75	72	3	20	13'91	9'92	—	399	71	52'87	Enniscoe
—	02	69	63	3	13	10'40	8'61	—	179	83	42'71	Markree
—	22	57	55	3	13	9'06	6'52	—	254	72	38'91	Seaforde
—	42	48	43	3	14	8'48	6'84	—	164	81	37'56	Dundarave
—	20	60	50	3	17	9'12	8'50	—	62	93	39'38	Omagh



## SUPPLEMENTARY RAINFALL, MARCH, 1911.

Div.	STATION.	Rain inches	Div.	STATION.	Rain inches
II.	Warlingham, Redvers Road	2.30	XI.	Lligwy .....	1.72
"	Ramsgate .....	2.08	"	Douglas .....	...
"	Hailsham .....	2.94	XII.	Stoneykirk, Ardwell House	1.21
"	Totland Bay, Aston House.	1.91	"	Dalry, The Old Garroch ...	2.26
"	Stockbridge, Ashley .....	2.48	"	Langholm, Drove Road.....	2.22
"	Grayshott .....	2.63	"	Beattock, Kinnelhead.....	1.45
"	Reading, Calcot Place.....	1.87	XIII.	St Mary's Loch, Cramilt Ldge	2.42
III.	Harrow Weald, Hill House.	1.68	"	North Berwick Reservoir ...	1.72
"	Pitsford, Sedgebrook .....	1.79	"	Edinburgh, Royal Observty.	.90
"	Somersham Vicarage.....	1.32	XIV.	Maybole, Knockdon Farm..	1.38
"	Woburn, Milton Bryant....	2.11	XV.	Campbeltown, Witchburn...	1.48
IV.	Colchester, Lexden.....	1.96	"	Glenreasdell Mains.....	1.72
"	Newport .....	...	"	Holy Loch, Ardnadam.....	2.69
"	Rendlesham .....	1.96	"	Ballachulish House.....	5.24
"	Swaffham .....	2.34	"	Islay, Fallabus .....	1.56
"	Blakeney .....	2.06	XVI.	Dollar Academy .....	2.36
V.	Bishops Cannings .....	2.40	"	Balquhiddy, Stronvar .....	2.59
"	Winterbourne Steepleton ...	3.29	"	Coupar Angus .....	.99
"	Ashburton, Druid House ...	3.93	"	Glenlyon, Meggernie Castle.	2.36
"	Okehampton, Oaklands.....	2.73	"	Blair Atholl .....	1.38
"	Cullompton .....	2.35	"	Montrose, Sunnyside Asylum	1.22
"	Hartland Abbey .....	2.47	XVII.	Alford, Lynturk Manse ...	2.49
"	Lynmouth, Rock House ...	2.16	"	Fyvie Castle.....	1.55
"	Probus, Lamellyn .....	3.29	"	Keith Station .....	1.79
"	North Cadbury Rectory ...	2.42	XVIII.	Glenquoich, Loan .....	11.50
VI.	Clifton, Pembroke Road ...	2.78	"	Skye, Dunvegan.....	3.53
"	Ross, The Graig .....	1.53	"	N. Uist, Lochmaddy .....	2.04
"	Shifnal, Hatton Grange.....	1.32	"	Alvey Manse .....	1.96
"	Blockley, Upton Wold .....	2.35	"	Loch Ness, Drumnadrochit.	2.95
"	Worcester, Boughton Park.	1.85	"	Glencarron Lodge .....	4.72
VII.	Market Overton.....	1.82	XIX.	Invershin .....	2.38
"	Market Rasen .....	1.92	"	Loch Stack, Ardchullin.....	4.93
"	Bawtry, Hesley Hall.....	1.12	"	Melvich .....	3.44
"	Derby, Midland Railway ...	1.39	XX.	Skibbereen Rectory.....	4.47
"	Buxton .....	2.80	"	Dunmanway, The Rectory..	5.31
VIII.	Nantwich, Dorfold Hall.....	1.29	"	Cork .....	2.81
"	Chatburn, Middlewood .....	1.81	"	Mitchelstown Castle .....	2.78
"	Cartmel, Flookburgh .....	1.41	"	Darrynane Abbey .....	3.88
IX.	Langsett Moor, Up. Midhope	1.84	"	Glenam [Clonmel] .....	2.96
"	Scarborough, Scalby .....	3.06	"	Newmarket-on-Fergus, Fenloe	1.65
"	Ingleby Greenhow .....	2.36	XXI.	Laragh, Glendalough .....	3.37
"	Mickleton .....	2.17	"	Balbriggan, Ardgillan.....	1.78
X.	Bardon Mill, Beltingham ...	2.37	"	Moynalty, Westland .....	1.85
"	Ilderton, Lilburn Cottage....	2.37	XXII.	Cong, The Glebe .....	2.58
"	Keswick, The Bank .....	1.85	"	Westport, St. Helens .....	2.78
XI.	Llanfrechfa Grange.....	2.83	"	Achill Island, Dugort .....	3.81
"	Treherbert, Tyn-y-waun ...	3.82	"	Mohill .....	1.93
"	Carmarthen, The Friary.....	3.01	XXIII.	Enniskillen, Portora .....	1.72
"	Castle Malgwyn [Llechryd].	2.76	"	Dartrey [Cootehill] .....	2.09
"	Plylimon .....	7.00	"	Warrenpoint, Manor House	1.45
"	New Radnor, Ednol .....	2.37	"	Banbridge, Milltown .....	1.25
"	Rhayader, Tyrmynydd .....	3.13	"	Belfast, Cave Hill Road.....	1.21
"	Lake Vyrnwy .....	2.62	"	Glenarm Castle.....	1.50
"	Llangyhanfal, Plâs Draw....	1.58	"	Londonderry, Creggan. Res.	2.05
"	Dolgelly, Bryntirion .....	3.78	"	Killybegs .....	2.80
"	Bettws-y-Coed, Tyn-y-bryn	2.58	"	Horn Head ... ..	1.76

Buxton ..... January 2.00  
 " ..... February 4.11

Glenquoich, Loan (February) 24.60  
 net 2.46

## METEOROLOGICAL NOTES ON MARCH, 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.—The month opened with brilliant sunshine but was changeable throughout, fine sunny days alternating with R and cloud. Winds from some westerly point prevailed in the first half of the month, but in the latter half the direction was N. or N.E. Duration of sunshine, 78·2\* hours, and of R 59·1 hours. Mean temp. 42°·2, or 0°·1 below the average. Evaporation ·59 in. Shade max. 61°·5 on 22nd; min. 28°·8 on 17th. F 4, f 15.

TENTERDEN.—A cold month with but few bright days but no severe frost. Duration of sunshine, 103·0† hours. Shade max. 62°·0 on 21st; min. 30°·0 on 8th and 10th. F 8, f 13.

TOTLAND BAY.—Duration of sunshine, 115·1\* hours, or 21·7 hours less than the average. Shade max. 56°·2 on 20th; min. 29°·7 on 17th. F 1, f 10.

PITSFORD.—R ·09 in. above the average. Mean temp. 44°·9. Shade max. 57°·4 on 2nd; min. 29°·5 on 8th. F 19.

NORTH CADBURY.—Temp. was a little above the average and ground frosts unusually few, but this was due to excess of cloud. Many nights were cold and many days were gloomy and raw. Shade max. 67°·0 on 31st; min. 28°·0 on 17th. F 7, f 11.

ROSS.—Shade max. 60°·0 on 2nd; min. 27°·3 on 17th. F 5.

HODSOCK PRIORY.—Rather dull and dry with cold days, but mild nights, and a large proportion of northerly winds. Shade max. 58°·6 on 2nd; min. 28°·9 on 5th. F 8, f 17.

SOUTHPORT.—Duration of sunshine, 127·5\* hours, and of R 42·2 hours. Mean temp. 42°·3, or 0°·8 above the average. Shade max. 54°·9 on 30th; min. 31°·9 on 26th. F 1, f 16.

HULL.—Mild at the beginning and the end, with a winterly period between of cold, squally winds and S showers, and a large amount of cloud. Shade max. 57°·0 on 3rd; min. 30°·0 on 13th. F 5, f 13.

HAVERFORDWEST.—Cold, wet, and stormy. Agricultural operations were backward. Duration of sunshine, 121·7\* hours.

LLANDUDNO.—Shade max. 53°·2 on 29th; min. 35°·5 on 8th.

CARGEN.—The month was remarkable for the extremely low R, which, with the exception of 1890, was the smallest fall registered in March in the past 52 years. There was no R after the 7th. Strong piercing E. winds continued uninterruptedly from 14th to 31st. Shade max. 52°·0 on 2nd; min. 29°·0 on 13th. F 5.

EDINBURGH.—Shade max. 52°·8 on 3rd; min. 30°·7 on 13th. F 2, f 13.

COUPAR ANGUS.—R ·75 in. below the average. The noteworthy features were the almost entire absence of frost at night and the cold and sunless days. Shade max. 54°·0 on 3rd; min. 26°·0 on 24th.

FORT AUGUSTUS.—The first half wet with prevailing S.W. winds, and the second half was dry with N.E. winds. Shade max. 54°·3 on 29th; min. 22°·2 on 22nd. F 8.

CORK.—Shade max. 56°·0 on 2nd; min. 29°·0 on 16th. F 8, f 20.

DUBLIN.—Opening with a few warm days and S.W. winds, the month ultimately proved cold and dull. N.W. winds prevailed from 11th to 17th and then N.E. or E. to the close. Mean temp. 43°·3. Shade max. 57°·2 on 2nd; min. 31°·6 on 17th. F 3, f 6.

MARKREE.—The finest March for many years. Shade max. 56°·0 on 2nd; min. 22°·3 on 26th. F 7, f 19.

WARRENPOINT.—N. and N.W. winds prevailed in the first half and E. winds in the latter half. Shade max. 55°·0 on 2nd; min. 33°·0 on 25th. F 0, f 5.

\* Campbell-Stokes.

† Jordan.

## Climatological Table for the British Empire, October, 1910.

STATIONS  (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
								0-100			inches		
London, Camden Square	72·8	2	41·6	21	60·6	48·3	50·0	89	107·8	36·3	2·00	13	8·7
Malta ... ..	38·5	10	61·0	21	77·9	67·3	63·2	76	147·0	...	·71	5	4·2
Lagos ... ..	88·0	15	69·0	17	84·7	72·8	74·1	77	155·0	69·0	7·00	12	...
Cape Town ... ..	87·9	28	43·1	16	70·9	52·9	52·2	71	...	...	1·48	10	3·6
Durban, Natal ... ..	81·0	9	53·7	12	74·9	60·9	...	...	139·5	...	4·39	18	6·3
Johannesburg ... ..	78·2	4	41·2	11	67·5	48·5	49·2	77	142·8	40·0	4·57	17	4·5
Mauritius ... ..	83·2	21	60·4	6, 8	80·3	64·7	60·9	69	155·2	50·5	1·62	9	6·1
Calcutta... ..	91·7	6	67·7	31	86·7	74·9	75·0	85	...	62·5	6·82	14	6·2
Bombay... ..	90·6	25	72·3	22	87·3	75·8	73·4	79	137·9	64·9	·62	3	3·7
Madras ... ..	97·4	2	72·5	23	89·4	76·1	74·0	82	142·7	72·4	9·64	16	5·2
Kodaikanal ... ..	66·0	11	48·0	6	62·3	51·7	53·6	92	134·6	34·6	12·86	27	7·7
Colombo, Ceylon ... ..	87·2	5*	71·2	15	85·0	74·9	73·4	80	155·5	68·8	16·83	19	6·6
Hongkong ... ..	88·0	8	66·4	13	79·7	72·0	65·6	72	141·9	...	·05	2	4·4
Melbourne ... ..	83·6	24	37·2	10	63·9	47·5	44·1	65	143·5	33·4	2·80	18	6·5
Adelaide ... ..	88·1	16	36·8	10	68·1	48·7	46·1	61	153·7	33·1	1·80	12	5·1
Coolgardie ... ..	91·0	13	38·0	2	71·9	46·6	31·7	56	156·3	34·9	·39	5	3·7
Perth ... ..	74·3	11	42·1	1	66·9	48·8	36·6	70	135·2	33·4	2·12	9	3·4
Sydney ... ..	93·9	25	47·8	12	70·5	54·4	50·5	63	149·9	36·3	3·80	21	4·8
Wellington ... ..	65·0	25	40·0	7	59·8	51·3	46·6	72	116·0	30·0	3·95	14	7·6
Auckland ... ..	68·5	25	46·0	30	63·8	52·3	52·0	79	135·0	43·0	2·19	19	7·0
Jamaica, Kingston ..	91·6	3	69·3	26	87·2	72·0	71·6	79	...	...	11·30	15	...
Grenada ... ..	90·0	26	71·0	sev.	85·0	74·0	72·0	80	142·0	...	10·39	17	4·5
Toronto ... ..	73·3	18	25·4	30	60·0	42·4	...	81	90·6	21·8	2·31	11	4·3
Fredericton ... ..	77·5	6	22·8	31	53·9	34·9	...	83	...	...	2·86	12	6·0
St. John, N.B. ... ..	61·5	11	30·7	22	52·7	41·2	...	...	...	...	3·82	17	5·8
Victoria, B.C. ... ..	62·7	15	35·7	26	55·9	45·8	...	84	...	...	5·09	16	8·0
Dawson ... ..	49·0	13	—3·0	8	31·7	18·7	...	...	...	...	1·67	12	7·3

\* 7, 8, 11, 12 and 13.

MALTA.—Mean temp. of air 72°·0. Average bright sunshine 8·3 hours per day.

Johannesburg.—Bright sunshine 251·5 hours.

Mauritius.—Mean temp. of air 0°·4, of dew point 0°·9, and R ·01 in., below averages. Mean hourly velocity of wind 9·8 miles, or 1·2 miles below average.

KODAIKANAL.—Bright sunshine 89 hours. TSS on 20 days.

COLOMBO.—Mean temp. of air 76°·8, or 3°·2 below, of dew point 0°·3 above, and R 2·25 in. above, averages. Mean hourly velocity of wind 6·0 miles. TS on 26th.

HONGKONG.—Mean temp. of air 75°·3. Bright sunshine 237·9 hours, or 26 hours above, and R 4·51 in. below, averages. Mean hourly velocity of wind 14·4 miles.

Melbourne.—Mean temp. of air 1°·8 below, and R ·14 in. above, averages.

Adelaide.—Mean temp. of air 3°·5 below average.

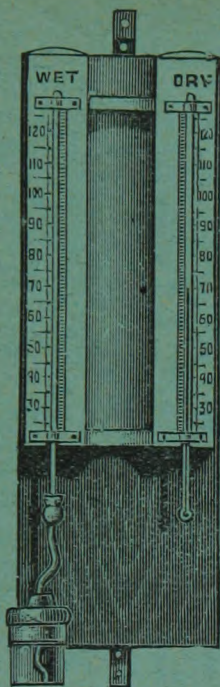
Coolgardie.—Mean temp. of air 4°·6, and R ·34 in., below averages.

Perth.—Mean temp. of air 3°·2, and R ·23 in., below averages.

Sydney.—Mean temp. of air 0°·9 below, and R ·94 in. above, averages.

Wellington.—Mean temp. of air 1°·4 above, and R ·29 in. below, averages. Bright sunshine 153·1 hours.

Auckland.—R 1·25 in. below average.



# AITCHISON'S

STANDARD

HYGROMETERS,  
RAIN GAUGES,  
BAROMETERS,  
THERMOMETERS,  
AND SELF-REGISTERING

Meteorological Instruments of all kinds

ILLUSTRATED PRICE LIST  
POST FREE.

## AITCHISON & Co.,

Opticians to H.M. Govt.,

428, STRAND, W.C.

And Branches:—

LONDON.

LEEDS, 37, Bond Street.

MANCHESTER, 33, Market Street,



## DARTON'S IMPROVED SELF-REGISTERING RAIN GAUGE

for accurately recording the amount of rainfall up to 10 inches, with index to show the difference between yesterday's and to-day's fall. Well made in stout copper, with deep brass receiving surface - - -

£3 10 0

Ditto, as above, in zinc, enamelled - - -

£2 15 0

## DARTON'S RECORDING HYGROMETER,

showing at a glance on a revolving chart the differences of temperature readings between the wet and dry bulbs, and the percentage of aqueous vapour held in suspension by the atmosphere, £7. 15. 0.

*Illustrated List of Standard, Registering, and Recording Meteorological Instruments, post free.*

## F. DARTON & Co., 142, St. John Street, London, E.C.

### RATES FOR ADVERTISEMENTS IN THIS MAGAZINE.

	One Insertion.	Six Insertions.	Twelve Insertions.	
WHOLE PAGE	30/-	26/-	22/6	} All Net.
HALF	16/6	14/6	12/6	
QUARTER	9/-	8/-	7/-	
EIGHTH	5/-	4/6	4/-	

*All applications for space to be made to*

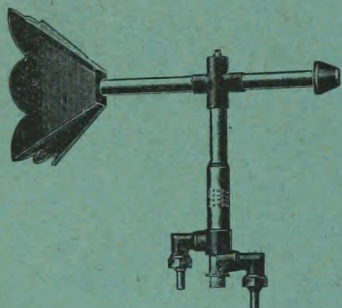
Mr. H. A. COLLINS, 27, ST. PETER'S ROAD, CROYDON.



# The ANEMO-BIAGRAPH.

(Wind Force Recorder.)

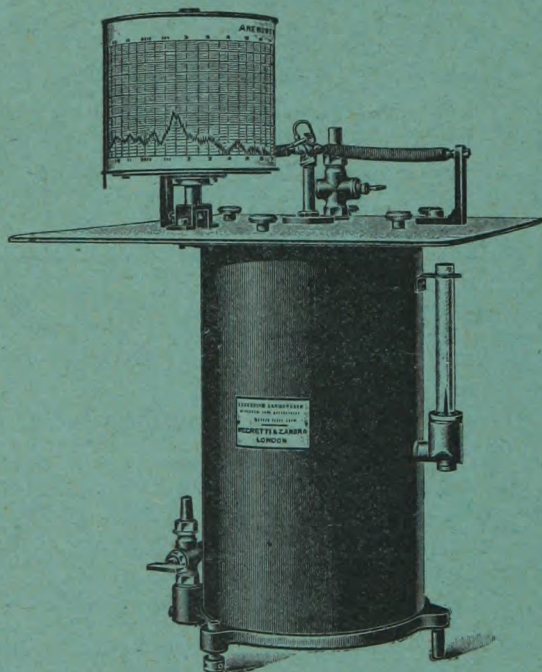
HALLIWELL-DINES PRINCIPLE.



PATENT

No. 21873,

1911.



Price £20 . 0 . 0.

FULL PARTICULARS POST FREE.

**NEGRETTI & ZAMBRA,**  
*Scientific Instrument Makers,*  
**38, HOLBORN VIADUCT, E.C.**

Branches: 45, CORNHILL, E.C., and  
122, REGENT STREET, W., LONDON.

Telegraphic Address: "NEGRETTI, LONDON."

Telephone No. 583 HOLBORN.

SHIELD & SPRING, Lancelot Place, Brompton Road, S.W.



NO. 544 SYMONS'S VOL. 46

# METEOROLOGICAL MAGAZINE

.... EDITED BY HUGH ROBERT MILL ....



MAY, 1911.

## • CONTENTS •

	PAGE
Weather in the Seventeenth Century. By WALTER SEDGWICK, M.A.	61
The Weather of April. By FRED. J. BRODIE .. ..	67
Map of April Rainfall in the Thames Valley .. ..	face p. 67
Balloon Ascents, September 3rd, 1908. By W. H. DINES, F.R.S...	68
CORRESPONDENCE:—	
The Supposed Cold of Anticyclones. By W. H. DINES, F.R.S., and PAUL A. COBBOLD .. ..	69
The Johannesburg Observatory. By CONTRIBUTOR .. ..	72
Watersheds. By INQUIRER .. ..	73
Effects of a Flash of Lightning. By REV. H. A. BOYS .. ..	73
"Sheet" or "Summer Lightning"? By J. EDMUND CLARK .. ..	74
Black Haze and Lancashire Smoke. By G. DAWSON LEWIS..	74
Our Arctic Spring. By L. C. W. BONACINA and others .. ..	75
Royal Meteorological Society .. ..	75
Reviews .. ..	78
Meteorological News and Notes .. ..	79
Rainfall Tables for April, 1911 .. ..	80
Meteorological Notes on April, 1911 .. ..	83
Climatological Table for the British Empire, November, 1910 ..	84

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

*Published on the 16th of each Month.*

*[Price 4d., or 5s. per Annum, Post Free.]*



## NOTICES.

It is requested that all Books for Review and Communications for the Editor be addressed to 62, Camden Square, London, N.W.

The responsibility for all facts and opinions expressed in the signed articles and letters published in this Magazine rests with their respective authors.

# Knowledge

## A Monthly Record of Science in all its Branches.

Each number consists of at least forty large quarto pages of Articles and Notes, by Authorities in their respective subjects.

**Profusely Illustrated.**

### CONTENTS OF MAY ISSUE

A Bird's-Eye View of the History of Astronomy. (With Folding Plate.)—Plant Hairs.—Euteeties.—The National Experimental Tank.—The Proper Motions of the Fixed Stars.—Hints on the Preparation of Skeletons of Vertebrates.—A New Lichen (*Gongylia viridis*).—Disks for Solar Projection.—The Face of the Sky for the Month.—Notes (Astronomy; Botany; Chemistry; Geology; Meteorology; Ornithology; Photography; Physics; Seismology; Zoology).—Microscopy.—Reviews of Books.—Correspondence.—Queries & Answers.—&c.

THROUGH ANY BOOKSELLER.

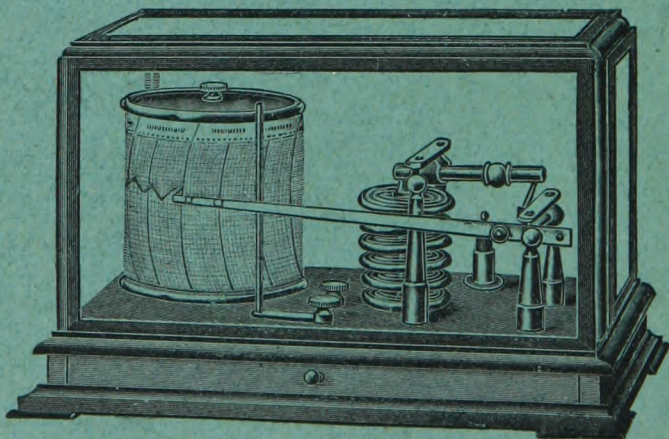
**MONTHLY—ONE SHILLING, net.**

Annual Subscription, **15/-**, post free anywhere.

Offices: 42, BLOOMSBURY SQUARE, LONDON.

## Darton's Barograph

for recording on a revolving chart the variations in barometric pressure during a week—forming a most interesting study of weather changes, for the Library, Dining Room or Editorial Office.



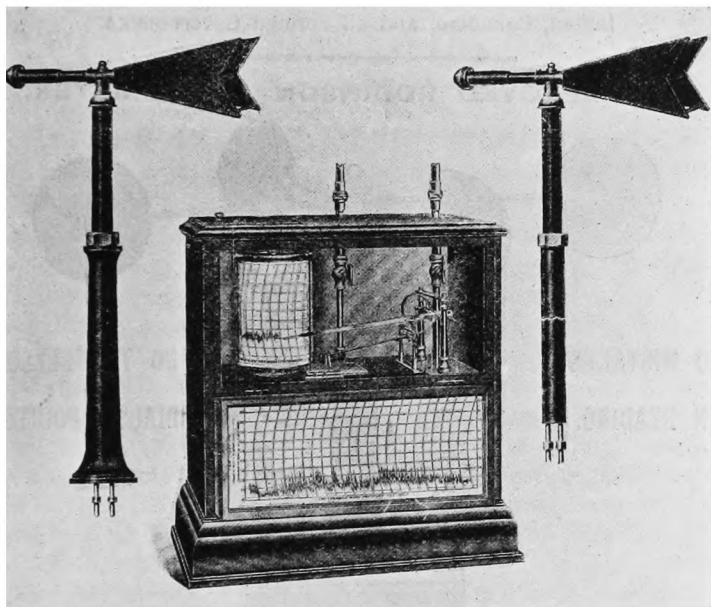
£4. 15. 0

Illustrated List of Standard, Registering, and Recording Meteorological Instruments, post free.

**F. DARTON & Co., 142, St. John Street, London, E.C.**

# THE "PEANDAR" SELF-RECORDING PRESSURE-TUBE ANEMOMETER

(Registered Design No. 569,153).



Is a great advance on the Cup Anemometer, inasmuch as it records upon a daily (24 hours') chart, not only the mean velocity for a period, but gives the actual pressure at any moment, in addition to the maximum pressures during gusts.

Velocities up to 100 miles, or 200 kilometres, per hour may be recorded on this apparatus.

Price (including two fifty-foot lengths of Conductor Piping and 400 Charts, Ink, and spare Pen) with Vane Shaft on cast iron pillar and flange for bolting on to a roof,

**£23 10 0**

**Carriage paid and safely delivered within U.K.**

DESCRIPTIVE CIRCULAR SENT ON APPLICATION.

SOLE MAKERS:

**PASTORELLI & RAPKIN, LTD.** (ESTAB. 1750.)

**46, HATTON GARDEN, LONDON, E.C.**

ACTUAL MAKERS of all kinds of METEOROLOGICAL INSTRUMENTS

Contractors to H.M. Government.

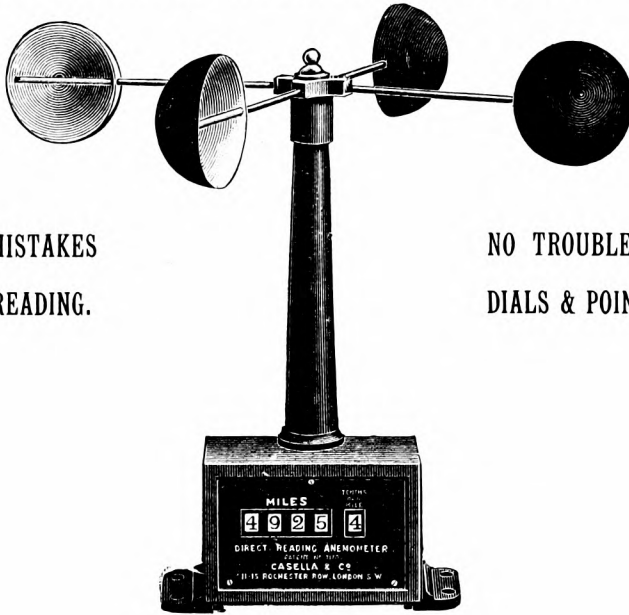
**STANDARD INSTRUMENTS OF ALL KINDS.**

ILLUSTRATED PRICE LISTS POST FREE.

**C. F. CASELLA & Co., LTD.,**  
MAKERS OF  
**Meteorological, Surveying and Scientific Instruments**

To the Admiralty, Ordnance and other Home Departments, and to the  
Indian, Canadian, and all Foreign Governments.

**AN IMPROVED ROBINSON ANEMOMETER.**



NO MISTAKES  
IN READING.

NO TROUBLESOME  
DIALS & POINTERS.

PATENT No. 7170 07

In CASELLA'S PATENT TOTALIZING ANEMOMETER the amount of wind is clearly indicated in black figures on a white ground.

The readings can be taken by an inexperienced observer as mistakes are impossible.

*For price and full particulars see our ANEMOMETER LIST,  
Post Free on application.*

**11-15 ROCHESTER ROW, VICTORIA STREET,  
LONDON, S.W.**

*Telegraphic Address: "ESCUTCHEON, LONDON." Telephone: WESTMINSTER 5599.*

# Symons's Meteorological Magazine.

---

No. 544.

MAY, 1911.

VOL. XLVI.

---

## WEATHER IN THE SEVENTEENTH CENTURY.

By WALTER SEDGWICK, M.A.

### INTRODUCTION.

It is often stated that the climate of England has undergone considerable changes in comparatively modern times, and that formerly Christmas time was more consistently cold and Midsummer more consistently warm, April more genial, and October less genial than at present. In fact, it appears to be generally believed that the coldest and warmest spells were more pronounced, and occurred somewhat earlier in the year, and that the annual variation of temperature was less broken by cold and warm spells out of their proper season. The date when the former climatic conditions is said to have existed is variously given; the "oldest inhabitant" affirms that there has been a great change since his boyhood, while others refer vaguely to the "old-fashioned" winters and summers, but so common is the belief that the climate of England has changed, that it is interesting to consider how far this belief is borne out by the observations handed down to us by those who lived in former days. An opportunity of comparing the weather of to-day with the weather of the Seventeenth Century is afforded by the diaries of John Evelyn and Samuel Pepys, and it is proposed in this and a few subsequent numbers to set out extracts from the diaries of those two writers which describe the weather of their time, and to consider whether those extracts show that any marked change in the climate of London has occurred since the Seventeenth Century.

It may be desirable to describe briefly who these writers were:—

John Evelyn, F.R.S., was born in 1620 and died in 1706; he thus lived from the reign of James I. to that of Queen Anne. He was a man of varied attainments and considerable distinction, and was on terms of great intimacy with many of the eminent men of his time. He took especial interest in questions of science, was one of the founders and also Secretary of the Royal Society, and on more than one occasion was asked to become the President, though this honour he declined. He was also interested in literature and art, and studied with attention questions of agriculture, gardening and kindred subjects. His diary is more of the character of Memoirs written up



from notes, and is a valuable commentary on the social, political, and scientific events of his life. Between 1641 and 1652 he spent several years travelling abroad, and his diary contains few notes on the weather prior to 1652, but subsequently to that year his observations on the weather become more frequent, especially in the last 25 years of his life. He was in London during the exceptionally severe winters of 1683-4, when the historic "Frost Fair" was held on the Thames.

Samuel Pepys, F.R.S., was born in 1633 and died in 1703, but his diary only covered the years 1660 to 1669. During the greater part of this period he was Clerk of the Acts and, *ex officio*, a member of the Navy Board; he was also a Younger Brother of the Trinity House. He was President of the Royal Society from 1684 to 1686, and, like Evelyn, he knew many eminent men in all walks of life, but his diary is devoted more to the social life and gossip of the day than to questions of science, and his observations on weather are of less interest than those of Evelyn, nevertheless they usefully supplement some of the gaps in Evelyn's diary.

In making a comparison between the weather of the Seventeenth Century, as described in these diaries, and the weather of to-day, a few points should be borne in mind. One is that the rigorous exactness which is expected from men of science to-day was not expected over two centuries ago, and the instruments were not then in existence which make possible the great accuracy of present day observations. The existence of atmospheric pressure was first demonstrated by Torricelli in 1643, and the actual proof of the principle of the barometer was given by Pascal about 1648, when Evelyn was 28. The relation of atmospheric pressure to weather is mentioned by Robert Boyle (1626-1691), but he expressed the opinion that it is exceedingly difficult to draw any correct conclusions. The hermetically-sealed thermometer had been invented in 1612 by Galileo, or possibly before his time, but this instrument was first made in England by Robert Boyle, and the substitution of mercury for spirit as the thermometric liquid was not suggested until 1693, when Evelyn was 73; this suggestion coming from Halley. The first rain gauge of which there is definite information was one shown by Sir C. Wren at a meeting of the Royal Society in 1662, and it is probable that he recorded rainfall regularly after that date; but the earliest records of rainfall which are in existence were commenced by Mr. Townley at Townley, in Lancashire, on 1st January, 1677, and the next earliest in England were started by Hooke at Gresham College, then the home of the Royal Society, in 1695, only 11 years before Evelyn's death.

Accordingly, although the barometer, thermometer, and rain gauge were known instruments before the close of the Seventeenth Century, yet there were but few in existence, and they cannot have been used regularly, if at all, by Evelyn or Pepys. Hence it would not have been possible for them to make accurate comparisons between the

weather of different years and the frequent use of the superlative in the descriptions of the weather in their diaries must be accepted with reserve. It must also be remembered that all non-instrumental observations on weather are largely affected by the personal element, and the diarist's impressions of cold and warmth, rain and drought, bad weather and good weather must necessarily have been influenced by his health and strength and by his occupation and pursuits at the time. Again, his tendency would be to record the abnormal rather than the normal conditions of weather.

Another important consideration is the change from the Julian to the Gregorian Calendar which was made in England in 1752. The Julian Calendar (named after Julius Cæsar), or Old Style, was adopted in its final form in the reign of the Emperor Augustus, and was used throughout civilised Europe till the Sixteenth Century. That Calendar assumed that the year was exactly  $365\frac{1}{4}$  days in length, and it ordained a leap year every fourth year without any exceptions. The true year, however, is about 11 minutes 12 seconds less than  $365\frac{1}{4}$  days, and this small difference amounts to three days in the course of every 400 years. In 1582 it was found that the vernal equinox occurred 10 days earlier than it did at the time of the Council of Nice in 325, and accordingly Pope Gregory XIII. published a Bull annulling 10 days by reckoning the 5th October, 1582, as the 15th October. He also ordained that years which were a multiple of 100 but not of 400 (*e.g.*, 1700) should not be leap years. The Gregorian Calendar, or New Style, was adopted by most continental Roman Catholic countries in the Sixteenth Century, and by Scotland in 1600, but it was not adopted in England until 1752. The difference between the two styles then amounted to 11 days (1700 having been reckoned a leap year under the Old Style but not under the New Style), and Parliament enacted that the 11 days after September 2nd should be omitted and the day following September 2nd should be September 14th. In Russia and other countries under the Greek Church the Old Style is still used, and the error is now 13 days. The result of the change of style is that any particular day of the year at the present time really corresponds (when considered in relation to the position of the sun in the Ecliptic) to a day dated in England 10 days earlier in the Seventeenth Century and 11 days earlier in the first half of the Eighteenth Century, *e.g.*, May 15th, 1911, corresponds with May 5th, 1611, and May 4th, 1711. It is possible that this change has some connection with the popular belief about the old-fashioned Christmas, since Christmas Day in the time of Evelyn really corresponds with January 4th or 5th of the present time, and in several years in the past decade there have been considerable falls of snow after Christmas which would have occurred before Christmas if the Julian Calendar had been still in force. Similarly, May Day used to occur 10 or 11 days later in the astronomical year than it does now, and there was consequently a better prospect of its being warm and genial.



It is also necessary to remember that under the Julian Calendar the year commences with the Feast of the Nativity (March 25th), and when days between January 1st and March 25th are mentioned there is sometimes a little confusion as to the actual year referred to.

#### PART I.—SPRING.

In this part are given extracts from the diaries which relate to the weather of March, April, and May. As regards the weather of these months the only information given by Evelyn prior to 1681 is with reference to the severe cold in March, 1658, and the cold spring of 1667, but in 1689 he makes a general statement about the springs since 1660, and his diary contains many remarks about the spring weather from 1681 to 1705. Pepys also refers to the cold spring of 1667, and makes several comments on the weather in May from 1660 to 1669.

So far as these extracts enable an opinion to be formed, they appear to show a close similarity between the spring weather in the second half of the Seventeenth Century and the spring weather of the present time. In March there is reference to great cold in 1658, 1667, and 1696, and unusual warmth in 1700. In April there were frequently then, as there are now, spells of a dry, easterly type, and while many springs are described as cold and backward, few are described as warm and pleasant. Occasionally the cold spells were prolonged well into May, as in 1688, 1692, and 1698.\* Attention is especially called to the observation dated 9th May, 1688, referring to a cold, late spring after a mild winter.

The springs from 1681 to 1705 of which information is given may be shortly described as below, and there is a noticeable correspondence between the weather of one year and that of the eleventh year after.

1681—Cold and dry.	1694—Dry.
1682—Wet.	1695—Cold.
1683—March hot and dry ; April wet.	1696—March cold ; April genial.
1684—Cold and dry.	1698—Cold.
1688—Cold.	1699—Stormy.
1689—Genial.	1700—Genial.
1692—Cold.	1701—Dry.
1693—Wet.	1705—Fine and dry.

*Note.*—In the following extracts the dates *have been corrected* to New Style, except where (O.S.) occurs.

Extracts from Pepy's diary are distinguished thus—(P.) ; all other extracts are from Evelyn's diary.

- 1658 17 March.—This had been the severest winter that any man alive had known in England. The crow's feet were frozen to their prey. Islands of ice inclosed both fish and fowl frozen, and some persons in their boats.
- 1660 30 May.—At sea off the Hague. This hath not been known four days together such weather this time of the year a great while. (P.)

- 1660 31 May.—At sea off the Hague. The weather foul all this day also. (P.)
- 1661 (a) 3 May.—Fair during day, late afternoon or evening “it fell a raining and thundering and lightning as I have not seen it do for some years.” (P.)
- 31 „ One of the greatest showers of rain that ever I saw. (P.)
- 1663 25 May.—Strange were the effects of the late thunder and lightning about a week hence at Northampton, coming with great rain which caused extraordinary floods in a few hours bearing away bridges, drowning horses, men, and cattle. (P.)
- 1666 1 May.—A mighty hot and pleasant day. (P.)
- 1667 16 March.—Great frosts, snow and winds prodigious at the vernal equinox; indeed it had been a year of prodigies in this nation, plague, war, fire, rain, tempest and comet.
- 16 „ The weather being become most bitter cold, the king saying to-day that it was the coldest day he ever knew in England. (P.)
- 17 „ This day was reckoned by all people the coldest day that ever was remembered in England. (P.)
- 26 „ The weather is now grown warm again after much cold. (P.)
- 14 April.—The cold so intense that there was hardly a leaf on a tree.
- 1668 14 April.—The Duke of York did tell us what rules he had of knowing the weather, and did now tell us we should have rain before to-morrow (it having been a dry season for some time), and so it did rain, all night almost; and pretty rules he hath, and told Brouncker and me some of them, which were such as no reason can readily be given for them. (P.)
- 1669 11 May.—The day being unpleasing. . . .dusty, windy and cold, and now and then a little dribbling of rain. (P.) May Day, O.S.
- 1681 6 April.—An extraordinary sharp cold spring, not yet a leaf on the trees, frost and snow lying.
- 9 May.—But one shower of rain all this month (April, O.S.).
- 1682 22 April.—This season was unusually wet, with rain and thunder.
- 1683 11 May.—March (O.S.) was unusually hot and dry, and all April (O.S.) excessively wet.
- 1684(b) 7 April.—The weather began to be more mild and tolerable, but there was not the least appearance of any spring.
- 14 „ Hardly the least appearance of any spring.
- 1687 22 May.—Such a storm of wind as had seldom happened, being a sort of hurricane. It kept the flood out of the Thames so that people went on foot over several places above bridge. Also an earthquake in several places in England about the time of the storm.
- 1688 25 April.—A dry, cold, backward spring; easterly winds.
- 9 May.—The weather was till now so cold and sharp, by an almost perpetual east wind, which had continued many months, that there was little appearance of any spring, and yet the winter was very favourable as to frost and snow.

- 1689 1 May.—This was one of the most seasonable springs, free from the usual sharp east winds that I have observed since 1660, which was much such an one.
- 1692 April.—No spring yet appearing.  
4 May.—Very cold and unseasonable weather, scarce a leaf on the trees.
- 15 ,, The eastern wind constantly blowing.
- 1693 1 March.—Hitherto an exceeding warm winter such as has seldom been known.  
8 ,, An extraordinary deep snow after almost no winter, and a sudden, gentle thaw.  
3 May.—An extraordinary wet spring.
- 1694 The whole month of April (O.S.) without rain.  
2 May.—A fiery exhalation rising out of the sea spread itself in Montgomeryshire a furlong broad and many miles in length, burning all straw, hay, thatch and grass, but doing no harm to trees, timber, or any solid things, only firing barns or thatched houses. It left such a taint on the grass as to kill all the cattle that eat of it. It [? the taint] lasted many months.
- 16 ,, Scarcely one shower had fallen since the beginning of April.
- 1695 April.—The latter end of March (O.S.) sharp and severe cold, with much snow and hard frost; no appearance of spring.  
24 ,, After a most severe, cold and snowy winter, without almost any shower for many months, the wind continuing N. and E., and not a leaf appearing, the weather and wind now changed, some showers fell, and there was a remission of cold.  
1 May.—The spring begins to appear, yet the trees hardly leafed.
- 1696 11 March.—The wind continuing N. and E. all this week.  
18 ,, Great frost and cold.  
22 April.—A very fine spring season.
- 1698 1 May.—An exceeding sharp and cold season.  
18 ,, An extraordinary great snow and frost.
- 1699 1 March.—A most furious wind, such as has not happened for many years.  
5 April.—After an extraordinary storm there came up the Thames a whale which was 56 feet long.
- 1700 19 March.—The season was like April for warmth and mildness.  
4 April.—The season warm, gentle, and exceeding pleasant.  
5 May.—A most glorious spring, with hope of abundance of fruit of all kinds and a propitious year.
- 1701 May.—A great dearth, no considerable rain having fallen for some months.  
28 ,, Very plentiful showers, the wind coming west and south.
- 1705 4 March.—Remarkable fine weather.  
22 ,, An exceeding dry season.

Notes.—(a) The Coronation Day of Charles II., 23 April, 1661 (O.S.).

(b) This followed the exceptionally cold winter of 1683-4, when the Frost Fair was held.





Symons's Meteorological Magazine.

*Matteson* of River Thomas above Yaddington and River Lea above Faldes Wale

Rainfall Stations reporting -

## THE WEATHER OF APRIL.

By FRED. J. BRODIE.

OVER the southern half of England the weather of April, which was at no time very warm, was distinguished at the outset by one of the sharpest touches of cold ever experienced in mid-spring. A brisk wind from the north-eastward prevailed at the time over all but the extreme northern parts of the United Kingdom, and temperature fell steadily, a keen frost occurring on the nights of the 4th and 5th in nearly all districts. At a large number of stations scattered over various parts of the country the sheltered thermometer fell at least  $10^{\circ}$  below the freezing point, a reading as low as  $17^{\circ}$  being recorded at West Linton, and a reading of  $20^{\circ}$  in Ayrshire, at Kilmarnock and Colmonell. On the surface of the grass frost occurred as far south as the Channel Islands (where considerable damage was done to the young potato crop) and in many of our northern and central districts it was severe, the exposed thermometer sinking below  $20^{\circ}$  in many places, and touching  $15^{\circ}$  at Dumfries and Llangammarch Wells, and  $14^{\circ}$  at Armagh and Markree Castle. Over eastern, central and southern England the day temperatures registered at this time were more remarkable even than the night frosts. On the 5th the thermometer in many places failed to rise more than a degree or two above the freezing point; at Hampstead and Worthing it did not exceed that level, and at Tunbridge Wells it did not pass beyond  $31^{\circ}$ . Heavy showers of snow occurred in many districts during the opening week, and at Guernsey the total fall, when melted, yielded  $\cdot 80$  in. to  $\cdot 90$  in. of water in the gauge. At the close of the first week the weather improved somewhat, but on the nights of the 10th and 11th further sharp frosts were experienced, the thermometer in the screen falling slightly below  $25^{\circ}$  in many districts, while the exposed instrument sank to  $15^{\circ}$  at Llangammarch Wells and to  $20^{\circ}$  at Cambridge, Birmingham, Kew and Wisley.

After the 11th a large anticyclone whose central area had been situated for some time off our north and north-west coasts, extended southwards over the whole kingdom, and the cold north-easterly wind gradually died away. For the remainder of the month the type of weather was almost continuously westerly or south-westerly, and temperature was above the average, the excess being greatest in the eastern parts of Great Britain. The warmest weather occurred respectively on the 14th and 15th or between the 22nd and 24th. On the earlier occasion the thermometer rose to  $65^{\circ}$  or a trifle above it in many parts of England and the south of Ireland, a reading of  $67^{\circ}$  being recorded at Camden Square, Greenwich and Westminster, and a reading of  $68^{\circ}$  (on the 13th) at Killarney. Between the 22nd and 24th the thermometer again exceeded  $65^{\circ}$  in several parts of eastern, central and southern England, and touched  $69^{\circ}$  (on the 22nd) at Raunds and Cambridge, and  $68^{\circ}$  at Camden Square. During the latter half of the month the nights were, as a rule, fairly mild, but



early on the 17th a rather sharp ground frost occurred in many districts, while on the nights of the 26th and 28th a similar visitation was reported over the northern half of the kingdom.

In the more southern districts the effect of the cold weather which prevailed early in the month was not entirely compensated for by the subsequent mildness, and the mean temperature of the month was therefore below the average. Further to the northward, where the early period of cold has been marked, the mean values were slightly above the normal. Most places in the South of England enjoyed more than the average amount of bright sunshine, but over the country, as a whole, the total duration was somewhat small. At Stornoway the total of 111 hours was little more than two-thirds of the average.

### BALLOON ASCENTS, SEPTEMBER 3rd, 1908.

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

Starting Point.	Country	A miles.	B ° F.	C miles.	D ° F.	E miles.	F
Hamburg.....	Germany ....	6.5	—55	7.3	—42	38	S.E.
Lindenberg....	„ ....	5.3	—56	11.3	?	71	E.
Paris .....	France.....	8.4	—80	9.0	—69	128	S.E. by E.
Strassburg ....	Germany ....	7.1	—65	7.3	—63	91	S.E. by E.
Munich.....	„ ....	6.1	—53	7.3	—51	105	S.E. by E.
Vienna .....	Austria ....	8.6	—47	12.0	—	119	E. by S.
Kuchino .....	Russia .....	7.3	—80	7.9	—71	60	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.

Owing to the date being that of the Meeting of the British Association at Dublin few balloons were sent up in England, and of these few unfortunately none were found.

The figures were of a very unusual character, especially those for Vienna, where a high temperature, —47, is combined with an unusual height of the isothermal. As a general rule, low temperatures and great heights go together.

The weather during the whole week was very rough, a succession of depressions passing from the Atlantic to the Continent.

ERRATA.—Not the least of the penalties of carrying on meteorological work under the pressure of coping with the monthly deluge of rainfall returns lies in the necessity of exorcising the spectres of typographical errors which for ever haunt the dealer in statistics. In the Magazine for January, 1911, page 223, line 18, *for 23rd read 3rd*, on which date the noteworthy shade minimum temperature referred to took place; and in the April number, on p. 42, 23 lines from bottom, *for two read three*, and on same pages, 22 lines from bottom, *for £2 read £3*.

## Correspondence.

To the Editor of Symons's Meteorological Magazine.

---

## THE SUPPOSED COLD OF ANTICYCLONES.

I AM glad that my letter should have drawn a reply from so high an authority as Dr. Hann, and must state at once that I have the greatest respect for his book, and do not class it among ordinary text books.

The first part of Dr. Hann's letter asserts the proposition that I have been trying to combat for many years, but it seems to me that the second part concedes everything for which I contend. St. Petersburg and Vienna are continental stations in the meteorological sense, and I express no opinion about them, but my position is that in the North-West of Europe the winter temperature is quite independent of whether the conditions be cyclonic or anticyclonic, and depends on the general trend of the prevailing air current.

The figures for Greenwich show that severe cold in the south-east of England is most likely to occur with the barometer below its average value, and that on days when the barometer is very high the temperature is close to its mean value. This is a very awkward fact for those who hold that an anticyclone is a "focus of cold," and hence we are asked to believe that the 1,300 odd days at Greenwich on which the barometer was above 30·20 in. were not, as a rule, anticyclonic, and that the severe frosts that occurred with the barometer below its mean value really occurred in anticyclonic weather. I leave it to every independent meteorologist to judge whether this is likely.

Doubtless a few exceptional cases can be found in which cyclonic conditions are shown on a chart with a high barometer, and conversely, but so fully is it recognised that a high barometer means an anticyclone, and a low barometer a cyclone, that many authors use the words indiscriminately. Thus the Americans use the word "high" for an anticyclone, and "low" for a cyclone, and in Dr. Hann's own book I find the following on page 402 (1906 edition), "*Witterung in den verschiedenen Sektoren einer Area hohen Luftdruckes. Beber (1)*," with the footnote, "(1) W. van Beber, '*Das Wetter in den barometrischen Maxima*.'"

These same figures of W. van Beber given on page 403 of Dr. Hann's very valuable book suffice to prove my point, and from them I extract the following. They are stated to relate to 8 a.m. The departures from the mean for an anticyclone in winter are given as  $-4^{\circ}\cdot3$  C. in the S.E. sector,  $-1^{\circ}\cdot4$  at the centre, and  $+3^{\circ}\cdot0$  in the N. sector. If the centre of an anticyclone is a "focus of cold," why does not the lowest temperature occur at the centre, and why, since the North side has a temperature of  $+3^{\circ}\cdot0$  C., may I not, with equal truth, call an anticyclone a focus of warmth?

It is true that the centre has a temperature at 8 a.m. of  $-1^{\circ}4$ , but 8 a.m. does not represent the daily mean. In the calm weather of an anticyclone the daily range is large, and 8 a.m. is close to the time of the minimum. Thus the comparison is between two minima, one when the range is large and one when it is normal, and of course the time when the range is large appears to be the colder, but is not so necessarily. The figures themselves show this, for the temperature at the centre in summer is given as  $-0^{\circ}2$  C., though on page 397 Dr. Hann states that the centre in summer is characterised by "great warmth." Doubtless it is so, but  $-0^{\circ}2$  does not indicate great warmth.

The time to which the figures given by Dr. Hann refer is not stated: presumably it is 8 a.m., and if so they do not fairly represent the mean temperature.

The plain fact is that it is the direction of the wind that matters. See Hann, p. 399. In Europe in winter the isotherms run North and South rather than East and West, and thus an east wind brings cold and a west wind warmth; hence the north side of an anticyclone and the south of a cyclone are warm, and the south side of an anticyclone and the north side of a cyclone are cold.

The second part of Dr. Hann's letter is practically equivalent to what I said in the *Quarterly Journal* of the R.Met.Soc. (Jan., 1899, Vol. 25, No. 109, p. 32). He finds that "extreme winter months in Central Europe show no constant relation to the variations of pressure in Central Europe itself," but that in extreme months the pressure is abnormally high to the North and North-East. This is very similar to my statement that no connection between the height of the barometer and the winter temperature at the same place could be found, but that an unusually high barometer at Berlin was accompanied by unusual cold at Geneva.

With regard to the Asiatic anticyclone, I believe that in so far as it is genuine, and not due to the method of reduction to sea level, it is caused by the cold and is not the cause of the cold. Every place that is cut off from the source of heat supplied by a large mass of open water becomes cold in winter—the coast of Labrador, for example. The prevailing winds prevent it from receiving heat from the Atlantic as Europe does; it lies within the region of the N. Atlantic depression, and yet its January mean is below  $0^{\circ}$  F.

All my opponents who have discussed this question have quoted the winter of 1879-80, an undoubted case of the occurrence of severe cold with a high barometer. I have never asserted that such cases do not occur, but the continual quoting of a special instance suggests to me the remark about an exception proving a rule. The emphasis laid on this particular winter shows that examples are scarce, and proves my statement that the winter temperature is independent of the height of the barometer.

W. H. DINES.

I AM glad to see in your March issue Mr. Dines giving chapter and verse showing the fallacy of the so-called rule that cold weather accompanies winter anticyclones, as I have long doubted the truth of the rule. The particular example in England that I can especially remember is February, 1891, which to my mind goes a long way to disprove the rule.

Mr. Dines asks about the truth of the rule in North America. As far as my experience goes from a residence of eighteen years here (about 300 miles north of Toronto), the reverse of the rule is more often true. The weather of the last week in March and the first two days of April this year has been a very good example of a steady, low temperature, considerably below the average for the time of year, accompanied by an abnormally low barometer, and no "let up" to the cold till the pressure had reached a more normal height.

At the same time there are frequent occasions when the rule is justified by the facts. This can be explained by the spreading out, or branching out, of the permanent continental anticyclone that is centred in the winter months over the province of Alberta, giving rise to the popular description of Medicine Hat as "the place where the cold waves come from." In Dr. Willis L. Moore's "Descriptive Meteorology," pp. 223-227, is an account of the formation and progress of a typical cold wave over the United States. But the primary cause of the development of the cold wave from the Alberta anticyclone seems to me to be the passage of a depression across the Southern States and along the Atlantic Coast to the Gulf of St. Lawrence.

The temperature of a district is so largely the result of the winds prevailing for the time being that the gradients have far more to do with the production of cold weather than the existence of high or low pressure over the country. Of course an anticyclone is often, but not always, accompanied by clear weather, which increases radiation, giving cold nights but warmer days. In the still clear weather of anticyclonic conditions we notice here a considerable warming-up effect in the middle of the day throughout February and March.

Possibly the rule could be more correctly stated by saying that an anticyclone which follows close on the heels of a depression in winter brings cold weather, but that if the anti-cyclone is persistent the cold decreases.

A distinction, too, should be drawn between cold waves and the type of weather that gives a continued low temperature; a cold wave implies a sudden drop either to the freezing point or of 20 to 40 degrees from the temperature of the previous day. A *cold spell*, if I may invent a new term, begins gradually and continues for a week or even longer, with an average temperature far below the normal and a gradual rise to average conditions. I imagine that in Asia the conditions are not quite the same as in America; there is a larger land area, and the main mountain ranges do not run north and south. I should expect to find cold waves in the Argentine, as I

think the Andes will have the same general effect as the Rockies. Dr. Moore (Loc. cit., p. 226) states that cold waves cannot accompany an anticyclone that advances over this continent from the Pacific.

PAUL A. COBBOLD, F.R.Met.Soc.

*Haileybury, Ontario, Canada, 7th April, 1911.*

## THE JOHANNESBURG OBSERVATORY.

MR. INNES is sanguine in thinking that by printing the out-station barometric results in inches, and the observatory hourly results in millimetres, he is attending to the interests of future investigators. How would it be if he were to "go one better" by either —

- (1.) Printing the out-station results in mm. ; or
- (2.) Printing his hourly results in inches ; or
- (3.) Printing the hourly means for each month in both mm. and inches ?

I am afraid that an astronomical observatory will always find it troublesome to do everything for meteorology that meteorologists would like to see done. Particularly is it practically impossible for the astronomical observatory to develop meteorology on the side of experimental science. That is a good reason why meteorologists—although they are willing to recognise the fine routine work done at such places as Greenwich—would prefer, on the whole, to see a permanent divorce between astronomy and meteorology, for meteorology will either have to run alone or take a back seat.

I was surprised at your remark as to the lack of suitability of the Transvaal Observatory for astronomical purposes. According to the speeches at the opening ceremony of this observatory—which was specially selected by astronomers—it only wanted good instruments to be a perfect astronomical observatory. It is one of the proofs that the best interests of astronomy and meteorology always clash, that if a meteorological observatory had been in contemplation a fine site was available on the French Rand. At least, so a Rand magnate told me.

CONTRIBUTOR.

[We have certainly been under the impression that the observatory at Johannesburg was primarily meteorological, and that any astronomical work done there was of a subordinate character. We agree with "Contributor" that purely meteorological observatories are best in the interest of meteorology ; but on the other hand, we fear that if meteorologists clamour too insistently for a divorce, astronomers will in some instances joyfully abandon meteorological work altogether, and many fine and ancient records would be hopelessly broken. Perhaps Mr. Innes will put us right as to whether the Johannesburg Observatory is meteorological or astronomical.—Ed. S.M.M.].

## WATERSHEDS.

IN the article in the Magazine for November, 1910, it is stated that "it sometimes happens, though rarely, that a stream flows along a watershed and bifurcates, part flowing down one slope, part down another."

I should much like to enquire if any such case is authentically known, and if so to learn particulars about it. Could any of your readers supply such?

It sounds highly paradoxical to speak of a stream flowing along a watershed, which is a height of land, and it seems almost impossible to picture such a phenomenon.

The case of a stream splitting (outside a delta area) and dividing itself between two distinct river systems seems rare in the extremest degree. There is the case of the Orinoco, and there is, I believe, a case in Lapland, northward of the head of the Gulf of Bothnia; but anomalous cases like these surely need closer investigation than they have hitherto had, as in cases of lakes with two outfalls, and the paradox probably disappears when all the facts are accurately known.

### INQUIRER.

[Apart from the classic example of the Casiquiare which unites the Orinoco and the Amazon system, there are several instances of rivers flowing across a watershed or, if the rather loose phrase be permitted, along one. The height of land which forms a watershed is sometimes rather shield-shaped than roof-shaped, and while, as in North America, the main drainage of the continent is shed to north and south like the Mackenzie and Mississippi, a line of drainage at right angles may traverse the main height of land, as in the case of the St. Lawrence. The Petterill, near Penrith, runs at one point so nearly along a watershed that water is drawn off through an opening in the bank, and eventually finds its way into a different valley. It must be acknowledged, however, that in strictness a watershed is a line, while a river-bed is an area which, though long in relation to its breadth, is not without that dimension. But while geometry admits no transitional forms between lines and surfaces, nature is full of compromises distressing to the systematic geographer.—Ed. *S.M.M.*]

---

## EFFECTS OF A FLASH OF LIGHTNING.

ON the evening of March 22nd, during a thunderstorm, a tall elm, 600 yards north-north-west of my home, was struck by lightning and a deep score made all down the stem. The road and opposite field were strewn with stringy fragments of wood and bark. My own servants, in a house not 200 yards from the tree, agree that the noise was such as they never heard. A woman living 400 yards from the tree, who was standing in her porch when the flash came, with a kettle in her hand, said she felt both her hands burnt. Our school-



master, who was about 100 yards away, stated that the flash had the appearance of a *large globe* about 15 or 18 ins. in diameter. His eyes were badly affected, and he had difficulty in performing his duties on the following day.

H. A. BOYS.

*North Cadbury Rectory, Somerset, March 24th, 1911.*

---

### “SHEET” OR “SUMMER LIGHTNING” ? OR NEITHER ?

THIS evening, at 7 p.m., there were three flashes at intervals of two or three minutes, in what were probably alto-stratus clouds, barely dense enough to obscure the stars. The clouds at the time were generally outspread, but appeared to be evaporating, and at 8 it was very clear. The flashes were localized between  $15^{\circ}$  and  $20^{\circ}$  above the horizon, centred from E.S.E. to N.E., successively, each, perhaps, extending horizontally over  $30^{\circ}$ . The reddish light was faint and diffuse, like exceedingly distant sheet lightning. Yet it could hardly have been that, for such would have affected the sky much nearer the horizon. On the other hand the diffuse glow contrasted with the usual “forked” character of “summer” lightning. The appearance suggested rather a single vacuum tube discharge. Cyclonic clouds were noted at 11 a.m., but the barometer continued rising until 2 a.m., 21st, slowly after 10 p.m. Is there anything exceptional in the phenomenon and what is its probable explanation.

J. EDMUND CLARK.

*Purley, Surrey, 20th February, 1911.*

---

### BLACK HAZE AND LANCASHIRE SMOKE.

IN the article on “The Brocken Spectre on Snowdon,” p. 227 of the January number, I read:—“easterly winds prevailed, and on several days there was much “black haze,” so much that the scenery was obscured, and no sun or sky was to be seen.”

I do not know whether all your readers would see the connection between the “easterly winds” and the “black haze” in the neighbourhood of Snowdon, or realise that the black haze comes from Lancashire chimneys. In dry weather it not only obscures North Wales, but is noticeable even in Ireland. On July 12th, 1910, after a few days of dry weather with east wind, I saw on the coast of Donegal, 200 miles from Lancashire, the sun set into a bank of black (i.e., smoky) haze much as I have seen it at New Brighton under similar conditions. Naturally in Donegal it was less dense, the sun becoming invisible about 10 minutes before setting, whereas at New Brighton I have seen it vanish into the haze an hour before setting. Of course, I am referring to *cloudless* weather in both cases.

G. DAWSON LEWIS.

*29, Devonshire Road, West Kirby, Birkenhead, 7th February, 1911.*

## OUR ARCTIC SPRING.

It would be correct, perhaps, to say that in the British Islands we normally get a damp Atlantic winter (November to January), followed by an Arctic spring (February to April), and the kind of weather we are now enduring, and which has gradually intensified since the beginning of March, is, after all, perfectly normal and typical of the season.

Why it is that in the southern counties of England the snowflakes will so often come down in April rather than in January, with a deliberateness that cannot be entirely explained by pressure distribution and wind direction, is very puzzling.

The conventional meaning of the word "spring-like," which is so different to the true meaning we have, of course, borrowed from the south, chiefly, perhaps, through the influence of one or two notably unpatriotic English poets who seemed in their day to find the genial atmosphere of a Grecian or Italian spring more stimulating to their imagination than the sight of tender foliage and scented herbs bravely endeavouring to open amid the howling wind, frowning sky, and belching snow-squalls of their northern home.

This evening (April 7th) at sunset the easterly wind in London was driving a very wild pattern of cirrus-sky—horses' tails, fish-bones, ferns, chess-boards, billiard-cues, and what not—which looked particularly ominous; for according to the happy anticipations of a versifier in an evening paper we shall be snowballing one another at Hyde Park Corner in May (he even speaks of the sound of "steel" on the Serpentine during the long days of the merry month), seemingly because Greenland's mountains will then be ready to send us down a series of north-westerly puffs more icy than usual, causing our fires to blaze at a time when our gardens will be trying to become paradises of lilac and hawthorn flower.

L. C. W. BONACINA.

*April 7th, 1911.*

THE following temperatures here for this week may interest you. The max. are entered to preceding day.

		Max.		Min.		Grass.		Rainfall.
		°		°		°		All of snow on 4th & 5th. In.
April	1	...	50·4	...	38·9	...	33·7	...
"	2	...	47·1	...	41·8	...	38·7	...
"	3	...	44·1	...	40·9	...	39·6	...
"	4	...	44·1	...	32·0	...	28·4	...
"	5	...	34·6	...	30·3	...	30·0	...
"	6	...	38·1	...	27·3	...	24·1	...
"	7	...	42·2	...	31·2	...	27·9	...
"	8	...	—	...	29·0	...	19·7	...

I have taken observations here for 26 years. This is the first April I have found any temperature in the screen fail to reach 43°·0 F.

I have not recorded any minimum temperature below  $28^{\circ}0$  F. in screen in any previous April. The sky was clear in the early morning of the 8th, with very cold, still air, and the grass thermometer fell to the unusual point  $19^{\circ}7$  F. The wind here during the week has been strong, but not up to gale force, as in many places, snow has fallen on five days, but only two days enough to measure.

JOHN DOVER.

*Totland Bay, Isle of Wight, 8th April, 1911.*

---

THE maximum temperature to-day (April 5th) in the screen (Kew certified thermometer) was  $34^{\circ}3$ . This will probably prove to be the lowest maximum ever recorded in the south of England for this day. The Greenwich tables from 1841 show that  $41^{\circ}4$  in 1864 has hitherto been the lowest maximum for April 5th. In fact, there is only one record of an April maximum below  $40^{\circ}$ , viz.,  $36^{\circ}3$  on April 19th, 1849, on which day a very heavy fall of snow took place in Kent and adjoining counties. The maximum yesterday (April 6th) was only  $36^{\circ}7$ .

H. K. G. ROGERS.

*"Glencart," Weybridge, 7th April, 1911.*

### ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, April 19th, at the Institution of Civil Engineers, Great George Street, Westminster, Dr. H. N. Dickson, President, in the chair.

Mr. W. Marriott read a paper on "Variations in the English Climate during the Thirty Years, 1881-1910." He stated that the Royal Meteorological Society in 1874 commenced the organisation of a series of "Second Order Stations," at which observations of pressure, temperature, humidity, rainfall and wind are made twice a day, viz., at 9 a.m. and 9 p.m. In addition to these, another class of stations, termed "Climatological," at which observations are made once a day, at 9 a.m., was organised in 1880. The monthly results from all these stations have been regularly published in the "Meteorological Record." The author has taken the general monthly means of all these results as representing the means for England and Wales, and these general means were depicted in the form of a series of diagrams, in which the variations of the various elements for each month were shown in red when above the average, and in blue when below the average for the 30 years, 1881-1910. The results were also exhibited to the meeting by means of lantern slides. The warmest months were August 1899, July 1900, and July 1901; while the coldest months were February 1895, January 1881, and December 1890. During the last 14 years the temperature in October was above the average with only one exception, viz., 1905. The years with the

highest mean temperature were 1898, 1893, and 1899, and the years with the lowest mean temperature were 1892, 1888, and 1887. The month with the highest mean pressure was February, 1891, and that with the lowest pressure was March, 1909. On the average April is the month with the least rainfall, and October the month with the heaviest rainfall; while June has the least number of days of rain. The wettest months during the 30 years were October, 1903, and October, 1891, and the driest months were February, 1891, and April, 1893. The years with the heaviest rainfall were 1903 and 1891, and the years with the least rainfall were 1887 and 1893. The wind diagrams showed that the prevailing winds were from the South-west and West, but that in April, May, and June, North-easterly winds were more pronounced than in the other months of the year.

Mr. W. W. Bryant said that it occurred to him to take a longer period, the 70 years of Greenwich observations, and investigate whether it would be possible to trace any secular change during it. He had come to the conclusion that it would be unjustifiable to draw any such deduction from the results.

Mr. W. H. Dines was surprised to see from the diagrams that recent years had been, on the whole, warm. The striking absence of any severe cold since February, 1895, was well known, and it seemed likely that there must soon be a return to average conditions in the winter, but he thought that there was ample evidence to show that the winter climate of Europe was slowly but surely becoming milder.


Colonel H. E. Rawson said that he was specially interested in the diagram giving the excess of S.W. winds over N.E., showing the correlation with the excessive rainfall in August. August was, as a rule, a wet month, and April dry, and when both were wet they generally determined the character of the rainfall for the year.

Mr. E. Gold said that September was a peculiar month, not only on the surface but also in the upper air, and no doubt the different effects were closely related to each other.

Captain W. F. Caborne, Mr. C. Harding, Mr. J. E. Clark, and the President also took part in the discussion, and Mr. Marriott replied.

Two papers by Captain C. H. Ley were, in his absence, read by the Secretary, viz., (1) "The Value of the Two-Theodolite Method for determining Vertical Air-Motion," and (2) "An Automatic Valve for Pilot Balloons."

The following gentlemen were elected Fellows of the Society:—Mr. G. R. Crompton, Mr. J. D. Fettes, Assoc.M.Inst.C.E., Mr. F. P. Khan, M.A., Assoc.M.Inst.C.E., Mr. P. S. Leggatt, and Mr. G. G. V. Millard.



## REVIEWS.

*What Will the Weather be?* The Amateur Forecaster's Vade Mecum.  
H. G. BUSK, F.R.Met.Soc. Cambridge: W. Heffer & Sons, Ltd.  
1911. Size  $7\frac{1}{2} \times 6$ . Pp. 28. Plates. Price 6d. net.

AN introduction by Mr. H. B. Stone explains Mr. Busk's purpose and methods. The purpose is stated thus:—

"The reader is supposed to be of average observation and should possess a reliable barometer (a self-recording instrument is recommended). If he observes whether this is rising or falling and knows the direction of the wind, by consulting the tables at the end of this volume he can foretell with reasonable accuracy the weather conditions for the ensuing twenty-four hours."

The weather is viewed as being either cyclonic or anti-cyclonic, and the conditions for a number of combinations of rising and falling barometer with wind from given directions is given in the Table, which forms the bulk of the pamphlet, with the associated weather conditions in winter and summer respectively. Other configurations of the isobars are not considered, nor is the case of a cyclone moving in any other than a generally easterly direction. No doubt the rules given will very often prove satisfactory, but the study of the daily weather maps should be recommended as a corrective.

---

*On the Bai-u, or Rainy Season in Japan*, by T. OKADA. Bulletin of the Central Meteorological Observatory of Japan. No. 5. Tokio, 1910. Size  $12 \times 9$ . Pp. 82. 9 Plates.

THIS memoir contains the results of the most recent research into the causes underlying the phenomena of the "Bai-u," or early summer rains of the Japanese archipelago and the adjacent mainland. The extension of the Imperial Japanese meteorological service to Korea and Eastern China provides essential information which has been until the last few years entirely wanting, and a methodical reduction of the whole of the available observations throws much light on a problem which has hitherto been but imperfectly explained. The features of the Bai-u season, which extends from mid-June to mid-July, are heavy rainfall, excessive cloudiness and humidity, and a very slight wind movement, the whole resulting in an extremely oppressive and unpleasant type of weather, but one nevertheless most beneficial from an agricultural point of view. The rainfall is heaviest in the southern islands, especially in Formosa, and falls off rapidly to the north, the distribution showing no apparent relation to the contour of the land or to the prevailing wind. The relative humidity and amount of cloud on the other hand are clearly dependent on the monsoon wind. The hypothesis put forward is that the rainfall at this season is the result of cyclonic disturbances of convectional origin due to the pronouncedly irregular heating of the moisture laden air. It is shown that the depressions develop most freely when

the barometric gradient is slight and the monsoon consequently fitful and wanting in strength. These conditions are coincident with the season at which the sun is vertical over the Valley of the Yangtse and Formosa, and in a less pronounced degree over Japan proper. The tabulated statistics of depressions give evidence of a strong tendency for cyclones to form in these neighbourhoods and to travel slowly over the archipelago. With the return of the Pacific anti-cyclonic centre from higher to lower latitudes, which occurs in the middle of July, the gradients become steeper, and the possibilities for irregular heating being diminished, the rains cease abruptly until, after a dry and hot interval, the season merges into the true monsoon maximum in the early autumn.

One of the most interesting chapters of the bulletin deals with the "Karatsuyu," or failure of the rains. The two most prominent failures of recent years were those of 1883 and 1893, years famous for memorable spring droughts in Europe. The incidence of the Karatsuyu shows a certain degree of correspondence with Wolfe's sun-spot periods, and this and other considerations lead the author to the reasonable conclusion that the dominating factors are certainly not of a local nature. This branch of the subject is, however, one which demands more exhaustive study, and we shall look forward with more than ordinary interest to any future developments of the enquiry in this direction.

C. S.

---

## METEOROLOGICAL NEWS AND NOTES.

THE TERM "ANTICYCLONE" has been the subject of an interesting correspondence in *The Times*. The name was said to be ugly and in many ways inappropriate, and Mr. Pearsall Smith suggested that an anticyclone should be called a *Halcyon* with reference to the fabled condition of weather at Christmas-tide, when the kingfisher or halcyon hatched out its brood floating on the sea. Other writers, some of them with a somewhat vague knowledge of the conditions to which the word "anticyclonic" is applied, suggested as alternatives (they certainly could not be called definitions) *calm*, *air-calm*, *wind-wyr*, *plenum*, and it was pointed out that on meteorological maps in this country and in descriptive writing in America the word *high* was already in familiar use. The result of the correspondence leaves us thankful that Sir Francis Galton hit on such a good word as *anticyclone*, which indeed would not have come into general use and survived for nearly half a century, had it not possessed merits counterbalancing its uncouthness, which is conspicuous only to those unfamiliar with the literature of meteorology.

ALL WIRELESS WEATHER TELEGRAMS from Atlantic steamers will, it is announced in the German papers, be transmitted henceforth, by agreement of the British and German governments, to the Meteorological Office, the *Deutsche Seewarte* at Hamburg, and the Central Meteorological Station at Aachen, for use in weather forecasts.



## RAINFALL TABLE FOR APRIL, 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	1·74	1·80
Tenterden.....	Kent.....	51 4	*0 41	190	1·77	1·89
Arundel (Patching).....	Sussex.....	50 51	0 27	130	1·82	1·84
Southampton (Cadland) ...	Hampshire.....	50 50	1 22	52	1·98	1·48
Oxford (Magdalen College)...	Oxfordshire.....	51 45	1 15	186	1·67	1·10
Wellingborough (Croyland Abbey).	Northampton....	52 18	0 41	174	1·78	·70
Shoeburyness.....	Essex.....	51 31	*0 48	13	1·25	1·25
Bury St. Edmunds (Westley)	Suffolk.....	52 15	*0 40	226	1·62	1·25
Geldeston [Beccles].....	Norfolk.....	52 27	*1 31	38	1·55	·81
Polapit Tamar [Launceston]	Devon.....	50 40	4 22	315	2·34	3·06
Rousdon [Lyme Regis].....	„.....	50 41	3 0	516	2·39	2·04
Stroud (Upfield).....	Gloucestershire..	51 44	2 13	226	2·09	·94
Church Stretton (Wolstaston)..	Shropshire.....	52 35	2 48	800	2·20	1·78
Coventry (Kingswood).....	Warwickshire ...	52 24	1 30	340	1·96	·83
Boston.....	Lincolnshire.....	52 58	0 1	25	1·57	·68
Workshop (Hodsock Priory).	Nottinghamshire	53 22	1 5	56	1·62	·63
Macclesfield.....	Cheshire.....	53 15	2 7	501	2·02	2·81
Southport (Hesketh Park)...	Lancashire.....	53 38	2 59	38	1·84	2·54
Wetherby (Ribston Hall) ...	Yorkshire, W.R.	53 59	1 24	130	1·85	1·19
Arncliffe Vicarage.....	„.....	54 8	2 6	732	3·73	4·63
Hull (Pearson Park).....	„ E.R.	53 45	0 20	6	1·69	1·40
Newcastle (Town Moor) ...	Northumberland	54 59	1 38	201	1·84	1·59
Borrowdale (Seathwaite) ...	Cumberland.....	54 30	3 10	423	6·91	12·65
Cardiff (Ely).....	Glamorgan.....	51 29	3 13	53	2·50	3·05
Haverfordwest.....	Pembroke.....	51 48	4 58	95	2·82	2·76
Aberystwyth (Gogerddan)...	Cardigan.....	52 26	4 1	83	2·48	2·30
Llandudno.....	Carnarvon.....	53 20	3 50	72	1·79	1·47
Cargen [Dumtries].....	Kirkcudbright...	55 2	3 37	80	2·50	4·61
Marchmont House.....	Berwick.....	55 44	2 24	498	2·28	1·74
Girvan (Pinnmore).....	Ayr.....	55 10	4 49	207	2·81	4·65
Glasgow (Queen's Park) ...	Renfrew.....	55 53	4 18	144	1·86	2·82
Inveraray (Newtown).....	Argyll.....	56 14	5 4	17	3·69	7·28
Mull (Quinish).....	„.....	56 34	6 13	35	2·98	4·56
Dundee (Eastern Necropolis)	Forfar.....	56 28	2 57	199	1·93	·78
Braemar.....	Aberdeen.....	57 0	3 24	1114	2·30	2·40
Aberdeen (Cranford).....	„.....	57 8	2 7	120	2·23	1·25
Cawdor.....	Nairn.....	57 31	3 57	250	1·62	1·69
Fort Augustus (S. Benedict's)	E. Inverness ...	57 9	4 41	68	2·22	3·01
Loch Torridon (Bendamph)	W. Ross.....	57 32	5 32	20	4·70	8·14
Dunrobin Castle.....	Sutherland.....	57 59	3 56	14	2·02	2·50
Wick.....	Caithness.....	58 26	3 6	77	1·89	1·76
Killarney (District Asylum)	Kerry.....	52 4	9 31	178	3·46	3·57
Waterford (Brook Lodge).....	Waterford.....	52 15	7 7	104	2·68	2·56
Nenagh (Castle Lough).....	Tipperary.....	52 54	8 24	120	2·54	2·38
Miltown Malbay.....	Clare.....	52 52	9 26	400	2·69	2·52
Gorey (Courtown House) ..	Wexford.....	52 40	6 13	80	2·37	2·23
Abbey Leix (Blandsfort)....	Queen's County..	52 56	7 17	532	2·54	3·14
Dublin (Fitz William Square)	Dublin.....	53 21	6 14	54	2·03	1·41
Mullingar (Belvedere).....	Westmeath.....	53 29	7 22	367	2·37	2·29
Ballinasloe.....	Galway.....	53 20	8 15	160	2·37	2·19
Crossmolina (Enniscoe).....	Mayo.....	54 4	9 18	74	3·13	3·71
Collooney (Markree Obsy.)...	Sligo.....	54 11	8 27	127	2·52	2·80
Seaforde.....	Down.....	54 19	5 50	180	2·76	2·44
Bushmills (Dundarave).....	Antrim.....	55 12	6 30	162	2·08	1·69
Omagh (Edenfel).....	Tyrone.....	54 36	7 18	280	2·50	2·66

RAINFALL TABLE FOR APRIL, 1911—*continued.*

RAINFALL OF MONTH ( <i>con.</i> )					RAINFALL FROM JAN. 1.				Mean Annual 1875-1909.	STATION.
Diff. from Av. in.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1875-1909. in.	1911. in.	Diff. from Aver. in.	% of Av.		
		in.	Date.							in.
+ .06	103	.57	1	11	6.93	6.39	— .54	92	25.11	Camden Square
+ .12	107	.71	1	13	7.76	7.03	— .73	91	27.64	Tenterden
+ .02	101	.56	1	12	8.53	7.03	— 1.50	82	30.48	Patching
— .50	75	.35	26	11	9.18	6.63	— 2.55	72	31.87	Cadland
— .57	66	.32	28	12	6.52	4.58	— 1.94	70	24.58	Oxford
— 1.08	39	.32	26	12	7.05	4.47	— 2.58	63	25.17	Croyland Abbey
— .00	100	.39	1	13	4.96	4.38	— .58	88	19.28	Shoeburyness
— .37	77	.28	28	10	6.62	6.37	— .25	96	25.40	Westley
— .74	52	.23	28	11	6.06	6.08	+ .02	100	23.73	Geldeston
+ .72	131	.66	1	13	11.62	8.59	— 3.03	74	38.27	Polapit Tamar
— .35	85	.51	29	12	10.13	7.64	— 2.49	75	33.54	Rousdon
— 1.15	45	.21	28	14	8.55	5.95	— 2.60	70	29.81	Stroud
— .42	81	.34	26	13	9.07	6.65	— 2.42	73	32.41	Wolstaston
— 1.13	42	.25	26	11	8.08	4.99	— 3.09	62	28.98	Coventry
— .89	43	.22	28	10	6.11	5.16	— .95	84	23.35	Boston
— .99	39	.16	28	13	6.66	3.43	— 3.23	52	24.46	Hodsock Priory
+ .79	139	.70	27	14	9.48	8.84	— .64	93	34.73	Macclesfield
+ .70	138	.62	29	11	8.57	7.35	— 1.22	86	32.70	Southport
— .66	64	.25	20	13	7.37	5.73	— 1.64	78	26.87	Ribston Hall
+ .90	124	.64	24	18	20.04	25.76	+ 5.72	128	61.49	Arneliffe
— .29	83	.27	28	16	7.01	6.26	— .75	89	26.42	Hull
— .25	86	.44	28	19	7.47	6.24	— 1.23	84	27.94	Newcastle
+ 5.74	182	2.16	25	17	41.94	50.54	+ 8.60	121	129.48	Seathwaite
+ .55	122	.83	20	12	12.11	11.91	— .20	98	42.28	Cardiff
— .06	98	.53	26	12	14.09	12.68	— 1.41	90	46.81	Haverfordwest
— .18	93	.50	25	14	12.52	10.93	— 1.59	87	45.46	Gogerddan
— .32	82	.39	19	12	8.54	5.85	— 2.69	68	30.36	Llandudno
+ 2.11	184	.71	25	16	13.35	13.42	+ .07	101	43.47	Cargen
— .54	76	.48	25	17	9.47	7.57	— 1.90	80	33.76	Marchmont
+ 1.84	165	.70	19	16	15.08	15.69	+ .61	104	49.77	Girvan
+ .96	152	.35	27	15	10.70	12.79	+ 2.09	120	35.97	Glasgow
+ 3.59	197	1.26	17	17	22.15	30.04	+ 7.89	136	68.67	Inveraray
+ 1.58	153	1.02	17	16	17.26	18.55	+ 1.29	107	56.57	Quinish
— 1.15	40	.20	24	13	7.91	3.64	— 4.27	46	28.64	Dundee
+ .10	104	...	...	...	10.64	9.64	— 1.00	91	34.93	Braemar
— .98	56	.24	25	16	9.60	6.03	— 3.57	63	32.73	Aberdeen
+ .07	104	.30	17	11	8.31	7.27	— 1.04	88	29.33	Cawdor
+ .79	136	.43	21	20	15.79	15.97	+ .18	101	44.53	Fort Augustus
+ 3.44	173	1.76	21	18	28.78	34.31	+ 5.53	119	83.61	Bendamp
+ .48	124	.39	16	15	9.99	9.52	— .47	95	31.90	Dunrobin Castle
— .13	93	.35	17	24	8.84	8.17	— .67	92	29.88	Wick
+ .11	103	.67	17	15	18.90	12.08	— 6.82	64	54.81	Killarney
— .12	96	.52	26	16	12.28	9.17	— 3.11	75	39.57	Waterford
— .16	94	.38	26	15	12.30	9.22	— 3.08	75	39.43	Castle Lough
— .17	94	.60	26	17	13.02	10.14	— 2.88	78	45.11	Miltown Malbay
— .14	94	.64	18	11	10.59	6.87	— 3.72	65	34.99	Courtown Ho.
+ .60	124	.55	18	17	10.83	9.52	— 1.31	88	35.92	Abbey Leix
— .62	69	.80	18	15	8.08	4.70	— 3.38	58	27.68	Dublin
— .08	97	.38	20	16	10.78	10.02	— .76	93	36.15	Mullingar
— .18	92	.50	20	15	10.88	10.10	— .78	93	36.64	Ballinasloe
+ .58	119	.55	21	17	17.04	13.63	— 3.41	80	52.87	Ennisco
+ .28	111	.42	27	14	12.92	11.41	— 1.51	88	42.71	Markree
— .32	88	.37	18	16	11.82	8.96	— 2.86	76	38.91	Seaford
— .39	81	.37	27	15	10.56	8.53	— 2.03	81	37.56	Dundarave
+ .16	106	.40	19	14	11.62	11.16	— .46	96	39.38	Omagh

## SUPPLEMENTARY RAINFALL, APRIL, 1911.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Warlingham, Redvers Road	2.37	XI.	Lligwy .....	2.94
„	Ramsgate .....	.97	„	Douglas .....	2.97
„	Hailsham .....	1.89	XII.	Stoneykirk, Ardwell House	2.87
„	Totland Bay, Aston House.	1.45	„	Dalry, The Old Garroch ...	6.11
„	Stockbridge, Ashley .....	1.82	„	Langholm, Drove Road.....	5.17
„	Grayshott .....	2.04	„	Beattock, Kinnelhead.....	6.70
„	Reading, Calcot Place.....	1.34	XIII.	St Mary's Loch, Cramilt Ldge	4.86
III.	Harrow Weald, Hill House.	1.70	„	North Berwick Reservoir ...	1.33
„	Pitsford, Sedgebrook .....	.86	„	Edinburgh, Royal Observty.	1.00
„	Somersham Vicarage.....	.78	XIV.	Maybole, Knockdon Farm..	3.85
„	Woburn, Milton Bryant.....	1.21	XV.	Campbeltown, Witchburn...	3.06
IV.	Colchester, Lexden .....	.85	„	Glenreadell Mains.....	3.90
„	Newport .....	.95	„	Holy Loch, Ardnadam.....	6.72
„	Rendlesham .....	1.28	„	Ballachulish House.....	8.79
„	Swaffham .....	.93	„	Islay, Fallabus .....	4.00
„	Blakeney .....	.84	XVI.	Dollar Academy .....	2.24
V.	Bishops Cannings .....	1.18	„	Balquhiddie, Stronvar .....	6.19
„	Winterbourne Steepleton ..	2.26	„	Coupar Angus .....	.80
„	Ashburton, Druid House ..	2.20	„	Glenlyon, Meggernie Castle.	5.69
„	Okehampton, Oaklands.....	3.37	„	Blair Atholl .....	2.42
„	Cullompton .....	2.41	„	Montrose, Sunnyside Asylum	1.50
„	Hartland Abbey .....	1.81	XVII.	Alford, Lynturk Manse ...	1.60
„	Lynmouth, Rock House ...	2.52	„	Fyvie Castle.....	1.34
„	Probus, Lamellyn .....	1.48	„	Keith Station .....	2.08
„	North Cadbury Rectory ..	2.27	XVIII.	Glenquoich, Loan .....	17.50
VI.	Clifton, Pembroke Road ...	2.03	„	Skye, Dunvegan .....	6.91
„	Ross, The Graig .....	.84	„	N. Uist, Lochmaddy .....	2.19
„	Shifnal, Hatton Grange.....	.75	„	Alvey Manse .....	1.91
„	Blockley, Upton Wold .....	.92	„	Loch Ness, Drumnadrochit.	2.15
„	Droitwich .....	.88	„	Glencarron Lodge .....	7.04
VII.	Market Overton.....	.94	XIX.	Invershin .....	2.53
„	Market Rasen .....	1.34	„	Loch Stack, Ardcullin.....	5.41
„	Bawtry, Hesley Hall.....	.61	„	Melvich.....	2.66
„	Derby, Midland Railway ...	1.38	XX.	Skibbereen Rectory.....	3.58
„	Buxton .....	3.51	„	Dunmanway, The Rectory..	5.03
VIII.	Nantwich, Dorfold Hall.....	.88	„	Cork .....	2.13
„	Chatburn, Middlewood .....	2.71	„	Mitchelstown Castle .....	3.10
„	Cartmel, Flookburgh .....	3.35	„	Darrynane Abbey .....	3.61
IX.	Langsett Moor, Up. Midhope	2.44	„	Glenam [Clonmel] .....	3.59
„	Scarborough, Scalby .....	.96	„	Newmarket-on-Fergus, Fenloe	2.17
„	Ingleby Greenhow .....	1.18	XXI.	Laragh, Glendalough .....	5.28
„	Mickleton .....	1.66	„	Balbriggan, Ardgillan.....	1.53
X.	Bardon Mill, Beltingham ...	...	„	Moynalty, Westland .....	2.94
„	Ilderton, Lilburn Cottage...	1.38	XXII.	Cong, The Glebe .....	2.65
„	Keswick, The Bank .....	4.46	„	Westport, St. Helens .....	2.99
XI.	Llanfrehfa Grange.....	3.73	„	Achill Island, Dugort .....	4.91
„	Treherbert, Tyn-y-waun ...	6.06	„	Mohill .....	2.30
„	Carmarthen, The Friary.....	3.07	XXIII.	Enniskillen, Portora .....	2.63
„	Castle Malgwyn [Llechryd].	2.97	„	Dartrey [Cootehill].....	3.45
„	Plynlimon .....	7.00	„	Warrenpoint, Manor House	2.50
„	New Radnor, Ednol .....	2.24	„	Banbridge, Milltown .....	1.75
„	Rhayader, Tyrmynydd .....	2.94	„	Belfast, Cane Hill Road.....	3.20
„	Lake Vyrnwy .....	3.25	„	Glenarm Castle.....	2.91
„	Llangyhanfal, Plâs Draw....	.58	„	Londonderry, Creggan. Res.	2.24
„	Dolgelly, Bryntirion .....	3.67	„	Killybegs .....	3.86
„	Bettws-y-Coed, Tyn-y-bryn	2.96	„	Horn Head ... ..	2.17

## METEOROLOGICAL NOTES ON APRIL, 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.—Unusual cold prevailed throughout the first ten days with frequent slight S falls. Beautiful dry, sunny weather followed, with an increase in temp., and there were 15 days' absolute drought from 10th to 24th. The duration of sunshine amounted to 164·0\* hours, with only two sunless days. Duration of R 35·1 hours. Evaporation 1·77 in. Shade max. 67°·5 on 22nd; min. 25°·5 on 6th, with two exceptions the lowest temp. recorded in April in 54 years. The shade max. on 5th was 38°·1, or 2°·9 below the previous lowest recorded in April, and that on 6th was 41°·0. F 5, f 10.

TENTERDEN.—Very cold at first but a fine Easter. The last six days were showery after a dry fortnight. Duration of sunshine 187·5† hours. Shade max. 63°·5 on 24th; min. 26°·0 on 6th. F 7, f 12.

TOTLAND BAY.—Duration of sunshine 176·8\* hours. Shade max. 56·8 on 26th; min. 27°·3 on 6th, the lowest on any April day in 26 years. F 5, f 10.

PITSFORD.—Mean temp. 46°·3. Shade max. 67°·6 on 22nd; min. 25°·4 on 12th. F 6.

NORTH CADBURY.—Temp. much below average, and wind and cloud well above normal. The chief feature of the month was the abnormal cold from 3rd to 7th. A freezing N.E. wind, almost a gale for 3 days, with driving S showers made this period quite the worst of the winter. Shade max. 65°·0 on 14th and 17th; min. 24°·5 on 8th. F 5, f 14†

ROSS.—Shade max. 60°·8 on 30th; min. 27°·0 on 12th.

HODSOCK PRIORY.—Shade max. 63°·8 on 15th; min. 27°·7 on 6th. F 6, f 14.

SOUTHPORT.—Duration of sunshine 147·9\* hours, and of R 45·8 hours. Mean temp. 45°·8. Shade max. 59°·6 on 21st; min. 28°·3 on 6th. F 4, f 13.

HULL.—Winterly with S at the beginning. Some fine periods after, but cold with high and squally winds at times; then dull and mild to the end. Shade max. 69°·0 on 21st; min. 29°·0 on 7th. F 5, f 10.

HAVERFORDWEST.—Dry, stormy and cold. Vegetation very backward. Duration of sunshine 168·5\* hours. Shade max. 61°·7 on 22nd.

LLANDUDNO.—Shade max. 59°·0 on 22nd; min. 33°·2 on 5th. F 0.

CARGEN.—The chief characteristics were the absence of sun and the continuance of strong winds. Sunshine nearly 100 hours below the average. Much damage done to expanding foliage, buds and fruit blossom. Shade max. 61°·3 on 13th; min. 26°·3 on 6th. F 3.

EDINBURGH.—Shade max. 60°·9 on 13th; min. 30°·6 on 3rd. F 4, f 8.

COUPAR ANGUS.—The fourth successive month with deficient R, and also the fourth in succession with high temp. There was an absence of severe frost and also of sunshine. Shade max. 65°·0 on 13th; min. 25°·0 on 8th.

FORT AUGUSTUS.—Shade max. 59°·5 on 11th; min. 24°·1 on 6th. F 3.

SKIBBEREEN.—Cold, dry and harsh, with E. winds in the first fortnight. Wet, with S.E. winds in the third week. Shade max. 57°·0 on 11th, 12th and 25th; min. 27°·0 on 10th. F 7.

DUBLIN.—The first twelve days were cold with steady N.E. winds and showers of S and H on 4th and 5th. Fresh to strong W. and S.W. winds prevailed from 17th. R fell heavily on 18th and in frequent showers subsequently to 28th. Mean temp. 48°·0. Shade max. 63°·5 on 22nd; min. 31°·8 on 4th. F 1, f 3.

MARKREE.—Dry with cold E. winds and severe night frosts from 2nd to 14th. The remainder was showery and mild and with but little sunshine. Shade max. 59°·2 on 22nd; min. 21°·5 on 6th. F 8, f 10.

WARRENPOINT.—Shade max. 61°·0 on 22nd and 23rd; min. 33°·0 on 4th. F 0, f 3.

\* Campbell-Stokes.

† Jordan.

## Climatological Table for the British Empire, November, 1910.

STATIONS  (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
								0-100			inches		
London, Camden Square	53·3	1	24·0	17	45·4	32·3	36·4	90	85·5	19·7	3·19	16	7·4
Malta ... ..	80·2	6	50·0	20	72·1	58·3	53·9	69	142·2	...	1·79	13	6·1
Lagos ... ..	90·0	18	71·0	5	87·3	74·4	74·3	73	155·0	72·2	1·86	3	...
Cape Town ... ..	91·8	14	47·1	7	71·9	54·5	52·6	68	...	...	1·47	8	4·4
Durban, Natal ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Johannesburg ... ..	79·0	16	41·4	5	71·1	50·7	48·1	68	151·1	41·1	·97	9	4·3
Mauritius ... ..	84·7	30	61·5	14	81·7	68·0	63·0	69	159·4	55·2	1·73	11	5·9
Calcutta... ..	86·0	14	52·1	30	82·3	63·0	62·5	71	...	46·6	·00	0	1·4
Bombay... ..	88·2	2	67·3	27	85·5	71·8	65·9	68	134·9	58·3	·14	2	1·8
Madras ... ..	89·7	13	62·5	27	83·1	71·3	69·3	81	143·4	59·6	15·78	11	4·8
Kodaikanal ... ..	70·3	29	44·6	19	61·1	49·9	49·2	83	137·5	33·1	11·41	22	6·4
Colombo, Ceylon ... ..	87·1	22	68·4	28	84·9	73·4	72·2	80	160·0	63·9	5·71	18	6·0
Hongkong ... ..	83·4	2	52·9	19	73·3	64·7	59·4	70	134·8	...	2·54	6	6·4
Melbourne ... ..	90·5	17	39·4	1	73·4	53·3	49·2	60	155·8	36·2	2·33	12	5·6
Adelaide ... ..	93·7	16	46·3	7	76·7	55·8	48·7	54	162·3	38·2	1·32	9	4·9
Coolgardie ... ..	101·2	14	45·0	5, 6	83·5	54·1	37·5	50	163·0	41·6	·58	3	2·6
Perth ... ..	96·6	25	45·0	6	74·4	55·1	42·3	64	160·9	35·5	·67	7	3·6
Sydney ... ..	86·4	24	49·9	3	73·4	58·1	50·2	54	150·0	39·0	·19	12	4·5
Wellington ... ..	76·0	22	42·2	17	64·8	53·0	51·3	76	125·0	34·0	3·91	9	5·1
Auckland ... ..	75·5	23	49·0	4, 17	67·7	55·9	55·7	81	147·0	45·0	3·71	14	6·9
Jamaica, Kingston ... ..	90·9	6	69·1	5	86·9	71·0	69·9	79	...	...	1·43	7	...
Grenada ... ..	86·0	5	71·0	30	83·8	74·6	72·1	79	141·0	...	9·44	26	4·5
Toronto ... ..	56·6	1	25·6	5	48·8	31·2	...	82	65·8	20·2	2·52	18	8·0
Fredericton ... ..	54·6	2	16·0	22	39·6	28·3	...	89	...	...	2·29	9	7·5
St. John, N.B. ... ..	51·5	2	25·5	21	42·0	33·2	...	...	...	...	2·04	9	7·2
Victoria, B.C. ... ..	54·8	1	33·3	26	48·2	39·8	...	89	...	...	7·71	20	8·0
Dawson ... ..	23·0	1	—25·0	29	7·3	—4·1	...	...	...	...	1·46	10	7·3

MALTA.—Mean temp. of air 63°·8. Average bright sunshine 5·4 hours per day.

Johannesburg.—Bright sunshine 256·2 hours.

Mauritius.—Mean temp. of air 1°·1, of dew point 1°·3, and R ·15 in., below averages. Mean hourly velocity of wind 12·4 miles, or 1·7 above average.

KODAIKANAL.—Bright sunshine 118 hours.

COLOMBO.—Mean temp. of air 76°·5, or 3°·2 below, of dew point 0°·1 below, and R 6·05 in. below, averages. Mean hourly velocity of wind 7·6 miles. TSS on 3 days.

HONGKONG.—Mean temp. of air 68°·7. Bright sunshine 156·4, or 33 hours below the average. Mean hourly velocity of wind 14·2 miles.

Melbourne.—Mean temp. of air 2°·1, and R ·12 in., above, averages.

Coolgardie.—Mean temp. of air 2°·0 below, and R ·01 in., above averages.

Perth.—Mean temp. of air 0°·6 below, and R ·04 in. above, averages.

Sydney.—Mean temp. of air 1°·1, and R 2·74 in., below averages.

Wellington.—Mean temp. of air 58°·9, or 2°·1 above the average. Bright sunshine 263·8 hours.

Auckland.—An average month. Mean temp. and Rainfall very near the mean for the past 44 years.

# JAMES J. HICKS

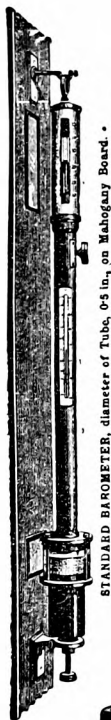
## Meteorological & Scientific Instruments

MANUFACTORY:—

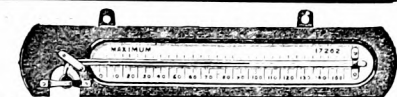
8, 9 & 10, HATTON GARDEN, LONDON, E.C.

Awarded Grand Prix Franco-British Exhibition, 1908; Nine Medals at the Paris Exhibition, 1900; London, 1862; Paris, 1867; London, 1885; Philadelphia, 1876.

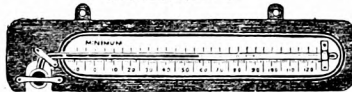
Standard "Fortin" Barometers.  
 Standard Mercurial Thermometers.  
 Standard Maximum Thermometers.  
 Standard Minimum Thermometers.  
 Standard Mason's Hygrometers.  
 Standard "Solar Maximum" Thermometers.  
 Standard Terrestrial Radiation Thermometers.  
 Standard "Earth Temperature" Thermometers.  
 Standard Symons's Rain Gauges.  
 Standard Meteorological Office Rain Gauges.  
 Standard Sunshine Recorders.  
 Improved Beckley Anemometers.  
 Improved Beckley Self-Recording Rain Gauge.  
 Self-Registering Aneroid Barometers.  
 Self-Registering Mercurial Barometers.  
 Meteorological Office Thermometer Screens.  
 Mountaineering Aneroid Barometers.  
 Aneroid Barometers.



