

SYMONS'S MONTHLY METEOROLOGICAL MAGAZINE.

CCCXCVI.]

JANUARY, 1899.

[PRICE FOURPENCE,
or 5s. per ann. post free.]

ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, December 21st, at the Institution of Civil Engineers, Great George Street, Westminster, Mr. F. C. Bayard, LL.M., President, in the chair.

The following candidates were balloted for and duly elected Fellows of the Society :—John Alfred Curtis ; John Dickinson Leigh, M.B., M.S., F.R.C.S. (Edin.) ; H. Bertram Nichols, A.M.I.C.E.

WEST INDIA HURRICANE.

Capt. A. Carpenter, R.N., D.S.O., gave an account of the hurricane which caused so much devastation in the West Indies in Sept., 1898.

The cyclone, passing 18 miles south of Barbadoes, swept over the southern half of St. Vincent Island, then took a north-west direction towards Aves Island, its rate of progression being about $7\frac{1}{2}$ miles an hour. From here it pursued a northerly course for 450 miles, passing between Puerto Rico and the Windward Islands. In lat. 23° N. it swerved to the north-west for 600 miles up to lat. 30° N., where, on the 17th, it commenced to recurve to the north-east. It was traced to lat. 44° N., long. 42° W., where it was still going strong on the 20th, having travelled 3000 miles at an average speed before recurvature of 8 miles an hour, and of 24 miles an hour afterwards.

Its diameter (taken as the limit within which there was a marked change in direction of wind) was 80 miles as it approached Barbadoes, and 170 miles after leaving St. Vincent. The actual storm centre, in which the force of wind greatly increased, was only 35 miles in diameter until St. Vincent was passed, but after that the strength of wind extended to 170 miles. The diameter of the calm vortex, or eye, of the storm was not less than 4 miles.

On nearing Bermuda the diameter of the cyclone was about 400 miles, and on passing Nova Scotia 450 miles, as depicted on the U.S. *Pilot Chart* for November.

The damage to the islands was very great. The houses of the peasantry are all of wood, and those of Europeans only of stone or brick in their lower courses.

In Barbadoes 11,400 houses were swept away or blown down. Some of these fell outward from all sides as if by an explosion from the

interior. About 115 persons were killed, and 50,000 became homeless.

At St. Vincent 6,000 houses were blown down or damaged beyond repair, 200 lives lost, and 20,000 people homeless. Not only were wooden houses blown down, but nearly all the churches and chapels were destroyed. Trees nearly a century old were uprooted, and the rain filled the mountain torrents to such magnitude that whole villages were swept away and estates wiped out beyond recognition. The high sea damaged Kingstown, and all shipping was destroyed. At the Botanic Gardens on the 11th the barometer fell from 29.539 in. at 10 a.m. to 28.509 in. at 11.40 a.m., and about 14 inches of rain fell in the 24 hours ending 9 a.m. on 12th. The rain at Fort Charlotte, overlooking Kingstown, was said to be "scalding hot" and smelt putrid, and clothes that got wet rotted after being washed. The volcano Soufrière, at the north end of the island, has been dormant since 1812. A lake, half a mile in diameter, lies in the crater. It seems possible that this water, which under a tropical sun must bear a high temperature and be somewhat foul, may have been licked up by the cyclonic whirl, and descended as stinking rain.

At St. Lucia the rain converted valleys into lakes, and an avalanche filled a valley for 3 miles, burying houses and estates. The high sea did much damage at Castries Harbour.

The same tale is told farther north, the heavy rain doing even more harm than the wind.

There was much atmospheric electricity over all the islands from the 10th to the 14th.

The surf was roaring on the east coast of St. Vincent twenty hours before the cyclonic centre reached it.

It does not appear that any of the meteorological observers have made arrangements for receiving reports of the height and direction of the ocean swell from the weather coasts during the hurricane months. The author feels sure that they lose a very valuable warning by not doing so. The following facts give another illustration of the warning thus afforded.

In August, 1880, at Port Royal, Jamaica, the author received nearly twenty-four hours' notice of the cyclone that swept over the island, wrecking every vessel except the Commodore's ship and his own little surveying schooner. None of the local folk saw anything unusual in the look of the weather, but the sea outside on the reefs was far greater than that due to the ordinary sea breeze.*

* Since the above paper was read we have received the *U.S. Monthly Weather Review* for September, 1898, which contains details as to the storm warning system which the English Government ought to have established 30 years ago, but which the U.S. Government have now the honour of providing for all nations. It contains also note of the early work of the observers respecting this Hurricane, and a chart of its track, which seems to be more westerly than that described by Capt. Carpenter; in fact, more like the normal tracks in the old works of Sir W. Reid and others published in the early part of this century, but we have not Capt. Carpenter's chart before us, and we hope that we have not heard the last of this storm.—ED. M. M.