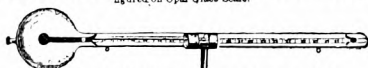
STANDARD BAROMETER, diameter of Tube, 0.5 in., on Mahogany Board.



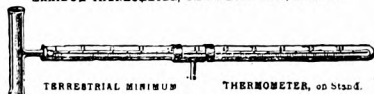
STANDARD MAXIMUM THERMOMETER, in Oak Frame, Tube divided on Stem, figured on Opal Glass Scale.



STANDARD MINIMUM THERMOMETER, in Oak Frame, Tube divided on Stem, figured on Opal Glass Scale.



MAXIMUM THERMOMETER, Black Bulb in Vacuum, on Stand.



TERRESTRIAL MINIMUM THERMOMETER, on Stand.

BECKLEY



RAIN GAUGE.



CAMPBELL-STOKES  
 SUNSHINE RECORDER,  
 With Curtis's Improvements,  
 as supplied to the Meteorological  
 Office for their Standard  
 Pattern, and fitted on  
 S.S. "Discovery,"  
 National Antarctic  
 Expedition, 1901.

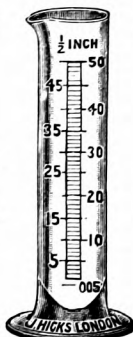
NEW OBSERVATORY CERTIFICATES SUPPLIED IF DESIRED.

## WILSON'S PATENT RADIO-INTEGRATOR.

### THE "CAMDEN" Pattern

RAIN

Price  
 2s. 6d.  
 Not  
 Verified

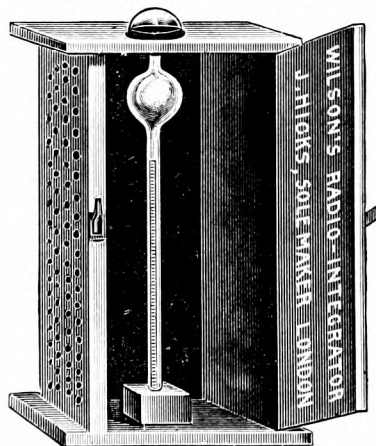


GLASS

Price  
 3s. 6d.  
 Verified.

Designed by  
 the late  
 DR. W. E.  
 WILSON, F.R.S.,  
 to record the  
 total amount of  
 Solar Radiation  
 daily received  
 by the ground.

Sole Maker—  
 J. J. HICKS.



Special Prices are given to Fellows of all Scientific Societies.

( v. )



# THE OBSERVATORY:

*A Monthly Review of Astronomy.*

EDITED BY

H. P. HOLLIS, B.A., F.R.A.S., AND T. LEWIS, F.R.A.S.

~~~~~

Contains full Reports of the Meetings of the Royal Astronomical and Royal Meteorological Societies, and of the British Astronomical Association; Articles by various eminent Astronomers, English, American and Continental; Correspondence on topics of interest connected with the Science; Notices of Observatories, Publications and current Discoveries. The "Oxford Note Book" is a special feature of the Magazine.

*The Observatory* was founded in 1877, and has become an established and very valuable publication.—*Prof. Young, in "Ten Years' progress in Astronomy."*

Annual Subscription (for the "Companion" and twelve Monthly Numbers), 13s.

*All communications should be addressed to the Editors of "The Observatory,"  
Royal Observatory, Greenwich, S.E.*

---

Cloth 8vo.    428 pages.    With Maps and Illustrations.

PRICE 10s.

## BRITISH RAINFALL, 1909.

THE FORTY-NINTH ANNUAL VOLUME.

COMPILED FROM THE RECORDS OF MORE THAN

4600 OBSERVERS

BY

HUGH ROBERT MILL.

---

LONDON: EDWARD STANFORD, 12, 13 & 14 LONG ACRE W C

( vi. )

# Royal Geographical Society's Publications.

## THE GEOGRAPHICAL JOURNAL.

Monthly. Illustrated. Edited by the Secretary. Price (to non-Fellows), 2s.

## HINTS TO TRAVELLERS.

Edited for the Council of the Royal Geographical Society by E. A. REEVES, F.R.G.S., F.R.A.S. Ninth Edition, revised and enlarged. In two volumes, illustrated. Price 15s. net. (To Fellows at the Office of the Society, 10s. net).

Vol. I.—Surveying and Practical Astronomy.

Vol. II.—Meteorology and Climate (by DR. H. R. MILL);  
Photography, Geology, Natural History, Anthro-  
pology, Industry and Commerce, Medical Hints, &c.

## THE DISTRIBUTION OF RAINFALL OVER THE LAND.

By DR. A. J. HERBERTSON. With monthly maps of Rain-  
fall. Price 5s. net. (To Fellows, 2s. 6d.)

## ON THE RESULTS OF A DEEP-SEA SOUNDING EXPEDITION,

In the North Atlantic in the summer of 1899, by R. E. PEAKE, M.Inst.C.E.; with notes on Temperature, Deep-Sea Deposits, &c., by SIR JOHN MURRAY, K.C.B., F.R.S. *Charts.* Price 5s. net. (To Fellows, 2s. 6d.)

## THE ANTARCTIC MANUAL,

For the use of the Expedition of 1901. Edited by GEORGE MURRAY, F.R.S., 1901. Pp. 586. *With a new chart of the Antarctic Regions.* Price, 15s. (To Fellows, 10s.)

~~~~~  
ROYAL GEOGRAPHICAL SOCIETY, 1, Savile Row, W.  
AND ALL BOOKSELLERS.

---

### RATES FOR ADVERTISEMENTS IN THIS MAGAZINE.

		One Insertion.		Six Insertions.		Twelve Insertions.	
WHOLE PAGE	...	30/-	...	26/-	...	22/6	} All Net.
HALF	...	16/6	...	14/6	...	12/6	
QUARTER	...	9/-	...	8/-	...	7/-	
EIGHTH	...	5/-	...	4/6	...	4/-	

*All applications for space to be made to*

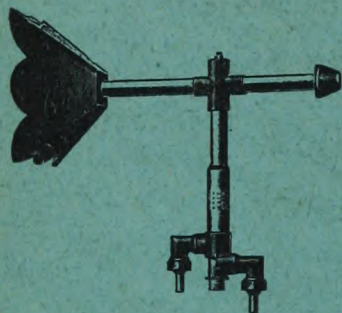
Mr. H. A. COLLINS, 27, ST. PETER'S ROAD, CROYDON.



# The ANEMO-BIAGRAPH.

(Wind Force Recorder.)

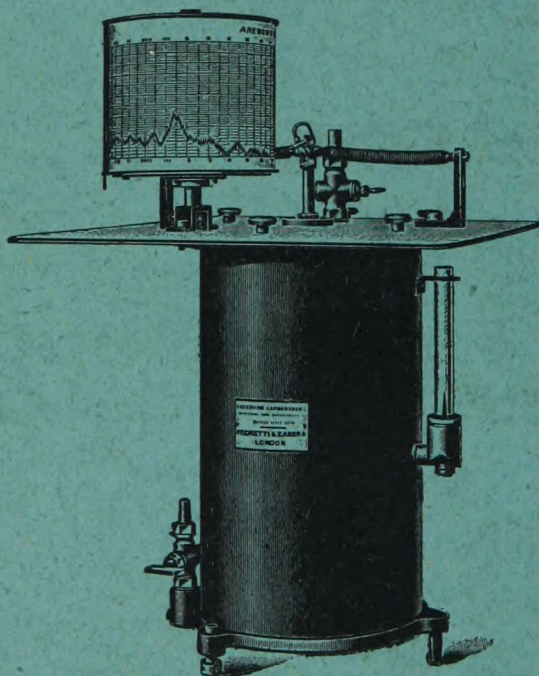
HALLIWELL-DINES PRINCIPLE.



PATENT

No. 21973,

1910.



Price £20 . 0 . 0.

FULL PARTICULARS POST FREE on application to the  
SOLE MAKERS :

**NEGRETTE & ZAMBRA,**  
*Scientific Instrument Makers,*  
**38, HOLBORN VIADUCT, E.C.**

Branches: 45, CORNHILL, E.C., and  
122, REGENT STREET, W., LONDON.

Telegraphic Address: "NEGRETTE, LONDON."

Telephone No. 583 HOLBORN.

SHIELD & SPRING, Lancelot Place, Brompton Road, S.W.

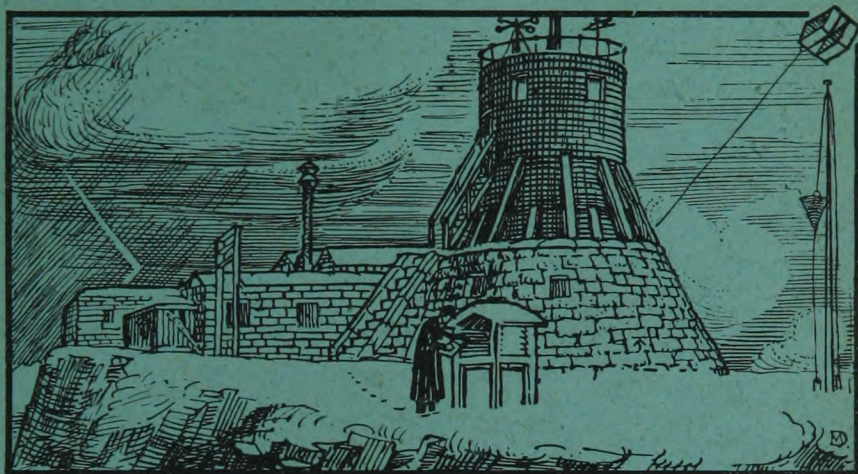


NO. 545 SYMONS'S VOL. 46

# METEOROLOGICAL

• MAGAZINE •

•••• EDITED BY HUGH ROBERT MILL ••••



JUNE, 1911.

## • CONTENTS •

	PAGE
Distribution of Rain in a Barometric Depression. By R. CORLESS, M.A. <i>(Illustrated)</i> ..	85
The Probable Rainfall in the North-East of England during the present Summer. By R. C. MOSSMAN, F.R.S.E. <i>(Illustrated)</i> ..	88
The Thunderstorms of May, 1911 .. .. .	89
Map of May Rainfall in the Thames Valley .. ! .. .	face p. 89
The Weather of May. By FRED. J. BRODIE .. .. .	90
Royal Meteorological Society .. .. .	92

### CORRESPONDENCE:—

The Great Thunderstorm of May 31st, 1911. By L. C. W. BONACINA and SPENCER C. RUSSELL .. .. .	95
Flood Rains in Buenos Aires. By R. C. MOSSMAN, F.R.S.E. ..	97
Review .. .. .	97
Balloon Ascents, September 30th, 1908. By W. H. DINES, F.R.S. ..	99
Rainfall Table for May, 1911 .. .. .	100
Supplementary Table of Rainfall, May, 1911, at 112 Stations ..	102
Meteorological Notes on May, 1911 .. .. .	103
Climatological Table for the British Empire, December, 1910 ..	104

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

Published on the 16th of each Month.]

[Price 4d., or 5s. per Annum, Post Free.



## NOTICES.

It is requested that all Books for Review and Communications for the Editor be addressed to 62, Camden Square, London, N.W.

The responsibility for all facts and opinions expressed in the signed articles and letters published in this Magazine rests with their respective authors.

# Knowledge

## A Monthly Record of Science in all its Branches.

Each number consists of at least forty large quarto pages of Articles and Notes, by Authorities in their respective subjects.

**Profusely Illustrated.**

### CONTENTS OF JUNE ISSUE

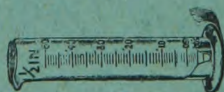
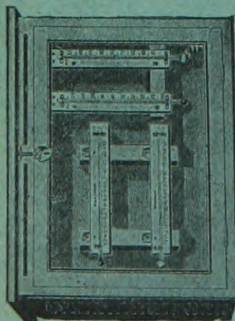
A Scientific Use for the Stereoscope.—Dises for Solar Projection.—The Austrian Research Vessel "Adria."—Science at the Coronation Exhibition.—Concerning Dimensions Generally, and the Effects of the Fourth Dimension in Particular.—William Herschel: His Telescopes and Work.—An Inexpensive Apparatus for the Systematic Separation of Sediments by Means of Heavy Solutions.—The Vinegar Industry.—The Brine Shrimp.—Postal Reform.—Solar Disturbances during April, 1911.—The Face of the Sky for the Month.—Notes (Astronomy; Botany; Chemistry; Geology; Meteorology; Ornithology; Photography; Physics; Zoology).—Microscopy.—Reviews of Books.—Correspondence.—Queries & Answers.—&c.

THROUGH ANY BOOKSELLER.

**MONTHLY—ONE SHILLING, net.**

Annual Subscription, **15/**, post free anywhere.

Offices: 42, BLOOMSBURY SQUARE, LONDON.



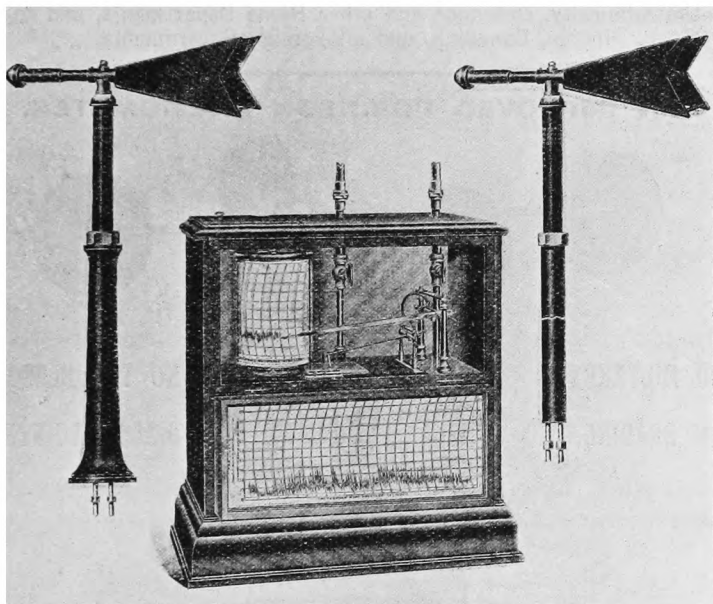
**DARTON'S  
"EDUCATIONAL"  
EQUIPMENT  
OF  
STANDARD  
INSTRUMENTS.**

*Prepared for Precision, Durability, Elegance & Economy.  
Comprising Improved Glass-fronted Screen, containing  
Max. and Min. Thermometers, and Hygrometer, Standard  
Barometer, Snowdon Rain Gauge with Camden Measure,  
and 12 Charts in frame with movable back, £7.  
Illustrated Catalogue post free.*

**F. DARTON & Co.,** 142, St. JOHN ST.,  
LONDON, E.C.

# THE "PEANDAR" SELF-RECORDING PRESSURE-TUBE ANEMOMETER

*(Registered Design No. 569,153).*



Is a great advance on the Cup Anemometer, inasmuch as it records upon a daily (24 hours') chart, not only the mean velocity for a period, but gives the actual pressure at any moment, in addition to the maximum pressures during gusts.

Velocities up to 100 miles, or 200 kilometres, per hour may be recorded on this apparatus.

Price (including two fifty-foot lengths of Conductor Piping and 400 Charts, Ink, and spare Pen) with Vane Shaft on cast iron pillar and flange for bolting on to a roof,

**£23 10 0**

**Carriage paid and safely delivered within U.K.**

DESCRIPTIVE CIRCULAR SENT ON APPLICATION.

SOLE MAKERS:

**PASTORELLI & RAPKIN, LTD.** (ESTAB. 1750.)

**46, HATTON GARDEN, LONDON, E.C.**

ACTUAL MAKERS of all kinds of METEOROLOGICAL INSTRUMENTS

Contractors to H.M. Government.

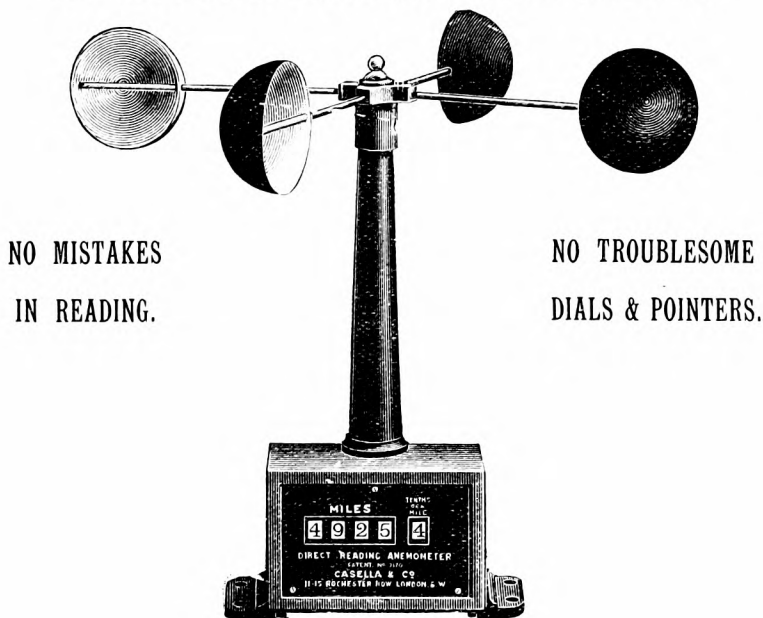
**STANDARD INSTRUMENTS OF ALL KINDS.**

↗ ILLUSTRATED PRICE LISTS POST FREE.



**C. F. CASELLA & Co., LTD.,**  
MAKERS OF  
**Meteorological, Surveying and Scientific Instruments**  
To the Admiralty, Ordnance and other Home Departments, and to the  
Indian, Canadian, and all Foreign Governments.

**AN IMPROVED ROBINSON ANEMOMETER.**



NO MISTAKES  
IN READING.

NO TROUBLESOME  
DIALS & POINTERS.

PATENT No. 7170 07

In CASELLA'S PATENT TOTALIZING ANEMOMETER the amount of wind is clearly indicated in black figures on a white ground.

The readings can be taken by an inexperienced observer as mistakes are impossible.

*For price and full particulars see our ANEMOMETER LIST,  
Post Free on application.*

**11-15 ROCHESTER ROW, VICTORIA STREET,  
LONDON, S.W.**

*Telegraphic Address: "ESCUTCHEON, LONDON." Telephone: WESTMINSTER 5599.*

# Symons's Meteorological Magazine.

---

No. 545.

JUNE, 1911.

VOL. XLVI.

---

## DISTRIBUTION OF RAIN IN A BAROMETRIC DEPRESSION.

By R. CORLESS, M.A.

IT has become one of the commonplaces of synoptic meteorology that the heaviest rain usually falls on the left-hand side of the path of the centre of a depression as one looks in the direction of motion of that centre. This appears to be true, in general, not only for depressions which move eastward or northward, but also for those that move towards the west or south. Dr. H. R. Mill's maps of the rainfall which was persistent in London for three days in June, 1903, are a good illustration of the rule.\* On that occasion the centre of a depression almost completely circumnavigated London in the counter-clockwise direction, so that the metropolis was always within the area of the depression to the left of its centre.

I think the following considerations may help us to understand a reason for the phenomenon.

For the sake of argument, we may consider a depression in which the wind is blowing tangentially to the isobars. Such an arrangement is possibly never met with at the surface, but the evidence of kite ascents goes to show that at a certain height, say 1,500 feet, the conditions are not dissimilar to those supposed. Let us therefore consider what happens at 1,500 feet above the surface.

The velocity of the wind ( $v$ ) may be found from the ordinary formula connecting wind and pressure gradient (see, *e.g.*, Meteorological Office publication, "Barometric gradient and wind force," where it is shown that there is usually very fair agreement between the actual wind at from 1,500 to 3,000 feet and the theoretical wind as computed from the distribution of pressure at sea-level). For our immediate purpose all that is required is that when the path of the air is straight, the relation

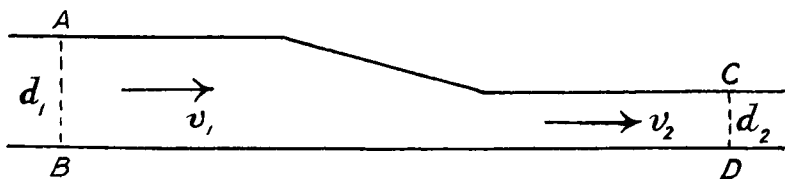
$$vd = \text{constant}$$

holds good between the wind velocity and  $d$ , the distance between consecutive isobars. When the path is curved cyclonically the value of  $v$  as determined from this equation is theoretically too large,

---

\* See this Magazine, Vol. 39 (1904), pp. 161-165, for the first statement of the generalization and for the maps referred to.—ED. S.M.M.

and the error increases with increasing curvature of the path. Now, we are assuming that at any instant the air moves tangentially to the isobars, so that at any given moment we may suppose that the surface isobars are the sections of a series of impermeable vertical partitions in the air, cut off by a horizontal plane at the 1,500 feet level, and that the air at that level is instantaneously moving in the channels thus formed. Looked at in this way, an interesting point arises. For the equation,  $vd = \text{constant}$ , is also exactly the condition that air should move horizontally along the channels without rising or sinking. This may be seen by considering a simple case.



Imagine that water is flowing steadily along a channel, of which the figure is a plan. At AB the cross-section  $d_1$  of the channel is double that ( $d_2$ ) at CD. It is evident that so long as the surface of the water remains horizontal (*i.e.*, so long as the motion is all in horizontal planes) the velocity ( $v_1$ ) at AB is half that ( $v_2$ ) at CD.

Thus,  $d_1 = 2d_2$  and  $v_1 = \frac{1}{2}v_2$ , hence  $v_1d_1 = v_2d_2$

and similarly, in general,  $vd$  is constant at all parts of the channel. The argument is similar in the case of air flowing horizontally. Thus (1) so long as the paths or trajectories of air are straight, we expect to find that the air moves entirely in horizontal planes.

Now, suppose that air which was originally moving in a straight trajectory is deflected cyclonically. We have already stated that the theoretical value of the wind in such a region is less than the value given by  $vd = \text{constant}$ . Returning to our water analogue, this means that at a part of the channel where it is curved the water does not move as rapidly as the water in the straight portion behind would like it; the result is that it tends to become piled up in the curved portion, and gravity only would prevent it from accumulating there. On the air, however, the effect of gravity is relatively feeble, and the superfluous air finds an easy escape. It cannot move sideways, and it is clear that it cannot move downwards over a large region; consequently it has no alternative but to rise. Thus (2) whenever the curvature of the trajectory of air increases, part of the air will rise. An upward current of air is admittedly the only way in which any appreciable amount of rain can be formed.

It remains to see that the conditions of (1) more nearly occur on the right, while those of (2) occur on the left of the path of the centre of a depression, no matter in what direction the depression is travelling. Although we likened the isobars to vertical partitions in the air, it is very important to remember that the partitions were

required only for an instant of time, and indeed it would be misleading to suppose that the motion of the air taking part in a cyclone is represented by causing it continually to flow between fixed vertical partitions erected upon the isobars. This matter is very fully dealt with by Shaw and Lempfert in "The Life History of Surface Air Currents," where it is shown that surface air may move over long distances in nearly straight lines (*i.e.*, great circles), in spite of the fact that the air may be continuously within the area of the closed isobars of a depression.

It may not be without interest to give a simple illustration of this effect. Suppose that the centre of a depression is moving from west to east at a rate of 20 miles an hour, and that a particle of air initially due south of the centre is also moving at 20 miles an hour. If the motion is along the isobars the particle will also be moving initially from west to east. At the end of an hour the particle would have moved a little north of east if the centre of the depression was at rest, but as the centre is actually moving at the same speed as the particle it is evident that the direction of the line joining the particle to the centre always remains due north and south, and therefore that the particle continues to move due east in a straight line parallel to the path of the centre, and at the same speed as the centre. In this case the curvature of the trajectory entirely disappears.

In a similar way it is easy to see that the curvature of the path of every particle, which would be that of its isobar if the depression was at rest, is always less than that of the isobar on the south side of the depression, and greater than that of the isobar on the north side of the depression, whenever the depression is moving eastward. It is also clear, on the other hand, that the greater curvature will be on the south side and the less on the north if the depression is moving in the opposite direction, from east to west; and, in general, that the less curvature is on the right of the path, and the greater curvature on the left, no matter in what direction the centre is moving. The diagrams of trajectories in "The Life History of Surface Air Currents" bring out this fact very clearly, and Gold, in "Barometric Gradient and Wind Force," gives a note showing how to compute the curvature of the trajectory in any given case.

We have seen reason to suppose that ascending air in a depression takes place at a point where the curvature of a trajectory is increasing, and we have also seen that the maximum curvature is on the left-hand side of the path of the centre. Accordingly, the front quadrant of the depression situated on the left side of the path is the region where we expect to find air ascending in appreciable amount, and this is the region where heavy falls of rain actually occur.

Of course, rain falls in many other parts of a depression, but the origin of such precipitation may be quite different from that here suggested, and would not affect the general argument outlined above.

## THE PROBABLE RAINFALL IN THE NORTH-EAST OF ENGLAND DURING THE PRESENT SUMMER.

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

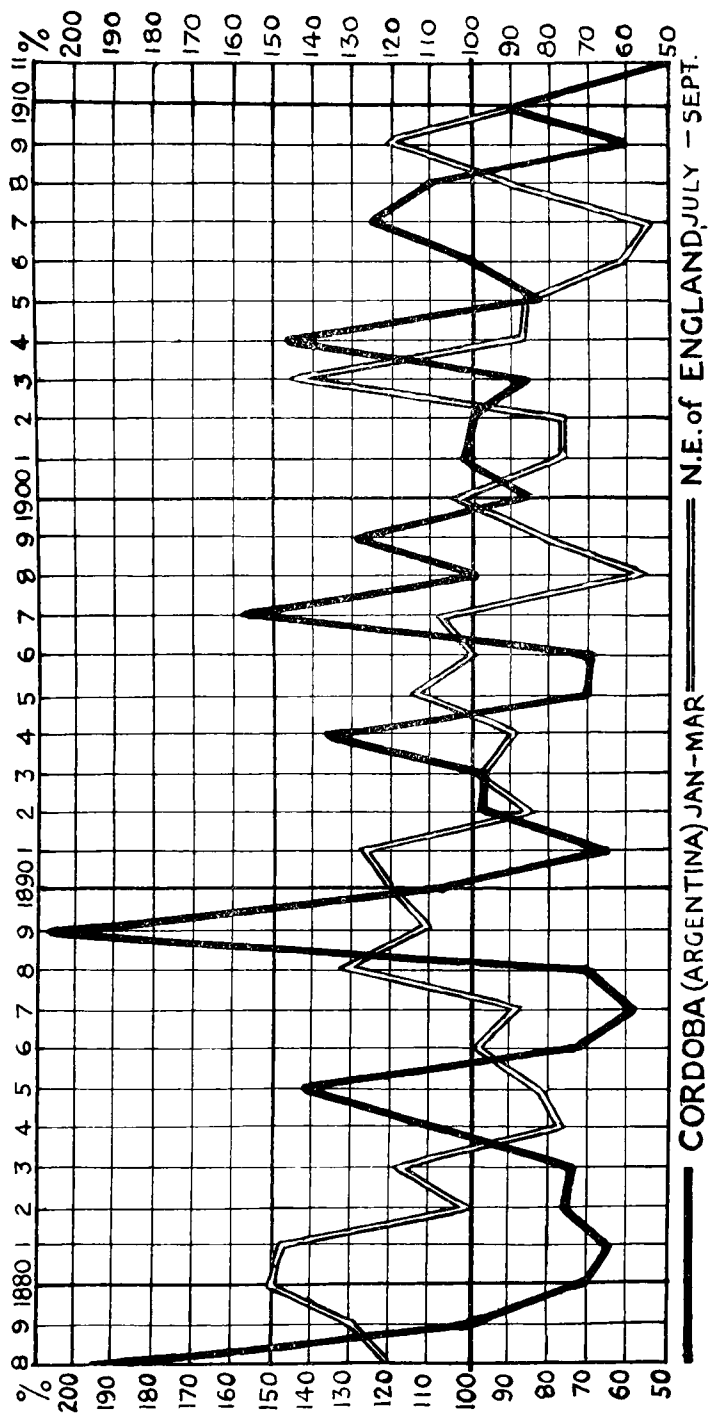
ON comparing the aggregate rainfall at Cordoba, Argentine Republic, for the first quarter of the year since 1878, with that over the north-west of England for the succeeding third quarter of the year, it is seen that the values are in general the reverse of each other, that is that when the rainfall during the first quarter of the year at Cordoba is in excess of the normal, then the rainfall of the third quarter of the year is in defect over the north-east of England, and *vice versa*. The following are the values expressed in inches, these being given in the diagram as percentages above or below the normal for the 33 years, 1878-1910.

	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
	in.	in.	in.	in.	in.	in.	in.	in.	in.
Cordoba .....	23.0	11.9	8.4	7.6	8.9	8.7	13.0	16.9	8.7
(Jan.—March.)									
N.E. England .....	8.4	9.0	10.5	10.3	6.9	8.3	5.3	5.7	6.8
(July—Sept.)									
	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.
	in.	in.	in.	in.	in.	in.	in.	in.	in.
Cordoba .....	6.7	8.3	24.4	12.6	7.7	11.4	11.3	16.1	8.2
N.E. England .....	6.1	9.2	7.7	8.3	8.8	6.6	6.8	6.2	7.9
	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.
	in.	in.	in.	in.	in.	in.	in.	in.	in.
Cordoba .....	8.0	19.0	11.1	15.2	10.0	11.9	11.7	10.0	17.3
N.E. England .....	6.9	7.4	3.8	5.6	7.3	5.4	5.4	10.1	6.1
	1905.	1906.	1907.	1908.	1909.	1910.	1911.		
	in.	in.	in.	in.	in.	in.	in.		
Cordoba .....	9.7	11.9	14.6	12.8	6.9	10.4	5.5		
N.E. England .....	5.8	4.4	3.8	6.2	8.3	6.3	—		

During the first quarter of this year the rainfall from January to March at Cordoba was only 5.5 inches against an average of 11.9 inches, being thus only 46 per cent. of the normal. On ten occasions since 1878 the rainfall at Cordoba for the first quarter of the year has fallen 25 or more per cent under the average. In these years the average rainfall over the north-east of England in the third quarter of the year was 19 per cent. above the normal. There was one failure, viz., in 1887, when the rainfall of Cordoba was 43 per cent. in defect, and in the north-east of England 13 per cent. in defect. In 1882, 1886 and 1896, dry weather prevailed at Cordoba, but in the specific district of England under discussion rainfall was normal. On the other hand, 1880, 1881, 1883, 1891, 1895, and 1909 show pronounced opposition in the rainfall curves at the two places, thus in the ten years which were characterised by deficient

Data for Cordoba till 1898 have been obtained from "Anales de la Oficina Meteorologica Argentina," Tomo XIII., p. 504, and from MS. after 1898. The values for England, N.E., from Vol. 32 of the "Weekly Weather Report of the Meteorological Office," Appendix 1.

# PERCENTAGE OF THE AVERAGE RAINFALL 1878-1910. AT CORDOBA (ARGENTINA) JAN-MAR & FOR N.E. ENGLAND JULY-SEPT.





THAMES VALLEY RAINFALL — MAY, 1911.



Symons's Meteorological Magazine.

Watershed of River Thames above Taddington, and River Lee above Felldes Weir.

Rainfall Stations reporting  
Isohyetals.

ALTITUDE  
SCALE

SCALE OF MILES



rainfall at Cordoba during the first three months, six of the succeeding summers (July—September) were wet in the north-east of England, three had a rainfall very slightly under the average, and one was dry. On the whole, therefore, there is a distinct suggestion that the coming summer will have a rainfall in excess of the normal over the north-east of England.

~~~~~

### THE THUNDERSTORMS OF MAY, 1911.

THANKS in no small measure to the admirable organization of the rainfall work of the Croydon Natural History Society in the hands of Mr. F. Campbell Bayard, we have been enabled only a few days subsequent to the event to study in considerable detail the distribution of rainfall in the thunderstorms which occurred in the home counties on May 31st, and which, no doubt on account of the coincidence with the time and place of the gathering together of the Derby-day crowds, received possibly an undue share of attention in the press. We have no great amount of information respecting the time of the storms, but there seems little doubt that these took place at a much earlier hour to the north of London than in the town itself and in Surrey, where the time is stated to have been generally between 5 and 8 p.m. A map of the rainfall of May 31st shows that on that day rain of any importance was confined to a comparatively narrow belt of country stretching from Hitchin on the north to Reigate and Tonbridge on the south. Within this there were two strips of comparatively heavy rain; a continuous strip on the western side from Reigate to Hitchin with more than 50 in., and a string of detached splashes running parallel to it on the eastern side from Tonbridge to Enfield. In the western strip 1·00 in. or more fell in five almost equidistant splashes, the most northerly of which appears to have been near Hitchin, and the most southerly between Dorking and Reigate. The heaviest rainfall, so far as we can ascertain, took place over the North Downs, culminating at Banstead, where two stations show records of 3·59 in. and 3·54 in. respectively. At Epsom 2·86 in. fell between 5.20 and 8 p.m., of which 2·44 in. fell from 5.20 to 6.10 p.m. At Chipstead 3·00 in., and at Blechingly 2·97 in. were also measured. In the eastern line of heavy rainfall splashes no such great amounts were reported, the maximum being 1·60 in., which fell between 6.30 and 7.30 p.m. at Sevenoaks.

Apart from the excessive rainfall over Banstead Downs, the most unusual feature of the storm of May 31st seems to have been the long continuance and intensity of the electrical discharges and the large number of casualties resulting from lightning. Want of space renders it impossible to give details of these, but it is interesting to observe that accidents were, on the whole, more numerous where the rainfall was slight, a result possibly of the relief to electrical tension brought about by the rain itself.

Little less remarkable from the point of view of rainfall were the storms of May 25th and 26th. For purposes of mapping, the falls of the two days were taken together, and it was found that a broad band, over which more than 1·00 in. fell, running from north to south across the middle Thames Valley, constituted the main feature. A smaller and, probably, detached splash lay between Basingstoke and Winchester. The most remarkable storm lay at the extreme south of these larger splashes, being localized at Fareham, where, at Roche Court, 1·09 in. fell on the 25th and 2·92 in. on the 26th, the latter fall taking place entirely between 3 and 5 p.m., whilst at The Mount the falls were ·79 in. and 3·13 in. ; on the 26th 3·00 in. fell in one hour from 2.45 to 3.45 p.m. Great damage to roads and fields resulted. At Rochford, Worcestershire, 3·06 in. fell on the 26th, whilst not more than ten miles away, at Bewdley, only a tenth of an inch was measured.

The rainfall distribution during May in the south of England was entirely dominated by the precipitation of these three days, though other thunderstorms of a less violent nature took place round the 11th, and considerable rain fell in some places on the 30th also.

The foregoing map of the rainfall of the Thames Valley for May shows two bands running north and south with more than 2 inches of rain ; the western due to the storms of the 25th and 26th, the eastern to that of the 31st.

From the north Midlands complaints continue to come of the great shortage of rainfall during the present year. At Wakefield the total fall from January 1st to May 31st amounted to 3·94 in., or little more than fell in a couple of hours at some spots on May 31st.

---

## THE WEATHER OF MAY.

By FRED. J. BRODIE.

OWING to frequent changes in the type of pressure distribution, the weather of May could seldom be regarded as altogether settled. Many fine spells were, however, experienced, and as the thermometer was, as a rule, above its average level, the month presented itself in a more favourable guise than in many recent years.

During the first few days, when a rather deep cyclonic disturbance moved slowly eastwards from Iceland, the weather in this country was influenced by "V-shaped" depressions passing also from west to east, and causing frequent falls of rain in most districts. Temperature was below the normal, and early on the 1st and 2nd frost occurred rather extensively, the sheltered thermometer falling slightly below 32° at several places in the west and north. On the grass the frost was more general, and locally rather severe, the minimum readings being as low as 23° at Crathes, 24° at Burnley, 25° at Balmoral and 26° at Durham and Colmonell. Between the 5th and 8th, when an anticyclone came in from the Atlantic and joined

another high pressure system previously existing over northern Europe, the weather improved and the thermometer rose to about its average level. Night frosts were, however, experienced between the 7th and 9th, the grass minima being as low as  $27^{\circ}$  at Kew and Rauceby, and  $28^{\circ}$  at Greenwich, Wisley and Tunbridge Wells. After the 9th the anticyclone gradually withdrew to the northward, and for the next three or four days the conditions were influenced by a large and rather complex area of low pressure which spread up from France and Spain. Thunderstorms commenced in the south-west of England on the 10th and afterwards extended over a large portion of the kingdom, the accompanying rainfall being, in many places, very heavy. Temperature, however, continued to rise, and between the 10th and 13th maximum readings of  $70^{\circ}$ , and upwards, were recorded very generally, the thermometer touching  $75^{\circ}$  at Tottenham, Margate, and Fort William,  $76^{\circ}$  at Greenwich and in the west of Scotland (at P'oltalloch and Colmonell), and, on the 10th,  $79^{\circ}$  at Camden Square. About the middle of the month the pressure distribution was rather variable, and the weather mostly fair, with, however, a good deal of fog and mist round the coasts.

The cold snap which is so often experienced about the second week in May had hitherto been conspicuous by its absence. In a mitigated form it put in a belated appearance between the 18th and 21st of the month, when a brisk wind swept down from the northward, and caused a decided fall of temperature in all parts of the country. At many places in the east and south-east of England the maximum readings of the 18th—20th were scarcely above  $50^{\circ}$ , and at Lowestoft, on the 18th, the thermometer did not exceed  $49^{\circ}$ . Ground frost occurred very generally on the nights of the 19th to 21st, the grass minima being as low as  $24^{\circ}$  at Llangammarch Wells,  $25^{\circ}$  at Greenwich and at Crathes, and  $26^{\circ}$  at Balmoral and Burnley.

For the remainder of the month the type of weather was mainly anticyclonic and the general conditions fair, warm, and very dry. A rather important break occurred, however, on the 26th and 27th, when an area of low pressure spread northwards from France and occasioned thunderstorms in many districts, with exceedingly heavy falls of rain in some parts of central and southern England. The temperature of the last ten days was almost continuously above the average, and between the 28th and 31st the thermometer touched  $80^{\circ}$  in many scattered parts of Great Britain, a reading of  $83^{\circ}$  being recorded on the 29th at Balmoral and Fort William, and a reading of  $82^{\circ}$  at Greenwich and Camden Square on the 31st. Thunderstorms occurred on the last day in several parts of England.

The mean temperature of the month was above the average; in parts of Scotland and Ireland it was, in fact, the highest recorded in May since 1896, while in London and some other portions of inland England it was higher than in any May of the previous 40 years. The total duration of bright sunshine was nearly everywhere in excess of the normal, but, as a rule, the excess was not large.

## ROYAL METEOROLOGICAL SOCIETY.

THE first of the afternoon meetings for the present session was held in the Society's rooms, 70, Victoria Street, Westminster, on Wednesday, May 17th, Dr. H. N. Dickson, President, being in the Chair.

Dr. H. R. Mill and Mr. C. Salter read a joint paper on "The Frequency and Grouping of Wet Days in London." The purpose of this paper was to place on record certain facts derived from the long rainfall record of 52 years, kept at Camden Square, bearing on a recent scheme for insurance against rain risks. Certain aspects of this insurance scheme were dealt with in *Symons's Meteorological Magazine* for April (p. 41-45), and nothing has since arisen to alter the opinion there expressed as to the crudity of the scheme under consideration. In this paper only days with a rainfall exceeding .20 in. (which the authors called, for the purpose of this paper only, a "wet day") are dealt with, and the discussion is strictly applicable to London only.

The average number of days with more than .20 in. of rain is 40 per annum, the average number of "rain days" being 163, so that practically there is in every four "rain days" one "wet day," under the above definition. The smallest number of "wet days" was 27 in 1864 and 1898, and the largest, 58, in 1879. A table was also included which stated the number of instances on which each day of the year had been a "wet day" in the 52 years. One day only, February 18th, never had a fall reaching the limit of .21 in. On July 27th and October 27th, however, such falls had occurred 13 times, and during the fortnight ending either on October 29th, 30th, or 31st, or November 7th, the number of occasions averaged 8.5 per day. After giving a detailed account of the distribution of the 2,083 "wet days" which occurred in the 52 years, 1859-1910, the authors examined the number of instances in which an insurance under one or two of the forms of policy offered would have resulted in a claim had a person in London insured every day for the week commencing with that day during the whole period of 52 years. The actual compensation yielded by each £1 of premium during each 7-day period would have been as follows:—

| Policy. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug.  | Sept. | Oct.  | Nov. | Dec. | Year. |
|---------|------|------|------|------|------|-------|-------|-------|-------|-------|------|------|-------|
| A ...   | 8/8  | 6/5  | 6/10 | 4/1  | 4/9  | 11/3  | 10/7  | 11/1  | 10/1  | 18/10 | 15/9 | 11/1 | 10/-  |
| B ...   | 9/1  | 8/6  | 7/10 | 7/7  | 9/1  | 11/3  | 11/4  | 10/10 | 10/-  | 13/10 | 12/8 | 10/9 | 10/3  |

Col. H. E. Rawson thought that no one would take out a policy in February. In the month of February they had their anticyclonic system arriving from Scandinavia, and bringing high pressure and no rain. The anticyclone belonging to Siberia moved westward in that month, and from 10 years' analyses of daily charts he had found that that particular system reached them as a mean on February 25th, when they had a coalescence of the Azores and Scandinavian systems.



Mr. F. J. Brodie thought that it would be almost impossible to discuss the question of rain insurance properly until they had received a large number of records from self-recording rain gauges which showed not only how much rain fell, but, more important still, when it fell, and how.

Mr. E. Gold took exception to the term "wet day," as used by Dr. Mill in the paper. He suggested that days with  $\cdot 20$  in. of rain or more might be called "X" days, being days on which rainfall exceeded the limit fixed by the *Excess* Insurance Company.

Mr. R. H. Hooker, Mr. W. W. Bryant, Mr. R. Strachan and Mr. J. Hopkinson took part in the discussion.

Dr. Mill, in reply, said that he agreed generally with all the speakers, but he did not think there was any great harm in using the term "wet day" in a temporary way as a contraction for "day with more than  $\cdot 20$  in. of rain falling in the 24 hours commencing at 9 a.m."

Mr. E. Mawley read his "Report on the Phenological Observations for 1910." The most noteworthy features of the Phenological year ending November, 1910, as affecting vegetation, were the continuous and heavy rainfall in February, a sudden change from cold to warm weather in the middle of May, the great dryness of September, and the heavy rains and low night temperatures in November. During the greater part of the year wild plants came into blossom behind their usual time, the departures from the average being greatest at the end of April and the beginning of May. Such early spring migrants as the swallow, cuckoo and nightingale made their appearance at about their usual dates. The only deficient farm crops were wheat, barley and peas. On the other hand, the yield of oats, beans, potatoes, turnips, mangolds and hay were above the average, and more especially beans, turnips and hay. The crop of apples, pears and plums was much under average, while all the small fruits, except strawberries which yielded well, were also rather under average.

As this was the last Report which Mr. Mawley would present on the Phenological Observations, an exceedingly cordial vote of thanks was accorded to him for having carried on the work during the past 20 years, and those present expressed their admiration of the way in which Mr. Mawley had devoted himself to this long labour of love.

The following gentlemen were elected Fellows of the Society:—Prof. S. C. Carrington, Mr. W. J. Carter, Capt. C. Eddie, Mr. K. S. A. Khan, Mr. S. D. Shroff, Mr. T. C. Soni, and Mr. A. F. Tredcroft, Assoc. M. Inst. C. E.

The biennial Dinner of the Society was held on Wednesday evening, May 17th, at the Trocadero Restaurant, Piccadilly Circus. The Fellows and their friends were received by the President (Dr. H. N. Dickson) before the Dinner.

The following is a list of those who were present (the names of the guests of the Society being printed in small capitals):—Mr. F. C. Bayard, Capt. A. E. Bell, Rev. H. A. Boys, Col. C. K. Brooke, Mr



A. H. Brown, Mr. W. W. Bryant, Commander W. F. Caborne, C.B., Mr. J. E. Clark, Mr. E. L. S. Cocks (Mayor of the City of Westminster), Mr. R. Corless, Mr. G. L. Courthope, M.P., Mr. J. A. Curtis, Mr. F. A. Darton, Mr. Du B. Davidson, Mr. F. Druce, Mr. F. W. Dyson, F.R.S. (Astronomer Royal), Mr. T. L. K. Edge, Mr. F. B. Edmonds, Mr. M. L. Evans, Mr. E. J. Garwood, Sir A. GEIKIE, K.C.B. (President of the Royal Society), Mr. E. Gold, Mr. P. H. Hepburn, Mr. N. Holden, Mr. T. F. Husband, Mr. R. Inwards, Mr. B. Latham, Mr. W. Marriott, Mr. W. J. Marriott, Mr. J. McEwan, Mr. T. McRow (Secretary of the Royal Agricultural Society), Mr. H. Mellish, Mr. G. H. Menhinnick, Dr. H. R. Mill (Director of the British Rainfall Organization), Mr. R. W. Munro, Mr. B. G. Pahlajaney, Prof. C. W. Peake, Mr. G. R. Pember, Major C. Peters, Dr. A. Philpot, Col. H. E. Rawson, C.B., Hon. K. Russell, Mr. S. C. Russell, Mr. C. Salter, Dr. R. H. Scott, F.R.S., Mr. W. Sedgwick, Dr. W. N. Shaw, F.R.S. (Director of the Meteorological Office), Mr. A. SIEMENS (President of the Institution of Civil Engineers), Capt. A. Simpson, Mr. J. A. G. Simpson, Mr. W. F. V. Simpson, Prof. H. J. Spooner, Mr. E. WHITE (Chairman of the London County Council), and the Rev. F. Wood.

After the usual loyal toasts had been proposed by the President, Dr. H. R. Mill proposed "The Houses of Parliament." Mr. G. L. Courthope, M.P., in responding, said that the Royal Meteorological Society and its work had benefitted agriculture in this country. He hoped that some one would make a study of the dry autumns in relation to sugar beet, and so confer a further benefit upon the agricultural community.

Sir Archibald Geikie in proposing "The Royal Meteorological Society," said that among the institutions in this country which have advanced the progress of meteorology, the Royal Meteorological Society deserves special recognition. Though only some 60 years old it has an excellent record of work done. Its numerous observing stations, its researches with kites and balloons, and its lectures for the purpose of making the principles and applications of the science more widely known, show a large amount of well-directed scientific energy.

The President, in responding, said that the interest which agricultural students take in the subject of meteorology had led him to re-examine some of the meteorological beliefs which one has usually taken for granted, and he thought that there were unlimited opportunities for the extension and opening up of new fields of work in this way.

Dr. W. N. Shaw proposed the toast of "Kindred Institutions," with which he coupled the name of Mr. Alexander Siemens, the President of the Institution of Civil Engineers, whose hospitality to the Society was highly appreciated by all present.

Mr. A. Siemens, in reply, said that the Society was always very welcome to the use of the rooms of the Institution, and he hoped that in about two years time they would be in the position to offer

the Society even better accommodation in their new building now in course of construction.

Mr. F. Druce, in proposing the toast of "Meteorology and Education," thought that it would not be too much to ask that every University throughout the country should have a lectureship of meteorology, and also that every medical and naval college should make this a subject of examination. If this were so, the great public schools would have to follow suit, and so the class in this country from which our greatest intellect is drawn would have a chance of acquiring some knowledge of this science.

Mr. T. McRow, in responding to the toast, said that the Royal Meteorological Society's exhibits at the Royal Agricultural Society's Shows were always very attractive, and were greatly appreciated.

Mr. H. Mellish proposed the toast of "the Visitors," to which Mr. E. L. S. Cocks, Mayor of the City of Westminster, responded.

Mr. E. White, the Chairman of the London County Council, proposed the toast of "the President," to which the Chairman briefly replied.

That the dinner was a successful one was shown by the fact that all present remained to the end, and kept their seats for some time after the conclusion of the speeches.

~~~~~  
**Correspondence.**

*To the Editor of Symons's Meteorological Magazine.*

---

### **THE GREAT THUNDERSTORM OF MAY 31st, 1911.**

I REMEMBER with considerable accuracy every thunderstorm that has occurred in the neighbourhood that I have happened to be in since the year 1890, when I was seven years old, and can fairly say that so far as London is concerned, the storm of the evening of May 31st was, in view of the terrific force of the discharges breaking every few seconds through an overwhelming darkness, the grandest and most awe-inspiring spectacle of the kind in my whole experience.

As usual the electrical disturbances seemed to burst independently at various points in and around London during the afternoon and evening, and one could not follow with certainty the career of any particular storm-centre. The fiercely hot and sultry May of 1911—in which, however, the usual polar snap managed to put in an appearance around the 20th—was prolific of thunderstorms of a truly terrific character in various parts of Great Britain, and the one which raged north of London on the afternoon of the 13th was just as severe as that of the 31st in the metropolis itself. The peculiar liability of the month of May to thunderstorms of a violent and dangerous type is well known at the Meteorological Office, and although July is usually credited with producing most thunder,

there is really very little to choose between May, June and July, the three months constituting the midsummer period. It would require a laborious statistical investigation to find out with certainty whether any small period in these three months is more thundery than another, but if I were asked for my impression as the result of personal and general experience as to the particular week in the year during which violent thunderstorms are especially liable to occur, I should point not to the fourth week in July, but to the week which marks the passing of May into June, say, May 28th—June 4th.

The physical explanation why all our most severe thunderstorms, like that of May 31st, occur in the narrow neck of relatively low barometric pressure between two anticyclonic systems is too obvious to need much demonstration.

The ascending currents of air necessary to thunderstorm generation cannot be established unless there is denser air available to supply the deficit of pressure to which the ascent of masses of air must necessarily give rise. Clearly the lateral pressure due to the outward downflow of air from the anticyclones will have the effect of forcing up masses of light heated air within the neck of low pressure.

L. C. W. BONACINA.

*3, Crossfield Road, South Hampstead, N. W., June 3rd, 1911.*

---

THE severest thunderstorm, and heaviest rainfall since records commenced in 1903, occurred here between 5 and 8 p.m. on May 31st.

The day had been exceptionally humid and close with a dense thunder haze gathering up towards 3 p.m. Very distant thunder was heard away to the northward at 3.35 p.m., continuing at intervals to 4.46 p.m., when three distinct storm centres became apparent—one to N. and N.E., another to N.W., and a third to S. and S.W. Two separate cloud currents were visible at 5 p.m., an upper one from S.W., and a lower from N.E. Fork lightning was first seen at 4.59 p.m., when the time interval to thunder was 3 seconds, and from then until 7 p.m. lightning and thunder were practically continuous. Rolling thunder was entirely absent, the peals coming in sharp decisive cracks, closely resembling cannonading, whilst the lightning flashes were of dazzling intensity. Between 5.30 and 5.45 p.m. a count of flash-frequency yielded 159.

The N. and N.E. and S. and S.W. centres appeared to coalesce near the zenith at 5.35 p.m., remaining almost stationary till 6.45 p.m., when a movement in a W. direction set in. The N.W. centre did not develop.

Rain commenced at 5.20 p.m., falling in a continuous torrent to 6.10 p.m., during which time the roads were converted into running streams, being over two feet deep in places. During the 50 minutes the rainfall amounted to 2.44 inches; and on the gauge being again read at 8 p.m. a further fall of 0.42 in. was registered, making a total of 2.86 inches in 2 hours and 40 minutes. The last thunder

was heard at 7.59 p.m., sheet lightning remaining visible until 9.30 p.m. Within a radius of three miles the following damage by lightning was recorded :—

Time.	Persons.			Horses killed.		Property damaged.		Direction.
5.30 p.m.....	Killed.	Injured.	...	1	...	—	...	E. & S.E.
6.5 p.m.....	3	8	...	—	...	3 ricks (hay) fired.	...	N.E.
6.25 p.m.....	—	—	...	3	...	—	...	S.E.

SPENCER C. RUSSELL.

*Epsom, Surrey, June 3rd, 1911.*

### FLOOD RAINS IN BUENOS AIRES.

AFTER five years' drought the city and province of Buenos Aires have been visited within a month by three very severe rainstorms. The first of these occurred on April 12th, when the rainfall over the city limits varied between 2.87 and 6.42 inches; this was a local thunderstorm rain, and did not extend in an intense form into the Province. On April 23rd great rains fell immediately to the south and east of Buenos Aires, although in the capital itself the maximum fall was 3.78 inches. The maximum falls reported in the 24 hours were 10.11 inches at Las Heras and 9.76 inches at La Llala, the mean rainfall over an area of 5,000 square miles being 7.76 inches. Great floods took place, owing to the overflowing of the Rio Chuelo, which flows through a thickly populated suburb of Buenos Aires, thousands of people were rendered homeless, and many lives were lost. On May 13th the city and adjoining region experienced another rainstorm, the downfall ranging from 4.33 to 2.80 inches, while in the Province 28 stations reported more than 100 millimetres (3.94 inches), the maximum fall being 7.60 inches at San Fernandez. Severe flooding was also reported on May 11th in the Province of Neuquen, owing to the rise of the Rivers Neuquen and Limay, due to excessive precipitation associated with a deep depression which advanced from the Pacific.

R. C. MOSSMAN.

*Buenos Aires, May 16th, 1911.*

### REVIEW.

*Handbuch der Ozeanographie* von DR. OTTO KRÜMMEL. *Band II. Die Bewegungsformen des Meeres (Wellen, Gezeiten, Strömungen).* Mit 182 Abbildungen im Text. Zweite, vollständig neu bearbeitete und wesentlich erweiterte Auflage. [Handbook of Oceanography by Dr. Otto Krümmel. Vol. II. The Movements of the Sea—Waves, Tides, Currents. With 182 illustrations in the text. Second Edition, completely recast and much enlarged.] Stuttgart: J. Engelhorn's Successors. 1911. Size 9 × 6½. Pp. xvi. + 766. Price 32 marks.

Four years ago we had the pleasure of welcoming the first volume of

this important work (Vol. 42 (1907), p. 238), and we now have the satisfaction of receiving the completion of the standard treatise of Oceanography, a science in which Professor Krümmel has made himself as supreme a master as Professor Hann in Meteorology. As in the first volume the fullest recognition is given to all the author's fellow-workers, and this entails the very frequent citation of works in the English language, for although there is no English treatise on oceanography, the greater part of the data on which the science was founded have been placed on record by British and American authorities. In recent years, we must confess, a greater volume of research has been flowing through German, Scandinavian, and Monegasque channels, all of which are rendered tributary in this splendid compendium and generalization.

Of the three divisions of the present volume, that on Tides may be said to stand clear of Meteorology, while that on Waves only touches on the particular subject of this Magazine in so far as concerns the relation to wind. In this connection it is interesting to note that Professor Krümmel, while quoting from this Magazine (Vol. 36 (1901), p. 57) Dr. Vaughan Cornish's statement that great wind waves usually come in groups of three, with the highest in the middle, recalls the expression which the fishermen near Kiel apply familiarly to such waves, "the mother with the two daughters."

Most meteorological interest attaches to the section on Ocean Currents, which have such far-reaching effects in modifying the climates of the Earth's surface. This is the first time that the results of the modern apparatus for the measurement of currents have been put forward in a systematic and generalized form. Professor Krümmel points out that one set of theorists accounts for ocean currents by the rotation of the Earth, another by differences of density due to temperature and salinity, and a third by the influence of wind. He shows that there are many constituent causes of the movement and direction of ocean currents, no one of which can account for all the phenomena. The main causes are differences of density, produced in various ways in the water itself by evaporation, radiation, rainfall, ice-melting, &c., and by external agents such as wind and the differences in atmospheric pressure from place to place. Secondary causes which affect the direction rather than the formation of currents include friction, the deviating influence of the Earth's rotation, and the configuration of the ocean shores. Each of these causes is described at length with adequate illustrations and copious references to original papers. The theoretical bearings of the question being thus established, the section concludes with a concise summary of the actual system of oceanic currents in each of the oceans.

Works of the standing of this treatise do not often appear, and Professor Krümmel deserves hearty congratulations on his courage in undertaking so great a task and on the result which he has achieved.

---

## BALLOON ASCENTS, SEPTEMBER—OCTOBER, 1908.

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

*September 30th, 1908.*

Starting Point.	Country	A miles.	B ° F.	C miles.	D ° F.	E miles.	F
Manchester....	England ....	9·2	—78	9·4	—76	59	N.E. by N.
Petersfield ....	" .....	9·4	—76	13·1	—72	63	N.E.
Hamburg.....	Germany....	?	—85	8·4	?	37	S.S.E.
Lindenberg....	" .....	8·4	—101	8·6	—99	39	S. by W.
Paris .....	France .....	8·9	—85	10·5	—83	23	N.E.
Strassburg ....	Germany....	8·8	—90	11·9	—67	32	S.S.W.
Munich.....	" .....	8·4	—90	9·4	—80	58	S.S.W.
Vienna.....	Austria ....	7·9	—83	10·9	—65	150	S.S.W.
Pavia .....	Italy .....	7·7	—89	9·6	—80	41	S.W. by S.
Pavlovsk ....	Russia .....	—	—	6·8	—72	39	S.S.E.

*October 1st, 1908.*

Pyrton Hill....	England ....	8·9	—90	13·1	—76	91	N.N.E.
Petersfield ....	" .....	8·8	—78	11·3	—72	88	N.N.E.
Brussels .....	Belgium ....	—	—	7·5	—81	7	E.
Hamburg.....	Germany....	9·6	—87	14·0	—69	3	S.E.
Paris.....	France .....	7·8	—89	9·6	—78	22	N. by W.
Strassburg ....	Germany....	9·5	—85	10·0	—81	32	S.W.
Munich .....	" .....	8·6	—81	8·8	—81	40	S.W. by W.
Vienna.....	Austria.....	8·2	—90	10·0	—81	75	S.W.
Pavia .....	Italy .....	6·8	—74	?	—	65	S.W. by S.
Kuchino .....	Russia .....	7·2	—63	9·7	—61	52	S.S.E.

*October 2nd, 1908.*

Manchester....	England ....	—	—	6·6	—56	50	N.N.E.
Pyrton Hill....	" .....	8·9	—80	12·5	—67	38	N.E. by N.
Petersfield ....	" .....	8·9	—78	10·0	—74	36	N. by E.
Brussels .....	Belgium ....	8·1	—83	8·3	—83	9	W.S.W.
Hamburg.....	Germany....	—	—81	8·7	—	49	S.E. by S.
Paris .....	France .....	8·4	—87	9·4	—69	75	N.W.
Strassburg ....	Germany....	8·4	—91	8·8	—87	15	S.S.W.
Munich .....	" .....	8·3	—85	9·0	—85	40	S.W. by W.
Vienna.....	Austria ....	8·5	—90	—	—	62	S.W.
Pavia .....	Italy .....	7·6	—89	8·5	—85	41	W.S.W.

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 are remarkable for the low temperatures, and more especially for the height of the commencement of the isothermal zone. The average values for October are 7·3 miles and —67° F., and it is unusual to find individual values above 8 miles or below —85°. The uniformity over the whole of West and Central Europe of very unusual conditions affords a strong proof of the general reliability of the observations. Settled fine weather prevailed during the period, and the temperature at the surface was unusually high for October. An extensive area of high pressure prevailed during the three days, and the drift of the balloons shows an anticyclonic circulation round the neighbourhood of Paris and Brussels.



## RAINFALL TABLE FOR MAY, 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	1'75	1'80
Tenterden.....	Kent.....	51 4	*0 41	190	1'65	'75
Arundel (Patching).....	Sussex.....	50 51	0 27	130	1'80	1'13
Southampton (Cadland) ..	Hampshire.....	50 50	1 22	52	1'96	1'71
Oxford (Magdalen College)...	Oxfordshire.....	51 45	1 15	186	1'81	2'21
Wellingborough (Croyland Abbey)...	Northampton.....	52 18	0 41	174	1'99	2'59
Shoeburyness.....	Essex.....	51 31	*0 48	13	1'27	'83
Bury St. Edmunds (Westley) ..	Suffolk.....	52 15	*0 40	226	1'93	'82
Geldeston [Beccles].....	Norfolk.....	52 27	*1 31	38	1'78	'75
Polapit Tamar [Launceston] ..	Devon.....	50 40	4 22	315	2'08	'86
Rousdon [Lyme Regis] .....	".....	50 41	3 0	516	2'02	'61
Stroud (Uplfield).....	Gloucestershire..	51 44	2 13	226	2'10	1'19
Church Stretton (Wolstaston)...	Shropshire.....	52 35	2 48	800	2'64	1'20
Coventry (Kingswood) .....	Warwickshire ..	52 24	1 30	340	2'15	'84
Boston.....	Lincolnshire.....	52 58	0 1	25	1'80	'73
Worksop (Hodsock Priory)...	Nottinghamshire	53 22	1 5	56	2'08	'83
Macclesfield.....	Cheshire.....	53 15	2 7	501	2'43	'71
Southport (Hesketh Park)...	Lancashire.....	53 38	2 59	38	2'13	1'48
Wetherby (Ribston Hall) ..	Yorkshire, W.R.	53 59	1 24	130	2'09	1'18
Arncliffe Vicarage.....	".....	54 8	2 6	732	3'55	3'90
Hull (Pearson Park) .....	"..... E.R.	53 45	0 20	6	1'98	'48
Newcastle (Town Moor) ..	Northumberland	54 59	1 38	201	2'04	'64
Borrowdale (Seathwaite) ..	Cumberland.....	54 30	3 10	423	7'50	8'66
Cardiff (Ely).....	Glamorgan.....	51 29	3 13	53	2'56	1'50
Haverfordwest.....	Pembroke.....	51 48	4 58	95	2'62	1'79
Aberystwyth (Gogerddan)...	Cardigan.....	52 26	4 1	83	2'63	2'94
Llandudno.....	Carnarvon.....	53 20	3 50	72	1'86	1'70
Cargen [Dumfries] .....	Kirkcudbright...	55 2	3 37	80	2'87	4'16
Marchmont House.....	Berwick.....	55 44	2 24	498	2'53	'86
Girvan (Pinnmore).....	Ayr.....	55 10	4 49	207	2'98	2'62
Glasgow (Queen's Park) ..	Renfrew.....	55 53	4 18	144	2'40	2'24
Inveraray (Newtown) .....	Argyll.....	56 14	5 4	17	3'53	4'96
Mull (Quinish).....	".....	56 34	6 13	35	2'99	4'39
Dundee (Eastern Necropolis) ..	Forfar .....	56 28	2 57	199	2'05	'81
Braemar.....	Aberdeen.....	57 0	3 24	1114	2'33	1'70
Aberdeen (Cranford) .....	".....	57 8	2 7	120	2'40	2'56
Cawdor.....	Nairn.....	57 31	3 57	250	2'07	2'20
Fort Augustus (S. Benedict's) ..	E. Inverness ..	57 9	4 41	68	2'36	1'94
Loch Torridon (Bendamph) ..	W. Ross.....	57 32	5 32	20	4'54	4'92
Dunrobin Castle.....	Sutherland.....	57 59	3 56	14	2'19	2'29
Wick.....	Caithness.....	58 26	3 6	77	2'04	2'02
Killarney (District Asylum) ..	Kerry.....	52 4	9 31	178	3'05	5'48
Waterford (Brook Lodge)...	Waterford.....	52 15	7 7	104	2'33	1'34
Nenagh (Castle Lough).....	Tipperary.....	52 54	8 24	120	2'51	2'99
Miltown Malbay.....	Clare.....	52 52	9 26	400	2'57	3'10
Gorey (Courtown House) ..	Wexford.....	52 40	6 13	80	2'24	1'37
Abbey Leix (Blandsfort) ....	Queen's County..	52 56	7 17	532	2'43	1'97
Dublin (Fitz William Square) ..	Dublin.....	53 21	6 14	54	2'07	1'29
Mullingar (Belvedere) .....	Westmeath.....	53 29	7 22	367	2'51	2'39
Ballinasloe.....	Galway.....	53 20	8 15	160	2'58	2'56
Crossmolina (Enniscoe).....	Mayo.....	54 4	9 18	74	3'17	2'26
Collooney (Markree Obsy.)...	Sligo.....	54 11	8 27	127	2'80	1'75
Seaforde.....	Down.....	54 19	5 50	180	2'72	2'01
Bushmills (Dundarave) .....	Antrim.....	55 12	6 30	162	2'37	1'91
Omagh (Edenfel).....	Tyrone.....	54 36	7 18	280	2'66	1'72

## RAINFALL TABLE FOR MAY, 1911—continued.

RAINFALL OF MONTH (con.)					RAINFALL FROM JAN. 1.				Mean Annual 1875-1909.	STATION.
Diff. from Av. in.	% of Av.	Max. in 24 hours.	No. of Days		Aver. 1875-1909.	1911.	Diff. from Aver. in.	% of Av.		
		in.	Date.		in.	in.			in.	
+ .05	103	.50	31	10	8.68	8.19	— .49	94	25.11	Camden Square
— .90	45	.34	13	6	9.41	7.78	— 1.63	83	27.64	Tenterden
— .67	63	.33	2	7	10.33	8.16	— 2.17	79	30.48	Patching
— .25	87	.40	25	8	11.14	8.34	— 2.80	75	31.87	Cadland
+ .40	122	.84	25	8	8.33	6.79	— 1.54	81	24.58	Oxford
+ .60	130	1.09	25	8	9.04	7.06	— 1.98	78	25.17	Croyland Abbey
— .44	65	.33	14	5	6.23	5.21	— 1.02	84	19.28	Shoeburyness
— 1.11	42	.42	14	6	8.55	7.19	— 1.36	84	25.40	Westley
— 1.03	42	.38	14	6	7.84	6.83	— 1.01	87	23.73	Goldeston
— 1.22	41	.34	3	7	13.70	9.45	— 4.25	69	38.27	Polapit Tamar
— 1.41	30	.37	2	5	12.15	8.25	— 3.90	68	33.54	Rousdon
— .91	57	.35	11	9	10.65	7.14	— 3.51	67	29.81	Stroud
— 1.44	45	.45	3	9	11.71	7.85	— 3.86	67	32.41	Wolstaston
— 1.31	39	.51	25	4	10.23	5.83	— 4.40	57	28.98	Coventry
— 1.07	41	.37	14	8	7.91	5.89	— 2.02	74	23.35	Boston
— 1.25	40	.38	26	8	8.74	4.26	— 4.48	49	24.46	Hodsock Priory
— 1.72	29	.36	3	9	11.91	9.55	— 2.36	80	34.73	Macclesfield
— .65	69	.80	3	6	10.70	8.83	— 1.87	83	32.70	Southport
— .91	56	.30	14	7	9.46	6.91	— 2.55	73	26.87	Ribston Hall
+ .35	110	1.28	3	13	23.59	29.66	+ 6.07	126	61.49	Arncliffe
— 1.50	24	.18	30	8	8.99	6.74	— 2.25	75	26.42	Hull
— 1.40	31	.20	14	11	9.51	6.88	— 2.63	72	27.94	Newcastle
+ 1.16	115	2.57	3	12	49.44	59.20	+ 9.76	120	129.48	Seathwaite
— 1.06	59	.63	3	8	14.67	13.41	— 1.26	91	42.28	Cardiff
— .83	68	.78	3	8	16.71	14.47	— 2.24	87	46.81	Haverfordwest
+ .31	112	1.58	13	11	15.15	13.87	— 1.28	92	45.46	Gogerddan
— .16	91	.71	13	7	10.40	7.55	— 2.85	73	30.36	Llandudno
+ 1.29	145	1.32	3	11	16.22	17.58	+ 1.36	108	43.47	Cargen
— 1.67	34	.33	3	8	12.00	8.43	— 3.57	70	33.76	Marchmont
— .36	88	.52	2	16	18.06	18.31	+ .25	101	49.77	Girvan
— .16	93	.67	3	12	13.10	15.03	+ 1.93	115	35.97	Glasgow
+ 1.43	140	1.13	1	13	25.68	35.00	+ 9.32	136	68.67	Inveraray
+ 1.40	147	.97	1	14	20.25	22.94	+ 2.69	113	56.57	Quinish
— 1.24	40	.31	3	9	9.96	4.45	— 5.51	45	28.64	Dundee
— .63	73	...	...	...	12.97	11.34	— 1.63	87	34.93	Braemar
+ .16	107	.66	15	12	12.00	8.59	— 3.41	72	32.73	Aberdeen
+ .13	106	.84	13	9	10.38	9.47	— .91	91	29.33	Cawdor
— .42	82	.45	3	14	18.15	17.91	— .24	99	44.53	Fort Augustus
+ .38	108	.86	23	14	33.32	39.23	+ 5.91	118	83.61	Bendamph
+ .10	105	.57	15	13	12.18	11.81	— .37	97	31.90	Dunrobin Castle
— .02	99	.40	15	17	10.88	10.19	— .69	94	29.88	Wick
+ 2.43	179	1.36	14	18	21.95	17.56	— 4.39	80	54.81	Killarney
— .99	58	.52	1	6	14.61	10.51	— 4.10	72	39.57	Waterford
+ .48	119	1.08	2	13	14.81	12.21	— 2.60	82	39.43	Castle Lough
+ .53	121	.94	2	15	15.59	13.24	— 2.35	85	45.11	Miltown Malbay
— .87	61	.62	2	6	12.83	8.24	— 4.59	64	34.99	Courtown Ho.
— .46	81	.47	3	13	13.26	11.49	— 1.77	87	35.92	Abbey Leix
— .78	62	.49	13	10	10.15	5.99	— 4.16	59	27.68	Dublin
— .12	95	.54	3	12	13.29	12.41	— .88	93	36.15	Mullingar
— .02	99	.93	2	13	13.46	12.66	— .80	94	36.64	Ballinasloe
— .91	71	1.07	2	11	20.21	15.89	— 4.32	79	52.87	Enniscoe
— 1.05	63	.51	2	10	15.72	13.16	— 2.56	84	42.71	Markree
— .71	74	.99	13	10	14.54	10.97	— 3.57	75	38.91	Seaforde
— .46	81	.74	3	11	12.93	10.44	— 2.49	81	37.56	Dundarave
— .94	65	.35	2	13	14.28	12.88	— 1.40	90	39.38	Omagh

## SUPPLEMENTARY RAINFALL, MAY, 1911.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Warlingham, Redvers Road	1·77	XI.	Lligwy .....	1·13
„	Ramsgate .....	1·11	„	Douglas .....	1·51
„	Hailsham .....	·81	XII.	Stoneykirk, Ardwell House	1·92
„	Totland Bay, Aston House.	1·18	„	Dalry, The Old Garroch ...	3·45
„	Stockbridge, Ashley .....	1·95	„	Langholm, Drove Road.....	3·56
„	Grayshott .....	1·71	„	Beattock, Kinnelhead.....	4·08
„	Reading, Calcot Place.....	2·12	XIII.	St Mary's Loch, Cramilt Ldge	3·11
III.	Harrow Weald, Hill House.	1·85	„	North Berwick Reservoir ...	·84
„	Pitsford, Sedgebrook .....	2·54	„	Edinburgh, Royal Observty.	1·08
„	Somersham Vicarage.....	·65	XIV.	Maybole, Knockdon Farm..	2·67
„	Woburn, Milton Bryant.....	1·43	XV.	Campbeltown, Witchburn...	2·90
IV.	Colchester, Lexden .....	·74	„	Glenreadell Mains.....	3·41
„	Newport .....	2·41	„	Holy Loch, Ardnadam.....	6·02
„	Rendlesham .....	·47	„	Ballachulish House.....	5·87
„	Swaffham .....	1·44	„	Islay, Fallabus .....	3·41
„	Blakeney .....	·79	XVI.	Dollar Academy .....	1·33
V.	Bishops Cannings .....	·85	„	Balquhiddy, Stronvar .....	5·53
„	Winterbourne Steepleton	1·75	„	Coupar Angus .....	1·44
„	Ashburton, Druid House ..	1·75	„	Glenlyon, Meggernie Castle.	3·05
„	Okehampton, Oaklands.....	1·58	„	Blair Atholl .....	1·30
„	Cullompton .....	1·72	„	Montrose, Sunnyside Asylum	·67
„	Hartland Abbey .....	·87	XVII.	Alford, Lynturk Manse ...	1·54
„	Lynmouth, Rock House ...	2·50	„	Fyvie Castle.....	3·27
„	Probus, Lamellyn .....	·53	„	Keith Station .....	2·52
„	North Cadbury Rectory ..	·97	XVIII.	Glenquoich, Loan .....	10·70
VI.	Clifton, Pembroke Road ...	1·21	„	Skye, Dunvegan .....	4·46
„	Ross, The Graig .....	2·11	„	N. Uist, Lochmaddy .....	3·38
„	Shifnal, Hatton Grange.....	·49	„	Alvey Manse .....	·80
„	Blockley, Upton Wold .....	·98	„	Loch Ness, Drumnadrochit.	1·19
„	Droitwich .....	·48	„	Glencarron Lodge .....	3·93
VII.	Market Overton.....	2·33	XIX.	Invershin .....	2·09
„	Market Rasen .....	·89	„	Loch Stack, Ardchullin.....	2·64
„	Bawtry, Hesley Hall.....	·76	„	Melvich.....	1·53
„	Derby, Midland Railway ...	·73	XX.	Skibbereen Rectory.....	2·72
„	Buxton .....	1·37	„	Dunmanway, The Rectory..	5·34
VIII.	Nantwich, Dorfold Hall.....	·78	„	Cork .....	1·82
„	Chatburn, Middlewood .....	2·01	„	Mitchelstown Castle .....	2·27
„	Cartmel, Flookburgh .....	1·67	„	Darrynane Abbey .....	2·72
IX.	Langsett Moor, Up. Midhope	9·7	„	Glenam [Clonmel] .....	1·30
„	Scarborough, Scalby .....	·94	„	Newmarket-on-Fergus, Fenloe	2·48
„	Ingleby Greenhow .....	·96	XXI.	Laragh, Glendalough .....	2·82
„	Mickleton .....	1·23	„	Balbriggan, Ardgillan.....	1·11
X.	Bellingham, High Green Manor	1·72	„	Moynalty, Westland .....	1·97
„	Ilderton, Lilburn Cottage..	·67	XXII.	Cong, The Glebe .....	1·54
„	Keswick, The Bank .....	4·79	„	Westport, St. Helens .....	2·12
XI.	Llanfrechfa Grange.....	2·11	„	Achill Island, Dugort .....	3·89
„	Treherbert, Tyn-y-waun ...	5·92	„	Mohill .....	2·44
„	Carmarthen, The Friary.....	3·04	XXIII.	Enniskillen, Portora .....	1·50
„	Castle Malgwyn [Llechryd].	2·73	„	Dartrey [Cootehill].....	2·46
„	Plynlimon .....	2·90	„	Warrenpoint, Manor House	2·54
„	New Radnor, Ednol .....	1·38	„	Banbridge, Milltown .....	1·85
„	Rhayader, Tyrmynydd .....	1·68	„	Belfast, Cave Hill Road.....	2·54
„	Lake Vyrnwy .....	1·86	„	Glenarm Castle.....	2·51
„	Llangyhanfal, Plâs Draw....	1·04	„	Londonderry, Creggan. Res.	1·78
„	Dolgelly, Bryntirion .....	2·30	„	Killybegs .....	2·15
„	Bettws-y-Coed, Tyn-y-bryn	2·36	„	Horu Head ... ..	1·04

## METEOROLOGICAL NOTES ON MAY, 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.—Beautiful sunny weather with high temp. prevailed throughout. There were TSS on the 11th and 31st, which, together, yielded 50 per cent. of the total R for the month. During the latter storm, 25 in. of R fell in 6 minutes. The mean temp., 58°·0, was 40°·1 above the average and the highest in May since 1893, and excepting only that year and 1868, the highest in the 54 years' record. Duration of sunshine 180·1\* hours, and of R 22·8 hours. Evaporation 2·58 in. Shade max. 81°·7 on 31st; min. 38°·1 on 7th. F 0, f 0.

TENTERDEN.—A beautiful month and very warm, except in first week, and a few days in third. The latter half was very dry. Duration of sunshine 261·0† hours. Shade max. 78°·0 on 31st; min. 37°·0 on 7th. F 0, f 5.

TOTLAND BAY.—Duration of sunshine 267·3\* hours. Shade max. 75°·9 on 26th and 29th; min. 39°·8 on 5th. F 0, f 0.

PITSFORD.—R 49 in. above the average. Mean temp. 55°·8. Shade max. 76°·3 on 31st; min. 35°·2 on 9th. F 0.

NORTH CADBURY.—The calmest, and, on the whole, the warmest May in 15 years record. The conditions were of a thundery type for about half the month, and there was a bad storm on 10th, and slight storms on 26th and 30th. On 26th about 75 in. of R fell in a short time at Castle Cary, 3½ miles north. The streets were flooded and drains choked. Shade max. 81°·5 on 26th; min. 37°·0 on 3rd and 5th. F 0, f 8.

ROSS.—With the exception of heavy TSS on 10th and 26th, an exceptionally warm and fine month. Shade max. 78°·4 on 29th; min. 38°·1 on 21st. F 0, f 0.

HODSOCK PRIORY.—The R in the 5 months, January to May, is less than in any of the previous 35 years. Shade max. 75°·1 on 29th; min. 30°·9 on 9th. F 1, f 5.

SOUTHPORT.—The warmest May in 40 years record. Mean temp. 55°·3, or 4°·8 above the average. Duration of sunshine 247·5\* hours, and of R 19·9 hours. Shade max. 78°·4 on 29th; min. 37°·3 on 21st. F 0, f 5.

HULL.—Shade max. 77°·0 on 25th; min. 31°·0 on 1st. F 1, f 3.

NEWCASTLE.—The R was the least registered in May since 1868, with the exception of May, 1905, when 51 in. fell on 14 days.

HAVERFORDWEST.—Sunshine 267·3\* hours. Shade max. 78°·8 on 28th.

LLANDUDNO.—Duration of sunshine 257·6\* hours. Shade max. 69°·2 on 30th; min. 41°·8 on 21st.

CARGEN.—The shade max. exceeded 70° on the last six days and reached 79°·5 on 29th and 30th, which was unprecedented here in May. Shade min. 32°·5 on 1st and 6th. F 0.

EDINBURGH.—Shade max. 66°·8 on 28th; min. 36°·8 on 1st. F 0, f 1.

COUPAR ANGUS.—Mean temp. 54°·1 and 5° above the average. The shade max. exceeded 70° on every day in the last week and reached 78°·0 on 30th; min. 31°·5 on 5th.

FORT AUGUSTUS.—Shade max. 69°·0 on 25th; min. 29°·2 on 1st. F 1.

DUNMANWAY.—The first half was very unsettled, but the latter half was summerlike and warm, excepting the 23rd to 25th. T and L occurred on five days, and 75 in. of R fell in 40 minutes on 13th, and 70 in. in the same time on the 14th.

DUBLIN.—Though opening with unsettled weather the month proved to be one of the finest and warmest Mays on record. The mean temp., 55°·3, was only twice exceeded in the past 45 years, viz., in 1868 and 1893. Shade max. 69°·8 on 24th; min. 41°·1 on 4th. F 0, f 0.

MARKREE.—Shade max. 76°·0 on 29th; min. 34°·3 on 21st and 28th. F 0, f 13.

WARRENPOINT.—On the evening of 13th 1·03 in. of R fell in less than 45 minutes. Shade max. 72°·0 on 29th; min. 53°·0 on 3rd. F 0, f 0.

\* Campbell-Stokes.

† Jordan.

## Climatological Table for the British Empire, December, 1910.

STATIONS  (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
								0-100			inches		
London, Camden Square	54·6	16	26·8	28	48·7	40·0	41·9	91	67·0	21·8	3·29	20	8·0
Malta ... ..	71·2	7	47·3	30	62·9	55·4	54·0	84	134·1	...	6·52	15	6·1
Lagos ... ..	90·0	6	70·0	26	87·4	74·4	74·5	75	148·0	71·0	·14	2	...
Cape Town ... ..	95·9	1	49·7	30	78·8	60·9	57·8	68	...	...	·07	3	2·3
Durban, Natal ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Johannesburg ... ..	93·3	18	45·5	23	74·6	52·1	52·9	70	149·3	44·2	5·10	16	2·6
Mauritius ... ..	88·5	27*	67·3	2	85·8	71·4	68·0	73	158·7	59·9	2·73	18	6·7
Calcutta... ..	81·4	11	45·6	24	77·7	53·3	52·6	66	...	40·1	·00	0	0·4
Bombay... ..	88·3	13	65·3	20	84·1	69·0	65·4	71	133·3	58·1	·00	0	0·3
Madras ... ..	85·5	24	62·2	18	83·7	67·0	65·1	76	135·5	58·8	·05	1	3·4
Kodaikanal ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Colombo, Ceylon ... ..	88·2	29	69·6	16	85·1	71·4	69·7	77	137·0	65·2	3·37	8	4·7
Hongkong ... ..	77·1	1	45·8	23	65·1	54·9	49·0	66	120·2	...	·79	7	5·8
Melbourne ... ..	94·9	29	43·2	21	73·3	52·5	48·4	60	158·9	38·9	3·64	16	6·0
Adelaide ... ..	96·0	26	45·5	19	76·8	55·0	48·7	55	166·8	38·5	1·25	8	5·0
Coolgardie ... ..	100·6	24	46·0	2	88·9	58·0	47·8	46	163·8	42·9	·19	2	2·4
Perth ... ..	95·3	10	48·0	2	78·4	59·5	54·0	62	152·2	39·1	·09	2	2·8
Sydney ... ..	96·7	27	54·0	19	77·9	62·4	54·9	58	158·1	44·7	8·47	19	5·1
Wellington ... ..	72·8	20	44·6	4	66·3	54·9	52·9	76	125·0	37·0	3·59	15	7·0
Auckland ... ..	76·5	16	52·0	11	69·9	57·5	58·0	83	143·0	48·0	2·83	19	6·0
Jamaica, Kingston ..	88·9	...	63·9	...	85·5	69·1	68·5	79	...	...	3·09	10	...
Grenada ... ..	85·0	15†	70·0	26‡	82·7	73·8	69·8	77	141·0	...	5·74	24	3·5
Toronto ... ..	38·7	23	—6·8	31	28·5	13·7	...	86	52·2	—9·3	1·74	16	7·5
Fredericton ... ..	46·5	24†	—15·0	18	27·1	9·3	...	87	...	...	4·08	10	6·5
St. John, N.B. ... ..	47·7	30	—2·7	16	30·3	16·3	...	...	...	...	4·46	15	6·3
Victoria, B.C. ... ..	51·5	...	30·3	...	45·7	39·9	...	91	...	...	6·41	21	...
Dawson ... ..	28·0	20	—49·0	13	—10·7	—24·5	...	...	...	...	·60	12	7·1

\* and 30. † and 25. ‡ 27, 28 and 29.

MALTA.—Mean temp. of air 58°·6. Average bright sunshine 4·0 hours per day.

Johannesburg.—Bright sunshine 298·8 hours.

Mauritius.—Mean temp. of air 0°·4, and R 2·21 in., below, dew point 0°·4 above, averages. Mean hourly velocity of wind 9·3 miles, or 1·5 below average.

COLOMBO.—Mean temp. of air 75°·8, or 3°·2 below, of dew point 1°·2 below, and R 1·86 in. below, averages. Mean hourly velocity of wind 11·8 miles. TSS on the 25th.

HONGKONG.—Mean temp. of air 59°·7, or 3°·0 below average. Bright sunshine 168·2 hours. Mean hourly velocity of wind 9·1 miles.

Melbourne.—Mean temp. of air 1°·6 below, and R 1·41 in. above, averages.

Adelaide.—R 42 in. above average.

Coolgardie.—R 51 in. below average.

Perth.—R 48 in. below average.

Sydney.—Mean temp. of air 0°·2, and R 5·87 in., above, averages.

Wellington.—Mean temp. of air 0°·2 above, and R 3·38 in. above, averages. Bright sunshine 258·5 hours.

Auckland.—A muggy, showery month. R above average, and mean temp. below average.

# **PUBLICATIONS**

OF THE

## **ROYAL METEOROLOGICAL SOCIETY.**

---

### **QUARTERLY JOURNAL OF THE ROYAL METEOROLOGICAL SOCIETY.**

This contains the Papers read at the Meetings, together with the Discussions, and also Notes, Correspondence, Notices of Recent Publications, and the titles of such papers as appear to be of general interest bearing on Meteorology in the Periodicals which are received in the Society's Library. Price 5s.

### **THE METEOROLOGICAL RECORD.**

Monthly Results of observations made at the Stations of the Royal Meteorological Society, with Remarks on the Weather for each quarter. Price 1s. 6d.

### **HINTS TO METEOROLOGICAL OBSERVERS.**

Instructions for taking Observations, and Tables for their Reduction; together with a Glossary of Meteorological Terms. By WILLIAM MARRIOTT, Assistant Secretary. Sixth Edition, revised and enlarged. With Illustrations. Price 1s. 6d. Post Free, 1s. 8d.

### **SOME FACTS ABOUT THE WEATHER.**

A Popular Meteorological Handbook. By WILLIAM MARRIOTT, Assistant-Secretary. Second and Revised Edition. Price 6d. Post Free 7d.

---

*The above may be obtained from*

**EDWARD STANFORD, 12, 13 & 14, LONG ACRE, LONDON, W.C.**

**Or at the Offices of the Society, 70, VICTORIA STREET, LONDON, S.W.**



# THE OBSERVATORY:

*A Monthly Review of Astronomy.*

EDITED BY

H. P. HOLLIS, B.A., F.R.A.S., AND T. LEWIS, F.R.A.S.

~~~~~

Contains full Reports of the Meetings of the Royal Astronomical and Royal Meteorological Societies, and of the British Astronomical Association; Articles by various eminent Astronomers, English, American and Continental; Correspondence on topics of interest connected with the Science; Notices of Observatories, Publications and current Discoveries. The "Oxford Note Book" is a special feature of the Magazine.

*The Observatory* was founded in 1877, and has become an established and very valuable publication.—Prof. Young, in "*Ten Years' progress in Astronomy.*"

Annual Subscription (for the "Companion" and twelve Monthly Numbers), 13s.

*All communications should be addressed to the Editors of "The Observatory,"  
Royal Observatory, Greenwich, S.E.*

---

Cloth 8vo.    428 pages.    With Maps and Illustrations.

PRICE 10s.

## BRITISH RAINFALL, 1909.

---

THE FORTY-NINTH ANNUAL VOLUME.

---

COMPILED FROM THE RECORDS OF MORE THAN

4600 OBSERVERS

BY

HUGH ROBERT MILL.

---

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

# Royal Geographical Society's Publications.

---

## THE GEOGRAPHICAL JOURNAL.

Monthly. Illustrated. Edited by the Secretary. Price (to non-Fellows), 2s.

## HINTS TO TRAVELLERS.

Edited for the Council of the Royal Geographical Society by E. A. REEVES, F.R.G.S., F.R.A.S. Ninth Edition, revised and enlarged. In two volumes, illustrated. Price 15s. net. (To Fellows at the Office of the Society, 10s. net).

Vol. I.—Surveying and Practical Astronomy.

Vol. II.—Meteorology and Climate (by DR. H. R. MILL); Photography, Geology, Natural History, Anthropology, Industry and Commerce, Medical Hints, &c.

## THE DISTRIBUTION OF RAINFALL OVER THE LAND.

By DR. A. J. HERBERTSON. With monthly maps of Rainfall. Price 5s. net. (To Fellows, 2s. 6d.)

## ON THE RESULTS OF A DEEP-SEA SOUNDING EXPEDITION,

In the North Atlantic in the summer of 1899, by R. E. PEAKE, M.Inst.C.E.; with notes on Temperature, Deep-Sea Deposits, &c., by SIR JOHN MURRAY, K.C.B., F.R.S. *Charts*. Price 5s. net. (To Fellows, 2s. 6d.)

## THE ANTARCTIC MANUAL,

For the use of the Expedition of 1901. Edited by GEORGE MURRAY, F.R.S., 1901. Pp. 586. *With a new chart of the Antarctic Regions*. Price, 15s. (To Fellows, 10s.)

~~~~~  
ROYAL GEOGRAPHICAL SOCIETY, 1, Savile Row, W.  
AND ALL BOOKSELLERS.

---

### RATES FOR ADVERTISEMENTS IN THIS MAGAZINE.

		One Insertion.	Six Insertions.	Twelve Insertions.	
WHOLE PAGE	...	30/-	26/-	22/6	} All Net.
HALF	...	16/6	14/6	12/6	
QUARTER	...	9/-	8/-	7/-	
EIGHTH	...	5/-	4/6	4/-	

*All applications for space to be made to*

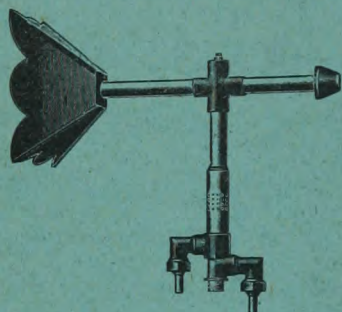
MR. H. A. COLLINS, 32, BIRDHURST ROAD, CROYDON.



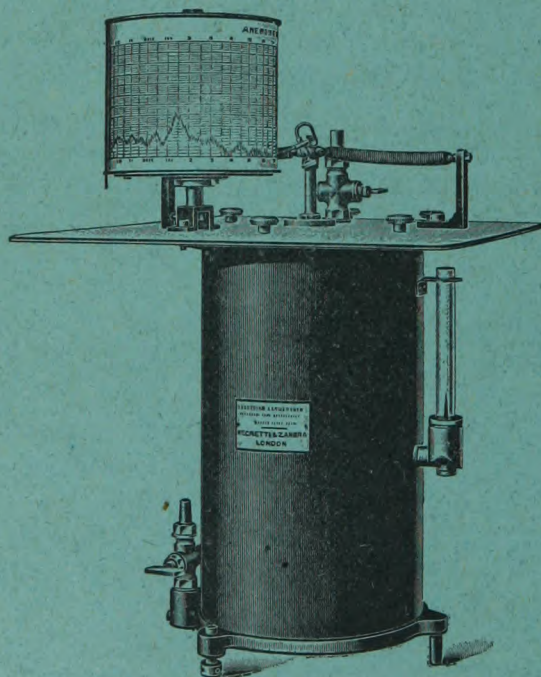
# The ANEMO-BIAGRAPH.

(Wind Force Recorder.)

HALLIWELL-DINES' PRINCIPLE.



PATENT  
No. 21973,  
1910.



Price £20 . 0 . 0.

FULL PARTICULARS POST FREE on application to the  
SOLE MAKERS:

**NEGRETTI & ZAMBRA,**  
*Scientific Instrument Makers,*  
**38, HOLBORN VIADUCT, E.C.**

Branches: 45, CORNHILL, E.C., and  
122, REGENT STREET, W., LONDON.

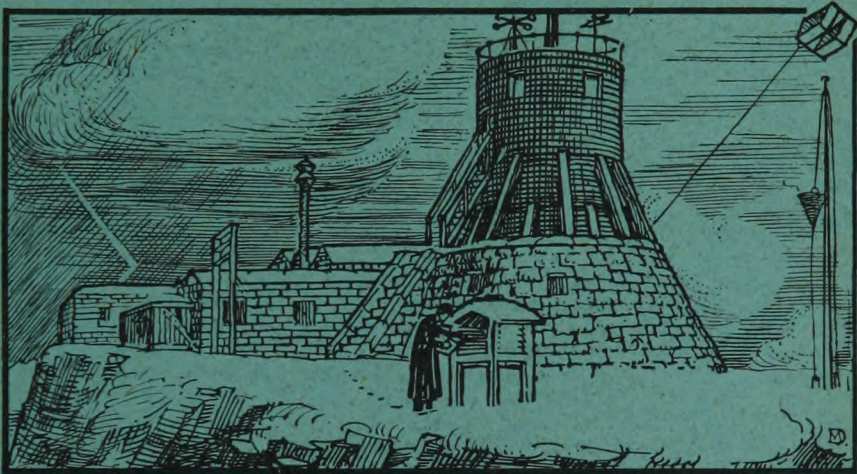
Telegraphic Address: "NEGRETTI, LONDON."

Telephone No. 583 HOLBORN.

SHIELD & SPRING, Lancelot Place, Brompton Road, S.W.



NO. 546 SYMONS'S VOL. 46  
 METEOROLOGICAL  
 ❄️ · MAGAZINE · ❄️  
 .... EDITED BY HUGH ROBERT MILL ....



JULY, 1911.

· CONTENTS ·

	PAGE
The Disappearance of Cloud at Full Moon. By WM. ELLIS, F.R.S.	105
Fall of Temperature in Bright Weather. By A. O. WALKER	106
Weather in the Seventeenth Century, Part II.; Summer. By WALTER SEDGWICK, M.A.	107
CORRESPONDENCE:—	
Movement of Rain in Thunderstorms. By J. FAIRGRIEVE	112
Destruction of Wind Vane by Lightning. B. J. HOPKINSON	113
Drought in the East of Scotland. Col. C. MCINROY, C.B.	114
Black Haze. By W. PIFFE BROWN	115
Curious Long-enduring Cloud. By W. F. DENNING, F.R.A.S.	115
Rothsay Rainfall in Spring and Summer. By A. B. M.	116
Heavy Rainfall in the North of England. By Hon. and Rev. W. ELLIS and W. F. VINT	116
Diurnal Range of Barometer in S. Nigeria. By C. A. A. BARNES	117
Balloon Ascents, Nov.—Dec., 1908. By W. H. DINES, F.R.S.	118
Royal Meteorological Society	119
High July Temperature in London	120
Meteorological News and Notes	122
Rainfall Tables for June, 1911	124
Meteorological Notes on June, 1911	127
Climatological Table for the British Empire, January, 1910	128

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

*Published on the 16th of each Month.*

*[Price 4d., or 5s. per Annum, Post Free.]*



## NOTICES.

It is requested that all Books for Review and Communications for the Editor be addressed to 62, Camden Square, London, N.W.

The responsibility for all facts and opinions expressed in the signed articles and letters published in this Magazine rests with their respective authors.

---

## AN IMPORTANT NEW WORK.

# WEATHER SCIENCE.

## An Elementary Introduction to Meteorology.

By F. W. Henkel, B.A., F.R.A.S., Member of the British Astronomical Association, etc. Illustrated. Large Crown 8vo., cloth, 6s. net. (Inland postage 4d.)

This work deals in a popular yet scientific manner with weather problems and prognostics, theories of atmospheric circulation, clouds, their various forms and movements, the winds, atmospheric electricity, local and seasonal variations, etc. An account is given of the principal instruments made use of by meteorologists, and the work of a "Second Order" Observatory, as well as some reference to standard and self-recording instruments. The author also deals with the results of recent research in the upper regions of the vast atmospheric ocean. The book is illustrated by photographs of cloud forms, drawings of instruments and apparatus, maps and diagrams, views of observatories, etc.

---

ON SALE AT ALL BOOKSELLERS.

T. FISHER UNWIN, 1, ADELPHI TERRACE, LONDON.

---

# DARTON'S HYGROGRAPH

(SELF-RECORDING HYGROMETER)

Showing at a glance on a revolving weekly chart the differences of temperature readings between the wet and dry bulbs, and the percentage of aqueous vapour held in suspense by the atmosphere.

The point of each pen of this instrument is set precisely on the same temperature-line and the same time-line on the chart—a great advantage over other Hygrometers.

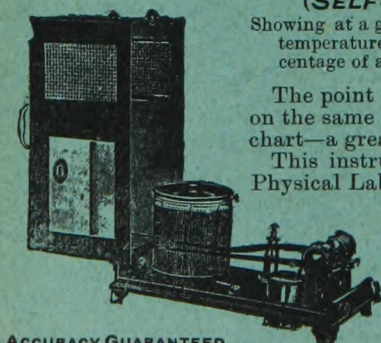
This instrument has been approved of by the National Physical Laboratory, Colonial Observatories and others.

It is compact, self-contained, without any projections liable to injury, and very portable.

Complete, with One Year's supply of Charts, 10° to 110° F., and Hygrometrical Tables,

£7 : 15 : 0

This instrument is a Thermograph as well as a Hygrometer.



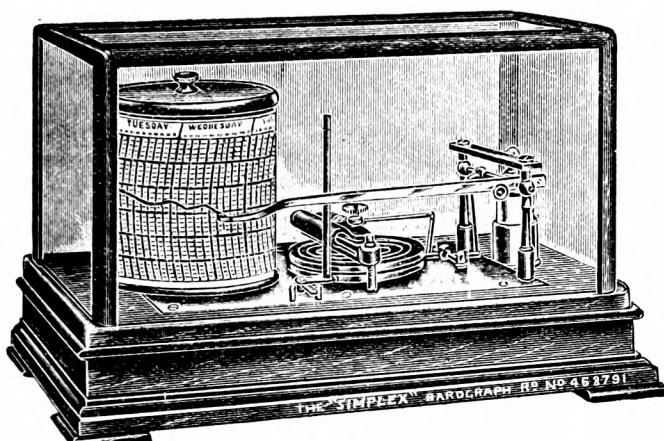
ACCURACY GUARANTEED.

Illustrated List of Standard Meteorological Instruments, post free.

**F. DARTON & Co., 142, St. John Street, London, E.C.**

GIFTS OF LASTING INTEREST.

ABSOLUTELY ACCURATE.

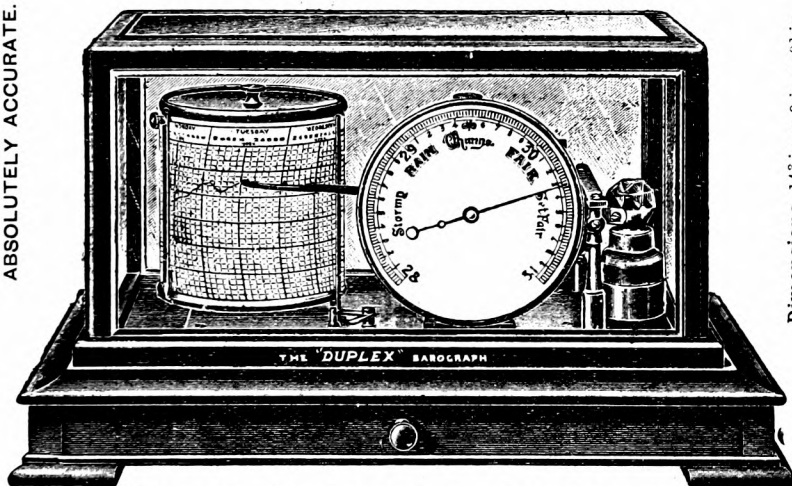


Dimensions, 13½ in. x 7½ in. x 8½ in.

### The "SIMPLEX" BAROGRAPH,

In Oak Case, glazed top and sides. Records on a Weekly Chart  
Price, with a year's supply of Charts, Ink and Instructions, complete, **£3 18 6.**

ABSOLUTELY ACCURATE.



Dimensions, 14½ in. x 9 in. x 8½ in.

### The "DUPLEX" BAROGRAPH,

With our new Opal glass dial attachment, showing present reading of the Barometer in addition to the record on the chart. Very best quality, in solid oak, walnut, or mahogany case, with bevelled edge plate glasses and chart drawer.

Price complete, with a year's supply of Charts, Ink, and Instructions, **£6 2 6.**

### The BARO-THERMOGRAPH.

(COMBINATION SELF-RECORDING BAROMETER AND THERMOMETER.)

☛ Special Illustrated List of Barographs and Thermographs (covering various patterns, from **£3 10s.**), post free.

**PASTORELLI & RAPKIN, LTD.** (ESTAB. 1750.)

ACTUAL MAKERS of *all kinds* of Meteorological Instruments.

CONTRACTORS TO H.M. GOVT.

**46, HATTON GARDEN, LONDON, E.C.**

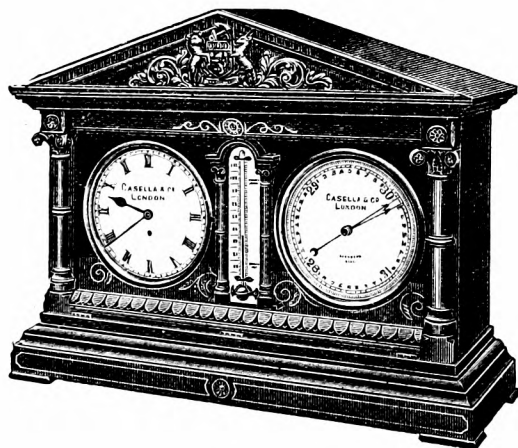
☛ Illustrated List of STANDARD INSTRUMENTS Post Free.

\*\* We pay carriage and guarantee safe delivery within U.K. on all our Instruments.



**C. F. CASELLA & Co., LTD.,**  
MAKERS OF  
**Meteorological, Surveying and Scientific Instruments**

To the Admiralty, Ordnance and other Home Departments, and to the  
Indian, Canadian, and all Foreign Governments.



**INSTRUMENTS FOR PRESENTATION.**

C. F. CASELLA & Co. make a special feature of instruments of good design, sound material and first-class workmanship for presentation purposes. Inquiries on this subject are invited.

The illustration above depicts a combined clock and barometer designed and made by us for use in one of the Colonial Houses of Parliament.

**11-15 ROCHESTER ROW, VICTORIA STREET,  
LONDON, S.W.**

*Telegraphic Address: "ESCUTCHEON, LONDON." Telephone: WESTMINSTER 5599.*

# Symons's Meteorological Magazine.

---

No. 546.

JULY, 1911.

VOL. XLVI.

---

## THE DISAPPEARANCE OF EVENING CLOUD AT FULL MOON.

By WILLIAM ELLIS, F.R.S.

IN your magazine for December last Mr. Denning, in an account of his observation of the lunar eclipse of the preceding month, makes reference to "the opinion held by Sir J. Herschel and others that the full moon possesses the faculty of clearing away clouds." Humboldt and Arago both held the same view. When first I became acquainted with these statements I felt that many years' experience as an astronomical observer at Greenwich had not given me the impression that evening tendency to clearance of the sky was in any way peculiar to the period of full moon, but rather that it existed in equal degree at all times, a conclusion that received confirmation from the statement of Admiral Fitzroy in his "Weather Book," to the effect that in fine weather there is a general tendency towards a disappearance of clouds soon after evening, "whether the moon is visible or not, whether full, or near any other period."

It then occurred to me to test the question by employing the observations of the amount of cloud made each two hours (twelve observations daily) at the Royal Observatory, Greenwich, in the years 1841 to 1847. Grouping together, during this period, the observations on the five days about full moon, and similarly the five days about new moon, there was found in both cases to be, on the average, a maximum amount of cloud in the forenoon, and a minimum amount in the evening. Now, if from any cause there was found to be a greater dispersion of evening cloud under a full moon than at the time of new moon, the evening amount of cloud at full moon should be considerably less than that at new moon, but there was no significant difference, the amount at the time of full moon being indeed slightly greater than that at new moon; thus giving no support to the supposition of lunar influence to disperse evening cloud. The result thus arrived at was given at length in a communication to the "Philosophical Magazine" for July, 1867.

Some years afterwards the Rev. S. J. Johnson (in the "Monthly Notice" of the Royal Astronomical Society for January, 1894) dealt

also with this question in a different but very practical way. He says that he noted "the state of the sky at moonrise and at midnight on the day of full moon for the past fifteen years [1879 to 1893] with the result that there is no foundation for the theory referred to." What he found is that of 186 occasions of full moon during the period mentioned, in 126 cases there was a similar sky "when full moon rose and at midnight," in 33 cases the sky was "clearer about midnight than at moonrise," and in 27 cases was "more overcast about midnight."

The two methods thus employed cannot be said in any way to support the view that there is greater tendency of the evening cloud to disperse under a full moon rather than at any other period, or indeed that the moon has any concern therewith. It may be asked how has belief in the existence of such tendency arisen. An attempted explanation that I gave in the before-mentioned "Philosophical Magazine" paper may be here reproduced. The Greenwich observations of amount of cloud show, as before mentioned, a maximum in the forenoon and a minimum in the evening, and this presumably represents the usual climatic variation. Thus diminishing evening cloud at or near full moon coincides with the rising of the moon and her advance towards the meridian, the ascent of the moon and the diminishing cloud giving an appearance and, indeed, an impression of *cause* and *effect*. Now, the change from a cloudy to a clear state of the evening sky is much more likely to attract attention when occurring near to full moon, for with no moon the disappearance of cloud, though making visible the stars, does little to change the general aspect of the evening, but under a full moon the disappearance of evening cloud, especially in the winter, entirely changes the whole appearance of nature, the splendour of the night in comparison with the previous dulness attracting the attention of even the most casual observer.

From what has been said it follows that the disappearance of evening cloud is not more prevalent at full moon than at other parts of the lunation. But when it occurs at full moon the circumstance is more open to general observation, although otherwise it has no significance. On the other hand, clouded nightly skies are quite as prevalent at full moon as at any other period. In both cases being atmospheric variations with which the moon seemingly can have no concern.

### ~~~~~ FALL OF TEMPERATURE IN BRIGHT WEATHER.

THE remarkable fall in the temperature shown by the following figures, *with practically continuous sunshine* during the daylight hours, seems worth recording. The change began on the afternoon of the 6th, with a N.E. wind increasing from 4 to 8, Beaufort scale.

	June	5th	6th	7th.
Max. in shade.....	82°·1	.....	74°·0	..... 60°·0

ALFRED O. WALKER.

*Ulcombe Place, nr. Maidstone, 3rd July, 1911.*

## WEATHER IN THE SEVENTEENTH CENTURY.

By WALTER SEDGWICK, M.A.

## PART II.—SUMMER.

IN Part I. (see this Magazine for May, 1911) extracts were given from the diaries of John Evelyn, F.R.S., and Samuel Pepys, F.R.S., describing the spring weather in and near London in the second half of the Seventeenth Century, and the question was considered whether these extracts indicated a permanent change in the climate of London between that era and the present time. In this number extracts are given from these diaries describing the weather of summer (June, July, August) with a view to considering further the same question. In order to make a true comparison between the weather in the time of Evelyn and the weather of to-day, allowance must be made, as explained in the Introduction to this series of articles, for the alteration of the Calendar from the Julian, or Old Style, to the Gregorian, or New Style, and the quotations from the diaries have to be post-dated 10 or 11 days. It is further necessary to bear in mind that the diarists would be disposed to chronicle all the occurrences in the weather which were of an exceptional character, but to say little about weather of a normal type, and that they had not the use of instruments such as the barometer, thermometer and rain gauge, without which absolute accuracy in comparisons between the weather of different years cannot be obtained.

The observations on the summer weather, which are found in the two diaries, are more numerous than those on the spring weather, but as many of the former relate only to severe thunderstorms, or other weather conditions of a purely temporary character, it is more difficult to form an opinion as to the general type of summer weather which occurred during the lifetime of the diarists than it was in the case of the spring weather. It is, nevertheless, apparent that the summers in the Seventeenth Century were neither consistently fine and dry nor consistently cold and wet, and presented as great contrasts in weather as do the summers of the Twentieth Century. The most noticeable event was the great drought of 1684. This followed an exceptionally severe winter and a cold late spring, and was succeeded by another severe winter and early summer drought. In fact, for a period of eighteen months (January, 1684, to June, 1685) weather of a Continental type, with a large annual variation of temperature and a very small rainfall, prevailed over London and its neighbourhood.

It is, however, in years of bad summers that assertions of a change of climate are most frequently heard, and attention is principally directed to the years in which bad summers were experienced in the time of Evelyn. The worst summer was doubtless that of 1692, but prolonged bad weather also occurred in the summers of 1648, 1658, 1663, 1686, 1687 (June), 1693 (June), 1695 (August), 1696 and 1703, and excessive cold is referred to on several occasions, *e.g.*, on 12th

June, 1658. During the 54 years which elapsed between the return of Evelyn from his continental travels in 1652 and his death in 1706, there are two periods during which fairly continuous weather observations are given either by him or by Pepys, *i.e.*, 1656 to 1669 and 1681 to 1705. In the former period, covering 14 years, there were two noticeably bad summers, 1658 and 1663, and one which was certainly very fine, 1665, the plague year; of the others it is impossible to form any reliable opinion, but the presumption is that they were of a normal type as, had they been abnormally fine or bad, the fact would probably have been recorded. In the latter period, covering 25 years, bad summers appear to have been more frequent. Four were altogether bad, 1686, 1692, 1696 and 1703, and three others bad at any rate for a month, 1687, 1693 and 1695, but it is necessary to remember that during this period Evelyn was an old man, and would have been more inclined to classify a summer as cold and ungenial than he would have been in his younger years. So far as information is given, the summer weather of this period may be briefly described as follows:—

1681—June, prolonged drought.	1693—Early wet, late fine.
1684—Prolonged drought.	1694—Fine.
1685—June, prolonged drought.	1695—August wet and cold.
1686—Very wet.	1696—Very wet and unsettled
1687—June stormy.	1699—Hot and dry.
1689—June fine.	1700—June fine.
1690—August, early fine, late cold and wet.	1701—Early hot, late unsettled.
1691—August hot and thundery.	1703—Wet and cold.
1692—Very wet.	1705—June dry and hot.

The accounts given of the summers in this period of 25 years indicate a marked oscillation of climate, as in the first five years there was a tendency to prolonged drought, in the next eleven years to rain and bad weather, and in the last nine years to warmth and fine weather, but when the description of the weather over the whole period covered by the two diaries is considered, it appears that good and bad summers and dry and wet summers occurred with about the same frequency as in the present age, and, not only is there no evidence to justify any positive assertion that the climate of London has changed since the Seventeenth Century, but considerable reason for thinking that the summer weather occurring in a long period of years was, on the whole, much the same then as it is now.

*Note.*—In the following extracts the dates *have been corrected* to New Style, except where (O.S.) occurs.

Extracts from Pepys's diary are distinguished thus—(P.); all other extracts are from Evelyn's diary.

1636. This year being extremely dry the pestilence much increased in London and divers parts of England.
1648. A most exceeding wet year.

1652. 21 June.—Weather hot.  
       5 July.—After a drought of near four months, there fell so violent a tempest of hail, rain, wind, thunder and lightning, as no man had seen the like in his age; the hail being in some places 4 or 5 inches about, brake all glass about London, especially at Deptford, and more at Greenwich.
1656. 17 to 21 July.—Excessive hot.
1657. 31 August.—A most prodigious rain in London, the year was very sickly in the country.
1658. (a) 12 June.—An extraordinary storm of hail and rain, the season as cold as winter, the wind northerly near six months. (13th). A large whale was taken near Greenwich . . . length 58 ft., height 16.  
       (b) 28 August.—A tempestuous wind which threw down my greatest trees at Sayes Court, and did much mischief all over England. It continued the whole night and till three in the afternoon of the next in the south-west and destroyed all our winter fruit.
1660. 3 July.—Rain all the morning. (P.)  
       (c) 15 ,, —Exceeding rain all day. (E.) Rain all the morning. (P.)
1662. 29 July.—It raining hard upon the water [the Thames] . . . the King came by in his barge going down towards the Downes . . . but methought it lessened my esteem of a king, that he should not be able to command the rain. (P.)  
       30 ,, —A great storm on the Downes; damage to shipping. (P.)
1663. 26 July.—A most extraordinary wet and cold season.  
       31 ,, —This day the Parliament kept a fast for the present unseasonable weather. (P.)
1664. 11 June.—A storm of hail. (P.)  
       21 ,, —Very warm and pleasant. (P.)  
       26 August.—2.0 a.m.—A severe thunderstorm, with such continued lightnings, not flashes but flames, that all the sky and air was light . . . not a minute's space between, new flames all the time . . . with such a storm of rain as I never heard in my life. (P.)
1665. (d) 17 June.—The hottest day that ever I felt in my life. (P.)  
       (d) 26 July.—Most extraordinary hot that ever I knew it. (P.)
1666. 26 July.—A wonderful dark sky, and shower of rain this morning. At Harwich a shower of hail as big as walnuts. (P.)
1667. 6 August.—It raining hard this day all day to our great joy, it having not rained, I think this month [July O.S.] before. (P.)
1668. 1 June.—It rained very hard all this day. (P.)  
       2 ,, —To Bishop Stortford. The ways are mighty full of water, so as hardly to be passed. (P.)  
       4 ,, —To Cambridge. The waters not being now so high as before. (P.)
1669. 9 June.—To the Park whence the rain sent us suddenly home. (P.)
1675. An exceeding dry summer.



1681. 4 June.—There had scarcely fallen any rain since Christmas.  
 22 „ —It still continued so great a drought as had never been known in England, and it was said to be universal.
- 1684(e) 12 July.—There had been an excessive hot and dry spring and such a drought still continued as never was in my memory.  
 23 „ —Some small sprinkling of rain, the leaves dropping from the trees as in autumn.  
 20 August.—We had now rain after such a drought as no man in England had known.
1685. 3 June.—We had hitherto not any rain for many months, so as the caterpillars had already devoured all the winter fruit through the whole land, and even killed several greater old trees. Such two winters and summers I had never known.  
 24 „ —Such a dearth for want of rain as never was in my memory.  
 27 „ —The exceeding drought still continues.  
 8 July.—We had now plentiful rain after two years' excessive drought and severe winters.
1686. 12 June.—Such storms, rain and foul weather seldom known at this time of the year. The storms being succeeded by excessive hot weather.  
 30 „ —An extraordinary season of violent and sudden rain.  
 23 July.—The season very rainy.
1687. 3 July.—Hitherto a very windy and tempestuous summer.
1689. 3 July.—An extraordinary drought.  
 21 „ —An unusual and violent storm of thunder, rain and wind . . . such was the impetuosity of the wind as to carry up the waves [on the Thames] in pillars and spouts most dreadful to behold, rooting up trees and ruining some houses.
1690. August.—Hitherto (25th August, O.S.) it had been a most seasonable summer. A very extraordinary fine season.  
 22 „ —A very great storm of thunder and lightning.  
 25 „ —The season much changed to wet and cold. Unseasonable and most tempestuous weather.  
 27 „ —An extraordinary sharp cold east wind.
1691. 5 August.—An extraordinary hot season, yet refreshed by some thunder showers.  
 23 „ —Thunderstorm, rain and wind very violent.
1692. 19 June.—An exceeding great storm of wind and rain, in some places stripping the trees of their fruit and leaves as if it had been winter, and an extraordinary wet season with great floods.  
 5 July.—This whole summer was exceeding wet and rainy; the like had not been known since the year 1648, whilst in Ireland there had not been known so great a drought.  
 24 August.—Still an exceeding wet season.

1693. 4 July.—A very wet hay harvest and little summer as yet.  
 16 August.—Very lovely harvest weather . . . but no garden fruit.
1694. 13 June.—Seasonable showers.  
 11 July.—Glorious steady weather, corn and all fruits in extraordinary plenty generally.  
 15 August.—Stormy and unseasonable wet weather this week.
1695. 7 August.—A very wet season.  
 21 „ —The weather now so cold that greater frosts were not always seen in the midst of winter; this succeeded much wet and set harvest extremely back.
1696. 1 July.—An exceeding rainy cold unseasonable summer.  
 17 „ —A northern wind altering the weather with a continual and impetuous rain of three days and nights changed it into perfect weather.  
 22 „ —Very unseasonable and uncertain weather.
1699. 21 June.—After a long drought, we had a refreshing shower.  
 5 July.—The heat has been so great almost all this month (June O.S.) that I do not remember to have felt much greater in Italy, and this after a winter the wettest, though not the coldest, that I remember for fifty years last past.  
 2 August.—Seasonable showers after a continuance of excessive drought and heat.
1700. 13 June.—A sweet season with a mixture of refreshing showers.
1701. August.—The weather changed from heat not much less than in Italy or Spain for some few days to wet, dripping and cold, with intermissions of fair.
1703. 24 June.—Rains have been great and continued, and now near Midsummer cold and wet.  
 5 August.—The last week in this month (July O.S.) an uncommon long continued rain, and the Sunday following thunder and lightning.
1705. June.—The season very dry and hot.

---

NOTES.—(a). Another occasion when a whale came up the Thames is mentioned by Evelyn in April, 1699.

(b). Possibly there is some mistake in this date, and the gale referred to is that which occurred on the 30th August (O.S.), 1658, and is associated with the last illness of Oliver Cromwell, who died 3rd September (O.S), 1658.

(c). The day of the state visit of Charles II. to the City after the Restoration.

(d). The summer of the great plague in London.

(e). This summer followed the severe winter of Frost Fair. Evelyn describes great cold up to the 14th April.

---

## Correspondence.

*To the Editor of Symons's Meteorological Magazine.*

---

### MOVEMENT OF RAIN IN THE THUNDERSTORM OF MAY 31st, 1911.

THE thunderstorm which occurred on Derby Day, May 31st, in and around London was so severe that very many people, who otherwise take little note when rain falls, were compelled to fix in their memory the time at which the rain began and ended. It seemed therefore a convenient opportunity to make some attempt to trace the course of the rainstorm, as distinct from the total rainfall, in a more accurate way than has been done hitherto, as far as the writer knows. The preliminary results are given below; the account of the methods adopted and the discussion of the meaning of the results are reserved till later.

Soon after mid-day rain began to fall over two districts which lie to the north and to the south-east of Hertford respectively. The former fall gradually moved westwards and south-westwards. By 2 o'clock the rain was falling over an area which was some four or five miles wide, the longer axis of which lay north-east from St. Albans.

Then developments took place quickly. In another quarter-of-an-hour the longer axis of the storm had moved so that it lay about north and south, and rain was falling over an area that extended from beyond Hitchin on the north for some twenty miles to the south of that town. By 2.30 the rain was falling three or four miles farther south still. Meantime, the rainstorm which originally was south-east of Hertford, seems to have moved westward, and about this time coalesced with what had developed into the main storm. By 3 o'clock rain had reached Acton and was falling on an area more than 30 miles long from north to south, and about eight miles wide.

After this time the disturbance ceased to expand, but continued to move slowly southwards, the axis turning slightly anticlockwise. By 3.15 rain had ceased to fall over Hitchin, but had reached the Thames. By 4 o'clock Wimbledon was reached, the axis of the storm now extending from that town to King's Langley.

Shortly after this there was a fresh development. Rain appears to have begun to fall at Crowborough Beacon, in Sussex, and on the area to the north-west of it; this, it will be noticed, lies on a prolongation south-eastwards of the axis of what may be called the main storm. By 5 o'clock the rain of the main storm had reached the North Downs a little to the east of Epsom, the axis of the rain area now lying from Banstead to Watford.

Then the storm appears to have entered on another phase. Without extending much farther southward than the southern edge of the North Downs, the main area broadened out to the north-west-

ward, so that by 6 o'clock rain was falling over a rhomboid-shaped area, two sides of which roughly lay parallel to the North Downs and two sides parallel to a line from Caterham to Harrow. Simultaneously with this development, or perhaps a little earlier, rain began to fall on well-defined small areas in north and south London. As these grew, the general movement of the main storm, which till this time had been on the whole somewhat S.S.W., appears to have been reversed. The rain over the areas north and east of Guildford, which had never been heavy, ceased entirely. Over the rest of the south-west area on which rain was still falling, that rain was light. At 7 o'clock the distribution of rainfall was very complicated, but, speaking roughly, the isolated patches of rainfall over London had "run together" and become the main storm. Thereafter the rain extended north-westwards and north-eastwards. The eastward advance reached, on the whole, its farthest limit about 7.30, when the front of the storm lay along an irregular line north-west and south-east through the City.

From that time onwards the rain for the most part decreased in volume, and the rain area broke up into patches and then decreased in size. By 8.15 the most considerable of these patches extended for some three miles round the south of Hampstead. This gradually shrank, and though by 8.45 it was the only important area on which rain still fell, the rain there was slight. Shortly thereafter rain ceased entirely.

I should be glad if further information could be sent by anyone who remembers any periods, however short, on Derby Day on which either (1) rain fell, or (2) rain did not fall, the one fact being as important as the other. The exact place of observation should be stated.

J. FAIRGRIEVE.

3, Friern Barnet Road, New Southgate, London, N., 1st July, 1911.

[From Mr. Fairgrieve's position as the master of a large day school to which pupils come from all parts of London, he had special facilities for obtaining particulars as to the hour of occurrence of rain in the great thunderstorm to which he referred, and he has set out the facts on a number of interesting sketch maps. We hope that many of our readers may be able to help him in completing his interesting investigation. — Ed. S.M.M.]

## DESTRUCTION OF A WIND VANE BY LIGHTNING.

A LARCH planted here in 1874 was cut down in 1900 owing to overcrowding, and made into a pole for a wind-vane, mounted on an iron tube 4 feet long, with the usual letters below the vane denoting the four points of the compass. It was set up in the far corner of a tennis lawn, divided from a meadow of  $4\frac{1}{2}$  acres by a continuous iron fence, the pole standing 35 feet high about 100 yards from my house

in a very open position. In the thunderstorm of Thursday, 11th May, it was struck by lightning and destroyed.

I was in London at the time, but was informed that the storm was the most terrific ever known to have occurred here. It commenced soon after 3 p.m., with rain and hail from about 3.30, and lasted until 5 p.m., and in the hour and a half 1.90 in. of rain fell, nearly all between 3.30 and 4.30, described as at one time like a solid sheet of water rather than drops, and doing much damage to flowers and immature fruit. The vane was struck at 3.35 p.m. My gardener describes the noise made as first a crackling, followed immediately by a crash like a large sheet of glass being smashed to atoms. The vane itself does not show any sign of damage from the lightning; it was broken to pieces by being thrown to the ground, damaging the iron fence in its fall; nor does the pole for two feet below the iron cap on its summit into which the tube supporting the vane was screwed, for which distance there is an old split in the centre. The break, commencing at the close of this split, but from the outside of the pole, caused a total length of 17 feet from the top of the vane to be thrown down; another piece, 12 feet long, was thrown a few yards away, and smaller pieces were scattered in an irregular ellipse about 190 feet long and 100 feet wide, the pole being nearly in the centre. About 20 feet of the pole is standing, with a narrow piece cut out down to the ground, the broken length mentioned overlapping. Small pieces were driven into the ground like arrows shot from a bow.

During the worst of the storm two horses (not mine) which were in my meadow, stood in the centre, as far as possible away from fence or tree. A neighbour saw a ball of fire roll along his lawn, and felt a queer momentary burning sensation at the time.

JOHN HOPKINSON.

*Wreetwood, Watford, 25th May, 1911.*

### DROUGHT IN THE EAST OF SCOTLAND.

I THINK it worth while to record that on the 15th May .01 in. of rain was recorded here, and since that date the only rainfall until 15th June (inclusive) were .13 in. on 26th May (a heavy plump occurring about 3 a.m. of 27th) and .02 in. on 13th June, *i.e.*, .15 in. in a full month.

I may add that at a distance of less than two miles from this to the north-east not even the .13 in. shower was experienced.

On the morning of the 17th I took off .15 in., which fell after 4 a.m., and yesterday .21 in. For the 18th *nil*. We are quite burnt up, and the nights of the 14th and 15th being frosty (5° of frost recorded in a district four miles from this), potatoes were blackened.

CHAS. MCINROY.

*The Burn, Edzell, Brechin, 19th June, 1911.*

### BLACK HAZE.

REFERRING to Mr. G. Dawson Lewis's observations on "Black Haze and Lancashire Smoke" in the May number, black haze is common here during the prevalence of north-easterly winds. In the country one often hears the remark, "Oh, it is blight," but if you ask what sort of blight could produce such obscurity, of course no explanation is ever forthcoming. In his book on "Weather Forecasting" Mr. Grainger devotes a short chapter to the subject, but does not suggest that it arises from smoke. On p. 61 he says, "The air becoming calm and the cold northerly air pressing forward, condensation takes place, the haze will form and slowly advance from the north." And, again, on p. 62, "This haze must be caused by the pressure of a cold northerly or easterly air current upon a warmer atmosphere."

If the black haze of North Wales is caused by the smoke from the Lancashire chimnies, the smoke from the chimnies of the "Black Country"—Staffordshire and neighbourhood (distant in a north-easterly direction only about 60 miles)—may be accountable for that which occurs in this direction, but it would be interesting to know if there are *any* favoured spots in this country where black haze is *unknown*. Perhaps some of your readers can say?

W. PIFFE BROWN.

*Belgrave Road, Gloucester, 22nd May, 1911.*

---

### CURIOUS LONG-ENDURING CLOUD.

ON Good Friday evening, April 14th, at 8.30, I saw in due E. a faint pillar-shaped cloud, looking much like a comet's broad tail. Its position was  $12^{\circ}$  S.S.E. of Arcturus, the centre of the streak being in about  $218^{\circ} + 10^{\circ}$ , and it was some  $6^{\circ}$  long and  $1^{\circ}$  broad. It moved very slowly, the upper part travelling faster than the lower. At about 9.25 the cloud crossed the upper part of the moon and pointed directly to the bright planet Jupiter then shining a few degrees E.N.E.

The cloud had travelled  $25^{\circ}$  in 55 minutes from above E. to E.S.E. and had rotated through  $90^{\circ}$ , the major axis being vertical at 8.30 and horizontal at 9.25. When the cloud encountered the moon's upper side, that region of our satellite assumed a brilliant turquoise blue colour, and this showed for some time afterwards.

I do not think the cloud band was formed by the luminous residue of a meteor-streak. But it was noticed as a special object by many people here who thought it might be a comet's train. If any meteorological observers at Bath, or places east of Bristol, noticed the cloud and recorded the positions, I should be glad to have details for the purpose of calculating the height and direction of motion.

W. F. DENNING, F.R.A.S.

*Bristol, 15th April, 1911.*



## ROTHESAY RAINFALL IN SPRING AND SUMMER.

THE rainfall of spring and summer (March to August) in Rothesay shows an average of about 20·30 in., reckoning from 1800 to 1906 (spring 9·00 in., summer 11·30 in.).

It may be of some interest to know that the total fall of the last five spring-summer seasons (1906-10) "breaks the record," apparently. That is, it is the wettest group of five consecutive spring-summer seasons since 1800. The amount is 125·00 in.; the highest before was 121·70 in. in the group about 1860. All five springs were wet, also summers, except 1906. The springs since 1903, indeed, all show excess, this year included. The smoothed curve of those five season values shows gradual rise on the whole since 1885, the group about which had only 86·30 in. A.B.M.

## HEAVY RAINFALL IN THE NORTH OF ENGLAND.

FROM midnight on Friday to midnight on Saturday, the 24th, there fell 3·45 in. of rain here. I happened to be out at that hour each night, and measured the fall. This is a record for 24 hours here for 34 years. The next highest was 3·22 in. on October 26th, 1900, and October 8th, 1903. In 1903 ·54 in. fell the following day; in 1900 ·17 in. fell the preceding day; but in each of those days the measurement was taken as usual at 9 o'clock.

The total rainfall for the month of June in the low gardens, 35 ft. above the sea level, was 5·19 in., as against 4·79 in. at the higher level, 137 ft., and for the two days, June 23rd and 24th, it was 1·20 in. and 2·53 in., total 3·73 in., against 3·56 in. As 3·45 in. fell on the higher level in the 24 hours, we may deduct about the same from the lower level measurement; so about 3·62 in. fell in the 24 hours from midnight to midnight. It was by my fortunate measurement of the gauge at midnight that I could deduct what fell afterwards during the night. In most returns the fall will seem to have been spread over two days. I have two sets of rain gauges of three each on the different levels, so there can be no mistake.

WILLIAM ELLIS.

*Bothalhaugh, Morpeth, July 3rd, 1911.*

I SEND note of rainfall which began here at 7.35 p.m. on Friday, June 23rd, the day having been up to that hour a very charming summer's day. The persistency and severity of the rain-storm has not been equalled in this district for many years, probably not since October, 1900.

24th—9 0 a.m. gave	1.36 in.
10.0 a.m. „	·31 in. )
noon „	·27 in. )
7.35 p.m. „	·96 in. )
25th—9.0 a.m. gave	·32 in. )
	1·86 in.

Thus it will be seen that for 24 hours ending 7.35 p.m. on the 24th 2.90 in. had fallen, or early this morning, for the rain temporarily ceased, 3.22 in. for 36 hours.

W. F. VINT.

*The Cedars, Sunderland, June 25th, 1911.*

[The daring forecast by Mr. Mossman of a wet summer in the north of England, given in our last number, lends a special interest to the foregoing letters. The storm beginning on June 23rd, after the Royal Progress through the London streets, brought a rainfall of more than an inch in the south of England, increasing along the east coast to the north, exceeding 2 inches in Lincolnshire, exceeding 3 inches in Durham, and culminating in an area with more than 4 inches for the three days, June 23rd to June 25th, in Northumberland and Berwickshire. So far as we can interpret the weather charts, the depression producing this deluge came from the north-west, but on the 24th, at 7 a.m., when the centre was over the Wash, it doubled back to the north-east, the area to the left of the track getting the heaviest rain both times, being the east of Northumberland, Durham and Berwickshire. Less than an inch fell on the west coast of the north of England and south of Scotland.—Ed. *S.M.M.*]

## DIURNAL RANGE OF BAROMETER IN SOUTHERN NIGERIA.

REGULAR observations are being made here to determine the mean position and variations of the barometric wave, of which results will be submitted later. In the interim, it may be of interest to know of the following approximate mean corrections which have been obtained by Mercurial No. C 885 (J. Hicks), at an elevation of about 15 feet above mean sea level, viz :—

At 6 a.m. ....	+0.016 in.	At 1 p.m. ....	+0.008 in.
7 „ ....	—0.015 „	2 „ ....	+0.030 „
8 „ ....	—0.037 „	3 „ ....	+0.044 „
9 „ ....	—0.047 „	4 „ ....	+0.049 „
10 „ ....	—0.047 „	5 „ ....	+0.046 „
11 „ ....	—0.036 „	6 „ ....	+0.035 „
12 noon ....	—0.018 „		

The maximum and minimum readings, it will be observed, occur at about 9.30 a.m. and 4 p.m. respectively ; whilst the daily mean occurs about 6.30 a.m. and 1 p.m. The above results cover a period of about 2 years (1908-1910).

CHAS. A. ALBERT BARNES, Assoc.M.Inst.,C.E.

*Lagos Observatory, 4th May, 1911.*

## BALLOON ASCENTS, NOVEMBER—DECEMBER, 1908.

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

*November 5th, 1908.*

Starting Point.	Country	A miles.	B ° F.	C miles.	D ° F.	E miles.	F
Pyrton Hill....	England ....	6·5	—53	10·9	—48	26	S.E. by E.
Brussels .....	Belgium ....	7·9	—89	18·1	—	50	S.S.E.
Hamburg.....	Germany....	7·3	—71	8·6	—62	109	S.S.E.
Lindenberg....	„ ....	6·9	—78	12·9	—74	58	S.E. by S.
Paris.....	France.....	—	—	11·3	—71	26	S.
Strassburg ....	Germany....	7·4	—81	10·9	—76	67	
Vienna .....	Austria.....	6·8	—71	11·3	—69	59	S.E. by E.
Pavlovsk ....	Russia .....	7·7	—54	9·4	—60	31	S.E. by E.

A remarkably uniform and extensive air current from the N.W. prevailed over Europe on this occasion. The temperatures seem to have been very irregular, the large difference of 36° F. being shown between the comparatively near stations of Pyrton Hill and Brussels. With regard to the extreme height of 18·1 miles recorded at Brussels it should be remembered that a very small error in the pressure, the element that is measured, involves at such a height a very large error in the height. An error of 1·5 mm., or ·06 in. makes a difference of 1 km., or  $\frac{5}{8}$  of a mile. On the actual trace drawn on smoked metal this is about  $\frac{1}{250}$  part of an inch, and this statement shows how difficult an even approximate determination of such heights is.

A high pressure area lay to the north and north-west, and a low pressure area to the south and east.

*December 3rd, 1908.*

Starting Point.	Country.	A miles.	B ° F.	C miles.	D ° F.	E miles.	F
Manchester....	England ....	6·9	—88	9·4	—70	50	S.E.
Brussels .....	Belgium ....	7·6	—96	8·4	—88	125	S.E.
Paris .....	France .....	7·3	—85	9·6	—76	17	S.E. by E.
Strassburg ....	Germany....	7·6	—96	11·2	—88	45	S.E. by E.
Munich .....	„ ....	7·9	—87	8·6	—78	38	S.E. by E.
Vienna.....	Austria ....	8·3	—85	11·4	—80	85	S.E. by E.
NizhniOlchidaeff	Russia .....	7·7 ?	—78	—	—	81	E.S.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.

As on November 5th an extensive north-west current of air is shown. An extensive high pressure area, united with the Atlantic anticyclone, lay over Central Europe, while a depression was passing in the north from Iceland to Russia.

~~~~~

## ROYAL METEOROLOGICAL SOCIETY.

THE second afternoon Meeting for the present session was held on Wednesday, June 14th, at the Society's rooms, 70, Victoria Street, Westminster, Dr. H. N. Dickson, President, in the chair.

Dr. C. Chree, F.R.S., read a paper on "The Diurnal Inequality of Barometric Pressure at Castle O'er, Dumfriesshire," in which he gave the results of a discussion of the barograph records kept by the late Mr. R. Bell during the seven years 1902 to 1908. These results show a well marked principal maximum and minimum at 10 p.m. and 5 a.m. respectively. Every single year agrees in this except 1908, which puts the maximum at 7 a.m. The existence of a secondary maximum and minimum is unmistakable, but while the hour of occurrence of the former is clearly 11 a.m., that of the latter is less distinct. It seems to be 4 p.m., but a longer series of observations would have been necessary to confirm this.

Mr. W. W. Bryant said that there were distinct differences between the curves at Castle O'er and at Greenwich, especially in the relative importance of the maxima and minima. The Greenwich principal minimum was always in the afternoon, except in January, and the principal maximum nearly always at 10 a.m.

Dr. W. N. Shaw hoped the paper would encourage other Fellows to do something in the way of discussing barograph records. It was desirable to find out whether any of the diurnal variation of the pressure was due to variation in the temperature and the want of accurate compensation in the barograph for temperature.

Mr. E. Gold said that the diurnal variation in the lower part of the atmosphere decreased as one went upwards, so that, as Castle O'er was higher than many other stations, it would be expected on this account to have a smaller amplitude for the diurnal variation; the semi-diurnal variation would decrease to some extent, and the phase angle become less.

Dr. C. Chree, in reply, said that with regard to the amplitude of the 8-hour term, the suggestion that its large size in winter was due to the day making a closer approach to one-third of the 24 hours had something to be said for it. In the case of the 12-hour term at the British stations, the amplitude did appear to be the largest near the equinoxes.

Mr. Spencer C. Russell read a paper on "Rain Drop Experiments," in which he gave an account of a number of interesting experiments which he had carried out at Epsom during the last two years in order to obtain a permanent record of the variations in the size of rain-drops as they occurred. The first method employed was the exposure of a number of ruled slates, divided into quarter-inch sections, and gently brushed over with an even coating of oil. This was not altogether satisfactory, as, during heavy rain, the drops impinged upon the slate with such force as to become broken up into a series of drops composed of one large and a number of small ones. The most

satisfactory results have been given by the use of plaster of Paris. Mr. Russell exhibited to the Meeting a number of rain-drop models obtained by letting the drops fall into dry plaster of Paris. He stated that the sizes of the drops which he had already collected were, 7 of 6 mm., 44 of 5 mm., 73 of 4 mm., 222 of 3 mm., 257 of 2 mm., 175 of 1 mm., and 107 of less than 1 mm.

Mr. E. Gold said that the Society was indebted to Mr. Russell for his investigations into what might be called the details of Meteorology.

A joint paper by Mr. A. J. Makower, Dr. W. Makower, Mr. W. M. Gregory and Mr. H. Robinson was also read, describing the experiments which they carried out last August at Ditcham Park, near Petersfield, in Hampshire, to investigate the electrical state of the air at different heights above the ground by means of kites and balloons.

The following gentlemen were elected Fellows of the Society:—Mr. J. Dunn, Assoc.M.Inst.C.E., Prof. W. W. Holland, Ph.D., Mr. M. T. Oung, and Mr. M. H. Tagg.

~~~~~

## HIGH JULY TEMPERATURE IN LONDON.

JULY opened under cloudy conditions with low temperature, but before the close of the first week the newspaper press of the country was loudly acclaiming the unprecedented nature of the heat which was held to account for many deaths in those parts of the country where its intensity was most keenly felt. The shade maximum temperature at Camden Square showed a continuous rise from the 1st to the 8th, each day being warmer than its predecessor. Temperature exceeded 80° on each day from the 5th to the 8th, the highest reading being 90°·0 on the 8th. This temperature has not been reached since the great heat of September, 1906, during which 94°·0 was registered on the 2nd. It is a striking fact that, although July is normally the warmest month of the year, the thermometer has not registered 90° in that month since 1900. In that year July was a month of great heat, with 5 days showing a record of 90° or above. On the 16th of July, 1900, the thermometer registered 95°·2, which is the highest shade temperature recorded in 54 years. It must be explained that the temperatures dealt with here are those recorded on the Glaisher stand, which is usually held to give extreme temperatures rather more extreme than those recorded in a Stevenson screen.

The following table shows, in striking contrast, the difference between the maximum temperatures on July 5th—8th, and those recorded in the corresponding days of last year, which were unusually cool.







## Maximum shade temperature.

	1910.	1911.	Difference
July 5th	67 <sup>o</sup> ·7	81 <sup>o</sup> ·4	13 <sup>o</sup> ·7
„ 6th	66·2	83·3	17·1
„ 7th	61·5	88·5	27·0
„ 8th	65·6	90·0	24·4
Mean Max (5—8th)	65·3	85·8	20·5

On the 9th and 10th the shade temperature only reached 77°·3 and 75°·6 respectively, but rose rapidly on the morning of the 11th to a maximum of 84°·5. Almost cloudless skies continued throughout that and the two following days, on which maximum temperatures of 84°·3 and 83°·8 were recorded. The extreme dryness of the air, which made the heat less oppressive on these three days, is shown in the following table giving the relative humidity calculated from the hygrometric observations made at 3 p.m. alongside the corresponding figures for the same days in 1910. The average difference of 30 per cent. for the three days is extremely rare if not altogether unprecedented.

## Relative humidity at 3 p.m.

	1910.	1911.	Difference.
July 11th	56	34	22
„ 12th	66	38	28
„ 13th	77	37	40
Average, 11th—13th	66	36	30

## THE RAINFALL OF JUNE, 1911, IN THE THAMES VALLEY.

THE map of the rainfall during June in the Thames Valley and surrounding districts, for which our monthly map is prepared, owes its chief interest to the fact that the distribution resembles more close the type of a winter month than that of June, which is commonly of quite a different character. It will be observed that the area over which the rainfall was more than two inches corresponded in a general way with the outline of the more elevated land forming the Cotteswold Hills in the west, the North Downs on the south, and the Chiltern Hills in the east of the valley. A great tongue with less than two inches lay in the lower land between, and another cut out the Thames estuary, the two nearly meeting on the south of London. In the north-east part of the area dealt with local rainfalls brought the month's total to over three inches in one or two spots. Over the whole of the area practically the whole of the rainfall during June fell during the latter half, an absolute drought occurring in the first fortnight in most places.

The wettest part of the British Isles in relation to the average rainfall for the month was undoubtedly the north-east of England and south-east of Scotland, as explained in the correspondence on pp. 116, 117, but no less remarkable was the extreme dryness of the east of Scotland north of the Tay, where a considerable area had less than 1 inch of rain for the month ; thus bearing out Colonel McInroy's letter on p. 114.

---

### METEOROLOGICAL NEWS AND NOTES.

THE UTILITY OF WEATHER FORECASTS is still so much a matter of opinion in this country that the Council of the Royal Meteorological Society deserves every encouragement in the step they have taken in suggesting a more convenient period for the daily forecast of the Meteorological Office, and a wider publicity than is the case at present. In a letter to *The Times* of July 6th, Dr. H. N. Dickson, the President of the Society, shows that, as issued in the morning newspapers, the forecasts are too late to allow of the work of public bodies being planned in accordance with the probable weather of the day. He points out that the special forecasts for agricultural purposes, prepared at 2.30 p.m. from June 1st to September 30th, refer to the fifteen hours, 6 a.m. to 9 p.m., of the following day, and adds, "Presumably they could be issued all the year round, and they could easily reach the general public before the arrangements for next day's work were finally completed, provided proper facilities for distribution were given. Early editions of evening papers are obviously useful only in towns, but the systems employed in some countries whereby forecasts are displayed (say about 3.30 p.m.) at local telegraph offices, or even their contents made known by signals affixed to railway trains, do not seem impracticable." We look forward hopefully to the matter being considered by the Meteorological Committee.

THE INTERNATIONAL BALLOON ASCENTS for meteorological research in the upper air, usually made in the first week of each month, have been changed for September, in order to prevent clashing with the British Association Meeting at Portsmouth. Under the new arrangement the ascents will take place from the 11th to the 16th of September, 1911.

BRITISH RAINFALL, 1910, is now in so forward a state of preparation that any returns to be inserted in the General Table must be in the hands of the Editor by July 20th. The general discussions of rainfall are practically completed, and any additional records which may be received will be too late to be taken account of in the forthcoming volume, which is the fiftieth of the series.

THE FIRING OF GUNS AS A CAUSE OF RAIN was the subject of a question in the House of Commons on March 8th, when Viscount Dalrymple asked the First Lord of the Admiralty whether he would arrange for the Fleet to carry out their heavy gun-firing practice round the coast at some other period of the year than in the middle of harvest time, when the resultant heavy rain may cause serious loss to the farming community. "The resultant heavy rain" has a highly scientific sound: one thinks of some parallelogram of aerial forces disturbing the aqueous molecules; but it is plain that Lord Dalrymple is not a reader of this Magazine. Mr. Mackenna, no doubt advised by the proper authority, very wisely replied that there is no evidence that the firing causes heavy rain, and went on to explain that the winter season was unsuitable for firing practice with heavy guns at sea. In connection with the question our readers will remember Mr. Gaster's letter published on p. 35 in the March number. Superstition dies hard, and despite the common-sense reply to the recent question in the House of Commons, we find, if we can trust the following paragraph from the *Daily Mail*, a member of the House of Lords suggesting that that ancient and honourable body, the Highland and Agricultural Society of Edinburgh, should make a fool of itself. The paragraph is from a London paper, hence its misconception of the somewhat unexpected title of the Society it refers to.

"In moving that the Admiralty be petitioned to discontinue heavy gunfire round the coasts during August and September when clouds were about, the Earl of Stair, at a meeting of the Highland Agricultural Society in Edinburgh yesterday, said that firing was apt to bring down rain, and at that time of the year fine weather was desirable."

ERRATUM.—So many of our readers have pounced gleefully on the statement that  $58^{\circ}\cdot 0$  was  $40^{\circ}\cdot 1$  above the average temperature, in the note on the month of May at Camden-square (p. 103), that it hardly seems necessary to explain that a mistake was made, and that the correct figure was " $4^{\circ}\cdot 1$  above the average," but we owe it to ourselves to explain that the difficulty of getting so large an amount of observational material, the last reading of which is made on the first of the month, in the printing press by the 14th, makes it impossible to see the final proof in all cases, and we have to pass for press subject to the corrections on the paged-proof sent to the printer. If, as in the present case, our correction is not noticed, we can only say that a very rare error is a less fault than chronic unpunctuality.

WE REGRET that this number must appear without the usual article on the Weather of the Month, which has not reached us up to the date of going to press.



## RAINFALL TABLE FOR JUNE, 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	2'28	2'69
Tenterden.....	Kent.....	51 4	*0 41	190	2'03	1'93
Arundel (Patching).....	Sussex.....	50 51	0 27	130	2'13	1'90
Southampton (Cadland) .....	Hampshire.....	50 50	1 22	52	2'17	2'34
Oxford (Magdalen College).....	Oxfordshire.....	51 45	1 15	186	2'27	1'08
Wellingborough (Croyland Abbey).....	Northampton.....	52 18	0 41	174	2'10	1'62
Shoeburyness.....	Essex.....	51 31	*0 48	13	1'77	1'97
Bury St. Edmunds (Westley).....	Suffolk.....	52 15	*0 40	226	2'21	3'09
Geldeston [Beccles].....	Norfolk.....	52 27	*1 31	38	1'77	2'25
Polapit Tamar [Launceston].....	Devon.....	50 40	4 22	315	2'18	4'17
Rousdon [Lyme Regis].....	".....	50 41	3 0	516	2'18	1'62
Stroud (Upfield).....	Gloucestershire.....	51 44	2 13	226	2'43	2'87
Church Stretton (Wolstaston).....	Shropshire.....	52 35	2 48	800	2'59	2'98
Coventry (Kingswood).....	Warwickshire.....	52 24	1 30	340	2'52	2'01
Boston.....	Lincolnshire.....	52 58	0 1	25	1'95	2'59
Worksop (Hodsock Priory).....	Nottinghamshire.....	53 22	1 5	56	2'06	2'52
Macclesfield.....	Cheshire.....	53 15	2 7	501	2'85	3'64
Southport (Hesketh Park).....	Lancashire.....	53 38	2 59	38	2'26	2'31
Wetherby (Ribston Hall) .....	Yorkshire, W.R.....	53 59	1 24	130	2'17	3'60
Arnccliffe Vicarage.....	".....	54 8	2 6	732	3'63	4'84
Hull (Pearson Park).....	"..... E.R.....	53 45	0 20	6	2'09	3'15
Newcastle (Town Moor) .....	Northumberland.....	54 59	1 38	201	2'04	4'62
Borrowdale (Seathwaite) .....	Cumberland.....	54 30	3 10	423	6'94	10'74
Cardiff (Ely).....	Glamorgan.....	51 29	3 13	53	2'55	2'13
Haverfordwest.....	Pembroke.....	51 48	4 58	95	2'74	2'42
Aberystwyth (Gogerddan).....	Cardigan.....	52 26	4 1	83	2'97	3'34
Llandudno.....	Carnarvon.....	53 20	3 50	72	1'97	2'63
Cargen [Dumtries].....	Kirkcudbright.....	55 2	3 37	80	2'84	4'24
Marchmont House.....	Berwick.....	55 44	2 24	498	2'38	5'11
Girvan (Pinmore).....	Ayr.....	55 10	4 49	207	3'04	3'62
Glasgow (Queen's Park) .....	Renfrew.....	55 53	4 18	144	2'41	2'03
Inveraray (Newtown).....	Argyll.....	56 14	5 4	17	3'64	3'91
Mull (Quinish).....	".....	56 34	6 13	35	3'30	2'62
Dundee (Eastern Necropolis).....	Forfar.....	56 28	2 57	199	2'06	'88
Braemar.....	Aberdeen.....	57 0	3 24	1114	2'18	1'91
Aberdeen (Cranford).....	".....	57 8	2 7	120	2'02	2'29
Cawdor.....	Nairn.....	57 31	3 57	250	2'13	2'99
Fort Augustus (S. Benedict's) .....	E. Inverness.....	57 9	4 41	68	2'07	1'94
Loch Torridon (Bendamph).....	W. Ross.....	57 32	5 32	20	4'07	5'42
Dunrobin Castle.....	Sutherland.....	57 59	3 56	14	2'10	1'04
Wick.....	Cuithness.....	58 26	3 6	77	1'83	3'19
Killarney (District Asylum).....	Kerry.....	52 4	9 31	178	2'92	4'01
Waterford (Brook Lodge).....	Waterford.....	52 15	7 7	104	2'79	3'46
Nenagh (Castle Lough).....	Tipperary.....	52 54	8 24	120	2'70	2'39
Miltown Malbay.....	Clare.....	52 52	9 26	400	3'12	2'33
Gorey (Courtown House) .....	Wexford.....	52 40	6 13	80	2'59	1'43
Abbey Leix (Blandsford).....	Queen's County.....	52 56	7 17	532	2'58	1'72
Dublin (Fitz William Square).....	Dublin.....	53 21	6 14	54	2'00	1'74
Mullingar (Belvedere).....	Westmeath.....	53 29	7 22	367	2'72	3'04
Ballinasloe.....	Galway.....	53 20	8 15	160	2'69	2'29
Crossmolina (Enniscoe).....	Mayo.....	54 4	9 18	74	3'17	3'37
Collooney (Markree Obsy.).....	Sligo.....	54 11	8 27	127	3'11	2'27
Seaforde.....	Down.....	54 19	5 50	180	2'88	2'83
Bushmills (Dundarave).....	Antrim.....	55 12	6 30	162	2'56	2'41
Omagh (Edenfel).....	Tyrone.....	54 36	7 18	280	2'82	2'42



RAINFALL TABLE FOR JUNE, 1911—*continued.*

RAINFALL OF MONTH (con.)					RAINFALL FROM JAN. 1.				Mean Annual 1875-1909.	STATION.
Diff. from Av. in.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1875-1909.	1911.	Diff. from Aver. in.	% of Av.		
		in.	Date.		in.	in.			in.	
+ '41	118	'92	23	11	10'96	10'88	— '08	99	25'11	Camden Square
— '10	95	'71	23	12	11'44	9'71	—1'73	85	27'64	Tenterden
— '23	89	'76	23	10	12'46	10'06	—2'40	81	30'48	Patching
+ '17	108	'56	16	11	13'31	10'68	—2'63	80	31'87	Cadland
—1'19	48	'23	24	11	10'60	7'87	—2'73	74	24'58	Oxford
— '48	77	'69	23	11	11'14	8'68	—2'46	78	25'17	Croyland Abbey
+ '20	111	1'30	23	9	'80	7'18	— '82	90	19'28	Shoeburyness
+ '88	140	1'29	23	14	10'76	10'28	— '48	96	25'40	Westley
+ '48	127	'62	23	12	9'61	9'08	— '53	94	23'73	Geldeston
+1'99	191	'99	1	16	15'88	13'62	—2'26	86	38'27	Rolapit Tamar
— '56	74	'49	16	12	14'33	9'87	—4'46	69	33'54	Rousdon
+ '44	118	'88	24	12	13'08	10'01	—3'07	77	29'81	Stroud
+ '39	115	'88	17	10	14'30	10'83	—3'47	76	32'41	Wolstaston
— '51	80	'47	24	13	12'75	7'84	—4'91	61	28'98	Coventry
+ '64	133	1'16	23	15	9'86	8'48	—1'38	86	23'35	Boston
+ '46	122	1'13	24	9	10'80	6'78	—4'02	63	24'46	Hodsock Priory
+ '79	128	1'39	24	14	14'76	13'19	—1'57	89	34'73	Macclesfield
+ '05	102	'88	24	14	12'96	11'14	—1'82	86	32'70	Southport
+1'43	166	1'26	24	13	11'63	10'51	—1'12	90	26'87	Ribston Hall
+1'21	133	1'16	24	16	27'22	34'50	+7'28	127	61'49	Arneliffe
+1'06	151	1'03	24	16	11'08	9'89	—1'19	89	26'42	Hull
+2'58	227	2'07	24	14	11'55	11'50	— '05	100	27'94	Newcastle
+3'80	155	2'54	21	15	56'38	69'94	+13'56	124	129'48	Seathwaite
— '42	84	'74	29	11	17'22	15'54	—1'68	90	42'28	Cardiff
— '32	88	'79	24	10	19'45	16'89	—2'56	87	46'81	Haverfordwest.
+ '37	112	'81	18	14	18'12	17'21	— '91	95	45'46	Gogerddan
+ '66	134	1'27	24	15	12'37	10'18	—2'19	82	30'36	Llandudno
+1'40	149	1'44	17	11	19'06	21'82	+2'76	114	43'47	Cargen
+2'73	215	2'71	24	11	14'38	13'54	— '84	94	33'76	Marchmont
+ '58	119	'85	24	16	21'10	21'93	+ '83	104	49'77	Girvan
— '38	84	'58	17	8	15'51	17'06	+1'55	110	35'97	Glasgow
+ '27	107	1'36	21	15	29'32	38'91	+9'59	133	68'67	Inveraray
— '68	79	1'12	21	14	23'55	25'56	+2'01	108	56'57	Quinish
—1'18	43	'22	17	11	12'02	5'33	—6'69	45	28'64	Dundee
— '27	88	...	...	...	15'15	13'25	—1'90	88	34'93	Braemar
+ '27	113	1'45	24	14	14'02	10'88	—3'14	78	32'73	Aberdeen
+ '86	140	1'70	24	6	12'51	12'46	— '05	100	29'33	Cawdor
— '13	94	'38	21	16	20'22	19'85	— '37	98	44'53	Fort Augustus
+1'35	133	1'62	21	18	37'39	44'65	+7'26	119	83'61	Bendamp
—1'06	50	'43	24	9	14'28	12'85	—1'43	90	31'90	Dunrobin Castle
+1'36	174	1'18	24	15	12'71	13'38	+ '67	105	29'88	Wick
+1'09	137	1'46	18	16	24'87	21'57	—3'30	87	54'81	Killarney
+ '67	124	1'22	16	12	17'40	13'97	—3'43	80	39'57	Waterford
— '31	89	'83	2	13	17'51	14'60	—2'91	83	39'43	Castle Lough
— '79	75	'65	16	16	18'71	15'57	—3'14	83	45'11	Miltown Malbay
—1'16	55	'70	16	8	15'42	9'67	—5'75	63	34'99	Courtown Ho.
— '86	67	'49	19	15	15'84	13'21	—2'63	83	35'92	Abbey Leix
— '26	87	'41	16	12	12'15	7'73	—4'42	64	27'68	Dublin
+ '32	112	'73	17	12	16'01	15'45	— '56	97	36'15	Mullingar
— '40	85	'82	19	14	16'15	14'95	—1'20	93	36'64	Ballinasloe
+ '20	106	'72	2	15	23'38	19'26	—4'12	82	52'87	Enniscoe
— '84	73	'51	21	16	18'83	15'43	—3'40	82	42'71	Markree
— '05	98	'84	22	11	17'42	13'80	—3'62	79	38'91	Seaforde
— '15	94	'90	17	11	15'49	12'85	—2'64	83	37'56	Dundarave
— '40	86	'50	21	14	17'10	15'30	—1'80	89	39'38	Omagh



## SUPPLEMENTARY RAINFALL, JUNE, 1911.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Warlingham, Redvers Road	2·33	XI.	Lligwy .....	2·26
„	Ramsgate .....	1 66	„	Douglas .....	...
„	Hailsham .....	2·21	XII.	Stoneykirk, Ardwell House	3·25
„	Totland Bay, Aston House.	1·48	„	Dalry, The Old Garroch ...	2·78
„	Stockbridge, Ashley .....	1·98	„	Langholm, Drove Road.....	3·15
„	Grayshott .....	2·09	„	Beattock, Kinnelhead.....	4·10
„	Reading, Calcot Place.....	1·86	XIII.	St Mary's Loch, Cramilt Ldge	3·06
III.	Harrow Weald, Hill House.	2·27	„	North Berwick Reservoir ...	2·34
„	Pitsford, Sedgebrook .....	1·47	„	Edinburgh, Royal Observty.	2·50
„	Somersham Vicarage.....	1·72	XIV.	Maybole, Knockdon Farm..	3·13
„	Woburn, Milton Bryant.....	...	XV.	Campbeltown, Witchburn...	2·23
IV.	Colchester, Lexden .....	2·23	„	Glenreadell Mains.....	1·95
„	Newport .....	2·65	„	Holy Loch, Ardnadam.....	4·23
„	Rendlesham .....	1·68	„	Ballachulish House.....	2·05
„	Swaffham .....	4·69	„	Islay, Ballabus .....	1·92
„	Blakeney .....	2·67	XVI.	Dollar Academy .....	...
V.	Bishops Cannings .....	1·84	„	Balquhider, Stronvar .....	4·74
„	Winterbourne Steepleton ...	2·10	„	Coupar Angus .....	·72
„	Ashburton, Druid House ..	2·98	„	Glenlyon, Meggernie Castle.	2·98
„	Okehampton, Oaklands.....	3·64	„	Blair Atholl .....	1·75
„	Cullompton .....	2·22	„	Montrose, Sunnyside Asylum	1·25
„	Hartland Abbey .....	2·76	XVII.	Alford, Lynturk Manse ...	2·38
„	Lynmouth, Rock House ...	3·44	„	Fyvie Castle.....	3·55
„	Probus, Lamellyn .....	2·54	„	Keith Station .....	3·55
„	North Cadbury Rectory ...	2·08	XVIII.	Glenquoich, Loan .....	9·10
VI.	Clifton, Pembroke Road ...	3·09	„	Skye, Dunvegan.....	3·02
„	Ross, The Graig .....	1·09	„	N. Uist, Lochmaddy .....	...
„	Shifnal, Hatton Grange.....	2·52	„	Alvey Manse .....	1·69
„	Blockley, Upton Wold .....	2·27	„	Loch Ness, Drumnadrochit.	3·49
„	Droitwich .....	1·39	„	Glencarron Lodge .....	5·45
VII.	Market Overton.....	1·90	XIX.	Invershin .....	1·43
„	Market Rasen .....	3·42	„	Loch Stack, Ardchullin.....	4·07
„	Bawtry, Hesley Hall.....	2·76	„	Melvich .....	2·79
„	Derby, Midland Railway ...	2·35	XX.	Skibbereen Rectory.....	2·26
„	Buxton .....	2·88	„	Dunmanway, The Rectory..	2·21
VIII.	Nantwich, Dorfold Hall.....	2·44	„	Cork .....	2·94
„	Chatburn, Middlewood .....	4·52	„	Mitchelstown Castle .....	3·09
„	Cartmel, Flookburgh .....	3·05	„	Darrynane Abbey .....	2·47
IX.	Langsett Moor, Up. Midhope	3·41	„	Glenam [Clonmel] .....	1·77
„	Scarborough, Scalby .....	4·49	„	Newmarket-on-Fergus, Fenloe	2·26
„	Ingleby Greenhow .....	4·48	XXI.	Laragh, Glendalough .....	3·44
„	Mickleton .....	2·54	„	Balbriggan, Ardgillan.....	3·09
X.	Bellingham, High Green Manor	3·94	„	Moynalty, Westland .....	...
„	Ilderton, Lilburn Cottage... 5·44	6·21	XXII.	Cong, The Glebe .....	2·89
„	Keswick, The Bank .....	...	„	Westport, St. Helens .....	3·55
XI.	Llanfrechfa Grange.....	2·35	„	Achill Island, Dugort .....	3·11
„	Treherbert, Tyn-y-waun ...	6·30	„	Mohill .....	1·60
„	Carmarthen, The Friary....	3·84	XXIII.	Enniskillen, Portora .....	1·55
„	Castle Malgwyn [Llechryd].	3·20	„	Dartrey [Cootehill].....	2·17
„	Plynlimon.....	8·20	„	Warrenpoint, Manor House	2·72
„	New Radnor, Ednol .....	2·66	„	Banbridge, Milltown .....	2·29
„	Rhayader, Tyrmynydd .....	4·76	„	Belfast, Cave Hill Road.....	1·68
„	Lake Vyrnwy .....	3·82	„	Glenarm Castle.....	2·39
„	Llangyhanfal, Pläs Draw....	3·82	„	Londonderry, Creggan. Res.	2·34
„	Dolgelly, Bryntirion .....	3·20	„	Killybegs .....	2·73
„	Bettws-y-Coed, Tyn-y-bryn	3·70	„	Horn Head ...	2·07

## METEOROLOGICAL NOTES ON JUNE, 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.—Beautiful sunny and dry weather prevailed in the first half, accompanied by high temp. in the first week, 80° being exceeded on 5 days. In the latter half fair weather predominated, but with a good deal of R. Duration of sunshine 193·3\* hours, and of R 39·6 hours. Mean temp. 61°·4 or 1°·1 above the average. Evaporation 3·34 in. The shade max., 87°·6 on 5th, was the highest temp. registered since 3rd September, 1906; min. 41°·8 on 15th. F 0, f 0.

TENTERDEN.—Warm and sunny till 9th; then a week of cold nights and the rest of the month mostly dull, especially in the mornings. Duration of sunshine 226·0† hours. Shade max. 82°·0 on 5th; min. 38°·0 on 14th. F 0, f 0.

TOTLAND BAY.—Duration of sunshine 261·0\* hours, or 50·6 hours above the average. Shade max. 80°·2 on 6th; min. 42°·1 on 11th. F 0, f 0.

COLCHESTER, LEXDEN.—Very cool after the first 6 days of heat. An absolute drought of 16 days ended on 13th, and a partial drought of 32 days with ·07 in. of R ended on 16th.

HARTLAND ABBEY.—Very hot and dry weather in the first half of the month following 20 dry days in May, making 34 days without R. T was heard several times but without R.

ROSS.—Shade max. 82°·6 on 8th; min. 39°·0 on 15th. F 0, f 0.

HODSOCK PRIORY.—The long dry period which had lasted from the beginning of the year was brought to a close by a TS on 17th, followed by a splendid R on 23rd and 24th, which was most welcome, though rather late for corn and hay. Shade max. 82°·6 on 5th; min. 34°·0 on 15th. F 0, f 4.

SOUTHPORT.—Duration of sunshine 238·6\* hours, and of R 45·8 hours. Mean temp. 57°·4, or 0°·5 above the average. Shade max. 81°·4 on 1st; min. 37°·8 on 10th. F 0, f 3.

HULL.—Fine and dry to 12th. Afterwards cloudy with welcome showers to the end of month. About 30 hours R on 23rd and 24th. Shade max. 81°·0 on 8th; min. 55°·0 on 13th. F 0, f 0.

HAVERFORDWEST.—Very warm to 10th, but cold afterwards with moderate R. Duration of sunshine 261·0\* hours. Shade max. 79°·3 on 8th; min. 40°·3 on 15th.

LLANDUDNO.—Shade max. 80°·2 on 1st; min. 43°·0 on 15th.

CARGEN.—A dry spell lasting for 33 days ended on 15th and was followed by two consecutive days of heavy R, 2·21 in. being registered on 16th and 17th. The temp. of the first 8 days was very high, the shade max. averaging 80°, but during the rest of the month it only once reached 70°. Shade max. 81°·0 on 1st; min. 36°·5 on 15th. F 0.

EDINBURGH.—Shade max. 77°·9 on 7th; min. 39°·4 on 14th. F 0, f 0.

COUPAR ANGUS.—The sixth successive month with deficient R. The high temp. of May continued during the first week when it gave way to cold, dry and barren N. winds, which continued, more or less, to the close. Shade max. 80°·5 on 7th; min. 34°·0 on 16th. F 0, f 0.

FORT AUGUSTUS.—Shade max. 77°·4 on 2nd; min. 35°·1 on 15th. F 0.

CORK.—R ·54 in. above the average. Shade max. 72°·0 on 2nd; min. 45°·0 on 20th. F 0, f 0.

DUBLIN.—An absolute drought began on May 16th, and lasted until June 14th. After that date the weather was unsettled, cool, cloudy and showery. Mean temp. 58°·4, or 0°·5 above the average. Shade max. 72°·9 on 2nd; min. 43°·0 on 15th. F 0, f 0.

MARKREE.—Shade max. 78°·4 on 8th; min. 30°·8 on 14th. F (?), f 4.

WARRENPOINT.—Shade max. 71°·0 on 1st and 7th; min. 45°·0 on 13th. F 0, f 0.

\* Campbell-Stokes.

† Jordan.

## Climatological Table for the British Empire, January, 1911.

STATIONS  (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain		Aver. Cloud.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
	52°1	26	25°6	14	42°4	34°6	36°0	90	78°1	22°0	1·38	12	7·8
London, Camden Square	62·2	15	43·0	4	56·8	49·9	46·9	82	123·0	...	4·87	17	6·7
Malta ... ..	89·0	26	65·0	27	85·1	67·5	72·3	72	141·0	62·0	4·57	3	...
Lagos ... ..	92·4	29	54·5	18	78·3	61·6	62·2	71	...	...	·63	4	3·5
Cape Town ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Durban, Natal	82·3	28	48·0	19	76·2	55·3	57·2	79	151·3	46·4	5·73	14	4·3
Johannesburg ... ..	87·6	30*	68·7	15	85·3	72·3	71·4	80	165·3	62·4	8·09	21	6·5
Mauritius ... ..	86·5	27	48·0	29	81·7	58·7	57·6	66	...	40·6	·02	1	1·7
Calcutta ... ..	90·7	22	61·3	28	83·0	69·5	65·2	71	132·9	53·4	·06	2	1·9
Bombay ... ..	89·5	28	63·1	30	85·8	67·9	67·3	76	138·1	58·9	...	...	2·4
Madras ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Kodaikanal ... ..	89·7	21	66·4	13	86·5	70·8	70·5	78	137·7	63·2	5·47	11	4·6
Colombo, Ceylon	74·4	5	47·5	19	63·1	55·5	51·2	74	117·8	...	·74	6	6·6
Hongkong ... ..	94·0	7	61·8	25	75·9	64·7	60·5	71	148·5	55·4	15·26	24	7·1
Sydney ... ..	96·7	5	51·0	10	77·6	57·8	53·0	59	158·4	45·1	·13	7	4·9
Melbourne ... ..	89·8	5	43·2	21	70·4	52·5	48·7	67	148·0	40·0	·44	8	5·0
Hobart, Tasmania	100·5	23	52·3	20	85·9	63·7	52·7	47	162·1	44·0	·17	2	2·9
Adelaide ... ..	97·5	17	56·0	5	83·9	62·7	58·1	61	152·9	45·9	...	...	2·6
Perth ... ..	108·6	25	51·2	11	95·8	64·8	51·8	43	176·0	50·0	·21	3	3·5
Coolgardie ... ..	76·0	24	47·2	15	68·3	56·0	52·8	72	127·0	41·0	2·99	8	7·0
Wellington ... ..	80·2	22	52·0	14	73·8	58·7	61·7	85	148·0	49·0	1·25	8	4·5
Auckland ... ..	90·1	1	62·7	11	86·6	66·4	64·9	75	...	...	·13	6	3·6
Jamaica, Kingston	84·0	8	69·0	†	81·0	71·2	65·3	73	140·0	...	5·00	28	5·0
Grenada ... ..	44·1	2	—1·7	16	33·0	18·8	...	...	50·7	—4·7	2·08	19	7·1
Toronto ... ..	48·2	2, 3	—31·0	18	25·9	—0·5	...	85	...	...	3·45	11	5·7
Fredericton ... ..	47·0	2, 3	—14·0	17	31·7	11·2	...	77	...	...	3·29	17	5·6
St. John, N.B.	50·2	6	14·9	13	39·9	32·5	...	89	...	...	4·30	22	9·0
Victoria, B.C. ...	2·0	4	—62·0	25	—29·2	—41·0	...	...	...	...	1·52	12	8·7
Dawson ... ..													

\* and 31. † Several.

MALTA.—Mean temp. of air 52°·7. Average bright sunshine 5·6 hours per day.

Johannesburg.—Bright sunshine 267·5 hours.

Mauritius.—Mean temp. of air 0°·4, dew point 1°·1, and R ·48 in., above averages. Mean hourly velocity of wind 7·3 miles, or 2·3 below average.

COLOMBO.—Mean temp. of air 76°·5, or 2°·5 below, of dew point 0°·1 below, and R 2·00 in. above, averages. Mean hourly velocity of wind 6·8 miles. TSS on 5 days.

HONGKONG.—Mean temp. of air 58°·9, or 1°·2 below, R ·72 in. below, averages. Bright sunshine 139·2 hours. Mean hourly velocity of wind 13·7 miles.

Sydney.—Mean temp. of air 1°·3 below, and R 11·59 in., above, averages.

Melbourne.—Mean temp. of air 0°·2 above, and R ·59 in. below, averages.

Hobart.—Mean temp. of air 0°·6 and R 1·41 in. below averages.

Adelaide.—Mean temp. of air 0°·6 above, R ·59 in. below, averages.

Perth.—Mean temp. of air 0°·2, and R ·39 in. below averages.

Coolgardie.—Mean temp. of air 3°·3 above, and R ·18 in. below averages.

Wellington.—Mean temp. of air 0°·3, and R ·39 in. below, averages. Bright sunshine 279·5 hours.

Auckland.—Dry month. R considerably under average of 44 years, and temp. slightly under average.

# JAMES J. HICKS

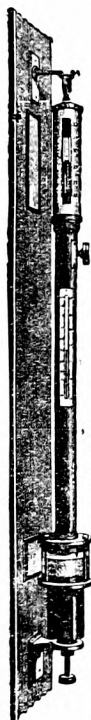
## Meteorological & Scientific Instruments

MANUFACTORY:—

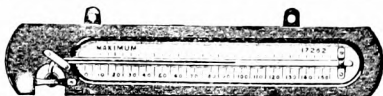
8, 9 & 10, HATTON GARDEN, LONDON, E.C.

Awarded Grand Prix Franco-British Exhibition, 1908; Nine Medals at the Paris Exhibition, 1900; London, 1862; Paris, 1867; London, 1885; Philadelphia, 1876; Rio de Janeiro, 1909.

Standard "Fortin" Barometers.  
Standard Mercurial Thermometers.  
Standard Maximum Thermometers.  
Standard Minimum Thermometers.  
Standard Mason's Hygrometers.  
Standard "Solar Maximum" Thermometers.  
Standard Terrestrial Radiation Thermometers.  
Standard "Earth Temperature" Thermometers.  
Standard Symons's Rain Gauges.  
Standard Meteorological Office Rain Gauges.  
Standard Sunshine Recorders.  
Improved Beckley Anemometers.  
Improved Beckley Self-Recording Rain Gauge.  
Self-Registering Aneroid Barometers.  
Self-Registering Mercurial Barometers.  
Meteorological Office Thermometer Screens.  
Mountaineering Aneroid Barometers.  
Aneroid Barometers.



STANDARD BAROMETER, diameter of Tube, 0.5 in., on Mahogany Board.



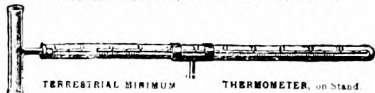
STANDARD MAXIMUM THERMOMETER, in Oak Frame, Tube divided on Stem, figured on Opal Glass Scale.



STANDARD MINIMUM THERMOMETER, in Oak Frame, Tube divided on Stem, figured on Opal Glass Scale.



MAXIMUM THERMOMETER, Black Bulb in Vacuum, on Stand.



TERRESTRIAL MINIMUM THERMOMETER, on Stand.

BECKLEY



RAIN GAUGE.



CAMPBELL-STOKES  
SUNSHINE RECORDER,  
With Curtis's Improvements.

As supplied to the Meteorological Office for the Standard Pattern and noted on S.S. "Discovery," National Antarctic Expedition, 1901.

NEW OBSERVATORY CERTIFICATES SUPPLIED IF DESIRED.

### WILSON'S PATENT RADIO-INTEGRATOR.

#### THE "CAMDEN" Pattern

RAIN



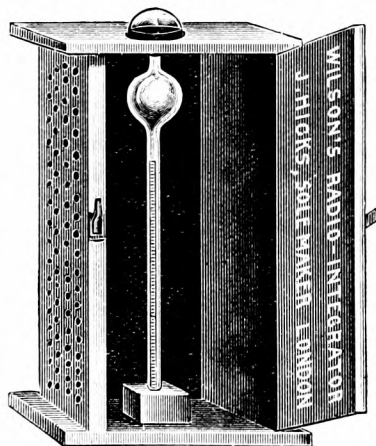
GLASS

Price  
2s. 6d.  
Not  
Verified

Price  
3s. 6d.  
Verified.

Designed by  
the late  
DR. W. E.  
WILSON, F.R.S.,  
to record the  
total amount of  
Solar Radiation  
daily received  
by the ground.

Sole Maker—  
J. J. HICKS.



Special Prices are given to Fellows of all Scientific Societies.

( v. )



## A Monthly Record of Science in all its Branches.

Each number consists of at least forty large quarto pages of Articles and Notes, by Authorities in their respective subjects.

**Profusely Illustrated.**

### CONTENTS OF JULY ISSUE

On Loading Telephone Cables.—Plant Hairs.—The Goldschmidt Reaction.—The Political importance of Astronomy as a Peace Promoter.—Radio-Active Recoil.—Spring and Summer Shooting Stars.—An Antediluvian Zoological Garden.—On drawing Ellipses.—A Notable Record: Capture of a New Species of Mymar.—Unique American Steam Motor Car.—Solar Disturbances during May, 1911.—The Face of the Sky for the Month.—Notes (Astronomy; Botany; Chemistry; Geology; Meteorology; Ornithology; Photography; Physics; Zoology).—Microscopy.—Reviews of Books.—Correspondence.—Queries & Answers.—&c.

THROUGH ANY BOOKSELLER.

**MONTHLY—ONE SHILLING, net.**

Annual Subscription, **15/-**, post free anywhere.

Offices: 42, BLOOMSBURY SQUARE, LONDON.

---

## THE OBSERVATORY:

*A Monthly Review of Astronomy.*

EDITED BY

H. P. HOLLIS, B.A., F.R.A.S., AND T. LEWIS, F.R.A.S.

~~~~~

Contains full Reports of the Meetings of the Royal Astronomical and Royal Meteorological Societies, and of the British Astronomical Association; Articles by various eminent Astronomers, English, American and Continental; Correspondence on topics of interest connected with the Science; Notices of Observatories, Publications and current Discoveries. The "Oxford Note Book" is a special feature of the Magazine.

*The Observatory* was founded in 1877, and has become an established and very valuable publication.—Prof. Young, in "*Ten Years' progress in Astronomy*."

Annual Subscription (for the "Companion" and twelve Monthly Numbers), 13s.

*All communications should be addressed to the Editors of "The Observatory,"*  
Royal Observatory, Greenwich, S. E.



# Royal Geographical Society's Publications.

## THE GEOGRAPHICAL JOURNAL.

Monthly. Illustrated. Edited by the Secretary. Price (to non-Fellows), 2s.

## HINTS TO TRAVELLERS.

Edited for the Council of the Royal Geographical Society by E. A. REEVES, F.R.G.S., F.R.A.S. Ninth Edition, revised and enlarged. In two volumes, illustrated. Price 15s. net. (To Fellows at the Office of the Society, 10s. net).

Vol. I.—Surveying and Practical Astronomy.

Vol. II.—Meteorology and Climate (by DR. H. R. MILL);  
Photography, Geology, Natural History, Anthropology, Industry and Commerce, Medical Hints, &c.

## THE DISTRIBUTION OF RAINFALL OVER THE LAND.

By DR. A. J. HERBERTSON. With monthly maps of Rainfall. Price 5s. net. (To Fellows, 2s. 6d.)

## ON THE RESULTS OF A DEEP-SEA SOUNDING EXPEDITION,

In the North Atlantic in the summer of 1899, by R. E. PEAKE, M.Inst.C.E.; with notes on Temperature, Deep-Sea Deposits, &c., by SIR JOHN MURRAY, K.C.B., F.R.S. *Charts.* Price 5s. net. (To Fellows, 2s. 6d.)

## THE ANTARCTIC MANUAL,

For the use of the Expedition of 1901. Edited by GEORGE MURRAY, F.R.S., 1901. Pp. 586. *With a new chart of the Antarctic Regions.* Price, 15s. (To Fellows, 10s.)

~~~~~  
ROYAL GEOGRAPHICAL SOCIETY, 1, Savile Row, W.  
AND ALL BOOKSELLERS.

---

### RATES FOR ADVERTISEMENTS IN THIS MAGAZINE.

	One Insertion.	Six Insertions.	Twelve Insertions.	
WHOLE PAGE	30/-	26/-	22/6	} All Net.
HALF	16/6	14/6	12/6	
QUARTER	9/-	8/-	7/-	
EIGHTH	5/-	4/6	4/-	

*All applications for space to be made to*

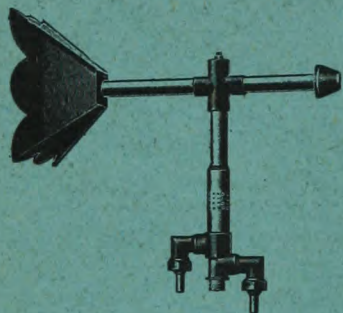
MR. H. A. COLLINS, 32, BIRDHURST ROAD, CROYDON



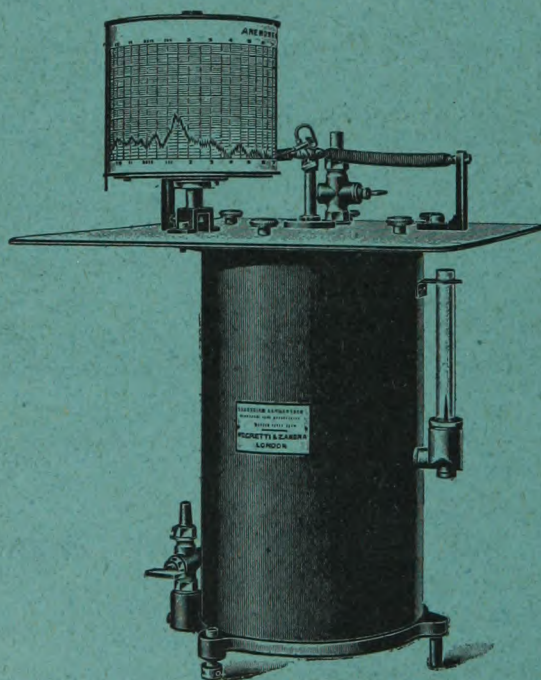
# The ANEMO-BIAGRAPH.

(Wind Force Recorder.)

HALLIWELL-DINES PRINCIPLE.



PATENT  
No. 21973,  
1910.



Price £20 . 0 . 0.

FULL PARTICULARS POST FREE on application to the  
SOLE MAKERS:

**NEGRETTI & ZAMBRA,**  
*Scientific Instrument Makers,*  
**38, HOLBORN VIADUCT, E.C.**

Branches: 45, CORNHILL, E.C., and  
122, REGENT STREET, W., LONDON.

Telegraphic Address: "NEGRETTI, LONDON."

Telephone No. 583 HOLBORN.

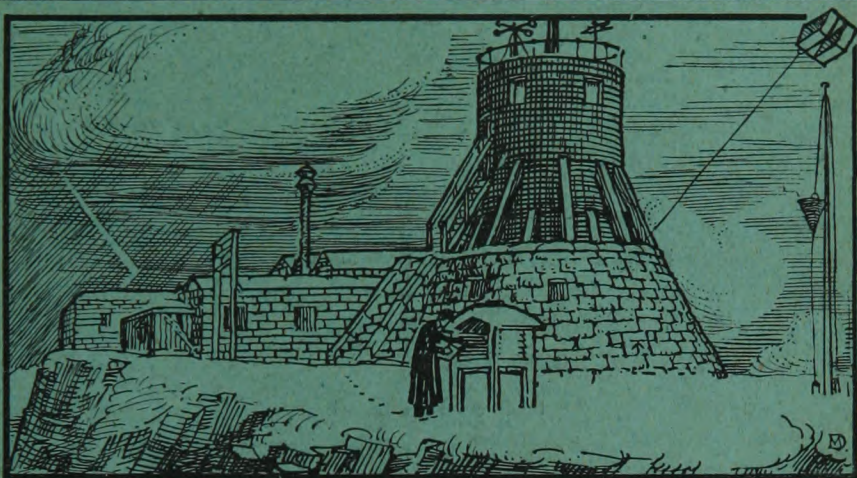
SHIELD & SPRING, Lancelot Place, Brompton Road, S.W.



NO. 547 SYMONS'S VOL. 46

# METEOROLOGICAL MAGAZINE

.... EDITED BY HUGH ROBERT MILL ....



AUGUST, 1911.

## CONTENTS

	PAGE
The Hottest Day on Record in London .. .. .	129
The Drought of July, 1911. ( <i>Illustrated</i> ) .. .. .	130
Map of July Rainfall of Thames Valley .. .. .	face p. 131
The Weather of June and July. By FRED. J. BRODIE .. .. .	133
Serious Drought in India .. .. .	135
International Balloon Ascents, Jan., 1909. By W. H. DINES, F.R.S. .. .. .	137
CORRESPONDENCE:—	
Damage by Lightning. By CHARLES L. BROOK. ( <i>Illustrated</i> ) .. .. .	138
The Latest Snow Spot in Wales. By J. R. GETHIN JONES .. .. .	139
The Disappearance of Evening Cloud. By A. F. .. .. .	140
Reviews .. .. .	142
Rainfall Table for July, 1911 .. .. .	144
Supplementary Table of Rainfall, July, 1911, at 112 Stations .. .. .	146
Meteorological Notes on July, 1911 .. .. .	147
Climatological Table for the British Empire, February, 1910 .. .. .	148

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

Published on the 16th of each Month.]

[Price 4d., or 5s. per Annum, Post Free.



## NOTICES.

It is requested that all Books for Review and Communications for the Editor be addressed to 62, Camden Square, London, N.W.

The responsibility for all facts and opinions expressed in the signed articles and letters published in this Magazine rests with their respective authors.

---

## **READY END OF AUGUST.**

---

Cloth 8vo. Over 400 pages. With Maps and Illustrations.

PRICE 10s.

## **BRITISH RAINFALL, 1910.**

THE FIFTIETH ANNUAL VOLUME.

COMPILED FROM THE RECORDS OF NEARLY  
5000 OBSERVERS

BY

HUGH ROBERT MILL.

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.



### **DARTON'S IMPROVED SELF-REGISTERING RAIN GAUGE**

for accurately recording the amount of rainfall up to 10 inches, with index to show the difference between yesterday's and to-day's fall. Well made in stout copper, with deep brass receiving surface

£3 10 0

Ditto, as above, in zinc, enamelled

£2 15 0

### **DARTON'S RECORDING HYGROMETER,**

showing at a glance on a revolving chart the differences of temperature readings between the wet and dry bulbs, and the percentage of aqueous vapour held in suspension by the atmosphere, £7. 15. 0.

*Illustrated List of Standard, Registering, and Recording Meteorological Instruments, post free.*

**F. DARTON & Co., 142, St. John Street, London, E.C.**

## THE "DEMONSTRATION" SET OF THERMOMETERS and SCREEN.

Designed for the use of observers who have not the convenience for setting up the ordinary full size Stevenson's Screen.

As will be seen, the apparatus is easily fixed upon a wall or post, and the Thermometers are specially made in a reduced size, whilst still of Standard accuracy.

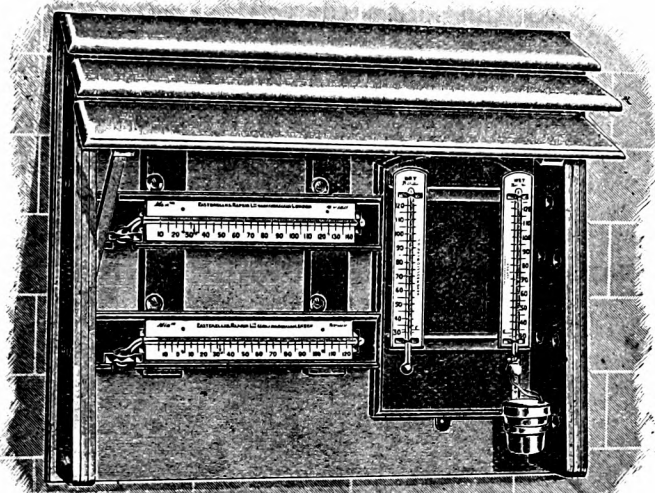
The Screen is designed to allow of the correct observation of shade temperatures. It is well made, and painted white.

The Thermometers are graduated upon the stems, figured upon the opal scales, and well mounted upon seasoned oak slabs.

**PRICE COMPLETE**  
as illustrated,  
**£2 : 15 : 0**

Screen separately,  
16/6.

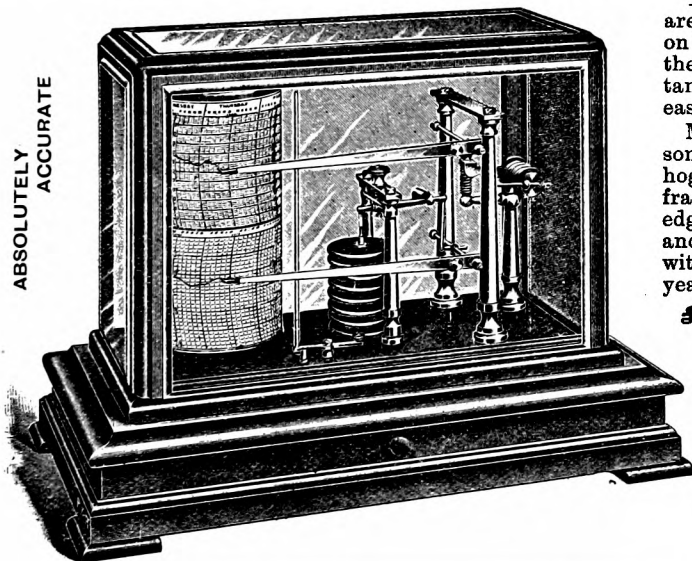
Kew Certificates,  
10/- extra.



## THE BARO-THERMOGRAPH.

(COMBINATION SELF-RECORDING BAROMETER & THERMOMETER).

ABSOLUTELY  
ACCURATE



The weekly charts are both lithographed on the same sheet, the records are simultaneously made, and easily followed.

Mounted in handsome solid oak, mahogany, or walnut frame, with bevelled edge plate glasses, and chart drawer, with charts for one year, ink, &c.,

**£10 : 0 : 0**

Dimensions  
17" x 9" x 12"

**Special Illd.**  
List of Barographs and Thermographs (covering various patterns, from **£3 10s.**), post free.

**PASTORELLI & RAPKIN, LTD.** (ESTAB. 1750)

ACTUAL MAKERS of *all kinds* of Meteorological Instruments.  
CONTRACTORS TO H.M. GOVT.

**46, HATTON GARDEN, LONDON, E.C.**

**Illustrated List of STANDARD INSTRUMENTS Post Free.**

"SNOWDON" RAIN GAUGES & "CAMDEN" MEASURES (certified by Dr. Mill) in stock.

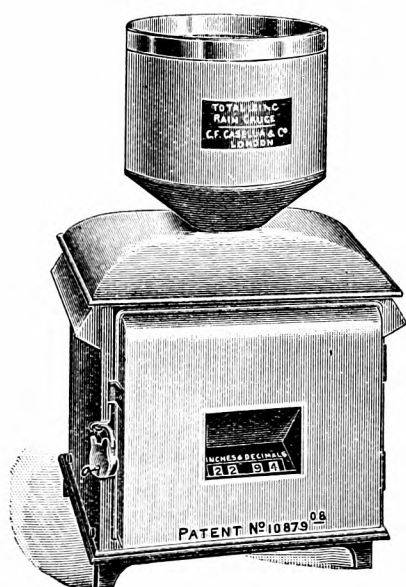
\*. We pay carriage and guarantee safe delivery within U.K. on all our Instruments.

( iii. )

# Rainfall Measurement.

For all kinds of RAIN GAUGES, whether self-recording, registering or the ordinary collecting ones, C. F. CASELLA & Co.'s patterns will be found to be

**ACCURATE, SERVICEABLE and INEXPENSIVE.**



This illustration shows our PATENT TOTALIZING RAIN GAUGE as supplied to the War Office.

Its merits are obvious : no mistakes, nothing to get out of order.

---

☛ Kindly write for new Price Lists.

**C. F. CASELLA & Co., LTD.,**  
**11-15 ROCHESTER ROW, VICTORIA STREET,**  
**LONDON, S.W.**

*Telegraphic Address:* "ESCUTCHEON, LONDON."

*Telephone:* WESTMINSTER 5599.

# Symons's Meteorological Magazine.

---

No. 547.

AUGUST, 1911.

VOL. XLVI.

---

## THE HOTTEST DAY ON RECORD IN LONDON.

AUGUST 9th, 1911, proved to be the hottest day in the long record of temperature kept at Camden Square since 1858. The temperature at 9 a.m. was  $78^{\circ}\cdot7$ , at 9.40 it had reached  $83^{\circ}\cdot0$ , the increase being at the rate of a tenth of a degree per minute. At 1 p.m. the reading was  $95^{\circ}\cdot0$ , and at 2.15 p.m. the dry bulb thermometer read  $97^{\circ}\cdot1$ , this being also the temperature shown on the maximum thermometer hung on the same Glaisher stand. Special care was taken to turn the stand so that the sun never shone on the instruments. At 3 p.m. the reading was  $95^{\circ}\cdot8$ , at 4 p.m.  $95^{\circ}\cdot0$ , at 5 p.m.,  $93^{\circ}\cdot1$ , at 6.15 p.m.  $89^{\circ}\cdot0$ , and at 9 p.m.  $74^{\circ}\cdot4$ .

The previous occasions on which the maximum temperature exceeded  $93^{\circ}$  in the fifty-four years' record were as follows:—July 21st, 1868,  $93^{\circ}\cdot3$ ; July 22nd, 1868,  $93^{\circ}\cdot2$ ; July 15th, 1881,  $94^{\circ}\cdot6$ ; August 18th, 1893,  $93^{\circ}\cdot6$ ; July 16th, 1900,  $95^{\circ}\cdot2$  (previous highest); July 19th, 1900,  $93^{\circ}\cdot4$ ; July 25th, 1900,  $94^{\circ}\cdot0$ ; August 31st, 1906,  $93^{\circ}\cdot2$ ; September 2nd, 1906,  $94^{\circ}\cdot4$ . This shows that the maximum temperature on August 9th at Camden Square was  $1^{\circ}\cdot9$  above the highest previously recorded.

In 1881, when Camden Square recorded  $94^{\circ}\cdot6$ , the Royal Observatory at Greenwich, also on a Glaisher stand, recorded  $97^{\circ}\cdot1$ ; and we understand that on August 9th this year the reading at Greenwich was  $100^{\circ}$ . The fact of so open a position as the top of Greenwich Hill having a maximum shade temperature three degrees higher than much more sheltered stations at a lower altitude in London is very remarkable.

On August 9th the maximum temperature at the Meteorological Office in South Kensington was  $97^{\circ}$ , and the same figure was registered by Mr. G. Searle at West Kensington. At Mill Hill, 380 feet above sea level, Mrs. H. R. Mill recorded  $95^{\circ}\cdot8$  in the Stevenson screen, while the black bulb thermometer in vacuo gave a maximum of  $142^{\circ}\cdot4$ . She recorded a black bulb temperature of  $146^{\circ}\cdot8$  on July 22nd when the shade maximum was  $90^{\circ}\cdot0$ . Mr. W. B. Butler, with Kew verified instruments in a Stevenson screen, recorded  $97^{\circ}\cdot3$  at Old Southgate, London, N., 255 feet above the sea; and Mr. H. E. Frier at Ponders End, Middlesex, 50 feet above sea level, recorded



98°·8 with a Kew certified Six's thermometer in a Stevenson screen. This is, we believe, the highest shade temperature recorded in standard conditions in the British Isles, the Greenwich thermometer like that at Camden Square being exposed on a Glaisher stand, which always gives more extreme values than the Stevenson screen. At Camden Square when 97°·1 was registered on the stand, the maximum thermometer in the screen read only 95°·0.

Amongst high readings some distance from London which have been reported to us on the same day are 96° by Mr. Axford at St. Giles, Salisbury; 95°·8 by Mr. Burrell at Westley Hall, Bury St. Edmunds; 95° by Mr. J. Ellis Mace at Tenterden, and 91° by Mr. C. L. Brook at Harewood Lodge, Meltham, who states that such a temperature had not occurred since 1868.

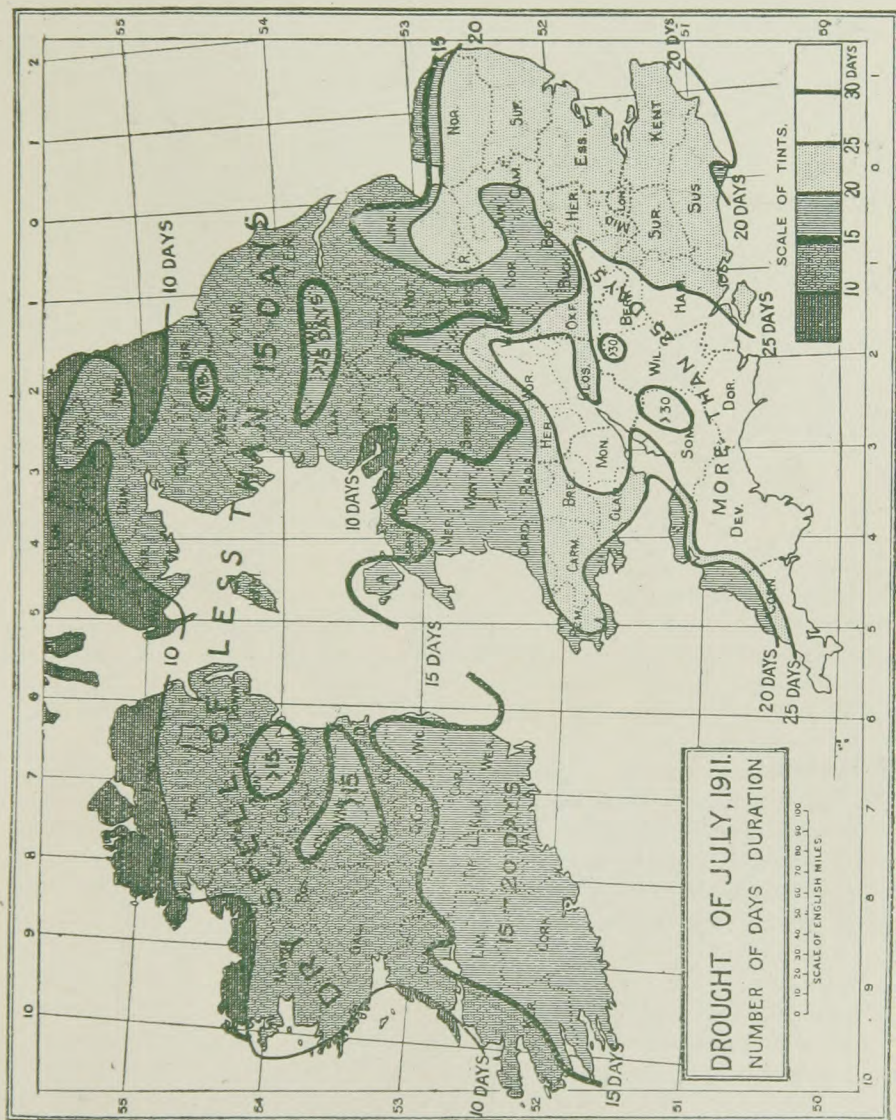
---

### THE DROUGHT OF JULY, 1911.

THE rainfall of July has proved exceedingly small in England, Wales, and the south of Ireland, in some places under 5 per cent. of the average, but rather above the average in the west of Scotland. An absolute drought, or period of more than 14 days without rain, occurred in all parts of the British Isles south of a rather wavy line drawn from the south-west of Ireland to Dublin, and thence by Holyhead across England to the north coast of Norfolk. A map has been prepared showing the part of the country in which more than ten consecutive days without rain occurred, and this is published herewith. In most cases an extra day should be added from June to complete the dry spell; but to do this would have more than doubled the time required to compile the map, which would have had to waste the sweetness of its approach to perfection in a cupboard at Camden Square instead of showing its graphic, if less perfect, outlines in this Magazine.