FROST AND ANTICYCLONES.

Mr. W. H. Dines, B.A., read a paper on the connection between the winter temperature and the height of the barometer in north-western Europe.

In the spring of 1897 the author read a paper before the Society dealing with the connection between frost and anticyclonic conditions at Greenwich. The period dealt with was 1841-90 inclusive, and the statistical evidence obtained left no doubt on his mind that the current theory on the subject is radically false. In that paper it was shown that the mean height of the barometer during nearly all the noted frosts of the period was below the average, and that 16 frosts only out of 74 had been accompanied by a high barometer (above 30·20 ins.), and that, whereas the average duration of a frost was 9 days, the average of those 16 high barometer frosts was only 6 days. The present paper is a further contribution to the subject based on observations at Christiania 1868-93, Berlin 1848-93 and Geneva 1840-95, and the author sums up as follows.

"Thus the three different ways in which the question has been investigated give the same answer, namely, that the winter temperature at a place in Western Europe has no connection with the height of the barometer at that place, and that in winter it is just as likely to be cold when the barometer is below the average as when it is above the average."

These papers are an important criticism of a somewhat fundamental question and the acceptance of the author's conclusions would, as was stated in the discussion, necessitate the rewriting of nearly all the Meteorological text books. We much regret that it is impossible to do justice the paper or to report the discussion by Messrs. F. C. Bayard, C. Harding, F. J. Brodie, R. H. Scott, G. J. Symons and Major Rawson, without reproducing the diagrams which we should scarcely be justified in doing before they appear in the Quarterly Journal of the Society.

GODFRIDUS—THE BOOK OF KNOWLEDGE.

IN Vol. XXXI., pp. 101-106 and 114-115, we enumerated and partly described the contents of such editions of the above work as we had been able to trace, and intimated that a complete bibliography would require much work. Since then we have succeeded in purchasing several editions which at that time we had to describe on the authority of bibliographers, and we have at least three editions not quoted in that list. We do not, however, think that the time to revise and complete the account has yet come; on the contrary, it seems more remote, for one copy (of 1766) claims the parentage of Lilly the Astrologer (1602-1681), and another drops Godfridus, Melampus, Erra Pater and Lilly, and starts with a fresh title as below.

We reprint the title nearly in fac-simile in order that our readers may know the style of book for which we are searching.

The NEWEST, BEST,
And Very-much Esteemed
BOOK *of* KNOWLEDGE.

Being *Very Necessary* and *Useful* for the
Instruction and *Benefit* of all Persons.

S H E W I N G

The Effects of the PLANETS and other Astronomical CONSTELLATIONS; with the Strange Events that happen to *Men, Women, and Children*, Born under them.

Together with

The *Husbandman's Practice*: Or, *Prognostication* for *Ever*. And the *Shepherd's Perpetual Calendar* for the *Weather*.

A L S O

A Brief Discourse of the Natural Causes of *Meteors*; with an Account of several Remarkable *Earth-quakes, Rains, Thunders, Thunder-Bolts, Lightnings, Comets, Blazing-Stars, &c.*

A N D

Observations on the *Weather*, and *Signs* foretelling *Rain*.—A Brief Collection of all the *Members* of *Man* Physiognomiz'd.—*Signification* of *Moles* on *Man* or *Woman*.—*Interpretation* of *Dreams*.—And *Pythagoras's Wheel of Fortune*.

W I T H

A Particular Account of the *Earth* and *Sea*: And a Description of the most Magnificent *Temple* of *Solomon*: Also of the *Seven Wonders* of the *World*.

L O N D O N:

Printed for A. WILDE, in *Aldersgate-Street*:
Sold also by the BOOK-SELLERS in Town and
Country. 1764.

It is a 12mo, of 156 pages, on very poor paper, and evidently owes its preservation to having been strongly bound. It will be noticed that the title has been quite changed, and, in fact, the book is more like a popular treatise on the weather.

The following lines front the title page. *Mirabile dictu* they are not in Inwards's *Weather Lore*; perhaps Mr. Inwards will put them in his 4th edition. To us they are suggestive of the well-known lines, "The hollow winds begin to blow," &c., which are attributed to Dr. E. Darwin and to Dr. Jenner. It will be interesting to find which was published first.