It will be observed that although the drought did not extend to twenty days in Ireland, the area with more than twenty rainless days in England stretched from sea to sea, and was not much less in area than the portion with fifteen days or more. The very exceptional length of twenty-five days of drought was the rule to the west of a line drawn from the Solent to Dunstable, and several stations within this area had no rain to record for the whole month. The intensity of this drought was the more severely felt because the very same part of the country with the maximum duration in July had already suffered a long drought in May and early June.

The most interesting part of the drought area lies within the limits of our monthly rainfall map of the Thames Valley and its surroundings, on which it will be observed that there are only a few splashes of more than 1 inch of rain for the month, representing the positions of the thunderstorms in which the drought broke up in the last week of July. It will be noticed that the greater part of the





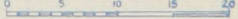
# THAMES VALLEY RAINFALL - JULY, 1911.



ALTITUDE SCALE

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

SCALE OF MILES



Source: Meteorological Magazine.

Watershed of River Thames above Teddington, and River Lee above Faldes Wale.

Rainfall Stations reporting  
Isohyets.

map shows less than half-an-inch of rain, and in the south-west we have drawn isohyets for a quarter of an inch and also for one-tenth of an inch, Wiltshire, together with a large part of Berkshire and Gloucestershire having had less than this insignificant sprinkling as the total rainfall for the month. In the extreme south-west, several stations report a rainless month, and there we have shown a small area on which we believe that no rain at all fell. It is probable that this condition of things was unprecedented for July.

It is impossible to refer to all the correspondence we have received ; but we have pleasure in adding to this notice a few lines describing the personal experience of Observers.

**Belper.**—Ten months had a total rainfall less than half-an-inch, during the 34 years and 7 months of my record, from January, 1877, to July, 1911. Of these, two months had less than a quarter of an inch, viz. :—February, 1891, rainfall .12 in. falling on 2 days, and July, 1911, with .04 in. falling on 3 days.—JOHN HUNTER.

**Branston Hall, Lincoln.**—The rainfall here for the month of July is 0.14 in. The total rainfall so far this year has been 8.03 in. I have had to go back to a return of rainfall taken at South Kyme, from 1800, to find such a low return for July. I find that in 1826 there was no rain in July, and the return for that year is so very remarkable\* I give it below :—

	in.		in.		in.
January .....	.33	June.....	.89	November ...	2.02
February ...	.87	July.....	.00	December ...	1.05
March .....	.24	August ...	1.12		
April .....	.00	September.	1.18		8.79
May .....	.00	October ...	1.09		

A. S. LESLIE MELVILLE.

**Lanwithan, Lostwithiel.**—The drought began on June 30th at noon, and ended on July 29th at 2.30 p.m., making 28 complete days without rain. On July 29th we were visited with a very severe thunderstorm. The thunder lasted here from about 12.30 to 6 p.m. ; was very severe from 2.30 to 4. About 2.45 the wind rose suddenly from a dead calm to the force of a hurricane, which lasted about half-an-hour. In Fowey Harbour boats were swamped and vessels dragged their anchors. Here also we had torrents of rain for about an hour—.75 in., .60 in. of which fell in half-an-hour and was torrential. On the Fowey a remarkable rise and fall of the tide was observed. The July drought is the third spell of dry weather we have had this year, namely, March 30th to April 18th, 19 days absolute drought ; and May 4th to June 1st, 28 days, but on 3 days during this time .25 in. fell. In the year 1887 we had 36 days absolute drought.—MABEL FOSTER.

**Stoke Fleming, near Dartmouth.**—The only rainfall here in July was .48 in. on the 29th (.47 in. of it in 1½ hours, with thunder) and .05 in. on the 31st.—CHAS. F. SELBY.

**Chewton Mendip.**—You may be interested to hear that the rainfall for July at the Priory, Chewton Mendip, was .05 in. on July 31st. I believe it really fell in August, but before 9 a.m. on August 1st.—WALDEGRAVE.

**Chelwood Rectory, North Somerset.**—We only had one hour's rain in July, yielding .22 in., of which .20 in. fell from 2.40 p.m. to 3.25 p.m. on the

\* Too remarkable to be accepted.—ED. S.M.M.

26th. Last Saturday, the 29th, my self-registering thermometer registered 93° at 3 p.m. There was a strong south-easterly wind blowing all the day.—HUBERT SATCHELL.

**Clifton.**—This absolute drought lasted 25 days—from the 1st to the 26th—when it was broken by showers in the afternoon, which, however, gauged only .07 in. Its duration has been equalled only three times in the last 55 years, viz. : in September, 1907, June, 1887, and June, 1865, and it has been once exceeded by a drought of 27 days in February, 1891.—ROBT. F. STURGE.

**Bath.**—The rainfall for July as measured by me, in my rain gauge in Somerset Place, was .03 in. on 2 days, the lowest for any month in the year, since I began to keep a rain gauge in 1869, both as regards the rainfall itself and the number of days on which the rain fell. I learn from the papers that the rainfall as taken in July, 1911, was nil at the Henrietta Park; nil at the Literary Institution; .08 in. at Monkswood (1 day); Bath Easton .02 in. (1 day); Charlcombe .01 in. (1 day). These gauges are all in or near Bath.—R. LEWIS LLOYD.

**North Cadbury, Somerset.**—July, but for the strange storm on the 29th, would have been a rainless month. The 29th was very hot, and I do not doubt the maximum of 94° about 2 p.m., as the wind was strong and there was no doubt about free circulation of air. At 4 it began to grey over from south-south-east, and thundery cumuli formed low down in the north. The greyness darkened and took the form of well defined arches, each darker than the one before it, working across the sky from south-south-east. The appearance was like that of a sirocco sky in Algiers or Patras. At 5.20 Cadbury Camp, a high hill just one mile south, became obscured as if by rain, and all the country to the south-west and west disappeared. Then came a furious blast from the south, and the air was filled with dust *from grass fields*. It was a dust storm worthy of Algeria. There was a little thunder and lightning, and rain began gently at 6.30 p.m. and ceased about 7.30 (.05 in.), a few drops came about 9 p.m. when the sky cleared. The rain was nowhere enough to do any good.—H. A. BOYS.

**Market Lavington.**—The rainfall of July seems (to me) very remarkable being a total of .02 in. of which .01 in. fell on the 2nd and .01 in. on the 29th. On, I think, 2 other days light showers fell, but nothing measurable. It has been very strange that during the extraordinary heat of July, in this district, we have had not a single thunderstorm. Market Lavington is situated in the valley to the north of Salisbury Plain, about 290 feet above sea level.—A. PLEYDELL BOUVERIE.

**Shrewton.**—As Salisbury Plain seems, so far as I can gather, to have been near the focus of the July drought, figures may be of interest. Rain : .03 in. on one day, the 29th; absolute drought 1st—28th; temperature, absolute maximum 92° on 29th, three other days over 90°, 19 in all over 80°. Owing to the dryness of the air the sun's heat was intense, but the minima were comparatively low, and the mean temp. for the month works out at 66°. The driest month in the long Chitterne record near here was July, 1885, with .03 in., but that month was much less hot.—F. J. WARDALE. †

**Downton, Salisbury.**—The drought here in South Wilts has been remarkable. There was no rain at all from July 1st to 25th. On July 26th. there were a few drops about 6.45 a.m. for something like a quarter of an

hour, but certainly nothing like .01 of an inch. I should put it down as about .0005 in. No rain on July 27th or 28th. On July 29th we came in for the edge of a thunderstorm at 6.20 p.m., which ceased before 7 p.m., and produced .05 in., which stands as the total for the month. The characteristic of the month has been intense heat without sultriness, and brilliant sunshine. The hottest day was July 29th, with 91° F. in the screen. Bright sunshine exceeded 350 hours. The black bulb thermometer in vacuo was above 130° F. on every day in the month, and on July 9th, 20th and 24th was 150°, 154° and 151° F. respectively.—FRANK PENROSE.

**Dinan, France.**—The rainfall here for July may be of interest in connection with the drought in England. Total rain in July was .31 in. Such rain as fell was merely local and fell on 5 days. The thunderstorm of the 29th was very heavy, but here only .04 in. of rain fell. The absolute drought lasted 21 days, from the 2nd to 22nd.—P. A. GORE.

Several letters too long for insertion this month, will, if possible, be published in a subsequent number.

---

## THE WEATHER OF JUNE AND JULY.

By FRED. J. BRODIE.

### JUNE.

JUNE opened with warm, seasonable weather, but owing to shallow barometrical depressions in the south, thunderstorms occurred between the 1st and 5th in several isolated districts. On the 1st and 2nd the thermometer rose slightly above 80° at a number of places situated in the northern and central parts of Great Britain, and touched 83° at Balmoral, Fort William and Aspatia. After the 4th, in a large anticyclone, shade readings of 80° and upwards were recorded in nearly all parts of the United Kingdom, the thermometer reaching 84° at Greenwich and Fulbeck. A shallow low-pressure system over the Bay of Biscay on the 8th was accompanied by thunderstorms in the Channel Islands and the south-west of England, with a very heavy fall of rain in Guernsey.

The Atlantic anticyclone then receded westward, and between the 9th and 14th a cold current of air from the northward prevailed, with a temperature considerably below the average. On the night of the 9th the sheltered thermometer fell below 40° in nearly all districts, and touched 35° at some places in the west and north, the readings on the grass being as low as 25° at Llangammarch Wells and Burnley, and 27° at Southport and Wisley. A cyclonic disturbance, which extended slowly from the Atlantic over the entire Kingdom, caused the wind to shift to the eastward or south-eastward, with rain in all districts, and thunderstorms in many scattered places. Between the nights of the 13th and 15th a ground frost was experienced, the exposed thermometer falling at least 5° below the freezing point in several localities. On the night of the 14th a reading of 24° was



recorded at Birmingham, and a reading of  $19^{\circ}$  at Llangammarch Wells, and at many places in the west and north the frost is reported to have caused considerable damage to the growing crops. Cool, unsettled weather continued to prevail throughout the Coronation week (ended July 24th), a heavy fall of rain being experienced in the west of Scotland on the 21st, and a still heavier fall over the north and east of Great Britain on the 23rd and 24th. Temperature was considerably below the normal, but towards the close of the month, when the wind backed to west or south-west, the thermometer rose somewhat, the general conditions being, however, still unsettled and showery, with thunderstorms in some parts of Ireland and Scotland. Over the country generally the mean temperature was nearly normal. The total duration of bright sunshine was as a rule somewhat above the normal.

### JULY.

IN addition to a phenomenally long summer drought, lasting in many places for a period of considerably over three weeks, the month of July was marked by several features of more than ordinary meteorological interest.

At the commencement of the month, in the rear of a cyclonic disturbance which passed from Iceland to northern Europe, a cool north-westerly breeze was blowing across the United Kingdom, with passing showers in most districts, but scarcely any rain in the south of England. After the 2nd a large anticyclone came in from the Atlantic, and for the ensuing fortnight brilliantly fine weather prevailed, the week ending the 8th being the sunniest experienced over the country generally since the widespread adoption of recording instruments 30 years ago. Temperature was almost continuously above the normal, the warmest spells occurring on the 7th and 8th, and between the 12th and 14th. On the earlier occasion the thermometer in the screen rose above  $85^{\circ}$  in many parts of England, and, locally, in the south of Ireland, and touched  $90^{\circ}$  at Camden Square, Epsom and Cullompton. On the latter occasion, between the 12th and the 14th, shade maxima of  $85^{\circ}$  and upwards were observed over a large portion of the United Kingdom, some of the highest temperatures being recorded in the north. At Crieff the thermometer on the 12th rose to  $89^{\circ}$ , and at Balmoral on the 13th it touched  $88^{\circ}$ . Between the 17th and the 21st less settled weather was produced by low pressure systems which moved over the Atlantic in close proximity to our own western and northern coasts. Frequent rains were consequently experienced over Ireland and north Britain, but over a large portion of eastern and southern England the weather remained very dry, with a continued high temperature. On the 21st shade readings above  $85^{\circ}$  were registered in many places, and on the following day the thermometer exceeded  $90^{\circ}$ , the readings being as high as  $93^{\circ}$  at Camden Square and South Kensington,  $94^{\circ}$  at Margate

and  $96^{\circ}$  at Greenwich. The Greenwich reading had been exceeded only twice in the course of the previous 70 years, viz., on July 22nd, 1868, and July 15th, 1881, on each of which occasions the thermometer rose to  $97^{\circ}$ . Between the 24th and 27th less settled conditions were produced by shallow low pressure systems which spread in from the Atlantic, and on the 25th and 26th sharp thunderstorms were experienced in various parts of the country. One of the most striking events in the meteorological history of the month was the unusually violent thunderstorm which burst over the western parts of London on July 28th. The storm appears to have reserved its worst fury for South Kensington, and the daily records made by the automatic instruments at the Meteorological Office formed one of the most striking series ever collected in the metropolis, or perhaps in any other part of the country. The storm came up rapidly from the north-eastward just after 5 p.m., and in the course of 15 minutes 1.10 inch of rain was collected, the thermometer dropped almost instantaneously  $22^{\circ}$ , and the wind rose in squalls to a velocity of 54 miles an hour. The storm was essentially one of a local character, especially as regards intensity, but on the following day, when a large cyclonic disturbance extended over the United Kingdom from the south-westward, thunderstorms occurred in all parts of the country, with exceedingly heavy falls of rain in the south of Ireland, a tidal wave on the coast of South Devon, and a storm of dust in South Wales. On the 28th and 29th the shade temperature again rose above  $90^{\circ}$  in several parts of England and Wales, and reached  $93^{\circ}$  at Bath.

With the frequent recurrence of such unusual warmth, it is not surprising to find that the mean temperature of the month was everywhere in excess of the average, and that in the south of England the excess was large. In London the month proved to be the warmest July for at least 40 years past. The amount of bright sunshine also showed a large excess in all parts of the country, many places in the south of England recording at least 100 hours more than the average. At Westminster the total of 320 hours was as many as 139 in excess of the average.

---

### SERIOUS DROUGHT IN INDIA.

THE feebleness of the south-west monsoon this year has given rise to much anxiety and alarm in India, which is reflected in the following extracts from the dispatches of the Indian Correspondents of *The Times* :—

BOMBAY, July 23rd.

“The continued scarcity of rain is causing anxiety, though a slight improvement is noticeable. To-morrow the Bombay Hindus will close their

shops and go in procession to the sea shore, there performing the concluding ceremony of an elaborate ritual for propitiating the god Indra. The Parsis and Mahomedans are organising large prayer meetings. In the Cathedral the prayer for rain has been said for the last ten days."

BOMBAY, July 24th.

"Remarkable scenes were witnessed to-day, when 5,000 Hindus marched through the principal streets to the sea shore, and immersed the image of Shrungra Rushi as an invocation for rain. The image had been worshipped continuously in the Cloth Market by 90 Brahmans. Heavy clouds hung in the sky as the processionists, having reached the sea shore, performed the accustomed rites, with ceremonial dances and the wailing of conches, before committing the image to the waters."

SIMLA, July 27th.

"The continued feebleness of the monsoon is beginning to cause much anxiety."

SIMLA, July 28th.

"The area affected by the drought is very extensive. It includes the northern parts of the Bombay Presidency, the deficiency in Gujerat being very marked, Central India, Rajputana, portions of the Central Provinces, and practically the whole of the United Provinces, while the eastern and southern parts of the Punjab are also suffering. Burma, Assam, the two Bengals, and the Deccan districts have had good rain, though unequally distributed. The deficiency in the United Provinces varies from 6 in. to 17 in.

The geographical area is best described as the country west of a line drawn from Bombay, through Jubbulpore, to Darbhanga; in other words, nearly one-half of the whole country, but in parts of the United Provinces and the Punjab the canals and the rivers are furnishing an unlimited supply of water owing to the heavy snowfall in the Himalayas last spring."

BOMBAY, August 6th.

"Friday and Saturday's rainfall in Bombay City amounted to 10 in., and heavy rain is continuing. The rainfall is fairly general in North-east India, lower Burma, and Bombay. Some rain has fallen in the eastern part of the Central Provinces, the Deccan, and Northern Madras. Rain is wanted in the United Provinces, the Punjab, Gujerat, and Kathiawar."

BOMBAY, August 7th.

"Rain has fallen generally in the Central Provinces, Konkan, the Deccan, and Haiderabad, and locally in Central India and in the extreme north-west of the United Provinces. There has been nothing more than a drizzle in Gujerat and Kathiawar, where the situation is desperate."

BOMBAY, August 8th.

"The rainfall continues in Burma and North-east India. Rain has fallen locally in the United and Central Provinces, and generally in the Deccan, Konkan, and Haiderabad. None has fallen in Gujerat, Kathiawar, Central India, and the Punjab."

## INTERNATIONAL BALLOON ASCENTS.

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

*January 11th, 1909.*

Starting Point.	Country.	A miles.	B ° F.	C miles.	D ° F.	E miles.	F
Petersfield ....	England ....	6.3	-76	9.9	-63	806	E.S.E.
Paris .....	France .....	7.0	-76	9.7	?	442	S.E. by E.
Strassburg ....	Germany ....	6.4	-74	7.0	-74	19	S.E.
Munich .....	„ .....	7.2	-74	8.5	-70	37	S.S.E.
Pavlovsk ....	Russia .....	6.1	-76	7.2	-71	21	E. by S.

*January 12th, 1909.*

Manchester....	England ....	?	?	6.9	-71	263	E.S.E.
Brussels .....	Belgium ....	6.1	-78	8.4	-67	235	E.S.E.
Hamburg.....	Germany....	5.6	-63	9.7	-70	97	E. by N.
Paris.....	France .....	7.2	-80	7.5	-76	173	E.S.E.
Strassburg ....	Germany....	6.1	-81	9.1	-72	84	S.S.E.
Munich.....	„ .....	6.4	-76	8.1	?	62	E.S.E.
Vienna.....	Austria.....	6.5	-81	9.5	-62	82	E.S.E.
Pavia.....	Italy .....	7.1	-92	10.6	-72	90	S.E.

*January 13th, 1909.*

Manchester....	England ....	6.6	-67	14.4	-78	282	E. by S.
Pyrton Hill....	„ .....	7.7	-70	9.6	-68	643	E.S.E.
Brussels .....	Belgium ....	6.3	-85	9.0	-76	100	E.S.E.
Hamburg.....	Germany....	6.1	-80	7.0	-69	86	S.E. by E.
Paris.....	France ....	6.4	-81	6.5	-80	197	S.S.E.
Strassburg ....	Germany....	6.6	-87	9.3	-63	91	S.S.E.
Vienna.....	Austria ....	6.1	-78	6.8	-76	73	S.E. by E.
Pavia .....	Italy .....	6.8	-80	7.3	-74	98	E.S.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.

Owing to the strong wind that was blowing from the west, but few of the English balloons were found. The distances run from Petersfield and Paris on the 11th and from Pyrton Hill on the 13th are very unusual. The temperature shown over Pavia on the 12th is very low.

On the 11th an extensive low-pressure system with very low pressures lay to the west of Norway, with one anticyclone over Spain and another over the Alps. The depression decreased in intensity and moved eastwards, while the Spanish anticyclone showed but little change.

## Correspondence.

*To the Editor of Symons's Meteorological Magazine.*

---

## DAMAGE BY LIGHTNING.

On Saturday, June 17th, 1911, two short but severe thunderstorms occurred in this valley; the first lasted from 3.15 to 3.30 p.m. with heavy rain (·10 in. in  $3\frac{1}{2}$  min.). During this storm Meltham Hall, distant about 300 yards in a south-westerly direction, was affected in the following way—three persons were standing in a broad passage, facing at a distance of three or four yards an ordinary electric light pendant from the ceiling; all three at the instant of a flash saw this light surrounded by a globe of fire described as being about two feet in diameter, the appearance was momentary; at the same instant, a fourth person standing with his back to this electric light and having on his left hand a fire hydrant, the end of which is about four feet above the floor, saw a flash pass from the end of the hydrant to the floor with a sharp crack; no damage was done, except that possibly the burning out of the safety fuse of the electric lights in the cellar may be attributed to this flash; the electric light, round which the globe of fire appeared, was uninjured.

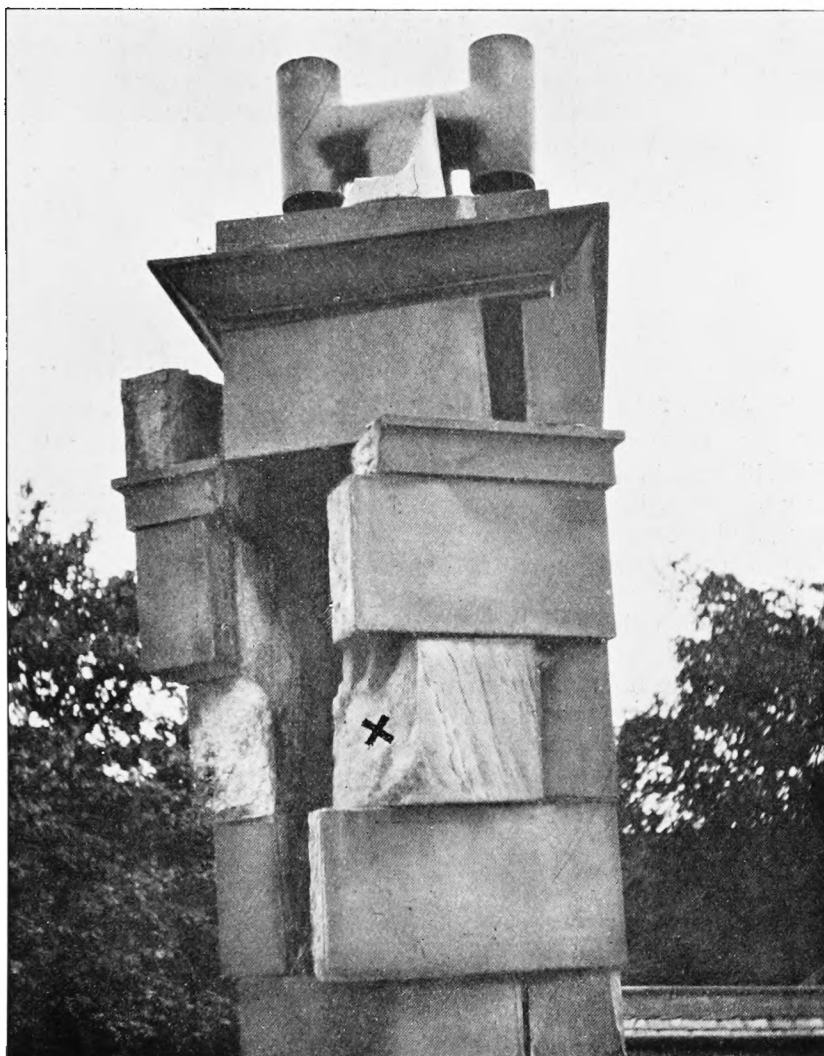
The second storm lasted from 4.5 to 4.30 p.m., and the same house was again struck, this time more seriously. The photograph shows the damage done to a chimney stack; the stones of this are solid ashlar, and are approximately 6 in.  $\times$  6 in.  $\times$  18 in. One only (marked with a cross) was broken, but all the stone work for the first five courses was apparently forced outwards, and was within an ace of tumbling down; the grate of the bedroom next below this chimney was shifted about half an inch out of its position, and the fender was thrown into the middle of the room.

In this storm, also, another house half a mile away was struck, and the contents of one room partially burnt. Also in a small wood belonging to me an oak tree was completely destroyed; at about two-thirds of its height from the ground the main trunk was split into shreds, but not severed, so that the top tumbled over on to the next tree; the lower part of the trunk was split in two, quite two-thirds of the bark was stripped and much of it thrown into the field adjoining to a considerable distance, but how far I cannot ascertain. Perhaps, however, the most curious feature was that the wood of the tree where the bark had been stripped was grooved in several places just as if a cheese scoop had been used, the ground all around being littered with chips.

CHARLES L. BROOK.

*Harewood Lodge, Meltham, July 23rd, 1911.*





CHIMNEY OF MELTHAM HALL DAMAGED BY LIGHTNING.

---

### THE LATEST SNOW SPOT IN WALES.

It has struck me that your Magazine should record every year, if possible, the date of the disappearance of each winter's latest snow spot in England and Wales. Since the description of the Carnedd Llewelyn spot in this Magazine for June, 1910, and in *British Rainfall*, 1909, the matter has taken several people interested to visit the place. The 1910-11 winter accumulation disappeared before the end of May; whereas the 1909-10 winter accumulation

lasted till the middle of July and the 1908-9 winter accumulation lasted till the end of June. About 30 years ago it lasted until August.

As the last winter was so mild and this summer so warm, it would be very interesting to know whether the accumulation at Ben Nevis has lasted under such exceptional conditions.

J. R. GETHIN JONES.

*Capel-y-Ffn, Llanthony, August 2nd, 1911.*

### THE DISAPPEARANCE OF EVENING CLOUD.

MR. ELLIS's paper on "The Disappearance of Cloud at Full Moon" is of great interest; he will increase your readers' obligation to him if he will explain the fact he alludes to, which must surely puzzle many observers besides myself, viz.: the frequent clearance of the sky just about sunset.

And may I hope to have another difficulty removed? In a certain type of weather we not infrequently see small cumulus clouds almost all round the horizon while the zenith is quite clear. I am told it is very frequently so at sea. Now those clouds are on some one's zenith and yet it is most characteristic of this sort of weather to have a clear sky overhead; how is this to be explained? Nature herself seems to lend colour to our auto-centric tendencies.

A.F.

We submitted this letter to Mr. Ellis and have much pleasure in adding his interesting reply:—

I was pleased to read the appreciative remarks of your correspondent, A.F., on my little paper "The Disappearance of Evening Cloud at Full Moon." A friend has kindly drawn my attention to the description of evening contained in Book IV. of Milton's "Paradise Lost," the latter part of which runs as follows:—

"Now glowed the firmament  
With living sapphires: Hesperus that led  
The starry host, rode brightest till the Moon,  
Rising in clouded majesty, at length  
Apparent queen, unveiled her peerless light,  
And o'er the dark her silver mantle threw."

These lines are interesting as indicating some predominant influence of the moon in the evening sky, added to which the beauty of a moonlight evening (so well described by Shakespeare in his "Merchant of Venice") draws the attention of many persons in a

special degree thereto. Under such circumstances it is not surprising to find that an impression is created assigning the evening dispersion of cloud to action of the moon. Then come the facts of observation, showing that there is as much evening clearance at new moon as at full moon, and conversely as many clouded nights at full moon as at new moon. But having disassociated the two phenomena as regards their scientific aspect, we may still be allowed to link them together in poetic fancy as expressed in Milton's verse.

In reply to the inquiry of A.F. as to the cause of the frequent clearance of the sky just about sunset, it may be said to be a consequence, indeed a phase, of the diurnal variation in the amount of cloud, which I may, perhaps, be allowed again to mention reaches, on the average, a maximum in the forenoon, falling to a minimum in the evening, and rising again to the maximum on the following forenoon. There is, however, little variation in the amount of cloud during a winter day; in summer the variation during the day is, on the average, greater. But the departures from averages on individual days are very great. Here are some examples—*a*. At times many days in succession will remain cloudy throughout, especially in winter. *b*. On other occasions cloud by day will fade away in the evening. *c*. A fine day may cloud up in the evening. *d*. Less frequently there will occur days that are clear throughout. It is when a day of the class *b*. coincides with a rising full moon that the impression is given of lunar influence.

With respect to the appearance of small clouds round the horizon when the zenith is clear, said to be not infrequent, I fear that I am not too well acquainted with the condition described. Can it be a question of perspective. Small clouds, seen near the horizon, might be really a considerable distance apart. If the spectator could be transported to the neighbourhood of the small clouds what then might be the appearance. The condition described, if frequent, seems to be abnormal, and one for which it seems difficult to suggest any physical cause.

I should in conclusion draw attention to a paper communicated by Dr. Shaw, F.R.S., to the Royal Meteorological Society in 1902, entitled "*La Lune mange les Nuages*," an abstract of which is given on page 38 of Vol. 37 of this Magazine. It deals with the thermal relations of floating clouds, the variations in which can be so readily observed under a bright moon, although the phenomena described are not confined to any special period being of the class *b* (above) in which, under the moon, the clouds become illuminated, giving the impression implied in the French proverb. WILLIAM ELLIS.

*August, 1911.*

---

## REVIEWS.

*Weather Science, an elementary introduction to Meteorology.* By F. W. HENKEL, B.A., late Director of Markree Observatory. London: T. Fisher Unwin, 1911. Size 8 × 5½. Pp. 336. Price 6s. net.

MR. HENKEL is well-known to the readers of this Magazine as a practical meteorological observer, with a wide knowledge of the literature of the subject. He makes no profession of originality in the work before us, and is scrupulous in citing his authorities. As is perhaps natural in an author who has had less experience of teaching than of observing, he is apt to assume familiarity with the ideas of scientific study on the part of his readers, and we fear that some will find the plunge into isobars in the first chapter a little too bracing, but the reader should soon get over this, and as he goes deeper he will find much to interest him.

Apart from a tendency to repeat statements, which after all is no great defect in a book which is an introduction and not a text book, Mr. Henkel writes agreeably and touches upon a vast number of facts and generalisations grouped in a popular rather than a strictly scientific order. That he should occasionally make a slight slip in matters of detail is not surprising, for it is difficult for anyone outside the narrow limits of his own special branch to appreciate the relative importance of the less familiar data of his own science. We only venture to refer to a few points on which we have special opportunities to be informed, and we should not do this but for the kindly recognition in the Preface of a very slight courtesy we were glad to show the Author, the terms of which might suggest that we had seen and approved the proof sheets.

The number of stations reporting to the British Rainfall Organizations is quite truthfully given on p. 89 as "more than three thousand five hundred," but one thousand five hundred observers would be better pleased to see credit given for the full five thousand. On p. 90 the Snowdon rain gauge is figured, but not named, nor is the nature of the all-important differences from the Howard rain gauge made plain, "merely an improvement on Howard's" is hardly a fair description, for the improvement is revolutionary. The Camden glass is not referred to, and the reference to recording rain gauges is brief and inadequate. In the chapter on Observatories the name of the Royal Meteorological Society is given inadvertently on p. 245 for that of the Scottish Meteorological Society, to which the credit for maintaining the observatory on Ben Nevis for nearly twenty years of course belongs.

There is no doubt that the general reader will join the general chorus of praise with which the newspapers of the country have welcomed Mr. Henkel's book, the value of which to the journalist writing "a weather story" must indeed be very great.

---

*Handbuch der Klimatologie* von DR. JULIUS HANN. Band III. Klimatographie. II. Teil. Klima der gemäßigten und der Polarzonen. Dritte, wesentlich umgearbeitete und vermehrte Auflage. [*Handbook of Climatology*, by DR. JULIUS HANN. Vol. III., Part 2. Climate of the Temperate and Polar Zones. Third greatly improved and enlarged edition.] Stuttgart: J. Engehorns Nachf. 1911. Size  $9 \times 6\frac{1}{2}$ . Pp. x. + 714. Price 23m.

THE new volume of Dr. Hann's second great work must be received by meteorologists with that respectful admiration which all his publications command, and this is by no means diminished although the scale of the work has prevented the author from referring to the more recent maps of average rainfall in various parts of the British Isles, or indeed mentioning the humble efforts of the British Rainfall Organization in elucidating its small corner of the problem of the climatology of the Temperate Zone. It is natural in such a work to take the continents as the main subject of comparative study, the off-lying islands introducing complications and diversities which cannot be treated adequately in a generalization on the scale employed. The great value of the largely augmented mass of material incorporated in this volume for the better known parts of the world will perhaps be found to lie in the Tables of Temperature and other climatological data which are given for each region dealt with; but in the less known regions the descriptions now given are in many cases the first authentic treatment of the climatic conditions. The chapters on the Polar regions are thus practically original works and will be very helpful as a guide to the treatment of the new data which is being accumulated regarding them.

---

*Hints to Meteorological Observers.* By W. MARRIOTT, F.R.Met.Soc. Seventh Edition. London: Edward Stanford. 1911. Size 10 + 6. Pp. 76. Price 1s. 6d.

THIS popular and accurate guide to meteorological observers continues to improve as it enlarges. It is thoroughly practical, very wisely leaving out of its scope aspirations after systems of abstract perfection, with which only the learned few will ever be called upon to deal, and leaving details of difficult measurements and adjustments to the care of the specialists, who can alone cope with them. Mr. Marriott's genius as an inspector of meteorological instruments and observers makes this book the best of its kind we know.

---

BRITISH RAINFALL, 1910, containing the records from nearly 5,000 stations, re-arranged according to a new plan, is now in the press, and will be issued to subscribers before the end of August.

## RAINFALL TABLE FOR JULY, 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	2'57	1'17
Tenterden.....	Kent.....	51 4	*0 41	190	2'21	'15
Arundel (Patching).....	Sussex.....	50 51	0 27	130	2'46	'34
Southampton (Cadland).....	Hampshire.....	50 50	1 22	52	2'42	'13
Oxford (Magdalen College).....	Oxfordshire.....	51 45	1 15	186	2'43	'27
Wellingborough (Croyland Abbey).....	Northampton.....	52 18	0 41	174	2'54	'12
Shoeburyness.....	Essex.....	51 31	*0 48	13	1'73	'12
Bury St. Edmunds (Westley).....	Suffolk.....	52 15	*0 40	226	2'68	'37
Geldeston [Beccles].....	Norfolk.....	52 27	*1 31	38	2'37	'60
Polapit Tamar [Launceston].....	Devon.....	50 40	4 22	315	2'74	'55
Rousdon [Lyme Regis].....	„.....	50 41	3 0	516	2'68	'28
Stroud (Upheld).....	Gloucestershire.....	51 44	2 13	226	2'75	'17
Church Stretton (Wolstaston).....	Shropshire.....	52 35	2 48	800	2'58	'51
Coventry (Kingswood).....	Warwickshire.....	52 24	1 30	340	2'60	'19
Boston.....	Lincolnshire.....	52 58	0 1	25	2'35	'13
Worksop (Hodsock Priory).....	Nottinghamshire.....	53 22	1 5	56	2'35	'15
Macclesfield.....	Cheshire.....	53 15	2 7	501	3'41	'45
Southport (Hesketh Park).....	Lancashire.....	53 38	2 59	38	2'92	'35
Wetherby (Ribston Hall).....	Yorkshire, W.R.....	53 59	1 24	130	2'56	'47
Arncliffe Vicarage.....	„.....	54 8	2 6	732	4'75	1'07
Hull (Pearson Park).....	„ E.R.....	53 45	0 20	6	2'39	'71
Newcastle (Town Moor).....	Northumberland.....	54 59	1 38	201	2'90	1'05
Borrowdale (Seathwaite).....	Cumberland.....	54 30	3 10	423	8'91	2'73
Cardiff (Ely).....	Glamorgan.....	51 29	3 13	53	3'26	'45
Haverfordwest.....	Pembroke.....	51 48	4 58	95	3'39	'63
Aberystwyth (Gogerddan).....	Cardigan.....	52 26	4 1	83	4'03	'85
Llandudno.....	Carnarvon.....	53 20	3 50	72	2'52	1'17
Cargen [Dumfries].....	Kirkcudbright.....	55 2	3 37	80	3'20	1'66
Marchmont House.....	Berwick.....	55 44	2 24	498	3'30	'89
Girvan (Pinnore).....	Ayr.....	55 10	4 49	207	3'73	3'00
Glasgow (Queen's Park).....	Renfrew.....	55 53	4 18	144	2'91	2'05
Inveraray (Newtown).....	Argyll.....	56 14	5 4	17	4'72	5'64
Mull (Quinish).....	„.....	56 34	6 13	35	4'12	4'62
Dundee (Eastern Necropolis).....	Forfar.....	56 28	2 57	199	2'84	1'14
Braemar.....	Aberdeen.....	57 0	3 24	1114	2'65	1'40
Aberdeen (Cranford).....	„.....	57 8	2 7	120	3'00	1'49
Cawdor.....	Nairn.....	57 31	3 57	250	3'14	2'74
Fort Augustus (S. Benedict's).....	E. Inverness.....	57 9	4 41	68	2'98	1'76
Loch Torridon (Bendamph).....	W. Ross.....	57 32	5 32	20	5'35	8'45
Dunrobin Castle.....	Sutherland.....	57 59	3 56	14	2'91	2'22
Wick.....	Caithness.....	58 26	3 6	77	2'67	2'44
Killarney (District Asylum).....	Kerry.....	52 4	9 31	178	3'53	2'92
Waterford (Brook Lodge).....	Waterford.....	52 15	7 7	104	3'13	3'37
Nenagh (Castle Lough).....	Tipperary.....	52 54	8 24	120	3'02	3'88
Miltown Malbay.....	Clare.....	52 52	9 26	400	3'59	2'91
Gorey (Courtown House).....	Wexford.....	52 40	6 13	80	2'90	2'31
Abbey Leix (Blandsfort).....	Queen's County.....	52 56	7 17	532	2'99	4'09
Dublin (Fitz William Square).....	Dublin.....	53 21	6 14	54	2'60	2'99
Mullingar (Belvedere).....	Westmeath.....	53 29	7 22	367	3'16	2'80
Ballinasloe.....	Galway.....	53 20	8 15	160	3'07	2'74
Crossmolina (Ennisceoe).....	Mayo.....	54 4	9 18	74	3'26	4'48
Collooney (Markree Obsy.).....	Sligo.....	54 11	8 27	127	3'36	4'14
Seaforde.....	Down.....	54 19	5 50	180	3'32	1'06
Bushmills (Dundarave).....	Antrim.....	55 12	6 30	162	3'28	3'23
Omagh (Edenfel).....	Tyrone.....	54 36	7 18	280	3'34	4'09



## RAINFALL TABLE FOR JULY, 1911—continued.

RAINFALL OF MONTH (con.)					RAINFALL FROM JAN. 1.				Mean Annual 1875-1909.	STATION.
Diff. from Av. in.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1875-1909. in.	1911. in.	Diff. from Aver. in.	% of Av.		
		in.	Date.						in.	
-1.40	46	.89	28	5	13.53	12.05	-1.48	89	25.11	Camden Square
-2.06	7	.08	24	2	13.65	9.86	-3.79	72	27.64	Tenterden
-2.12	14	.17	26	3	14.92	10.40	-4.52	70	30.48	Patching
-2.29	5	.12	29	2	15.73	10.81	-4.92	69	31.87	Cadland
-2.16	11	.24	29	2	13.03	8.14	-4.89	63	24.58	Oxford
-2.42	5	.06	27	4	13.68	8.80	-4.88	64	25.17	Croyland Abbey
-1.61	7	.10	24	3	9.73	7.30	-2.43	75	19.28	Shoeburyness
-2.31	14	.17	26	4	13.44	10.65	-2.79	79	25.40	Westley
-1.77	25	.29	24	6	11.98	9.68	-2.30	81	23.73	Geldeston
-2.19	20	.35	29	6	18.62	14.17	-4.45	76	38.27	Polapit Tamar
-2.40	10	.28	29	1	17.01	10.15	-6.86	60	33.54	Rousdon
-2.58	6	.09	26	3	15.83	10.18	-5.65	64	29.81	Stroud
-2.07	20	.39	29	5	16.88	11.34	-5.54	67	32.41	Wolstaston
-2.41	7	.14	29	3	15.35	8.03	-7.32	52	28.98	Coventry
-2.22	6	.06	20	6	12.21	8.61	-3.60	71	23.35	Boston
-2.20	6	.05	19, 29	6	13.15	6.93	-6.22	53	24.46	Hodsock Priory
-2.96	13	.14	1	9	18.17	13.64	-4.53	75	34.73	Macclesfield
-2.57	12	.10	30	8	15.88	11.49	-4.39	72	32.70	Southport
-2.09	18	.15	2	6	14.19	10.98	-3.21	77	26.87	Ribston Hall
-3.68	22	.30	20	11	31.97	35.57	+3.60	111	61.49	Arneliffe
-1.68	30	.30	29	8	13.47	10.60	-2.87	79	26.42	Hull
-1.85	36	.40	2	11	14.45	12.55	-1.90	87	27.94	Newcastle
-6.18	31	1.19	20	14	65.29	72.67	+7.38	111	129.48	Seathwaite
-2.81	14	.18	30	5	20.48	15.99	-4.49	78	42.28	Cardiff
-2.76	19	.21	22	9	22.84	17.52	-5.32	77	46.81	Haverfordwest
-3.18	21	.32	29	6	22.15	18.06	-4.09	81	45.46	Gogerddan
-1.35	46	.85	29	9	14.89	11.35	-3.54	76	30.36	Llandudno
-1.54	52	.86	27	11	22.26	23.48	+1.22	105	43.47	Cargen
-2.41	27	.16	20, 29	11	17.68	14.43	-3.25	82	33.76	Marchmont
- .73	80	.53	28	23	24.83	24.93	+ .10	100	49.77	Girvan
- .86	70	.62	27	13	18.42	19.11	+ .69	104	35.97	Glasgow
+ .92	120	.92	4	24	34.04	44.55	+10.51	131	68.67	Inveraray
+ .50	112	1.02	24	24	27.67	30.18	+2.51	109	56.57	Quinish
-1.70	40	.22	20	16	14.86	6.47	-8.39	44	28.64	Dundee
-1.25	53	...	...	...	17.80	14.65	-3.15	82	34.93	Braemar
-1.51	50	.32	16	15	17.02	12.37	-4.65	73	32.73	Aberdeen
- .40	87	.47	1	10	15.65	15.20	- .45	97	29.33	Cawdor
-1.22	59	.39	27	20	23.20	21.61	-1.59	93	44.53	Fort Augustus
+3.10	158	1.17	7	24	42.74	53.10	+10.36	124	83.61	Bendamp
- .69	76	.47	7	14	17.19	15.07	-2.12	88	37.90	Dunrobin Castle
- .23	91	.47	18	18	15.38	15.82	+ .44	103	29.88	Wick
- .61	83	.75	21, 26	12	28.40	24.49	-3.91	86	54.81	Killarney
+ .24	108	1.16	31	11	20.53	17.34	-3.19	84	39.57	Waterford
+ .86	129	1.60	29	11	20.53	18.48	-2.05	90	39.43	Castle Lough
- .68	81	.70	29	18	22.30	18.48	-3.82	83	45.11	Miltown Malbay
- .59	80	.77	26	11	18.32	11.98	-6.34	65	34.99	Courtown Ho.
+1.10	137	1.27	31	13	18.83	17.30	-1.53	92	35.92	Abbey Leix
+ .39	115	1.24	29	14	14.75	10.72	-4.03	73	27.68	Dublin
- .36	89	.58	31	11	19.17	18.25	- .92	95	36.15	Mullingar
- .33	89	1.02	29	14	19.22	17.69	-1.53	92	36.64	Ballinasloe
+1.22	137	1.22	31	19	26.64	23.74	-2.90	89	52.87	Enniscoe
+ .78	123	.77	29	17	22.19	19.57	-2.62	88	42.71	Markree
-2.26	32	.18	3	12	20.74	14.86	-5.88	72	38.91	Seaforde
- .05	98	.41	27	22	18.77	16.08	-2.69	86	37.56	Dundarave
+ .75	122	.60	30	18	20.44	19.39	-1.05	95	39.38	Omagh

## SUPPLEMENTARY RAINFALL, JULY, 1911.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Warlingham, Redvers Road	·24	XI.	Lligwy .....	·74
„	Ramsgate .....	·32	„	Douglas .....	2·34
„	Hailsham .....	·46	XII.	Stoneykirk, Ardwell House	2·28
„	Totland Bay, Aston House.	·15	„	Dalry, The Old Garroch ...	2·63
„	Stockbridge, Ashley .....	·01	„	Langholm, Drove Road.....	1·85
„	Grayshott .....	·92	„	Beattock, Kinnelhead.....	2·77
„	Reading, Calcot Place.....	·31	XIII.	St Mary's Loch, Cramilt Ldge	1·37
III.	Harrow Weald, Hill House.	·46	„	North Berwick Reservoir ...	1·19
„	Pitsford, Sedgebrook .....	·43	„	Edinburgh, Royal Observty.	·96
„	Somersham Vicarage.....	·22	XIV.	Maybole, Knockdon Farm...	2·35
„	Woburn, Milton Bryant....	·46	XV.	Campbeltown, Witchburn...	3·50
IV.	Colchester, Lexden.....	·35	„	Glenreadell Mains.....	4·11
„	Newport .....	·31	„	Holy Loch, Ardnadam.....	4·93
„	Rendlesham .....	·57	„	Ballachulish House.....	3·48
„	Swaffham .....	·16	„	Islay, Eallabus .....	4·12
„	Blakeney .....	·30	XVI.	Dollar Academy .....	3·12
V.	Bishops Cannings .....	·04	„	Balquhider, Stronvar .....	3·62
„	Winterbourne Steepleton ...	·15	„	Coupar Angus .....	1·47
„	Ashburton, Druid House ...	1·13	„	Glenlyon, Meggernie Castle.	2·60
„	Okehampton, Oaklands.....	·33	„	Blair Atholl.....	1·87
„	Cullompton .....	·30	„	Montrose, Sunnyside Asylum	1·11
„	Hartland Abbey .....	·38	XVII.	Alford, Lynturk Manse ...	1·81
„	Lynmouth, Rock House ...	·54	„	Fyvie Castle.....	2·16
„	Probus, Lamellyn .....	1·23	„	Keith Station .....	3·75
„	North Cadbury Rectory ..	·05	XVIII.	Glenquoich, Loan .....	12·00
VI.	Clifton, Pembroke Road ...	·09	„	Skye, Dunvegan.....	6·71
„	Ross, The Graig .....	·25	„	N. Uist, Lochmaddy .....	5·23
„	Shifnal, Hatton Grange.....	·47	„	Alvey Manse .....	1·05
„	Blockley, Upton Wold .....	·05	„	Loch Ness, Drumnadrochit.	1·24
„	Droitwich .....	·33	„	Glencarron Lodge .....	7·44
VII.	Market Overton.....	·26	XIX.	Invershin .....	3·11
„	Market Rasen .....	·33	„	Loch Stack, Ardchullin.....	6·64
„	Bawtry, Hesley Hall.....	·23	„	Melvich .....	3·50
„	Derby, Midland Railway ...	·05	XX.	Skibbereen Rectory.....	2·57
„	Buxton .....	...	„	Dunmanway, The Rectory..	3·45
VIII.	Nantwich, Dorfold Hall.....	·67	„	Cork .....	2·97
„	Chatburn, Middlewood .....	·78	„	Mitchelstown Castle .....	3·99
„	Cartmel, Flookburgh .....	·69	„	Darrynane Abbey .....	4·09
IX.	Langsett Moor, Up. Midhope	·20	„	Glenam [Clonmel] .....	4·90
„	Scarborough, Scalby .....	1·58	„	Newmarket-on-Fergus, Fenloe	2·27
„	Ingleby Greenhow .....	·93	XXI.	Laragh, Glendalough .....	3·66
„	Mickleton.....	·39	„	Balbriggan, Ardgillan.....	2·20
X.	Bellingham, High Green Manor	·94	„	Moynalty, Westland .....	3·30
„	Ilderton, Lilburn Cottage...	·81	XXII.	Cong, The Glebe .....	3·41
„	Keswick, The Bank .....	·96	„	Westport, St. Helens .....	2·78
XI.	Llanfrehfa Grange.....	·32	„	Achill Island, Dugort .....	5·42
„	Treherbert, Tyn-y-waun ...	·56	„	Mohill .....	3·03
„	Carmarthen, The Friary.....	·80	XXIII.	Enniskillen, Portora .....	4·04
„	Castle Malgwyn [Llechryd].	·62	„	Dartrey [Cootehill].....	3·14
„	Plynlimon.....	1·50	„	Warrenpoint, Manor House	3·18
„	New Radnor, Ednol .....	·70	„	Banbridge, Milltown .....	3·44
„	Rhayader, Tyrmynydd .....	·59	„	Belfast, Cave Hill Road.....	2·22
„	Lake Vyrnwy .....	·94	„	Glenarm Castle.....	2·52
„	Llangyhanfal, Plâs Draw....	·97	„	Londonderry, Creggan. Res.	3·04
„	Dolgelly, Bryntirion .....	·87	„	Killybegs .....	4·72
„	Bettws-y-Coed, Tyn-y-bryn	1·00	„	Horn Head ...	2·23

## METEOROLOGICAL NOTES ON JULY, 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.—Brilliantly sunny and warm weather continued throughout the month. An absolute drought of 24 days ended on 23rd. Only five instances of longer droughts have occurred in the preceding 53 years. During a TS on 28th, .75 in. of R fell in ten minutes. The mean temp.,  $69^{\circ}\cdot 0$ , was  $5^{\circ}\cdot 5$  above the average, and the highest on record for any month. Duration of R  $5\cdot 5$  hours, and of sunshine  $283\cdot 1^*$  hours, with no sunless days. Evaporation  $4\cdot 60$  in. The shade max.,  $92^{\circ}\cdot 6$  on 22nd, was the highest temp. recorded in July since 25th July, 1900; min.  $48^{\circ}\cdot 5$  on 3rd. F 0, f 0.

TENTERDEN.—The driest July in 49 years. The duration of sunshine,  $358\cdot 0^{\dagger}$  hours, was the most for any month in 20 years. Shade max.  $93^{\circ}\cdot 5$  on 22nd; min.  $44^{\circ}\cdot 5$  on 3rd. F 0, f 0.

TOTLAND BAY.—Temp. exceeded  $80^{\circ}$  on eight days. Mean temp.  $65^{\circ}\cdot 6$ . Duration of sunshine,  $377\cdot 5^*$  hours, was the greatest ever recorded. Shade max.  $85^{\circ}\cdot 2$  on 29th; min.  $46^{\circ}\cdot 9$  on 4th. F 0, f 0.

PITSFORD.—R  $3\cdot 17$  in. below the average. Mean temp.  $66^{\circ}\cdot 0$ . Shade max.  $92^{\circ}\cdot 4$  on 29th; min.  $41^{\circ}\cdot 5$  on 11th. F 0.

POLAPIT TAMAR.—Exceptionally sunny, hot and dry. An absolute drought lasted from 1st to 16th, and a smaller total R has only occurred twice before in 42 years. Shade max.  $85^{\circ}\cdot 0$  on 8th; min.  $45^{\circ}\cdot 2$  on 6th. F 0, f 0.

ROSS.—Shade max.  $91^{\circ}\cdot 8$  on 29th; min.  $41^{\circ}\cdot 5$  on 16th.

HODSOCK PRIORY.—Shade max.  $89^{\circ}\cdot 1$  on 28th; min.  $38^{\circ}\cdot 5$  on 11th. F 0, f 1.

SOUTHPORT.—The driest July in 40 years. Duration of sunshine  $284\cdot 3^*$  hours, and the greatest for the month in 20 years' record. Duration of R,  $6\cdot 5$  hours. Shade max.  $85^{\circ}\cdot 8$  on 29th; min.  $45^{\circ}\cdot 1$  on 24th. F 0, f 0.

HULL.—Shade max.  $89^{\circ}\cdot 0$  on 21st; min.  $45^{\circ}\cdot 0$  on 3rd. F 0, f 0.

HAYERFORDWEST.—Hot and dry. No R fell until 21st. Duration of sunshine  $295\cdot 9^*$  hours. Shade max.  $86^{\circ}\cdot 1$  on 29th; min.  $42^{\circ}\cdot 6$  on 24th. F 0, f 0.

LLANDUDNO.—Shade max.  $84^{\circ}\cdot 8$  on 29th; min.  $49^{\circ}\cdot 2$  on 2nd.

CARGEN.—Shade max.  $88^{\circ}\cdot 0$  on 13th; min.  $41^{\circ}\cdot 8$  on 1st. F 0.

EDINBURGH.—Shade max.  $83^{\circ}\cdot 7$  on 12th; min.  $43^{\circ}\cdot 0$  on 3rd. F 0, f 0.

COUPAR ANGUS.—The seventh successive month with deficient R. Shade max.  $91^{\circ}\cdot 0$  on 12th; min.  $36^{\circ}\cdot 0$  on 3rd. F 0, f 0.

FORT AUGUSTUS.—Shade max.  $84^{\circ}\cdot 1$  on 12th; min.  $37^{\circ}\cdot 1$  on 3rd.

CORK.—An absolute drought of 19 days ended on 18th. Shade max.  $79^{\circ}\cdot 0$  on 14th; min.  $44^{\circ}\cdot 0$  on 3rd. F 0, f 0.

DUBLIN.—Until the 19th the R was only .03 in., but of the last 14 days 11 were rain days. A violent TS on the afternoon of 29th gave  $1\cdot 21$  in. of R in 45 minutes. Mean temp.  $63^{\circ}\cdot 5$ . Temp. rose above  $70^{\circ}$  on 21 days. Shade max.  $78^{\circ}\cdot 2$  on 13th; min.  $45^{\circ}\cdot 6$  on 2nd. F 0, f 0.

MARKREE.—Fine until 18th, but R fell on most days after with T on several occasions. Shade max.  $82^{\circ}\cdot 0$  on 12th; min.  $41^{\circ}\cdot 0$  on 23rd. F 0, f 0.

WARRENPOINT.—On the whole a fine warm month, but considerable R at the latter end with severe TSS. Shade max.  $78^{\circ}\cdot 0$  on 13th; min.  $50^{\circ}\cdot 0$  on 1st. F 0, f 0.

\* Campbell-Stokes.

† Jordan.

## Climatological Table for the British Empire, February, 1911.

STATIONS  (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain		Aver. Cloud.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
								0-100			inches		
London, Camden Square	55·6	18	20·5	1	46·7	35·2	36·6	83	92·3	17·5	1·43	14	6·5
Malta ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Lagos ... ..	92·0	26	74·0	1	88·4	76·6	76·8	72	149·0	71·0	·29	2	...
Cape Town ... ..	99·4	10	54·0	15	82·6	62·5	60·9	69	...	...	·50	5	2·6
Durban, Natal ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Johannesburg ... ..	35·0	16	43·9	25	75·3	54·4	53·3	70	149·1	43·2	3·10	9	3·6
Mauritius ... ..	85·6	21	67·0	21	83·1	72·5	70·9	81	160·7	60·6	12·68	18	6·9
Calcutta... ..	94·7	27	47·8	3	85·0	58·0	54·0	57	...	40·4	·05	1	1·0
Bombay... ..	91·2	13	58·6	2	84·4	68·1	63·2	67	135·2	50·1	·00	0	0·6
Madras ... ..	92·1	1	62·0	20	86·3	65·7	65·5	72	141·3	58·6	·00	0	1·5
Kodaikanal ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Colombo, Ceylon ... ..	94·7	7	67·1	14	88·9	71·1	69·6	73	156·0	62·4	·45	1	3·9
Hongkong ... ..	74·2	15	47·1	24	65·5	56·2	51·0	71	125·0	...	·00	0	5·0
Sydney ... ..	87·9	27	59·4	17	77·7	65·2	59·6	67	152·0	53·0	4·92	23	6·1
Melbourne ... ..	90·3	8	52·4	20	76·7	60·0	57·1	67	152·1	46·7	5·35	14	5·9
Hobart, Tasmania ... ..	84·0	22	49·0	24	72·9	57·1	52·9	65	151·2	45·2	2·27	13	5·5
Adelaide ... ..	97·5	22	50·6	26	80·3	61·6	55·5	59	162·9	43·0	1·30	12	5·5
Perth ... ..	101·2	1	53·4	22	85·3	63·1	54·9	50	159·2	45·1	·03	1	2·4
Coolgardie ... ..	103·6	20	51·0	13*	88·3	59·4	48·8	36	171·0	48·0	·00	0	2·0
Wellington ... ..	74·6	18	46·6	5	67·1	53·4	51·2	72	129·0	39·0	7·58	9	6·3
Auckland ... ..	77·5	13	50·5	6	73·4	58·4	62·8	90	147·0	47·0	1·76	7	5·0
Jamaica, Kingston ... ..	89·8	14	65·3	4	87·0	65·9	61·2	66	...	...	·03	2	3·3
Grenada ... ..	87·0	17	69·0	†	82·0	71·0	75·5	...	141·2	...	2·77	13	4·5
Toronto ... ..	47·7	25	4·7	6	32·2	18·7	...	...	60·8	1·6	2·12	14	7·2
Fredericton ... ..	44·0	27	—22·0	13	23·4	—1·5	...	81	...	...	1·47	7	4·5
St. John, N.B. ... ..	44·3	27	—6·2	13	24·8	7·4	...	71	...	...	2·41	9	4·3
Victoria, B.C. ... ..	49·0	28	24·4	2	44·1	34·0	...	78	...	...	·96	11	7·0
Dawson ... ..	45·0	19	—54·0	1	3·6	—15·7	...	...	...	...	·91	9	6·5

\* and 28.

† 4 days.

*Johannesburg.*—Bright sunshine 247·7 hours.*Mauritius.*—Mean temp. of air 1°·3, dew point 0°·2 below, and R 5·46 in. above, averages. Mean hourly velocity of wind 13·2 miles, or 4·0 above the average.

COLOMBO.—Mean temp. of air 78°·0, or 2°·1 below, of dew point 1°·0 below, and R 1·52 in. below, averages. Mean hourly velocity of wind 6·1 miles.

HONGKONG.—Mean temp. of air 60°·2, or 2°·2 above, R 1·75 in. below, averages. Bright sunshine 189·9 hours. Mean hourly velocity of wind 14·0 miles.

*Sydney.*—Mean temp. of air 0°·4 below, and R 2·26 in., above, averages.*Melbourne.*—Mean temp. of air 1°·1 above, and R 3·66 in. above, averages.*Adelaide.*—Mean temp. of air 71°·0, or 3°·0 below, and R 7·2 in. above, averages.*Wellington.*—Mean temp. of air 60°·2, or 2°·2 below, and R 4·25 in. above, averages. Bright sunshine 221·2 hours.*Auckland.*—Mean temp. of air under average,

# JAMES J. HICKS

## Meteorological & Scientific Instruments

MANUFACTORY:—

8, 9 & 10, HATTON GARDEN, LONDON, E.C.

Awarded Grand Prix Franco-British Exhibition, 1908; Nine Medals at the Paris Exhibition, 1900; London, 1862; Paris, 1867; London, 1885; Philadelphia, 1876; Rio de Janeiro, 1909.

Standard "Fortin" Barometers.

Standard Mercurial Thermometers.

Standard Maximum Thermometers.

Standard Minimum Thermometers.

Standard Mason's Hygrometers.

Standard "Solar Maximum" Thermometers.

Standard Terrestrial Radiation Thermometers.

Standard "Earth Temperature" Thermometers.

Standard Symons's Rain Gauges.

Standard Meteorological Office Rain Gauges.

Standard Sunshine Recorders.

Improved Beckley Anemometers.

Improved Beckley Self-Recording Rain Gauge.

Self-Registering Aneroid Barometers.

Self-Registering Mercurial Barometers.

Meteorological Office Thermometer Screens.

Mountaineering Aneroid Barometers.

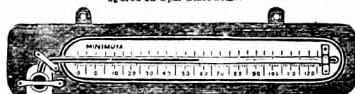
Aneroid Barometers.



STANDARD BAROMETER, diameter of Tube, 0.5 in., on Mahogany Board.



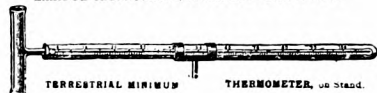
STANDARD MAXIMUM THERMOMETER, in Oak Frame, Tube divided on Stem, figured on Opal Glass Scale.



STANDARD MINIMUM THERMOMETER, in Oak Frame, Tube divided on Stem, figured on Opal Glass Scale.



MAXIMUM THERMOMETER, Black Bulb in Vacuo, on Stand.



TERRESTRIAL MINIMUM THERMOMETER, on Stand.

BECKLEY



RAIN GAUGE.



CAMPBELL-STOKES  
SUNSHINE RECORDER,  
With Curtis's Improvements,

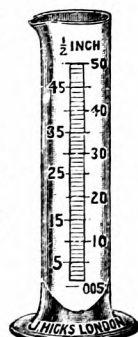
as supplied to the Meteorological Office for their Standard Pattern, and fitted on S.S. "Discovery," National Antarctic Expedition, 1901

NEW OBSERVATORY CERTIFICATES SUPPLIED IF DESIRED.

### WILSON'S PATENT RADIO-INTEGRATOR.

#### THE "CAMDEN" Pattern

RAIN



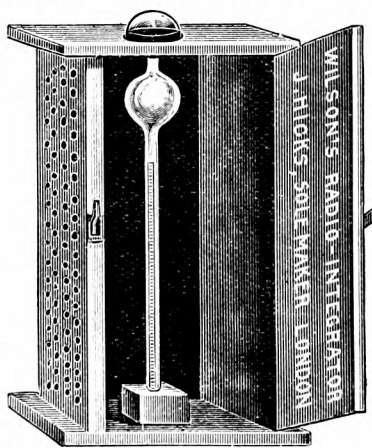
GLASS

Price  
2s. 6d.  
Not  
Verified

Price  
3s. 6d.  
Verified.

Designed by  
the late  
DR. W. E.  
WILSON, F.R.S.,  
to record the  
total amount of  
Solar Radiation  
daily received  
by the ground.

Sole Maker—  
J. J. HICKS.



Special Prices are given to Fellows of all Scientific Societies.

( v. )



## A Monthly Record of Science in all its Branches.

Each number consists of at least forty large quarto pages of Articles and Notes, by Authorities in their respective subjects.

**Profusely Illustrated.**

### CONTENTS OF AUGUST ISSUE.

The True Structure of the Diatom Valve.—Discs for Solar Projection.—Notes of a Naturalist in the Mediterranean.—The New Fairy Fly: The Discovery of the Female of *Mymar regalis*.—Some Notes on *Actinosphaerium eichornii*.—The Common Sandpiper (*Actinopus hypoleucus*).—Family Handwriting.—A Unique Sundial.—Flightless Birds.—The Time of High Water.—Solar Disturbances during June, 1911.—The Face of the Sky for the Month.—Notes (Astronomy; Botany; Chemistry; Geology; Meteorology; Ornithology; Photography; Physics; Zoology).—Microscopy.—Reviews of Books.—Correspondence.—Queries and Answers.—&c.

THROUGH ANY BOOKSELLER.

**MONTHLY—ONE SHILLING, net.**

Annual Subscription, **15/-**, post free anywhere.

Offices: **42, BLOOMSBURY SQUARE, LONDON.**

---

## THE OBSERVATORY:

*A Monthly Review of Astronomy.*

EDITED BY

H. P. HOLLIS, B.A., F.R.A.S., AND T. LEWIS, F.R.A.S.

~~~~~

Contains full Reports of the Meetings of the Royal Astronomical and Royal Meteorological Societies, and of the British Astronomical Association; Articles by various eminent Astronomers, English, American and Continental; Correspondence on topics of interest connected with the Science; Notices of Observatories, Publications and current Discoveries. The "Oxford Note Book" is a special feature of the Magazine.

*The Observatory* was founded in 1877, and has become an established and very valuable publication.—Prof. Young, in "Ten Years' progress in Astronomy."

Annual Subscription (for the "Companion" and twelve Monthly Numbers), 13s.

All communications should be addressed to the Editors of "*The Observatory*,"  
Royal Observatory, Greenwich, S.E.



# Royal Geographical Society's Publications.

---

## THE GEOGRAPHICAL JOURNAL.

Monthly. Illustrated. Edited by the Secretary. Price (to non-Fellows), 2s.

## HINTS TO TRAVELLERS.

Edited for the Council of the Royal Geographical Society by E. A. REEVES, F.R.G.S., F.R.A.S. Ninth Edition, revised and enlarged. In two volumes, illustrated. Price 15s. net. (To Fellows at the Office of the Society, 10s. net).

Vol. I.—Surveying and Practical Astronomy.

Vol. II.—Meteorology and Climate (by DR. H. R. MILL);  
Photography, Geology, Natural History, Anthropology, Industry and Commerce, Medical Hints, &c.

## THE DISTRIBUTION OF RAINFALL OVER THE LAND.

By DR. A. J. HERBERTSON. With monthly maps of Rain-fall. Price 5s. net. (To Fellows, 2s. 6d.)

## ON THE RESULTS OF A DEEP-SEA SOUNDING EXPEDITION,

In the North Atlantic in the summer of 1899, by R. E. PEAKE, M.Inst.C.E.; with notes on Temperature, Deep-Sea Deposits, &c., by SIR JOHN MURRAY, K.C.B., F.R.S. *Charts*. Price 5s. net. (To Fellows, 2s. 6d.)

## THE ANTARCTIC MANUAL,

For the use of the Expedition of 1901. Edited by GEORGE MURRAY, F.R.S., 1901. Pp. 586. *With a new chart of the Antarctic Regions*. Price, 15s. (To Fellows, 10s.)

~~~~~  
ROYAL GEOGRAPHICAL SOCIETY, 1, Savile Row, W.  
AND ALL BOOKSELLERS.

---

### RATES FOR ADVERTISEMENTS IN THIS MAGAZINE.

		One Insertion.	Six Insertions.	Twelve Insertions.	
WHOLE PAGE	...	30/-	26/-	22/6	} All Net.
HALF	...	16/6	14/6	12/6	
QUARTER	...	9/-	8/-	7/-	
EIGHTH	...	5/-	4/6	4/-	

*All applications for space to be made to*

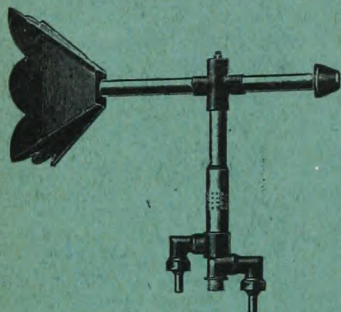
Mr. H. A. COLLINS, 32, BIRDHURST ROAD, CROYDON



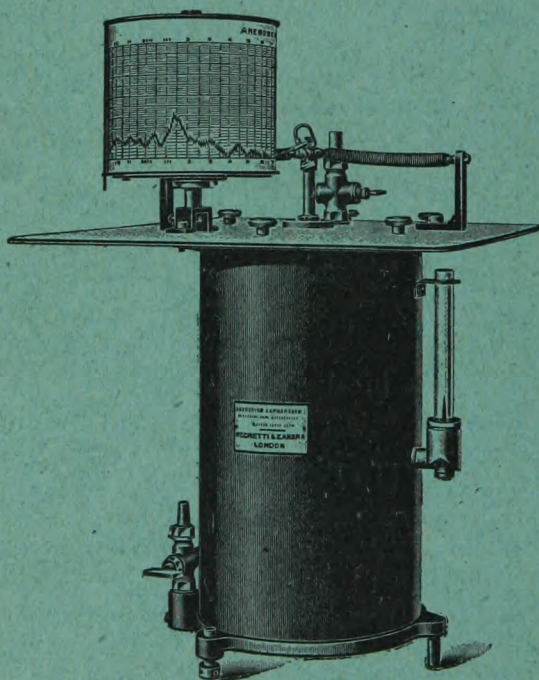
# The ANEMO-BIAGRAPH.

(Wind Force Recorder.)

HALLIWELL-DINES PRINCIPLE.



PATENT  
No. 21973,  
1910.



Price £20 . 0 . 0.

FULL PARTICULARS POST FREE on application to the  
SOLE MAKERS:

**NEGRETTE & ZAMBRA,**  
*Scientific Instrument Makers,*  
**38, HOLBORN VIADUCT, E.C.**

Branches: 45, CORNHILL, E.C., and  
122, REGENT STREET, W., LONDON.

Telegraphic Address: "NEGRETTE, LONDON."

Telephone No. 583 HOLBORN.

SHIELD & SPRING, Lancelot Place, Brompton Road, S.W.



NO. 548 SYMONS'S VOL. 46

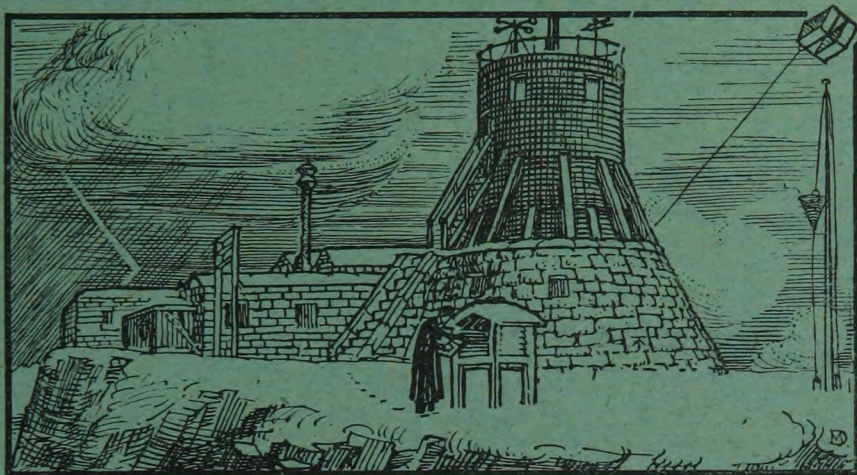
# METEOROLOGICAL



# MAGAZINE



.... EDITED BY HUGH ROBERT MILL ....



SEPTEMBER, 1911.

## CONTENTS

	PAGE
Meteorology at the British Association .. .. .	149
The Hot July and August of 1911 in London .. .. .	153
Map of August Rainfall of Thames Valley .. .. .	face p. 155
The Weather of August. By FRED. J. BRODIE .. .. .	155
CORRESPONDENCE:—	
Disappearance of Clouds at Evening. By JOHN AITKEN, F.R.S., R. STRACHAN and CAPT. CAMPBELL HEPWORTH, R.N.R., C.B.	156
The Greenwich Temperature of 100° in the Shade. By WALTER W. BRYANT .. .. .	159
Our Permanent Snow Spots. By REV. R. P. DANSEY .. .. .	160
Planetary Rainfall. By J. R. SUTTON .. .. .	161
Obituary: Commander R. A. EDWIN, R.N. .. .. .	162
International Balloon Ascents, February and March, 1909. By W. H. DINES, F.R.S. .. .. .	163
Rainfall Table for August, 1911 .. .. .	164
Supplementary Table of Rainfall, August, 1911, at 112 Stations	166
Meteorological Notes on August, 1911 .. .. .	167
Climatological Table for the British Empire, March, 1911. .. .	168

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

Published on the 16th of each Month.]

[Price 4d., or 5s. per Annum, Post Free.



## NOTICES.

It is requested that all Books for Review and Communications for the Editor be addressed to 62, Camden Square, London, N.W.

The responsibility for all facts and opinions expressed in the signed articles and letters published in this Magazine rests with their respective authors.

---

## **NOW READY.**

Cloth 8vo. 440 pages. With 79 Maps and Illustrations.

PRICE 10s.

# **BRITISH RAINFALL, 1910.**

THE FIFTIETH ANNUAL VOLUME.

COMPILED FROM THE RECORDS OF NEARLY  
5000 OBSERVERS

BY

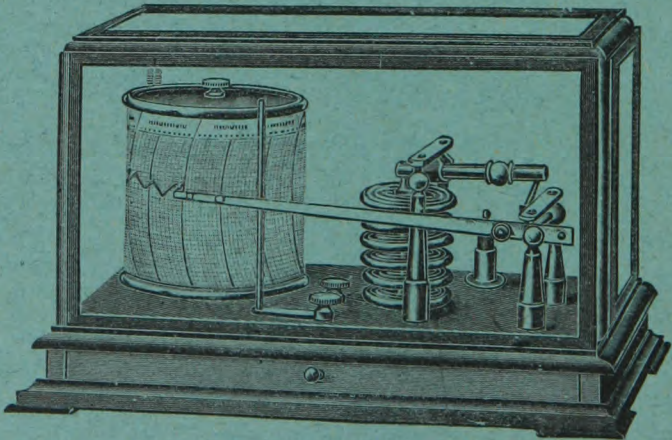
**HUGH ROBERT MILL.**

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

---

## **Darton's Barograph**

for recording on a revolving chart the variations in barometric pressure during a week—forming a most interesting study of weather changes, for the Library, Dining Room or Editorial Office.

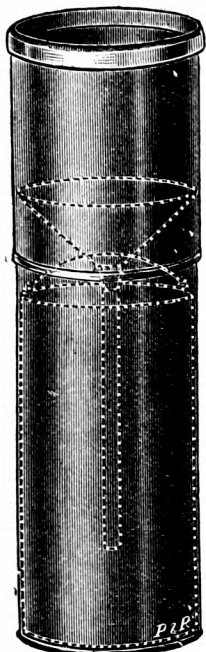


£4. 15. 0

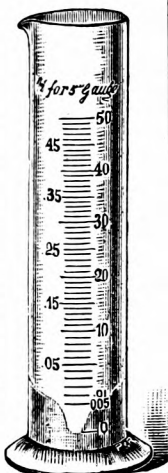
*Illustrated List of Standard, Registering, and Recording Meteorological Instruments, post frée.*

**F. DARTON & Co., 142, St. John Street, London, E.C.**

# RAIN GAUGES.



Standard "Snowdon" Rain Gauge,  
Stout Copper Body, with  
Extra Heavy Brass Rim,  
complete with  
Standard  
"Camden" Measure,  
21/-.



## The "Wilson"

### SELF-REGISTERING

#### Rain Gauge.

With Improved Receiver to  
prevent splashing.



From  
60/-.

## The "Peandar"

### SELF-RECORDING

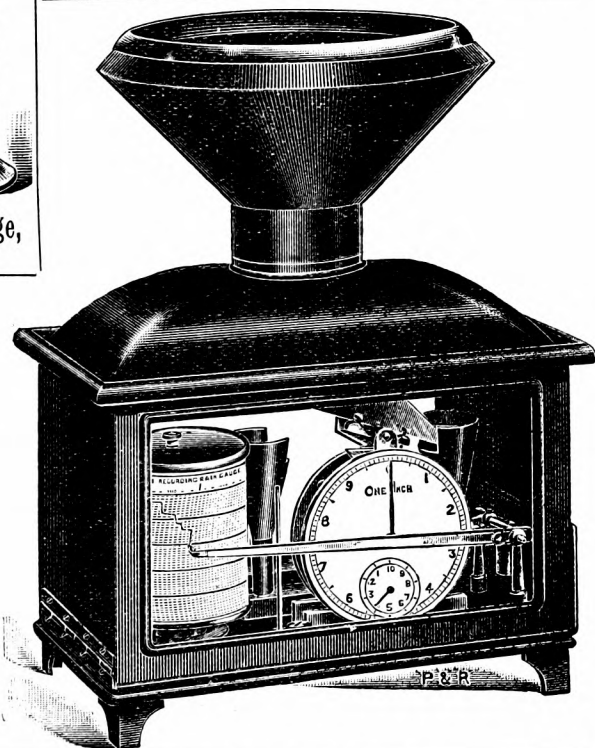
#### Rain Gauge.

Records automatically on a  
Weekly Chart.

Totalizing to 10 in. £9 7 6

" 200 " 9 15 0

Complete with one year's charts,  
pen and ink.



# PASTORELLI & RAPKIN, LTD. (ESTAB. 1750.)

46, HATTON GARDEN, LONDON, E.C.,

ACTUAL MAKERS of STANDARD, SELF REGISTERING, and  
SELF RECORDING METEOROLOGICAL INSTRUMENTS of ALL KINDS.

(WITH KEW, OR DR. MILL'S CERTIFICATES, IF DESIRED.)

WRITE FOR ILLUSTRATED DESCRIPTIVE PRICE LISTS, POST FREE.

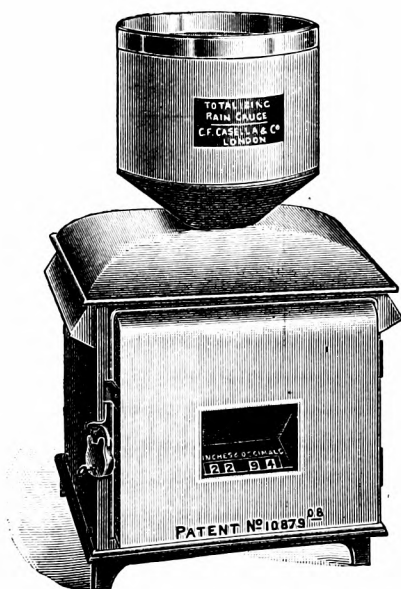
\*\* We pay carriage and guarantee safe delivery within U.K. on all our Instruments.

( iii. )

# **Rainfall Measurement.**

For all kinds of RAIN GAUGES, whether self-recording, registering or the ordinary collecting ones, C. F. CASELLA & Co.'s patterns will be found to be

**ACCURATE, SERVICEABLE and INEXPENSIVE.**



This illustration shows our PATENT TOTALIZING RAIN GAUGE as supplied to the War Office.

Its merits are obvious : no mistakes, nothing to get out of order.

---

☛ Kindly write for new Price Lists.

**C. F. CASELLA & Co., LTD.,**  
**11-15 ROCHESTER ROW, VICTORIA STREET,**  
**LONDON, S.W.**

*Telegraphic Address:* "ESCUTCHEON, LONDON."

*Telephone:* WESTMINSTER 5599



# Symons's Meteorological Magazine.

---

No. 548.      SEPTEMBER, 1911.      VOL. XLVI.

---

## METEOROLOGY AT THE BRITISH ASSOCIATION.

THE eighty-first meeting of the British Association for the Advancement of Science, held at Portsmouth, from August 30th to September 6th, will be remembered for the exceptionally fine weather which prevailed throughout, and for a marked revival of interest in the work of the Association on the part of scientific workers and students. The Association had never met in Portsmouth before, and, although the Mayor and Corporation showed hospitality on an unequalled scale, a very small proportion of the members and associates were local residents. On this account, although the funds suffered and the meetings were less full than usual, a larger proportion of those present in the audience was ready and able to take part in the discussions.

The evening lecture to the working people, quaintly termed "the operative classes" of the town, arranged by the British Association, but not part of the official proceedings, was given to a large audience by Dr. H. R. Mill on "Rain," and some reflections suggested by its reception will probably appear next month.

Portsmouth is fortunate in possessing a very fine town hall and municipal college in the centre of the town, with a small but well laid out park with a complete climatological station close by : in and around these the meeting places were grouped, and within easy reach of a fine stretch of common bordering Spithead, where sea-breezes and the sight of the varied shipping of a naval port could be enjoyed.

The meeting presided over by Sir William Ramsay, who is perhaps the widest-minded of British men of science, and the most sympathetic with all branches of scientific work, was a decided success as a whole and with respect to the individual sections. It was, as is always the case, most successful with respect to those subjects which are best established and least in need of encouragement. The conception of the "advancement of science" would almost seem to be to protect and forward all branches which are long-established and obviously flourishing, and to improve the less organized, the less developed and the less recognized branches by the interposition of obstacles and the

withdrawal of opportunities, so that they may gain strength through adversity, or disappear from amongst their robuster rivals.

We refer especially to those observational sciences which are concerned with the surface of the Earth, and while dependent in great measure on Mathematics and Physics, are after all no more closely bound to Section A than are Chemistry and Geology; and although united in many aspects with Geography, are yet as clearly separate from the subject-matter of Section E as are Botany and Zoology. Chief amongst these bond-subjects is Meteorology, towards which Section A shows the solicitude of Pharaoh towards the Hebrews. Again and again signs have appeared that the troublesome group might be allowed to proceed in search of a new position of its own; but again and again Section A has hardened its analogue of a heart and would not let them go. So the old trouble we have complained of year after year has been allowed to go on in the same old way. The meteorological papers have been scattered. On one occasion a few were separated in the agenda of Section A, and it was announced in the Committee that they would be taken in a particular room after the completion of a certain paper in the general meeting of Section A. Guessing at a probable hour, the President of the Royal Meteorological Society and the Director of the British Rainfall Organization sat for a long time alone and expectant, until when driven forth by hunger they heard a familiar voice through the door of a room in a far distant part of the building, and found that the place of meeting had been changed at the last moment. On another occasion the meeting of Section A was announced as divided into three "departments," and a notice-board was displayed "Meteorology, Room 6;" but no hour of meeting was mentioned. We were anxious to hear a paper in Section E bearing on an aspect of the study of the atmosphere, and after an hour left it unfinished and sought Room 6, sure that we would find the meeting half over; but we found Room 6 empty but for the presence of the Director of the Meteorological Office, who having put a series of exhibits in order was patiently waiting for an audience, who had no idea when he was to begin. These are small matters in a way; but they show that Section A is overcharged with work, or that it has not a sufficient organizing staff to carry out its programme, and they spoilt what might have been a very successful meeting from the meteorological point of view.

The Meteorological Breakfast begins a day no more; but the Meteorological Luncheon, arranged by Mr. Gold of the Meteorological Office, appears to fulfil the same function and to be more in harmony with the spirit of the day. A report of the very successful Portsmouth Luncheon will, we hope, appear in our next number.

While blaming Section A for its dog-in-the-manger attitude towards Meteorology, we have in view the element of continuity in Section A which over-rides the personal views of its highest officials duly elected to serve their year. On the present occasion the President of the Section, Professor H. H. Turner, F.R.S., of Oxford,

gave an address, which, while full of encouragement to hundreds of Observers, must have been singularly unpalatable to the exclusive specialists in mathematics and the more recondite branches of physics who regard their own methods as alone worthy of the name of science, and treat with indifference crusted on a kernel of contempt, the work of all who stand outside their circle.

Professor Turner's address was entitled, "The Characteristics of the Observational Sciences," and his views on the policy of his Section must appear as strong as our own, to anyone who reads between his well-spaced lines. He said :—

"The neglect is not confined to Astronomy, but extends, as some of us recently pointed out, to the other sciences of observation ; and we thought that, as a corollary, it would be better for the Section to divide, in order that these sciences might not continue the struggle for existence in an atmosphere to which they were apparently ill-suited. But the Section decided against the suggestion, and I have no intention of appealing against the decision. This explicit statement will, I trust, suffice to prevent misunderstanding if I proceed to examine the possible causes of neglect—for I cannot but regard the record as significant of some cause which it will be well to recognise, even if we cannot remove it. Personally, I think the cause is not far to seek, and my hope is to make it manifest ; but as the statement of it involves something in the nature of an accusation, I will beg leave to make it as gently as possible by using the words of others, especially of those against whom the mild accusation is to be made."

We cannot give enough of the address to show how completely and powerfully the accusation is driven home ; but we must quote a few passages in which the illustrations are drawn from Meteorology, for Professor Turner shows as sympathetic a feeling for the position of our science in the shadow of Section A, as for that of his own science, Astronomy.

He quotes and comments upon the attitude towards Observational science of Professor Bartholomew Price, when President of Section A, in 1860 :—

"And finally we come to the facts of meteorology and its kindred subjects, many of which are scarcely yet brought within any law at all."

There is here much that will command ready and universal assent ; but is there not also a rather unnecessary social scale ? The science of planetary movement had not yet been "brought within any law at all" (as we now use the term) in Tycho Brahé's time ; but was the astronomy of Tycho Brahé socially inferior to that of Kepler ? . . . .

Or consider the case of M. Teisserenc de Bort, when he began sending up his balloons. "Show me your laws," cries the mathematician. "But they are just what I hope to find," replies M. de Bort. "Yes, but surely you have formulated some law you wish to test?" pursues the invigilator. "How am I to give you proper scientific rank unless you can produce at least a tentative law?" "On the other hand, I wish to keep a perfectly open mind," maintains M. de Bort. "Then I fear I cannot admit you to

our class at present ; you must join the infants' class, and I can only give you my best wishes that you may reach maturity some day." Unperturbed, M. de Bort continues to send up his balloons, and almost immediately discovers the great fact about the isothermal region, which will be a permanent factor in the meteorology of the future. The mathematician is now ready to admit him, as a worthy person who has found a law about the constitution of the atmosphere. But was not the merit in sending up the balloons, whatever came of it? Is it not sometimes more courageous to take risks of failure? The mathematician, safe in his stronghold which possesses "probably in the highest degree attainable by human intellect the characteristics of perfect and necessary science," is like a man who has inherited a good old-established business, and he has a distaste for the methods of those who have to try new ventures. No doubt many who make such trials fail ; but, on the other hand, great fortunes have been made in that way.

Then, turning to Sir George Darwin's statement, when President of Section A in 1886, that "a mere catalogue of facts, however well-arranged, has never led to any important scientific generalization," he says :—

And I will now definitely formulate the view that the perception of the need for observations, the faith that something will come of them, and the skill and energy to act on that faith—that these qualities, all of which are possessed by any observer worthy the name, have at least as much to do with the advance of science as the formulation of a theory, even of a correct theory. The work of the observer is often forgotten—it lies at the root of the plant ; it is easier to notice the theories which blossom and ultimately produce the fruit. But without the patient work of the observer underground there would be neither blossom nor fruit. It is also easy to fix attention on the mechanical nature of much observation ; but this is not the principal feature of observing any more than is numerical computation of mathematics.

Later, he cites the disparagement of the inductive method by De Morgan in the "Budget of Paradoxes" :—

"There is an attempt at induction going on, which has yielded little or no fruit, the observations made in the meteorological observatories. The attempt is carried on in a manner which would have caused Bacon to dance for joy. . . . And what has come of it? Nothing, says M. Biot, and nothing will ever come of it : the veteran mathematician and experimental philosopher declares, as does Mr. Ellis, that no single branch of science has ever been fruitfully explored in this way."

De Morgan was a mathematician, and I have noticed that mathematicians are apt to be crisp in their statements ; but he is a bold man who says, "Nothing will ever come of it." Perhaps an equally crisp statement on the other side may be pardoned. I adventure the remark that if nothing has hitherto come of such observations, it is because observers have been misled by the very teaching of De Morgan and others who share his views ; they have been told that they will do no good without a theory until they have come to believe it ; whereas the truth probably lies in a quite different direction.

Professor Turner goes on to show that in Astronomy important generalizations have been arrived at by the marshalling of legions of facts by an investigator searching for relationships with an open mind uncramped by hypotheses, and he shows, by reference to his work on Rainfall Records, described in this Magazine for April, 1911, p. 47, that similar results may be expected to reward work carried on in the same spirit in Meteorology also. Finally, in the course of a very just appreciation of the value of the work of the "mere observers," who are usually made to feel their position as destitute aliens in Section A, he says:—

It should be one of the articles of faith with an observer that the record is sacred, and must not be broken. Most of them, indeed, act on that principle already; but there are heretics, and it pained us to find even Prof. Schuster himself tinged with heresy. On the very occasion when he did so much for the observer by presenting his beautiful method, he suggested that it might even be advisable to drop observing for a time in order to apply the method to accumulated observations. He may possibly be right, but the observer had better believe him wrong. There ought to be an "observer's promise," like the promise of the boy scout; and one part of it should be not to interrupt the record, and another should be to publish the observations regularly, and never to let them accumulate beyond five years.

Professor Turner has taken a bold step in vindicating Observers in the august presence of mathematicians and physicists, and coming from a man who shares with the leaders of mathematical and physical science the highest scientific distinctions this country can afford, the criticism cannot easily be ignored, or depreciated as that of an outsider.

---

## THE HOT JULY AND AUGUST OF 1911 IN LONDON.

It is probably still too early to attempt to review the temperature observations during the prolonged hot spell of the present summer, since up to the time of writing September bids fair to yield some results not so far removed from the unprecedented as to be unworthy of notice. The end of August, however, bringing to a close two months the mean temperature of which at Camden Square reached  $68^{\circ}6$ , or no less than  $5^{\circ}7$  above the average and  $1^{\circ}3$  beyond any previous two-monthly period in 53 years, is an event to chronicle.

The great heat which characterized July commenced on the 5th, when the shade temperature rose above  $80^{\circ}$  for the first time for a month; after that date, however, no fewer than 19 of the remaining days in the month experienced a shade temperature of  $80^{\circ}$ , five of them of  $90^{\circ}$ , and the maximum reading,  $92^{\circ}6$ , on the 22nd, was the highest in July since 1900. The mean shade maximum for the whole month reached the high figure of  $81^{\circ}7$ , or  $7^{\circ}4$  above the



average, and was the highest yet recorded with the single exception of  $82^{\circ}\cdot4$  in the remarkable July of 1868. The minimum readings were less remarkable, no doubt on account of the absence of cloud; but the mean,  $56^{\circ}\cdot9$ , was  $2^{\circ}\cdot7$  above the average, and there are only four previous higher figures. The mean temperature for the month was  $69^{\circ}\cdot0$ , or  $5^{\circ}\cdot5$  above the average. Judged by this standard this was the warmest July in the Camden Square record, its rivals, 1859, 1868 and 1900, having the values  $68^{\circ}\cdot9$ ,  $68^{\circ}\cdot8$  and  $68^{\circ}\cdot6$ .

Taken alone, therefore, July, 1911, although in some respects unprecedented, was hardly so greatly so as to give the year the character of *annus mirabilis* so readily claimed for it by the Press, but the prolongation of the hot spell throughout practically the whole of August provides some reason for the phrase. Temperature readings of  $80^{\circ}$  in the shade were observed on 14 out of the first 20 days in August, reaching  $90^{\circ}$  on four days, and on the 9th the unparalleled maximum of  $97^{\circ}\cdot1$ , to which reference was made in our last issue (p. 129). Although the last 11 days of August were not excessively hot, the mean maximum for the whole month was  $80^{\circ}\cdot8$ , or  $8^{\circ}\cdot1$  above the average. This is the first occasion on which a mean maximum of  $80^{\circ}$  or above has been observed in August. The mean minimum exceeded that of July by  $1^{\circ}\cdot0$ , being  $57^{\circ}\cdot9$ , or  $4^{\circ}\cdot5$  above the average, and  $1^{\circ}\cdot3$  higher than the highest previously recorded, namely  $56^{\circ}\cdot6$  in 1899. The mean temperature for the month,  $68^{\circ}\cdot2$ ,  $5^{\circ}\cdot9$  above the average, was also beyond precedent.

Taking the months of July and August together, it is easy to see that we may look in vain for any previous year which can challenge comparison with 1911 on the point of high summer temperature.

*Shade Temperature, July and August, 1911.*

SHADE TEMPERATURE.	1911.				1858—1910. JULY—AUGUST.	
	July.	August.	July—Aug.	July—August. Diff. from Aver.	Highest	Date.
Mean Temp.....	$69^{\circ}\cdot0$	$68^{\circ}\cdot2$	$68^{\circ}\cdot6$	$+5^{\circ}\cdot7$	$67^{\circ}\cdot3$	1899
„ Maximum	$81^{\circ}\cdot7$	$80^{\circ}\cdot8$	$81^{\circ}\cdot3$	$+7^{\circ}\cdot8$	$79^{\circ}\cdot3$	1899
Absolute „	$92^{\circ}\cdot6$	$97^{\circ}\cdot1$	$97^{\circ}\cdot1$	...	$95^{\circ}\cdot2$	July 16, 1900
Mean Minimum	$56^{\circ}\cdot9$	$57^{\circ}\cdot9$	$57^{\circ}\cdot4$	$+3^{\circ}\cdot6$	$57^{\circ}\cdot0$	1899
Absolute „	$48^{\circ}\cdot5$	$48^{\circ}\cdot4$	$48^{\circ}\cdot4$	...	$50^{\circ}\cdot9$	1899

It will be observed that the high maximum readings depart more from the normal than the minimum readings, and indeed the small amount of cloud, together with exceptionally large values for duration of sunshine, and the very high temperatures observed by the black-bulb exposed thermometer, go to show that the period was one of intense radiation, when one might quite reasonably have looked for night temperatures below the average for the time of year.





## THE WEATHER OF AUGUST.

By FRED. J. BRODIE.

AUGUST, 1911, was distinguished by a meteorological event unparalleled in the history of the previous 70 years, an event whose recurrence is, therefore, barely possible within the lifetime of the present generation. Great extremes of heat have been experienced in England at various times in July, and notably on the 21st and 22nd of the month, when the thermometer rose above  $90^{\circ}$  in many parts of the eastern, midland and southern counties, and exceeded  $95^{\circ}$  at Greenwich and Epsom. The earlier half of August witnessed a continuance of very warm weather, culminating on the 9th in shade temperatures of a higher level than any previously recorded at stations for which an extended series of observations is available. At a large number of places in eastern, central and south-eastern England, the thermometer exceeded  $95^{\circ}$ , a reading as high as  $98^{\circ}$  being observed at Epsom, Canterbury and Raunds, and a reading of  $99^{\circ}$  at Ponders End. The highest value was, however, reported at Greenwich, where the thermometer just succeeded in touching  $100^{\circ}$ , the reading being nearly  $3^{\circ}$  higher than anything recorded at the Royal Observatory since the commencement of unimpeachable temperature observations in 1841. The remarkable outburst of warmth did not by any means exhaust the capacities of a summer which proved, in many ways, of quite an exceptional character. Four days later, on August 13th, the thermometer again rose to  $90^{\circ}$  in several parts of England, and touched  $92^{\circ}$  at Tottenham and Raunds; while in the early days of September, when the summer should, according to recognised rules, have been at an end, still higher readings were observed in inland portions of our southern counties.

Between about the 7th and 18th of the month, the type of pressure distribution over the United Kingdom was mainly anticyclonic, and the winds variable, excepting on the 11th to 13th, when a decided breeze from the eastward or north-eastward prevailed. In the opening week a large shallow cyclonic system extended in from the Atlantic, and occasioned heavy falls of rain on the 4th and 5th in Ireland, Wales, and the neighbouring portions of England. Between the 19th and 22nd another shallow disturbance, which spread up originally from the south-westward, moved slowly eastwards across Ireland and England, its progress being attended by general thunderstorms on the 20th, and by heavy falls of rain in many districts on the 21st. In the closing week, depressions of greater intensity moved north-eastwards across the upper parts of the Atlantic, and produced in these Islands a distinct south-westerly type of conditions, the wind occasionally blowing with considerable strength on our extreme western and northern coasts. Over England there was still a preponderance of fair dry weather, but thunderstorms occurred on the 30th in most districts; in Ireland and Scotland the weather was very changeable. Although the thermometer remained above the average,

no very high temperatures were recorded after the middle of the month. In the last 10 days the nights were cool, ground frosts occurring on the nights of the 22nd, 23rd and 29th in several inland parts of Ireland, Scotland and Wales.

The mean temperature of the month was everywhere above the average, the excess amounting in the south of England to between  $5^{\circ}$  and  $6^{\circ}$ . In Ireland and the south-west of England the month was less warm than in 1899, but in the south and west of Scotland it was the warmest August since that of 1893, while in the south and east of England it was the warmest for at least 40 years past. The duration of bright sunshine was largely above the average, excepting in the Scilly Islands, where the excess was slight. In London (at Westminster) the aggregate of 243 hours was 75 hours in excess of the normal, and was 13 hours in excess of any August record since observations commenced in 1883.

---

### Correspondence.

*To the Editor of Symons's Meteorological Magazine.*

---

#### DISAPPEARANCE OF CLOUDS AT EVENING.

MIGHT I be allowed to offer an explanation of the disappearance of clouds in the evening, frequently observed under certain conditions of weather. This phenomenon, so far as I have observed, generally takes place in settled conditions and but little wind. These clouds are due to the sunshine heating the lower air, which rises and carries with it the vapour which has risen during the night and early morning. This hot, moist air rises till expansion cools it below the dew point, when it becomes visible as a cloud, which in reality is only the top of an invisible column of moist air. This cloud goes on rising so long as the sun keeps up a supply of moist air; but as the day advances the supply of moisture gets exhausted, and the sun's heat grows less and less, and the supply at last stops. While the cloud was ascending it was moving in dry air, consequently it was undergoing evaporation all over its upper surfaces, and when the rate of the ascending column slackens and stops, this evaporating process gradually dissolves the cloud as the rate of dissolution becomes greater than the rate of supply. Further, when these clouds become of small dimensions, they tend to fall, and in falling become heated and so dissipated.

With regard to the apparent difference in the amount of cloud overhead and on the horizon, this condition of sky is one that may be observed on any day when the air is clear and there are few clouds. Overhead the sky may be cloudless, yet one will almost always see clouds near the horizon, and if there are a few small clouds overhead,



the sky towards the horizon will probably be quite clouded. As suggested by Mr. Ellis in your last number, part of this may be due to perspective, but there is another and a more important cause, which is that clouds have three dimensions. We only see the length and breadth of clouds overhead, and while these dimensions seem to decrease as the clouds recede from us and approach the horizon, their vertical dimensions only then become visible. If the clouds were infinitely thin, this blocking action would not take place, but as the vertical dimensions of the clouds then come into view, they block the spaces between them. Take a crude illustration. Suppose the sky was one half covered with square patches of cloud distributed equally over the sky; in fact, imagine a chess board, and let the black squares represent clouds and the white clear sky. Suppose one were to look at a cloudy sky arranged like that, and that the clouds were infinitely thin. Then, if we looked vertically, one half of the sky would appear clouded, and if we looked towards the horizon, the sky would also be only one half clouded, but we would see far more clouds within a given angle. Now suppose, in place of the clouds having only length and breadth, we imagine they have a depth equal to their length and breadth. On looking up to such a sky, we would still find it only half covered overhead as before, but at a very slight angle from the vertical, about  $45^{\circ}$  in this case, the sky would appear wholly covered.

JOHN AITKEN.

*Ardenlea, Falkirk, 26th August, 1911.*

---

MR. W. ELLIS explains away the notion that the moon disperses clouds. He has not explained how otherwise they are dispersed at night. Perhaps the following explanation may be reasonable.

Cumulus is the characteristic cloud during daylight, and passes into stratus during night. Before and after sunset detached cumulus begins to disintegrate. The sky, where blue becomes light blue, and soon the welkin has a canopy of haze showing some stars. This is the case especially after hot sunshine. The clouds, descending with the decline of the sun, assume a lower level in passing into stratus, and this attaining a lower level becomes haze. Then, if the air is capable of taking up all the vapour of the haze, the air becomes moister, but is transparent. This going on, the lowest air becomes more and more moist, until the lowest temperature of the night is reached. Even then a thick stratum of air may not be saturated, so that neither rain nor dew can be condensed notwithstanding radiation. If air gets to the dewpoint, then dew or mist may form on the ground, in some localities fog. Even the air upon the ground may remain all night, showing humidity several degrees below 100. If the aqueous meteors are not entirely absorbed, the surplus remains as cloud or haze; or even, with an overcast sky to begin with, rain. Often the air being dry, especially after hot sunshine, the ground

also being hot, takes after sundown all the aqueous meteors, without any rain reaching the ground, so that clouds are dispersed, moon not being visible. It is in hot weather, when the air is nearly charged with vapour that the nights are not only hot, but the air is muggy and oppressive because evaporation from living subjects is impeded.

*11, Offord Road, London, Sept. 4th, 1911.*

R. STRACHAN.

REFERRING to the letter of your correspondent "A.F." in your Magazine of last month, the appearance of cumulus clouds near the horizon when the zenith is clear is very familiar to me; although, I must admit, that I have always seen a few small scattered cumuli above when these conditions have obtained.

This appearance seems to me to be largely due to perspective, but also to the fact that an observer, looking towards the horizon, sees through a much greater thickness of cloud-scattered atmosphere than when looking above.

A few small widely separated clouds are hardly noticeable, but when seen in larger numbers apparently near together, attract the attention. Having so very frequently noticed, at sea, the apparent anomaly alluded to, I am tempted to offer this explanation.

CAMPBELL HEPWORTH.

*2, Amherst Road, Ealing, W., Sept. 9th, 1911.*

[Mr. W. Ellis, F.R.S., writes, in regard to the not infrequent occurrence of a certain condition of sky spoken of by A. F. (in the August number, page 140), that he has received a letter from a friend, a keen observer and lover of nature, who, though not suggesting any explanation thereof, writes as follows:—"As regards the prevalence of cloud round the horizon at sunset, I agree with A. F. that this is very common. I have frequently noticed before sunset at Westminster that the sky has apparently been clear from the zenith to as low down as I could see; and I have accordingly gone up to Hampstead Hill, and on arriving there have found the horizon all round, but especially near the sun, clouded up to about  $15^{\circ}$  or  $20^{\circ}$  above the horizon, although the rest of the sky was quite clear." We think that Dr. Aitken's theory accounts for this remarkable appearance which we have sometimes observed at sea for many hours, where the zenith of the observer at a given moment was the zenith of the point on the sea-horizon towards which the ship is moving half-an-hour before, and would be the zenith of the point on the sea-horizon directly astern half-an-hour later. When we first saw this effect we explained it by the fact that the sea-horizon was a circle of roughly 12 miles in diameter, while the clouds that were referred to the same imaginary circle were spread over a circle of sea of vastly greater diameter, and so even thinly scattered clouds appeared to be massed on the horizon as the stars do in the milky way. This is the same as Captain Hepworth's explanation, which reached us after the above note was written.—Ed. *S.M.M.*]

(b.)		Stand in R.O. Ground.	New Thermograph.	Corr. to Thermograph.
1893.	Aug. 16	93.0	91.2	+1.8
	„ 17	94.2	92.2	2.0
	„ 18	95.1	93.3	1.8
1898.	Sept. 8	92.1	91.9	0.2
				+1.5

(c.)		Stand in		New Thermograph.		Corr. to	
		Mag. Pavilion	Enclosure.			Thermograph.	
1900.	July 16 .....	94·0	.....	94·3	.....	—0·3	
	„ 25 .....	93·0	.....	94·2	.....	—1·2	
1906.	Aug. 31 .....	94·3	.....	93·1	.....	+1·2	
	Sept. 2 .. .....	93·5	.....	93·8	.....	—0·3	
1911.	July 21 .....	93·7	.....	93·0	.....	+0·7	
	„ 22 .....	95·6	.....	95·1	.....	+0·5	Mean
	Aug. 9 .....	100·0	.....	98·3	.....	+1·7	+0·3

On the day in question, the 9th inst., the maximum reading in the Stevenson Screen near the Standard was 96°·6, and in that in the Royal Observatory ground 97°·5.

It may be of interest to mention that I myself took the 3 p.m. observations of the Standard on the 9th inst., when the maximum read exactly 100°·0. I re-set the thermometer and completed the routine duty, and on looking again at the Stand found the maximum again reading 100°·0. The Thermograph also confirms this, for its first maximum occurred at 3 p.m., and after a short drop was repeated almost continuously until 3.30 p.m.

WALTER W. BRYANT.

*Royal Observatory, Greenwich, London, S.E., Aug. 15th, 1911.*

### OUR PERMANENT SNOW SPOTS.

IN reply to Mr. Gethin Jones' letter in your last issue, the following information may be of interest. Mr. Gethin Jones' letter is headed "The Latest Snow Spot," but as at least two of the snow beds mentioned in this letter have never been known to disappear, the title "Latest Snow Spots" would not be quite accurate for them. With regard to the snow beds of Ben Nevis, I am indebted to Mr. Miller for the following facts. On August 28th there was on Ben Nevis a good big patch of snow below the place where the ashes from the old Observatory used to be thrown over the cliff, and two other beds looking towards the cliff from the top of the Tower Ridge, Mr. Miller says he does not think these two beds will thaw this year now. One of them, presumably, must be the famous permanent snow bed of the Observatory Gully, described by me in your Magazine, vol. 40 (1905), p. 29, and by Mr. V. H. Gatty in the *Geographical Journal*, vol. 27 (1906), p. 487. During the last fortnight of July Mr. Miller says there were heavy showers of snow on the Ben, and on one or two occasions there were 2 to 3 inches lying on the summit, "except for that experience we have enjoyed more or less a tropical summer, an exceptional experience for the Western Highlands."

With regard to the Cairngorms, Mr. Seton Gordon writes me as follows, under date August 26th :—"Although up to now the summer has been a very dry one on the hills, still, the heat—with the exception of a few days—has been nothing exceptional, and there is still a certain amount of snow in the Cairngorms. Monadh Mhor

(3,651 ft.) still retains a single field which is very slow indeed in disappearing. The snow field on Braeriach is quite as big as last year; but the snow beds on Ben Muich Dhui are, I think, somewhat smaller, and there is some slight chance of their disappearing. There has been a marked absence this season of the strong and soft winds from the S.W., and these, I think, do more to melt the snow than hot calm days." Mr. Gordon hopes to compare the Cairngorm beds with those lying under Ben Nevis and the Aonachs, and in this I hope he will be successful, as the beds of the latter mountain have never been investigated.

R. P. DANSEY.

### PLANETARY RAINFALL.

SOME years ago I made a comparison between some annual values of rainfall at Buenos Aires, published by Mr. W. G. Davis, and the annual values at Cape Town. A more detailed investigation would have been of great interest, no doubt, had I been able to get the monthly falls for the South American station. However so far as the available material goes it seems to suggest that Buenos Aires and Cape Town are in the same rain system, and agree better with each other than Cordoba agrees with the north-east of England, as claimed by Mr. Mossman's results given in this Magazine in June last.

The following are percentages of the annual mean for 40 years:—

	Buenos Aires. per cent.	Cape Town. per cent.		Buenos Aires. per cent.	Cape Town. per cent.	
1861 .....	60	99	.....	1881 .....	100	99
1862 .....	110	124	.....	1882 .....	109	114
1863 .....	82	99	.....	1883 .....	134	124
1864 .....	83	73	.....	1884 .....	119	109
1865 .....	85	72	.....	1885 .....	98	108
1866 .....	90	74	.....	1886 .....	103	107
1867 .....	62	89	.....	1887 .....	76	89
1868 .....	117	77	.....	1888 .....	107	140
1869 .....	126	125	.....	1889 .....	145	120
1870 .....	103	108	.....	1890 .....	93	102
1871 .....	77	78	.....	1891 .....	103	117
1872 .....	78	114	.....	1892 .....	75	159
1873 .....	87	92	.....	1893 .....	64	91
1874 .....	108	101	.....	1894 .....	85	87
1875 .....	89	100	.....	1895 .....	144	110
1876 .....	104	103	.....	1896 .....	88	66
1877 .....	95	138	.....	1897 .....	87	78
1878 .....	109	159	.....	1898 .....	107	111
1879 .....	70	72	.....	1899 .....	120	104
1880 .....	90	69	.....	1900 .....	215	82

This shows agreement in 32 years, and disagreement in eight years.

The five years' (1906—10) drought at Buenos Aires, which Mr. Mossman mentions, has also been paralleled by a considerable shortage of rain in the same period at Cape Town.

J. R. SUTTON.

*Kimberley, July 15th, 1911.*



[It should be noted that the relation Mr. Mossman traced between the rainfall of Cordoba and the north-east of England was an inverse resemblance between the seasons, a dry late summer and early autumn (January to March) at Cordoba being followed by a wet late summer and early autumn (July to September) in the north-east of England.—ED., *S.M.M.*]

---

### Robert Atherton Edwin.

LONDON, 1839 — WELLINGTON, 1911.

COMMANDER ROBERT ATHERTON EDWIN, R.N., who died at Wellington, New Zealand, on July 15th, at the age of 71, was a veteran meteorologist who, for 25 years, prepared and issued daily weather forecasts for a country extending north and south for nearly a thousand miles.

Captain Edwin was born in London, in 1839, and educated at Wimborne Minster Grammar School, Dorsetshire. On January 14th, 1853, he entered the Royal Navy as a naval cadet. He was wounded at the action of Sevastopol on October 17th, 1854. He was present at the capture of Canton, and was also in New Zealand during the early part of the Maori War. He retired from the Royal Navy in 1871, and became a Nautical Examiner for the New Zealand Government, an office he held until 1900.

Captain Edwin had studied meteorology in England and in the Royal Navy, and he was entrusted with the duty of establishing the Weather Bureau in connection with the Marine Department and the Telegraph Office of New Zealand, and as "Weather Reporter" he developed a system of reports and forecasts which won public approval. The Meteorological Office for climatological work had been established in 1867, and carried on by the late Sir James Hector, F.R.S., but the two branches were kept separate until 1907, when they were united under Captain Edwin as the first Director.

In the beginning of 1909 Captain Edwin retired on a pension, but he was active until almost the last week of his life. His genial nature and wide acquaintance infused a singular brightness and happiness into the eventide of a long and honourable career.

Captain Edwin took the kindest interest in veteran sailors and soldiers, cheering and helping them in various ways. He was an enthusiastic member of the Navy League, and a founder of the Wellington branch. His principal pastime was the old English game of bowls, in which he was an expert, and he was President of the New Zealand Association for a time.

His work as a meteorologist was necessarily confined very much to his daily labours, but he wrote papers for the Royal Meteorological Society, of which he was a Fellow for several years, and valuable results of his investigations were published in the volumes of the New Zealand Institute for the years 1879 and 1904, and in other journals.

D. C. B.

## INTERNATIONAL BALLOON ASCENTS.

FEBRUARY AND MARCH, 1909.

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

*February 4th, 1909.*

Starting Point.	Country.	A miles.	B ° F.	C miles.	D ° F.	E miles.	F
Petersfield ....	England ....	7.5	—92	9.5	—81	268	E.S.E.
Lindenberg....	Germany....	7.1	—71	7.6	(?)	182	S.E.
Paris .....	France.....	7.5	—72	8.4	—81	164	S.E.
Pavia .....	Italy .....	8.3	—94	9.8	—76	96	S.S.E.
Pavlovsk .....	Russia .....	5.8	—79	8.8	—87	31	E. by S.
Kuchino .....	„ ....	6.0	—73	9.4	—78	21	E. by N.
Nizhni Olchadaeff	„ ....	5.4	—62	7.7	—56	36	E.S.E.

The isothermal region was high in the west and south and low in the east, and the temperatures not unusual for the time of year. An extensive cyclonic area was moving eastwards over North and Middle Europe, while a high pressure area lay over Spain, with an extension towards the Alps.

*March 4th, 1909.*

Manchester....	England ....	5.0	—67	6.6	—62	10	S. by E.
Pyrton Hill....	„ ....	5.0	—55	6.3	—49	11	N.N.W.
Brussels .....	Belgium ....	5.1	—63	13.0 ?	—69	44	N.E.
Lindenberg....	Germany....	4.8	—60	10.4	—49 ?	46	N.E.
Paris .....	France ....	4.7	—58	8.2	—54	63	E. ?
Strassburg ....	Germany....	4.7	—62	5.7	—58	48	N.N.E.
Kuchino .....	Russia .....	6.2	—87	9.7	—72	48	N.

A large and deep depression lay over the Channel with high pressure over Iceland and Russia. At many stations the wind was so strong that no ascent could take place. In accordance with the general rule, the isothermal in the low pressure regions was very low, and the temperature high. The consistency of the observations is unusually good. Taking the type of weather into account, the small distances travelled by the balloons are noticeable. On this occasion at least the depression was not an eddy produced by a strong westerly upper current.

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.



## RAINFALL TABLE FOR AUGUST, 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	2'39	·49
Tenterden.....	Kent.....	51 4	*0 41	190	2'42	1'20
Arundel (Patching).....	Sussex.....	50 51	0 27	130	2'52	1'26
Southampton (Cadland) ...	Hampshire.....	50 50	1 22	52	2'85	·86
Oxford (Magdalen College)...	Oxfordshire.....	51 45	1 15	186	2'44	1'04
Wellingborough (Croyland Abbey).	Northampton.....	52 18	0 41	174	2'38	1'77
Shoeburyness.....	Essex.....	51 31	*0 48	13	1'74	1'55
Bury St. Edmunds (Westley)	Suffolk.....	52 15	*0 40	226	2'52	1'56
Geldeston [Beccles].....	Norfolk.....	52 27	*1 31	38	2'22	·46
Polapit Tamar [Launceston]	Devon.....	50 40	4 22	315	3'17	1'78
Rousdon [Lyme Regis].....	".....	50 41	3 0	516	2'84	·41
Stroud (Upheld).....	Gloucestershire..	51 44	2 13	226	2'90	1'87
Church Stretton (Wolstaston)..	Shropshire.....	52 35	2 48	800	3'43	1'58
Coventry (Kingswood).....	Warwickshire ...	52 24	1 30	340	2'81	1'57
Boston.....	Lincolnshire.....	52 58	0 1	25	2'39	2'78
Worksop (Hodsock Priory).	Nottinghamshire	53 22	1 5	56	2'55	1'65
Macclesfield.....	Cheshire.....	53 15	2 7	501	3'76	2'74
Southport (Hesketh Park)..	Lancashire.....	53 38	2 59	38	3'73	3'62
Wetherby (Ribston Hall) ...	Yorkshire, W.R.	53 59	1 24	130	2'78	2'18
Arncliffe Vicarage.....	".....	54 8	2 6	732	5'62	4'21
Hull (Pearson Park).....	" E.R.	53 45	0 20	6	3'05	2'23
Newcastle (Town Moor) ...	Northumberland	54 59	1 38	201	3'20	3'12
Borrowdale (Seathwaite) ...	Cumberland.....	54 30	3 10	423	11'47	9'93
Cardiff (Ely).....	Glamorgan.....	51 29	3 13	53	4'54	2'11
Haverfordwest.....	Pembroke.....	51 48	4 58	95	4'21	4'20
Aberystwyth (Gogerddan)..	Cardigan.....	52 26	4 1	83	4'88	5'91
Llandudno.....	Carnarvon.....	53 20	3 50	72	3'16	2'94
Cargen [Dumtries].....	Kirkcudbright...	55 2	3 37	80	4'23	3'47
Marchmont House.....	Berwick.....	55 44	2 24	498	3'54	1'54
Girvan (Pinmore).....	Ayr.....	55 10	4 49	207	4'54	2'31
Glasgow (Queen's Park) ...	Renfrew.....	55 53	4 18	144	3'62	2'42
Inveraray (Newtown).....	Argyll.....	56 14	5 4	17	6'02	7'95
Mull (Quinish).....	".....	56 34	6 13	35	5'00	3'64
Dundee (Eastern Necropolis)	Forfar.....	56 28	2 57	199	3'34	1'13
Braemar.....	Aberdeen.....	57 0	3 24	1114	3'63	1'14
Aberdeen (Cranford).....	".....	57 8	2 7	120	3'07	1'11
Cawdor.....	Nairn.....	57 31	3 57	250	3'05	·56
Fort Augustus (S. Benedict's)	E. Inverness ...	57 9	4 41	68	3'52	3'99
Loch Torridon (Bendamph)	W. Ross.....	57 32	5 32	20	6'61	6'31
Dunrobin Castle.....	Sutherland.....	57 59	3 56	14	2'71	·78
Wick.....	Caitness.....	58 26	3 6	77	2'73	1'23
Killarney (District Asylum)	Kerry.....	52 4	9 31	178	4'57	2'70
Waterford (Brook Lodge)...	Waterford.....	52 15	7 7	104	3'73	2'56
Nenagh (Castle Lough).....	Tipperary.....	52 54	8 24	120	4'04	2'36
Miltown Malbay.....	Clare.....	52 52	9 26	400	4'98	2'65
Gorey (Courtown House) ..	Weaford.....	52 40	6 13	80	3'31	2'34
Abbey Leix (Blandsfort)....	Queen's County..	52 56	7 17	532	3'94	3'15
Dublin (Fitz William Square)	Dublin.....	53 21	6 14	54	3'08	·87
Mullingar (Belvedere).....	Westmeath.....	53 29	7 22	367	4'00	1'99
Ballinasloe.....	Galway.....	53 20	8 15	160	3'96	2'61
Crossmolina (Enniscoe).....	Mayo.....	54 4	9 18	74	4'68	2'97
Collooney (Markree Obsy.).	Sligo.....	54 11	8 27	127	4'30	3'47
Seaforde.....	Down.....	54 19	5 50	180	3'64	1'85
Bushmills (Dundarave).....	Antrim.....	55 12	6 30	162	4'06	1'68
Omagh (Edenfel).....	Tyrrone.....	54 36	7 18	280	4'22	3'21

RAINFALL TABLE FOR AUGUST, 1911—*continued.*

RAINFALL OF MONTH (con.)					RAINFALL FROM JAN. 1.				Mean Annual 1875-1909.	STATION.
Diff. from Av. in.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1875-1909. in.	1911. in.	Diff. from Aver. in.	% of Av.		
		in.	Date.						in.	
-1.90	21	.22	20	7	15.92	12.54	-3.38	79	25.11	Camden Square
-1.22	50	.88	20	5	16.07	11.06	-5.01	69	27.64	Tenterden
-1.26	50	.46	30	8	17.44	11.66	-5.78	67	30.48	Patching
-1.99	30	.39	30	8	18.58	11.67	-6.91	63	31.87	Cadland
-1.40	43	.24	25	10	15.47	9.18	-6.29	59	24.58	Oxford
- .61	74	.82	21	12	16.06	10.57	-5.49	66	25.17	Croyland Abbey
- .19	89	.88	21	6	11.47	8.85	-2.62	77	19.28	Shoeburyness
- .96	62	1.16	21	6	15.96	12.21	-3.75	76	25.40	Westley
-1.76	21	.19	25	7	14.20	10.14	-4.06	71	23.73	Geldeston
-1.39	56	.48	5	15	21.79	15.95	-5.84	73	38.27	Polapit Tamar
-2.43	14	.14	28	7	19.85	10.56	-9.29	53	33.54	Rousdon
-1.03	64	.66	21	13	18.73	12.05	-6.68	64	29.81	Stroud
-1.85	46	.58	27	11	20.31	12.92	-7.39	64	32.41	Wolstaston
-1.24	56	.34	21	13	18.16	9.60	-8.56	53	28.98	Coventry
+ .39	116	.99	21	11	14.60	11.39	-3.21	78	23.35	Boston
- .90	65	.62	27	13	15.70	8.58	-7.12	55	24.46	Hodsock Priory
-1.02	73	.86	27	14	21.93	16.38	-5.55	75	34.73	Macclesfield
- .11	97	1.11	5	13	19.61	15.11	-4.50	77	32.70	Southport
- .60	78	.90	20	11	16.97	13.16	-3.81	78	26.87	Ribston Hall
-1.41	75	.95	7	14	37.59	39.78	+2.19	106	61.49	Arnccliffe
- .82	73	.68	27	11	16.52	12.83	-3.69	78	26.42	Hull
- .08	98	1.62	21	15	17.65	15.67	-1.98	89	27.94	Newcastle
-1.54	87	2.50	4	14	76.76	82.60	+5.84	108	129.48	Seathwaite
-2.43	46	.50	27	12	25.02	18.10	-6.92	72	42.28	Cadiff
- .01	100	1.48	4	13	27.05	21.72	-5.33	80	46.81	Haverfordwest
+1.03	121	1.27	27	15	27.03	23.97	-3.06	89	45.46	Gogerddan
- .22	93	.97	4	12	18.05	14.29	-3.76	79	30.36	Llandudno
- .76	82	1.02	31	12	26.49	26.95	+ .46	102	43.47	Cargen
-2.00	43	.41	5	13	21.22	15.97	-5.25	75	33.76	Marchmont
-2.23	51	.53	24	15	29.37	27.24	-2.13	93	49.77	Girvan
-1.20	67	.80	31	12	22.04	21.53	- .51	98	35.97	Glasgow
+1.93	132	2.50	31	18	40.06	52.50	+12.44	131	68.67	Inveraray
-1.36	73	.82	28	18	32.67	33.82	+ 1.15	104	56.57	Quinish
-2.21	34	.23	19	14	18.20	7.60	-10.60	42	28.64	Dundee
-2.49	31	...	...	...	21.43	15.79	-5.64	74	34.93	Braemar
-1.96	36	.30	9	15	20.09	13.48	-6.61	67	32.73	Aberdeen
-2.49	18	.16	31	6	18.70	15.76	-2.94	84	29.33	Cawdor
+ .47	113	.88	31	17	26.72	25.60	-1.12	96	44.53	Fort Augustus
- .30	95	1.22	7	19	49.35	59.41	+10.06	121	83.61	Bendamp
-1.93	29	.23	20	10	19.90	15.85	-4.05	80	31.90	Dunrobin Castle
-1.50	45	.26	20	18	18.11	17.05	-1.06	94	29.88	Wick
-1.87	59	.86	1	17	32.97	27.19	-5.78	82	54.81	Killarney
-1.17	69	.76	4	12	24.26	19.90	-4.36	82	39.57	Waterford
-1.68	58	.43	2	17	24.57	20.84	-3.73	85	39.43	Castle Lough
-2.33	53	.55	11	19	27.28	21.13	-6.15	77	45.11	Miltown Malbay
- .97	71	.98	5	14	21.63	14.32	-7.31	66	34.99	Courtown Ho.
- .79	80	.49	28	19	22.77	20.45	-2.32	90	35.92	Abbey Leix
-2.21	28	.16	28	15	17.83	11.59	-6.24	65	27.68	Dublin
-2.01	49	.35	23	16	23.17	20.24	-2.93	87	36.15	Mullingar
-1.35	66	.40	5	16	23.18	20.30	-2.88	88	36.64	Ballinasloe
-1.71	64	.45	31	22	31.32	26.71	-4.61	85	52.87	Enniscoie
- .83	81	.54	2	20	26.49	23.04	-3.45	87	42.71	Markree
-1.79	51	.49	23	12	24.38	16.71	-7.67	69	38.91	Seaforde
-2.38	41	.25	5	15	22.83	17.76	-5.07	78	37.56	Dundarave
-1.01	76	.72	31	15	24.66	22.60	-2.06	92	39.38	Omagh

## SUPPLEMENTARY RAINFALL, AUGUST, 1911.

Div.	STATION.	Rain inches	Div.	STATION.	Rain inches.
II.	Warlingham, Redvers Road	·48	XI.	Lligwy .....	3·33
„	Ramsgate .....	·91	„	Douglas .....	1·93
„	Hailsham .....	1·28	XII.	Stoneykirk, Ardwell House	1·85
„	Totland Bay, Aston House.	·50	„	Dalry, The Old Garroch ...	3·96
„	Stockbridge, Ashley .....	...	„	Langholm, Drove Road.....	4·72
„	Grayshott .....	1·25	„	Beattock, Kinnelhead.....	4·24
„	Reading, Calcot Place.....	1·07	XIII.	St Mary's Loch, Cramilt Ldgc	2·68
III.	Harrow Weald, Hill House.	·88	„	North Berwick Reservoir ...	1·28
„	Pitsford, Sedgebrook .....	1·56	„	Edinburgh, Royal Obsvtry.	1·19
„	Woburn, Milton Bryant.....	1·31	XIV.	Maybole, Knockdon Farm..	2·50
„	Chatteris, The Priory .....	2·21	XV.	Campbeltown, Witchburn...	2·56
IV.	Colchester, Lexden .....	·96	„	Glenreadell Mains.....	3·05
„	Newport .....	·42	„	Holy Loch, Ardnadam.....	7·15
„	Rendlesham .....	·73	„	Ballachulish House.....	2·77
„	Swaffham .....	·69	„	Islay, Eallabus .....	2·67
„	Blakeney .....	1·48	XVI.	Dollar Academy .....	2·97
V.	Bishops Cannings .....	2·05	„	Balquhider, Stronvar .....	7·12
„	Winterbourne Steepleton ...	·76	„	Coupar Angus .....	1·59
„	Ashburton, Druid House ...	1·97	„	Glenlyon, Meggernie Castle.	5·48
„	Okehampton, Oaklands.....	1·76	„	Blair Atholl .....	2·53
„	Cullompton .....	2·67	„	Montrose, Sunnyside Asylum	·91
„	Hartland Abbey .....	2·84	XVII.	Alford, Lynturk Manse ...	1·44
„	Lynmouth, Rock House ...	2·49	„	Fyvie Castle .....	1·33
„	Probus, Lamellyn .....	1·19	„	Keith Station .....	·81
„	North Cadbury Rectory .....	2·24	XVIII.	Glenquoich, Loan .....	13·30
VI.	Clifton, Pembroke Road ...	1·80	„	Skye, Dunvegan.....	7·63
„	Ross, The Graig .....	1·59	„	N. Uist, Lochmaddy .....	3·89
„	Shifnal, Hatton Grange.....	1·17	„	Alvey Manse .....	1·25
„	Blockley, Upton Wold .....	1·50	„	Loch Ness, Drumnadrochit.	1·80
„	Droitwich .....	1·79	„	Glencarron Lodge .....	5·57
VII.	Market Overton.....	1·49	XIX.	Invershin .....	·99
„	Market Rasen .....	1·69	„	Loch Stack, Ardcullin.....	4·39
„	Bawtry, Hesley Hall.....	1·44	„	Melvich.....	1·89
„	Derby, Midland Railway ...	1·69	XX.	Skibbereen Rectory.....	2·49
„	Buxton .....	2·75	„	Dunmanway, The Rectory..	3·39
VIII.	Nantwich, Dorfold Hall.....	1·82	„	Cork .....	2·32
„	Chatburn, Middlewood .....	3·06	„	Mitchelstown Castle .....	1·96
„	Cartmel, Flookburgh .....	3·49	„	Darrynane Abbey .....	2·89
IX.	Langsett Moor, Up. Midhope	3·28	„	Glenam [Clonmel] .....	2·06
„	Scarborough, Scalby .....	3·76	„	Newmarket-on-Fergus, Fenloe	2·22
„	Ingleby Greenhow .....	2·46	XXI.	Laragh, Glendalough .....	2·41
„	Mickleton .....	2·54	„	Balbriggan, Ardgillan.....	2·34
X.	Bellingham, High Green Manor	4·35	„	Moynalty, Westland .....	2·28
„	Ilderton, Lilburn Cottage...	1·77	XXII.	Cong, The Glebe .....	3·75
„	Keswick, The Bank .....	3·69	„	Westport, St. Helens .....	3·33
XI.	Llanfrechfa Grange .....	2·55	„	Achill Island, Dugort .....	3·67
„	Treherbert, Tyn-y-waun ...	6·70	„	Mohill, The Rectory .....	2·90
„	Carmarthen, The Friary....	4·05	XXIII.	Enniskillen, Portora .....	...
„	Castle Malgwyn [Llechryd].	3·05	„	Dartrey [Cootehill].....	1·66
„	Plynlimon .....	8·20	„	Warrenpoint, Manor House	1·70
„	New Radnor, Ednol .....	3·54	„	Banbridge, Milltown .....	1·04
„	Rhayader, Tyrmynydd .....	5·46	„	Belfast, Cave Hill Road.....	2·54
„	Lake Vyrnwy .....	4·42	„	Glenarm Castle.....	2·36
„	Llangyhanfal, Plâs Draw....	3·60	„	Londonderry, Creggan. Res.	2·57
„	Dolgelly, Bryntirion .....	7·19	„	Killybegs .....	4·23
„	Bettws-y-Coed, Tyn-y-bryn	4·64	„	Horn Head ... ..	2·92

## METEOROLOGICAL NOTES ON AUGUST, 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.—Fine, extremely hot and sunny throughout. An absolute drought extended from 2nd to 18th, this being the third of the present year. Mean temp.  $68^{\circ}2$ , or  $5^{\circ}9$  above the average, and the highest yet recorded in August.† Duration of rain 9.2 hours and of sunshine 207.4\* hours; one sunless day. Evaporation 3.19 in. Shade max.  $97^{\circ}1$  on 9th, the highest shade temperature ever recorded at Camden Square; min.  $48^{\circ}4$  on 31st. F 0, f 0.

TENTERDEN.—Hot and dry, with temp. on three days over  $90^{\circ}0$ . Drought broke on 20th with severe TS in evening. Shade max.  $95^{\circ}0$  on 9th; min.  $46^{\circ}0$  on 31st. F 0, f 0.

TOTLAND BAY.—The R was the lowest for 25 years. Duration of sunshine, 252\* hours, the greatest yet recorded in August. Partial drought from June 30th—August 27th, with .38 in. of R. Shade max.  $86^{\circ}6$  on 13th, the highest reading for 25 years; min.  $48^{\circ}3$  on 31st. F 0, f 0.

PITSFORD.—R .31 in. below the average. Mean temp.  $65^{\circ}9$ . Shade max.  $96^{\circ}5$  on 9th; min.  $43^{\circ}6$  on 31st. F 0.

POLAPIT TAMAR.—A very hot and dry month. Shade max.  $85^{\circ}0$  on 14th; min.  $41^{\circ}0$  on 31st. F 0, f 0.

ROSS.—From May 27th to August 20th (86 days) the R was only 1.62 in. Shade max.  $92^{\circ}6$  on 9th; min.  $43^{\circ}9$  on 31st. F 0, f 0.

HODSOCK PRIORY.—The mean temp. and the extreme max. were the highest recorded in any month since the record commenced in 1879. Shade max.  $94^{\circ}4$  on 9th; min.  $41^{\circ}7$  on 17th. F 0, f 0.

BUXTON.—Mean temp.  $61^{\circ}6$ , or  $4^{\circ}8$  above the average of 35 years. Duration of sunshine 205.5\* hours, or 62 above 25 years' average. Shade max.  $88^{\circ}4$  on 9th, the highest temp. ever recorded here; min.  $43^{\circ}0$  on 31st. F 0, f 0.

SOUTHPORT.—Duration of sunshine 264.4\* hours, or 85.5 hours above the average, and 40 hours above the highest previous value in 20 years. Mean temp.  $63^{\circ}9$ , or  $4^{\circ}4$  above the average, and the highest value for any month in the 41 years' record. Duration of R, 42.5 hours. Shade max.  $87^{\circ}4$  on 13th; min.  $47^{\circ}9$  on 16th. F 0, f 0.

HULL.—Shade max.  $88^{\circ}0$  on 9th; min.  $46^{\circ}0$  on 17th. F 0, f 0.

HAVERFORDWEST.—Shade max.  $84^{\circ}9$  on 13th; min.  $41^{\circ}2$  on 3rd. F 0, f 0.

CARGEN.—Absolute drought for 18 days, from 7th to 24th. Shade max.  $86^{\circ}0$  on 13th; min.  $41^{\circ}0$  on 23rd. F 0.

EDINBURGH.—Shade max.  $78^{\circ}7$  on 9th; min.  $45^{\circ}6$  on 16th. F 0, f 0.

COUPAR ANGUS.—R 1.86 in. below the average. Mean temp.  $60^{\circ}9$ , the highest yet recorded. Shade min.  $40^{\circ}0$  on 17th. F 0, f 0.

FORT AUGUSTUS.—Shade max.  $76^{\circ}9$  on 9th; min.  $42^{\circ}7$  on 17th. F 0.

CORK.—Shade max.  $73^{\circ}0$  on 13th; min.  $45^{\circ}0$  on 10th and 30th. F 0, f 0.

DUBLIN.—A very fine, warm month. Mean temp.  $62^{\circ}8$ . The R was the smallest recorded in August since 1884. TSS on 12th, 13th and 28th. Shade max.  $78^{\circ}1$  on 17th. F 0, f 0.

MARKREE.—Duration of sunshine 193.5\* hours. Shade max.  $82^{\circ}2$  on 13th; min.  $35^{\circ}3$  on 23rd. F 0, f 1.

WARRENPOINT.—A fine, warm month. A peculiarly warm wind sprang up about 8.30 p.m. on 8th, coming from W.N.W. in alternately cool and warm gusts. Shade max.  $76^{\circ}0$  on 13th; min.  $53^{\circ}0$  on 5th. F 0 0.

\* Campbell-Stokes.

† Jordan

‡ See p. 153.



## Climatological Table for the British Empire, March, 1911.

STATIONS  (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain		Aver.	
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.		
	Temp.	Date.	Temp.	Date.										
London, Camden Square	61°·5	22	28°·8	17	49°·2	36°·4	37°·8	0·100	87	94°·9	24°·4	inches 1·73	18	6·9
Malta ... ..	72°·5	27	45°·5	6	61°·6	52°·9	49°·7	81	132°·5	...	1°·21	8	5·8	
Lagos ... ..	92°·0	4*	69°·9	5	87°·9	75°·2	74°·3	73°·8	151°·0	67°·2	11°·26	13	...	
Cape Town ... ..	97°·0	4	50°·4	21	80°·2	59°·2	57°·9	67	...	...	°·26	7	3·0	
Johannesburg ... ..	90°·9	2	43°·4	24	70°·5	53°·6	52°·9	79	147°·6	43°·1	2°·59	12	5·3	
Mauritius ... ..	85°·3	16	65°·2	24	82°·0	71°·9	70°·0	81	159°·4	57°·9	12°·13	20	6·8	
Calcutta... ..	96°·2	1	58°·6	24	90°·5	69°·0	61°·8	64	...	51°·3	1°·95	3	2·2	
Bombay... ..	90°·0	15	69°·3	20	85°·9	72°·8	67°·5	70	135°·0	61°·9	0°·00	...	1·2	
Madras ... ..	94°·9	8	64°·6	1	90°·0	72°·9	72°·2	77	142°·2	61°·5	0°·00	...	1·0	
Kodaikanal ... ..	73°·4	24	46°·0	2	70°·0	50°·6	44°·0	60	141°·3	29°·2	°·14	5	3·0	
Colombo, Ceylon ... ..	96°·1	11	72°·8	31	90°·2	74°·7	72°·6	75	142°·9	70°·0	2°·39	4	3·3	
Hongkong ... ..	79°·1	16	54°·2	18	69°·5	61°·8	60°·5	83	125°·5	...	3°·81	12	8·1	
Sydney ... ..	85°·0	27	55°·9	21	75°·3	61°·6	56°·6	66	158°·0	46°·8	1°·95	19	5·1	
Melbourne ... ..	88°·3	5	49°·1	20	72°·1	56°·6	53°·8	69	146°·5	43°·8	7°·50	17	6·3	
Adelaide ... ..	100°·0	5	49°·9	16‡	77°·9	58°·0	51°·8	58	161°·9	39°·7	°·83	6	5·2	
Perth ... ..	96°·8	8	46°·9	18	79°·9	60°·0	54°·4	61	155°·3	39°·3	°·14	5	5·3	
Coolgardie ... ..	1°·0·0	9	42°·2	18	82°·5	57°·6	48°·7	51	169°·0	39°·2	°·35	4	4·3	
Hobart, Tasmania ..	80°·1	11	44°·2	20	67°·5	53°·4	50°·1	70	146°·4	39°·3	5°·41	18	6·4	
Wellington ... ..	73°·2	13	48°·0	11	67°·6	57°·7	53°·7	73	120°·0	39°·0	°·34	8	6·9	
Auckland ... ..	76°·5	3	55°·5	26	72°·4	60°·2	62°·5	88	151°·0	52°·0	2°·32	11	6·3	
Jamaica, Kingston ..	86°·6	6	63°·2	7	85°·8	66°·3	64°·6	74	...	...	2°·05	6	3·2	
Grenada ... ..	90°·0	9†	68°·0	11	85°·3	71°·9	...	66	142°·0	...	°·06	14	3·5	
Toronto ... ..	55°·2	27	1°·3	16	37°·3	23°·0	...	...	64°·4	—0°·8	2°·05	18	4·9	
Fredericton ... ..	49°·5	26	—10°·0	7	34°·6	10°·9	...	80	...	...	3°·48	8	5·3	
St. John, N.B. ... ..	46°·1	28	2°·3	1	34°·5	19°·6	...	71	...	...	4°·71	12	4·8	
Victoria, B.C. ... ..	57°·1	15	27°·2	2	51°·8	35°·7	...	78	...	...	1°·93	9	5°·0	
Dawson ... ..	37°·0	28	—47°·0	13	15°·5	—7°·5	...	...	...	...	0°·77	11	5°·1	

\* and 11.

† and 27.

‡ and 31.

Kodaikanal—Jan. ....	71°·9	14	43°·0	26	65°·2	48°·2	28°·1	52	120°·6	19°·2	°·21	3	3°·5
„ —Feb. ....	74°·2	25	39°·8	7	66°·7	45°·2	35°·9	53	132°·9	19°·3	°·24	2	2°·2

MALTA.—Mean temp. of air, 56°·2. Average bright sunshine, 6·6 hours per day.

MAURITIUS.—Mean temp. of air 1°·3, dew point 0°·9 below, and R 2·85 in. above. averages. Mean hourly velocity of wind 12·8 miles, or 3·4 above average.

COLOMBO.—Mean temp. of air 80°·6, or 1°·4 below, of dew point 0°·3 above, and R 1·94 in. below, averages. Mean hourly velocity of wind 4·3 miles. TSS on 2 days.

HONGKONG.—Mean temp. of air 65°·5, or 2°·8 above, R °·95 in. above, and bright sunshine 24 hours above, averages. Mean hourly velocity of wind 14·8 miles.

SYDNEY.—Mean temp. of air 0°·6 below, and R 3·13 in. below, averages.

MELBOURNE.—Mean temp. of air 0°·3 below, and R 5·39 in. above, averages.

PERTH.—Mean temp. of air 1°·2 below, and R °·61 in. below, averages.

COOLGARDIE.—Mean temp. of air 2°·0 below, and R °·28 in. below, averages.

HOBART, TASMANIA.—Mean temp. of air 1°·0 above, and R 3·80 in. above, averages.

WELLINGTON.—Mean temp. of air 2°·3 above, and R 3·12 in. below, averages.

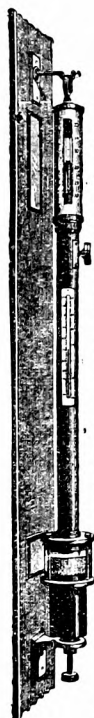
# JAMES J. HICKS

## Meteorological & Scientific Instruments

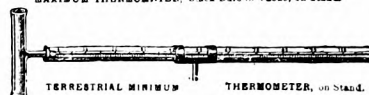
MANUFACTORY:—  
8, 9 & 10, HATTON GARDEN, LONDON, E.C.

Awarded Grand Prix Franco-British Exhibition, 1908; Nine Medals at the Paris Exhibition, 1900; London, 1862; Paris, 1867; London, 1885; Philadelphia, 1876; Rio de Janeiro, 1909.

Standard "Fortin" Barometers.  
Standard Mercurial Thermometers.  
Standard Maximum Thermometers.  
Standard Minimum Thermometers.  
Standard Mason's Hygrometers.  
Standard "Solar Maximum" Thermometers.  
Standard Terrestrial Radiation Thermometers.  
Standard "Earth Temperature" Thermometers.  
Standard Symons's Rain Gauges.  
Standard Meteorological Office Rain Gauges.  
Standard Sunshine Recorders.  
Improved Beckley Anemometers.  
Improved Beckley Self-Recording Rain Gauge.  
Self-Registering Aneroid Barometers.  
Self-Registering Mercurial Barometers.  
Meteorological Office Thermometer Screens.  
Mountaineering Aneroid Barometers.  
Aneroid Barometers.



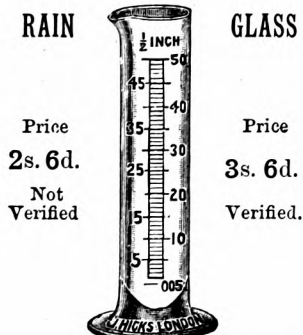
STANDARD BAROMETER, diameter of Tube, 0.5 in., on Mahogany Board.



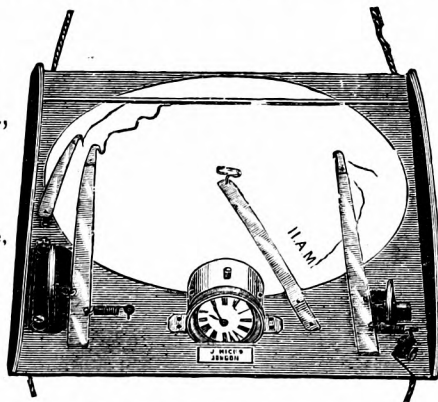
NEW OBSERVATORY CERTIFICATES SUPPLIED IF DESIRED.

### METEOROGRAPH, for use with Kites

#### THE "CAMDEN" Pattern



Designed by  
W. H. DINES, Esq.,  
F.R.S.  
~~~~~  
Records the Pressure,  
Temperature,  
Humidity, &c., of  
the Upper Air.



Special Prices are given to Fellows of all Scientific Societies.  
( v. )



## **A Monthly Record of Science in all its Branches.**

Each number consists of at least forty large quarto pages of Articles and Notes, by Authorities in their respective subjects.

**Profusely Illustrated.**

### **CONTENTS OF SEPTEMBER ISSUE.**

A New Astronomy: The Story of Nova Persei. By Professor A. W. Bickerton.—The True Structure of the Diatom Valve.—Mountain Building and Ore Deposition.—Clusters and Nebulæ.—A New Table, and so on, for Practical Microscopy.—Astronomy at the Coronation Exhibition. Solar Disturbance during July, 1911.—The Face of the Sky for the Month.—Notes (Astronomy; Botany; Chemistry; Geology; Meteorology; Ornithology; Photography; Physics; Zoology).—Microscopy.—Reviews of Books.—Correspondence.—Queries and Answers.—&c.

THROUGH ANY BOOKSELLER.

**MONTHLY—ONE SHILLING, net.**

Annual Subscription, **15/-**, post free anywhere.

Offices: **42, BLOOMSBURY SQUARE, LONDON.**

---

## **THE OBSERVATORY:**

*A Monthly Review of Astronomy.*

EDITED BY

**H. P. HOLLIS, B.A., F.R.A.S., AND T. LEWIS, F.R.A.S.**

~~~~~

Contains full Reports of the Meetings of the Royal Astronomical and Royal Meteorological Societies, and of the British Astronomical Association; Articles by various eminent Astronomers, English, American and Continental; Correspondence on topics of interest connected with the Science; Notices of Observatories, Publications and current Discoveries. The "Oxford Note Book" is a special feature of the Magazine.

*The Observatory* was founded in 1877, and has become an established and very valuable publication.—Prof. Young, in "*Ten Years' progress in Astronomy*."

Annual Subscription (for the "Companion" and twelve Monthly Numbers), 13s.

*All communications should be addressed to the Editors of "The Observatory," Royal Observatory, Greenwich, S. E.*

# Royal Geographical Society's Publications.

---

## THE GEOGRAPHICAL JOURNAL.

Monthly. Illustrated. Edited by the Secretary. Price (to non-Fellows), 2s.

## HINTS TO TRAVELLERS.

Edited for the Council of the Royal Geographical Society by E. A. REEVES, F.R.G.S., F.R.A.S. Ninth Edition, revised and enlarged. In two volumes, illustrated. Price 15s. net. (To Fellows at the Office of the Society, 10s. net).

Vol. I.—Surveying and Practical Astronomy.

Vol. II.—Meteorology and Climate (by DR. H. R. MILL);  
Photography, Geology, Natural History, Anthropology, Industry and Commerce, Medical Hints, &c.

## THE DISTRIBUTION OF RAINFALL OVER THE LAND.

By DR. A. J. HERBERTSON. With monthly maps of Rainfall. Price 5s. net. (To Fellows, 2s. 6d.)

## ON THE RESULTS OF A DEEP-SEA SOUNDING EXPEDITION,

In the North Atlantic in the summer of 1899, by R. E. PEAKE, M.Inst.C.E.; with notes on Temperature, Deep-Sea Deposits, &c., by SIR JOHN MURRAY, K.C.B., F.R.S. *Charts.* Price 5s. net. (To Fellows, 2s. 6d.)

## THE ANTARCTIC MANUAL,

For the use of the Expedition of 1901. Edited by GEORGE MURRAY, F.R.S., 1901. Pp. 586. *With a new chart of the Antarctic Regions.* Price, 15s. (To Fellows, 10s.)

~~~~~  
ROYAL GEOGRAPHICAL SOCIETY, 1, Savile Row, W.  
AND ALL BOOKSELLERS.

---

### RATES FOR ADVERTISEMENTS IN THIS MAGAZINE.

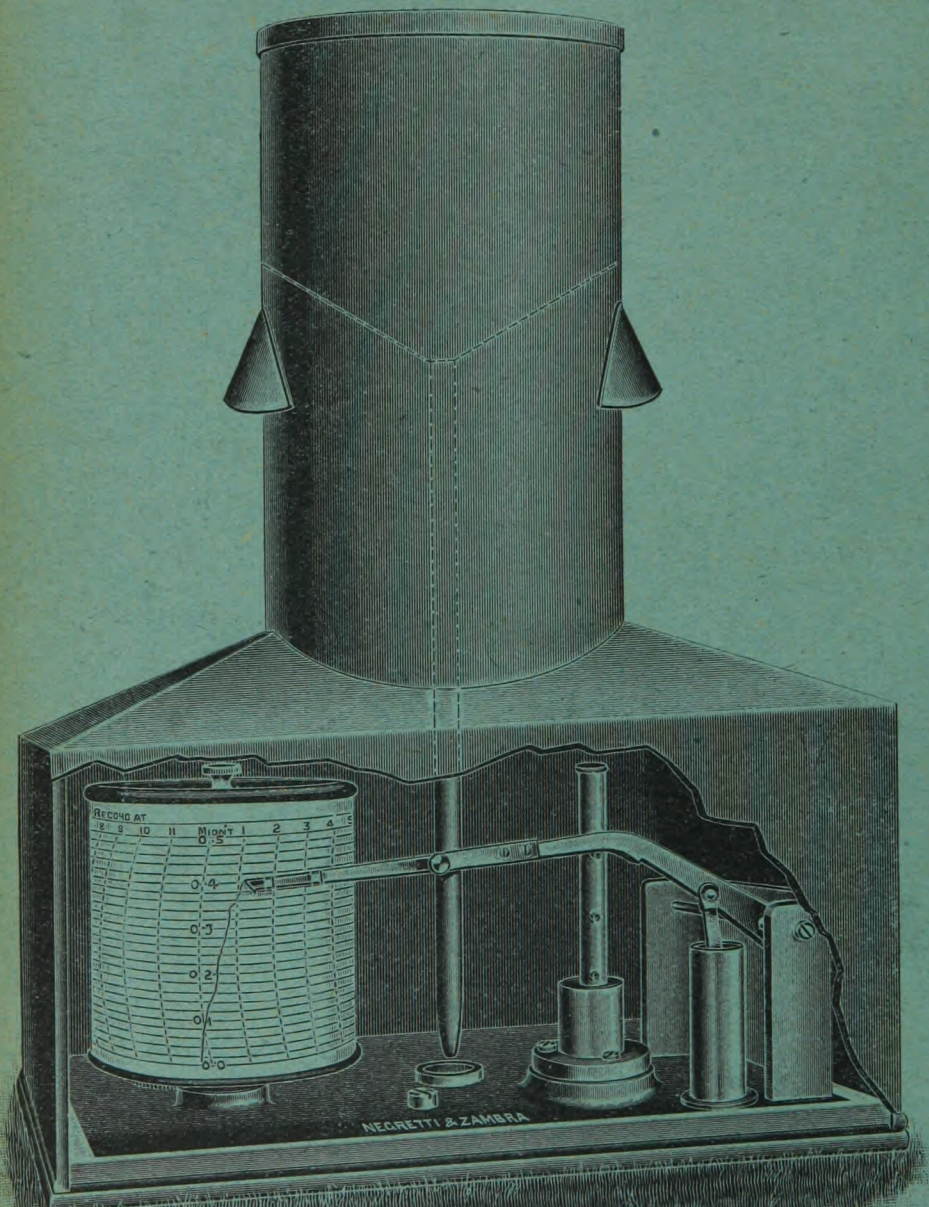
|            |     | One Insertion. | Six Insertions. | Twelve Insertions. |             |
|------------|-----|----------------|-----------------|--------------------|-------------|
| WHOLE PAGE | ... | 30/-           | ...             | 26/-               | ...         |
| HALF       | ..  | 16/6           | ...             | 14/6               | ...         |
| QUARTER    | ..  | 9/-            | ...             | 8/-                | ...         |
| EIGHTH     | ..  | 5/-            | ...             | 4/6                | ...         |
|            |     |                |                 |                    | 22/6 } All  |
|            |     |                |                 |                    | 12/6 } Net. |
|            |     |                |                 |                    | 7/- }       |
|            |     |                |                 |                    | 4/- }       |

*All applications for space to be made to*

Mr. H. A. COLLINS, 32, BIRDHURST ROAD, CROYDON



# The "HYETOGRAPH."



Write for descriptive pamphlet and other Meteorological Instruments to the  
SOLE MAKERS,

**NEGRETTI & ZAMBRA,**  
SCIENTIFIC INSTRUMENT MAKERS,  
38, HOLBORN VIADUCT, E.C.,

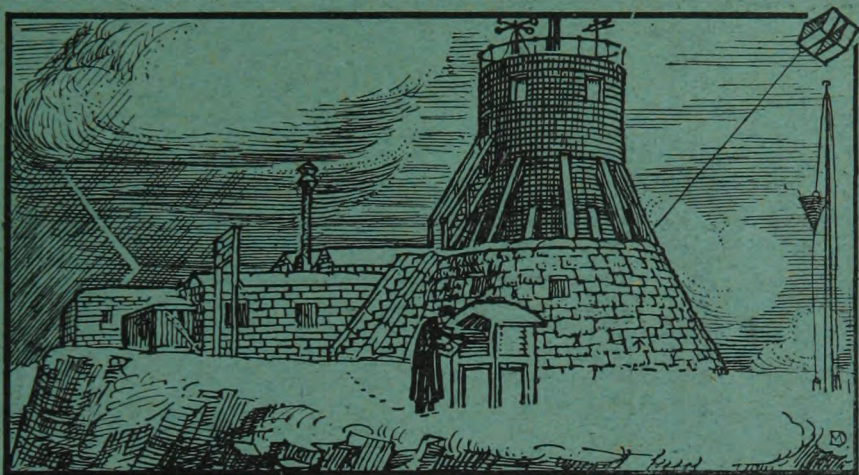
Branches: 45, CORNHILL, E.C., and  
122, REGENT STREET, W., LONDON.

Telegraphic Address: "NEGRETTI, LONDON." Telephone No.: 583 HOLBORN.

SHIELD & SPRING, Lancelot Place, Brompton Road, S.W.



NO. 549 SYMONS'S VOL. 46  
 METEOROLOGICAL  
 ❄️ · MAGAZINE · ❄️  
 .... EDITED BY HUGH ROBERT MILL ....



OCTOBER, 1911.

· CONTENTS ·

|                                                                                                  | PAGE        |
|--------------------------------------------------------------------------------------------------|-------------|
| Weather in the Seventeenth Century. By WALTER SEDGWICK, M.A.                                     | 169         |
| The Hot Weather of July—September, 1911, in London ..                                            | 173         |
| Meteorology at the British Association. By E. GOLD, M.A. ..                                      | 174         |
| Map of September Rainfall of Thames Valley ..                                                    | face p. 177 |
| The Weather of September. By FRED. J. BRODIE ..                                                  | 177         |
| International Balloon Ascents, April, 1909. By W. H. DINES, F.R.S.                               | 178         |
| CORRESPONDENCE :—                                                                                |             |
| Planetary Rainfall. By W. H. DINES, F.R.S. ..                                                    | 179         |
| Meteorology at the British Association. By E. GOLD, M.A. ..                                      | 179         |
| Disappearance of Evening Cloud. By W. ELLIS, F.R.S. ..                                           | 180         |
| How our Hottest Summer on Record would appear in the<br>South of Europe. By L. C. W. BONACINA .. | 181         |
| Black Haze. By F. S. GRANGER ..                                                                  | 182         |
| Reviews ..                                                                                       | 182         |
| Rainfall Table for September, 1911 ..                                                            | 184         |
| Supplementary Table of Rainfall, September, 1911, at 112 Stations                                | 186         |
| Meteorological Notes on September, 1911 ..                                                       | 187         |
| Climatological Table for the British Empire, April, 1911 ..                                      | 188         |

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

Published on the 16th of each Month.]

[Price 4d., or 5s. per Annum, Post Free.



## NOTICES.

It is requested that all Books for Review and Communications for the Editor be addressed to 62, Camden Square, London, N.W.

The responsibility for all facts and opinions expressed in the signed articles and letters published in this Magazine rests with their respective authors.

---

### Messrs. H. SOTHERAN & Co.

are always ready to purchase Libraries or Smaller Collections of Scientific Works, Sets of the Learned Societies, &c., for their best value in cash. Distance from town is of no importance; and all books, &c., when bought, are removed without trouble or expense to the sellers.

To be Published immediately:

CATALOGUE OF SECOND-HAND BOOKS ON

### Meteorology and Terrestrial Magnetism,

With a SUPPLEMENT of Works on AERONAUTICS.

Copies may be had, post free, on application.

### HENRY SOTHERAN & Co.,

*Booksellers to His Majesty the King,*

140, STRAND, W.C., & 43, PICCADILLY, W.

Telegraphic Address: Bookmen, London. Codes: Unicode and A.B.C.

Telephones: (Strand) Central 1515. (Piccadilly) Mayfair 3601.

---

## NOW READY.

Cloth 8vo. 440 pages. With 79 Maps and Illustrations.

PRICE 10s.

## BRITISH RAINFALL, 1910.

THE FIFTIETH ANNUAL VOLUME.

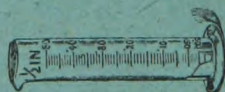
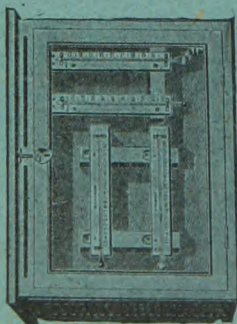
COMPILED FROM THE RECORDS OF NEARLY  
5000 OBSERVERS

BY

HUGH ROBERT MILL.

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

---



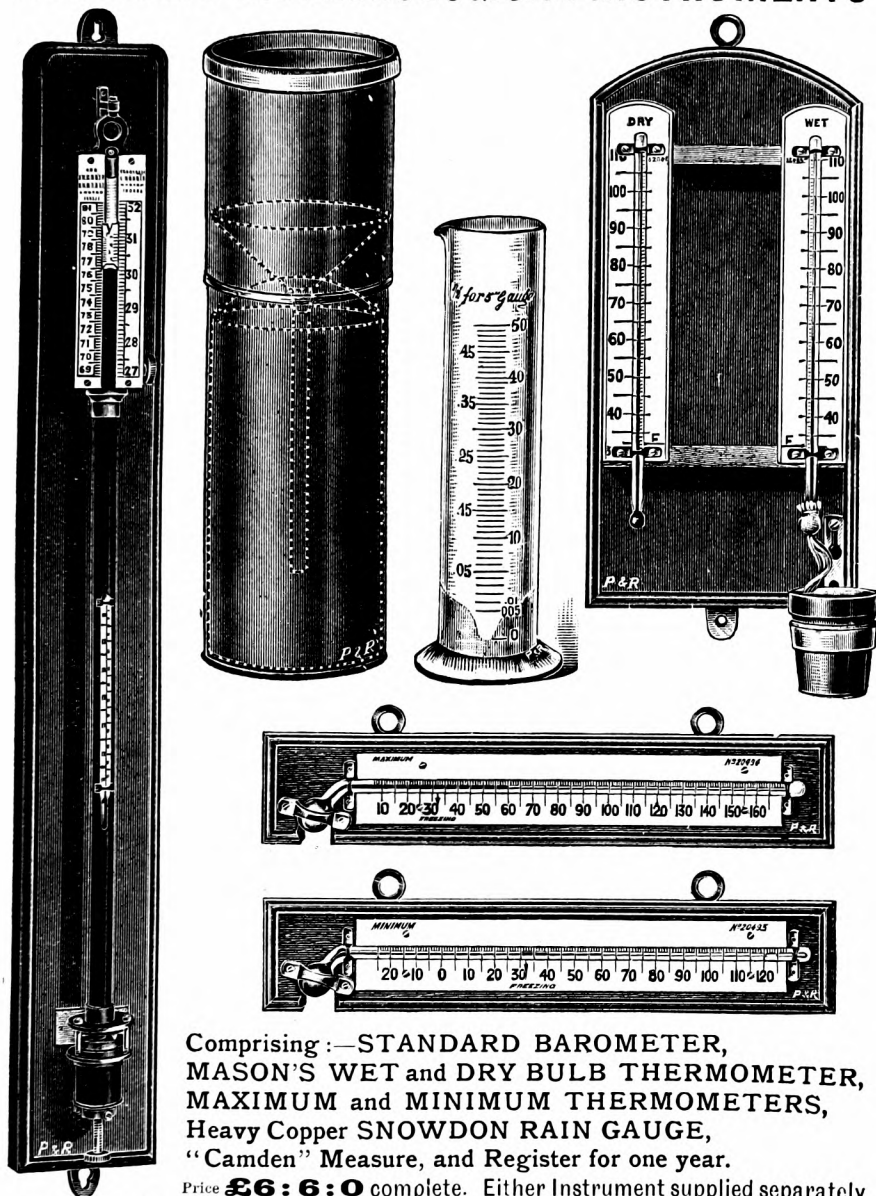
**DARTON'S  
"EDUCATIONAL"  
EQUIPMENT  
OF  
STANDARD  
INSTRUMENTS.**

*Prepared for Precision, Durability, Elegance & Economy.  
Comprising Improved Glass-fronted Screen, containing  
Max. and Min. Thermometers, and Hygrometer, Standard  
Barometer, Snowdon Rain Gauge with Camden Measure,  
and 12 Charts in frame with movable back. £7.*

Illustrated Catalogue post free.

**F. DARTON & Co.,** 142, St. JOHN ST.,  
LONDON, E.C.

# THE "PEANDAR" (P. AND R.) SET OF STANDARD METEOROLOGICAL INSTRUMENTS



Comprising:—STANDARD BAROMETER,  
MASON'S WET and DRY BULB THERMOMETER,  
MAXIMUM and MINIMUM THERMOMETERS,  
Heavy Copper SNOWDON RAIN GAUGE,  
"Camden" Measure, and Register for one year.

Price **£6:6:0** complete. Either Instrument supplied separately  
Packed and safely delivered free to any Address in the United Kingdom.

N.B.—All the above Instruments will pass the Kew Observatory test. Kew Certificates, if  
desired, £1 2s. extra.

Particulars of more expensive also of cheaper Sets on application.

**SOLE MAKERS, PASTORELLI & RAPKIN, LTD. (Estab. 1750)**  
**46, HATTON GARDEN, LONDON, E.C.,**

**ACTUAL MAKERS of ALL KINDS of METEOROLOGICAL INSTRUMENTS.**

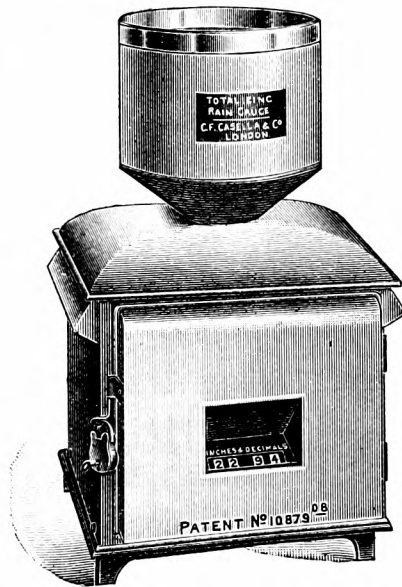
Write for Illustrated Descriptive Lists of Standard, Self Registering, and  
Self Recording Instruments, Post Free.

Telephone : 1981 Holborn. **CONTRACTORS TO H.M. GOVT.** Telegrams : Rapkin, London.

# Rainfall Measurement.

For all kinds of RAIN GAUGES, whether self-recording, registering or the ordinary collecting ones, C. F. CASELLA & Co.'s patterns will be found to be

**ACCURATE, SERVICEABLE and INEXPENSIVE.**



This illustration shows our PATENT TOTALIZING RAIN GAUGE as supplied to the War Office.

Its merits are obvious : no mistakes, nothing to get out of order.

---

☛ Kindly write for new Price Lists.

**C. F. CASELLA & Co., Ltd.,**  
**11-15 ROCHESTER ROW, VICTORIA STREET,**  
**LONDON, S.W.**

*Telegraphic Address* : "ESCUTCHEON, LONDON."      *Telephone* : WESTMINSTER 5599.

# Symons's Meteorological Magazine.

---

No. 549.

OCTOBER, 1911.

VOL. XLVI.

---

## WEATHER IN THE SEVENTEENTH CENTURY.

By WALTER SEDGWICK, M.A.

### PART III.—AUTUMN.

OF the four seasons of the year, so far, at any rate, as the neighbourhood of London is concerned, Autumn is the least liable to be distinguished by climatic conditions of a noticeable or memorable character. At this period of the year there can be no occurrence of such phenomena as extreme heat waves, severe frosts or prolonged droughts, which are likely to be long remembered because of their effect upon the health, comfort and prosperity of mankind, and of the injury which they cause to crops, gardens and plant life. Usually the more noticeable features of autumn weather are strong winds and heavy rainfalls, and even these are liable to escape the pen of the chronicler, because the gales of September, October and November are on the average exceeded in frequency and strength by the gales of December and January, and the rainfalls of autumn seldom cause floods as extensive as those of winter. Hence it is not surprising to find that Evelyn and Pepys, when chronicling the noticeable events of their time, have made fewer comments on the weather occurring during the autumn months than in the case of the other seasons of the year.

It is also unusual to hear statements implying that there has been a change in the character of autumn weather even by those who believe firmly in a permanent change in the climate of England, and although the intended meaning of the familiar phrases, "an old-fashioned winter" and "an old-fashioned summer," is well understood, the expression, "an old-fashioned autumn," is unfamiliar, and conveys no clear meaning. Accordingly, when considering the witness of the two diarists relating to the weather of the autumn months, we do not know what alleged alteration in the English climate we are to establish or refute.

Taking September first, we find in the diaries eleven years in which the weather of this month is mentioned. Of these, four are noted for spells of fine weather, viz. :—1666, 1678, 1696 and 1697, and one for thoroughly bad weather, viz. :—1661. The two Septembers of



1684 and 1689 are referred to for great warmth, and that of 1663 for great cold. On the whole September seems to have been a fine month in the Seventeenth Century, but the information given is too scanty to justify any certain conclusion.

The month of October presents special interest, owing to the comparatively high temperatures experienced in recent years, and the popular belief which has consequently arisen that summer-like weather tends to remain until later in the year than was formerly the case. Mr. Marriott has recently shewn that in England the temperature of October has been above the average for the last fourteen years, 1897-1910, except only in 1905 (*vide* "Variations in the English Climate, 1881-1910," *Quarterly Journal Royal Met. Soc.*, Vol. 38, July, 1911), and if this represented a steady and continuous change, and not merely a periodic change, the weather of October in the time of Evelyn should be noticeably colder than at the present time. This, however, so far as can be judged from the diaries is not the case. In 1692 Evelyn refers to October as "this usually pleasant month"; also he writes of "a most pleasant autumn" in 1691, "very mild weather the whole of October," in 1695, and "a warm and pleasant season," in 1699. It is true that he describes the warm weather of October, 1699, as unusual, but, on the other hand, he only refers to one October, viz., 1692, as a cold month. Even the recent warm October of 1908 seems to have a counterpart in the October of 1668, when Pepys writes of "the most summer weather that ever was seen." There is one extract which at first sight does suggest a difference of climate in the nature of an earlier winter than now, viz., Evelyn's entry of the 9th October, 1695, "weather very sharp, winter approaching apace," but it will be seen that only a few weeks later he writes of "very mild weather the whole of October"; and on the succeeding 4th January he says, "hitherto mild, dark, misty weather." In fact, it seems that in October, 1695, Evelyn fell into the error, which is so common at the present day, of mistaking a very brief spell of cold weather in the early autumn for the beginning of a severe winter.

November is mainly referred to by Evelyn for its unsettled and stormy weather, this being sometimes accompanied by cold and snow, as in 1643 and 1684, but more usually by mild temperatures and rain. The cold referred to on the 12th November, 1684, was followed by a severe winter, but in several other years the cold of November was only temporary, and the year 1691 is noted for its fine warm weather at the end of the month. The general character of the weather of this month, as described by Evelyn, is very similar to its general character at the present time.

It is interesting to read the account of a London fog on the 25th November, 1699, which, except for its brief duration, must have been similar to the London fogs of a few years ago.

*Note.*—In the following extracts the dates have been corrected to New Style, except where (O.S.) occurs.

- Extracts from Pepys's diary are distinguished thus—(P.); all other extracts are from Evelyn's diary.
1631.        There happened now an extraordinary dearth in England, corn bearing an excessive price.
1643. 21 November.—Between Dover and Calais—Weather snowy.  
 22    „        —Between Calais and Boulogne—A great fall of snow accompanied with hail, rain and sudden darkness.
1661. 28 September.—An exceeding sickly, wet autumn.
1663. 7        „        —Cold all night and this morning, and a very great frost they say abroad, which is much, having had no summer at all almost. (P).  
 29 October.—Waked with a very high wind, and said to my wife “I pray God I hear not of the death of any great person, this wind is so high,” fearing that the Queen might be dead. (P.)
1666. (a) 12 September.—The wind mighty high and driving the fire into the City, and everything after so long a drought proving combustible. (P.)  
               At night—it being brave, dry and moonshine, and warm weather. (P.)
- (a) 13        „        —A fierce eastern wind in a very dry season . . . .  
               The heat with a long set of fair and warm weather had even ignited the air and prepared the materials to conceive the fire.
- (a) 14        „        —The eastern wind still more impetuously driving the flames forward.
- 19        „        —Rainy: which it had not done a good while before. (P.)
- 6, 7 October.—Weather very bad . . . . a very furious blowing night. (P.)
- 31        „        —This season, after so long and extraordinary a drought in August and September (O.S.), as if preparatory for the dreadful fire, was so very wet and rainy as many feared an ensuing famine.
1668. 7 October.—It being most summer weather that ever was seen. (P.)  
 8        „        —A most summerlike day and a fine warm evening. (P.)
1671. 23 September.—A dreadful tempest.
1675. 25 October.—An exceedingly dry . . . autumn.
1676. 10 November.—A prodigious and dangerous mist (in the evening).
1678. 18 September.—Excessive hot autumn.
1679. 16 October.—A very wet and sickly season.
1684. 3 September.—Excessive hot. We had not had above one or two considerable showers, and those storms, these eight or nine months. Many trees died for the want of refreshment.  
 12 November.—A sudden change from temperate warm weather to an excessive cold rain, frost, snow and storm, such as had seldom been known. This winter began as early and fierce as the past did late; till about Christmas there then had been hardly any winter.
1685. 15 November.—An extraordinary wet morning.



1688. 24 October.—The wind, which had been hitherto west, was east all this day.  
28 November.—It was now a very hard frost.
1689. 4 September.—Hitherto it has been a most seasonable summer.  
20 November.—After a very wet season the winter came on severely.  
27 „ —Much wet without frost, yet the wind north and easterly.
1690. 22 October.—Very great storms of wind.  
26 November.—Exceeding great storms, yet a warm season.
1691. 23 September.—Great storm at sea.  
24 October.—A most pleasing autumn.  
18 November to 10 December.—An extraordinary dry and warm season, without frost, and like a new spring; such as had not been known for many years.
1692. October (O.S.)—This season was so exceedingly cold by reason of a long and tempestuous north-east wind that this usually pleasant month was very uncomfortable. No fruit ripened kindly.
1693. 10 November.—A very wet and uncomfortable season.  
22 „ —The season continued very wet as it had nearly all the summer, if one might call it summer, in which there was no fruit, but corn was very plentiful.
1695. 5 October.—The season wet, great storms, unseasonable harvest weather.  
9 „ —Very cold weather . . . . . Weather very sharp, winter approaching apace.  
4 November.—Very mild weather the whole of October (O.S.)
1696. September (O.S.)—Fine seasonable weather, and a great harvest after a cold wet summer.  
3 November.—Unseasonable stormy weather and an ill seed time.  
18 „ —The first frost began fiercely, but lasted not long.  
25 „ to 3 December.—Very stormy weather, rain and inundations.
1697. September (O.S.)—Very bright weather, but with sharp east wind.  
13 October.—Great storms all the week.
1699. 31 October.—After an unusual warm and pleasant season we were surprised with a very sharp frost.  
25 November.—There happened this week so thick a mist and fog that people lost their way in the streets, it being so intense that no light of candles or torches yielded any (or but very little) direction. . . . . It began about four in the afternoon and was quite gone by eight, without any wind to disperse it. At the Thames they beat drums to direct the waterman to make the shore.
- 1704.(b) 18 September.—The day before was wet and stormy, but this was one of the most serene and calm days that had been all the year.  
October (O.S.)—This year has been very plentiful.

---

NOTES.—(a). The days of the Fire of London began 2nd Sept., 1666 (O.S.)

(b). The day of the thanksgiving service for the battle of Blenheim.

## THE HOT WEATHER OF JULY-SEPTEMBER, 1911, IN LONDON.

THE great warmth which dominated July and August extended well into September, and an examination of the records for the three months at Camden Square shows some interesting results. Last month attention was directed in these pages to the fact that July and August were the two warmest months in the long record, taking the mean temperature as indicative of the whole month. Though September was in no way so remarkable as the two earlier months, it was, nevertheless, a month of high temperature, especially in the first half, and considerable interest attaches to the three months when compared with previous records.

The mean temperature of September, 1911, was  $60^{\circ}\cdot4$ , or  $2^{\circ}\cdot7$  above the average, and this has been exceeded in five previous Septembers. The mean shade maximum was  $73^{\circ}\cdot0$ , or  $5^{\circ}\cdot6$  above the average, and this has only been exceeded in September three times, in 1865, 1895 and 1898. The highest shade temperature of the month was  $92^{\circ}\cdot3$  on the 8th, which, with the exception of  $94^{\circ}\cdot0$  in 1906, was the highest temperature ever recorded in September.

The mean temperature for the three months, July to September, was  $65^{\circ}\cdot9$ , or  $4^{\circ}\cdot7$  above the average. This is  $1^{\circ}\cdot5$  higher than for any July to September period in the preceding 53 years, the nearest approach being in 1868 and 1899, which both gave  $64^{\circ}\cdot4$ , or  $3^{\circ}\cdot2$  above the average. Temperature reached  $80^{\circ}$  on 8 days in September, making a total of 42 days with temperature  $80^{\circ}$  or above in the three months. In 1868 and 1899 there were only 30 and 29 days respectively on which  $80^{\circ}$  was reached. There was a remarkable absence of cloud, the mean amount at 9 a.m. for the three months in the scale 0—10 being 3·1, 4·5 and 3·0. In this fact, probably, lies the reason for the close proximity to the normal of the minimum temperatures, while the maxima were much in excess. The duration of sunshine for the three months was unusually great, and amounted to 688·7 hours, or 229·6 hours a month.

The following table shows a comparison of July to September, 1911, with 1868 and 1899, the years in which the conditions most nearly approached those of the present year, and with the average of the 50 years 1860–1909:—

|         | JULY.              |                    |               | AUGUST.            |                    |               | SEPTEMBER.         |                    |               |
|---------|--------------------|--------------------|---------------|--------------------|--------------------|---------------|--------------------|--------------------|---------------|
|         | Mean Temp.         | Mean Max.          | Absolute Max. | Mean Temp.         | Mean Max.          | Absolute Max. | Mean Temp.         | Mean Max.          | Absolute Max. |
| Average | $63^{\circ}\cdot5$ | $74^{\circ}\cdot3$ | ...           | $62^{\circ}\cdot3$ | $72^{\circ}\cdot7$ | ...           | $57^{\circ}\cdot7$ | $67^{\circ}\cdot4$ | ...           |
| 1868... | 68·8               | <b>82·4</b>        | 93·3          | 64·0               | 73·9               | 88·2          | 60·4               | 71·8               | 91·0          |
| 1899... | 67·6               | 79·2               | 89·2          | 67·0               | 79·4               | 91·2          | 58·6               | 68·4               | 79·7          |
| 1911... | <b>69·0</b>        | 81·7               | 92·6          | <b>68·2</b>        | <b>80·8</b>        | <b>97·1</b>   | 60·4               | 73·0               | 92·3          |

The values in heavy type are the highest for the months to which they refer in the Camden Square record.

## METEOROLOGY AT THE BRITISH ASSOCIATION.

## THE METEOROLOGICAL LUNCHEON.

By E. GOLD, M.A.

THE third annual Meteorological Luncheon was held on Tuesday, September 4th, at the Esplanade Hotel, Portsmouth.

The following is believed to be a complete list of those present at the luncheon :—

Mr. C. O. Bartrum  
Mrs. Bartrum  
Dr. H. Basset  
Mr. H. Bateman  
Mr. F. A. Bellamy  
Dr. Borns  
Mr. C. W. Campbell  
Mr. C. J. P. Cave  
Mrs. Cave  
Rev. A. L. Cortie  
Mr. J. I. Craig  
Mrs. Craig  
Dr. H. N. Dickson  
Mr. J. S. Dines  
Dr. F. W. Dyson, F.R.S.  
Mr. A. S. Eddington  
Dr. Mearns Fraser  
Mr. Wilson Fox  
Mr. E. Gold  
Mrs. Gold

Mr. H. R. Hassé  
Prof. W. M. Hicks, F.R.S.  
Dr. W. G. Humphreys  
Mrs. Humphreys  
Mr. E. Kitto  
Mrs. Kitto  
Lady Lockyer  
Dr. H. R. Mill  
Mrs. H. R. Mill  
Prof. J. Milne, F.R.S.  
Dr. J. W. Nicholson  
Prof. Pettersson  
Mr. W. E. Rolston  
Dr. W. N. Shaw, F.R.S.  
Mrs. Shaw  
Mr. F. T. M. Stratton  
Miss Stratton  
Prof. Trouton, F.R.S.  
Prof. H. H. Turner, F.R.S.

Dr. Shaw, who presided, explained that the function of the luncheon was not to provide opportunities for making and hearing speeches, it was rather to enable observers and workers to realise how much each was dependent on the other, and how much each suffered through the other's delinquencies. There was a certain simplicity, more apparent than real, in the requirements of meteorological observations: they ought all to be exactly the same as each other, and as their predecessors, neither better nor worse. He referred to the exceptional character of the year's weather, and said he could offer a very simple explanation. In May he lost his umbrella one night after a dinner at the Trocadero. At the time he thought he had taken in exchange the umbrella of the Director of the British Rainfall Organization. He had discovered his mistake only during the previous week; and now if he had to issue a forecast, all he could say was, "Look out, squalls ahead," because last night he lost his umbrella again.

Dr. Mill rose to welcome the foreign guests, or, as he more truthfully and gracefully called them, "our guests from other lands." Meteorology was a world-science and recognised no political boundaries or divisions. Mr. J. I. Craig represented one of the youngest but at the same time one of the most enterprising of the official services, the Survey Department of Egypt. He could hardly be called "foreign" in his official capacity, and he might be pardoned

if he said that in his private capacity Mr. Craig represented the choicest part of these islands. Professor Pettersson was no stranger to those present, since this was his fourth visit to the meetings of the British Association. He was not only a representative of the world-wide science of oceanography, but of many sciences, since he had originally achieved distinction as a chemist. Professor Pettersson was, however, the most modest of men, as modest indeed as his University of Stockholm, which contented itself with the name of High School. Dr. Humphreys represented the greatest meteorological service of the world, that of the United States, and the occasions on which that service was not represented at these banquets were very rare. He had great pleasure in seeing so excellent a custom kept up, and renewed the old welcome to the new representative. He asked those present to drink in the good old British way to the health of the guests from other lands.

Mr. Craig acknowledged briefly the kindness extended to him. He came from a hot place to this country to enjoy its cool breezes, but the past summer had resembled so closely the weather from which he had fled that it had produced desecration of an old nursery classic, which now ran—— (The speaker then lapsed into poetry.)

Professor Pettersson confessed that he did not belong to the pure strain of meteorologists, although his oceanographical work led him to results which might interest such meteorologists, while their work interested him. He always gained pleasure and instruction from the meetings of the British Association, and his pleasure was never alloyed even by the loss of his umbrella. Dr. Shaw's misfortune brought to his mind a story told of the Primate of his country. On a certain very wet day he was to be received in audience by the King, and on alighting from his carriage was proceeding straight to the presence chamber when an attendant remonstrated: "Your grace has forgotten to leave your umbrella and goloshes." "Ah!" returned the Archbishop, "I have already lost four umbrellas in this house, and do not intend to lose another," and without more ado marched into the King's presence wearing his goloshes and firmly holding his umbrella.

Dr. Humphreys said how he wished his chief, Professor Willis Moore, had been there to listen to the kind things which Dr. Mill had said, and to reply on behalf of the service which he represented. They in America had a large area to deal with, and the practical problems presented to them were varied as the climates of the different regions. In California at this period of the year a man might forecast fine weather every day and have 90 per cent. of accurate forecasts; but woe betide the man who forecasted fine weather when it rained, or who forecasted rain when it continued fine. The people there were engaged in fruit-drying, and so long as the weather was fine the fruit lay out in the trays; when rain was expected the trays were piled in stacks, and were easily kept dry, and the fruit was not damaged; but if the rain did not come, the

labour of piling was wasted, and the drying had been retarded unnecessarily. Accuracy in the forecasts was therefore of vital importance. The case was similar in connection with frosts in spring, the baneful effect of which on the fruit trees was minimised by "smudging." The difficulty in the cranberry marshes was even greater, because frost sometimes occurred there when there was no other frost anywhere around. In the marshes frost could be prevented by flooding with water; but the supply was limited, and if it was used on the strength of an inaccurate forecast, none might be available when frost actually came.

Dr. Dickson proposed the toast of Cosmical Physics. He did not feel quite sure that he understood exactly what the term meant, and he thought that he might be in better condition if he could drop the "s" out of cosmical. He had on one occasion prepared a recondite address to an estimable temperance society on the "Ethics of Port," before he realized that he had been the victim of a mistake, and the title "Ethics of Sport" had to be substituted, with a fresh address. In Professor Turner, whose name he wished to couple with the toast, they had one of the most ardent supporters and able exponents of Cosmical Physics.

Professor Turner said that although one might not be able to say much about "Cosmical Physics" until one knew more about the Cosmos, he might be able to tell them something about it, because he was there at its birth. At the Dover meeting of the Association in 1899, Section A divided, and the Department of Meteorology met separately on certain days. The next year, at Bradford, the Department of Astronomy, with a separate chairman and address, met on two days. In 1901, at Glasgow, this plan was continued, with himself as chairman; but the difficulty of obtaining an audience made it clear that the plan needed alteration, and the next year, at Belfast, the department of "Astronomy and Cosmical Physics" met for the first time, with Professor Schuster as chairman. Since then Cosmical Physics has grown and extended its bounds, which were in the nature of things never very rigid, until it seemed to some of us that it deserved to rank as a separate section. That idea did not, however, meet with general approval, and we are now concerned with making the best of things as they are.

Dr. Shaw proposed the toast of "Local Meteorology," and associated with it the name of Dr. Mearns Fraser, who was responsible for the observations made at Portsmouth. In one sense all meteorology was local, and it was only through the fidelity with which the observations in each place were continued, that the greater part of our knowledge of climate had been obtained.

Dr. Mearns Fraser replied very briefly, and asked the company, in view of the weather which had been provided at Portsmouth during the meeting, to remember that "actions speak louder than words." He had been gratified by the kind way in which reference had been made to the station under his charge.





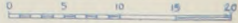
# THAMES VALLEY RAINFALL SEPTEMBER, 1911.



ALTITUDE SCALE

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

SCALE OF MILES



## THE WEATHER OF SEPTEMBER.

By FRED. J. BRODIE.

It was not until very nearly the middle of September that the marvellous summer of 1911 could be regarded as at an end.

At the opening of the month, showery weather was produced in Ireland and Scotland by a depression which moved eastwards across Iceland. The greater part of England lay under the influence of a large Continental anticyclone, and on the 2nd the thermometer over our eastern, midland and south-eastern counties rose above  $85^{\circ}$ , a shade maximum as high as  $90^{\circ}$  being recorded at Camden Square and at Cromer and Hillington. After this the Continental high-pressure area was joined by a new system, which came in from the Atlantic, and from the 3rd to the 11th anticyclonic conditions ruled supreme. Bright sunny weather was, therefore, experienced very generally, with a continued high temperature, especially over England. The heat appears to have culminated on the 8th, when the thermometer, for the seventh time this year, rose above  $90^{\circ}$  in many English districts, and touched  $93^{\circ}$  at Hampstead, Bath and Cambridge, and  $94^{\circ}$  at Greenwich and at Raunds (Northamptonshire). On the following day when a northerly wind sprang up in the rear of a shallow depression which moved eastwards across the south of England, the thermometer fell rapidly, the maximum readings being mostly below  $70^{\circ}$ .

After the 11th the anticyclone withdrew bodily to the Continent, and on the following day the passage of a deep cyclonic system from Iceland to Norway was accompanied by the development of secondary disturbances over various parts of Western Europe. In the front of these secondaries a warm wind set in from the southward, the thermometer on the 12th rising to  $85^{\circ}$  and upwards in many parts of our eastern and south-eastern counties, to  $88^{\circ}$  at Greenwich and to  $89^{\circ}$  at Camden Square. This burst of heat proved to be the last of the season, no shade readings appreciably above  $70^{\circ}$  being afterwards recorded in any part of the United Kingdom. Between the 14th and 18th of the month an anticyclone again spread in temporarily from the Atlantic, but the conditions had then become autumnal, and although the days were fairly warm and sunny, the nights were cold, with sharp ground frosts on the 15th and 16th. It was only in the central parts of Scotland and Wales that the sheltered thermometer fell below the freezing point, but on the surface of the grass the minima were as low as  $14^{\circ}$  at Llangammarch Wells,  $22^{\circ}$  at Hereford and  $27^{\circ}$  at Colmonell (Ayrshire). Between the 19th and 21st a large barometrical depression, which had extended southward from Iceland, moved eastward directly across the United Kingdom, and with the northerly winds which set in in its rear another ground frost was experienced, the exposed thermometer falling on the early morning of the 21st or 22nd to  $18^{\circ}$  at Llangammarch Wells, and to  $22^{\circ}$  at Balmoral, Hereford and Marlborough. From the 22nd to the 27th a showery south-westerly type of weather prevailed, the most

important feature occurring on the 25th, when an extremely heavy downpour of rain was experienced in the south-east of Ireland. At the close of the month the weather fell into a very tempestuous state. On the night of the 29th a cyclonic disturbance, which had originally been developed over the upper part of the Atlantic, moved rapidly in an east-south-easterly direction across North Britain and afterwards passed on to Holland, North Germany and the Baltic. In the front of the system the southerly and south-westerly breeze was of no great strength, but in its rear the barometer rose very suddenly and the wind increased considerably from north and north-west and blew with the force of a whole gale over the entire southern portion of the North Sea, including our own south and south-east coasts. The storm resulted in numerous maritime casualties.

Owing to the excessive warmth of the earlier days the mean temperature of the month was considerably above the average in the south and east of England, and especially in the Channel Islands, where the week ended September 9th was unusually hot. In the north of England the excess was small and in many parts of Scotland and Ireland there was a slight deficiency of warmth. The north of Scotland experienced about the normal quantity of bright sunshine, but in most other districts there was a large excess. In London (at Westminster) the total duration, 215 hours, was no fewer than 98 hours in excess of the normal, and was greater than in any September since the recording instrument was permanently installed in 1883. The nearest approach was in 1895, when 194 hours were registered.

## INTERNATIONAL BALLOON ASCENTS.

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

*April 1st, 1909.*

| Starting Point.   | Country.    | A<br>miles. | B<br>° F. | C<br>miles. | D<br>° F. | E<br>miles. | F          |
|-------------------|-------------|-------------|-----------|-------------|-----------|-------------|------------|
| Manchester.....   | England ..  | 6·2         | —64       | 8·8         | —63       | 75          | S.E. by S. |
| Pyrton Hill.....  | „ ..        | 5·6         | —69       | 8·8         | —63       | 40          | S.E.       |
| Lindenberg.....   | Germany..   | 6·6         | —83       | 8·4         | —71       | 36          | N.E. by E. |
| Paris .....       | France....  | 7·4         | —78       | 10·5        | —74       | 81          | E.S.E.     |
| Strassburg .....  | Germany..   | 6·8         | —74       | 7·8         | —62       | 45          | E. by S.   |
| Nizhni Olchadaeff | Russia .... | 6·5         | —69       | 8·9         | —58       | 4           | 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.

In the morning the south-western part of an extensive trough of low pressure lay over Holland and North Germany; alterations in the distribution of pressure were occurring very rapidly, so that by 6 p.m. the barometer over Scotland had risen from 30·10 in. to 30·40 in., and the evening chart showed quite a different system.

## Correspondence.

*To the Editor of Symons's Meteorological Magazine.*

---

## PLANETARY RAINFALL.

THE values of rainfall percentages for Cape Town and Buenos Aires supplied by Dr. Sutton are interesting, but they do not suffice to show that there is any real connection between the two places. The correlation co-efficient between the quantities has only the low value of  $\cdot 16$ , with a probable error of  $\cdot 11$ , and the apparent connection may well be a chance one and be reversed in the next thirty years. (See a paper by Mr. R. H. Hooker in the *Quarterly Journal* of the R. Met. Soc. for October, 1908. Vol. **34**. No. 141. p. 277.)

For comparison I append the values of some correlation co-efficients.

Rainfall in the 13—20th weeks of the year and the depth of water in a deep well at the end of August, '63.

Spring rainfall and the crop of hay '80.

Mean temperature and death rate of the summer quarter, '72.

Barometric pressure at the surface and the height of the isothermal zone, '68 (in England). Barometric pressure and the temperature of the isothermal, —'60 (in England).

---

W. H. DINES.

## METEOROLOGY AT THE BRITISH ASSOCIATION.

I THINK the account, published in your September issue, of Meteorology at the British Association's Portsmouth meeting performs an excellent service in bringing more directly before meteorologists the stimulus and encouragement which are contained in Professor Turner's address; but in its earlier paragraphs it conveys a wrong impression, and one which may be harmful to the progress of our science in this country. It seizes on two incidents in the details of organisation, and leaves the reader to assume that these represent the position of Meteorology, and the share it had in the meeting at Portsmouth. In order to show how far such an assumption would depart from fact, I need only point out that Dr. Humphreys, of the U.S. Weather Bureau, read a paper in full section immediately after Professor Turner's Presidential address, that Dr. Shaw made the opening contribution from the side of Section A to the joint discussion on Aeronautics, that Dr. Shaw's paper on the thunderstorm which occurred in London at the end of July and the line squall of the following day was taken in the main meeting room immediately after that discussion, that the remaining meteorological papers were grouped together for reading on the Tuesday morning immediately after the discussion on Stellar motion and before the Meteorological Luncheon, and that such of those papers as were not completed in the hour-and-a-half on Tuesday morning were put down for reading in full section early on Wednesday morning, when a good audience was actually present. The real fault of such a pessimistic account



lies, not so much in its largely undeserved censure of the Association and the organising staff of Section A, but rather in its effect on Meteorologists, who ought to be encouraged in every way to support the Association. They receive the impression that the meetings are no place for Meteorology or for them, and they stay away. The result will be to depreciate meteorological stock in the eyes of the Association and of the community; and the goal of a separate section for Cosmical Physics, towards which we strive, will be made harder of attainment. We shall reach that goal only when we have shown that there are enough members of the Association interested in Cosmical Physics to run a separate section for a week, with papers and discussions worthy of the high traditions of the Association, and especially of Section A, of which we have hitherto formed an important constituent part. To that end it is important that accounts of Meteorology at the meetings should be fair when made by Officers of the Association, and fair and generous when made by critics.

E. GOLD.

[We gladly publish Mr. Gold's letter and hope that the discussion will not drop here. We wrote from twenty-five years personal experience of Meteorology in Section A, remembering that a sub-section on Cosmical Physics had been deliberately abandoned, and that the President of Section A this year, while not approving the abandonment, accepted it without appeal. To anyone who attended all the meetings of Section A the fact that Dr. Shaw's paper on Thunderstorms was taken in the main meeting room was entirely satisfactory; but to those who desired to hear that paper and could not come to the preceding discussion, the change of room was less agreeable. To refer to this, as Mr. Gold truly says, was seizing on an incident, but it was an illustrative incident and that is why it was seized on. Mr. Gold is seeking the same end as we; he still thinks it may be reached by submission to the dominant party in Section A; we, after watching the working of submission for many years, think that expostulation may now be tried; but if Meteorology is brought to more honour by any means in the British Association and in the mind of the scientific, as well as of the larger public, we shall be content.—Ed. *S.M.M.*]

### THE DISAPPEARANCE OF EVENING CLOUD.

IN the communication to the Magazine for July, which seems to have led to an interesting correspondence, my object was simply to show, from the statistics of cloud, that the supposed tendency of the full moon to disperse evening cloud was a misconception, to which may be added the further not unimportant remark that cloud conditions have relation with temperature, but that no heat is received from the moon. It was not my purpose to discuss in detail the nature of the changing aspect of cloud in an evening sky, but it is very interesting to read the views of others thereon.

W. ELLIS.

## HOW OUR HOTTEST SUMMER ON RECORD WOULD APPEAR IN THE SOUTH OF EUROPE

Now that the hot weather has gone, and with it the great fuss made about it in the daily press, it may be well to compare the mean temperature of July and August, 1911, in England, with normal conditions for July and August in Italy or Spain. The mean temperature, day and night, for July and August, 1911, in the South of England, we may put at about  $68^{\circ}$ , and the average mean temperature for July and August all over the lowlands of Italy, as varying between  $75^{\circ}$  and  $80^{\circ}$ . It thus appears that our hottest summer on record would be one of the coldest on record in southern Europe. Even *I* am astonished at this result, who am perhaps more interested in climatic differences than most meteorologists. But, great as is the difference in air temperature between northern and southern Europe in summer, the difference in the power of the sun is still more striking.

In England, even on our hottest days, it is not dangerous for anyone in *good health* to take moderate exercise in the open—in fact, anything short of a game of “rugger”; but in Italy, to cross an open court-yard in the full glare of the mid-day sun is like stepping into a “fiery furnace,” and nothing but a pressing duty will induce anyone to do so. It is enough, during the hottest hours of the day, to sit in darkened rooms, with the sun shut out by thick double shutters, perspiring from head to foot.

I really think such a summer as we have had this year in England is, taking it all round, far more enjoyable and salubrious than that terribly inclement Atlantic type of summer we so often experience. It is noteworthy that our hottest day, August 9th, with  $100^{\circ}$  in the shade at Greenwich, fell just one day outside what we may define, according to the altitude of the sun, as the three months constituting the midsummer period—May 8th to August 8th.

The very high temperatures which were continued till the 12th of September were, of course, favoured by the heat of the previous months, and it is hardly possible for the equinoctial sun of September in latitude  $50^{\circ}$  to raise the temperature to  $90^{\circ}$  in the shade, except after a universally hot summer, such as occurred this year, in 1906, and in 1898.

L. C. W. BONACINA.

*September 23rd, 1911.*

---

## BLACK HAZE.

IN reply to Mr. Piffe Brown's remarks on the black haze, p. 115, I would say that I have never seen atmospheric conditions that suggested the presence of sufficient smoke or minute dust in the atmosphere to cause this unusual blackness. In some cases everything was opposed to such an idea. Before the commencement of the haze, distant objects as a rule could be easily seen as on any ordinary fine day, and

after the northerly haze had disappeared, the atmosphere would be clearer and in one instance brilliant. And further, they are only occasionally, or we might say rarely, seen in this district when very black and dense. If smoke or dust is necessary for their formation, how are we to account for a dark haze appearing in the midst of a heavy and prolonged rainfall. Surely the atmosphere in such a case must have been cleansed somewhat during a four hours' drenching rain.

All the blackest hazes I have seen lasted barely an hour. I witnessed one while on the top of the highest hill south of the Vale of Belvoir. The vale was soon black up to the southern slope. It all cleared away rapidly (or evaporated), and the air became clearer than before. Smoke could not have been the cause of this haze, as the few large chimneys to the north were 16 to 20 miles away. I am not referring to haze caused by the passing of a V depression, but to those that appear and disappear without leaving a trace behind them.

F. S. GRANGER.

2, Colville Street, Nottingham.

---

## REVIEWS.

*Climatic Control.* By L. C. W. BONACINA. Illustrated with sketch maps, diagrams and weather charts. London: Adam and Charles Black, 1911. Size 7 x 5. Pp. viii. + 168.

THIS is one of the series of books entitled "Black's School Geography," edited by Professor L. W. Lyde, and it has many points of originality not often shown in ordinary school books of the size. It appeals in our opinion as much to the intelligent general reader as to the teacher or schoolboy, and we have no hesitation in recommending it to our readers. While the individuality of the author is more apparent in a few passages than some readers may care for, the almost passionate intensity of his feeling for the phenomena of the atmosphere gives a refreshing air of reality to every chapter. One cannot but feel in reading the book that climate is one of the things that really matters, and is worth careful study. We do not agree with all the opinions expressed, and we feel in particular that the author has taken a somewhat lugubrious view of the climate of the British Isles and especially of that of Scotland. We should be inclined to give more weight to the compensating advantages of the long summer days when set against the gloom of the winter months, and to give prominence to the exhilaration of the Highland air which makes a "soft" day a very light affliction, and modifies the heat of dry summer weather to the stimulating temper of the sub-tropical plateaux of America and Africa. The winter storms are short and fleeting visitations, and they are nearly as often warm as cold. We

consider that Mr. Bonacina's favourite adjective "treacherous" is too anthropomorphic to be applied to climate in a scientific book, and we suspect that his outlook on climate is dominated by extreme types of weather. On the other hand we fully recognise the powerful impression which the impassioned presentation of climate and its effects must produce on a fresh mind, and in the present state of Climatology as a subject of popular ignorance we feel sure that Mr. Bonacina's book will do much good. So far as we are aware the facts adduced are correctly stated, the one oversight of importance we have noticed being the rainfall of over 200 inches for a spot in the Lake District, referred to on p. 62. It is true that the rainfall at the Styne in 1872 amounted to 240 inches, but the average rainfall cannot be more than 170 inches, and there is only a small area with so much as 100 inches.

The plan of the book is excellent. It commences with two introductory chapters on the General Principles of Climatology and Types of Land in relation to Climate, goes on to discuss Well-known Lands in relation to Climatic Control (two chapters), The Influence of Climate upon Man (three chapters), and ends with a condensed chapter on Meteorology, which many readers would have dispensed with if they could have had instead an expansion of the earlier chapters. There is always much difficulty in writing a little book of this sort from original data; it would probably have been easier for Mr. Bonacina to have prepared a work on a much more ambitious scale, and then to have condensed and adapted it to the purpose of the present series. While we have felt it right to point out the limitations of the work we feel none the less that it is one of solid merit and deserves a large circulation.

---

*Weather Wisdom in Agriculture with hints on forecasting.* By R. W. DUNLOP. London [1911]: Vinton & Co. Size  $5\frac{1}{2} \times 3\frac{1}{2}$ . Pp. 48. Price 1s. net.

THIS dainty little volume is a reprint of a series of articles which appeared in the *Agricultural Gazette*, and it contains much sound practical advice, with hints on the interpretation of the Meteorological Office weather reports and suggestions for supplementing the official forecasts by local observations. It will be found useful by many besides farmers and gardeners, and we have only one fault to find with it—that is the recommendation of the Howard rain gauge, and the suggestion that a still cheaper instrument could be constructed at home. It cannot be too widely known that a funnel of the Snowdon pattern is essential for every rain gauge; only the price stands in the way, and we hope that some instrument maker will have the courage to produce a Snowdon pattern rain gauge at a cost of 7s. 6d. We do not see why it cannot be done here just as profitably as it is done in the case of similar instruments in Germany.

## RAINFALL TABLE FOR SEPTEMBER, 1911.

| STATION.                           | COUNTY.              | Lat.<br>N. | Long.<br>W.<br>[*E.] | Height<br>above<br>Sea.<br>ft. | RAINFALL<br>OF MONTH.          |              |
|------------------------------------|----------------------|------------|----------------------|--------------------------------|--------------------------------|--------------|
|                                    |                      |            |                      |                                | Aver.<br>1875—<br>1909.<br>in. | 1911.<br>in. |
| Camden Square.....                 | London.....          | 51 32      | 0 8                  | 111                            | 2'00                           | 1'31         |
| Tenterden.....                     | Kent.....            | 51 4       | *0 41                | 190                            | 2'25                           | 1'42         |
| Arundel (Patching).....            | Sussex.....          | 50 51      | 0 27                 | 130                            | 2'58                           | 1'75         |
| Southampton (Cadland) ...          | Hampshire.....       | 50 50      | 1 22                 | 52                             | 2'60                           | 1'29         |
| Oxford (Magdalen College)...       | Oxfordshire.....     | 51 45      | 1 15                 | 186                            | 1'98                           | 1'21         |
| Wellingborough (Croyland Abbey)... | Northampton.....     | 52 18      | 0 41                 | 174                            | 2'14                           | 1'29         |
| Shoeburyness.....                  | Essex.....           | 51 31      | *0 48                | 13                             | 1'70                           | 1'04         |
| Bury St. Edmunds (Westley)...      | Suffolk.....         | 52 15      | *0 40                | 226                            | 2'18                           | 1'86         |
| Geldeston [Beccles].....           | Norfolk.....         | 52 27      | *1 31                | 38                             | 2'13                           | 2'06         |
| Polapit Tamar [Launceston]...      | Devon.....           | 50 40      | 4 22                 | 315                            | 3'11                           | 2'72         |
| Rousdon [Lyme Regis].....          | ".....               | 50 41      | 3 0                  | 516                            | 2'69                           | 1'23         |
| Stroud (Upfield).....              | Gloucestershire..... | 51 44      | 2 13                 | 226                            | 2'39                           | 1'45         |
| Church Stretton (Wolstaston)...    | Shropshire.....      | 52 35      | 2 48                 | 800                            | 2'40                           | 2'14         |
| Coventry (Kingswood).....          | Warwickshire.....    | 52 24      | 1 30                 | 340                            | 2'35                           | 1'63         |
| Boston.....                        | Lincolnshire.....    | 52 58      | 0 1                  | 25                             | 2'07                           | 1'95         |
| Workshop (Hodsock Priory)...       | Nottinghamshire..... | 53 22      | 1 5                  | 56                             | 1'84                           | 1'52         |
| Macclesfield.....                  | Cheshire.....        | 53 15      | 2 7                  | 501                            | 2'92                           | 3'13         |
| Southport (Hesketh Park)...        | Lancashire.....      | 53 38      | 2 59                 | 38                             | 3'09                           | 4'65         |
| Wetherby (Ribston Hall) ...        | Yorkshire, W.R.....  | 53 59      | 1 24                 | 130                            | 2'11                           | 2'30         |
| Arncliffe Vicarage.....            | ".....               | 54 8       | 2 6                  | 732                            | 4'55                           | 4'96         |
| Hull (Pearson Park).....           | ".....               | 53 45      | 0 20                 | 6                              | 2'05                           | 3'32         |
| Newcastle (Town Moor) ...          | Northumberland.....  | 54 59      | 1 38                 | 201                            | 2'00                           | 2'75         |
| Borrowdale (Seathwaite) ...        | Cumberland.....      | 54 30      | 3 10                 | 423                            | 1'28                           | 7'30         |
| Cardiff (Ely).....                 | Glamorgan.....       | 51 29      | 3 13                 | 53                             | 3'61                           | 2'50         |
| Haverfordwest.....                 | Pembroke.....        | 51 48      | 4 58                 | 95                             | 3'91                           | 3'09         |
| Aberystwyth (Gogerddan)...         | Cardigan.....        | 52 26      | 4 1                  | 83                             | 3'89                           | 3'78         |
| Llandudno.....                     | Carnarvon.....       | 53 20      | 3 50                 | 72                             | 2'50                           | 4'67         |
| Cargen [Dumfries].....             | Kirkcudbright.....   | 55 2       | 3 37                 | 80                             | 3'34                           | 1'95         |
| Marchmont House.....               | Berwick.....         | 55 44      | 2 24                 | 498                            | 2'67                           | 1'49         |
| Girvan (Pinmore).....              | Ayr.....             | 55 10      | 4 49                 | 207                            | 4'30                           | 2'49         |
| Glasgow (Queen's Park) ...         | Renfrew.....         | 55 53      | 4 18                 | 144                            | 2'99                           | 1'82         |
| Inveraray (Newtown).....           | Argyll.....          | 56 14      | 5 4                  | 17                             | 6'15                           | 3'84         |
| Mull (Quinish).....                | ".....               | 56 34      | 6 13                 | 35                             | 5'20                           | 5'00         |
| Dundee (Eastern Necropolis)...     | Forfar.....          | 56 28      | 2 57                 | 199                            | 2'34                           | '91          |
| Braemar.....                       | Aberdeen.....        | 57 0       | 3 24                 | 1114                           | 2'73                           | '64          |
| Aberdeen (Cranford).....           | ".....               | 57 8       | 2 7                  | 120                            | 2'69                           | 1'05         |
| Cawdor.....                        | Nairn.....           | 57 31      | 3 57                 | 250                            | 2'55                           | 1'54         |
| Fort Augustus (S. Benedict's)...   | E. Inverness.....    | 57 9       | 4 41                 | 68                             | 3'54                           | 2'58         |
| Loch Torridon (Bendamph)...        | W. Ross.....         | 57 32      | 5 32                 | 20                             | 7'28                           | 8'59         |
| Dunrobin Castle.....               | Sutherland.....      | 57 59      | 3 56                 | 14                             | 2'51                           | 1'56         |
| Wick.....                          | Caithness.....       | 58 26      | 3 6                  | 77                             | 2'57                           | 2'36         |
| Killarney (District Asylum)...     | Kerry.....           | 52 4       | 9 31                 | 178                            | 3'79                           | 4'14         |
| Waterford (Brook Lodge)...         | Waterford.....       | 52 15      | 7 7                  | 104                            | 3'19                           | 4'43         |
| Nenagh (Castle Lough).....         | Tipperary.....       | 52 54      | 8 24                 | 120                            | 3'16                           | 2'61         |
| Miltown Malbay.....                | Clare.....           | 52 52      | 9 26                 | 400                            | 4'18                           | 3'88         |
| Gorey (Courtown House) ...         | Wexford.....         | 52 40      | 6 13                 | 80                             | 2'78                           | 3'54         |
| Abbey Leix (Blandsfort)....        | Queen's County.....  | 52 56      | 7 17                 | 532                            | 2'93                           | 2'00         |
| Dublin (Fitz William Square)...    | Dublin.....          | 53 21      | 6 14                 | 54                             | 2'06                           | 1'01         |
| Mullingar (Belvedere).....         | Westmeath.....       | 53 29      | 7 22                 | 367                            | 3'02                           | 2'25         |
| Ballinasloe.....                   | Galway.....          | 53 20      | 8 15                 | 160                            | 2'99                           | ...          |
| Crossmolina (Enniscoe).....        | Mayo.....            | 54 4       | 9 18                 | 74                             | 4'42                           | 2'76         |
| Collooney (Markree Obsy.)...       | Sligo.....           | 54 11      | 8 27                 | 127                            | 3'65                           | 2'23         |
| Seaforde.....                      | Down.....            | 54 19      | 5 50                 | 180                            | 3'25                           | 1'18         |
| Bushmills (Dundarave).....         | Antrim.....          | 55 12      | 6 30                 | 162                            | 3'49                           | 1'56         |
| Omagh (Edenfel).....               | Tyrone.....          | 54 36      | 7 18                 | 280                            | 3'39                           | 1'73         |



RAINFALL TABLE FOR SEPTEMBER, 1911—*continued.*

| RAINFALL OF MONTH ( <i>con.</i> ) |          |                   |             |       | RAINFALL FROM JAN. 1. |       |                      |          | Mean Annual 1875-1909. | STATION.        |
|-----------------------------------|----------|-------------------|-------------|-------|-----------------------|-------|----------------------|----------|------------------------|-----------------|
| Diff. from Av. in.                | % of Av. | Max. in 24 hours. | No. of Days | Date. | Aver. 1875-1909.      | 1911. | Diff. from Aver. in. | % of Av. |                        |                 |
|                                   |          | in.               |             |       | in.                   | in.   |                      |          | in.                    |                 |
| — '69                             | 65       | '41               | 13          | 11    | 17'92                 | 13'85 | —4'07                | 77       | 25'11                  | Camden Square   |
| — '83                             | 63       | '52               | 13          | 8     | 18'32                 | 12'48 | —5'84                | 68       | 27'64                  | Tenterden       |
| — '83                             | 68       | '41               | 29          | 10    | 20'02                 | 13'41 | —6'61                | 67       | 30'48                  | Patching        |
| —1'31                             | 50       | '28               | 19          | 8     | 21'18                 | 12'96 | —8'22                | 61       | 31'87                  | Cadland         |
| — '77                             | 61       | '30               | 13. 20      | 8     | 17'45                 | 10'39 | —7'06                | 60       | 24'58                  | Oxford          |
| — '85                             | 60       | '36               | 23          | 8     | 18'20                 | 11'86 | —6'34                | 65       | 25'17                  | Croyland Abbey  |
| — '66                             | 61       | '39               | 13          | 8     | 13'17                 | 9'89  | —3'28                | 75       | 19'28                  | Shoeburyness    |
| — '32                             | 85       | '54               | 30          | 7     | 18'14                 | 14'07 | —4'07                | 78       | 25'40                  | Westley         |
| — '07                             | 97       | '68               | 30          | 11    | 16'33                 | 12'20 | —4'13                | 75       | 23'73                  | Geldeston       |
| — '39                             | 87       | '48               | 19          | 13    | 24'90                 | 18'67 | —6'23                | 75       | 38'27                  | Polapit Tamar   |
| —1'46                             | 46       | '27               | 19          | 11    | 22'54                 | 11'79 | —10'75               | 52       | 33'54                  | Rousdon         |
| — '94                             | 61       | '47               | 13          | 11    | 21'12                 | 13'50 | —7'62                | 64       | 29'81                  | Stroud          |
| — '26                             | 89       | '74               | 12          | 11    | 22'71                 | 15'06 | —7'65                | 66       | 32'41                  | Wolstaston      |
| — '72                             | 69       | ...               | ...         | ...   | 20'51                 | 11'23 | —9'28                | 55       | 28'98                  | Coventry        |
| — '12                             | 94       | '53               | 23          | 12    | 16'67                 | 13'34 | —3'33                | 80       | 23'35                  | Boston          |
| — '32                             | 83       | '42               | 23          | 10    | 17'54                 | 10'10 | —7'44                | 58       | 24'46                  | Hodsock Priory  |
| + '21                             | 107      | '87               | 27          | 12    | 24'85                 | 19'51 | —5'34                | 78       | 34'73                  | Macclesfield    |
| +1'56                             | 150      | 1'75              | 12          | 16    | 22'70                 | 19'76 | —2'94                | 87       | 32'70                  | Southport       |
| + '19                             | 109      | '55               | 29          | 14    | 19'08                 | 15'46 | —3'62                | 81       | 26'87                  | Ribston Hall    |
| + '41                             | 109      | 1'25              | 12          | 12    | 42'14                 | 44'74 | +2'60                | 106      | 61'49                  | Arlcliffe       |
| +1'27                             | 162      | 1'05              | 23          | 11    | 18'57                 | 16'15 | —2'42                | 87       | 26'42                  | Hull            |
| + '75                             | 137      | '74               | 11          | 13    | 19'65                 | 18'42 | —1'23                | 94       | 27'94                  | Newcastle       |
| —3'98                             | 65       | 2'15              | 19          | 13    | 88'04                 | 89'90 | +1'86                | 102      | 129'48                 | Seathwaite      |
| —1'11                             | 69       | '58               | 23          | 14    | 28'63                 | 20'60 | —8'03                | 72       | 42'28                  | Cardiff         |
| — '82                             | 79       | '67               | 23          | 14    | 30'96                 | 24'81 | —6'15                | 80       | 46'81                  | Haverfordwest   |
| — '11                             | 97       | 1'47              | 12          | 14    | 30'92                 | 27'75 | —3'17                | 90       | 45'46                  | Gogerddan       |
| +2'17                             | 187      | 1'26              | 12          | 14    | 20'55                 | 18'96 | —1'59                | 92       | 30'36                  | Llandudno       |
| —1'39                             | 58       | '57               | 29          | 8     | 29'83                 | 28'90 | —'93                 | 97       | 43'47                  | Cargen          |
| —1'18                             | 56       | '78               | 29          | 10    | 23'89                 | 17'46 | —6'43                | 70       | 33'76                  | Marchmont       |
| —1'81                             | 58       | '50               | 28          | 15    | 33'67                 | 29'73 | —3'94                | 88       | 49'77                  | Girvan          |
| —1'17                             | 61       | '49               | 29          | 12    | 25'03                 | 23'35 | —1'68                | 93       | 35'97                  | Glasgow         |
| —2'31                             | 62       | '48               | 28          | 20    | 46'21                 | 56'34 | +10'13               | 122      | 68'67                  | Inveraray       |
| — '20                             | 96       | 1'08              | 19          | 24    | 37'87                 | 38'82 | + '95                | 103      | 56'57                  | Quinish         |
| —1'43                             | 39       | '30               | 8           | 10    | 20'54                 | 8'51  | —12'03               | 41       | 28'64                  | Dundee          |
| —2'09                             | 23       | ...               | ...         | ...   | 24'16                 | 16'43 | —7'73                | 68       | 34'93                  | Braemar         |
| —1'64                             | 39       | '30               | 8           | 12    | 22'78                 | 14'53 | —8'25                | 64       | 32'73                  | Aberdeen        |
| —1'01                             | 60       | '35               | 8           | 11    | 21'25                 | 17'30 | —3'95                | 81       | 29'33                  | Cawdor          |
| — '96                             | 73       | '40               | 26          | 18    | 30'26                 | 28'18 | —2'08                | 93       | 44'53                  | Fort Augustus   |
| +1'31                             | 118      | 1'45              | 26          | 26    | 56'63                 | 68'00 | +11'37               | 120      | 83'61                  | Bendamp         |
| — '95                             | 62       | '32               | 1           | 12    | 22'41                 | 17'41 | —5'00                | 78       | 31'90                  | Dunrobin Castle |
| — '21                             | 92       | '76               | 28          | 18    | 20'68                 | 19'41 | —1'27                | 94       | 29'88                  | Wick            |
| + '35                             | 109      | 1'42              | 12          | 15    | 36'76                 | 31'33 | —5'43                | 85       | 54'81                  | Killarney       |
| +1'24                             | 139      | 1'82              | 25          | 12    | 27'45                 | 24'33 | —3'12                | 89       | 39'57                  | Waterford       |
| — '55                             | 83       | '77               | 11          | 13    | 27'73                 | 23'45 | —4'28                | 85       | 39'43                  | Castle Lough    |
| — '30                             | 93       | '60               | 19          | 17    | 31'46                 | 25'01 | —6'45                | 80       | 45'11                  | Miltown Malbay  |
| + '76                             | 127      | 1'68              | 26          | 11    | 24'41                 | 17'86 | —6'55                | 73       | 34'99                  | Courtown Ho.    |
| — '93                             | 68       | '60               | 25          | 14    | 25'70                 | 22'45 | —3'25                | 87       | 35'92                  | Abbey Leix      |
| —1'05                             | 49       | '37               | 25          | 11    | 19'89                 | 12'60 | —7'29                | 63       | 27'68                  | Dublin          |
| — '77                             | 74       | '55               | 11          | 12    | 26'19                 | 22'49 | —3'70                | 86       | 36'15                  | Mullingar       |
| ...                               | ...      | ...               | ...         | ...   | ...                   | ...   | ...                  | ...      | 36'64                  | Ballinasloe     |
| —1'66                             | 62       | '48               | 19          | 19    | 35'74                 | 29'47 | —6'27                | 82       | 52'87                  | Enniscoe        |
| —1'42                             | 61       | '36               | 20          | 17    | 30'14                 | 25'27 | —4'87                | 84       | 42'71                  | Markree         |
| —2'07                             | 36       | '42               | 22          | 9     | 27'63                 | 17'89 | —9'74                | 65       | 38'91                  | Seaforde        |
| —1'93                             | 45       | '29               | 29          | 15    | 26'32                 | 19'32 | —7'00                | 73       | 37'56                  | Dundarave       |
| —1'66                             | 51       | '35               | 22          | 14    | 28'05                 | 24'33 | —3'72                | 87       | 30'38                  | Omagh           |

## SUPPLEMENTARY RAINFALL, SEPTEMBER, 1911.

| Div.  | STATION.                     | Rain<br>inches | Div.   | STATION.                     | Rain<br>inches. |
|-------|------------------------------|----------------|--------|------------------------------|-----------------|
| II.   | Warlingham, Redvers Road     | 1·43           | XI.    | Lligwy .....                 | 3·71            |
| „     | Ramsgate .....               | 1·55           | „      | Douglas .....                | „               |
| „     | Hailsham .....               | 1·53           | XII.   | Stoneykirk, Ardwell House    | 1·30            |
| „     | Totland Bay, Aston House.    | 1·22           | „      | Dalry, The Old Garroch ...   | 2·81            |
| „     | Stockbridge, Ashley .....    | 1·25           | „      | Langholm, Drove Road.....    | 4·09            |
| „     | Grayshott.....               | 1·33           | „      | Beattock, Kinnelhead.....    | 3·30            |
| „     | Reading, Calcot Place.....   | 1·40           | XIII.  | St Mary's Loch, Cramilt Ldge | 1·83            |
| III.  | Harrow Weald, Hill House.    | 1·46           | „      | North Berwick Reservoir ...  | 1·09            |
| „     | Pitsford, Sedgebrook .....   | 1·33           | „      | Edinburgh, Royal Observty.   | 1·17            |
| „     | Woburn, Milton Bryant.....   | 1·13           | XIV.   | Maybole, Knockdon Farm...    | 2·52            |
| „     | Chatteris, The Priory .....  | 2·13           | XV.    | Campbeltown, Witchburn...    | 3·52            |
| IV.   | Colchester, Lexden.....      | 1·47           | „      | Glenreadell Mains.....       | 2·67            |
| „     | Newport .....                | 1·28           | „      | Holy Loch, Ardnadam.....     | 4·13            |
| „     | Rendlesham .....             | 1·61           | „      | Ballachulish House.....      | 3·88            |
| „     | Swaffham .....               | 2·52           | „      | Islay, Ballabus .....        | 3·07            |
| „     | Blakeney .....               | 1·67           | XVI.   | Dollar Academy .....         | 1·79            |
| V.    | Bishops Cannings .....       | 1·03           | „      | Balquhider, Stronvar .....   | 2·60            |
| „     | Winterbourne Steepleton ..   | 1·37           | „      | Coupar Angus .....           | 1·00            |
| „     | Ashburton, Druid House ..    | 2·72           | „      | Glenlyon, Meggernie Castle.  | 2·29            |
| „     | Okehampton, Oaklands.....    | 2·95           | „      | Blair Atholl.....            | ·51             |
| „     | Cullompton .....             | 1·59           | „      | Montrose, Sunnyside Asylum   | 1·00            |
| „     | Hartland Abbey .....         | 2·55           | XVII.  | Alford, Lynturk Manse ...    | ·81             |
| „     | Lynmouth, Rock House ...     | 3·47           | „      | Fyvie Castle.....            | 1·34            |
| „     | Probus, Lamellyn .....       | 2·67           | „      | Keith Station .....          | 1·13            |
| „     | North Cadbury Rectory ..     | 1·37           | XVIII. | Glenquoich, Loan .....       | 15·80           |
| VI.   | Clifton, Pembroke Road ...   | 1·61           | „      | Skye, Dunvegan .....         | 5·74            |
| „     | Ross, The Graig .....        | 1·14           | „      | N. Uist, Lochmaddy .....     | 3·21            |
| „     | Shifnal, Hatton Grange.....  | 1·55           | „      | Alvey Manse .....            | 2·14            |
| „     | Blockley, Upton Wold .....   | 1·75           | „      | Loch Ness, Drumnadrochit.    | 2·20            |
| „     | Droitwich .....              | 1·36           | „      | Glencarron Lodge .....       | 9·64            |
| VII.  | Market Overton.....          | 1·83           | XIX.   | Invershin .....              | 1·93            |
| „     | Market Rasen .....           | 1·99           | „      | Loch Stack, Ardchullin.....  | 8·67            |
| „     | Bawtry, Hesley Hall.....     | 1·74           | „      | Melvich.....                 | 3·64            |
| „     | Derby, Midland Railway ...   | 1·51           | XX.    | Skibbereen Rectory.....      | 5·35            |
| „     | Buxton .....                 | 2·94           | „      | Dunmanway, The Rectory..     | 4·29            |
| VIII. | Nantwich, Dorfold Hall.....  | 2·70           | „      | Cork .....                   | 2·58            |
| „     | Chatburn, Middlewood .....   | 4·14           | „      | Mitchelstown Castle .....    | 3·12            |
| „     | Cartmel, Flookburgh .....    | 4·98           | „      | Darrynane Abbey .....        | 4·76            |
| IX.   | Langsett Moor, Up. Midhope   | 2·32           | „      | Glenam [Clonmel] .....       | 3·37            |
| „     | Scarborough, Scalby .....    | 3·44           | „      | Newmarket-on-Fergus, Fenloe  | 3·45            |
| „     | Ingleby Greenhow .....       | 2·39           | XXI.   | Laragh, Glendalough .....    | 3·04            |
| „     | Mickleton.....               | 2·24           | „      | Balbriggan, Ardgillan.....   | ·81             |
| X.    | Bellingham, High Green Manor | 2·04           | „      | Moynalty, Westland .....     | 1·34            |
| „     | Ilderton, Lilburn Cottage... | 1·75           | XXII.  | Cong, The Glebe .....        | 2·23            |
| „     | Keswick, The Bank .....      | 3·65           | „      | Westport, St. Helens .....   | 2·56            |
| XI.   | Llanfrecfha Grange.....      | 2·02           | „      | Achill Island, Dugort .....  | 4·90            |
| „     | Treherbert, Tyn-y-waun ...   | 6·18           | „      | Mohill, The Rectory .....    | 1·89            |
| „     | Carmarthen, The Friary.....  | 3·82           | XXIII. | Enniskillen, Portora .....   | 1·73            |
| „     | Castle Malgwyn [Lechryd].    | 3·22           | „      | Dartrey [Cootehill].....     | 1·48            |
| „     | Plynlimon.....               | 8·20           | „      | Warrenpoint, Manor House     | 1·80            |
| „     | New Radnor, Ednol .....      | 2·99           | „      | Banbridge, Milltown .....    | 1·42            |
| „     | Rhayader, Tyrnynydd .....    | 4·65           | „      | Belfast, Cave Hill Road..... | 1·57            |
| „     | Lake Vyrnwy .....            | „              | „      | Glenarm Castle.....          | 1·27            |
| „     | Llangyhanfal, Plâs Draw....  | 3·93           | „      | Londonderry, Creggan. Res.   | 2·14            |
| „     | Dolgelly, Bryntirion .....   | 5·12           | „      | Killybegs .....              | 3·96            |
| „     | Bettws-y-Coed, Tyn-y-bryn    | 4·76           | „      | Horn Head ... ..             | 2·34            |

## METEOROLOGICAL NOTES ON SEPTEMBER, 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.—Fine, sunny weather with almost cloudless skies prevailed throughout and with unusually high temp. in the first half.† Mean temp.  $60^{\circ}4$ , or  $2^{\circ}7$  above the average. Duration of R  $25\cdot1$  hours and of sunshine  $198\cdot2^*$  hours; two sunless days. Evaporation  $1\cdot96$  in. The shade max.  $92^{\circ}3$  on 8th, was the highest temp. ever recorded in September, excepting only  $94^{\circ}0$  on 2nd September, 1906; min.  $39^{\circ}0$  on 22nd and 29th. F 0, f 0.

TENTERDEN.—Brilliant month almost throughout and with great heat till after 12th. Violent gale on 30th. Duration of sunshine,  $255\cdot0^{\dagger}$  hours. Shade max.  $90^{\circ}0$  on 8th; min.  $39^{\circ}0$  on 29th. F 0, f 0.

TOTLAND BAY.—The ninth successive month with less than the average R. A partial drought 75 days with  $\cdot70$  in. of R terminated on 12th. Shade max.  $79^{\circ}3$  on 5th and 7th; min.  $43^{\circ}1$  on 18th. F 0, f 0.

PITSFORD.—R  $1\cdot27$  in. below the average. Mean temp.  $57^{\circ}5$ . Shade max.  $91^{\circ}4$  on 8th; min.  $35^{\circ}6$  on 22nd. F 0.

NORTH CADBURY.—A month of extremes and with violent changes. The wind movement was almost the least for September in the record, and the duration of sunshine was almost the greatest. In the first 12 days the lowest shade max. was  $75^{\circ}0$ , but after that  $73^{\circ}5$  was the highest. Shade max.  $94^{\circ}2$  on 8th; min.  $36^{\circ}0$  on 22nd. F 0, f 4.

ROSS.—Shade max  $89^{\circ}8$  on 8th; min.  $32^{\circ}8$  on 23rd. F 0, f 0.

HODSOCK PRIORY.—Shade max.  $88^{\circ}0$  on 8th and the highest in September, except  $93^{\circ}0$ , which occurred on two days in 1906; min.  $32^{\circ}2$  on 22nd. F 0, f 6.

SOUTHPORT.—Duration of sunshine  $184\cdot5^*$  hours, or  $46\cdot4$  hours above the average. Duration of R  $58\cdot2$  hours. Mean temp.  $56^{\circ}0$ . Shade max.  $74^{\circ}9$  on the 8th; min.  $39^{\circ}3$  on 22nd. F 0, f 0.

HULL.—Fine warm days at the beginning with frequent dew and mist at night. Unsettled on most days from 19th to the end. A gale caused damage to trees and property on 30th. Shade max.  $82^{\circ}0$  on 7th; min.  $37^{\circ}0$  on 22nd. F 0, f 1.

HAVERFORDWEST.—Fine and warm to 11th. Colder broken weather after a strong gale on 25th. Duration of sunshine,  $188\cdot5^*$  hours. Shade max.  $81^{\circ}5$  on 8th; min.  $38^{\circ}4$  on 17th. F 0, f 0.

LLANDUDNO.—Shade max.  $75^{\circ}2$  on 10th; min.  $44^{\circ}2$  on 21st.

CARGEN.—No R in the first 18 days. The earliest and shortest harvest on record; the yield was little below the average. Water very scarce and pastures bare. Shade max.  $72^{\circ}0$  on 3rd; min.  $31^{\circ}3$  on 22nd. F 1.

EDINBURGH.—Shade max.  $71^{\circ}6$  on 11th; min.  $35^{\circ}2$  on 30th. F 0, f 0.

COUPAR ANGUS.—The R was only half the average and it was the ninth successive month with deficient fall. A water famine is threatened in some districts here. Shade max.  $72^{\circ}0$  on 6th; min.  $27^{\circ}5$  on 22nd.

FORT AUGUSTUS.—Shade max.  $67^{\circ}0$  on 10th; min.  $32^{\circ}0$  on 21st. F 1.

CORK.—Shade max.  $73^{\circ}0$  on 8th; min.  $39^{\circ}0$  on 16th and 29th. F 0, f 0.

DUBLIN.—Fine, dry and warm at first. Temp. gave way after 11th, and the rest of month was distinctly cool. Mean temp.  $56^{\circ}5$ . Shade max.  $73^{\circ}1$  on 5th; min.  $41^{\circ}7$  on 21st. F 0, f 0.

MARKREE.—The first part was fine, dry and warm. Showers on most days after with some ground frosts. Shade max.  $70^{\circ}6$  on 13th; min.  $36^{\circ}0$  on 21st. F 0, f 4.

WARRENPOINT.—Shade max.  $70^{\circ}0$  on 1st; min.  $40^{\circ}0$  on 20th. F 0, f 0.

\* Campbell-Stokes.

† Jordan.

‡ See p. 173.

## Climatological Table for the British Empire, April, 1911.

| STATIONS<br><br>(Those in italics are<br>South of the Equator.) | Absolute. |       |          |       | Average. |      |               |             | Absolute.       |                   | Total Rain |       | Aver. |
|-----------------------------------------------------------------|-----------|-------|----------|-------|----------|------|---------------|-------------|-----------------|-------------------|------------|-------|-------|
|                                                                 | Maximum.  |       | Minimum. |       | Max.     | Min. | Dew<br>Point. | Humidity.   | Max. in<br>Sun. | Min. on<br>Grass. | Depth.     | Days. |       |
|                                                                 | Temp.     | Date. | Temp.    | Date. |          |      |               |             |                 |                   |            |       |       |
| London, Camden Square                                           | 67·5      | 22    | 25·5     | 6     | 56·1     | 39·7 | 39·8          | 0·100<br>78 | 112·8           | 24·1              | 1·80       | 11    | 7·8   |
| Malta ... ..                                                    | 70·0      | 30    | 49·0     | 16    | 63·1     | 54·5 | 51·4          | 80          | 135·2           | ...               | 1·50       | 10    | 5·4   |
| Lagos ... ..                                                    | 92·0      | 1     | 70·0     | 12    | 88·2     | 73·4 | 74·3          | 73          | 157·0           | 68·0              | 7·87       | 12    | ...   |
| Cape Town ... ..                                                | 94·5      | 4     | 48·8     | 24    | 73·5     | 55·7 | 54·4          | 73          | ...             | ...               | 1·77       | 10    | 5·3   |
| Johannesburg ... ..                                             | 73·4      | 1     | 41·8     | 27    | 67·6     | 49·6 | 52·0          | 77          | 138·6           | 39·5              | 2·76       | 10    | 3·7   |
| Mauritius ... ..                                                | ...       | ...   | ...      | ...   | ...      | ...  | ...           | ...         | ...             | ...               | ...        | ...   | ...   |
| Calcutta... ..                                                  | 101·9     | 28    | 68·1     | 21    | 95·0     | 76·1 | 72·9          | 71          | ...             | 64·5              | 2·03       | 2     | 2·6   |
| Bombay... ..                                                    | 92·2      | 26    | 72·8     | 5     | 88·1     | 76·0 | 71·8          | 74          | 132·7           | 65·9              | ·00        | 0     | 1·4   |
| Madras ... ..                                                   | 102·2     | 18    | 73·3     | 2     | 93·7     | 78·1 | 75·6          | 78          | 144·1           | 70·9              | ·00        | 0     | 2·3   |
| Kodaikanal ... ..                                               | 74·9      | 5     | 51·6     | 28    | 71·3     | 54·9 | 47·7          | 62          | 138·1           | 39·5              | 4·37       | 15    | 4·0   |
| Colombo, Ceylon ... ..                                          | 91·2      | 4     | 73·7     | 24    | 88·7     | 77·6 | 74·2          | 76          | 145·6           | 70·1              | 1·97       | 6     | 5·6   |
| Hongkong ... ..                                                 | 86·9      | 26    | 61·3     | 1     | 74·0     | 66·4 | 64·3          | 82          | 139·1           | ...               | 5·94       | 13    | 7·6   |
| Sydney ... ..                                                   | 87·1      | 9     | 45·9     | 28    | 70·4     | 55·5 | 47·8          | 65          | 141·2           | 35·9              | 3·58       | 16    | 4·3   |
| Melbourne ... ..                                                | 82·8      | 4     | 35·5     | 29    | 65·6     | 49·0 | 46·5          | 67          | 136·1           | 27·9              | 1·12       | 4     | 5·7   |
| Adelaide ... ..                                                 | 86·9      | 3     | 42·0     | 20    | 72·0     | 52·6 | 47·2          | 60          | 144·0           | 31·7              | ·31        | 7     | 4·7   |
| Perth ... ..                                                    | 89·1      | 15    | 50·8     | 30    | 75·5     | 56·1 | 53·1          | 67          | 147·0           | 39·7              | 3·40       | 9     | 3·7   |
| Coolgardie ... ..                                               | 98·0      | 2     | 45·0     | 10*   | 79·8     | 52·4 | 45·6          | 54          | 157·0           | 40·0              | ·03        | 1     | ...   |
| Hobart, Tasmania ... ..                                         | 77·2      | 4     | 38·0     | 30    | 61·6     | 47·0 | 42·8          | 67          | 129·5           | 36·0              | 2·50       | 15    | 6·0   |
| Wellington ... ..                                               | 73·8      | 23    | 45·0     | 19    | 65·8     | 57·0 | 53·6          | 75          | 113·0           | 37·0              | 2·53       | 13    | 8·0   |
| Auckland ... ..                                                 | 75·0      | 7     | 53·0     | 30    | 71·1     | 59·9 | 60·4          | 84          | 136·0           | 49·0              | 7·43       | 21    | 6·7   |
| Jamaica, Kingston ... ..                                        | 91·8      | 22    | 66·0     | 21    | 88·1     | 69·4 | 67·4          | 67          | ...             | ...               | 1·36       | 5     | 4·0   |
| Grenada ... ..                                                  | 87·0      | sev.  | 71·0     | 15    | 85·0     | 73·9 | ...           | 71          | 141·2           | ...               | 1·67       | 18    | 4·5   |
| Toronto ... ..                                                  | 76·0      | 28    | 16·3     | 2     | 52·0     | 34·6 | ...           | ...         | 90·8            | 10·3              | 1·54       | 10    | 4·2   |
| Fredericton ... ..                                              | 78·0      | 29    | 7·5      | 3     | 49·1     | 25·7 | ...           | 66          | ...             | ...               | 1·93       | 6     | 4·6   |
| St. John, N.B. ... ..                                           | 66·5      | 29    | 11·5     | 3     | 45·1     | 29·7 | ...           | ...         | ...             | ...               | 1·34       | 10    | 4·4   |
| Victoria, B.C. ... ..                                           | 66·8      | 23    | 27·7     | 13    | 54·7     | 36·2 | ...           | 67          | ...             | ...               | ·59        | 4     | 4·0   |
| Dawson ... ..                                                   | 59·0      | 30    | -25·0    | 10†   | 38·6     | 8·9  | ...           | ...         | ...             | ...               | 1·30       | 6     | 5·1   |

\* and 14.

† and 11.

MALTA.—Mean temp. of air, 58°·3. Average bright sunshine, 7·9 hours per day.

Johannesburg.—Bright sunshine, 232·5 hours.

KODAIKANAL.—Bright sunshine, 216 hours.

COLOMBO.—Mean temp. of air 80°·7, or 1°·8 below, of dew point 0°·3 below, and R 7·96 in. below, averages. Mean hourly velocity of wind 6·6 miles. TS on 2 days.

HONGKONG.—Mean temp. of air 69°·7. Bright sunshine 138·8 hours. Mean hourly velocity of wind 13·3 miles.

Sydney.—Mean temp. of air 1°·6 below, and R 1·41 in. below, averages.

Melbourne.—Mean temp. of air 2°·3 below, and R 1·22 in. below, averages.

Adelaide.—Rainfall, 1·50 in. below average.

Perth.—Mean temp. of air equal to average, and R 1·76 in. above average.

Coolgardie.—Mean temp. of air 0°·7 above, and R ·62 in. below, averages.

Hobart, Tasmania.—Mean temp. of air 1°·0 below, and R ·69 in. above, averages.

Wellington.—Mean temp. of air 4°·6 above, and R 1·51 in. below, averages.

Auckland.—Mean temp. of air 4°·0 above average.

# JAMES J. HICKS

## Meteorological & Scientific Instruments

MANUFACTORY:—

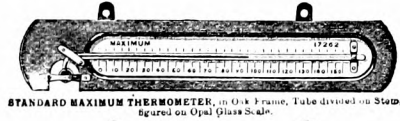
8, 9 & 10, HATTON GARDEN, LONDON, E.C.

Awarded Grand Prix Franco-British Exhibition, 1908; Nine Medals at the Paris Exhibition, 1900; London, 1862; Paris, 1867; London, 1885; Philadelphia, 1876; Rio de Janeiro, 1909.

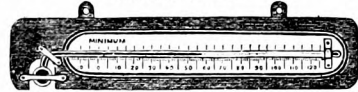
Standard "Fortin" Barometers.  
 Standard Mercurial Thermometers.  
 Standard Maximum Thermometers.  
 Standard Minimum Thermometers.  
 Standard Mason's Hygrometers.  
 Standard "Solar Maximum" Thermometers.  
 Standard Terrestrial Radiation Thermometers.  
 Standard "Earth Temperature" Thermometers.  
 Standard Symons's Rain Gauges.  
 Standard Meteorological Office Rain Gauges.  
 Standard Sunshine Recorders.  
 Improved Beckley Anemometers.  
 Improved Beckley Self-Recording Rain Gauge.  
 Self-Registering Aneroid Barometers.  
 Self-Registering Mercurial Barometers.  
 Meteorological Office Thermometer Screens.  
 Mountaineering Aneroid Barometers.  
 Aneroid Barometers.



STANDARD BAROMETER, diameter of Tube, 0.5 in., on Mahogany Board.



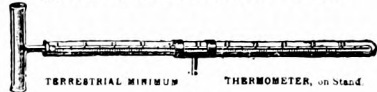
STANDARD MAXIMUM THERMOMETER, in Oak Frame, Tube divided on Stem, figured on Opal Glass Scale.



STANDARD MINIMUM THERMOMETER, in Oak Frame, Tube divided on Stem, figured on Opal Glass Scale.



MAXIMUM THERMOMETER, Black Bulb in Vacuum, on Stand.



TERRESTRIAL MINIMUM THERMOMETER, on stand.



BECKLEY

RAIN GAUGE.



CAMPBELL-STOKES  
 SUNSHINE RECORDER,  
 With Curtis's Improvements.

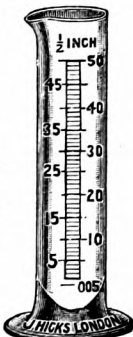
as supplied to the Meteorological Office for their Standard Pattern, and fitted on "Discovery," National Antarctic Expedition, 1901.

NEW OBSERVATORY CERTIFICATES SUPPLIED IF DESIRED.

### METEOROGRAPH, for use with Kites

#### THE "CAMDEN" Pattern

RAIN



GLASS

Price

2s. 6d.

Not

Verified

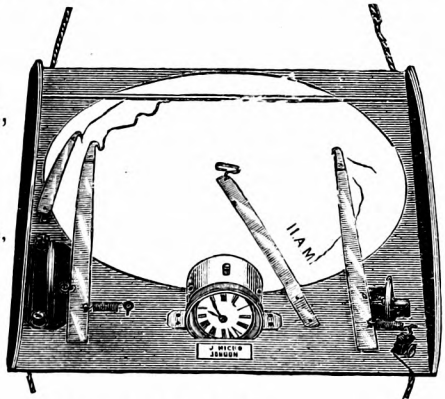
Price

3s. 6d.

Verified.

Designed by  
 W. H. DINES, Esq.,  
 F.R.S.

Records the Pressure,  
 Temperature,  
 Humidity, &c., of  
 the Upper Air.



Special Prices are given to Fellows of all Scientific Societies.

( v. )





## **A Monthly Record of Science in all its Branches.**

Each number consists of at least forty large quarto pages of Articles and Notes, by Authorities in their respective subjects.

**Profusely Illustrated.**

### **CONTENTS OF OCTOBER ISSUE.**

The New Astronomy: II. Double and Wonder Stars. By Professor A. W. Bickerton.—The Meteorology of the Upper Air.—Plant Photography.—The Zoological Side of Commerce: Horsehair.—Meteoric Phenomena.—Sweeping (for Rare Insects).—Solar Disturbances during August, 1911.—The Face of the Sky for the Month.—Notes (Astronomy; Botany; Chemistry; Geology; Meteorology; Ornithology; Physics; Zoology).—Microscopy.—Reviews of Books.—Correspondence.—Queries and Answers.—&c.

THROUGH ANY BOOKSELLER.

**MONTHLY—ONE SHILLING, net.**

Annual Subscription, **15/-**, post free anywhere.

Offices: **42, BLOOMSBURY SQUARE, LONDON.**

---

## **THE OBSERVATORY:**

*A Monthly Review of Astronomy.*

EDITED BY

**H. P. HOLLIS, B.A., F.R.A.S., AND T. LEWIS, F.R.A.S.**