Infallible Signs of Rainy Weather, from the Observation of divers Animals.

IF *Ducks* or *Drakes* their Wings do flutter high,
 Or tender *Colts* upon their Backs do lie;
 If *Sheep* do bleat, or play, or skip about,
 Or *Swine* hide Straw by bearing on their Snout;
 If *Oxen* lick themselves against the Hair,
 Or grazing *Kine* to feed apace appear,
 If *Cattle* bellow, gazing* from below,
 Or if *Dogs* Entrails rumble to and fro,
 If *Doves* or *Pigeons* in the Evening come
 Later than usual to their Dove-House Home;
 If *Crows* and *Daws* do oft themselves be-wet,
 Or *Ants* and *Pismires* Home a-pace do get;
 If in the Dust *Hens* do their Pinions shake,
 Or by their flocking a great Number make;
 If *Swallows* fly upon the Water low,
 Or *Wood-Lice* seem in Armies for to go;
 If *Flies*, or *Gnats*, or *Fleas* infest and bite,
 Or sting more than they're wont by Day or Night;
 If *Toads* hie Home, or *Frogs* do croak amain,
 Or *Peacocks* cry:—*Soon after look for Rain.*

REVIEW.

Etudes internationales des Nuages. 1896 and 1897. *Observations et Mésures de la Suède I, II.* Publication de l'Observatoire Météorologique de l'Université Roy. d'Upsala. 4to. [1898.] 134 pp., 1 plate.

ENGLAND is, we fear, being left behind as regards meteorology.

Welsh and Glaisher may be said to have originated high-class work in balloons, but what followers have they here now? The French, Germans, and Russians are devoting time and money to it, and, we believe, actually sent an aeronaut to this country.

Douglas Archibald led the way with kites years ago, but what are we now doing? It is to Lawrence Rotch and to the U.S. Weather Bureau that we have to look.

Howard started the nomenclature of clouds, Whipple worked at determining their height, and Clayden is still doing his best single-

* ?Grazing.

handed and at his own cost. But what have we to put by the side of the work of Hildebrandsson and Teisserenc de Bort?

Somebody ought to ponder over the explanation of these facts.

We, however, have merely to indicate the character and contents of the work before us.

In the first ten pages Dr. Hildebrandsson gives an historical sketch of cloud work, from the time (just 25 years ago) when he first organised the Swedish corps of Cirrus observers, down to the meeting of the International Conference at Paris in 1896. We see no English names quoted but those of Ralph Abercromby and Ley, and excepting Clayden, Whipple, and Wilson Barker, we remember no other Englishman who has worked regularly at the subject. In 1874 it was resolved that, "*Toutes les Institutions Météorologiques centrales sont invitées à organiser une première série d'observations et de mesures des nuages pendant une année, du 1er Mai 1896, à 1er Mai 1897.*" This volume gives the results for Upsala—time will show what other countries have done.

Part II. describes the instruments used, their position, and the methods by which the altitudes of the clouds were computed. The theodolites are much smaller than those used by M. Teisserenc de Bort at his observatory at Trappes; but Dr. Hildebrandsson seems satisfied that they were quite free from error, and as the base line was rather more than half a mile in length, the angles were usually considerable.

Part III. gives the observations *in extenso* and some summaries; we cannot go fully into these, but may note in conclusion that according to Fig. 3, when the pressure at sea-level is about 30.4 in., the cirri have an altitude of five miles; the highest seems to have been six miles at 7.5 p.m. on April 27th, 1897.

AURORÆ AND STORMS.

To the Editor of the Meteorological Magazine.

SIR,—In the December number, at page 164, you put a query in a note at the foot of the page in reference to displays of the aurora, asking for proof that they foretell storms.

An old friend of mine told me 40 years ago that a relation of his, who commanded for two or three years a cruiser in the Channel, had observed that whenever an aurora appeared the wind would blow hard from the S.W. in 48 hours. I have myself verified this as the unfailing result of my own observation ever since.

Your obedient servant,

JOHN SLATTER.

Whitchurch, Oxon., 19th December, 1898.

RESULTS OF METEOROLOGICAL OBSERVATIONS AT CAMDEN SQUARE FOR 40 YEARS, 1858-97.

DECEMBER.