~~~~~

Contains full Reports of the Meetings of the Royal Astronomical and Royal Meteorological Societies, and of the British Astronomical Association; Articles by various eminent Astronomers, English, American and Continental; Correspondence on topics of interest connected with the Science; Notices of Observatories, Publications and current Discoveries. The "Oxford Note Book" is a special feature of the Magazine.

*The Observatory* was founded in 1877, and has become an established and very valuable publication.—Prof. Young, in "Ten Years' progress in Astronomy."

Annual Subscription (for the "Companion" and twelve Monthly Numbers), 13s.

*All communications should be addressed to the Editors of "The Observatory,"  
Royal Observatory, Greenwich, S.E.*

# Royal Geographical Society's Publications.

## THE GEOGRAPHICAL JOURNAL.

Monthly. Illustrated. Edited by the Secretary. Price (to non-Fellows), 2s.

## HINTS TO TRAVELLERS.

Edited for the Council of the Royal Geographical Society by E. A. REEVES, F.R.G.S., F.R.A.S. Ninth Edition, revised and enlarged. In two volumes, illustrated. Price 15s. net. (To Fellows at the Office of the Society, 10s. net).

Vol. I.—Surveying and Practical Astronomy.

Vol. II.—Meteorology and Climate (by DR. H. R. MILL); Photography, Geology, Natural History, Anthropology, Industry and Commerce, Medical Hints, &c.

## THE DISTRIBUTION OF RAINFALL OVER THE LAND.

By DR. A. J. HERBERTSON. With monthly maps of Rainfall. Price 5s. net. (To Fellows, 2s. 6d.)

## ON THE RESULTS OF A DEEP-SEA SOUNDING EXPEDITION,

In the North Atlantic in the summer of 1899, by R. E. PEAKE, M.Inst.C.E.; with notes on Temperature, Deep-Sea Deposits, &c., by SIR JOHN MURRAY, K.C.B., F.R.S. *Charts.* Price 5s. net. (To Fellows, 2s. 6d.)

## THE ANTARCTIC MANUAL,

For the use of the Expedition of 1901. Edited by GEORGE MURRAY, F.R.S., 1901. Pp. 586. *With a new chart of the Antarctic Regions.* Price, 15s. (To Fellows, 10s.)

~~~~~  
ROYAL GEOGRAPHICAL SOCIETY, 1, Savile Row, W.  
AND ALL BOOKSELLERS.

---

### RATES FOR ADVERTISEMENTS IN THIS MAGAZINE.

|            |     | One Insertion. | Six Insertions. | Twelve Insertions. |               |
|------------|-----|----------------|-----------------|--------------------|---------------|
| WHOLE PAGE | ... | 30/-           | 26/-            | 22/6               | } All<br>Net. |
| HALF       | ... | 16/6           | 14/6            | 12/6               |               |
| QUARTER    | ... | 9/-            | 8/-             | 7/-                |               |
| EIGHTH     | ... | 5/-            | 4/6             | 4/-                |               |

All applications for space to be made to

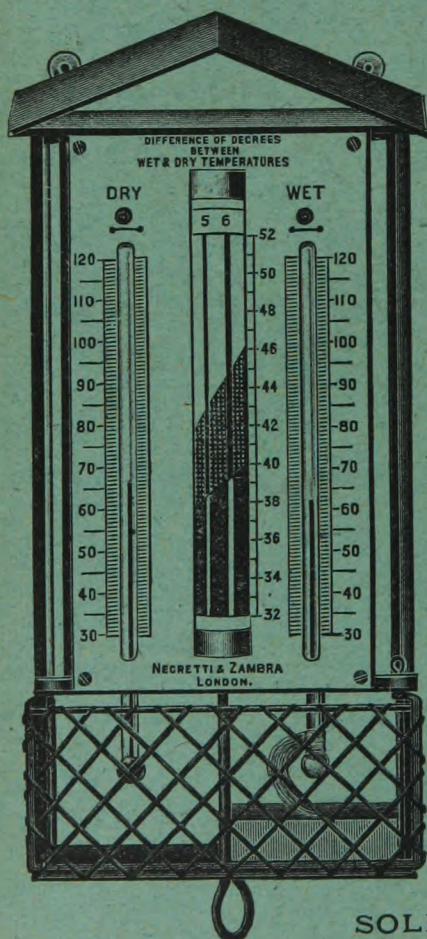
Mr. H. A. COLLINS, 32, BIRDHURST ROAD, CROYDON.



# NEGRETTI & ZAMBRA'S HORTICULTURAL HYGROMETER

(REGISTERED DESIGN.)

An Instrument for ascertaining in a Simple manner, the likelihood of a Frost During the Night.



The object of the Horticultural Hygrometer is to show in a simple manner, **without** the use of tables, whether the dew point is below freezing, and consequently whether frost may be expected.

We need hardly point out to Horticulturists and Agriculturists the importance of detecting the arrival of frost, whether it be an **Early Winter Frost** or a **Late Spring Frost**. One should have some means of knowing whether to take the necessary steps for the protection of valuable plants, crops, fruit trees, etc

*Descriptive Pamphlet Post Free on application to the*

SOLE MAKERS,

**NEGRETTE & ZAMBRA,**  
*Scientific Instrument Makers,*  
**38, HOLBORN VIADUCT, E.C.**

Branches: 45, CORNHILL, E.C., and  
122, REGENT STREET, W., LONDON.

Telegraphic Address: "NEGRETTE, LONDON."

Telephone No. 583 HOLBORN.

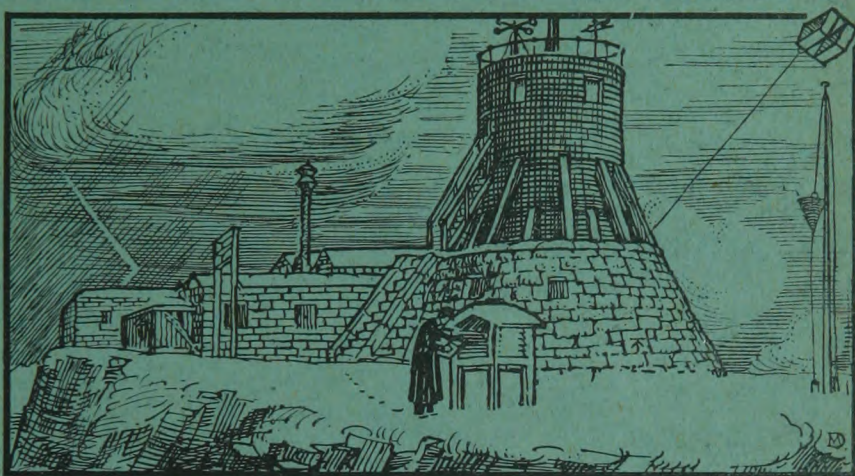
**BRUSSELS INTERNATIONAL EXHIBITION, 1910.**

Awarded Grand Prix and Gold Medal for Scientific Instruments.

SHIELD & SPRING, Lancelot Place, Brompton Road, S.W.



NO. 550 SYMONS'S VOL. 46  
 METEOROLOGICAL  
 ❄️ • MAGAZINE • ❄️  
 .... EDITED BY HUGH ROBERT MILL ....



NOVEMBER, 1911.

• CONTENTS •

|                                                                                               | PAGE    |
|-----------------------------------------------------------------------------------------------|---------|
| Is the Zodiacal Light a Meteorological Phenomenon? By F. W. HENKEL, B.A., F.R.A.S. . . . .    | 189     |
| Map of October Rainfall of Thames Valley . . . . .                                            | face p. |
| The Weather of October. By FRED. J. BRODIE . . . . .                                          | 194     |
| Meteorology at the British Association. By E. GOLD, M.A. . . . .                              | 195     |
| International Balloon Ascents, April, 1909. By W. H. DINES, F.R.S. . . . .                    | 198     |
| CORRESPONDENCE:—                                                                              |         |
| Temperature of Rain. By A. F. . . . .                                                         | 199     |
| The October Rainfall. By D. W. HORNER, F.R.Met.Soc., RALPH FLETCHER, and JOHN DOVER . . . . . | 199     |
| Our Hottest Summer on Record. By MISS TAWNEY . . . . .                                        | 200     |
| Cumulus Clouds on October 21st. By L. C. W. BONACINA . . . . .                                | 201     |
| Great Heat in a Thunder Squall. By F. B. PARKINSON . . . . .                                  | 201     |
| Heavy Rain in Snowdonia. By A. LOCKWOOD, F.R.Met.Soc. . . . .                                 | 201     |
| A Lecture and the Newspapers . . . . .                                                        | 202     |
| Reviews . . . . .                                                                             | 206     |
| Meteorological News and Notes . . . . .                                                       | 207     |
| Rainfall Table for October, 1911 . . . . .                                                    | 208     |
| Supplementary Table of Rainfall, October, 1911, at 112 Stations . . . . .                     | 210     |
| Meteorological Notes on October, 1911 . . . . .                                               | 211     |
| Climatological Table for the British Empire, May, 1911 . . . . .                              | 212     |

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

Published on the 16th of each Month.]

[Price 4d., or 5s. per Annum, Post Free.



## NOTICES.

It is requested that all Books for Review and Communications for the Editor be addressed to 62, Camden Square, London, N.W.

The responsibility for all facts and opinions expressed in the signed articles and letters published in this Magazine rests with their respective authors.

---

### Messrs. H. SOTHERAN & Co.

are always ready to purchase Libraries or Smaller Collections of Scientific Works, Sets of the Learned Societies, &c., for their best value in cash. Distance from town is of no importance; and all books, &c., when bought, are removed without trouble or expense to the sellers.

*Just Published :*

CATALOGUE OF SECOND-HAND BOOKS ON

### Meteorology and Terrestrial Magnetism,

With a SUPPLEMENT of Works on AIRMANSHIP.

A copy may be had, post free, on application.

### HENRY SOTHERAN & Co.,

*Booksellers to His Majesty the King,*

140, STRAND, W.C., & 43, PICCADILLY, W.

Telegraphic Address : Bookmen, London. Codes : Unicode and A.B.C.

Telephones : (Strand) Central 1515. (Piccadilly) Mayfair 3601.

---

## NOW READY.

Cloth 8vo. 440 pages. With 79 Maps and Illustrations.

PRICE 10s.

## BRITISH RAINFALL, 1910.

THE FIFTIETH ANNUAL VOLUME.

COMPILED FROM THE RECORDS OF NEARLY  
5000 OBSERVERS

BY

HUGH ROBERT MILL.

LONDON : EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

---

### F. DARTON & CO.

have been awarded the

### GRAND PRIX

at the last

### 3 Great International Exhibitions

(MILAN, 1909; BRUSSELS, 1910; TURIN, 1911)

for the excellence of Self-recording and other

## METEOROLOGICAL INSTRUMENTS

of their manufacture.

*New Illustrated Catalogue, post free.*

Clerkenwell Optical Works,

142 St. John Street, & 52 Clerkenwell Road, London, E.C.

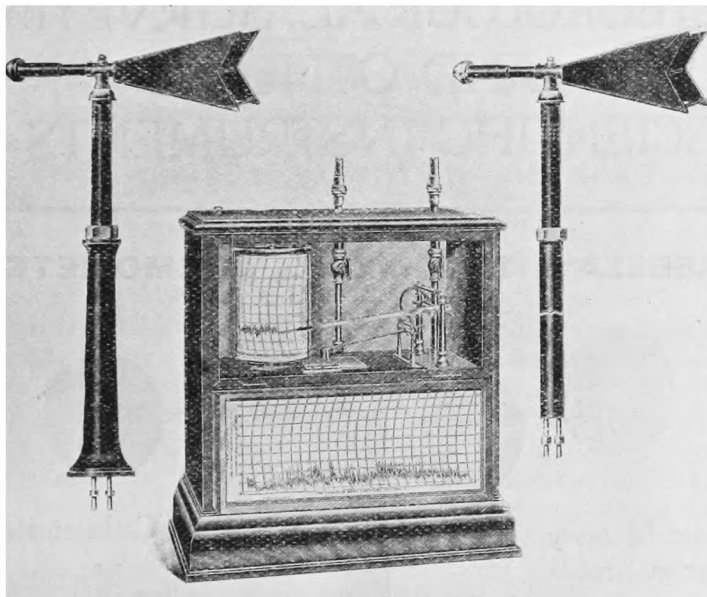
ESTABLISHED 1834.

# THE "PEANDAR"

## SELF-RECORDING

## PRESSURE-TUBE ANEMOMETER

(Registered Design No. 569,153).



Is a great advance on the Cup Anemometer, inasmuch as it records upon a daily (24 hours') chart, not only the mean velocity for a period, but gives the actual pressure at any moment, in addition to the maximum pressures during gusts.

Velocities up to 100 miles, or 200 kilometres, per hour may be recorded on this apparatus.

Price (including two fifty-foot lengths of Conductor Piping and 400 Charts, Ink, and spare Pen) with Vane Shaft on cast iron pillar and flange for bolting on to a roof,

**£23 10 0**

**Carriage paid and safely delivered within U.K.**

DESCRIPTIVE CIRCULAR SENT ON APPLICATION.

SOLE MAKERS:

**PASTORELLI & RAPKIN, LTD.** (ESTAB. 1750.)

**46, HATTON GARDEN, LONDON, E.C.**

ACTUAL MAKERS of all kinds of METEOROLOGICAL INSTRUMENTS

Contractors to H.M. Government.

**STANDARD INSTRUMENTS OF ALL KINDS.**

ILLUSTRATED PRICE LISTS POST FREE.

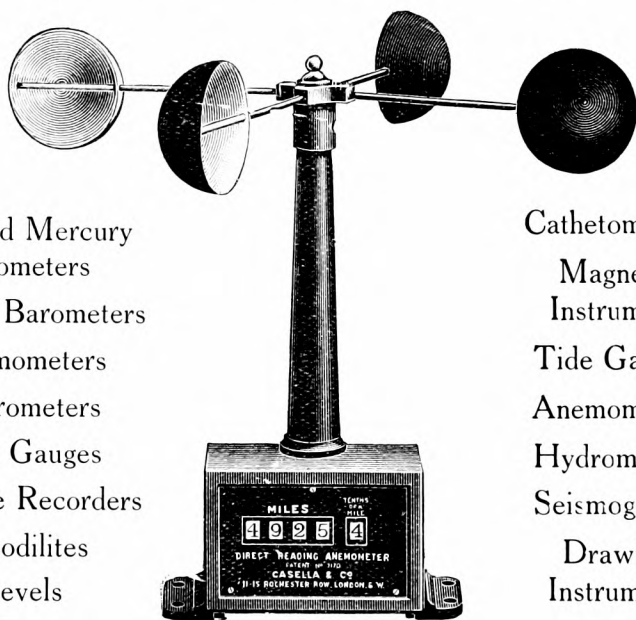


# C·F·CASELLA·&·CO·LTD

*Makers of*  
METEOROLOGICAL, SURVEYING  
AND OTHER  
SCIENTIFIC INSTRUMENTS

---

## CASELLA'S TOTALIZING ANEMOMETER



Standard Mercury  
Barometers  
Aneroid Barometers  
Thermometers  
Hygrometers  
Rain Gauges  
Sunshine Recorders  
Theodolites  
Levels  
Etc.

Cathetometers  
Magnetic  
Instruments  
Tide Gauges  
Anemometers  
Hydrometers  
Seismographs  
Drawing  
Instruments  
Etc.

PATENT No. 7170 07

This instrument is a great improvement on the ordinary dial anemometer

CATALOGUES ON APPLICATION

---

11-15, ROCHESTER ROW, VICTORIA ST.,  
LONDON, S.W.

# Symons's Meteorological Magazine.

---

No. 550.

NOVEMBER, 1911.

VOL. XLVI.

---

## IS THE ZODIACAL LIGHT A METEOROLOGICAL PHENOMENON ?

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

THE true nature of the mysterious luminosity known as the Zodiacal Light is still a matter about which considerable uncertainty exists, so that although we may certainly class it amongst τὰ μετέωρα (the things above) it cannot be definitely asserted that it is an astronomical or cosmical phenomenon rather than a meteorological or terrestrial one. Singularly enough, this apparition appears to have escaped the notice of the ancients, and even of the keen-sighted Arab observers of mediæval times, though obscure references to the "Trabes" occur in Pliny's Natural History and other works, which have been considered by some to relate to the Zodiacal Light, though it seems, on the whole, more probable that the Aurora is intended, and, indeed, even in recent times considerable confusion between the two phenomena has existed. It is somewhat doubtful whether Kepler ever saw the light or recognised its existence, and the first undoubted mention occurs in Childrey's "Natural History of England" (1659) and his "Britannia Baconica" (1661), in which works he draws the attention of the curious to a singular light noticed by him in the early spring evenings, describing its course in much the same terms as later observers. But it was through the observations of Dominique Cassini, one of the illustrious dynasty of astronomers at the Paris Observatory, that the existence of the phenomenon became generally known to the scientific world. He first saw it in March, 1683, and in consequence of his observations published a theory not differing greatly from what is now regarded as, on the whole, the most probable view of its nature. In our latitudes the Zodiacal Light is a soft conical or lenticular beam extending upwards from the western horizon in spring evenings, and from the eastern horizon on autumn mornings before sunrise, being best seen at those times of the year because the portion of the ecliptic along which it lies is then most nearly perpendicular to the horizon, and the light has, consequently, its greatest upward extension. Its axis lies nearly along the ecliptic or, perhaps, more nearly in the plane of the sun's equator, its course being almost entirely confined

to the limits of the Zodiac, which is the broad belt extending about  $8^\circ$  north and south of the sun's apparent path in the sky, whence the name Zodiacal Light. At its base near the horizon the breadth varies from about  $8^\circ$  to  $20^\circ$ , occasionally exceeding the latter dimensions, but its edges are so ill-defined and faint that much difficulty is experienced in saying exactly how far it extends. The light sometimes does not extend more than  $70^\circ$  from the sun's place in the sky, but occasionally has been traced over more than  $100^\circ$  from that position, whilst, as we shall presently mention, the "Gegenschein" is at an angular distance of  $180^\circ$  from the sun. Its brilliancy is usually interior to that of the brighter parts of the Milky Way, and the base is often of a reddish hue, due, no doubt, to the superposition of twilight effects upon it. In tropical regions it is seen of much greater brilliancy, of a pure white colour, and has been said to extend sometimes right across the sky, forming a complete ring. Many observations were made by Humboldt, both in Europe and during his journeys through tropical South America. He particularly noticed the great contrast between its luminosity in our latitudes and more favoured regions, and also the remarkable variations in its brilliancy as seen at different times from the same place, partly, but not wholly, to be accounted for by varying atmospheric conditions.

In 1855 the Rev. G. Jones, after a two years' cruise of the U.S. frigate *Mississippi*, published a volume dealing very exhaustively with his observations on the Zodiacal Light and deductions therefrom. On two occasions, when in latitude  $23\frac{1}{2}^\circ$  N. at the winter solstice, he saw the extraordinary spectacle of the Zodiacal Light simultaneously visible near both the eastern and western horizons from 11 p.m. to 1 a.m., for several successive nights. Humboldt relates that he, too, once saw a second light in the east contemporaneously with the principal beam in the west, which he then thought to be due to reflection. Brorsen was the first, however, definitely to detect another interesting feature in connection with this phenomenon. Watching the sky on moonless nights he several times noticed a large, feeble glow of very diffused light. This glow was of, roughly, circular shape, and from  $10^\circ$  to  $15^\circ$  in diameter. By a few nights' observations he found that this object was moving eastwards amongst the stars nightly, and that the position of its centre was almost exactly opposite to the sun's place in the sky, but perhaps slightly to the north of the ecliptic. An imaginary line drawn from the sun through the Earth's centre and prolonged into the sky would always pass near the centre of this object, which he accordingly named the Gegenschein or Counter-glow. The Gegenschein has since been carefully studied by Barnard in America, Backhouse in England, and others. It was well seen at Johannesburg during the autumn of 1910 by Mr. Innes and his assistants, and seems to have been especially distinct towards the end of September. In form it is usually seen rather as a somewhat elongated oval than circular, the centre about one degree north of the ecliptic and its

longitude approximately  $179\frac{1}{2}^{\circ}$  from the sun's place (Backhouse), the longer axis parallel to the ecliptic, and about  $7^{\circ}$  in length. Mr. Maxwell Hall, of Jamaica, in the "Monthly Weather Review," March, 1906, gives some results of his observations for thirty years of the Zodiacal Light and Gegenschein. He found a breadth varying from  $47^{\circ}$ , at an angular distance of  $30^{\circ}$  from the sun's place, to  $6^{\circ}$  at  $180^{\circ}$  angular distance, and examined its spectrum by means of a small, direct vision spectroscope. All that he could gather from these observations "showed that the Zodiacal Light contained reflected light from the sun." He found the Gegenschein to be sometimes invisible, at other times very distinct, varying little from the usual  $6^{\circ}$  or  $7^{\circ}$ , in breadth, but as much as  $30^{\circ}$  in length at  $180^{\circ}$  from the sun's position.

Observations made by other observers give considerable divergencies as to the character of the spectrum. The late A. C. Ranyard and Father Secchi found, in 1870, that the Zodiacal Light is produced by matter reflecting the sun's light, and obtained nothing but a faint, continuous spectrum, whilst Angström at Upsala, and Acrimiz in Spain, found the spectrum to be mainly two bright lines, which they identified with those given by the Aurora. Serpieri of Urbino, Gronemann of Holland, and others look upon the phenomena as a purely terrestrial one, possibly of an electrical nature, whilst most astronomers incline to the views of Cassini, adopted without much modification from later discovery. Cassini considered that in the space between the sun and the Earth there circulates an immense number of small bodies, forming a ring, these particles reflecting the sunlight, though too small to be visible separately. Observations showing that the Zodiacal Light extends more than  $90^{\circ}$  away from the sun's position in the sky, it is evident that some part of the matter lies beyond the Earth's orbit, and accordingly it has been assumed that these countless small bodies form rather a kind of thin, flat sheet whose innermost edge may, perhaps, be continuous with the solar corona, and whose outer members lie far beyond the region travelled over by our planet. That the Earth encounters such objects is well known from the phenomena of meteoric stones, aerolites, and shooting stars, and, in addition, "empty space" must contain myriads of fragments of "cosmic dust," *débris* from comets' tails—in short, the matter of which the resisting medium is composed. Some of these bodies, moving in elongated elliptic orbits whose nearest point is close to the central body, by falling upon the sun may produce the appearances known as sun spots, and the equatorial acceleration of solar rotation. Mr. Jones, however, from his observations considered that they showed the existence of a "nebulous ring, with the Earth for its centre, lying within the orbit of the moon." Thus our own Earth, without our previously suspecting it, became endowed with a ring like the inner "crape ring" of Saturn. Commander Wilks, however, controverted Jones's views and regarded the Zodiacal Light as the result of the illumination of that portion

of the Earth's atmosphere upon which the rays of the sun fall vertically in tropical regions. He contrasted the tints of the evening and the morning Zodiacal Lights, describing the former as of a warm golden or purplish hue, the latter as being "cold and silvery," often in the tropics appearing as a bright brush of light, like a ray of the aurora, but without vacillating or pulsations.

Dr. Gronemann asserted that the connection between the morning and evening cones of light is not definitely established, and there is no evidence of their participation in the diurnal motion, so that, in his opinion, it is a purely terrestrial phenomenon, as already stated, "probably of an electrical nature." On the other hand, evidence is not wanting of its change of appearance in the course of the year, and during a single night, its rising and setting, whilst these, as well as its position along the ecliptic rather than along the equator (the plane of the Earth's orbital motion, not that of the diurnal motion), are all in favour of the theory of its extra-terrestrial origin.

The late Sir William Huggins, who was inclined to regard the solar corona as probably due to the continual outflow of very minute particles from the sun, considered that the Zodiacal Light is a result of the yet further extension of these bodies. Dr. Veeder, of Rochester, New York, draws attention to changes in magnetic phenomena, and the varying presentment of the Earth and sun, as all having their influence on the peculiarities of the Zodiacal Light. That some part at least of the differences of opinion already outlined arises from the confusion between distinct phenomena is fairly evident. A phenomenon, which he called the Lunar Zodiacal Light, was described by the Rev. G. Jones as being a short, oblique cone lying nearly in the plane of the ecliptic, and in the immediate vicinity of the moon, but has not been noticed by others. On occasions comet-like tails have been seen extending on each side of the moon to a distance of eight to ten times its diameter. The *horizon light* is another phenomenon occasionally seen. It is a faint white band, with parallel sides, lying all round and parallel to the horizon, separated from it by a dark interval. It is brightest and sharpest at its lower edge, which is usually at an altitude of about  $5^{\circ}$ , whilst the upper and fainter edge has usually an altitude of about  $20^{\circ}$ . At times it is as bright as the Milky Way, at others fainter than the Gegenschein. It appears to be caused by reflected starlight. Of the Gegenschein a number of different theories have been proposed. One of the most recent is that suggested by Mr. Innes, director of the Transvaal Observatory, in a letter to *Nature* (June 16th, 1910). The Earth is bombarded by meteorites which are continually throwing off corpuscles; these are repelled by the Earth and sun, thus producing in the part of the sky opposite the latter a faint tail, less extensive than that of a comet, but bright enough to be visible on a dark night as the Gegenschein. Professor Gylden has suggested that there are numerous small bodies moving in somewhat unstable orbits about the Earth, and more concentrated about the

region nearly opposite the sun's place. Professor E. E. Barnard, who had not previously heard of its existence, in 1883 independently discovered it, and watched its changes of form. He found it to be invisible in June and December, most round and conspicuous in March and September, like the Zodiacal Light, with which it is intimately connected. Nevertheless, though observations made simultaneously in North America and at Arequipa, in Peru, showed the absence of any large parallax (or displacement due to change of position on the Earth's surface), seeming to indicate that its distance is much greater than that of the moon, Professor Barnard is inclined to the view that it is an atmospheric phenomenon. He says, "When well seen the 'Gegenschein' always appears to be not far off, rather an illumination of our own atmosphere than a distinct celestial body." ("Popular Astronomy," No. 64.) Another view connects it with the asteroidal zone. A vast number of minute planetoids, when opposite the sun's place would shine with "full" disc, and would be collectively seen as a luminous patch. Away from this position less of their illuminated hemispheres would be turned towards us, and the particles would be further off from our planet, so that the light would rapidly diminish. Thus we should have, what is observed, a maximum of light opposite the sun, due to full illumination and comparative proximity, whilst the particles in other positions would be almost, if not quite, invisible. Professor Searle, of Harvard, who reviewed and discussed most of the previous observations, though not absolutely accepting any theory of the Zodiacal Light and Gegenschein, was inclined, on the whole, to regard the meteoric theory as the most probable.

Further observations as to all the peculiarities of these phenomena are still desirable. Unfortunately, the neighbourhood of cities and the populous "haunts of men" are not well suited for such researches, though Flammarion has recorded that even in Paris he once saw the Zodiacal Light with remarkable brilliancy during the month of February, 1871; but this was at a time shortly after the siege, when that city was without gas, and there was little artificial illumination to interfere with its visibility. A series of concerted observations from meteorological and astronomical observatories within the tropics, carried out for a number of years consecutively, seems alone likely to afford the means of discriminating between the various conflicting views as to its nature or, perhaps, of furnishing a more reliable theory. It is somewhat remarkable that our knowledge of these phenomena, which require no instrumental equipment for their observation, is but little greater than was possessed by the first discoverers, notwithstanding the great development of science in almost every other direction. The application of photography may be possible, but favourable opportunities for such work are somewhat rare. So far a complete and satisfactory answer to the question with which we commenced this paper cannot be given.



## THE WEATHER OF OCTOBER.

By FRED. J. BRODIE.

AFTER the stirring performances of the three preceding months, the meteorological history of October may be regarded as tame and uneventful. There were no great extremes either of heat or cold; the rainfall over the country generally, did not differ very materially from the average; and, with the exception of a violent outburst at the commencement of the month (bequeathed by September) wind storms were rare, and seldom of any great severity. One of the most interesting features was, perhaps, the frequent appearance of heavy rain around the south-east coast of England.

At the opening of the month the weather over England remained under the influence of the deep cyclonic disturbance which had passed across the United Kingdom on September 30th, a cool northerly wind still blowing with the force of a gale on our east and south-east coasts. On the 2nd and 3rd, when the depression moved in a dilatory and irregular fashion over Denmark and the Baltic, small secondary disturbances were developed over Great Britain and the North Sea, the weather remaining in a cool, changeable condition. On the 4th a large anticyclone began to extend over the country from the northern part of the Atlantic, and improving weather was experienced in all but our eastern and south-eastern districts, where thunderstorms occurred on the 5th, with heavy rain on the coasts of Kent and Sussex. Two days later, a shallow barometrical depression which moved north eastwards from the Bay of Biscay across the south-east of England to the North Sea and Denmark, occasioned another heavy fall in the same locality, but after this, the Atlantic anticyclone extended over the whole of Western Europe, and fair, but misty weather became general. The day temperatures at this time were slightly above the average, but the clear skies favoured the progress of terrestrial radiations, and between the 7th and 10th, night frosts occurred in most places. It was only in central Scotland that the thermometer fell much below the normal, but on the surface of the grass from 8 to 10 degrees of frost were registered in several parts of the Kingdom. At Balmoral the exposed thermometer fell to a minimum of 20°, at Hampstead to 19°, and at Llangammarch Wells to 17°. After the 11th, the anticyclone withdrew to the eastward, and on the 12th and 13th, when a depression moved in a south-easterly direction outside our south-west coasts, a mild breeze from the south-eastward set in, the thermometer rising slightly above 65° in many parts of England and Wales, and touching 68° at Greenwich, Manchester, Cullompton and Bettws-y-coed. Thunderstorms and heavy rain occurred on the 13th at several of the south coast stations. The disappearance of the south-western depression was followed by a temporary extension of the Continental anticyclone over all our more northern districts, the wind being easterly and the weather fair, but misty or foggy in many localities. After the 17th, a large cyclonic

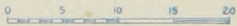
THAMES VALLEY RAINFALL OCTOBER, 1911.



ALTITUDE  
SCALE

| Below 250 feet | 250 to 500 feet | 500 to 1000 feet | Above 1000 feet |
|----------------|-----------------|------------------|-----------------|
|                |                 |                  |                 |

SCALE OF MILES



Symons's Meteorological Magazine.

Watershed of River Thames above Teddington, and River Lee above Feltham Water.

Rainfall Stations reporting



disturbance began to spread in very gradually from the Atlantic, the mild south-easterly winds in the front of the system resulting in a rise of the thermometer on the 18th and 19th to  $65^{\circ}$  or a trifle above it in many parts of England, Wales and Ireland and to  $68^{\circ}$  at Guernsey. On the 21st and 22nd, the centre of the oceanic depression moved eastwards across the United Kingdom to the northern portions of the Continent. Fresh disturbances soon arrived however, off our western and northern coasts, and for the remainder of the month the weather was in a rough, unsettled state, with occasional gales from between south-west and north-west, and frequent heavy falls of rain. Temperature was usually above the average in England and Ireland, but below it in Scotland, with snow in several places on the 25th and 26th. On the nights of the 25th to 28th, sharp frosts occurred very generally, the sheltered thermometer falling early on the 29th to  $25^{\circ}$  or less in many parts of the country, to  $20^{\circ}$  at Nairn and Llangammarch Wells,  $18^{\circ}$  at West Linton, and  $15^{\circ}$  at Balmoral. On the surface of the grass the readings were as low as  $8^{\circ}$  at Llangammarch Wells,  $13^{\circ}$  at Balmoral, and  $15^{\circ}$  at Birmingham.

The mean temperature of the month was below the average in the east of Scotland and the north-east of England, but above it elsewhere, the excess being greatest in our eastern and south-eastern counties. In the north the absence of warmth was rather striking; at Leith, the thermometer, for the first time in October since 1892, failed to rise above  $59^{\circ}$ . The duration of bright sunshine varied considerably, but was, as a rule, not far removed from the average.

---

## METEOROLOGY AT THE BRITISH ASSOCIATION.

### SECOND PAPER.

By E. GOLD, M.A.

IMMEDIATELY after the President's Address in Section A, Dr. W. J. Humphreys contributed a paper on "The Earth as a Radiator." From the results obtained by registering balloons for the temperature of the stratosphere in different latitudes, the author found approximate values for the radiation from the Earth (mainly from the atmosphere) in different latitudes. The results showed that this outward radiation was least near the equator, where the inward radiation is greatest, and greatest in temperate latitudes, a secondary minimum at the pole being indicated by the ascents in high latitudes. In the discussion it was pointed out that the results depend largely on the assumption that the atmosphere acts as a "gray" body, an assumption difficult to reconcile both with laboratory experiments and with the circulation of the atmosphere. The values might be subject to considerable correction for irregularities in the absorbing power for different parts of the spectrum.

Dr. Shaw made the most interesting and effective contribution on the part of Section A to the joint discussion on Aeronautics. His

comparison of an aeroplane in a variable wind to a bicycle on a bumpy road was peculiarly happy and suggestive. In the course of his remarks he stated that the aviator had discovered what was rather loosely described as "a hole in the air." The phenomenon might be associated with the eddy caused by a solid obstruction such as a cliff, or it might arise from some hitherto unknown peculiarity in local atmospheric circulation, or it might be the result of the action on the aeroplane of known phenomena which had not been considered in this connection. Mr. Berriman, in opening the discussion, had assumed a uniform wind, but the fact was that there was no such thing as a uniform wind in the atmosphere in which aviation was practised. An average wind of twenty miles per hour would oscillate between ten and thirty miles per hour. The effect of this was to produce variations of pressure on the aeroplane which might be compared to the variations of the forces in the vertical plane through the direction of motion produced on a bicycle by a bumpy road. There were, however, simultaneous oscillations of direction, and to complete the analogy it would be necessary to imagine something which would produce pushes on the bicycle from the side. It might be that the two oscillations together would account for the effects experienced by aviators.

In the course of the same discussion, Mr. J. S. Dines pointed out that the variability of the wind was most marked near the earth's surface, and that it would not be possible to overcome the difficulties by a mere increase of speed, because the speed would need to be greatest near the surface where the plane was started or stopped.

On Monday Dr. Shaw showed slides illustrating the changes which occurred during the thunderstorm and squall on Friday, July 28th, 1911, when the wind at South Kensington rose suddenly to 56 miles per hour, and rain fell at the rate of an inch in ten minutes nearly. This squall was comparatively local, but on the next day a similar squall crossed the country from the south-west of Ireland to Scotland, and remarkable dust storms in South Wales were associated with it.

On Tuesday the first meteorological paper was Commander Campbell Hepworth's discussion of the effect of the Labrador current upon the surface temperature of the North Atlantic, and of the latter upon the air temperature and barometric pressure over the British Isles. The purpose of the paper was to show the importance of the Labrador current in modifying the influence of the Gulf Stream. The discussion covered the five years 1903-7, and showed that an increase in the current was followed by a decrease in the temperature of the water in a zone stretching from Florida Strait to Valencia. Unfortunately Commander Hepworth was unable to be present, and the short abstract gave only the general conclusions. Dr. Dickson expressed his pleasure at the completion of such an important piece of work, and looked forward to the full publication of the discussion, which appeared to confirm certain results which he had found from a consideration of two years' observations.



Dr. Shaw showed models representing air currents up to heights of 10 kilometres, which had been obtained from the observations of pilot balloons, made at Ditcham Park by Mr. Cave. The models were instructive to those unfamiliar with the details of upper air observations and suggestive to those bent upon unravelling the mysteries of atmospheric circulation.

Dr. Humphreys read a short paper on the water vapour in the atmosphere on clear days, as determined from the observations made by registering and manned balloons. The thickness of the layer of water which would be formed if all the vapour were condensed, was found to be  $2e$  millimetres, where  $e$  is the vapour pressure at the earth's surface in millimetres of mercury. The value found by Hann, as the average of all days, was  $2.3e$ .

Mr. Gold gave a brief account of the results obtained from the ascents in Ireland, undertaken by the Committee for the Investigation of the Upper Atmosphere. These successful ascents had been made from Mungret College, Limerick, in the present year, and on July 6th, values for the temperature had been obtained up to 21km.

Dr. Dickson put forward the suggestion that the treatment of general atmospheric circulation might be simplified by taking the equatorial circulation to form a system by itself, with little interchange with the circulation in higher latitudes. Mr. Gold repeated Mr. W. H. Dines's objections to a similar suggestion which he had made in a Report read at Winnipeg in 1909. The fact that the winds in the equatorial regions have a persistent easterly component, make it essential that there should be interchange with the air from regions where the motion is from the west, in order to prevent the frictional forces from destroying the relative westerly momentum in the region of the equatorial circulation. He added, that even partial interchange would be insufficient, and that there must be complete transference, from one region to another, of the air in the troposphere, if the frictional effects are mixed throughout the troposphere in their respective regions.

On Wednesday, Dr. Ball and Mr. J. I. Craig communicated a paper, read by Mr. Craig, on the Use of Diagrams in the Classification of Climates. The diagrams dealt with temperature and humidity and showed the annual course of these elements by a single closed figure for each of a selection of places from different parts of the world. The diagrams proved very suggestive, and Mr. Craig pointed out how they could be used, not only by the man who was considering his health, but also in connection with such problems as cotton growing. The facility with which the similarity or the differences between climates of different places can be exhibited by the diagrams, ought to make them of great practical use.

On Saturday many of the meteorologists present had the pleasure of listening to Dr. Mill's interesting evening lecture on "Rain." It was refreshing to hear him emphasize the fundamental importance of convection as the rain-maker.

## INTERNATIONAL BALLOON ASCENTS.

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

*May 5th, 1909.*

| Starting Point.  | Country.     | A<br>miles. | B<br>° F. | C<br>miles. | D<br>° F. | E<br>miles. | F        |
|------------------|--------------|-------------|-----------|-------------|-----------|-------------|----------|
| Petersfield .... | England .... | 6.9         | -82       | 9.3         | -76       | 59          | W.       |
| Brussels .....   | Belgium .... | 7.6         | -81       | 8.4         | -79       | 81          | W.       |
| Lindenberg....   | Germany....  | 7.1         | -89       | 10.6        | -74       | 31          | W. by S. |
| Paris .....      | France.....  | 7.4         | -69       | 8.9         | -62       | 44          | W.S.W.   |
| Strassburg ....  | Germany....  | —           | —         | 6.6         | -74       | 31          | W. by S. |
| Munich.....      | „ ....       | 6.8         | -63       | 8.6         | -47       | 49          | W.S.W.   |
| Pavlovsk .....   | Russia ..... | 5.8         | -54       | 9.1         | -51       | 94          | E.S.E.   |

*May 6th.*

|                   |              |     |     |      |     |    |           |
|-------------------|--------------|-----|-----|------|-----|----|-----------|
| Pyrton Hill....   | England .... | 7.1 | -85 | 9.8  | -63 | 34 | N.W.by W. |
| Petersfield ....  | „ ....       | 8.1 | -84 | 11.9 | -76 | 51 | N.W.by W. |
| Brussels .....    | Belgium .... | 8.2 | -72 | 10.1 | -59 | 40 | W.        |
| Lindenberg....    | Germany....  | 6.8 | -77 | 10.2 | ?   | 75 | S. by W.  |
| Paris.....        | France ....  | 6.9 | -53 | 8.5  | -53 | 34 | S.S.W.    |
| Strassburg ....   | Germany....  | 7.2 | -80 | 9.8  | -62 | 35 | S.W.by W. |
| Munich .....      | „ ....       | 7.2 | -73 | 12.8 | ?   | 31 | S.W.      |
| Vienna .....      | Austria..... | 8.3 | -73 | 11.1 | ?   | 53 | S.S.W.    |
| Nizhni Olchadaeff | Russia ....  | 6.1 | -50 | 9.5  | -36 | 31 | N.E.      |

*May 7th.*

|                  |              |     |     |      |     |    |          |
|------------------|--------------|-----|-----|------|-----|----|----------|
| Manchester....   | England .... | 7.5 | -64 | 11.3 | -57 | 16 | W.S.W.   |
| Pyrton Hill....  | „ ....       | 7.9 | -67 | 9.7  | -54 | 24 | W.       |
| Petersfield .... | „ ....       | 7.5 | -79 | 10.3 | -62 | 29 | W.       |
| Brussels .....   | Belgium .... | 7.3 | -87 | 7.6  | -85 | 36 | S.W.     |
| Hamburg.....     | Germany....  | 7.3 | -77 | 10.9 | -58 | 62 | S. by W. |
| Paris.....       | France ..... | ?   | ?   | 10.1 | -83 | 39 | W.S.W.   |
| Strassburg ....  | Germany....  | 7.4 | -81 | 9.6  | -66 | 44 | S. by W. |
| Munich.....      | „ ....       | 7.8 | -74 | 17.0 | -53 | 82 | S.       |
| Vienna.....      | Austria .... | 5.6 | -61 | 8.1  | -56 | 31 | S.       |
| Pavlovsk ....    | Russia ..... | 5.1 | -52 | 9.3  | -50 | 17 | S.S.W.   |

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 weather throughout the three days was dominated by an extensive high pressure area which lay over the north of Europe, a fact which appears from the unusual westerly drift of nearly all the balloons.

The temperature at Paris, on May 6th, seems rather high, but otherwise the values seem to follow the distribution of the surface pressure according to the usual rule.

## Correspondence.

*To the Editor of Symons's Meteorological Magazine.*

## TEMPERATURE OF RAIN.

Is there any record of the temperature of rain? If so, what is the highest temperature recorded—(a) for these islands; (b) for the world?

A. F.

## THE OCTOBER RAINFALL.

I THINK the rainfall at Tunbridge Wells during the past six months has been so remarkable that it will be worthy of a note in your Magazine. I here place beside one another the 5 months—May to September, and the five “weekly periods,” of which October may be said to be made up.

| Month.         | in.  | Week of October. | in.  |
|----------------|------|------------------|------|
| May.....       | 1·09 | 1st.....         | 1·93 |
| June ..        | 2·41 | 2nd.....         | ·32  |
| July.....      | ·38  | 3rd.....         | 1·53 |
| August .....   | ·97  | 4th.....         | 1·86 |
| September..... | 1·52 | 5th.....         | ·60  |
| Total 5 Months | 6·37 | Total October    | 6·24 |

It will be seen from this that nearly as much rain fell in October as in the previous five months. If, indeed, we add the rainfall of the opening days of November, which amounts to ·59 in., thus making a full fifth week, we get the extraordinary total for the period between the 1st October and the 4th November, of 6·83 inches.

D. W. HORNER,

*Haukenbury, Tunbridge Wells, November 4th, 1911.*

F.R.Met.Soc.

THE Rainfall in the week ending at 9 a.m. on November 5th, was so extraordinary, even for this rainy district, that I am sending it to you. At 10.45 p.m. on October 29th it began to rain, and—

|                        |          |             |
|------------------------|----------|-------------|
| At 9 a.m. on Oct. 30th | 4·17 in. | had fallen. |
| “ “ “ Oct. 31st        | ·92      | “ “ “       |
| “ “ “ Nov. 1st         | ·18      | “ “ “       |
| “ “ “ Nov. 2nd         | 1·31     | “ “ “       |
| “ “ “ Nov. 3rd         | ·17      | “ “ “       |
| “ “ “ Nov. 4th         | 2·00     | “ “ “       |
| “ “ “ Nov. 5th         | 1·43     | “ “ “       |

This made a total of 10·18 inches in 7 days, of which nearly 5 inches fell in 24 hours (between mid-day on October 29th and mid-day on October 30th); most of this 10 inches fell at night—Wednesday and Saturday last being nice, bright days till evening.

RALPH FLETCHER.

*Rydal Farm, Ambleside, 6th November, 1911.*

[It is interesting to notice that the rainfall at Seathwaite on October 29th, read at 9 a.m. on the 30th, was 7·00 in., a figure which has very rarely been exceeded.—ED. *S.M.M.*]

DOUBTLESS you will receive much information as to the shortness of rainfall this year. The following fact may interest you ; possibly it is almost exceptional. At this west end of the Isle of Wight, each individual month so far this year is short of the average. I notice that in 1896 the first eight months had a total rainfall less than the first eight months of the present year. Now that we have completed nine months, I find that not one previous year gave us so small a total as 1911 for the first three-quarters of the year. I give the figures since they are remarkable. I have taken meteorological readings here for a quarter of a century.

|                 | Previous lowest,<br>1898. |       | 1911.      |       | Average Year. |
|-----------------|---------------------------|-------|------------|-------|---------------|
| January .....   | ·60 .....                 |       | 1·16 ..... |       | 2·15          |
| February .....  | 2·56 .....                |       | 1·40 ..... |       | 1·82          |
| March .....     | ·35 .....                 |       | 1·91 ..... |       | 2·00          |
| April .....     | 1·36 .....                |       | 1·45 ..... |       | 1·78          |
| May .....       | 3·59 .....                |       | 1·18 ..... |       | 1·62          |
| June .....      | 1·26 .....                |       | 1·48 ..... |       | 1·91          |
| July .....      | ·44 .....                 |       | ·15 .....  |       | 1·91          |
| August .....    | 1·43 .....                |       | ·50 .....  |       | 2·33          |
| September ..... | 1·11 .....                |       | 1·22 ..... |       | 2·00          |
| Totals          | 12·70                     | ..... | 10·45      | ..... | 17·52         |

The driest quarter before this year was April, May, June in 1893, which only gave us 1·94 inches of rain. The driest half-year I have known here, was January to June, 1892, with a total of 5·99 inches. The driest year was 1908, with a total of 21·68 inches.

Our average rainfall here for the year amounts to 27·66 inches.

JOHN DOVER.

*Aston House, Totland Bay, Isle of Wight, 2nd October, 1911.*

## HOW OUR HOTTEST SUMMER ON RECORD WOULD APPEAR IN THE SOUTH OF EUROPE.

I HAVE read with much interest Mr. Bonacina's letter in the October number of the Magazine, on "How our hottest summer would appear in the South of Europe," especially in view of your statement in *The Times* of August 10th, that a shade temperature of 97°·1 had never been reached in Colombo, as you believed. I do not know what the maximum was at the place where I was staying on August 9th, but I found it very unpleasant to go near the garden door on the S. side of the house, as it felt like approaching an oven. Of course Mr. Bonacina is speaking of the mean temperature, but I hope he or others will give us some more comparisons, as it is very interesting for home-keeping people to realise the conditions of other countries in temperature and weather.

E. M. TAWNEY.

*Oxford, October 25th, 1911.*

### CUMULUS CLOUDS ON OCTOBER 21st.

THE mighty chain of cumulus which bounded London's eastern horizon on the afternoon of October 21st, the day previous to the destructive gale on the south coast, appeared to mark the line of the trough of a cyclonic depression, for the chain appeared about 3 p.m., immediately after a smart shower and stiff squall, followed by clearing sky and some reduction of temperature.

I happened to be on Hampstead Heath that afternoon, looking towards Highgate, and have never seen a line of cumulus more strikingly endowed with all the mystery, power and majesty of the high mountains than that which adorned that Essex horizon. As I watched those snowy radiant peaks, sharp-edged and cut in to the green-blue of the heavens, those gloomy cloud caverns, those huge flanking buttresses, each a mountain in itself, with the dark encircling vapour wreaths, I saw in an instant, by analogy, the root of that ennobling influence so powerfully described by Ruskin, which hallows the simple lives of the few who dwell among the high mountains. It was of the cumulus more than any other cloud-form that the Psalmist was thinking when he wrote "Thy truth reacheth unto the clouds" (*Ps. cviii. 4*), and let us discern the inner meaning of these words every time our skies break and the clouds dispose themselves in a sublime chain of lofty summits.

L. C. W. BONACINA.

*Hampstead, N. W., October 27th, 1911.*

---

### GREAT HEAT IN A THUNDER SQUALL.

It may interest you to know that at 9 p.m., on the 20th September, a thunder cloud approached from the west, bringing with it a squall of wind that caused the temperature to rise in a few minutes to 110° F. By 9.45 p.m. it had fallen again to 67°, which I expect was about the temperature before the squall. I do not think my thermometer responded quick enough to register the highest point, but it is safe to say it rose 40° in five minutes.

F. B. PARKINSON.

*Madibi Mines, Kimberley, South Africa, 1st October, 1911.*

---

### HEAVY RAIN IN SNOWDONIA.

NEARLY half the rain of October fell in the last three days. On the 29th it commenced at 10 a.m., and continued all day. The wind, which had force 5 in the morning, increased to a good gale at night; 3.03 in. rain fell at Pen y Gwryd. On the 30th very heavy rain caused large floods, the Glaslyn and Gwryd rose faster than I have seen them rise before. 1.21 in. of rain fell. At Llydau, for the two days 29th—30th, 4.95 in. fell at No. 10 gauge, and 5.82 in. at No. 9.

For the week, October 29th to November 4th inclusive, 9.52 in. of rain fell at Pen y Gwryd, and 12.99 in. at Llyn Llydau No. 9.

A. LOCKWOOD, F.R.Met.Soc.

*Pen y Gwryd, November 8th, 1911.*



## A LECTURE AND THE NEWSPAPERS.

PRESS-CUTTING agencies are always providing surprises for their clients, and nothing has struck us more as a result of their efforts than the amount of currency reports of scientific proceedings of minor importance receive, and the small public notice that is taken of the more valuable scientific news.

We have before us a mass of cuttings relating to the lecture on "Rain," delivered in Portsmouth on September 2nd, by Dr. H. R. Mill, which we have sorted out into 58 cuttings containing substantially a report, and 34 cuttings containing editorial comments.

As regards reports : space is of course never available for a verbatim report ; but a lecturer is frequently asked for an abstract of his lecture beforehand. Such an abstract is rarely printed completely, or in such a way as to preserve the proper proportions of the various parts of the subject, so that in the best circumstances the public rarely receive what the lecturer believes to be a fair abstract of his discourse, but only such portions of it as an editor considers most likely to interest his readers. In circumstances which are not the best, a reporter either modifies the lecturer's abstract or selects extracts from his own shorthand report, of a character which he thinks likely to attract, and after editorial revision and curtailment this is printed. As regards comments, they are made in practically all cases on the reports as printed, and if the reports are misleading the value of the comments is small, though as we shall show, their manner may be amusing. A lecture, such as that under discussion, which is continuously illustrated by maps, diagrams and photographs thrown on the screen, appeals simultaneously both to eye and ear, and would be at best but a poor exposition to a blind man who heard it all, or to a deaf man who saw it all. A verbatim reporter would from this point of view be a blind man, and the only way of giving a fair idea of such a lecture would be to follow it with both eye and ear, and take occasional notes as memoranda. A lecturer of experience does not occupy his time in reciting information, every word of which it is essential to remember ; in this respect a lecture differs entirely from a chapter in a text book. The utmost that can be hoped for is—(1) that no fairly attentive auditor can carry away a positive error supposing that it is truth ; (2) that every attentive auditor can follow the course of reasoning without fatigue, and retain a clear general impression of the whole. To secure as near an approach to this as possible, the lecturer must suit his manner of presentation to his audience, endeavouring to address the average member of it, in such a way as not to make the more instructed feel that what is said is infantile, and not to make the less instructed feel that it is beyond hope of comprehension. To an audience of advanced students in the special subject, technical terms are permissible without circumlocution, and are necessary to convey the most precise information ; to an educated

audience accustomed to apply their minds to new ideas, a few technical terms may fairly be used if they are clearly defined at the first time of using; but to an audience unversed in the subject, and unaccustomed to receive new ideas, the presentation must be entirely devoid of technicality, and it will be found in practise that the description of a technical idea in every-day language requires the use of so many words that the idea is brought gradually into the mind and the shock of novelty may be largely overcome, so that it is received almost as something familiar and is not alarming. The use of many simple words instead of one technical term acts as an automatic brake on the lecturer, preventing him from presenting ideas unfamiliar to his audience so rapidly as to be hopelessly confusing; but in any case, close attention on the part of the audience is required to follow the unfamiliar ideas as they are presented, and their meaning developed. The moment that overstrained attention produces weariness, the lecture is over so far as any good it can do is concerned; but the slightest relaxation of attention on the part of an audience is instantaneously perceptible by the lecturer even in the dark, and it is his duty then to allow the audience rest by the relief of a laugh if a touch of humour can be introduced, or to spur the flagging attention by a totally unexpected application of the line of reasoning to something of general interest, or, should necessity arise, to sacrifice altogether what may even be his own favourite part of the subject and go on to something easier. Should the audience see the purpose of the laugh, or the thrill, or the change of subject, it is likely to fail of its effect, so that whatever happens, the continuity of the discourse must never appear to fail if the general impression of the lecture as a whole is to be produced. This introductory statement is required because unless a critic knows the audience to which a lecture is addressed, and the purpose of allowing a gleam of humour to flicker at one point or another, he is very apt to mistake the manner of presentation for the lecturer's ideal of the best way of expounding his subject, and to look on the humour as an end aimed at, instead of as an aid brought in to meet an emergency.

We cannot attempt to analyze the various reports which varied in length from nearly a column to about five lines, and followed one or other of about four original reports which were copied, modified, or selected from by the various newspapers; but there was a tendency to pepper even the shorter notices with "(laughter)" at frequent intervals. As a matter of fact all the statements which were introduced to relieve tension by a laugh, could have been made in five minutes, while the serious side of the subject occupied seventy minutes.

The following is the lecturer's abstract of the lecture as delivered, the number of minutes devoted to each part of the subject being stated in brackets, and the various illustrative facts adduced being omitted:—

A very common idea of Rain is that it is a nuisance, spoiling pleasure out of doors, and stopping work. Starting from this we may look at the measures

adopted for abating the nuisance, for example by farmers in drying hay and architects in designing houses (10 mins.). The nature and habits of rain must be studied by the scientific method, which depends in the first place on accurate measurement, which for some comparative purposes may be indirect, like the records of the height of the Nile in Egypt, but for most purposes must be direct by means of rain gauges. The standard rain gauge of the present day is the result of successive simplifications of the earlier designs (5 mins.). To measure accurately one-hundredth of an inch of rain involves the use of a glass so much narrower than the surface which catches the rain that the amount which corresponds to one-hundredth of an inch on the larger surface stands high enough to be easily seen. All rain gauges should be of uniform pattern, exposed in the same way in similar surroundings, the amount of rain read at the same hour, and the record kept legibly and correctly, so as to avoid the common errors which are made by hundreds of observers every year (10 mins.). The existence of a number of rain gauges separated by short intervals of space makes it possible to correct many errors by careful comparison, and the best form of comparison is to enter the readings of the various rain gauges on a map. The 5,000 rain gauges at work in the British Isles enable this to be done in most cases, but some districts are still poorly represented. Rainfall maps are made most expressive by drawing lines of equal rainfall, and tinting the areas of higher fall (7 mins.). The study of rainfall maps for days of heavy rainfall enables two types of storm rain to be distinguished, both of which in this country are apparently independent of the form of the ground and dependent only on up-rising air-masses set in motion by causes residing in the atmosphere. Whatever causes air to rise causes rain to fall, and the study of thunder-storm rains shows that as much as 4 inches of rain may occur in a single afternoon in any part of the British Isles, such falls inevitably producing great damage. The long-continued heavy rains accompanying the passage of an area of low pressure across the country may produce an equally great amount, though usually distributed over a whole day or several days, and the area of heaviest fall is usually situated to the left of the track of the centre in whatever direction the storm travels (17 mins.). Such exceptionally heavy rains form but a small proportion of the total rain for a year, most of which falls with wind which is moving nearly horizontally and rises only when it meets the upward slope of hills; on rising the air is chilled and more rain falls from it. Thus in every locality and for the country as a whole the average annual rainfall varies, other things being equal, with the height of the land; and a map of the average rainfall closely resembles a map of the elevation of the ground (5 mins.). The rainfall of every year differs from the average, but to a different degree and often in a different direction in various parts of the country. When the total rainfall for the whole country in each year of a long series is compared one sees that there are sometimes spells of years all with more than the average rainfall, and sometimes spells of years all with less than the average rainfall; but usually wet and dry years alternate at shorter intervals, for instance from 1889 to 1907 there was a continuous succession of two dry years followed by one wet. This order broke down in 1908, and it appears as if it were altering into an order in which for a time the number of wet years would be greater than the number of dry years (6 mins.). Having viewed rain as a nuisance and as

a subject of scientific study, it remains to show its supreme importance in the economy of the world in supplying rivers, shaping scenery and regulating the luxuriance of vegetation, also its supreme utility to mankind as the only source of water supply, and a valuable means of producing work in rapids and waterfalls. Seen in its true position rain is only one phase of the grand circulation of water in Nature, when after being raised by the heat of the sun as vapour from the sea, and wafted by the wind to the land, it condenses in clouds whence rain descends on the high ground, gathers into streams, and flows as rivers back into the sea, transforming the world whose work it does on the way (15 mins.).

We cannot attempt to summarize the reports as printed; a few were well done touching on most of the essential features, but the greater number simply seized on an illustration, often disregarding the thing illustrated, and noted the "laughter" without a hint that it was merely an expression of relief after close attention to a stiff bit of reasoning. Twenty-eight of the headings fastened on the probability of the impending preponderance of wet years over dry; but every one gave it a far more definite form than in the lecture; thus "Wet Weather ahead—gloomy forecast," "Succession of rainy years," "Many Wet years in the near future," "Wet Years to come—Doleful prophecy," "A miserable weather prediction," "Prospect of wet seasons," "Wet cycle predicted," and, without any justification in the lecture, "Wet summers foretold." Seven papers made a head-line describing the lecture as "amusing," or cited "Humours of Rain Observing," "The amusing side of wet weather," and half a dozen others made prominent notices of trivial anecdotes of no value save as illustrations of facts that the notice did not refer to.

This being the case with the reports it is not surprising that some of the comments were beside the mark. Of these, many were kindly, some showed quaint, but interesting view-points, and a few were so far misled by the ill-balanced report as to be fairly ridiculous. For instance, an Irish journal of high repute produced the following—our comments are interspersed in italics within brackets:—

Dr. Mill gave a popular lecture on "rain" to his colleagues of the British Association (*untrue: it was given to the working men of Portsmouth*) on Saturday. It is a subject in which we all take an interest, but he does not seem to have advanced our knowledge of it. He began, unfortunately, by telling us that we are fast approaching a series of years that will be uniformly wet (*untrue: he began quite differently, and towards the end of the lecture mentioned the probability of wet years predominating over dry years*). It is the amiable British custom to pray for rain if they have three consecutive fine days in any summer. (*A month later in both Protestant and Roman Catholic churches in Ireland prayers for rain were offered.*) In spite of the ungrateful complaints with which the regular appearance of the sun this year has been received, no one really wants wet seasons. (*The water-works authorities of several Irish towns hold very different views.*) Having thus alienated the sympathies of his audience (*a fact to which none of the reports were unkind enough to refer*), Dr. Mill was compelled to resort to humour to restore its equanimity. Scientific people usually have a rather restricted idea of humour, and, unless the telegraphic summary

does him grave injustice (*surely this canniness is not native to Erin*) Dr. Mill's jests suggest (*the pun is noted*) not only scientific attainments but Scottish ancestry. (*After one of his lectures Dr. Mill was hailed by an Irish working man as a compatriot, and could not convince his interlocutor that the Irish strain in his ancestry came in some centuries back: "Are you sure you're certain?" said Pat.*) As a matter of fact the weather generally arouses the worst instincts of the scientific mind. It defies all calculation and restraint. The meteorologists have devised elaborate methods of expressing their ignorance, but, beyond this indispensable preliminary to research, they have not advanced very far. (*The journalist then leaves the subject of the lecture, and expresses his own opinion as to various problems of climatic changes, which he appears to assume to have occurred in historic times.*)

We have quoted and annotated the above because it shows in a delightfully exaggerated form the danger of generalizing and criticizing from the data supplied by inaccurate abstracts of incomplete reports. Half a dozen other Irish journalists gave clear summaries of the same lecture, and made remarks the generosity of which would make the lecturer glad to believe them just.

### REVIEWS.

*Characteristics of Existing Glaciers.* By WILLIAM HERBERT HOBBS, Professor of Geology in the University of Michigan, New York. The Macmillan Company, 1911. Size 9 x 6. Pp. xxiv. + 302.

IN the study of glaciers geology and meteorology meet, for glacier ice, though it is one of the forms in which atmospheric precipitation is restored to the sea, is at the same time of sufficient stability to be a powerful agent in geological work, and in extreme conditions may even be viewed as a geological formation. Professor Hobbs while naturally approaching the subject from the geological side does full justice to the climatic element, and from our point of view this is the characteristic feature of the able and comprehensive work before us. He lays stress in the Introduction on the very small fall in mean temperature which may suffice to change a temperate region into an abode of snow, whence glaciers take their origin; and he divides his subject boldly into the discussion of mountain glaciers, where only a small area of land is exposed to a frigid climate, and polar glaciers (arctic and antarctic), where a vast region has a climate sufficiently severe to produce a continuous covering of snow or glacier ice. The method of formation of this inland ice is dealt with most completely in the account of south polar conditions, all the recent expeditions being laid under contribution for the data. At a time when our knowledge of the climate of the Antarctic is being rapidly extended, we are inclined to be cautious in generalising about it, for the facts now being accumulated may modify our provisional opinions materially; but we must allow that Professor Hobbs has made good use of his authorities, combining the results for, so far as we are aware, the first time. He strongly supports the theory of polar anticyclones, attributing the accumulation of snow on the Antarctic



high plateau to the condensation of moisture from the upper currents descending in the centre of the high pressure area, the small ice-needles, perhaps derived from cirrus cloud, being melted by adiabatic heating and re-frozen on coming within reach of the influence of the extremely cold surface of the snow. The thorough grasp of the problem taken by Professor Hobbs, and the way in which he has marshalled the facts collected from many sources, cannot fail to command the admiration of the reader, and we feel that his work is a very valuable summary of our knowledge of ice in Nature.

---

*Sixth Annual Report of the Meteorological Committee to the Lords Commissioners of His Majesty's Treasury, for the year ended 31st March, 1911 (the Fifty-sixth year of the Meteorological Office),* London, H.M. Stationery Office. To be purchased from Wyman & Sons Ltd., Fetter Lane, E.C., 1911. Size  $9 \times 7\frac{1}{2}$ . Pp. 164. Price 2s. 3d.

THIS report is a record of progress, marking a new era in the history of the Meteorological Office. The removal to worthy premises in South Kensington, the extension of the powers of the Office to include the administration of the Kew Physical Observatory, and the Magnetic Observatory on Eskdalemuir, and various improvements in the plan and the production of the Weather Reports are each in their way facts of outstanding importance, involving a great amount of organizing work on the part of the Director, Dr. Shaw. The Report contains photographs of the new building at South Kensington, of the meteorological observatory on the roof, and of some of the rooms, and also of the Observatories at Kew, Eskdalemuir and Valencia. The work done in all departments of the great institute of geo-physics into which the Meteorological Office has grown, is naturally very great and varied, so that it is hopeless to attempt a summary of it in the limited space at our disposal; but we recommend our readers to procure and study this Report.

---

### METEOROLOGICAL NEWS AND NOTES.

THE METEOROLOGICAL OFFICE has informed us of the following appointments:—MR. G. I. TAYLOR, Fellow of Trinity College, Cambridge, Smith's Prizeman, 1910, has been appointed Schuster Reader in Dynamical Meteorology for three years from 1st January, 1912. MR. L. SOUTHERNS, B.A., B.Sc., of Emmanuel College, has been appointed Special Assistant at Eskdale Observatory. MR. G. DOBSON, B.A., Research Student of Gonville and Caius College, has been appointed Graduate Assistant for Research in Atmospheric Electricity for one year from 1st October, 1911.

DR. ARTHUR SCHUSTER, F.R.S., has presented to the Eskdale Observatory an instrument made in St. Petersburg, from designs by Prince Boris Galitzine, for the registration of the vertical component of seismic movements. Dr. Schuster had previously presented corresponding instruments for registering the horizontal component, so that all three components are now the subject of continuous registration.

## RAINFALL TABLE FOR OCTOBER, 1911.

| STATION.                         | COUNTY.                   | Lat.<br>N. | Long.<br>W.<br>[*E.] | Height<br>above<br>Sea.<br>ft. | RAINFALL<br>OF MONTH.          |              |
|----------------------------------|---------------------------|------------|----------------------|--------------------------------|--------------------------------|--------------|
|                                  |                           |            |                      |                                | Aver.<br>1875—<br>1909.<br>in. | 1911.<br>in. |
| Camden Square.....               | <i>London</i> .....       | 51 32      | 0 8                  | 111                            | 2'72                           | 3'12         |
| Tenterden.....                   | <i>Kent</i> .....         | 51 4       | *0 41                | 190                            | 3'48                           | 4'99         |
| Arundel (Patching).....          | <i>Sussex</i> .....       | 50 51      | 0 27                 | 130                            | 4'01                           | 5'13         |
| Southampton (Cadland) ...        | <i>Hampshire</i> .....    | 50 50      | 1 22                 | 52                             | 4'07                           | 4'26         |
| Oxford (Magdalen College).       | <i>Oxfordshire</i> ...    | 51 45      | 1 15                 | 186                            | 2'82                           | 2'19         |
| Wellingborough (Croyland Abbey). | <i>Northampton</i> ...    | 52 18      | 0 41                 | 174                            | 2'61                           | 2'08         |
| Shoeburyness.....                | <i>Essex</i> .....        | 51 31      | *0 48                | 13                             | 2'31                           | 2'44         |
| Bury St. Edmunds (Westley)       | <i>Suffolk</i> .....      | 52 15      | *0 40                | 226                            | 2'72                           | 2'94         |
| Geldeston [Beccles].....         | <i>Norfolk</i> .....      | 52 27      | *1 31                | 38                             | 2'84                           | 2'12         |
| Polapit Tamar [Launceston]       | <i>Devon</i> .....        | 50 40      | 4 22                 | 315                            | 4'84                           | 3'87         |
| Rousdon [Lyme Regis].....        | ".....                    | 50 41      | 3 0                  | 516                            | 3'81                           | 3'76         |
| Stroud (Uphfield).....           | <i>Gloucestershire</i> .. | 51 44      | 2 13                 | 226                            | 3'21                           | 2'41         |
| Church Stretton (Wolstaston)..   | <i>Shropshire</i> .....   | 52 35      | 2 48                 | 800                            | 3'77                           | 3'35         |
| Coventry (Kingswood).....        | <i>Warwickshire</i> ...   | 52 24      | 1 30                 | 340                            | 3'20                           | 2'53         |
| Boston.....                      | <i>Lincolnshire</i> ..... | 52 58      | 0 1                  | 25                             | 2'75                           | 2'77         |
| Workshop (Hodsock Priory).       | <i>Nottinghamshire</i>    | 53 22      | 1 5                  | 56                             | 2'77                           | 2'05         |
| Macclesfield.....                | <i>Cheshire</i> .....     | 53 15      | 2 7                  | 501                            | 3'53                           | 2'75         |
| Southport (Hesketh Park)..       | <i>Lancashire</i> .....   | 53 38      | 2 59                 | 38                             | 3'74                           | 2'40         |
| Wetherby (Ribston Hall) ...      | <i>Yorkshire, W.R.</i>    | 53 59      | 1 24                 | 130                            | 3'18                           | 2'71         |
| Arncliffe Vicarage.....          | ".....                    | 54 8       | 2 6                  | 732                            | 6'48                           | 6'57         |
| Hull (Pearson Park).....         | "..... <i>E.R.</i>        | 53 45      | 0 20                 | 6                              | 3'19                           | 1'88         |
| Newcastle (Town Moor) ...        | <i>Northumberland</i>     | 54 59      | 1 38                 | 201                            | 3'20                           | 2'49         |
| Borrowdale (Seathwaite) ...      | <i>Cumberland</i> .....   | 54 30      | 3 10                 | 423                            | 12'71                          | 13'16        |
| Cardiff (Ely).....               | <i>Glamorgan</i> .....    | 51 29      | 3 13                 | 53                             | 4'87                           | 3'96         |
| Haverfordwest.....               | <i>Pembroke</i> .....     | 51 48      | 4 58                 | 95                             | 5'51                           | 6'35         |
| Aberystwyth (Gogerddan)..        | <i>Cardigan</i> .....     | 52 26      | 4 1                  | 83                             | 5'38                           | 5'45         |
| Llandudno.....                   | <i>Carnarvon</i> .....    | 53 20      | 3 50                 | 72                             | 3'78                           | 3'70         |
| Cargen [Dumtries].....           | <i>Kirkcudbright</i> ...  | 55 2       | 3 37                 | 80                             | 4'45                           | 3'79         |
| Marchmont House.....             | <i>Berwick</i> .....      | 55 44      | 2 24                 | 498                            | 3'83                           | 4'02         |
| Girvan (Pinmore).....            | <i>Ayr</i> .....          | 55 10      | 4 49                 | 207                            | 5'38                           | 5'01         |
| Glasgow (Queen's Park) ...       | <i>Renfrew</i> .....      | 55 53      | 4 18                 | 144                            | 3'36                           | 3'20         |
| Inveraray (Newtown).....         | <i>Argyll</i> .....       | 56 14      | 5 4                  | 17                             | 6'50                           | 4'50         |
| Mull (Quinish).....              | ".....                    | 56 34      | 6 13                 | 35                             | 5'87                           | 3'50         |
| Dundee (Eastern Necropolis)      | <i>Forfar</i> .....       | 56 28      | 2 57                 | 199                            | 2'81                           | 1'37         |
| Braemar.....                     | <i>Aberdeen</i> .....     | 57 0       | 3 24                 | 1114                           | 3'88                           | 2'48         |
| Aberdeen (Cranford).....         | ".....                    | 57 8       | 2 7                  | 120                            | 3'23                           | 3'11         |
| Cawdor.....                      | <i>Nairn</i> .....        | 57 31      | 3 57                 | 250                            | 2'95                           | 2'65         |
| Fort Augustus (S. Benedict's)    | <i>E. Inverness</i> ...   | 57 9       | 4 41                 | 68                             | 4'14                           | 2'21         |
| Loch Torridon (Bendamph)         | <i>W. Ross</i> .....      | 57 32      | 5 32                 | 20                             | 8'38                           | 2'86         |
| Dunrobin Castle.....             | <i>Sutherland</i> .....   | 57 59      | 3 56                 | 14                             | 3'15                           | 1'86         |
| Wick.....                        | <i>Caithness</i> .....    | 58 26      | 3 6                  | 77                             | 3'14                           | 1'72         |
| Killarney (District Asylum)      | <i>Kerry</i> .....        | 52 4       | 9 31                 | 178                            | 5'59                           | 5'27         |
| Waterford (Brook Lodge)...       | <i>Waterford</i> .....    | 52 15      | 7 7                  | 104                            | 4'00                           | 4'35         |
| Nenagh (Castle Lough).....       | <i>Tipperary</i> .....    | 52 54      | 8 24                 | 120                            | 3'48                           | 4'02         |
| Miltown Malbay.....              | <i>Clare</i> .....        | 52 52      | 9 26                 | 400                            | 4'31                           | 4'42         |
| Gorey (Courtown House) ..        | <i>Wexford</i> .....      | 52 40      | 6 13                 | 80                             | 3'75                           | 4'45         |
| Abbey Leix (Blandsfort)...       | <i>Queen's County</i> ..  | 52 56      | 7 17                 | 532                            | 3'53                           | 3'48         |
| Dublin (Fitz William Square)     | <i>Dublin</i> .....       | 53 21      | 6 14                 | 54                             | 2'88                           | 3'79         |
| Mullingar (Belvedere).....       | <i>Westmeath</i> .....    | 53 29      | 7 22                 | 367                            | 3'19                           | 4'57         |
| Ballinasloe.....                 | <i>Galway</i> .....       | 53 20      | 8 15                 | 160                            | 3'19                           | 4'53         |
| Crossmolina (Ennisceoe).....     | <i>Mayo</i> .....         | 54 4       | 9 18                 | 74                             | 5'27                           | 5'11         |
| Collooney (Markree Obsy.).       | <i>Sligo</i> .....        | 54 11      | 8 27                 | 127                            | 4'21                           | 3'94         |
| Seaforde.....                    | <i>Down</i> .....         | 54 19      | 5 50                 | 180                            | 3'65                           | 4'41         |
| Bushmills (Dundarave).....       | <i>Antrim</i> .....       | 55 12      | 6 30                 | 162                            | 3'60                           | 2'72         |
| Omagh (Edenfel).....             | <i>Tyrone</i> .....       | 54 36      | 7 18                 | 280                            | 3'76                           | 3'39         |

## RAINFALL TABLE FOR OCTOBER, 1911—continued.

| RAINFALL OF MONTH (con.) |          |                   |             |     | RAINFALL FROM JAN. 1. |        |                      |          | Mean Annual 1875-1909. | STATION.        |
|--------------------------|----------|-------------------|-------------|-----|-----------------------|--------|----------------------|----------|------------------------|-----------------|
| Diff. from Av. in.       | % of Av. | Max. in 24 hours. | No. of Days |     | Aver. 1875-1909.      | 1911.  | Diff. from Aver. in. | % of Av. |                        |                 |
| in.                      |          | in. Date.         |             |     | in.                   | in.    |                      |          | in.                    |                 |
| + .40                    | 115      | 1.10              | 24          | 14  | 20.64                 | 16.97  | -3.67                | 82       | 25.11                  | Camden Square   |
| +1.51                    | 143      | .79               | 7           | 20  | 21.80                 | 17.47  | -4.33                | 80       | 27.64                  | Tenterden       |
| +1.12                    | 128      | 1.14              | 21          | 15  | 24.03                 | 18.54  | -5.49                | 77       | 30.48                  | Patching        |
| + .19                    | 105      | 1.16              | 24          | 14  | 25.25                 | 17.22  | -8.03                | 68       | 31.87                  | Cadland         |
| - .63                    | 78       | .51               | 4           | 16  | 20.27                 | 12.58  | -7.69                | 62       | 24.58                  | Oxford          |
| - .53                    | 80       | .48               | 24          | 19  | 20.81                 | 13.94  | -6.87                | 67       | 25.17                  | Croyland Abbey  |
| + .13                    | 106      | .55               | 4           | 15  | 15.48                 | 12.33  | -3.15                | 80       | 19.28                  | Shoeburyness    |
| + .22                    | 108      | .80               | 13          | 18  | 20.86                 | 17.01  | -3.85                | 81       | 25.40                  | Westley         |
| - .72                    | 75       | .45               | 24          | 19  | 19.17                 | 14.32  | -4.85                | 75       | 23.73                  | Geldeston       |
| - .97                    | 80       | .70               | 20          | 18  | 29.74                 | 22.54  | -7.20                | 76       | 38.27                  | Polapit Tamar   |
| - .05                    | 99       | .94               | 27          | 20  | 26.35                 | 15.55  | -10.80               | 59       | 33.54                  | Rousdon         |
| - .80                    | 75       | .38               | 20          | 15  | 24.33                 | 15.91  | -8.42                | 65       | 29.81                  | Stroud          |
| - .42                    | 89       | .58               | 21          | 17  | 26.48                 | 18.41  | -8.07                | 70       | 32.41                  | Wolstaston      |
| - .67                    | 79       | .75               | 24          | 15  | 23.71                 | 13.76  | -9.95                | 58       | 28.98                  | Coventry        |
| + .02                    | 101      | .57               | 4           | 25  | 19.42                 | 16.11  | -3.31                | 83       | 23.35                  | Boston          |
| - .72                    | 74       | .32               | 21          | 17  | 20.31                 | 12.15  | -8.16                | 60       | 24.46                  | Hodsock Priory  |
| - .78                    | 78       | .43               | 29, 30      | 16  | 28.38                 | 22.26  | -6.12                | 78       | 34.73                  | Macclesfield    |
| -1.34                    | 64       | .74               | 29          | 15  | 26.44                 | 22.16  | -4.28                | 84       | 32.70                  | Southport       |
| - .47                    | 85       | .76               | 22          | 18  | 22.26                 | 18.17  | -4.09                | 82       | 26.87                  | Ribston Hall    |
| + .09                    | 101      | 1.92              | 29          | 14  | 48.62                 | 51.31  | +2.69                | 106      | 61.49                  | Arneliffe       |
| -1.31                    | 59       | .29               | 26          | 20  | 21.76                 | 18.03  | -3.73                | 83       | 26.42                  | Hull            |
| - .71                    | 78       | .81               | 26          | 22  | 22.85                 | 20.91  | -1.94                | 92       | 27.94                  | Newcastle       |
| + .45                    | 104      | 7.00              | 29          | 12  | 100.75                | 103.06 | +2.31                | 102      | 129.48                 | Seathwaite      |
| - .91                    | 81       | .70               | 29          | 16  | 33.50                 | 24.56  | -8.94                | 73       | 42.28                  | Cardiff         |
| + .84                    | 115      | 1.00              | 20          | 22  | 36.47                 | 31.16  | -5.31                | 85       | 46.81                  | Haverfordwest   |
| + .07                    | 101      | .90               | 29          | 16  | 36.30                 | 33.20  | -3.10                | 91       | 45.46                  | Gogerddan       |
| - .08                    | 98       | .63               | 2           | 17  | 24.33                 | 22.66  | -1.67                | 93       | 30.36                  | Llandudno       |
| - .66                    | 85       | 1.38              | 29          | 11  | 34.28                 | 32.69  | -1.59                | 95       | 43.47                  | Cargen          |
| + .19                    | 105      | .78               | 26          | 19  | 27.72                 | 21.48  | -6.24                | 77       | 33.76                  | Marchmont       |
| - .37                    | 93       | 1.95              | 29          | 14  | 39.05                 | 34.74  | -4.31                | 89       | 49.77                  | Girvan          |
| - .16                    | 95       | 1.24              | 29          | 13  | 28.39                 | 26.55  | -1.84                | 94       | 35.97                  | Glasgow         |
| -2.00                    | 69       | 2.11              | 29          | 11  | 52.71                 | 60.84  | +8.13                | 115      | 68.67                  | Inveraray       |
| -2.37                    | 60       | 1.19              | 29          | 16  | 43.74                 | 42.32  | -1.42                | 97       | 56.57                  | Quinish         |
| -1.44                    | 49       | .49               | 24          | 12  | 23.35                 | 9.88   | -13.47               | 42       | 28.64                  | Dundee          |
| -1.40                    | 64       | ...               | ...         | ... | 28.04                 | 18.91  | -9.13                | 67       | 34.93                  | Braemar         |
| - .12                    | 96       | 1.24              | 23          | 17  | 26.01                 | 17.64  | -8.37                | 68       | 32.73                  | Aberdeen        |
| - .30                    | 90       | .53               | 24          | 12  | 24.20                 | 19.95  | -4.25                | 82       | 29.33                  | Cawdor          |
| -1.93                    | 53       | .53               | 31          | 16  | 34.40                 | 30.39  | -4.01                | 88       | 44.53                  | Fort Augustus   |
| -5.52                    | 34       | .72               | 29          | 15  | 65.01                 | 70.86  | +5.85                | 109      | 83.61                  | Bendarnagh      |
| -1.29                    | 59       | .59               | 23          | 13  | 25.56                 | 19.27  | -6.29                | 75       | 31.90                  | Dunrobin Castle |
| -1.42                    | 55       | .32               | 29          | 17  | 23.82                 | 21.13  | -2.69                | 89       | 29.88                  | Wick            |
| - .32                    | 94       | 1.46              | 29          | 19  | 42.35                 | 36.60  | -5.75                | 86       | 54.81                  | Killarney       |
| + .35                    | 109      | .93               | 20          | 19  | 31.45                 | 28.68  | -2.77                | 91       | 39.57                  | Waterford       |
| + .54                    | 115      | 1.60              | 29          | 17  | 31.21                 | 27.47  | -3.74                | 88       | 39.43                  | Castle Lough    |
| + .11                    | 103      | 1.20              | 29          | 17  | 35.77                 | 29.43  | -6.34                | 82       | 45.11                  | Miltown Malbay  |
| + .70                    | 119      | 1.44              | 20          | 21  | 28.16                 | 22.31  | -5.85                | 79       | 34.99                  | Courtown Ho.    |
| - .05                    | 99       | .67               | 20          | 20  | 29.23                 | 25.93  | -3.30                | 89       | 35.92                  | Abbey Leix      |
| + .91                    | 132      | .83               | 20          | 20  | 22.77                 | 16.39  | -6.38                | 72       | 27.68                  | Dublin          |
| +1.38                    | 143      | 1.70              | 29          | 17  | 29.38                 | 27.06  | -2.32                | 92       | 36.15                  | Mullingar       |
| +1.34                    | 142      | 1.43              | 29          | 17  | 29.36                 | 27.43  | -1.93                | 93       | 36.64                  | Ballinasloe     |
| - .16                    | 97       | 1.08              | 29          | 23  | 41.01                 | 34.58  | -6.43                | 84       | 52.87                  | Enniscoe        |
| - .27                    | 94       | 1.35              | 29          | 19  | 34.35                 | 29.21  | -5.14                | 85       | 42.71                  | Markree         |
| + .76                    | 121      | .78               | 26          | 15  | 31.28                 | 22.30  | -8.98                | 71       | 38.91                  | Seaforde        |
| - .88                    | 76       | .56               | 29          | 13  | 29.92                 | 22.04  | -7.88                | 74       | 37.56                  | Dundarave       |
| - .37                    | 90       | 1.05              | 29          | 18  | 31.81                 | 27.72  | -4.09                | 87       | 39.38                  | Omagh           |

## SUPPLEMENTARY RAINFALL, OCTOBER, 1911.

| Div.  | STATION.                     | Rain<br>inches | Div.   | STATION.                     | Rain<br>inches. |
|-------|------------------------------|----------------|--------|------------------------------|-----------------|
| II.   | Warlingham, Redvers Road     | 5.04           | XI.    | Lligwy .....                 | 3.15            |
| „     | Ramsgate .....               | 5.66           | „      | Douglas.....                 | ...             |
| „     | Hailsham .....               | 6.05           | XII.   | Stoneykirk, Ardwell House    | 3.13            |
| „     | Totland Bay, Aston House.    | 5.21           | „      | Dalry, The Old Garroch ...   | 6.50            |
| „     | Stockbridge, Ashley .....    | 2.64           | „      | Langholm, Drove Road.....    | 4.50            |
| „     | Grayshott.....               | 5.27           | „      | Beattock, Kinnelhead.....    | 5.59            |
| „     | Reading, Calcot Place.....   | 2.49           | XIII.  | St Mary's Loch, Cramilt Ldge | 4.18            |
| III.  | Harrow Weald, Hill House.    | 2.61           | „      | North Berwick Reservoir ...  | 2.47            |
| „     | Pitsford, Sedgebrook .....   | 1.98           | „      | Edinburgh, Royal Observty.   | 3.26            |
| „     | Woburn, Milton Bryant.....   | 2.20           | XIV.   | Maybole, Knockdon Farm..     | 3.96            |
| „     | Chatteris, The Priory .....  | 1.97           | XV.    | Campbeltown, Witchburn...    | 4.54            |
| IV.   | Colchester, Lexden.....      | 2.30           | „      | Glenreadell Mains .....      | 3.55            |
| „     | Newport .....                | 3.30           | „      | Holy Loch, Ardnadam.....     | 7.10            |
| „     | Rendlesham .....             | 2.61           | „      | Ballachulish House.....      | 4.78            |
| „     | Swaffham .....               | 2.39           | „      | Islay, Eallabus .....        | 4.19            |
| „     | Blakeney .....               | 2.43           | XVI.   | Dollar Academy .....         | 4.13            |
| V.    | Bishops Cannings .....       | 1.99           | „      | Balquhider, Stronvar .....   | 5.15            |
| „     | Winterbourne Steepleton ...  | 5.25           | „      | Coupar Angus .....           | 1.71            |
| „     | Ashburton, Druid House ..    | 6.01           | „      | Glenlyon, Meggernie Castle.  | 4.39            |
| „     | Okehampton, Oaklands.....    | 5.10           | „      | Blair Atholl .....           | 2.64            |
| „     | Cullompton .....             | 4.37           | „      | Montrose, Sunnyside Asylum   | 2.26            |
| „     | Hartland Abbey .....         | 3.41           | XVII.  | Alford, Lynturk Manse ...    | 2.30            |
| „     | Lynmouth, Rock House ...     | 4.58           | „      | Fyvie Castle.....            | 2.83            |
| „     | Probus, Lamellyn .....       | 3.85           | „      | Keith Station .....          | 2.93            |
| „     | North Cadbury Rectory ..     | 3.08           | XVIII. | Glenquoich, Loan .....       | 11.50           |
| VI.   | Clifton, Pembroke Road ...   | 2.89           | „      | Skye, Dunvegan.....          | 4.34            |
| „     | Ross, The Graig .....        | 1.77           | „      | N. Uist, Lochmaddy .....     | 3.37            |
| „     | Shifnal, Hatton Grange.....  | 1.86           | „      | Alvey Manse .....            | 2.42            |
| „     | Blockley, Upton Wold .....   | 2.62           | „      | Loch Ness, Drumnadrochit.    | 2.20            |
| „     | Droitwich .....              | 1.68           | „      | Glencarron Lodge .....       | 3.20            |
| VII.  | Market Overton.....          | 2.82           | XIX.   | Invershin .....              | 1.99            |
| „     | Market Rasen .....           | 2.45           | „      | Loch Stack, Ardochullin....  | 3.22            |
| „     | Bawtry, Hesley Hall.....     | 1.67           | „      | Melvich.....                 | 2.88            |
| „     | Derby, Midland Railway ...   | 2.12           | XX.    | Skibbereen Rectory.....      | 5.08            |
| „     | Buxton.....                  | 3.35           | „      | Dunmanway, The Rectory..     | 6.45            |
| VIII. | Nantwich, Dorfold Hall.....  | 2.43           | „      | Cork .....                   | 4.50            |
| „     | Chatburn, Middlewood .....   | 3.86           | „      | Mitchelstown Castle .....    | 4.33            |
| „     | Cartmel, Flookburgh .....    | 5.63           | „      | Darrynane Abbey .....        | 6.25            |
| IX.   | Langsett Moor, Up. Midhope   | 3.74           | „      | Glenam [Clonmel] .....       | ...             |
| „     | Scarborough, Scalby .....    | 3.11           | „      | Newmarket-on-Fergus, Fenloe  | 3.75            |
| „     | Ingleby Greenhow .....       | 2.63           | XXI.   | Laragh, Glendalough .....    | 7.36            |
| „     | Mickleton.....               | 3.13           | „      | Balbriggan, Ardgillan.....   | 3.75            |
| X.    | Bellingham, High Green Manor | 4.09           | „      | Moynalty, Westland .....     | 4.33            |
| „     | Ilderton, Lilburn Cottage... | 3.94           | XXII.  | Cong, The Glebe .....        | 4.02            |
| „     | Keswick, The Bank .....      | 6.10           | „      | Westport, St. Helens .....   | 4.41            |
| XI.   | Llanfrechfa Grange.....      | 4.34           | „      | Achill Island, Dugort .....  | 5.22            |
| „     | Treherbert, Tyn-y-waun ...   | 5.98           | „      | Mohill, The Rectory .....    | 3.04            |
| „     | Carmarthen, The Friary.....  | 4.82           | XXIII. | Enniskillen, Portora .....   | 3.19            |
| „     | Castle Malgwyn [Llechryd].   | 4.50           | „      | Dartrey [Cootehill].....     | 3.36            |
| „     | Plynlimon.....               | 8.20           | „      | Warrenpoint, Manor House     | 5.78            |
| „     | New Radnor, Ednol .....      | 3.95           | „      | Banbridge, Milltown .....    | 2.71            |
| „     | Rhayader, Tyrmynydd .....    | 6.35           | „      | Belfast, Cave Hill Road..... | 3.70            |
| „     | Lake Vyrnwy .....            | ...            | „      | Glenarm Castle.....          | 5.23            |
| „     | Llangyhanfal, Plâs Draw....  | 2.41           | „      | Londonderry, Creggan. Res.   | 2.43            |
| „     | Dolgelly, Bryntirion .....   | 4.64           | „      | Killybegs .....              | 5.04            |
| „     | Bettws-y-Coed, Tyn-y-bryn    | 5.17           | „      | Horn Head ...                | 2.97            |

## METEOROLOGICAL NOTES ON OCTOBER, 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.—The conditions throughout were of an unsettled type, fine, sunny days alternating with days of gloom and overcast skies. A sharp TS with L and R occurred on the morning of 22nd. Mean temp.  $50^{\circ}4$ , or  $0^{\circ}3$  above the average. Duration of sunshine,  $77^{\circ}8^*$  hours, and of R  $39^{\circ}8$  hours. Evaporation  $64$  in. Shade max.  $63^{\circ}2$  on 18th; min.  $28^{\circ}5$  on 29th. F 1, f 4.

TENTERDEN.—Cold at first but warm in the middle of the month; wet after 18th. Duration of sunshine,  $121^{\circ}5^{\dagger}$  hours. Shade max.  $64^{\circ}5$  on 18th and 19th; min.  $31^{\circ}5$  on 29th. F 1, f 4.

TOTLAND BAY.—R  $72$  in. above the average, and the first month in excess after nine consecutive months with deficient R. Duration of sunshine,  $116^{\circ}2^*$  hours. Shade max.  $63^{\circ}7$  on 12th; min.  $31^{\circ}6$  on 29th. F 1, f 4.

PITSFORD.—R  $110$  in. below the average. Mean temp.  $48^{\circ}7$ . Shade max.  $62^{\circ}4$  on 13th; min.  $25^{\circ}6$  on 29th. F 3.

NORTH CADBURY.—The first week and the last five days were cold, but the intervening period was warm. The first 18 days were dry, except for a local TS on 13th, but from 19th to the close the month was distinctly wet. Shade max.  $71^{\circ}5$  on 13th; min.  $28^{\circ}5$  on 29th. F 1, f 7.

ROSS.—Shade max  $65^{\circ}0$  on 13th; min.  $25^{\circ}6$  on 29th.

HODSOCK PRIORY.—Shade max.  $69^{\circ}6$  on 8th; min.  $27^{\circ}3$  on 29th. F 2, f 12.

SOUTHPORT.—An exceptionally easterly October. Fine, calm and dry to 18th. Duration of sunshine  $111^{\circ}2^*$  hours, or  $15^{\circ}1$  hours above the average. Duration of R  $45^{\circ}4$  hours. Mean temp.  $49^{\circ}0$ , or  $0^{\circ}4$  above the average. Shade max.  $62^{\circ}9$  on the 18th; min.  $31^{\circ}2$  on 29th. F 1, f 7.

HULL.—Unsettled and showery weather generally to 9th, then finer to 18th, when the weather became unsettled again, with frequent R to the end. Shade max.  $60^{\circ}0$  on 4 days; min.  $29^{\circ}0$  on 29th. F 1, f 6.

HAVERFORDWEST.—Duration of sunshine,  $122^{\circ}4^*$  hours. Shade max.  $64^{\circ}8$  on 19th; min.  $32^{\circ}5$  on 28th. F 0, f 0.

LLANDUDNO.—Shade max.  $64^{\circ}0$  on 13th; min.  $34^{\circ}5$  on 29th.

CARGEN.—Fine weather prevailed until 19th, but thereafter there were only three days without R. Pastures very green. Shade max.  $62^{\circ}3$  on 13th; min.  $22^{\circ}8$  on 29th. F 4.

EDINBURGH.—Shade max.  $56^{\circ}2$  on 30th; min.  $31^{\circ}2$  on 28th. F 1, f 5.

COUPAR ANGUS.—A month of ideal weather and the tenth successive month with deficient R. Shade max.  $59^{\circ}0$  on 11th; min.  $19^{\circ}0$  on 29th.

FORT AUGUSTUS.—Shade max.  $60^{\circ}2$  on 17th; min.  $21^{\circ}0$  on 28th. F 6.

LOCH STACK.—Duration of sunshine,  $80^{\circ}7$  hours.

CORK.—R  $120$  in. above the average. Mean temp.  $1^{\circ}7$  below the average. Shade max.  $57^{\circ}0$  on 19th; min.  $31^{\circ}0$  on 25th. F 1, f 4.

DUBLIN.—Cold and changeable at first, but very fine from 6th to 12th. Unsettled with abundant R from 19th almost to the close. Mean temp.  $50^{\circ}8$ . Shade max.  $61^{\circ}4$  on 18th; min.  $33^{\circ}2$  on 29th. F 0, f 3.

MARKREE.—Fine generally until 17th but stormy afterwards, with heavy rain and frequent frosts. Shade max.  $64^{\circ}9$  on 18th; min.  $25^{\circ}9$  on 28th. F 6, f 11.

WARRENPOINT.—The first half was fine, but the latter half was very wet. Shade max.  $59^{\circ}0$  on 19th; min.  $36^{\circ}0$  on 28th. F 0, f 0.

\* Campbell-Stokes.

† Jordan.



## Climatological Table for the British Empire, May, 1911.

| STATIONS<br><br>(Those in <i>italics</i> are<br>South of the Equator.) | Absolute. |       |          |       | Average. |       |               |           | Absolute.       |                   | Total Rain |       | Aver.  |      |
|------------------------------------------------------------------------|-----------|-------|----------|-------|----------|-------|---------------|-----------|-----------------|-------------------|------------|-------|--------|------|
|                                                                        | Maximum.  |       | Minimum. |       | Max.     | Min.  | Dew<br>Point. | Humidity. | Max. in<br>Sun. | Min. on<br>Grass. | Depth.     | Days. |        |      |
|                                                                        | Temp.     | Date. | Temp.    | Date. |          |       |               |           |                 |                   |            |       | Cloud. |      |
|                                                                        | 81°·7     | 31    | 38°·1    | 7     | 69°·2    | 47°·9 | 49°·5         | 0·100     | 76              | 127°·4            | 32°·3      | 1°·80 | 10     | 5°·8 |
| London, Camden Square                                                  | 89°·0     | 1     | 71°·0    | 8     | 84°·8    | 74°·0 | 74°·1         | 79        | 151°·0          | 68°·3             | 21°·12     | 26    | ...    | ...  |
| Lagos ... ..                                                           | 90°·0     | 14    | 41°·5    | 27    | 70°·0    | 51°·6 | 51°·9         | 70        | ...             | ...               | 5°·20      | 8     | 4°·0   | ...  |
| Cape Town ... ..                                                       | 70°·7     | 4     | 36°·3    | 28    | 59°·7    | 42°·7 | 35°·3         | 64        | 127°·8          | 33°·1             | 3°·86      | 10    | 4°·7   | ...  |
| Johannesburg ... ..                                                    | 80°·6     | 5     | 55°·2    | 19    | 77°·7    | 64°·8 | 62°·7         | 77        | 145°·9          | 43°·9             | 1°·15      | 6     | 4°·3   | ...  |
| Mauritius ... ..                                                       | 99°·0     | 12    | 72°·4    | 9     | 95°·1    | 79°·0 | 76°·3         | 73        | ...             | 69°·9             | 3°·09      | 5     | 3°·3   | ...  |
| Calcutta ... ..                                                        | 94°·2     | 29    | 78°·4    | 1     | 91°·4    | 80°·8 | 76°·5         | 75        | 134°·9          | 73°·5             | °·04       | 2     | 3°·8   | ...  |
| Bombay ... ..                                                          | 105°·5    | 25    | 77°·7    | 30    | 97°·8    | 82°·0 | 74°·2         | 70        | 144°·3          | 76°·4             | °·01       | 1     | 2°·0   | ...  |
| Madras ... ..                                                          | 74°·4     | 4     | 50°·8    | 28    | 70°·2    | 54°·8 | 51°·3         | 71        | 137°·2          | 37°·8             | 9°·70      | 20    | 5°·1   | ...  |
| Kodaikanal ... ..                                                      | 93°·4     | 13    | 70°·4    | 27    | 87°·9    | 76°·7 | 75°·3         | 81        | 140°·0          | 68°·6             | 6°·46      | 16    | 5°·9   | ...  |
| Colombo, Ceylon ... ..                                                 | 86°·9     | 30    | 68°·1    | 16    | 78°·8    | 72°·8 | 72°·5         | 90        | 139°·5          | ...               | 22°·15     | 26    | 8°·9   | ...  |
| Hongkong ... ..                                                        | 74°·1     | 5     | 41°·2    | 30    | 66°·3    | 52°·5 | 51°·4         | 79        | 122°·0          | 32°·1             | 1°·43      | 22    | 5°·0   | ...  |
| Sydney ... ..                                                          | 77°·2     | 6     | 37°·6    | 28    | 61°·2    | 49°·4 | 47°·3         | 75        | 116°·2          | 30°·5             | 3°·35      | 18    | 6°·6   | ...  |
| Melbourne ... ..                                                       | 85°·9     | 6     | 39°·8    | 30    | 65°·8    | 50°·3 | 48°·5         | 73        | 139°·5          | 30°·8             | 1°·89      | 19    | 6°·4   | ...  |
| Adelaide ... ..                                                        | 74°·4     | 12    | 42°·5    | 18    | 66°·1    | 50°·5 | 49°·5         | 74        | 129°·8          | 34°·2             | 1°·73      | 13    | 5°·1   | ...  |
| Perth ... ..                                                           | 80°·0     | 3     | 37°·4    | 7     | 67°·1    | 45°·1 | 42°·9         | 66        | 143°·2          | 31°·0             | 2°·00      | 6     | 3°·8   | ...  |
| Coolgardie ... ..                                                      | 66°·9     | 6     | 35°·0    | 29    | 58°·3    | 45°·8 | 43°·9         | 75        | 116°·3          | 32°·3             | 4°·09      | 21    | 6°·5   | ...  |
| Hobart, Tasmania ... ..                                                | 65°·2     | 10    | 38°·6    | 23    | 59°·6    | 48°·3 | 45°·5         | 73        | 106°·0          | 30°·0             | 2°·21      | 15    | 6°·4   | ...  |
| Wellington ... ..                                                      | 69°·0     | 1     | 41°·0    | 21    | 63°·8    | 51°·7 | 51°·7         | 81        | 128°·0          | 37°·0             | 5°·52      | 20    | 7°·2   | ...  |
| Auckland ... ..                                                        | 91°·3     | 30    | 68°·8    | 14    | 87°·3    | 71°·7 | 70°·3         | 79        | ...             | ...               | 1°·92      | 8     | 5°·9   | ...  |
| Jamaica, Kingston ... ..                                               | 90°·0     | 25    | 72°·0    | 12†   | 85°·5    | 74°·5 | ...           | 73        | 142°·0          | ...               | 3°·41      | 19    | 4°·0   | ...  |
| Grenada ... ..                                                         | 90°·8     | 28    | 28°·5    | 3     | 73°·5    | 49°·0 | ...           | ...       | 106°·6          | 23°·6             | 2°·01      | 8     | 3°·7   | ...  |
| Toronto ... ..                                                         | 91°·5     | 21    | 24°·0    | 5     | 71°·3    | 41°·9 | ...           | 66        | ...             | ...               | °·68       | 4     | 5°·1   | ...  |
| Fredericton ... ..                                                     | 72°·0     | 22    | 31°·0    | 4     | 58°·7    | 43°·0 | ...           | ...       | ...             | ...               | °·36       | 7     | 4°·7   | ...  |
| St. John, N.B. ... ..                                                  | 72°·4     | 31    | 37°·5    | 11    | 60°·3    | 44°·4 | ...           | 72        | ...             | ...               | 1°·80      | 10    | 6°·0   | ...  |
| Victoria, B.C. ... ..                                                  | 66°·0     | 2*    | 23°·0    | 13    | 56°·5    | 35°·8 | ...           | ...       | ...             | ...               | 1°·63      | 17    | 8°·1   | ...  |
| Dawson ... ..                                                          |           |       |          |       |          |       |               |           |                 |                   |            |       |        |      |

\* 25, 28 and 29.

† 13, 14 and 16.

Johannesburg.—Bright sunshine, 214·8 hours.

Mauritius.—Mean temp. of air 1°·4, dew point 1°·8, and R 2·12 in., below averages. Mean hourly velocity of wind 9·8 miles, or 0·7 above average.

KODAIKANAL.—Bright sunshine, 209·0 hours.

COLOMBO.—Mean temp. of air 79°·8, or 2°·4, of dew point 0°·1, and R 4·47 in., below averages. Mean hourly velocity of wind 7·1 miles. TSS on 4 days.

HONGKONG.—Mean temp. of air 75°·5, or 1°·3 below, R 9·85 in. above, and bright sunshine 86·1 hours, or 68 hours below, averages. Mean hourly velocity of wind 14·2 miles.

Sydney.—Mean temp. of air 0°·9 above, and R 3·52 in. below, averages.

Melbourne.—Mean temp. of air 1°·2 above, and R 1·24 in. above, averages.

Adelaide.—Rainfall, ·90 in. below average.

Perth.—Mean temp. of air 2°·3 below, and R 3·30 in. below, averages.

Coolgardie.—Mean temp. of air 1°·5 below, and R 1·35 in. above, averages.

Hobart, Tasmania.—Mean temp. of air 1°·4 above, and R 2·29 in. above, averages.

Wellington.—Mean temp. of air 1°·1 above, and R 2·64 in. below, averages. Bright sunshine 144·1 hours.

# **PUBLICATIONS**

OF THE

## **ROYAL METEOROLOGICAL SOCIETY.**

---

### **QUARTERLY JOURNAL OF THE ROYAL METEOROLOGICAL SOCIETY.**

This contains the Papers read at the Meetings, together with the Discussions, and also Notes, Correspondence, Notices of Recent Publications, and the titles of such papers as appear to be of general interest bearing on Meteorology in the Periodicals which are received in the Society's Library. Price 5s.

### **THE METEOROLOGICAL RECORD.**

Monthly Results of observations made at the Stations of the Royal Meteorological Society, with Remarks on the Weather for each quarter. Price 1s. 6d.

### **HINTS TO METEOROLOGICAL OBSERVERS.**

Instructions for taking Observations, and Tables for their Reduction ; together with a Glossary of Meteorological Terms. By WILLIAM MARRIOTT, Assistant Secretary. Sixth Edition, revised and enlarged. With Illustrations. Price 1s. 6d. Post Free, 1s. 8d.

### **SOME FACTS ABOUT THE WEATHER.**

A Popular Meteorological Handbook. By WILLIAM MARRIOTT, Assistant-Secretary. Second and Revised Edition. Price 6d. Post Free 7d.

---

*The above may be obtained from*  
**EDWARD STANFORD, 12, 13 & 14, LONG ACRE, LONDON, W.C.**

Or at the Offices of the Society, 70, VICTORIA STREET, LONDON, S.W.



## A Monthly Record of Science in all its Branches.

Each number consists of at least forty large quarto pages of Articles and Notes, by Authorities in their respective subjects.

**Profusely Illustrated.**

### CONTENTS OF NOVEMBER ISSUE.

The New Astronomy: III. Star Clusters and Nebulæ. By Professor A. W. Bickerton.—Fourier's Series in the Encyclopædia Britannica.—Psychical Research.—On Adjusting an Equatorial by means of Circumpolars.—Plant Hairs (continued).—Flight and Flying in the Encyclopædia Britannica.—A Method (believed to be original) of Dividing Angles of  $45^\circ$  or less into Three Equal Parts.—Solar Disturbances during September, 1911.—The Face of the Sky for the Month.—Notes (Astronomy; Botany; Chemistry; Geology; Meteorology; Ornithology; Physics; Zoology).—Microscopy.—Scientific Photography.—Reviews of Books.—Correspondence.—Queries and Answers.—&c.

THROUGH ANY BOOKSELLER.

**MONTHLY—ONE SHILLING, net.**

Annual Subscription, **15/-**, post free anywhere.

Offices: 42, BLOOMSBURY SQUARE, LONDON.

---

## THE OBSERVATORY:

*A Monthly Review of Astronomy.*

EDITED BY

H. P. HOLLIS, B.A., F.R.A.S., AND T. LEWIS, F.R.A.S.

~~~~~  
Contains full Reports of the Meetings of the Royal Astronomical and Royal Meteorological Societies, and of the British Astronomical Association; Articles by various eminent Astronomers, English, American and Continental; Correspondence on topics of interest connected with the Science; Notices of Observatories, Publications and current Discoveries. The "Oxford Note Book" is a special feature of the Magazine.

*The Observatory* was founded in 1877, and has become an established and very valuable publication.—Prof. Young, in "*Ten Years' progress in Astronomy.*"

Annual Subscription (for the "Companion" and twelve Monthly Numbers), 13s.

*All communications should be addressed to the Editors of "The Observatory,"  
Royal Observatory, Greenwich, S.E.*

# Royal Geographical Society's Publications.

---

## THE GEOGRAPHICAL JOURNAL.

Monthly. Illustrated. Edited by the Secretary. Price (to non-Fellows), 2s.

## HINTS TO TRAVELLERS.

Edited for the Council of the Royal Geographical Society by E. A. REEVES, F.R.G.S., F.R.A.S. Ninth Edition, revised and enlarged. In two volumes, illustrated. Price 15s. net. (To Fellows at the Office of the Society, 10s. net).

Vol. I.—Surveying and Practical Astronomy.

Vol. II.—Meteorology and Climate (by DR. H. R. MILL);  
Photography, Geology, Natural History, Anthropology, Industry and Commerce, Medical Hints, &c.

## THE DISTRIBUTION OF RAINFALL OVER THE LAND.

By DR. A. J. HERBERTSON. With monthly maps of Rainfall. Price 5s. net. (To Fellows, 2s. 6d.)

## ON THE RESULTS OF A DEEP-SEA SOUNDING EXPEDITION,

In the North Atlantic in the summer of 1899, by R. E. PEAKE, M.Inst.C.E.; with notes on Temperature, Deep-Sea Deposits, &c., by SIR JOHN MURRAY, K.C.B., F.R.S. *Charts*. Price 5s. net. (To Fellows, 2s. 6d.)