ELEMENTS.	MONTHLY MEANS OR TOTALS.										ABSOLUTE READINGS.					
	MEANS 9 A.M. AND 9 P.M.										EXTREMES AT 9 A.M. AND 9 P.M.					
	Mean, 40 years	Highest Month and Date.	Lowest Month and Date.	Highest Month.			Lowest Month.			Mean of all Highest Lowest.	Highest.			Lowest.		
				Mean.	Value.	Date.	Value.	Date.	Date.		Value.	Date.	Value.	Date.	Date.	Mean of all Highest Lowest.
Barometer (cor. & red.)	1 29.947	2 30.312 1879	3 29.481 1876	4 9 a.m. 9 p.m.	5 29.948 29.945	6 30.320 30.304	7 1879 1879	8 29.483 29.479	9 1876 1876		10 30.784 30.782	11 23rd, 15th,	12 28.398 28.323	13 4th, 8th,	14 1876 1886	15 29.174 29.200
(Dry Bulb.....)	39.3	46.2 1868	30.3 1890	9 a.m. 9 p.m.	39.0 39.6	46.1 40.4	1868 1868	29.7 30.8	1890 1890		56.0 56.5	14th, 6th,	12.1 17.3	25th, 24th,	1860 1860	26.4 27.5
Max.	44.0	..	..	..	..	50.7	1868	34.0	1890		58.9	5th,	24.3	31st,	1874	32.7
Min.	34.4	..	..	..	..	41.0	1868	25.5	1890		52.8	28th,	6.7	25th,	1860	22.9
(Wet Bulb.....)	38.1	44.9 1868	29.6 1890	9 a.m. 9 p.m.	37.8 38.3	44.6 45.1	1868 1868	29.1 30.1	1890 1890		54.8 55.8	14th, 6th,	11.9 16.9	25th, 24th,	1860 1860	25.8 26.7
Solar Rad., black...	51.8	...	...	...	...	59.1	1880	36.9	1890		87.0	10th,	24.8	31st,	1874	34.3
Solar Rad., bright..	44.9	...	...	...	...	48.3	1894	34.8	1890		62.0	5th,	26.8	21st,	1891	33.3
Grass Minimum ...	30.9	...	...	...	...	37.4	1876	22.0	1890		51.2	5th,	1.8	25th,	1860	18.5
Soil, 1 foot	39.9	...	...	...	...	43.0	'72, '76	33.6	1879		47.9	6th,	32.7	25, 27, 28, '78		36.3
Cloud	6.8	8.1 '76, '90	5.2 1886	9 a.m. 9 p.m.	6.8 6.7	8.6 8.1	1890 1870	5.2 5.0	1885 1886		10	Every year Every year	0 0	Various Various		0.6 0.2
Rainfall	2.13	6.25 1876	.36 1864	9 a.m. 9 p.m.	1.11 1.02	3.13 3.12	1876 1876	.19 .17	'64, '79 '64, '73		1.14 .85	24th, 26th,	.00 .00	Every year Every year		.00 .00

Max. Rainfall in 24 hours, 1.82 in., 26th, 1886. Mean max. daily fall, .54 in.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JULY, 1898.

STATIONS. <i>(Those in italics are South of the Equator.)</i>	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.									
England, London	82·9	15	43·9	11	73·8	53·5	51·5	0·100 69	127·7	39·1	inches 1·09	7	6·1
Malta.....	95·7	22	64·4	17	85·0	69·0	63·9	69	153·5	57·1	·00	0	1·1
<i>Cape of Good Hope</i> ...	78·4	26	34·3	9	61·9	46·7	45·1	84	...	...	6·13	13	5·3
<i>Mauritius</i>	76·0	15a	56·7	2	74·2	63·9	58·9	72	123·0	49·0	1·72	15	5·5
Calcutta.....	92·1	25	75·4	17	87·0	78·1	77·9	88	155·5	74·9	12·75	28	8·8
Bombay.....	86·7	4	73·7	23	84·2	77·6	76·8	87	137·5	73·2	20·72	31	9·2
Ceylon, Colombo	89·2	24	72·5	9	86·8	78·0	73·2	78	146·5	70·5	6·15	13	6·3
<i>Melbourne</i>	64·0	14	35·0	2	55·7	43·4	41·7	77	121·0	27·3	1·90	12	6·4
<i>Adelaide</i>	64·7	13	38·0	17	59·1	45·2	43·7	77	122·8	29·2	2·65	16	6·0
<i>Sydney</i>	70·1	27	40·4	20	58·7	45·3	40·0	80	144·3	28·0	3·73	10	2·9
<i>Wellington</i>	63·0	17	33·8	9	55·3	41·7	39·3	70	96·0	21·0	4·80	17	4·2
<i>Auckland</i>	62·0	26	41·0	21	58·1	49·9	45·5	78	110·0	38·0	6·18	23	6·1
Jamaica, Kingston.....	91·8	3, 29	70·3	19	88·7	72·8	70·2	70	...	...	1·63	7	...
Trinidad	93·0	19	68·0	11c	88·8	70·8	72·0	78	165·0	66·0	5·87	18	...
Grenada.....	84·2	1b	70·8	13	82·6	74·1	71·3	80	151·0	...	10·24	26	3·0
Toronto.....	94·0	3	43·3	11	81·5	60·2	59·9	68	123·5	33·5	·69	9	3·6
New Brunswick, Fredericton	93·9	3	42·5	6	78·0	51·6	56·3	62	...	...	1·38	10	4·9
Manitoba, Winnipeg ...	91·5	13	37·5	20	77·4	54·0	...	...	...	...	1·77	9	5·5
British Columbia, Esquimalt.....	79·6	30	46·2	7	69·8	50·6	54·6	85	...	...	·28	3	2·7