## THE ANTARCTIC MANUAL,

For the use of the Expedition of 1901. Edited by GEORGE MURRAY, F.R.S., 1901. Pp. 586. *With a new chart of the Antarctic Regions*. Price, 15s. (To Fellows, 10s.)

~~~~~  
ROYAL GEOGRAPHICAL SOCIETY, 1, Savile Row, W.  
AND ALL BOOKSELLERS.

---

### RATES FOR ADVERTISEMENTS IN THIS MAGAZINE.

|            |     | One Insertion. |     | Six Insertions. |     | Twelve Insertions. |               |
|------------|-----|----------------|-----|-----------------|-----|--------------------|---------------|
| WHOLE PAGE | ... | 30/-           | ... | 26/-            | ... | 22/6               | } All<br>Net. |
| HALF       | ..  | 16/6           | ... | 14/6            | ... | 12/6               |               |
| QUARTER    | ..  | 9/-            | ... | 8/-             | ... | 7/-                |               |
| EIGHTH     | ..  | 5/-            | ... | 4/6             | ... | 4/-                |               |

*All applications for space to be made to*

Mr. H. A. COLLINS, 32, BIRDHURST ROAD, CROYDON.



# NEGRETTI & ZAMBRA'S HORTICULTURAL HYGROMETER

(REGISTERED DESIGN.)

An Instrument for ascertaining in a Simple manner, the likelihood of a Frost During the Night.

The object of the Horticultural Hygrometer is to show in a simple manner, without the use of tables, whether the dew point is below freezing, and consequently whether frost may be expected.

We need hardly point out to Horticulturists and Agriculturists the importance of detecting the arrival of frost, whether it be an **Early Winter Frost** or a **Late Spring Frost**. One should have some means of knowing whether to take the necessary steps for the protection of valuable plants, crops, fruit trees, etc

*Descriptive Pamphlet Post Free on application to the*

SOLE MAKERS,

**NEGRETTI & ZAMBRA,**  
*Scientific Instrument Makers,*  
**38, HOLBORN VIADUCT, E.C.**

Branches: 45, CORNHILL, E.C., and  
122, REGENT STREET, W., LONDON.

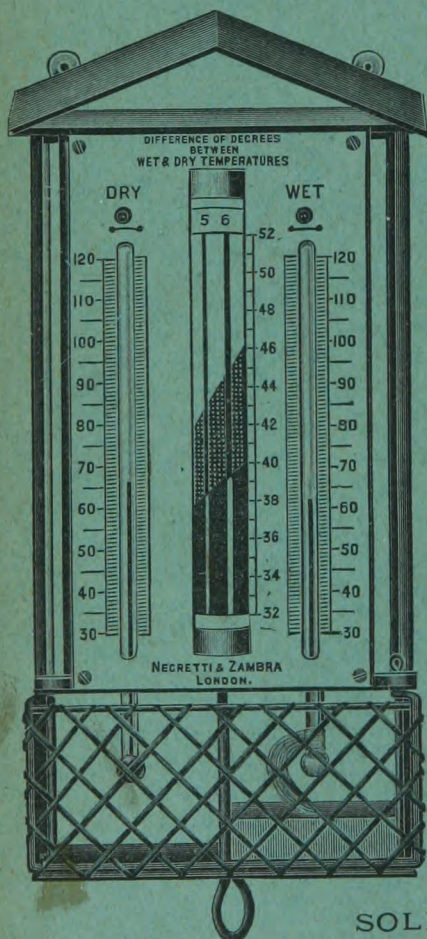
Telegraphic Address: "NEGRETTI, LONDON."

Telephone No. 583 HOLBORN.

**BRUSSELS INTERNATIONAL EXHIBITION, 1910.**

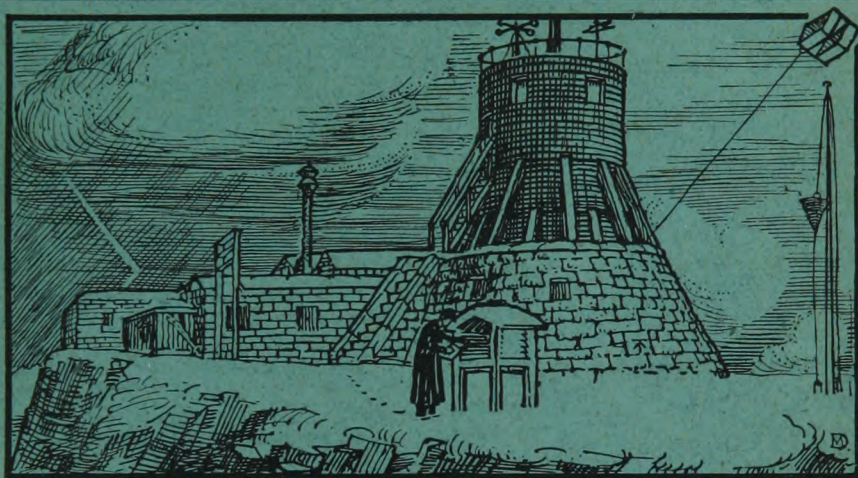
Awarded Grand Prix and Gold Medal for Scientific Instruments.

SHIELD & SPRING, Lancelot Place, Brompton Road, S.W.





NO. 551 SYMONS'S VOL. 46  
 METEOROLOGICAL  
 • MAGAZINE •  
 .... EDITED BY HUGH ROBERT MILL ....



DECEMBER, 1911.

• CONTENTS •

|                                                                   | PAGE        |
|-------------------------------------------------------------------|-------------|
| Weather in the Seventeenth Century. By WALTER SEDGWICK, M.A.      | 213         |
| Map of November Rainfall of Thames Valley ..                      | face p. 221 |
| The Weather of November. By FRED. J. BRODIE ..                    | 221         |
| International Balloon Ascents, June, 1909. By W. H. DINES, F.R.S. | 222         |
| Royal Meteorological Society ..                                   | 223         |

CORRESPONDENCE:—

|                                                                             |     |
|-----------------------------------------------------------------------------|-----|
| The Zodiacal Light. By CAPT. CAMPBELL HEPWORTH, C.B. ..                     | 225 |
| Weather Charts in Australian Newspapers. By H. A. HUNT.<br>(Illustrated) .. | 226 |
| Heat and Drought Records at Guernsey. By BASIL T. ROWSWELL                  | 227 |
| Our Hottest Summer. By L. C. W. BONACINA ..                                 | 227 |
| The "Supposed" Cold of Winter Anticyclones. By REV.<br>JOHN S. BEGG ..      | 228 |
| Rainfall Table for November, 1911 ..                                        | 232 |
| Supplementary Table of Rainfall, November, 1911, at 112 Stations            | 234 |
| Meteorological Notes on November, 1911 ..                                   | 235 |
| Climatological Table for the British Empire, June, 1911 ..                  | 236 |

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

Published on the 16th of each Month.]

[Price 4d., or 5s. per Annum, Post Free.



## NOTICES.

It is requested that all Books for Review and Communications for the Editor be addressed to 62, Camden Square, London, N.W.

The responsibility for all facts and opinions expressed in the signed articles and letters published in this Magazine rests with their respective authors.



## A Monthly Record of Science in all its Branches.

Each number consists of at least forty large quarto pages of Articles and Notes, by Authorities in their respective subjects.

**Profusely Illustrated.**

### CONTENTS OF DECEMBER ISSUE.

The New Astronomy: IV. The Galaxy and an Immortal Cosmos. By Professor A. W. Bickerton.—The Process Block.—A Scandinavian Tribe in the Arctic North West.—Animalcule found in a Ditch near Norwich.—Plant Hairs (*continued*).—Meteoric Shower of September 30th.—Solar Disturbances during October, 1911.—The Face of the Sky for December, 1911, and January, 1912.—Notes (Astronomy; Botany; Chemistry; Geology; Meteorology; Ornithology; Physics; Zoology).—Microscopy.—Scientific Photography.—Reviews of Books.—Correspondence.—Queries and Answers.—&c.

THROUGH ANY BOOKSELLER.

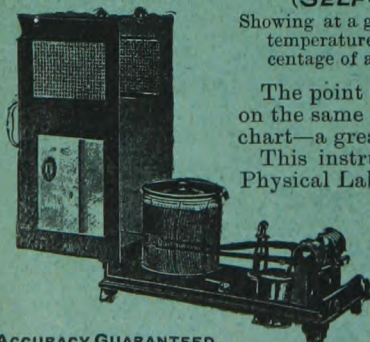
**MONTHLY—ONE SHILLING, net.**

Annual Subscription, **15/-**, post free anywhere.

Offices: 42, BLOOMSBURY SQUARE, LONDON.

## DARTON'S HYGROGRAPH

(SELF-RECORDING HYGROMETER)



Showing at a glance on a revolving weekly chart the differences of temperature readings between the wet and dry bulbs, and the percentage of aqueous vapour held in suspense by the atmosphere.

The point of each pen of this instrument is set precisely on the same temperature-line and the same time-line on the chart—a great advantage over other Hygrometers.

This instrument has been approved of by the National Physical Laboratory, Colonial Observatories and others.

It is compact, self-contained, without any projections liable to injury, and very portable.

Complete, with One Year's supply of Charts, 10° to 110° F., and Hygrometrical Tables,  
**£7 : 15 : 0**

This instrument is a Thermograph as well as a Hygrometer.

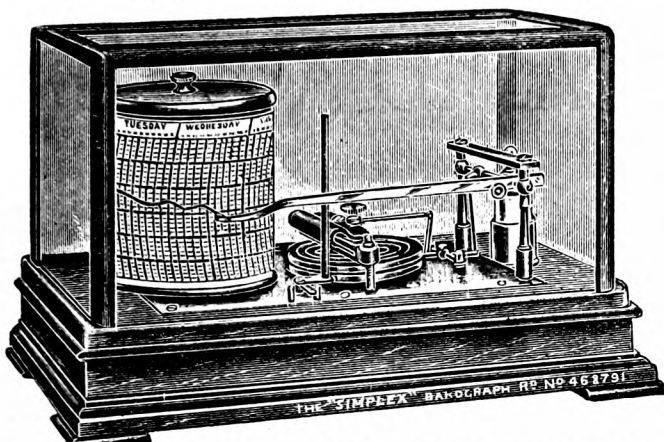
ACCURACY GUARANTEED.

*Illustrated List of Standard, Registering, and Recording Meteorological Instruments, post free*

**F. DARTON & Co., 142, St. John Street, London, E.C.**

GIFTS OF LASTING INTEREST.

ABSOLUTELY ACCURATE.

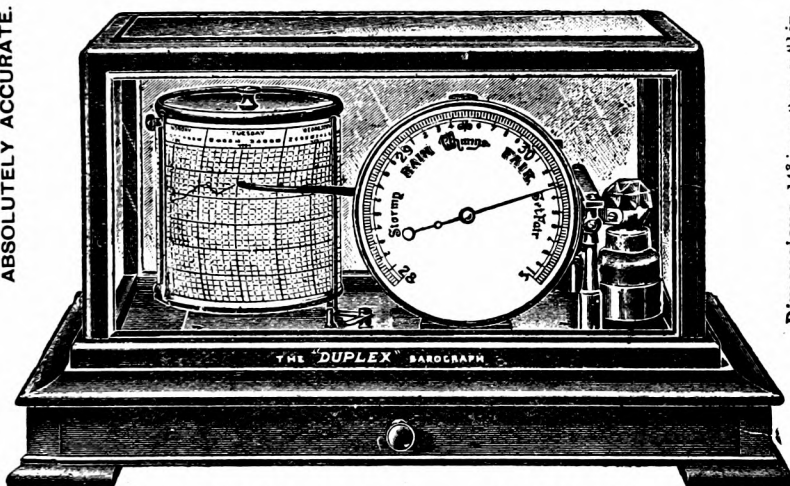


Dimensions, 18½ in. x 7½ in. x 8½ in.

### The "SIMPLEX" BAROGRAPH,

In Oak Case, glazed top and sides. Records on a Weekly Chart  
Price, with a year's supply of Charts, Ink and Instructions, complete, **£3 18 6**.

ABSOLUTELY ACCURATE.



Dimensions, 14½ in. x 9 in. x 8½ in.

### The "DUPLEX" BAROGRAPH,

With our new Opal glass dial attachment, showing present reading of the Barometer in addition to the record on the chart. Very best quality, in solid oak, walnut, or mahogany case, with bevelled edge plate glasses and chart drawer.  
Price complete, with a year's supply of Charts, Ink, and Instructions, **£6 2 6**.

### The BARO-THERMOGRAPH.

(COMBINATION SELF-RECORDING BAROMETER AND THERMOMETER.)

☛ Special Illustrated List of Barographs and Thermographs (covering various patterns, from **£3 10s.**), post free.

**PASTORELLI & RAPKIN, LTD.** (ESTAB. 1750.)

ACTUAL MAKERS of *all kinds* of Meteorological Instruments.

CONTRACTORS TO H.M. GOVT.

**46, HATTON GARDEN, LONDON, E.C.**

☛ Illustrated List of STANDARD INSTRUMENTS Post Free.

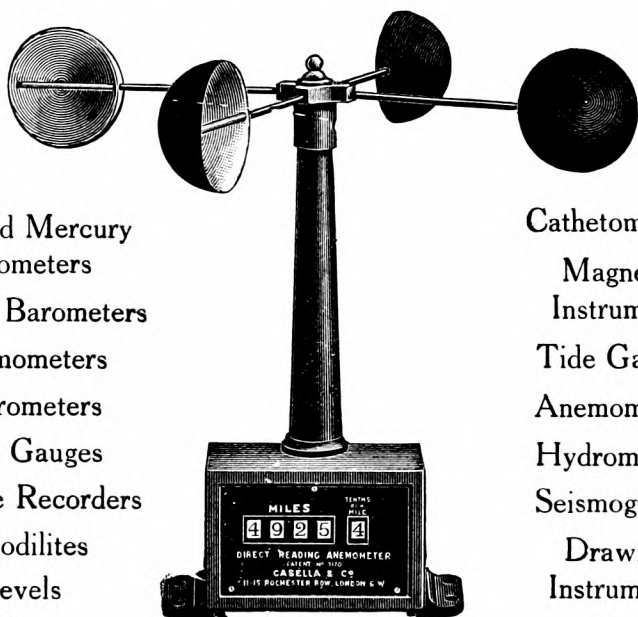
\*. We pay carriage and guarantee safe delivery within U.K. on all our Instruments.

# C·F·CASELLA·&·CO·LTD

*Makers of*  
METEOROLOGICAL, SURVEYING  
AND OTHER  
SCIENTIFIC INSTRUMENTS

---

## CASELLA'S TOTALIZING ANEMOMETER



Standard Mercury  
Barometers  
Aneroid Barometers  
Thermometers  
Hygrometers  
Rain Gauges  
Sunshine Recorders  
Theodolites  
Levels  
Etc.

Cathetometers  
Magnetic  
Instruments  
Tide Gauges  
Anemometers  
Hydrometers  
Seismographs  
Drawing  
Instruments  
Etc.

This instrument is a great improvement on the ordinary dial anemometer

CATALOGUES ON APPLICATION

---

11-15, ROCHESTER ROW, VICTORIA ST.,  
LONDON, S.W.



# Symons's Meteorological Magazine.

---

No. 551.

DECEMBER, 1911.

VOL. XLVI.

---

## WEATHER IN THE SEVENTEENTH CENTURY.

By WALTER SEDGWICK, M.A.

### PART IV.—WINTER.

IN the concluding article of this series it is proposed to consider the information given in the diaries of Evelyn and Pepys about the weather in the winter months (December, January and February). This information is more complete and in several respects more interesting than the accounts given of the weather in the other seasons of the year. The diaries throw considerable light on that much discussed question, the character of the old-fashioned winter, and Evelyn gives a long account of the historical winter of "Frost Fair" (1683-4).

It is fortunately possible, when dealing with non-instrumental observations, to make a more reliable comparison between the weather at different epochs during winter than during the other seasons, because in the case of winter we can compare the frequency of frost and snow, which are dependent on definite physical conditions, whereas in the case of the other seasons we have to rely largely on comparisons of such statements as "exceeding cold" or "extraordinary warmth," which are dependent on indefinite or unknown quantities, as for instance the temperament of the observer and the average conditions of weather at the time when the statements were made.

The popular opinion about the winters of the past is that they were more severe with heavier snowfalls and more prolonged frosts, and that wintry conditions set in before Christmas, and it is interesting to investigate both these views. When doing so it is necessary to keep in mind the great advance which has been made in the past two centuries in the conveniences and comforts of civilization. In the 17th century traffic was only carried on along badly kept roads and lanes, which were often quagmires, or by water, and consequently a fall of snow or spell of cold weather would have caused

far more discomfort and interference with daily life than they do now. It is therefore reasonable to conclude that the diarists of the 17th century would record as specially noticeable slight snow falls and frosts which would be scarcely noticed by the town dwellers of to-day, and allowance must be made for this when contrasting descriptions of the weather in winter given by the writers of that era with the actual weather experienced in the winters of our time.

\* Dealing first with the general character of winter weather as recorded in the diaries three points can be considered: (1) the records of snow, (2) the records of frosts, and (3) the number of mild winters. On reading the extracts at the end of this article it will be found that the recorded instances of snow are surprisingly few. There are only 13 winters in the whole series covered by the diaries in which snow is mentioned, *i.e.*, December 1662, January 1665, February 1666, February 1672, December 1676, December 1680, January 1689, January 1690, February 1692, January 1695, January 1696, December—January—February, 1696—7, and January, 1701. Of these snowfalls only three appear to have been prolonged, *i.e.*, December 1676, January 1695, and December—January—February, 1696—7, and against the long continuance of snow in the winter of 1696—7 there can be set Pepys' observation on the 7th December, 1662, "At my waking I found the tops of the houses covered with snow, which is a rare sight which I have not seen these three years." As far as the accounts of snow are considered there is certainly no reason for thinking that the winters in the time of Evelyn were more severe than those of our own time, rather the reverse.

Turning now to the second point, the records of frost, it does appear at first sight as if Evelyn experienced in his lifetime more prolonged frosts than have occurred in the past half century. In the first place there is the severe frost of 1683—4 (Frost Fair) which far surpassed in severity any frost within living memory, and there are no less than five winters in which Evelyn describes the Thames as being frozen, *i.e.*, February 1649, December 1662, January—February 1684, January 1685, and January 1695, and possibly also January 1689. No positive conclusion can, however, be drawn from the winter of Frost Fair, because not only did it surpass in severity all winters experienced by those now living but it also surpassed in severity all other winters in the lifetime of Evelyn. Attention should, therefore, be more especially directed to the number of occasions upon which the Thames is stated to have been frozen. It is noticeable that the description of the Thames as frozen is used somewhat loosely, and does not always mean frozen right across (*vide* the entry on the 11th December, 1662, "I went home by water, but not without exceeding difficulty, the Thames being frozen, great flakes of ice encompassing our boat") and in no winter except that of Frost Fair does Evelyn refer to the Thames as bearing pedestrian traffic. It must also be remembered that the Thames at London was in Evelyn's time a different river to what it is to-day. Then it flowed

for the most part between mud flats, now between embankments, and it is probable that it was in Evelyn's time a more sluggish river than it is now, and that ice would have formed more readily on its banks. This view is supported by the observations of the diarists on the 11th December, 1662, from which it appears that on the day when skating commenced on the canal in St. James's Park, ice was found on the Thames and the river was described as being frozen. Finally on this point attention is called to the very few winters in which the observations given in the diaries indicate a prolonged frost. Possibly six can be so described, *i.e.* 1658, December 1662, January 1665, 1683—4, 1694—5, and 1696—7, and of these only the frosts of 1683—4 and 1696—7 seem to have been so prolonged and severe as the great frosts of 1890—1 and January—February 1895.

As regards the third point, the frequency of mild winters, we find that at least 11 very mild or wet winters occurred in Evelyn's lifetime, *i.e.*, 1648, 1660—1, 1661—2, 1670—1, 1685—6, 1686—7, 1689—90, 1691—2, 1692—3, 1695—6, and 1699—1700, and those who maintain that the old-fashioned winters were *always* severe will have difficulty in reconciling their opinions with the following observations :—

- 1661. January 31.—The ways are dusty and the flies fly up and down, and the rose bushes are full of leaves.
- 1662. January 25.—Near as warm as at midsummer in some years.
- 1662. December 8.—A very hard frost, which is news to us after having none almost these three year.
- 1686. January 29.—So wet and mild a season had scarce been seen in man's memory.
- 1687. January 8.—Little appearance of any winter as yet.
- 1690. January 21.—The winter has been hitherto extremely wet, warm and windy.
- 1693. February 14.—Hitherto an exceeding mild winter.
- 1699. December 13.—Calm, bright and warm as in the middle of April.  
So continued on 31st January (21st O.S.)

In short, when all the information given in the two diaries about the winter weather during the half century which they cover, is considered together, it does not appear that cold winters were more frequent or mild winters less frequent than they have been in the past fifty years, or that the average severity of the winters in the time of the diarists was greater than at the present time.

There now remains for enquiry the other common view about the old-fashioned winters, *i.e.*, that wintry conditions commenced earlier and usually prevailed at Christmas Day. This view is certainly not substantiated by the two diaries, and it will be observed from the extracts below that on six occasions only is a continuance of cold weather described in December, whereas in a considerable majority of winters the first entry about snow or frost is in January or even later. Attention, however, is specially called to the fact that the



dates ascribed below to the extracts have been corrected to the Gregorian calendar (N.S.), and are not the dates given in the diaries, which are according to the Julian calendar (O.S.). In Evelyn's lifetime the New Style was in use throughout the greater part of western Europe, but had not been adopted in England, and the difference between the two calendars, which was fully explained in the May number of this Magazine, amounted in the 17th century to ten days. Consequently the retention of the Old Style in England made Christmas Day then correspond with January 4th of the present time, and if the diaries are considered with the dates uncorrected it will be found that wintry conditions began in at least four other years before Christmas, *i.e.*, 1664, 1666, 1683 and 1695, and probably also in two more, *i.e.*, 1684 and 1696, thereby doubling the number of years with wintry weather in December. It therefore appears, as indeed it is reasonable to have expected, that the error which had arisen in the calendar year by the use of the Julian calendar did have the effect of making the number of Christmas Days on which the country was under the influence of wintry weather more frequent than at the present time, and the fact that during the 17th century and the first half of the 18th, Christmas Day did not occur in England until 13 or 14 days after the winter solstice, probably did contribute to the prevalent belief that at Christmas time the country should be under the conditions usually depicted on Christmas cards. It is, however, clear that even under the Julian calendar there were many years with mild weather at Christmas, and the widely-held opinion about the severe character of the Christmas weather in the old-fashioned winters cannot be substantiated from the diaries.

The sequence of winter weather experienced in the two periods during which fairly continuous information is given in the diaries was as follows :—

|                            |                                              |
|----------------------------|----------------------------------------------|
| 1660-1. Very mild.         | 1689-90. Mild and wet.                       |
| 1661-2. Very mild.         | 1690-1. Cold December.                       |
| 1662-3. Cold December.     | 1691-2. Very mild and dry until<br>February. |
| 1664-5. Severe.            | 1692-3. Very mild.                           |
| 1665-6. Variable.          | 1694-5. Severe.                              |
| 1666-7. Frost in January.  | 1695-6. Mild and wet.                        |
| 1683-4. Very severe.       | 1696-7. Severe.                              |
| 1684-5. Severe.            | 1698-9. Mild.                                |
| 1685-6. Very mild and wet. | 1699-1700. Mild and dry until<br>February.   |
| 1686-7. Mild.              |                                              |
| 1688-9. Cold.              |                                              |

*Note.*—In the following extracts the dates *have been corrected* to New Style.

Extracts from Pepys' diary are distinguished thus—(P.); all other extracts are from Evelyn's diary.

1648. This was a most exceeding wet year, neither frost nor snow all the winter for more than six days in all.

1649. 1 February.—Now was the Thames frozen over, and horrid tempests of wind.
1656. 28 January.—Being a great frost, but a mist falling as I returned.
1658. [17 March.]—This had been the severest winter that any man alive had known in England. The crows' feet were frozen to their prey. Islands of ice enclosed both fish and fowl frozen, and some persons in their boats.
- 1660-1. 31 January.—It is strange what weather we have had all this winter; no cold at all; but the ways are dusty and the flies fly up and down and the rosebushes are full of leaves such a time of the year as was never known in this world before here. (P.)
- 1661-2. 25 January.—Great rain had fallen without any frost or seasonable cold, not only in England, but in Sweden, and the most northern parts, being here near as warm as at Midsummer in some years.
- „ —A fast day ordered by the Parliament to pray for more seasonable weather it having hitherto been summer weather, that it is both as to warmth and every other thing just as if it were the middle of May or June. (P.)
- 27 February.—This night and the next day fell such a storm of hail, thunder and lightning as never was seen the like in any man's memory, especially the tempest of wind, being south-west, which subverted besides huge trees, many houses, innumerable chimneys . . . .
- „ —Extraordinary wind . . . . (such as hath not been in memory before unless at the death of the late Protector) . . . . broke down part of several houses . . . . (P.)
- 1662-3. 4 December.—A very cold day. (P.)
- 7 „ —At my waking I found the tops of the houses covered with snow, which is a rare sight which I have not seen these three years. (P.)
- 8 „ —A very hard frost which is news to us after having none almost these three year. (P.)
- 11 „ —Having seen the strange and wonderful dexterity of the sliders on the new canal in St. James' Park performed before their Majesties by divers gentlemen and others with skates . . . . I went home by water, but not without exceeding difficulty, the Thames being frozen, great flakes of ice encompassing our boat.
- „ —Then over the Park (St. James') where I first in my life, it being a great frost, did see people sliding with their skates, which is a very pretty art. (P.)
- 23 „ —into the Park . . . the ice was broken and dangerous. (P.)
- 27 „ —Raining. (P.)
- 1663-4. 6 December.—The greatest tide that ever was remembered in England to have been in this River (the Thames); all White Hall having been drowned. (P.)
- 1664-5. 1 January.—It was now exceeding cold and a hard long frosty season.

- 12 January.—The street full of footballs, it being a great frost. (P.)
- 14 „ —Excessive sharp frost and snow.
- 16 February.—One of the coldest days, all say, they ever felt in England. (P.)
- 1665-6. 2 December.—Very exceeding hard frost and continues freezing (P.)
- 7 „ —Frosty cold. (P.)
- 23 „ —The plague is increased again this week notwithstanding there hath been a long day or two great frosts; but we hope it is only the effects of the late close warm weather. (P.)
- 2 February.—A most furious storm all night and morning. (P.)
- 3 „ —The wind being again very furious . . . bricks and tiles falling from the houses . . . and whole chimneys, nay, whole houses in two or three places blown down. (P.)
- 14 „ —It was a frost and had snowed last night. (P.)
- 1666-7. 3 January.—It being frost and dry. (P.)
- 7 „ —A most horrid cold night it was, frosty and moonshine (P.)
- 16 „ —An excellent frosty day. (P.)
- 19 „ —The breaking up of the frost. (P.)
- 1667-8. 18 January.—Raining. (P.)
- 16 February.—Raining. (P.)
- 1670-1. 25 December.—The thickest and darkest fog on the Thames that was ever known in the memory of man.
- 31 January.—This year the weather was so wet, stormy and unseasonable as had not been known in many years.
- 1671-2. 13 February.—An extraordinary snow.
- 1676-7. 20 December.—There fell so deep a snow as hindered us from Church.
- 22 „ —To London, in so great a snow as I remember not to have seen the like.
- 27 „ —More snow falling, I was not able to get to Church.
- (a) 1680-1. 22 December. After many days and nights of snow, cloudy and dark weather, the comet was very much wasted.
- 1683-4. 2 January.—The Thames frozen.
- 6 „ —It being in England this year one of the severest frosts that has happened of many years.
- 11 „ —The weather continuing intolerably severe, streets of booths were set upon the Thames; the air was so very cold and thick as of many years there had not been the like.
- 16 „ —The river quite frozen.
- 19 „ —I went across the Thames on the ice now become so thick as to bear not only streets of booths, in which they roasted meat and had divers shops of wares, quite across as in a town but coaches, carts and horses passed over. So I went from Westminster stairs to Lambeth . . . (returning) I walked over the ice from Lambeth-stairs to the Horseferry.
- 26 „ —The Thames was filled with people and tents, selling all sorts of wares as in the City.
- 3 February.—The frost continuing more and more severe, the Thames before London was still planted with booths in formal streets, all sorts of trades and shops furnished and

full of commodities, even to a printing press . . . . Coaches plied from Westminster to the Temple and from several other stairs to and fro, as in the streets, sleds, sliding with skates, a bull baiting, horse and coach races, puppet plays . . . . so that it seemed to be a bacchanalian triumph or carnival on the water, whilst it was a severe judgment on the land, the trees not only splitting as if lightning-struck, but men and cattle perishing in divers places and the very seas so locked up with ice that no vessels could stir out or come in. The fowls, fish, and birds and all our exotic plants and greens, universally perishing . . . . Nor was this severe weather much less intense in most parts of Europe even as far as Spain and the most southern tracts. London by reason of the excessive coldness of the air hindering the ascent of the smoke, was so filled with the fuliginous steam of the sea coal, that hardly could one see across the streets and this filling the lungs with its gross particles exceedingly obstructed the breast so as one could scarcely breathe. Here was no water to be had from the pipes and engines, nor could the brewers and divers other tradesmen work, and every moment was full of disastrous accidents.

- 15 February.—It began to thaw but froze again. My coach crossed from Lambeth to the Horseferry at Millbank. The booths were almost all taken down.
- (b) 18 „ —The weather was set in to an absolute thaw and rain, but the Thames still frozen.
- 1684-5. 11 January.—It proved so sharp weather, and so long and cruel a frost, that the Thames was frozen across, but the frost was often dissolved and then froze again.
- 1685-6. 2 December.—Hitherto was a very wet warm season.
- 10 January.—The winter had hitherto been extraordinary wet and mild.
- 29 January.—So wet and mild a season had scarce been seen in man's memory.
- 1686-7. 8 January.—Little appearance of any winter as yet.
- 1688-9. 17 January.—A long frost and deep snow; the Thames almost frozen over.
- 1689-90. 21 January.—This night there was a most extraordinary storm of wind, accompanied with snow and sharp weather; it did great harm in many places, blowing down houses, trees, &c., killing many people. It began about two in the morning and lasted till five, being a kind of hurricane, which mariners observe have begun of late years to come northward. This winter has been hitherto extremely wet, warm and windy.
- 1690-1. 30 December.—Most of this month cold and frost.
- 1691-2. Up to 10 December.—An extraordinary dry and warm season, without frost and like a new spring; such as had not been known for many years.

- 5 January.—An exceeding dry and calm winter, no rain for many past months.
- 3 February.—A frosty and dry season continued.
- 17 ,, —An extraordinary snow fell in most parts.
- 1692-3. 14 February.—Hitherto an exceeding mild winter.  
[1 March.]—Hitherto an exceeding warm winter, such as has seldom been known.
- 1693-4. 20 December.—A very great storm of thunder and lightning.
- 1694-5. 23 January.—The Thames was frozen over.  
30 January.—The frost and continual snow have now lasted five weeks.
- 13 February.—The long frost intermitted but not gone.
- 1695-6. 4 January.—Hitherto mild, dark, misty weather. Now snow and frost.  
12 February.—An extraordinary wet season, though temperate as to cold.
- 1696-7. 23 December.—Continuance of extreme frost and snow.  
27 January.—The severe frost and weather relented, but again froze with snow.
- (c) 17 February.—Severe frost continued with snow. Soldiers in the armies and garrison-towns frozen to death on their posts.
- 1698-9. 28 December.—Very warm, but exceeding stormy.
- 1699-1700. 4 December.—A gentle, calm, dry, temperate weather all this season of the year, but now came sharp, hard frost, and mist, but calm.  
13 December.—Calm bright and warm as in the middle of April. So continued on 31st Jany. (21st O.S.).  
4 February.—The weather was now altering into sharp and hard frost.  
28 February.—Mild and calm season, with gentle frost, and little mizzling rain.
- 1700-1. 15 January.—An exceeding deep snow and melted away as suddenly.  
30 ,, —Severe frost, and such a tempest as threw down many chimneys and did great spoil at sea.
- 1703-4. 2 December.—Wet and uncomfortable weather.
- (d) 7-8 December.—The effects of the hurricane and tempest of wind, rain and lightning through all the nation especially London were very dismal. Many houses demolished and people killed, &c.

(a) The Comet alluded to is the celebrated one of 1680, which was investigated by Sir Isaac Newton in his "Principia."

(b) Evelyn records that the French mails got through two days later.

(c) A leaf of the original MS. following this date is lost, and the diary does not show how long this severe weather continued.

(d) This was the memorable storm of November 26th to December 1st (O.S.), 1703, when the Eddystone Lighthouse, built by Henry Winstanley, was blown down.





# THAMES VALLEY RAINFALL NOVEMBER, 1911.



Watershed of River Thames above Teddington, and River Lee above Feltham Wells.

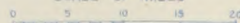
Symonds' Meteorological Magazine.

Rainfall Stations reporting  
inch.

ALTITUDE  
SCALE

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

SCALE OF MILES



## THE WEATHER OF NOVEMBER.

By FRED. J. BRODIE.

DURING the opening week the weather was influenced by deep cyclonic disturbances, whose centres passed along to the northward of the United Kingdom, mainly between Iceland and the Faeröe, and thence on to Scandinavia and northern Russia. Gales from south-west and west prevailed very generally; the storm of the 5th being in many places of great severity, and accompanied by heavy rain in Scotland. The strong south-westerly drift which swept up in the front of this disturbance resulted in day temperatures of  $55^{\circ}$  and upwards in nearly all parts of the country, the thermometer on the 4th or 5th rising to  $60^{\circ}$  at a few scattered places in England and Wales (including Westminster), and to  $61^{\circ}$  at Tottenham. Between the 8th and 13th disturbances continued to advance from the Atlantic following a more southerly track, across Ireland and England. In the south the wind continued to blow mainly from between south-west and west or north-west, but in Scotland it was more variable, and not infrequently from some easterly quarter. Temperature became somewhat lower, and between the nights of the 9th and 11th frost occurred in most districts, the sheltered thermometer falling at least  $5^{\circ}$  below the freezing point in many places, and at least  $10^{\circ}$  below it in some parts of Scotland. On the surface of the grass, minima of  $20^{\circ}$  or less were recorded at many northern stations, the exposed thermometer at Glasgow sinking to  $15^{\circ}$ , and at Llangammarch Wells to  $11^{\circ}$ . During the spell of variable cyclonic weather, thunder and lightning were observed in several isolated parts of the country. Between the 14th and 16th the Atlantic depressions took a more northerly course, and a mild south-westerly current of air again became general, the day temperatures exceeding  $55^{\circ}$  in most districts. On the 17th and 18th the passage of a complex depression, directly across the United Kingdom, was accompanied by heavy rain in the south-east of England, and snow and sleet in Scotland.

A complete change in the type of weather now took place, an anti-cyclone of increasing intensity passing very slowly eastwards along our more northern coasts and on to northern Europe, while a complex area of low pressure appeared over France and southern Europe. North-easterly winds of increasing strength consequently set in over the United Kingdom, blowing with the force of a gale in the Channel on the 16th, and although the weather became drier, showers of hail, sleet and snow were of rather frequent occurrence in our northern and eastern districts. Sharp frost occurred on the nights of the 20th or 21st, the sheltered thermometer falling to between  $8^{\circ}$  and  $10^{\circ}$  below the freezing point in many places, while instruments exposed on the grass sank to  $16^{\circ}$  at Newton Rigg and Aspatria and to  $10^{\circ}$  at Llangammarch Wells. After the 26th the northern anticyclone drifted away to central Russia, and low-pressure systems prevailed.

## INTERNATIONAL BALLOON ASCENTS.

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

*June 3rd, 1909.*

| Starting Point.   | Country.     | A<br>miles. | B<br>° F. | C<br>miles. | D<br>° F. | E<br>miles. | F          |
|-------------------|--------------|-------------|-----------|-------------|-----------|-------------|------------|
| Manchester....    | England .... | 6·9         | —61       | 12·5        | —53       | 41          | N.E.       |
| Pyrton Hill....   | „ ....       | 7·2         | —63       | 10·4        | —49       | 40          | N.         |
| Petersfield ....  | „ ....       | 6·9         | —60       | 11·9        | —43       | 44          | N. by E.   |
| Hamburg.....      | Germany....  | 6·7         | —66       | 15·5        | —         | 63          | E.         |
| Lindenberg....    | „ ....       | 7·4         | —74       | 8·1         | —56       | 50          | E.         |
| Paris.....        | France ..... | 7·3         | —67       | 8·4         | ?         | 94          | N. by E.   |
| Strassburg ....   | Germany....  | 7·3         | —80       | 14·0        | ?         | 44          | N.E. by N. |
| Munich.....       | „ ....       | 7·5         | —76       | 8·2         | ?         | 51          | E.N.E.     |
| Vienna.....       | Austria .... | 7·5         | —74       | 10·5        | —69       | 23          | S.E. by E. |
| Pavia .....       | Italy .....  | 7·4         | —78       | 9·1         | ?         | 26          | N.N.E.     |
| Pavlovsk .....    | Russia ..... | 5·9         | —49       | 9·8         | —50       | 51          | E. by S.   |
| Kuchino .....     | „ ....       | 6·6         | —76       | 9·4         | —58       | 121         | E. by S.   |
| Nizhni Olchidaeff | „ ....       | 6·8         | —77       | 10·2        | —58       | 39          | S.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.

On this occasion hourly ascents were made at Manchester, and many stations sent up three or four balloons. Out of 25 sent up at Manchester 18 were recovered, and Mr. Cave, at Ditcham Park, Petersfield, got four good traces. In the above table the successful ascent nearest to 7 a.m. has been taken, but it is much to be wished that some one would make a detailed study of the whole series of ascents.

On June 2nd an anticyclone lay to the westward of Ireland and a trough of low pressure stretched across from Spain to Finland. On the 3rd the high pressure had moved eastwards, and separate depressions were found over the Bay of Biscay and northern Russia.

The values of H<sub>c</sub> (column A), are very uniform, excepting at Pavlovsk, where, in consequence of the higher latitude, a low value is the rule. The temperature of the isothermal column falls steadily from N.W. to S.E., and it is noteworthy that a large inversion was present over the whole area excepting Pavlovsk. At many stations the temperature at the highest point is vitiated by solar radiation.

In opposition to the ascents in May the general drift was to the east and north-east, but there is no great noticeable difference about the recorded temperatures.

## ROYAL METEOROLOGICAL SOCIETY.

THE opening meeting of this Society for the present session was held on Wednesday evening, November 15th, at the Institution of Civil Engineers, Dr. H. N. Dickson, President, in the chair.

The President announced that the Council had that day awarded the Symons Gold Medal to Professor Cleveland Abbe, of the United States Weather Bureau, Washington, for the distinguished work which he had done in connection with meteorological science. The medal will be presented at the Annual Meeting of the Society.

Mr. Charles Harding read a paper on "The Abnormal Summer of 1911." He dealt with the data published in the *Weekly Weather Report* for each week from June 3rd to September 20th, and showed that the warmest weather was experienced in the English districts, although the temperature was generally in excess of the average for the entire kingdom. During the 18 weeks embraced by the whole period there were 15 weeks with the temperature above the average in England N.E., England E., Midland Counties and the English Channel. There was an excess in 14 weeks in England S.E. and England S.W., but not more than 12 warm weeks in any other part of the kingdom. The least number of warm weeks was 10 in the west of Scotland. The weeks with the greatest excess of temperature were those ending June 3rd and 10th, July 29th, August 5th, 12th, 19th, and September 9th.

Temperatures of 90° and above were limited solely to the English districts, but they occurred in all parts of England. The highest temperature reported from the stations used in the compilation of the *Weekly Weather Report* was 98° in the Midland counties, recorded during the week ending August 12th, and the highest temperatures for the whole period also occurred during this week in all the other English districts. There were six weeks in the east of England with a temperature of 90° or above, and five weeks in the Midland counties and in the south-east and south-west of England. Temperatures of 80° and above occurred in several districts for all weeks with the exception of those ending June 17th and 24th, July 1st, and September 23rd and 30th. The highest temperature in Scotland was 89°, and occurred in Scotland E. during the week ending July 15th; the maximum temperature in Ireland for the whole period also occurred during the same week, and was 88°.

The type of weather was mainly anticyclonic during the summer, but the only month with the mean barometric pressure especially high was July, when the mean at Greenwich, corrected and reduced to sea-level, was 30.15 in., which, during the last 100 years, was only exceeded in 1885, when the mean was 30.19 in. Mr. Harding pointed out that the facts which he had brought together showed that as far as temperature is concerned, the summer of 1911 was unique. The maximum temperature of 100° at Greenwich (96°.6 in the Stevenson screen) on August 9th, is the highest temperature

recorded in the British Isles since the establishment of comparable observations. The mean temperature for the summer was also higher than for any similar period during the last 70 years. The maximum temperature of  $95^{\circ}6$  on July 22nd has only been slightly exceeded on two previous occasions, and the September temperature of  $94^{\circ}1$  on the 8th has not previously been equalled during that month. So many hot days during the summer have never before been recorded. Mr. Harding further showed that the rainfall for the three summer months has only been smaller in three previous years during the period of 70 years, and also that the duration of bright sunshine was greater than in any previous summer since the introduction of sunshine recorders in 1881. As a consequence of the exceptional weather, the harvest was everywhere commenced at an earlier date than usual, and was quickly concluded.

Mr. H. Southall said that he did not believe that since 1880 there had been so long a dry period, taking a longer time than just the summer. In 1910, which was a very wet year in his district, he had 39 inches of rain at Ross; but from then to October 18th, 1911, he had only 10.64 in. This was lower than anything in the past 60 years.

Mr. F. J. Brodie said that if the weekly duration of sunshine in any locality exceeded half the possible amount the week might be regarded as extremely fine. In London the average annual number of such weeks in the 30 years ended 1910 was only 5, but in this year there were no fewer than 15 such weeks.

Mr. W. Marriott referred to some experiments on the effects of high temperatures on various substances, which he had carried out during the hot days in August and September. He said that there had been longer periods without rain than during the past summer. In the Meteorological Journal kept by the Rev. W. Cowe from 1795 to 1839 at Sudbury, Middlesex, there was a period of 49 consecutive days without rain, viz., from June 30th to August, 17th, 1800.

Mr. C. Salter gave some particulars respecting the drought in the Thames Valley above Teddington. Taking the three months, July—September, the general rainfall, as worked out by Dr. H. R. Mill, was 2.85 in., against an average of 6.68 in. These three months had a lower rainfall than ever recorded in any three consecutive summer months. There were, however, two previous instances of lower rainfall in three-monthly periods in the spring of 1893, and of these the most remarkable was March—May, when the three months' rainfall reached only 1.60 in. over the whole of the Thames Valley.

Colonel H. E. Rawson and Mr. E. Gold also spoke.

The following gentlemen were elected Fellows of the Society:—Prof. G. C. Chandra, Mr. H. M. A. Cooke, Mr. G. L. Courthorpe, M.P., Mr. H. A. P. Genge, Mr. W. Jowett, Mr. S. A. J. Keatinge, Pundit H. Lal, Mr. C. W. Marles, Mr. C. E. Morton, Mr. F. E. Norris, Mr. K. R. Parhawk, Capt. T. W. Pickard, Mr. J. Saunders, Mr. C. Y. Stevenson, Mr. G. R. Trafford, Mr. G. B. Wither, Mr. C. W. Wright.



## Correspondence.

*To the Editor of Symons's Meteorological Magazine.*

---

## THE ZODIACAL LIGHT.

THE perusal of Mr. Henkel's interesting contribution to the November number of your Magazine, tempts me to refer to observations of the Light recorded by Mr. E. W. Maunder during passages to and from India, and while in India with the Eclipse Expedition of 1887-88. These observations formed the subject of a paper by him, which came before the Royal Astronomical Society in March, 1898. Mr. Maunder there expressed the opinion that the "spindle-shaped beam of light" (referring to that portion of the Light nearest to and extending from the horizon) consists of a disc of particles lying wholly within the Earth's orbit; at the same time the fact that a narrow prolongation of the Light is traceable more than  $90^\circ$  from the sun, and, if the Gegenschein be part of it, to actual opposition, proves, he thought, that a portion of it is derived from matter outside the Earth's orbit, and points to a flat ring of matter lying a good way outside. "A satellite of Saturn," he remarked, "revolving round its primary in the middle of the Cassinian division of the rings would offer some analogy to the position of the Earth with regard to the two divisions of the Zodiacal Light."

Mr. William Anderson, in "Notes on the Zodiacal Light," communicated to the Royal Astronomical Society in May, 1898, gave results of his observations of the Light obtained at Madeira in 1895-96.

He attributed the narrowing of the band prolonged across the sky to particles that extend from the neighbourhood of the sun to beyond the Earth's orbit, but taper off towards the edge outside its orbit.

To both observers the prolongation of the Light appeared as a narrow band; but, as mentioned in my letter of the 6th February last on "The Recurrence of Warm and Cold Periods," the Light was seen by myself and officers of my ship on several successive nights in August, 1899, and again later on while crossing the Pacific, clearly outlined right across the sky, having a breadth of from  $18^\circ$  to  $20^\circ$ .

These observations of the Light, and many others recorded during voyages across the Pacific in the years 1897-99, details of which may be here omitted, gave the impression of a ring of cosmical matter, encircling the Earth about the zodiac, from which light is reflected.

All astronomers appear to agree in attributing the Light to reflection from cosmical bodies situated between the Earth and the sun. This swarm of small bodies may therefore, with some reason, be regarded as a screen; and, if a screen of varying density, may it not periodically exercise a modifying effect upon the supply of solar heat to this planet?

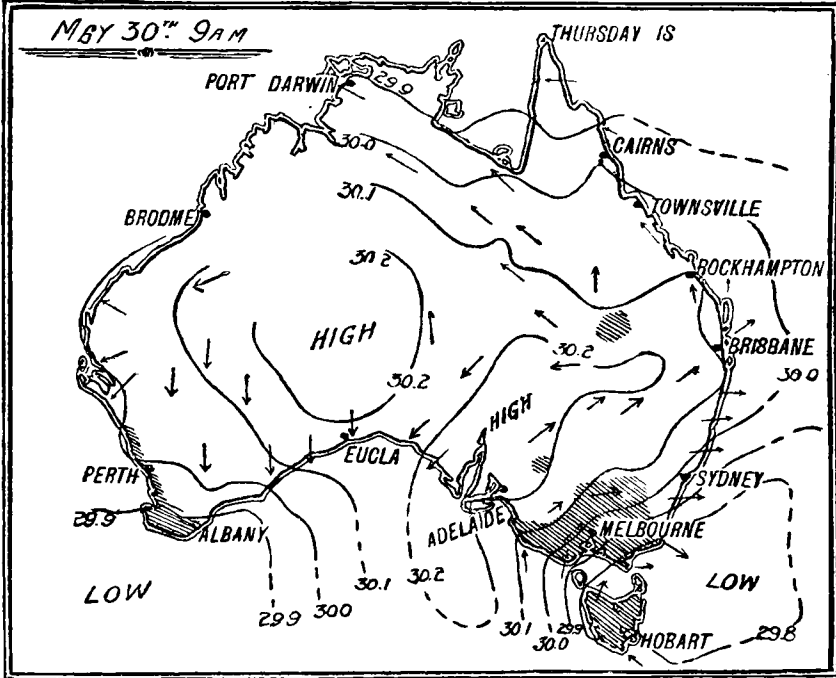
CAMPBELL HEPWORTH.

*2, Amherst Road, Ealing, W., 2nd December, 1911.*

## WEATHER CHARTS IN AUSTRALIAN NEWSPAPERS.

I SEND a copy of the Melbourne *Argus* containing its first reproduction of the isobaric chart.

I believe a valuable work would be produced if the principal isobaric indications as determined by the world's meteorological services were collected and published under one cover. It is quite probable that from a study of a comparison of these peculiarities, new laws may be discovered common to all parts of the world.



With regard to the publication of the Weather Chart in the daily papers of Australia, it first appeared in the *Argus* some twenty years ago. In 1904 the *Daily Telegraph* of Sydney was the first journal in New South Wales to reproduce it in that State. The Adelaide morning and evening papers took the matter up in the following year, and the *Sydney Morning Herald* started to print it in 1908. The Melbourne *Age* commenced to publish the charts at the end of last year, the *Argus* has now followed suit, and we are hoping that the principal papers in the other States may also be persuaded to render a like service to their local communities. H. A. HUNT,

*Commonwealth Meteorologist.*

*Meteorological Bureau, Central Office, Melbourne, 31st May, 1911.*

[Australia is ahead of the mother country with regard to the publication of weather charts in newspapers. The only newspaper in the British Isles to publish isobaric charts is *The Times*, and the execution of the work is by no means equal to that in the Melbourne *Argus*, a very slightly reduced reproduction of which we give above.

Ed. S.M.M.]

## HEAT AND DROUGHT RECORDS AT GUERNSEY.

THE wonderful summer of 1911, which has established new records for heat and drought at so many places, did not pass without leaving its mark on Channel Islands weather. On several days in July and August we came near to topping the highest maximum temperature on record at this station, but it was not until Friday, September 8th, that we actually did so. Late in the season as it was, however, that day stands out, both as regards maximum temperature ( $88^{\circ}6$ ) and mean ( $74^{\circ}6$ ), as the hottest day at Les Blanchés since observations were begun in January, 1894. The previous highest maximum temperature registered here was  $86^{\circ}0$  on September 1st, 1906, and the previous warmest day, July 19th, 1901, had a mean of  $73^{\circ}3$ .

July, August and September, turn out to be the warmest and driest three months of the name in the 18 years, 1894—1911. Very curiously the three months last year were the coldest (mean temperature  $58^{\circ}$ ), but not the wettest, of the series. This year's figures are:—

|                          | Temperature.  |       | Rainfall. |       | Rain days. |
|--------------------------|---------------|-------|-----------|-------|------------|
| 1911 (July-Sept.).....   | $63^{\circ}3$ | ..... | 2.64 in.  | ..... | 17         |
| Average (1894—1903)..... | $60^{\circ}2$ | ..... | 7.81 „    | ..... | 39         |
| Difference ... ..        | $+3^{\circ}1$ | ..... | $-5.17$ „ | ..... | $-22$      |

BASIL T. ROWSWELL.

*Les Blanchés, Guernsey, 7th October, 1911.*

## OUR HOTTEST SUMMER.

IN reply to Miss Tawney's letter in the November number, I think we should bear in mind that there are two factors which invariably pull down the mean temperature of a hot summer month in England far below that of an average summer month in warm countries. One of these factors is the invariable occurrence in England of cool or relatively cool intervals between the spurts of great heat, and the other is the great rarity of hot nights in England. It is, indeed, probable that the 50th—60th parallel belt is at midsummer actually that of the coolest summer nights, for whereas in southern Europe the enormous accumulation of heat by day causes the nights to be insufferably hot, in the far north of Europe along the Arctic circle the absence or practical absence of "night" prevents any marked nocturnal cooling of the air.

I would repeat once more, however, that the most striking difference between northern and southern Europe, say between Britain and Italy, is in the power of the sun, rather even than in the temperature of the air, a fact which emphasizes again the supreme importance of meteorologists not confining their estimation of climate to the temperature of the air.

L. C. W. BONACINA.

*November 22nd, 1911.*

## THE "SUPPOSED" COLD OF WINTER ANTICYCLONES.

By the REV. JOHN S. BEGG.

As a slight local contribution towards answering the question whether winter anticyclones are characterised by colder weather than the average for the season, this paper deals from three points of view with the observations for the past four winters at West Linton, a valley station in Peeblesshire, Scotland, 800 feet above sea-level; winter being taken to cover the period November—March (inclusive).

A "spell of severe frost" is taken to mean a period of three days or more during which the screen minimum temperature fell below 14° F. (—10 C.) once at least, and below 23° F. (—5° C.) on each night of the spell. This is, of course, an arbitrary classification, but it corresponds fairly well with one's idea of a spell of severe frost.

Of such periods during the past four winters there have been six, to which may be added a seventh, November 19th—23rd, 1910, which just failed, indeed, at West Linton (though not at some other Scottish stations) to fulfil the first condition, but abundantly fulfilled the second. The main relevant facts in regard to these periods are:—

TABLE I.

| PERIOD.         | No. of Days | Low-est Screen Min. | Mean Screen Min. | CLOUD.          |              |                 |              | Prevailing Wind Direction. | Pressure at West Linton. | Snow on Ground? |
|-----------------|-------------|---------------------|------------------|-----------------|--------------|-----------------|--------------|----------------------------|--------------------------|-----------------|
|                 |             |                     |                  | 9 P.M.          |              | 9 A.M.          |              |                            |                          |                 |
|                 |             |                     |                  | No. Cloud-less. | Mean (0-10). | No. Cloud-less. | Mean (0-10). |                            |                          |                 |
| '08, Jan. 2-5   | 4           | (F.) ° 10.3         | ° 14.9           | 2               | 5.0          | 3               | 2.2          | E.S.E.                     | High                     | Sprinkling      |
| '09, Mar. 2-6   | 5           | 1.0                 | 10.1             | 2               | 5.4          | 1               | 3.2          | N. to W.                   | Low                      | Yes             |
| '09, Nov 14-18  | 5           | 10.2                | 12.2             | 5               | 0.0          | 3               | 0.8          | W.N.W.                     | Mod. High                | No              |
| '09, Dec. 4-8   | 5           | 6.0                 | 12.5             | 4               | 2.0          | 2               | 4.6          | W.S.W.                     | Low                      | Yes             |
| '10, Jan. 21-23 | 3           | 7.3                 | 11.4             | 2               | 0.7          | 2               | 3.3          | W.N.W.                     | Neutral                  | „               |
| '10, „ 25-28    | 4           | —5.0                | 5.8              | 0               | 6.7          | 1               | 5.8          | N. to W.                   | Low                      | „               |
| '10, Nov 19-23  | 5           | 14.7                | 18.0             | 3               | 2.0          | 2               | 3.4          | W.N.W.                     | Mod. High                | Sprinkling      |

So far, then, one would say that the height of the barometer is certainly not the determining factor in the occurrence of severe frosts, which may occur under either anticyclonic or cyclonic conditions; but that, on the whole, the severest frosts coincide with a low barometer and a snow-covered ground.

A striking example of the lack of apparent connection between temperature and absolute barometric pressure (as distinguished from the *relative* positions over north-western Europe of cyclones and anticyclones) is found in the two successive months November and December, 1910. Both were characterised by an unusually low pressure over Scotland, but while the former was one of the coldest Novembers on record, the latter was one of the mildest Decembers.

If we sub-divide days of the cyclonic or anti-cyclonic type into "clear" days and "cloudy" days, we may be able to gain some idea as to how far high (or low) barometer *combines* with clear (or cloudy) sky to give the most favourable conditions for a severe frost.

For this purpose a 24-hour period was classified as a "clear" day, if it combined a mean cloud percentage at 9 p.m. and 9 a.m. of 30 or less, with the recording of 50 per cent., or more, of the possible sunshine on the succeeding (or preceding) day; and as a "cloudy" day if it combined a mean cloud percentage of 30 per cent. or more with 5 per cent. or less of the possible sunshine.

These "clear" and "cloudy" days were then sub-divided into anticyclonic and cyclonic groups, according to the type of pressure-distribution at West Linton, as shown in the Daily Weather Report Maps, days of an ill-defined type being neglected.

The result of this analysis is given in Table II., from which we

TABLE II.—*West Linton.*

|             |              | No. of Days. | Mean Max. | Mean Min. | Mean Max. and Min. | Differences from Normal.* |           |       |
|-------------|--------------|--------------|-----------|-----------|--------------------|---------------------------|-----------|-------|
|             |              |              |           |           |                    | Mean. Max.                | Mean Min. | Mean. |
| CLEAR DAYS  | Anticyclonic | 31           | 41.6      | 24.8      | 33.2               | +0.2                      | -5.4      | -2.6  |
|             | Cyclonic     | 27           | 36.8      | 20.9      | 28.8               | -4.7                      | -9.2      | -7.0  |
| CLOUDY DAYS | Anticyclonic | 53           | 40.1      | 34.7      | 37.4               | -0.4                      | +4.8      | +2.2  |
|             | Cyclonic     | 66           | 41.9      | 34.6      | 38.3               | +1.0                      | +4.7      | +2.8  |

gather

(1.) That clear weather, whether of the anticyclonic or cyclonic type, is, as regards mean temperature, and especially as regards night temperatures, considerably colder than the average, while cloudy weather is warmer.

(2.) That while day temperatures are slightly lower in anticyclonic than in cyclonic cloudy weather, there is no difference in the night temperatures, which are, on the average, about 5° above the normal.

(3.) That the greatest departure from the normal occurs in clear cyclonic weather. This is due in part, no doubt, to the fact that while in anticyclonic clear weather the ground is frequently clear of snow—cyclonic clear weather frequently follows in the wake of a snowstorm; but, in any case, the facts do not lend much support, for this particular locality, to the theory that an anticyclone (as compared with a different pressure distribution) is a "focus of cold"; for *this* the most potent determining factor seems rather to be *clearness of sky*. When this is combined with absence of wind and

\* In estimating the normal, account was taken of the fact that the proportion of days from each separate month varied slightly in the four groups.

the presence of a snow-covering, a severe frost is practically certain at such a station as West Linton, let the height of the barometer and even the direction of the wind be as they please; although a low barometer with the wind blowing light from some point between north and west probably provide the most favourable accompaniments to the above conditions for the occurrence of a frost of abnormal severity. Speaking broadly, it might be said that severe frost is characteristic not of anticyclonic weather as such (taking the word in its usual sense as simply connoting a high barometer), but of "radiation" weather.

As a matter of fact we know now, from the growing wealth of observations in the upper air and at high-level observatories, that the air in an anticyclone is normally warm and dry, and that the severity of the frost, such as it is, which accompanies *clear*\* anticyclonic weather in valley stations (high or low) is an effect confined to them, and is due to the imprisonment in the valleys of lakes of cold air formed, under gravity, by the flowing down of air in contact with the surface of adjacent slopes, which have been themselves excessively cooled through radiation. Although this is most strikingly shown, as Hann proves, in a large tract of mountainous country like Switzerland, there are indications of it in miniature, to a modified degree, in the observations at Leith and Blackford Hill, Edinburgh, a neighbouring "ridge" station about 400 feet higher. A comparison of these two stations in the cases of clear weather, cited above for West Linton, shows that while in *cyclonic* clear weather the minima at both are about 4° below the normal, yet in *anticyclonic* clear weather, while the difference is again about 4° at Leith, it is only 1°·5 at Blackford Hill, showing a distinct relative warmth at the "ridge" station.

While Hann admits the need of qualifying the absolute statement that a winter anticyclone is cold, he maintains that severe cold characterises the anticyclonic "core," or central region of highest barometer.

It may therefore be of some interest to examine the cases during the past four winters in which an anticyclonic "core" has been situated in the neighbourhood of West Linton. "Neighbourhood"

TABLE III.

|                      | Mean Max.     | Mean Min.     |
|----------------------|---------------|---------------|
| West Linton.....     | 38°·2 (40°·8) | 24°·4 (30°·1) |
| Blackford Hill ..... | 40°·0 (43°·7) | 31°·6 (34°·4) |
| Leith .....          | 40°·1 (44°·4) | 31°·7 (36°·3) |

Mean cloud at West Linton, 9 p.m., 4·8 (6·5), 9 a.m., 5·7 (7·1).

\* This would not exclude the case of shallow fogs forming in valleys, provided the slopes which supply the downward flow of cold air are themselves exposed to a clear sky.



in a meteorological connection must be taken in a somewhat wide sense, as occasions are extremely rare in which West Linton lies within the innermost isobar, as shown in the Daily Weather Maps; but taking all cases in which the point-centre, so far as can be judged, lay within 350 miles of West Linton, *i.e.*, when it lay anywhere over the United Kingdom or the North Sea, the four winters contribute 33 such days, the mean maximum and minimum temperatures of which at West Linton, Blackford Hill and Leith, compared with the normal (in brackets), are given in Table III.

While the mean amount of cloud, during the presence of the anticyclonic core in the neighbourhood, is rather less than the average, this is hardly sufficient in itself to account for the marked reduction in temperature, particularly in the minima; for it is a larger reduction than occurs with still clearer weather under conditions which, though anticyclonic, are on the whole less decisively so than in this case (see Table II.). Also, an examination of the wind directions on these 33 days shows a percentage distribution from the four quadrants almost identical with the normal winter distribution, so that the depression in temperature is not due to a preponderance of winds from the northerly half of the compass. On the other hand, the figures do indicate that in weather of this type the valley station at Leith, in spite of its greater proximity to the sea and lower altitude, is no warmer than the "ridge" station on Blackford Hill, which, so far as it goes, is quite in favour of the belief that in the free air at some height above local irregularities in the Earth's surface, the anticyclone would be found to be warm rather than cold.

In conclusion, while the total number of all these observations is hardly sufficient to justify general statements, the following summary might be hazarded, to await further observations at other times and in other localities for corroboration or the reverse.

(a.) The spells of severest frost occur with a *low* barometer, in quiet, clear weather, with the ground snow-covered.

(b.) Clearness of sky is the most potent factor operating in favour of the occurrence of winter frost.

(c.) To be in the neighbourhood of an anticyclonic "core" does seem to have a decided lowering effect upon the winter temperature at stations whose situation is low in comparison with the surrounding country, but this is quite compatible with the great mass of the air over an anticyclonic region being warm (for the season).

(d.) The support given to the theory of the "supposed" cold of winter anticyclones is confined to such cases as are referred to in the preceding section, there being no evidence that the extensive "suburbs," so to speak, of an anticyclone, at any level, experience an average temperature below the seasonal mean.



## RAINFALL TABLE FOR NOVEMBER, 1911.

| STATION.                         | COUNTY.            | Lat.<br>N. | Long.<br>W.<br>[*E.] | Height<br>above<br>Sea.<br>ft. | RAINFALL<br>OF MONTH.          |              |
|----------------------------------|--------------------|------------|----------------------|--------------------------------|--------------------------------|--------------|
|                                  |                    |            |                      |                                | Aver.<br>1875—<br>1909.<br>in. | 1911.<br>in. |
| Camden Square.....               | London.....        | 51 32      | 0 8                  | 111                            | 2'34                           | 3'62         |
| Tenterden.....                   | Kent.....          | 51 4       | *0 41                | 190                            | 3'07                           | 4'85         |
| Arundel (Patching).....          | Sussex.....        | 50 51      | 0 27                 | 130                            | 3'54                           | 7'45         |
| Southampton (Cadland) ..         | Hampshire .....    | 50 50      | 1 22                 | 52                             | 3'39                           | 5'24         |
| Oxford (Magdalen College).       | Oxfordshire .....  | 51 45      | 1 15                 | 186                            | 2'25                           | 2'26         |
| Wellingborough (Croyland Abbey). | Northampton....    | 52 18      | 0 41                 | 174                            | 2'23                           | 2'72         |
| Shoeburyness.....                | Essex.....         | 51 31      | *0 48                | 13                             | 2'09                           | 3'30         |
| Bury St. Edmunds (Westley)       | Suffolk.....       | 52 15      | *0 40                | 226                            | 2'40                           | 3'80         |
| Geldeston [Beccles].....         | Norfolk.....       | 52 27      | *1 31                | 38                             | 2'49                           | 2'98         |
| Polapit Tamar [Launceston]       | Devon.....         | 50 40      | 4 22                 | 315                            | 4'07                           | 5'59         |
| Rousdon [Lyme Regis] .....       | „.....             | 50 41      | 3 0                  | 516                            | 3'51                           | 3'92         |
| Stroud (Uphfield).....           | Gloucestershire..  | 51 44      | 2 13                 | 226                            | 2'77                           | 3'21         |
| Church Stretton (Wolstaston)...  | Shropshire.....    | 52 35      | 2 48                 | 800                            | 2'94                           | 4'12         |
| Coventry (Kingswood).....        | Warwickshire ..... | 52 24      | 1 30                 | 340                            | 2'61                           | 3'09         |
| Boston.....                      | Lincolnshire.....  | 52 58      | 0 1                  | 25                             | 2'05                           | 2'84         |
| Workshop (Hodsock Priory).       | Nottinghamshire    | 53 22      | 1 5                  | 56                             | 1'98                           | 2'78         |
| Macclesfield.....                | Cheshire.....      | 53 15      | 2 7                  | 501                            | 3'00                           | 2'76         |
| Southport (Hesketh Park)...      | Lancashire.....    | 53 38      | 2 59                 | 38                             | 3'16                           | 3'16         |
| Wetherby (Ribston Hall) ...      | Yorkshire, W.R.    | 53 59      | 1 24                 | 130                            | 2'34                           | 3'54         |
| Arncliffe Vicarage.....          | „.....             | 54 8       | 2 6                  | 732                            | 6'12                           | 9'67         |
| Hull (Pearson Park).....         | „..... E.R.        | 53 45      | 0 20                 | 6                              | 2'34                           | 3'22         |
| Newcastle (Town Moor) ...        | Northumberland     | 54 59      | 1 38                 | 201                            | 2'63                           | 3'74         |
| Borrowdale (Seathwaite) ...      | Cumberland.....    | 54 30      | 3 10                 | 423                            | 13'59                          | 18'08        |
| Cardiff (Ely).....               | Glamorgan.....     | 51 29      | 3 13                 | 53                             | 4'08                           | 7'28         |
| Haverfordwest.....               | Pembroke.....      | 51 48      | 4 58                 | 95                             | 5'16                           | 7'02         |
| Aberystwyth (Gogerddan)...       | Cardigan.....      | 52 26      | 4 1                  | 83                             | 4'50                           | 7'07         |
| Llandudno.....                   | Carnarvon.....     | 53 20      | 3 50                 | 72                             | 3'19                           | 2'77         |
| Cargen [Dumfries].....           | Kirkcudbright...   | 55 2       | 3 37                 | 80                             | 4'35                           | 6'92         |
| Marchmont House.....             | Berwick.....       | 55 44      | 2 24                 | 498                            | 3'21                           | 5'47         |
| Girvan (Pinmore).....            | Ayr.....           | 55 10      | 4 49                 | 207                            | 5'24                           | 5'05         |
| Glasgow (Queen's Park) ...       | Renfrew.....       | 55 53      | 4 18                 | 144                            | 3'63                           | 5'46         |
| Inveraray (Newtown).....         | Argyll.....        | 56 14      | 5 4                  | 17                             | 7'39                           | 10'37        |
| Mull (Quinish).....              | „.....             | 56 34      | 6 13                 | 35                             | 6'24                           | 5'82         |
| Dundee (Eastern Necropolis)      | Forfar.....        | 56 28      | 2 57                 | 199                            | 2'62                           | 2'82         |
| Braemar.....                     | Aberdeen.....      | 57 0       | 3 24                 | 1114                           | 3'76                           | 6'90         |
| Aberdeen (Cranford).....         | „.....             | 57 8       | 2 7                  | 120                            | 3'29                           | 4'73         |
| Cawdor.....                      | Nairn.....         | 57 31      | 3 57                 | 250                            | 2'60                           | 6'47         |
| Fort Augustus (S. Benedict's)    | E. Inverness ..... | 57 9       | 4 41                 | 68                             | 4'51                           | 8'91         |
| Loch Torridon (Bendamph)         | W. Ross.....       | 57 32      | 5 32                 | 20                             | 8'90                           | 8'99         |
| Dunrobin Castle.....             | Sutherland.....    | 57 59      | 3 56                 | 14                             | 3'25                           | 4'37         |
| Wick.....                        | Caithness.....     | 58 26      | 3 6                  | 77                             | 2'95                           | 3'30         |
| Killarney (District Asylum)      | Kerry.....         | 52 4       | 9 31                 | 178                            | 5'54                           | 7'25         |
| Waterford (Brook Lodge)...       | Waterford.....     | 52 15      | 7 7                  | 104                            | 3'80                           | 4'14         |
| Nenagh (Castle Lough).....       | Tipperary.....     | 52 54      | 8 24                 | 120                            | 3'88                           | 6'59         |
| Miltown Malbay.....              | Clare.....         | 52 52      | 9 26                 | 400                            | 4'50                           | 5'34         |
| Gorey (Courtown House) ..        | Wexford.....       | 52 40      | 6 13                 | 80                             | 3'41                           | 4'17         |
| Abbey Leix (Blandsfort)....      | Queen's County..   | 52 56      | 7 17                 | 532                            | 3'28                           | 4'58         |
| Dublin (Fitz William Square)     | Dublin.....        | 53 21      | 6 14                 | 54                             | 2'64                           | 3'02         |
| Mullingar (Belvedere).....       | Westmeath.....     | 53 29      | 7 22                 | 307                            | 3'38                           | 4'93         |
| Ballinasloe.....                 | Galway.....        | 53 20      | 8 15                 | 160                            | 3'59                           | 5'36         |
| Crossmolina (Ennisceoe).....     | Mayo.....          | 54 4       | 9 18                 | 74                             | 5'75                           | 8'62         |
| Collooney (Markree Obsy.)...     | Sligo.....         | 54 11      | 8 27                 | 127                            | 4'02                           | 5'82         |
| Seaforde.....                    | Down.....          | 54 19      | 5 50                 | 180                            | 3'86                           | 3'85         |
| Bushmills (Dundarave).....       | Antrim.....        | 55 12      | 6 30                 | 162                            | 3'77                           | 4'03         |
| Omagh (Edenfel).....             | Tyrone.....        | 54 36      | 7 18                 | 280                            | 3'66                           | 4'70         |

## RAINFALL TABLE FOR NOVEMBER, 1911—continued.

| RAINFALL OF MONTH (con.) |          |                   |        |             | RAINFALL FROM JAN. 1. |           |                      |          | Mean Annual 1875-1909. | STATION.        |
|--------------------------|----------|-------------------|--------|-------------|-----------------------|-----------|----------------------|----------|------------------------|-----------------|
| Diff. from Av. in.       | % of Av. | Max. in 24 hours. |        | No. of Days | Aver. 1875-1909. in.  | 1911. in. | Diff. from Aver. in. | % of Av. |                        |                 |
|                          |          | in.               | Date.  |             |                       |           |                      |          |                        |                 |
| +1.28                    | 155      | .68               | 11     | 19          | 22.98                 | 20.59     | -2.39                | 90       | 25.11                  | Camden Square   |
| +1.78                    | 158      | .93               | 18     | 21          | 24.87                 | 22.32     | -2.55                | 90       | 27.64                  | Tenterden       |
| +3.91                    | 210      | 1.37              | 17     | 16          | 27.57                 | 25.99     | -1.58                | 94       | 30.48                  | Patching        |
| +1.85                    | 155      | 1.30              | 11     | 18          | 28.64                 | 22.46     | -6.18                | 78       | 31.87                  | Cadland         |
| + .01                    | 100      | .57               | 11     | 16          | 22.52                 | 14.84     | -7.68                | 66       | 24.58                  | Oxford          |
| + .49                    | 122      | .44               | 19     | 21          | 23.04                 | 16.66     | -6.38                | 72       | 25.17                  | Croyland Abbey  |
| +1.21                    | 158      | .85               | 17     | 18          | 17.57                 | 15.63     | -1.94                | 89       | 19.28                  | Shoeburyness    |
| +1.40                    | 158      | 1.71              | 18     | 22          | 23.26                 | 20.81     | -2.45                | 89       | 25.40                  | Westley         |
| + .49                    | 120      | 1.23              | 18     | 19          | 21.66                 | 17.30     | -4.36                | 80       | 23.73                  | Geldeston       |
| +1.52                    | 137      | .59               | 7      | 24          | 33.81                 | 28.13     | -5.68                | 83       | 38.27                  | Polapit Tamar   |
| + .41                    | 112      | .95               | 11     | 21          | 29.86                 | 19.47     | -10.39               | 65       | 33.54                  | Rousdon         |
| + .44                    | 116      | .63               | 11     | 24          | 27.10                 | 19.12     | -7.98                | 71       | 29.81                  | Stroud          |
| +1.18                    | 140      | .77               | 9      | 24          | 29.42                 | 22.53     | -6.89                | 77       | 32.41                  | Wolstaston      |
| + .48                    | 118      | .68               | 27     | 22          | 26.32                 | 16.85     | -9.47                | 64       | 28.98                  | Coventry        |
| + .79                    | 138      | .45               | 26     | 27          | 21.47                 | 18.95     | -2.52                | 88       | 23.35                  | Boston          |
| + .80                    | 140      | .52               | 19     | 20          | 22.29                 | 14.93     | -7.36                | 67       | 24.46                  | Hodsock Priory  |
| - .24                    | 92       | .42               | 12     | 21          | 31.38                 | 25.02     | -6.36                | 80       | 34.73                  | Macclesfield    |
| .00                      | 100      | .41               | 11     | 20          | 29.60                 | 25.32     | -4.28                | 86       | 32.70                  | Southport       |
| +1.20                    | 151      | .46               | 19     | 22          | 24.60                 | 21.71     | -2.89                | 88       | 26.87                  | Ribston Hall    |
| +3.55                    | 157      | .85               | 26     | 20          | 54.74                 | 60.98     | +6.24                | 111      | 61.49                  | Arncliffe       |
| + .88                    | 138      | .65               | 26     | 23          | 24.10                 | 21.25     | -2.85                | 88       | 26.42                  | Hull            |
| +1.11                    | 142      | .80               | 18, 19 | 22          | 25.48                 | 24.65     | - .83                | 97       | 27.94                  | Newcastle       |
| +4.49                    | 133      | 3.34              | 3      | 21          | 114.34                | 121.14    | +6.80                | 106      | 129.48                 | Seathwaite      |
| +3.20                    | 178      | .83               | 12, 15 | 22          | 37.58                 | 31.84     | -5.74                | 85       | 42.28                  | Cardiff         |
| +1.86                    | 136      | .79               | 12     | 23          | 41.63                 | 38.18     | -3.45                | 92       | 46.81                  | Haverfordwest   |
| +2.57                    | 157      | 1.40              | 12     | 20          | 40.80                 | 40.27     | - .53                | 99       | 45.46                  | Gogerddan       |
| - .42                    | 87       | .33               | 11     | 20          | 27.52                 | 25.43     | -2.09                | 92       | 30.36                  | Llandudno       |
| +2.57                    | 159      | .97               | 4      | 18          | 38.63                 | 39.61     | + .98                | 103      | 43.47                  | Cargen          |
| +2.26                    | 170      | 1.20              | 17     | 23          | 30.93                 | 26.95     | -3.98                | 87       | 33.76                  | Marchmont       |
| - .19                    | 96       | .58               | 1, 5   | 23          | 44.29                 | 39.77     | -4.52                | 90       | 49.77                  | Girvan          |
| +1.83                    | 150      | .87               | 3      | 18          | 32.02                 | 32.20     | + .18                | 101      | 35.97                  | Glasgow         |
| +2.98                    | 140      | 1.67              | 5      | 19          | 60.10                 | 71.21     | +11.11               | 118      | 68.67                  | Inveraray       |
| - .42                    | 93       | .72               | 14     | 19          | 49.98                 | 48.14     | -1.84                | 96       | 56.57                  | Quinish         |
| + .20                    | 108      | .49               | 15     | 23          | 25.97                 | 12.70     | -13.27               | 49       | 28.64                  | Dundee          |
| +3.14                    | 184      | ...               | ...    | ...         | 31.80                 | 25.81     | -5.99                | 81       | 34.93                  | Braemar         |
| +1.44                    | 144      | .76               | 15     | 26          | 29.30                 | 22.37     | -6.93                | 76       | 32.73                  | Aberdeen        |
| +3.87                    | 248      | 1.22              | 9      | 15          | 26.80                 | 26.42     | - .38                | 99       | 29.33                  | Cawdor          |
| +4.40                    | 197      | 1.51              | 16     | 25          | 38.91                 | 39.30     | + .39                | 101      | 44.53                  | Fort Augustus   |
| + .09                    | 101      | 1.10              | 4      | 22          | 74.07                 | 79.85     | +5.78                | 108      | 83.61                  | Bendamp         |
| +1.12                    | 134      | .93               | 15     | 21          | 28.81                 | 23.64     | -5.17                | 82       | 31.90                  | Dunrobin Castle |
| + .35                    | 112      | .40               | 12     | 21          | 26.77                 | 24.43     | -2.34                | 91       | 29.88                  | Wick            |
| +1.71                    | 131      | 1.10              | 14     | 22          | 47.89                 | 43.98     | -3.91                | 92       | 54.81                  | Killarney       |
| + .34                    | 109      | .96               | 13     | 19          | 35.25                 | 32.82     | -2.43                | 93       | 39.57                  | Waterford       |
| +2.71                    | 170      | 1.01              | 14     | 20          | 35.09                 | 34.06     | -1.03                | 97       | 39.43                  | Castle Lough    |
| + .84                    | 119      | .77               | 1      | 20          | 40.27                 | 34.77     | -5.50                | 86       | 45.11                  | Miltown Malbay  |
| + .76                    | 122      | .70               | 12     | 20          | 31.57                 | 26.48     | -5.09                | 84       | 34.99                  | Courtown Ho.    |
| +1.30                    | 140      | 1.07              | 12     | 22          | 32.51                 | 30.51     | -2.00                | 94       | 35.92                  | Abbey Leix      |
| + .38                    | 114      | .61               | 12     | 23          | 25.41                 | 19.41     | -6.00                | 76       | 27.68                  | Dublin          |
| +1.55                    | 146      | .67               | 12     | 22          | 32.76                 | 31.99     | - .77                | 98       | 36.15                  | Mullingar       |
| +1.77                    | 149      | .90               | 14     | 21          | 32.95                 | 32.79     | - .16                | 100      | 36.64                  | Ballinasloe     |
| +2.87                    | 150      | 1.17              | 14     | 26          | 46.76                 | 43.20     | -3.56                | 92       | 52.87                  | Ennisceoe       |
| +1.80                    | 145      | .81               | 14     | 18          | 38.37                 | 35.03     | -3.34                | 91       | 42.71                  | Markree         |
| - .01                    | 100      | .79               | 17     | 22          | 35.14                 | 26.15     | -8.99                | 74       | 38.91                  | Seaforde        |
| + .26                    | 107      | .40               | 16     | 22          | 33.69                 | 26.07     | -7.62                | 77       | 37.56                  | Dundarave       |
| +1.04                    | 128      | .50               | 5      | 22          | 35.47                 | 32.42     | -3.05                | 91       | 39.38                  | Omagh           |

## SUPPLEMENTARY RAINFALL, NOVEMBER, 1911.

| Div.  | STATION.                     | Rain<br>inches | Div.   | STATION.                     | Rain<br>inches. |
|-------|------------------------------|----------------|--------|------------------------------|-----------------|
| II.   | Warlingham, Redvers Road     | 5.43           | XI.    | Lligwy .....                 | 3.92            |
| „     | Ramsgate .....               | 4.00           | „      | Douglas .....                | 5.17            |
| „     | Hailsham .....               | 7.13           | XII.   | Stoneykirk, Ardwell House    | 4.52            |
| „     | Totland Bay, Aston House.    | 5.07           | „      | Dalry, The Old Garroch ...   | 8.42            |
| „     | Stockbridge, Ashley .....    | 3.99           | „      | Langholm, Drove Road.....    | 6.45            |
| „     | Grayshott.....               | 4.95           | „      | Beattock, Kinnelhead.....    | 6.67            |
| „     | Reading, Calcot Place.....   | 3.32           | XIII.  | St Mary's Loch, Cramilt Ldge | 7.81            |
| III.  | Harrow Weald, Hill House.    | 3.25           | „      | North Berwick Reservoir ...  | 4.09            |
| „     | Pitsford, Sedgebrook.....    | 2.39           | „      | Edinburgh, Royal Observty.   | 4.41            |
| „     | Woburn, Milton Bryant.....   | 2.98           | XIV.   | Maybole, Knockdon Farm..     | 5.00            |
| „     | Chatteris, The Priory .....  | 2.50           | XV.    | Campbeltown, Witchburn...    | 6.03            |
| IV.   | Colchester, Lexden.....      | 3.26           | „      | Glenreasdell Mains.....      | 7.15            |
| „     | Newport .....                | 3.57           | „      | Holy Loch, Ardnadam.....     | 12.96           |
| „     | Rendlesham .....             | 3.06           | „      | Ballachulish House.....      | 12.17           |
| „     | Swaffham .....               | 3.96           | „      | Islay, Eallabus .....        | 6.54            |
| „     | Blakeney .....               | 3.48           | XVI.   | Dollar Academy .....         | 6.84            |
| V.    | Bishops Cannings .....       | 2.90           | „      | Balquhider, Stronvar .....   | 11.26           |
| „     | Winterbourne Steepleton ..   | 5.35           | „      | Coupar Angus .....           | 3.58            |
| „     | Ashburton, Druid House ...   | 7.27           | „      | Glenlyon, Meggernie Castle.  | 10.84           |
| „     | Okehampton, Oaklands.....    | 6.66           | „      | Blair Atholl.....            | 5.36            |
| „     | Cullompton .....             | 3.91           | „      | Montrose, Sunnyside Asylum   | 3.66            |
| „     | Hartland Abbey .....         | 4.31           | XVII.  | Alford, Lynturk Manse ...    | 5.78            |
| „     | Lynmouth, Rock House ...     | 6.08           | „      | Fyvie Castle.....            | 6.06            |
| „     | Probus, Lamellyn .....       | 4.15           | „      | Keith Station .....          | 6.48            |
| „     | North Cadbury Rectory ...    | 2.71           | XVIII. | Glenquoich, Loan .....       | 16.50           |
| VI.   | Clifton, Pembroke Road ...   | 4.73           | „      | Skye, Dunvegan.....          | 8.76            |
| „     | Ross, The Graig .....        | 2.75           | „      | N. Uist, Lochmaddy .....     | 4.25            |
| „     | Shifnal, Hatton Grange.....  | 2.53           | „      | Alvey Manse .....            | 6.78            |
| „     | Blockley, Upton Wold .....   | 2.94           | „      | Loch Ness, Drumnadrochit.    | 7.92            |
| „     | Droitwich .....              | 2.47           | „      | Glen carron Lodge .....      | 9.02            |
| VII.  | Market Overton.....          | 2.55           | XIX.   | Invershin .....              | 5.95            |
| „     | Market Rasen .....           | 2.94           | „      | Loch Stack, Ardchullin.....  | 7.75            |
| „     | Bawtry, Hesley Hall.....     | 2.36           | „      | Melvich.....                 | 4.36            |
| „     | Derby, Midland Railway ...   | 2.12           | XX.    | Skibbereen Rectory.....      | 5.94            |
| „     | Buxton.....                  | 5.10           | „      | Dunmanway, The Rectory..     | 9.60            |
| VIII. | Nantwich, Dorfold Hall.....  | 2.58           | „      | Cork .....                   | 5.25            |
| „     | Chatburn, Middlewood .....   | 4.87           | „      | Mitchelstown Castle .....    | 4.53            |
| „     | Cartmel, Flookburgh .....    | 5.90           | „      | Darrynane Abbey .....        | 6.87            |
| IX.   | Langsett Moor, Up. Midhope   | 5.61           | „      | Clonmel, Bruce Villa.....    | 4.44            |
| „     | Scarborough, Scalby .....    | 5.12           | „      | Newmarket-on-Fergus, Fenloe  | ...             |
| „     | Ingleby Greenhow .....       | 4.68           | XXI.   | Laragh, Glendalough .....    | 11.45           |
| „     | Mickleton.....               | 4.02           | „      | Balbriggan, Ardgillan .....  | 3.45            |
| X.    | Bellingham, High Green Manor | 5.77           | „      | Moynalty, Westland .....     | ...             |
| „     | Ilderton, Lilburn Cottage... | 3.99           | XXII.  | Cong, The Glebe .....        | 7.55            |
| „     | Keswick, The Bank .....      | 7.36           | „      | Westport, St. Helens .....   | 6.35            |
| XI.   | Llanfrecfa Grange.....       | 6.89           | „      | Achill Island, Dugort .....  | 9.71            |
| „     | Treherbert, Tyn-y-waun ...   | 14.64          | „      | Mohill, The Rectory .....    | 5.19            |
| „     | Carmarthen, The Friary.....  | 8.62           | XXIII. | Enniskillen, Portora .....   | 5.03            |
| „     | Castle Malgwyn [Llechryd].   | 7.21           | „      | Dartrey [Cootehill].....     | 4.48            |
| „     | Plynlimon.....               | 14.40          | „      | Warrenpoint, Manor House     | 4.97            |
| „     | New Radnor, Ednol .....      | 4.70           | „      | Banbridge, Milltown .....    | 2.89            |
| „     | Rhayader, Tyrmynydd .....    | 7.87           | „      | Belfast, Cave Hill Road..... | 4.69            |
| „     | Lake Vyrnwy .....            | ...            | „      | Glenarm Castle.....          | 4.35            |
| „     | Llangyhanfal, Plâs Draw....  | 2.79           | „      | Londonderry, Creggan. Res.   | 4.66            |
| „     | Dolgelly, Bryntirion .....   | 8.01           | „      | Killybegs .....              | 7.25            |
| „     | Bettws-y-Coed, Tyn-y-bryn    | 9.68           | „      | Horn Head ... ..             | 5.52            |

## METEOROLOGICAL NOTES ON NOVEMBER, 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.—There were several bright days in the early part, but the month generally was dull and rainy. Mean temp.  $44^{\circ}4$  or  $0^{\circ}9$  above the average, this being the seventh month in succession with temp. above the average. Duration of sunshine,  $46.1^*$  hours, and of R  $62.8$  hours. Evaporation  $.37$  in. Shade max.  $59.1$  on 4th; min.  $27^{\circ}7$  on 22nd. F 3, f 7.

TENTERDEN.—A fairly warm month, with a cool spell from 22nd to 27th. Very wet 7th to 19th. Duration of sunshine,  $55.0^+$  hours. Shade max.  $58^{\circ}5$  on 4th; min.  $24^{\circ}5$  on 22nd. F 3, f 11.

TOTLAND BAY.—Duration of sunshine,  $84.0^*$  hours. Shade max.  $58^{\circ}0$  on 1st and 4th; min.  $28^{\circ}2$  on 27th. F 2, f 10.

MILTON BRYANT.—Dull and wet generally. Mean temp.  $41^{\circ}4$ . Shade max.  $55^{\circ}0$  on 12th; min.  $24^{\circ}0$  on 22nd. F 11.

WINTERBOURNE STEEPLTON.—R about an inch in excess of the average, but the total for the eleven months of the year about 6 inches below the average. Shade max.  $56^{\circ}8$  on 4th; min.  $24^{\circ}0$  on 22nd. F 10, f 16.

ROSS.—The R in the 349 days ending November 30th was only  $14.99$  in., and is the smallest in the same time for 93 years. Shade max.  $57^{\circ}7$  on 4th; min.  $28^{\circ}0$  on 22nd. F 8.

HODSOCK PRIORY.—Shade max.  $56^{\circ}6$  on 1st and 4th; min.  $28^{\circ}7$  on 21st. F 7, f 17.

SOUTHPORT.—Duration of sunshine  $66.7^*$  hours, or  $15.4$  hours above the average. Duration of R  $63.5$  hours. Mean temp.  $43^{\circ}4$ . A whole gale on 5th, with gusts over 80 miles per hour. Shade max.  $56^{\circ}2$  on 5th; min.  $27^{\circ}3$  on 11th. F 2, f 13.

HULL.—A dull month, with frequent but not very heavy R. Mild to 26th, then colder, with squally, sleet showers at times. Dense fogs on 29th and 30th. High wind all day on 5th. Shade max.  $56^{\circ}0$  on 5th; min.  $29^{\circ}0$  on 29th. F 2, f 10.

HAVERFORDWEST.—Wet, stormy and mild. TSS on 10th and 17th. Duration of sunshine  $85.0^*$  hours. Shade max.  $57^{\circ}6$  on 5th; min.  $22^{\circ}3$  on 4th.

BETTWS-Y-COED.—Shade max.  $56^{\circ}0$  on 13th and 15th; min.  $29^{\circ}0$  on 26th. F 4, f 10.

CARGEN.—The first half was wet and stormy, but the second half fine and dry. A heavy gale on 5th did considerable damage to growing timber and buildings. Shade max.  $54^{\circ}8$  on 3rd; min.  $26^{\circ}0$  on 21st. F 6.

EDINBURGH.—Shade max.  $55^{\circ}5$  on 14th; min.  $30^{\circ}9$  on 21st. F 3, f 10.

COUPAR ANGUS.—The first month of the year with R above the average. Shade max.  $53^{\circ}0$  on 4th; min.  $26^{\circ}0$  on 10th.

FORT AUGUSTUS.—Shade max.  $54^{\circ}0$  on 15th; min.  $28^{\circ}5$  on 25th. F 10.

LOCH STACK.—Duration of sunshine,  $51.0$  hours.

DUNMANWAX.—First 14 days very wet. R commenced to fall at 6 p.m. on 13th and, with the exception of 3 hours on 14th, it fell steadily until 10 a.m. on 15th, making  $3.75$  in. in 40 hours. Great flood in River Bandon.

DUBLIN.—A changeable, showery month. Mean temp.  $44^{\circ}1$ , or  $1^{\circ}1$  below the average for November. Shade max.  $57^{\circ}5$  on 14th; min.  $30^{\circ}4$  on 22nd. F 4, f 5.

MARKREE.—R during the first 18 days, but the remainder of the month was fair, with frosts on most nights. Shade max.  $56^{\circ}7$  on 14th; min.  $22^{\circ}8$ . F 12, f 16.

WARRENPOINT.—A wet month with high winds, chiefly westerly. Shade max.  $54^{\circ}0$  on 14th; min.  $31^{\circ}0$  on 10th. F 1, f 3.

\* Campbell-Stokes.

† Jordan.

## Climatological Table for the British Empire, June, 1911.

| STATIONS<br><br>(Those in italics are<br>South of the Equator.) | Absolute. |       |          |       | Average. |       |               |             | Absolute.       |                   | Total Rain     |       | Aver. |
|-----------------------------------------------------------------|-----------|-------|----------|-------|----------|-------|---------------|-------------|-----------------|-------------------|----------------|-------|-------|
|                                                                 | Maximum.  |       | Minimum. |       | Max.     | Min.  | Dew<br>Point. | Humidity.   | Max. in<br>Sun. | Min. on<br>Grass. | Depth.         | Days. |       |
|                                                                 | Temp.     | Date. | Temp.    | Date. |          |       |               |             |                 |                   |                |       |       |
| London, Camden Square                                           | 87°·6     | 5     | 41°·8    | 15    | 71°·8    | 52°·2 | 52°·3         | 0-100<br>74 | 126°·3          | 34°·4             | inches<br>2·69 | 11    | 6·1   |
| Malta ... ..                                                    | 86°·0     | 9*    | 61°·1    | 2     | 78°·8    | 66°·5 | 62°·5         | 70          | 140°·0          | ...               | ·10            | 1     | 2·7   |
| Lagos ... ..                                                    | 89°·0     | 22    | 70°·0    | 12    | 83°·6    | 73°·4 | 73°·1         | 82          | 150°·0          | 66°·0             | 25·35          | 24    | ...   |
| Cape Town ... ..                                                | 81°·0     | 21    | 37°·0    | 15    | 64°·9    | 48°·3 | 48°·5         | 75          | ...             | ...               | 4·55           | 11    | 5·4   |
| Johannesburg ... ..                                             | 63°·8     | 21    | 25°·0    | 27    | 57°·7    | 38°·2 | 36°·0         | 72          | 118°·0          | 23°·0             | ·00            | 0     | 1·2   |
| Mauritius ... ..                                                | 80°·3     | 15    | 54°·8    | 11†   | 76°·5    | 61°·8 | 60°·3         | 75          | 142°·7          | 45°·9             | 3·86           | 12    | 4·9   |
| Calcutta... ..                                                  | 96°·4     | 28    | 73°·7    | 15    | 90°·5    | 78°·9 | 77°·7         | 84          | ...             | 72°·7             | 11·07          | 13    | 7·4   |
| Bombay... ..                                                    | 93°·0     | 1     | 76°·2    | 14    | 88°·0    | 79°·9 | 77°·4         | 82          | 130°·5          | 74°·6             | 10·85          | 18    | 7·2   |
| Madras ... ..                                                   | 106°·4    | 1     | 72°·6    | 4     | 99°·7    | 82°·3 | 72°·3         | 63          | 145°·4          | 72°·6             | ·63            | 5     | 4·8   |
| Kodaikanal ... ..                                               | 67°·8     | 16    | 51°·9    | 14    | 63°·5    | 53°·7 | 52°·0         | 83          | 147°·8          | 44°·7             | 7·19           | 24    | 7·1   |
| Colombo, Ceylon ... ..                                          | 87°·7     | 20    | 73°·2    | 10    | 85°·6    | 77°·1 | 74°·9         | 81          | 137°·6          | 70°·4             | 4·08           | 11    | 7·5   |
| Hongkong ... ..                                                 | 91°·3     | 18    | 75°·0    | 1     | 87°·2    | 79°·7 | 76°·8         | 82          | 142°·0          | ...               | 5·09           | 19    | 7·0   |
| Sydney ... ..                                                   | 65°·3     | 16    | 38°·9    | 24    | 59°·7    | 46°·0 | 40°·0         | 71          | 111°·3          | 28°·1             | ·21            | 13    | 4·0   |
| Melbourne ... ..                                                | 61°·2     | 17    | 34°·8    | 29    | 54°·2    | 43°·1 | 41°·9         | 77          | 96°·9           | 27°·9             | 3·72           | 20    | 6·7   |
| Adelaide ... ..                                                 | 65°·6     | 15    | 40°·0    | 23    | 58°·9    | 46°·9 | 45°·9         | 79          | 119°·7          | 30°·3             | 2·52           | 18    | 6·8   |
| Perth ... ..                                                    | 69°·2     | 24    | 38°·0    | 18    | 63°·3    | 46°·3 | 46°·4         | 73          | 118°·5          | 31°·0             | 3·58           | 12    | 4·4   |
| Coolgardie ... ..                                               | 67°·2     | 25    | 34°·2    | 21    | 60°·8    | 41°·8 | 42°·0         | 71          | 139°·0          | 30°·0             | 1·29           | 12    | 3·8   |
| Hobart, Tasmania ... ..                                         | 59°·0     | 16    | 33°·0    | 22    | 51°·5    | 40°·7 | 38°·7         | 76          | 105°·4          | 28°·7             | 1·89           | 19    | 6·2   |
| Wellington ... ..                                               | 62°·0     | 3     | 35°·4    | 16    | 54°·9    | 46°·6 | 38°·8         | 63          | 99°·0           | 29°·0             | 4·81           | 22    | 6·5   |
| Auckland ... ..                                                 | 63°·5     | 23    | 38°·5    | 26    | 59°·0    | 47°·6 | 47°·2         | 79          | 108°·0          | 34°·0             | 5·39           | 19    | 6·1   |
| Jamaica, Kingston .. ..                                         | 95°·2     | 25    | 72°·4    | 27    | 90°·6    | 74°·8 | 71°·4         | 70          | ...             | ...               | ·37            | 3     | 5·4   |
| Grenada ... ..                                                  | 85°·0     | sev.  | 71°·0    | 5     | 82°·3    | 74°·1 | ...           | 83          | 140°·0          | ...               | 19·36          | 27    | 7·0   |
| Toronto ... ..                                                  | 91°·6     | 22    | 47°·2    | 6     | 75°·4    | 55°·7 | ...           | ...         | 108°·0          | 44°·4             | 1·53           | 13    | 5·6   |
| Fredericton ... ..                                              | 85°·0     | 9     | 37°·8    | 25    | 71°·5    | 48°·9 | ...           | 74          | ...             | ...               | 5·79           | 11    | 6·6   |
| St. John, N.B. ... ..                                           | 81°·3     | 30    | 44°·3    | 3     | 67°·1    | 51°·1 | ...           | ...         | ...             | ...               | 3·15           | 15    | 5·8   |
| Victoria, B.C. ... ..                                           | 73°·2     | 10    | 40°·2    | 19    | 65°·1    | 47°·6 | ...           | 68          | ...             | ...               | ·73            | 7     | 6°·0  |
| Dawson ... ..                                                   | 83°·0     | 22    | 31°·0    | 2     | 71°·7    | 41°·7 | ...           | ...         | ...             | ...               | ·87            | 9     | 5·4   |

\* and 27.

† and 12.

MALTA.—Mean temp. of air 71°·9. Average bright sunshine 11·1 hours per day.

Johannesburg.—Bright sunshine, 272 hours.

Mauritius.—Mean temp. of air 0°·1, dew point 0°·7, and R 1·28 in., below averages. Mean hourly velocity of wind 9·9 miles, or equal to average.

KODAIKANAL.—Bright sunshine, 122 hours. TSS on eight days.

COLOMBO.—Mean temp. of air 77°·9, or 2°·9 below, of dew point 0°·7 above, and R 3·40 in. below, averages. Mean hourly velocity of wind 8·4 miles.

HONGKONG.—Mean temp. of air 82°·9, or 2°·2 above, R 11·29 in. below, and sunshine 248·5 hours, or 93·3 above, averages. Wind mean velocity 11·6 miles.

Sydney.—Mean temp. of air 1°·4 below, and R 4·97 in. below, averages.

Melbourne.—Mean temp. of air 1°·7 below, and R 1·62 in. above, averages.

Adelaide.—Mean temp. of air 0°·5 below, and R ·49 in. below, averages.

Perth.—Mean temp. of air 2°·0 below, and R 3·08 in. below, averages.

Hobart, Tasmania.—Mean temp. of air 1°·0 below, and R ·32 in. below, averages.

Wellington.—Mean temp. of air 1°·3 above, and R ·27 in. below, averages. Bright sunshine 119·4 hours.

Auckland.—Rainfall 1·70 in. above average.



# Royal Geographical Society's Publications.

## THE GEOGRAPHICAL JOURNAL.

Monthly. Illustrated. Edited by the Secretary. Price (to non-Fellows), 2s.

## HINTS TO TRAVELLERS.

Edited for the Council of the Royal Geographical Society by E. A. REEVES, F.R.G.S., F.R.A.S. Ninth Edition, revised and enlarged. In two volumes, illustrated. Price 15s. net. (To Fellows at the Office of the Society, 10s. net).

Vol. I.—Surveying and Practical Astronomy.

Vol. II.—Meteorology and Climate (by DR. H. R. MILL);  
Photography, Geology, Natural History, Anthropology, Industry and Commerce, Medical Hints, &c.

## THE DISTRIBUTION OF RAINFALL OVER THE LAND.

By DR. A. J. HERBERTSON. With monthly maps of Rainfall. Price 5s. net. (To Fellows, 2s. 6d.)

## ON THE RESULTS OF A DEEP-SEA SOUNDING

### EXPEDITION,

In the North Atlantic in the summer of 1899, by R. E. PEAKE, M.Inst.C.E.; with notes on Temperature, Deep-Sea Deposits, &c., by SIR JOHN MURRAY, K.C.B., F.R.S. *Charts.* Price 5s. net. (To Fellows, 2s. 6d.)

## THE ANTARCTIC MANUAL,

For the use of the Expedition of 1901. Edited by GEORGE MURRAY, F.R.S., 1901. Pp. 586. *With a new chart of the Antarctic Regions.* Price, 15s. (To Fellows, 10s.)

~~~~~  
ROYAL GEOGRAPHICAL SOCIETY, 1, Savile Row, W.  
AND ALL BOOKSELLERS.

---

### RATES FOR ADVERTISEMENTS IN THIS MAGAZINE.

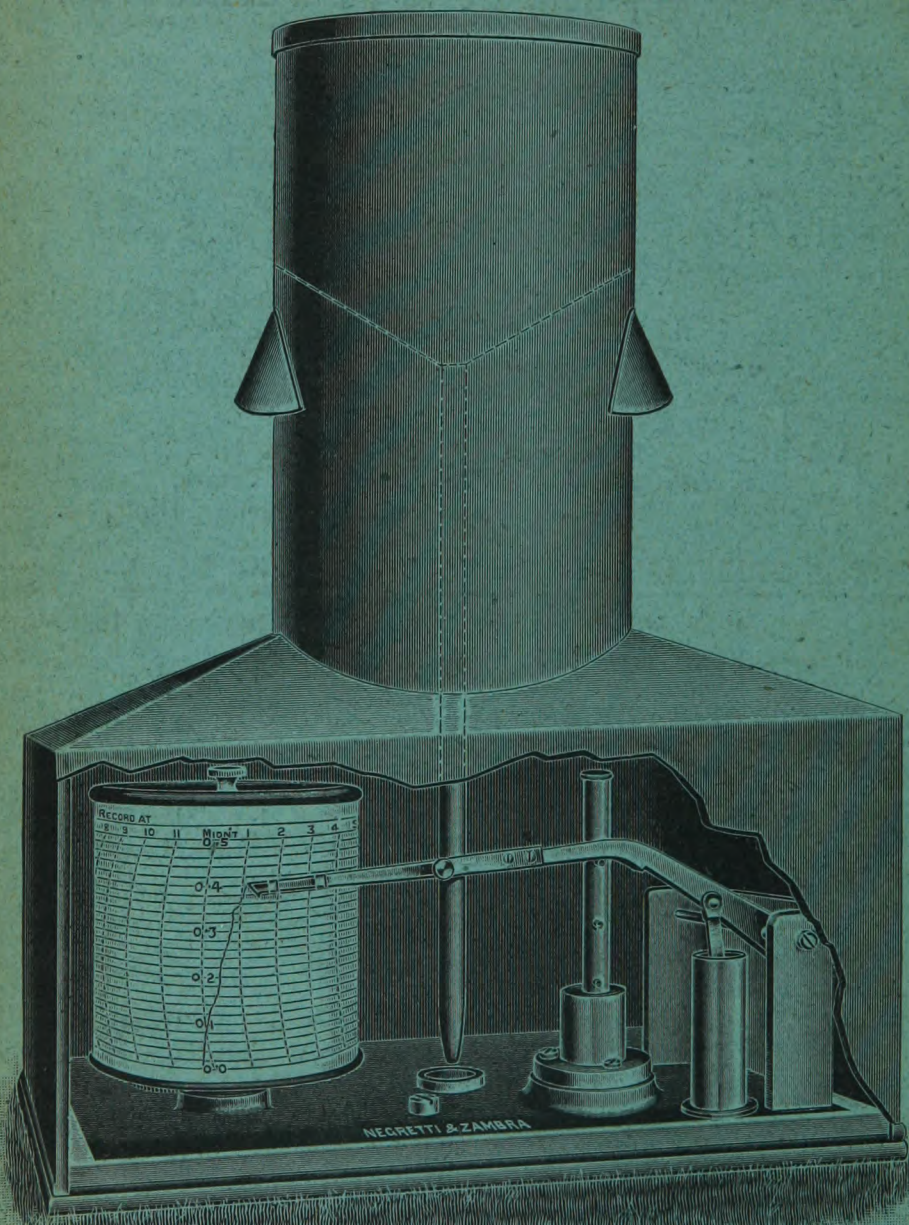
		One Insertion.	Six Insertions.	Twelve Insertions.	
WHOLE PAGE	...	30/-	...	26/-	22/6
HALF	..	16/6	...	14/6	12/6
QUARTER	..	9/-	...	8/-	7/-
EIGHTH	..	5/-	...	4/6	4/-

*All applications for space to be made to*

MR. H. A. COLLINS, 32, BIRDHURST ROAD, CROYDON.



# The "HYETOGRAPH."



Write for descriptive pamphlet and other Meteorological Instruments to the  
SOLE MAKERS,

**NEGRETTE & ZAMBRA,**  
SCIENTIFIC INSTRUMENT MAKERS,  
38, HOLBORN VIADUCT, E.C.,

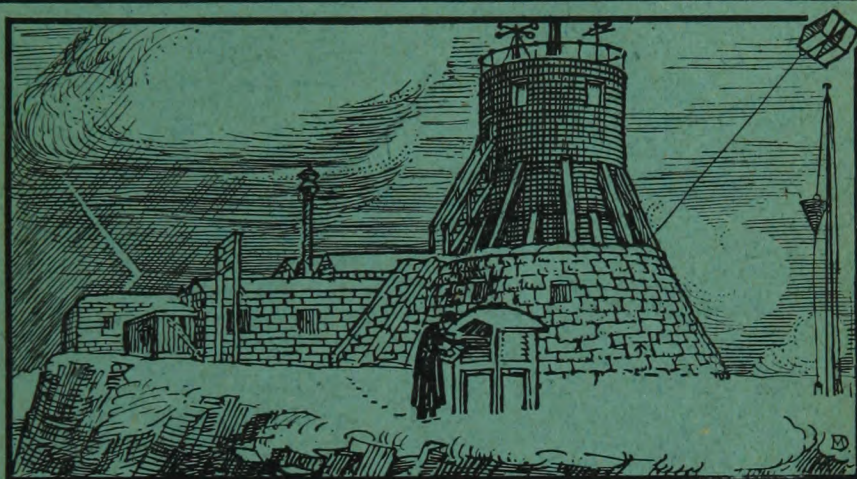
Branches: 45, CORNHILL, E.C., and  
122, REGENT STREET, W., LONDON.

Telegraphic Address: "NEGRETTE, LONDON." Telephone No.: 583 HOLBORN.

SHIELD & SPRING, Lancelot Place, Brompton Road, S.W.



NO. 552 SYMONS'S VOL. 46  
 METEOROLOGICAL  
 ✻ · MAGAZINE · ✻  
 .... EDITED BY HUGH ROBERT MILL ....



JANUARY, 1912.

• CONTENTS •

	PAGE
The Memorial Bronzes at the Meteorological Office..	237
Weather in South America during 1911. By R. C. MOSSMAN, F.R.S.E.	238
<b>Cornelis Harm Wind</b> .. .. .	241
The Rainfall of 1911..	242
Royal Meteorological Society .. .. .	243
Climatology of Southern Nigeria. By C. A. A. BARNES, C.E. ..	245
The Weather of December. By FRED. J. BRODIE .. .. .	247
International Balloon Ascents, July, 1909. By W. H. DINES, F.R.S.	249
CORRESPONDENCE:—	
The Rainfall of 1826. By H. K. G. ROGERS .. .. .	250
The Paries Cloud. By R. C. CANN LIPPINCOTT .. .. .	250
Small Range of Temperature. By H. K. G. ROGERS .. .. .	251
The Tendency for Frost and Snow around November 22nd, 1911. By L. C. W. BONACINA .. .. .	251
Meteorological News and Notes .. .. .	251
Reviews .. .. .	252
Rainfall Table for December, 1911 .. .. .	256
Supplementary Table of Rainfall, December, 1911, at 112 Stations	258
Meteorological Notes on December, 1911 .. .. .	259
Climatological Table for the British Empire, July, 1911 .. ..	260

LONDON: EDWARD STANFORD, 12, 13 & 14, LONG ACRE, W.C.

Published on the 16th of each Month.]

[Price 4d., or 5s. per Annum, Post Free.



## NOTICES.

It is requested that all Books for Review and Communications for the Editor be addressed to 62, Camden Square, London, N.W.

The responsibility for all facts and opinions expressed in the signed articles and letters published in this Magazine rests with their respective authors.

---

**Q A New Volume began with this Number.**



## **A Monthly Record of Science in all its Branches.**

Each number consists of at least forty large quarto pages of Articles and Notes, by Authorities in their respective subjects.

**Profusely Illustrated.**

### **CONTENTS OF JANUARY ISSUE.**

Editorial.—Ceylon: The Island of Jewels.—Snow Crystals.—Snakes, Burrs and Birds.—Professor A. W. Bickerton.—A Nature Calendar by Gilbert White.—The Milky Way.—Harmonograph Tracings recorded Electrolytically.—Solar Disturbances during November, 1911.—The Face of the Sky for February, 1912.—Notes (Astronomy; Botany; Chemistry; Geology; Meteorology; Ornithology; Physics; Zoology).—Microscopy.—Scientific Photography.—Reviews of Books.—Correspondence.—Queries and Answers.—&c.

WITH 3 FULL-PAGE PLATES, AND 48 ILLUSTRATIONS IN THE TEXT.

THROUGH ANY BOOKSELLER.

**MONTHLY—ONE SHILLING, net.**

Annual Subscription, **15/-**, post free anywhere.

Offices: 42, BLOOMSBURY SQUARE, LONDON.



## **DARTON'S IMPROVED SELF-REGISTERING RAIN GAUGE**

for accurately recording the amount of rainfall up to 10 inches, with index to show the difference between yesterday's and to-day's fall. Well made in stout copper, with deep brass receiving surface - - - - **£3 10 0**

Ditto, as above, in zinc, enamelled - - - - **£2 15 0**

### **DARTON'S RECORDING HYGROMETER,**

showing at a glance on a revolving chart the differences of temperature readings between the wet and dry bulbs, and the percentage of aqueous vapour held in suspension by the atmosphere, **£7. 15. 0.**

*Illustrated List of Standard, Registering, and Recording Meteorological Instruments, post free.*

**F. DARTON & Co., 142, St. John Street, London, E.C.**

## THE "DEMONSTRATION" SET OF THERMOMETERS and SCREEN.

Designed for the use of observers who have not the convenience for setting up the ordinary full size Stevenson's Screen.

As will be seen, the apparatus is easily fixed upon a wall or post, and the Thermometers are specially made in a reduced size, whilst still of Standard accuracy.

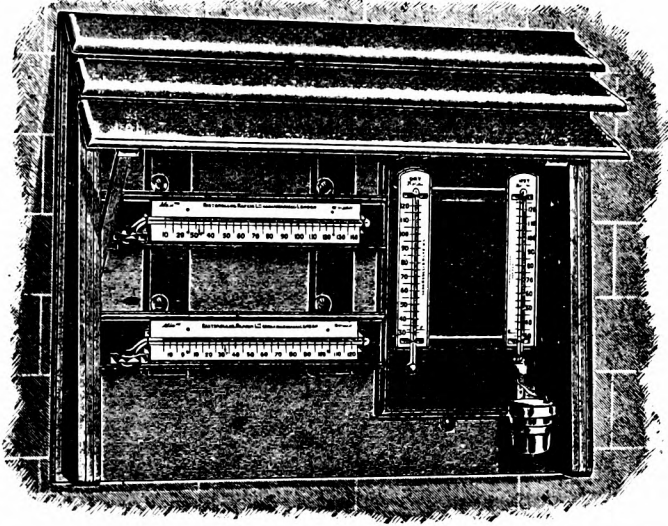
The Screen is designed to allow of the correct observation of shade temperatures. It is well made, and painted white.

The Thermometers are graduated upon the stems, figured upon the opal scales, and well mounted upon seasoned oak slabs.

**PRICE COMPLETE**  
as illustrated,  
**£2 : 15 : 0**

Screen separately,  
16/6.

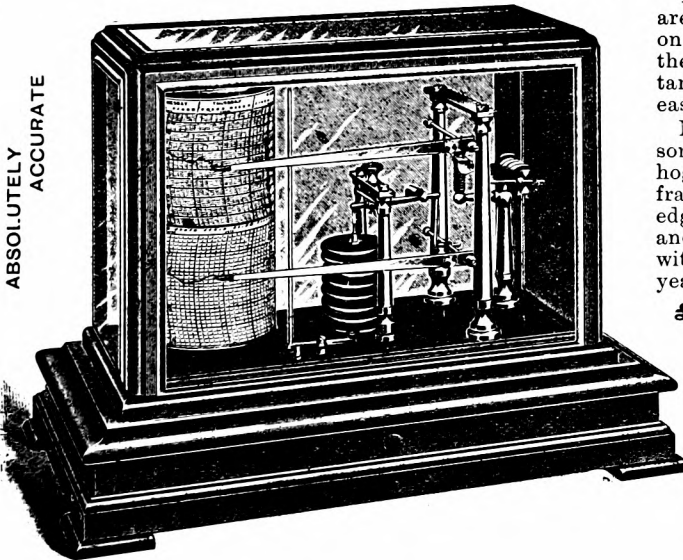
Kew Certificates,  
10/- extra.



## THE BARO-THERMOGRAPH.

(COMBINATION SELF-RECORDING BAROMETER & THERMOMETER).

ABSOLUTELY  
ACCURATE



The weekly charts are both lithographed on the same sheet, the records are simultaneously made, and easily followed.

Mounted in handsome solid oak, mahogany, or walnut frame, with bevelled edge plate glasses, and chart drawer, with charts for one year, ink, &c.,

**£10 : 0 : 0**

Dimensions  
17" x 9" x 12"

Special Illd.  
List of Baro-  
graphs and  
Thermographs  
(covering  
various  
patterns, from  
**£3 10s.**),  
post free.

**PASTORELLI & RAPKIN, LTD. (ESTAB. 1750)**

ACTUAL MAKERS of *all kinds* of Meteorological Instruments.

CONTRACTORS TO H.M. GOVT.

**46, HATTON GARDEN, LONDON, E.C.**

Illustrated List of STANDARD INSTRUMENTS Post Free.

"SNOWDON" RAIN GAUGES & "CAMDEN" MEASURES (certified by Dr. Mill) in stock.

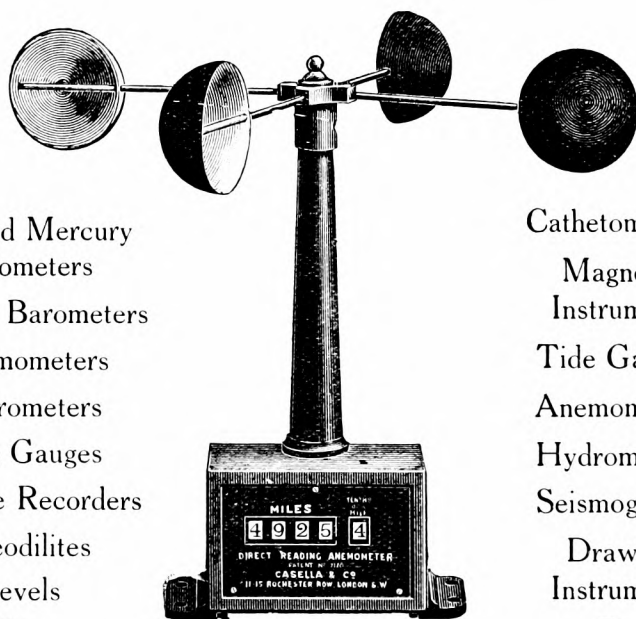
\*.\* We pay carriage and guarantee safe delivery within U.K. on all our Instruments.

# C·F·CASELLA·&·CO·LTD

*Makers of*  
METEOROLOGICAL, SURVEYING  
AND OTHER  
SCIENTIFIC INSTRUMENTS

---

## CASELLA'S TOTALIZING ANEMOMETER



Standard Mercury  
Barometers  
Aneroid Barometers  
Thermometers  
Hygrometers  
Rain Gauges  
Sunshine Recorders  
Theodolites  
Levels  
Etc.

Cathetometers  
Magnetic  
Instruments  
Tide Gauges  
Anemometers  
Hydrometers  
Seismographs  
Drawing  
Instruments  
Etc.

PATENT NO. 7170 <sup>07</sup>

This instrument is a great improvement on the ordinary dial anemometer

CATALOGUES ON APPLICATION

---

11-15, ROCHESTER ROW, VICTORIA ST.,  
LONDON, S.W.



# 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 (Curitiba 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	<u>2·5</u>		<u>3·0</u>		<u>2·7</u>

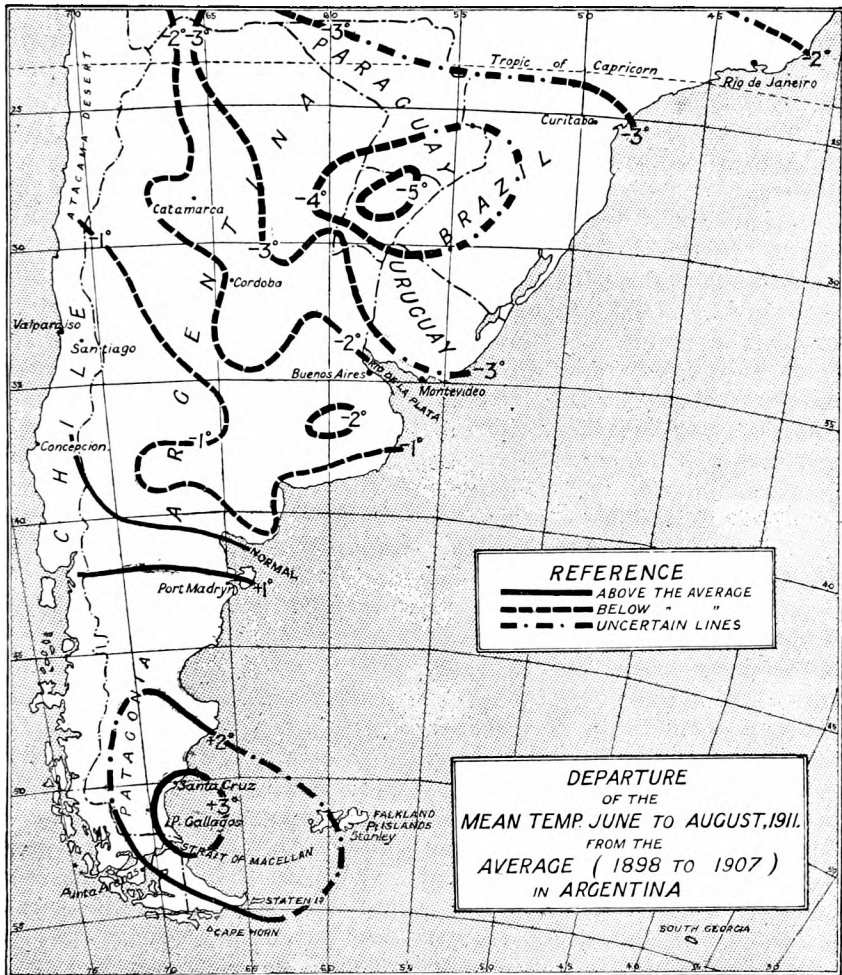
For the three winter months (June to August) the departures from the normal were as follows :—

Brazil (Curitiba 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  $2^{\circ}$  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  $1^{\circ}3$  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.  $40^{\circ}$  S.), the mean departure being  $3^{\circ}4$  for the British Isles, and  $2^{\circ}2$  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  $+2^{\circ}8$ , and for the Argentine Republic  $-2^{\circ}7$ . 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  $25^{\circ}$  and  $30^{\circ}$  S. and the meridians of  $57^{\circ}$  and  $66^{\circ}$  W. of Greenwich, where ten-day normals are available, show a mean depression of temperature of  $12^{\circ}7$ ; and at Catamarca the mean was as much as  $16^{\circ}6$  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  $13^{\circ}1$  under the average, while the mean minima were  $8^{\circ}5$  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.  $40^{\circ}$  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.  $37^{\circ}\text{S.}$ ) 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,  $4^{\circ}$  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, counter-balanced 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  $22^\circ$  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 inter-related: 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 :—

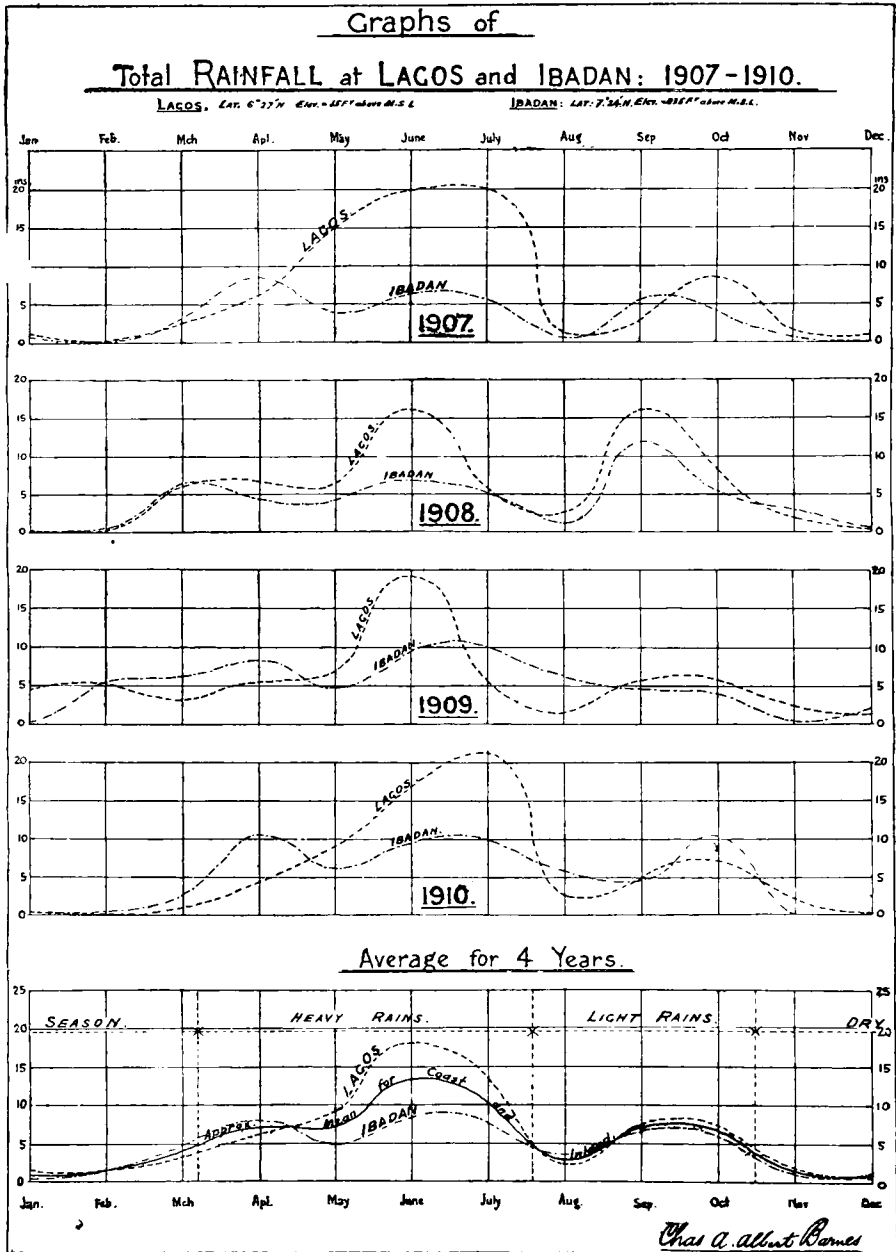
Western Province .....	58·47 ins. per annum.
Central       ,,       .....	82·37       ,,       ,,
Eastern       ,,       .....	105·10       ,,       ,,

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

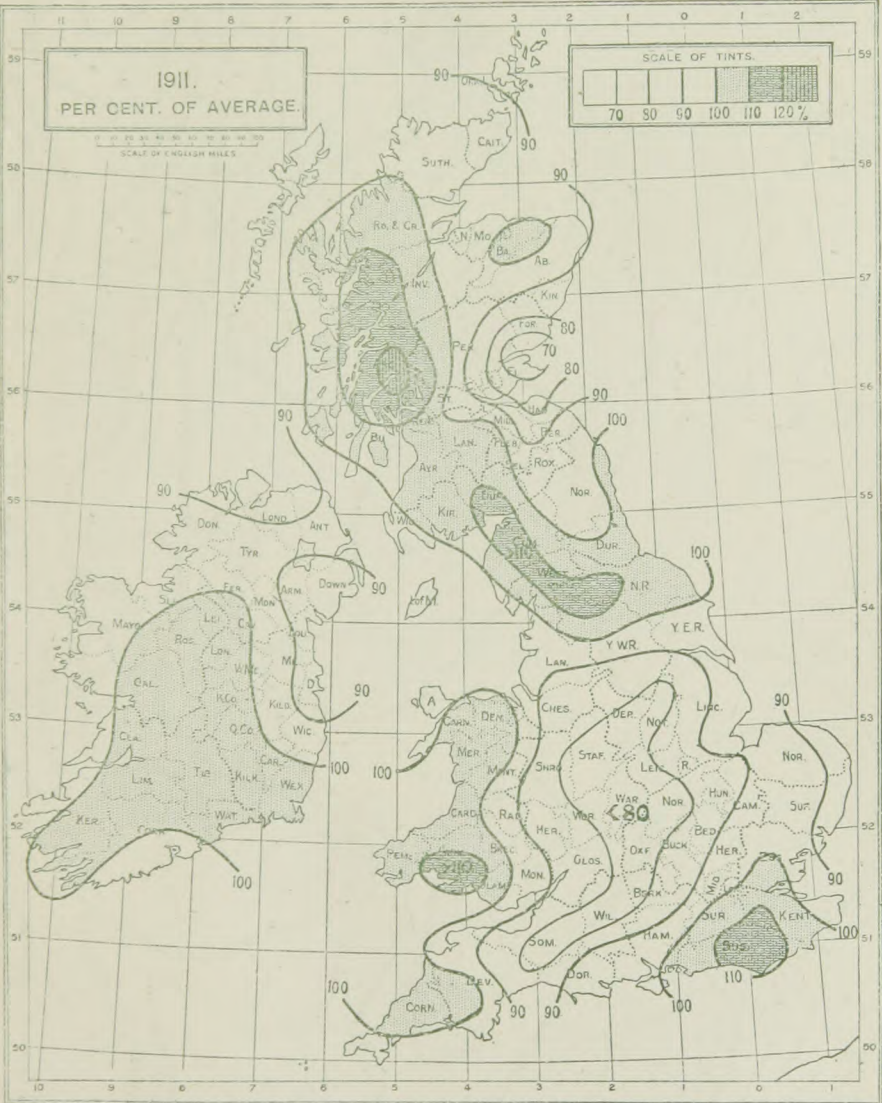
is about  $84^{\circ}$ . The highest average of maximum shade temperature was  $94^{\circ} \cdot 9$  at Olokemeji, Western province; and the lowest  $61^{\circ} \cdot 2$  at Oshogbo, Western province.



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.



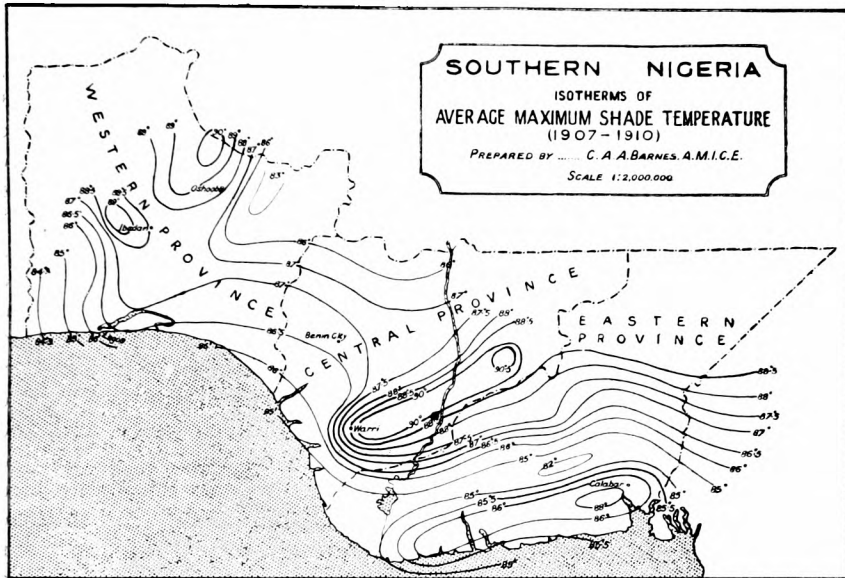
ALTITUDE SCALE

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

SCALE OF MILES



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  $146^{\circ}$  upon the average, whilst the thermometer at ground level gives about  $65^{\circ}$  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  $50^{\circ}$  or upwards over a large portion of the United Kingdom. On the 2nd and 3rd a reading of  $55^{\circ}$  was recorded at several places in the west, and a reading of  $57^{\circ}$  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  $56^{\circ}$ , at Glencarron, Fort Augustus and Dublin to  $57^{\circ}$ , and at Hawarden Bridge, near Chester, to  $58^{\circ}$ . On the 24th a reading as high as  $55^{\circ}$  was recorded at some English stations, and between the 27th and 30th in Ireland, the thermometer at Killarney touching  $56^{\circ}$  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  $10^{\circ}$  below the freezing point. During the sharp night frosts which were experienced in various districts between the 6th and 8th a reading slightly below  $25^{\circ}$  was recorded in a few isolated places, and on the 8th the sheltered thermometer at Balmoral fell to  $21^{\circ}$ . 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  $20^{\circ}$  or less, the thermometer at Wisley sinking to  $17^{\circ}$ , and at Llangammarch Wells to  $12^{\circ}$ . 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  $5^{\circ}$  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  $4^{\circ}$  and  $5^{\circ}$ . 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. by W.
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  $40^{\circ}\cdot 5$  and  $39^{\circ}\cdot 7$  respectively, showing a range of only  $0^{\circ}\cdot 8$  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)  $22 \times 17$ . 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  $2^{\circ}$  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
Arneliffe 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.....	Caitness.....	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
Miltoyn 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 (Enniscooe).....	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 ( <i>con.</i> )					RAINFALL FROM JAN. 1.				Mean Annual 1875-1909.	STATION.
Diff. from Av. in.	% of Av.	Max. in 24 hours.	No. of Days		Aver. 1875-1909.	1911.	Diff. from Aver. in.	% of Av.		
		in. Date.			in.	in.			in.	
+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	Arneliffe
+ .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	Ennisceoe
+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	Seaford
+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.	St Mary's Loch, Cramilt Ldge	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	„	Glenreadell Mains.....	8.14
„	Newport .....	4.14	„	Holy Loch, Ardnadam.....	12.36
„	Rendlesham .....	3.72	„	Ballachulish House.....	16.47
„	Swaffham .....	3.48	„	Islay, Fallabus .....	8.46
„	Blakeney .....	2.55	XVI.	Dollar Academy .....	4.49
V.	Bishops Cannings .....	5.68	„	Balquhider, 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, Sunnyside Asylum	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
„	Buxton, 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.	Llanfrehfa 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.,  $44^{\circ}\cdot7$ , was  $5^{\circ}\cdot0$  above the average, and excepting only 1868, 1898 and 1900, the highest for December in the 54 years' record. The duration of R,  $90\cdot4$  hours, was the greatest recorded in December in the past 32 years. Duration of sunshine,  $19\cdot2^*$  hours. Shade max.  $55^{\circ}\cdot2$  on 19th; min.  $27^{\circ}\cdot6$  on 8th. F 3, f 7.

TENTERDEN.—The wettest December for 35 years, and only exceeded by 1868, 1872 and 1876. Duration of sunshine,  $43\cdot0^{\dagger}$  hours. Shade max.  $54^{\circ}\cdot0$  on 19th; min.  $30^{\circ}\cdot0$  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,  $58\cdot9^*$  hours. Shade max.  $54^{\circ}\cdot9$  on 19th; min.  $33^{\circ}\cdot0$  on 6th. F 0, f 4.

PITSFORD.—Mean temp.  $41^{\circ}\cdot1$ . R  $4\cdot13$  in. above the average. Shade max.  $51^{\circ}\cdot2$  on 17th; min.  $28^{\circ}\cdot3$  on 8th and 9th. F 8.

ASHBURTON.—With the exception of 1876, when  $16\cdot92$  in. was recorded, it was the wettest December for 46 years. Shade max.  $52^{\circ}\cdot1$  on 29th; min.  $34^{\circ}\cdot7$  on 8th. F 0.

ROSS.—The wettest December for 94 years. Shade max.  $53^{\circ}\cdot5$  on 30th; min.  $28^{\circ}\cdot6$  on 8th. F 3.

HODSOCK PRIORY.—Shade max.  $53^{\circ}\cdot2$  on 17th; min.  $29^{\circ}\cdot6$  on 8th. F 6, f 21.

SOUTHPORT.—Duration of sunshine  $40\cdot7^*$  hours, or  $8\cdot1$  hours above the average. Duration of R  $106\cdot7$  hours. Mean temp.  $43^{\circ}\cdot4$ , or  $4^{\circ}\cdot1$  above the average. The number of rain days was the greatest in December during the 41 years' record. Shade max.  $53^{\circ}\cdot9$  on 18th; min.  $32^{\circ}\cdot3$  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.  $54^{\circ}\cdot0$  on 18th; min.  $31^{\circ}\cdot0$  on 8th. F 1, f 17.

HAVERFORDWEST.—Duration of sunshine  $59\cdot0^*$  hours. Shade max.  $62^{\circ}\cdot2$  on 13th; min.  $29^{\circ}\cdot8$  on 7th and 9th. F 4.

LLANDUDNO.—Shade max.  $55^{\circ}\cdot8$  on 17th; min.  $36^{\circ}\cdot2$  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.  $3^{\circ}\cdot0$  above the average. Shade max.  $53^{\circ}\cdot3$  on 18th; min.  $28^{\circ}\cdot0$  on 25th. F 7.

EDINBURGH.—Shade max.  $53^{\circ}\cdot3$  on 18th; min.  $31^{\circ}\cdot9$  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.  $53^{\circ}\cdot0$  on 18th; min.  $25^{\circ}\cdot0$  on 5th.

FORT AUGUSTUS.—Shade max.  $57^{\circ}\cdot2$  on 18th; min.  $26^{\circ}\cdot3$  on 4th. F 4.

LOCH STACK.—Duration of sunshine,  $20\cdot6$  hours.

CORK.—The R was the greatest for any month since December, 1899. Shade max.  $49^{\circ}\cdot0$  on 26th; min.  $27^{\circ}\cdot0$  on 6th. F 7, f 13.

DUBLIN.—An open, stormy, very wet month. The mean temp.,  $44^{\circ}\cdot5$ , was actually above that of November. Shade max.  $57^{\circ}\cdot2$  on 18th; min.  $33^{\circ}\cdot9$  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.  $58^{\circ}\cdot2$  on 18th; min.  $27^{\circ}\cdot7$  on 25th. F 14, f 17.

WARRENPOINT.—A month of continued R and with high winds on many days. Shade max.  $52^{\circ}\cdot0$  on 18th and 31st; min.  $37^{\circ}\cdot0$  on 5 days. F 0, f 1.

\* Campbell-Stokes.

† Jordan.

## Climatological Table for the British Empire, July, 1911.

STATIONS  (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
	Temp.	Date.	Temp.	Date.	Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	Cloud.
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	9	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	73°·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 6·2 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.

# JAMES J. HICKS

(Incorporated with  
W. F. STANLEY & Co., Ltd.)

## Meteorological & Scientific Instruments

MANUFACTORY:—

8, 9 & 10, HATTON GARDEN, LONDON, E.C.

Awarded Grand Prix Franco-British Exhibition, 1908; Nine Medals at the Paris Exhibition, 1900; London, 1862; Paris, 1867; London, 1885; Philadelphia, 1876; Rio de Janeiro, 1909.

Standard "Fortin" Barometers.

Standard Mercurial Thermometers.

Standard Maximum Thermometers.

Standard Minimum Thermometers.

Standard Mason's Hygrometers.

Standard "Solar Maximum" Thermometers.

Standard Terrestrial Radiation Thermometers.

Standard "Earth Temperature" Thermometers.

Standard Symons's Rain Gauges.

Standard Meteorological Office Rain Gauges.

Standard Sunshine Recorders.

Improved Beckley Anemometers.

Improved Beckley Self-Recording Rain Gauge.

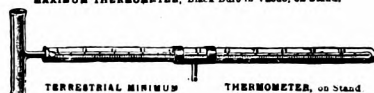
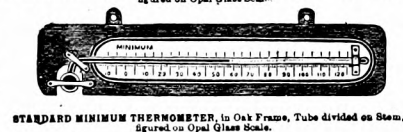
Self-Registering Aneroid Barometers.

Self-Registering Mercurial Barometers.

Meteorological Office Thermometer Screens.

Mountaineering Aneroid Barometers.

Aneroid Barometers.



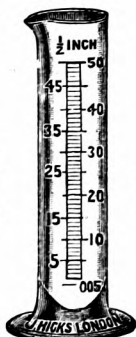
NEW OBSERVATORY CERTIFICATES SUPPLIED IF DESIRED.

## METEOROGRAPH, for use with Kites

### THE "CAMDEN" Pattern

RAIN

Price  
2s. 6d.  
Not  
Verified

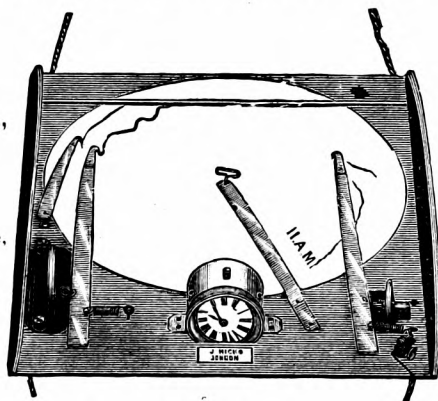


GLASS

Price  
3s. 6d.  
Verified.

Designed by  
W. H. DINES, Esq.,  
F. R. S.

Records the Pressure,  
Temperature,  
Humidity, &c., of  
the Upper Air.



Special Prices are given to Fellows of all Scientific Societies.

( v. )



# **PUBLICATIONS**

OF THE

## **ROYAL METEOROLOGICAL SOCIETY.**

---

### **QUARTERLY JOURNAL OF THE ROYAL METEOROLOGICAL SOCIETY.**

This contains the Papers read at the Meetings, together with the Discussions, and also Notes, Correspondence, Notices of Recent Publications, and the titles of such papers as appear to be of general interest bearing on Meteorology in the Periodicals which are received in the Society's Library. Price 5s.

### **THE METEOROLOGICAL RECORD.**

Monthly Results of observations made at the Stations of the Royal Meteorological Society, with Remarks on the Weather for each quarter. Price 1s. 6d.

### **HINTS TO METEOROLOGICAL OBSERVERS.**

Instructions for taking Observations, and Tables for their Reduction; together with a Glossary of Meteorological Terms. By WILLIAM MARRIOTT, Assistant Secretary. Sixth Edition, revised and enlarged. With Illustrations. Price 1s. 6d. Post Free, 1s. 8d.

### **SOME FACTS ABOUT THE WEATHER.**

A Popular Meteorological Handbook. By WILLIAM MARRIOTT, Assistant-Secretary. Second and Revised Edition. Price 6d. Post Free 7d.

*The above may be obtained from*  
**EDWARD STANFORD, 12, 13 & 14, LONG ACRE, LONDON, W.C.**  
Or at the Offices of the Society, 70, VICTORIA STREET, LONDON, S.W.

---

## **THE OBSERVATORY:**

*A Monthly Review of Astronomy.*

EDITED BY

H. P. HOLLIS, B.A., F.R.A.S., AND T. LEWIS, F.R.A.S.

---

*The Observatory* was founded in 1877, and has become an established and very valuable publication.—Prof. Young, in "*Ten Years' progress in Astronomy.*"

Annual Subscription (for the "*Companion*" and twelve Monthly Numbers), 13s.

*All communications should be addressed to the Editors of "The Observatory,"  
Royal Observatory, Greenwich, S.E.*

# Royal Geographical Society's Publications.

---

## THE GEOGRAPHICAL JOURNAL.

Monthly. Illustrated. Edited by the Secretary. Price (to non-Fellows), 2s.

## HINTS TO TRAVELLERS.

Edited for the Council of the Royal Geographical Society by E. A. REEVES, F.R.G.S., F.R.A.S. Ninth Edition, revised and enlarged. In two volumes, illustrated. Price 15s. net. (To Fellows at the Office of the Society, 10s. net).

Vol. I.—Surveying and Practical Astronomy.

Vol. II.—Meteorology and Climate (by DR. H. R. MILL); Photography, Geology, Natural History, Anthropology, Industry and Commerce, Medical Hints, &c.

## THE DISTRIBUTION OF RAINFALL OVER THE LAND.

By DR. A. J. HERBERTSON. With monthly maps of Rain-fall. Price 5s. net. (To Fellows, 2s. 6d.)

## ON THE RESULTS OF A DEEP-SEA SOUNDING EXPEDITION,

In the North Atlantic in the summer of 1899, by R. E. PEAKE, M.Inst.C.E.; with notes on Temperature, Deep-Sea Deposits, &c., by SIR JOHN MURRAY, K.C.B., F.R.S. *Charts.* Price 5s. net. (To Fellows, 2s. 6d.)

## THE ANTARCTIC MANUAL,

For the use of the Expedition of 1901. Edited by GEORGE MURRAY, F.R.S., 1901. Pp. 586. *With a new chart of the Antarctic Regions.* Price, 15s. (To Fellows, 10s.)

~~~~~  
ROYAL GEOGRAPHICAL SOCIETY, 1, Savile Row, W.  
AND ALL BOOKSELLERS.

---

### RATES FOR ADVERTISEMENTS IN THIS MAGAZINE.

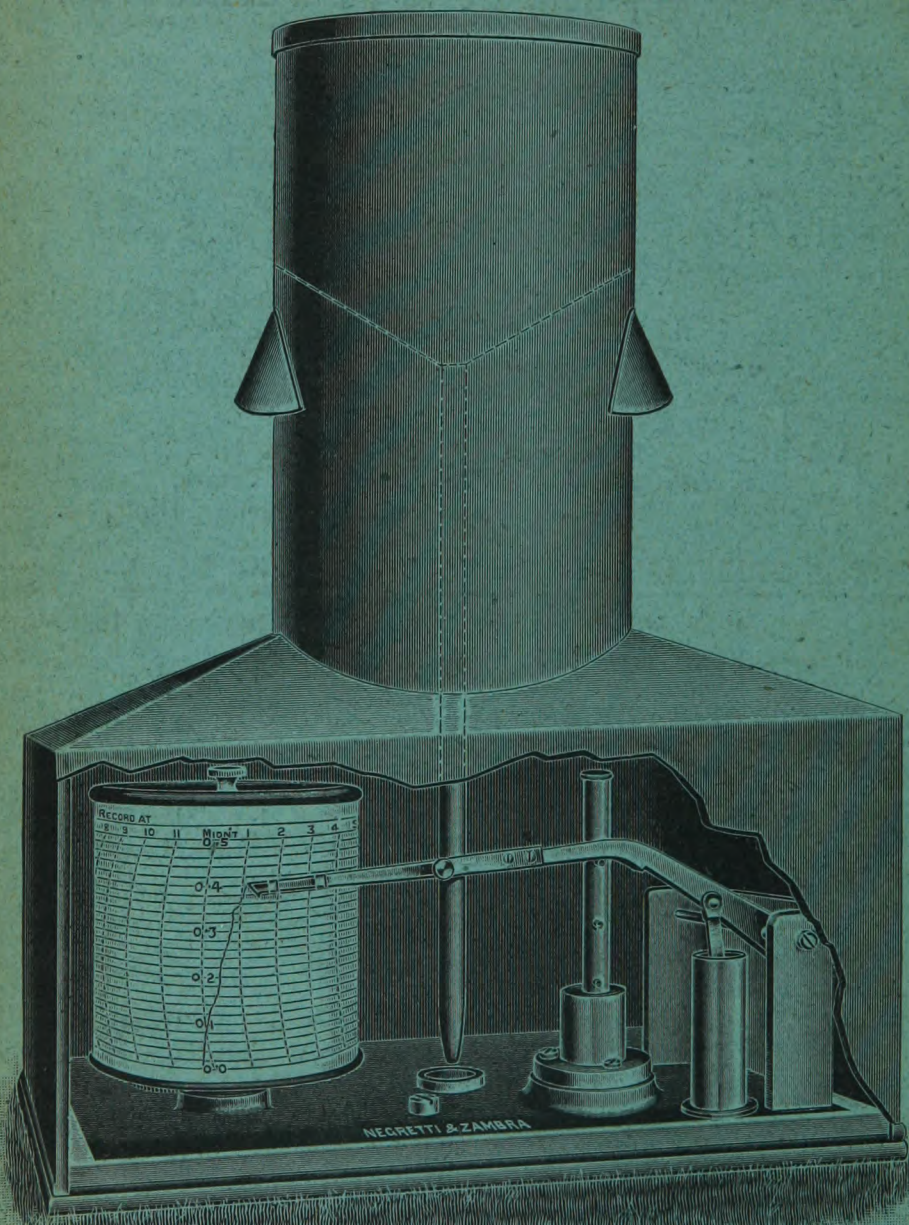
|            |     | One Insertion. | Six Insertions. | Twelve Insertions. |               |
|------------|-----|----------------|-----------------|--------------------|---------------|
| WHOLE PAGE | ... | 30/-           | 26/-            | 22/6               | } All<br>Net. |
| HALF       | ... | 16/6           | 14/6            | 12/6               |               |
| QUARTER    | ... | 9/-            | 8/-             | 7/-                |               |
| EIGHTH     | ... | 5/-            | 4/6             | 4/-                |               |

*All applications for space to be made to*

Mr. H. A. COLLINS, 32, BIRDHURST ROAD, CROYDON.



# The "HYETOGRAPH."



Write for descriptive pamphlet and other Meteorological Instruments to the  
SOLE MAKERS,

**NEGRETTI & ZAMBRA,**  
SCIENTIFIC INSTRUMENT MAKERS,  
38, HOLBORN VIADUCT, E.C.,

Branches: 45, CORNHILL, E.C., and  
122, REGENT STREET, W., LONDON.

Telegraphic Address: "NEGRETTI, LONDON." Telephone No.: 583 HOLBORN.

SHIELD & SPRING, Lancelot Place, Brompton Road, S.W.