a—and 17. b—and 12, 22, 28. c—and 12.

REMARKS.

MALTA.—Mean temp. 75°·1, or 2°·5 below average. Mean hourly velocity of wind 9·2, or 1·7 above average. Mean temp. of sea 78°·5. L on 3 days. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·1 above, of dew point 0°·5, and rainfall ·52 in. below, the average. Mean hourly velocity of wind 12·3 miles, or 0·5 above average; extremes, 30·5 on 27th and 2·1 on 19th; prevailing direction E.S.E. T on 22nd—the first time on record in July. The lowest barometer ever recorded in July (29·895 in.) occurred on 19th during the passage of bad weather to S. and S.E. T. F. CLAXTON.

CEYLON, COLOMBO.—Mean temp. of air 81°·6, or 1°·0 above, of dew point 0°·2 below, and rainfall 1·72 in. above, average. TSS on 3 days; L on 4 days. Mean hourly velocity of wind 9·7 miles; prevailing direction S.W. H. O. BARNARD.

Adelaide.—Mean temp. 0°·6 above, and rainfall slightly more than, the average of 41 years. Fair during the first half, but during the latter half generally squally and showery. C. TODD, F.R.S.

Sydney.—Temp. 0°·4 below, humidity 3·4 above, and rainfall ·55 in. below, average. Frequent light rains, meeting all requirements for wheat and grass, but not enough for tanks and rivers. H. C. RUSSELL, F.R.S.

Wellington.—Showery weather up to the middle, with S.E. and N.W. winds, at times strong, then fine, bright and cold up to 22nd; from 23rd to the end wet, and strong N.W. winds on 27th and 28th. T on 7th and 28th; H on 7th and 8th; fog on 9th; S on hills on 25th and 31st. Earthquakes on 5th and 8th. R. B. GORE.

Auckland.—Beginning and end of the month wet and stormy, middle fine and dry. Mean temp. slightly below, and rainfall 1·25 in. above, average. T. F. CHEESEMAN.

TRINIDAD.—Rainfall 3·58 in. below the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL,
DECEMBER, 1898.

For the Counties, Latitudes, and Longitudes of most of these Stations,
see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Uxbridge, Harefield Pk..	2·32	XI.	Builth, Abergwesyn Vic.	12·13
II.	Dorking, Abinger Hall .	3·41	„	Rhayader, Nantgwilt...	8·32
„	Birchington, Thor	1·29	„	Lake Vyrnwy	9·73
„	Hailsham	3·05	„	Corwen, Rhug	4·26
„	Ryde, Thornbrough	3·33	„	Criccieth, Talarvor	3·79
„	Emsworth, Redlands ...	3·05	„	I. of Man, Douglas	4·55
„	Alton, Ashdell	3·81	XII.	Stoneykirk, Ardwell Ho.	2·44
III.	Oxford, Magdalen Col..	2·18	„	New Galloway, Glenlee	8·41
„	Banbury, Bloxham	2·73	„	Moniaive, Maxwellton Ho.	6·88
„	Northampton, Sedgebrook	2·18	„	Lilliesleaf, Riddell	3·05
„	Stamford, Duddington..	1·96	XIII.	N. Esk Res. [Penicuik]	6·00
„	Alconbury	1·74	XIV.	Glasgow, Queen's Park..	6·32
„	Wisbech, Bank House...	1·84	XV.	Inverary, Newtown	16·24
IV.	Southend	1·80	„	Ballachulish, Ardsheal...	16·67
„	Harlow, Sheering.....	2·02	„	Islay, Gruinart School ...	...
„	Colchester, Lexden	2·36	XVI.	Dollar	5·31
„	Rendlesham Hall	3·12	„	Balquhiddier, Stronvar...	18·01
„	Scole Rectory	2·25	„	Coupar Angus Station...	2·75
„	Swaffham	2·15	„	Dalnaspidal H.R.S. ....	...
V.	Salisbury, Alderbury ...	2·93	XVII.	Keith H.R.S.	3·72
„	Bishop's Cannings	3·20	„	Forres H.R.S.	3·51
„	Blandford, Whatcombe ..	4·34	XVIII.	Fearn, Lower Pitkerrie..	4·24
„	Ashburton, Holne Vic...	6·56	„	N. Uist, Loch Maddy ...	...
„	Okehampton, Oaklands..	6·80	„	Invergarry	17·45
„	Hartland Abbey	5·40	„	Aviemore H.R.S.	3·86
„	Lynton, Glenthorne ...	6·91	„	Loch Ness, Drumnadrochit	9·73
„	Probus, Lamellyn	4·65	XIX.	Invershin	4·76
„	Wellington, The Avenue	3·20	„	Durness	10·07
„	North Cadbury Rectory	2·52	„	Watten H.R.S.	3·61
VI.	Clifton, Pembroke Road	4·49	XX.	Dunmanway, Coolkelure	8·72
„	Ross, The Graig	2·58	„	Cork, Wellesley Terrace	2·95
„	Wem, Clive Vicarage ...	2·44	„	Killarney, Woodlawn ..	7·66
„	Wolverhampton, Tettenhall	2·21	„	Caher, Duneske	2·25
„	Cheadle, The Heath Ho.	2·45	„	Ballingarry, Hazelfort...	2·42
„	Coventry, Priory Row ..	2·58	„	Limerick, Kilcornan ...	1·71
VII.	Grantham, Stainby	1·81	„	Broadford, Hurdlestown	2·94
„	Horncastle, Bucknall	1·92	„	Milton Malbay	5·29
„	Worksop, Hodsck Priory	2·00	XXI.	Gorey, Courtown House	2·09
VIII.	Neston, Hinderton	1·77	„	Athlone, Twyford	2·26
„	Southport, Hesketh Park	2·48	„	Mullingar, Belvedere ...	2·03
„	Chatburn, Middlewood..	5·79	„	Longford, Currygrane...	...
IX.	Melmerby, Baldersby ...	1·96	XXII.	Woodlawn	2·93
„	Scarborough, Observat'y	2·06	„	Crossmolina, Enniscoe ..	8·61
„	Middleton, Mickleton ...	4·31	„	Collooney, Markree Obs.	4·14
X.	Haltwhistle, Unthank...	4·58	„	Ballinamore, Lawderdale	4·10
„	Bamburgh	1·39	XXIII.	Warrenpoint	2·65
„	Duddon Valley, Ulpha School	8·35	„	Seaforde	2·69
„	Keswick, The Bank	11·52	„	Belfast, Springfield	2·97
XI.	Llanfrehfa Grange	5·28	„	Bushmills, Dundarave..	2·63
„	Llandovery	6·94	„	Stewartstown	3·01
„	Castle Malgwyn	6·59	„	Killybegs	8·19
„	Brecknock, The Barracks	5·16	„	Horn Head	7·13

DECEMBER, 1898.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.						Days on which -01 or more fell.	TEMPERATURE.						No. of Nights below 32°.	
		Total Fall.	Differ- ence from average 1880-9.	Greatest Fall in 24 hours		Dpth	Date		Max.		Min.		In shade.	On grass.		
				in.	Dpth				Deg.	Date	Deg.	Date				
I.	London (Camden Square) ...	2.54	+	.47	.87	6	12	57.1	4	27.1	24	3	13			
II.	Tenterden	2.13	—	.50	.37	31	15	55.0	4, 6	26.0	31	6	11			
"	Hartley Wintney	2.72	...	...	.87	6	16	57.0	7	24.0	23	7	14
III.	Hitchin	2.81	+	.78	.79	6	14	57.0	6	26.0	30	7	...			
"	Winslow (Addington)	3.18	+	.73	1.18	6	16	56.0	4, 18	25.0	31	7	12			
IV.	Bury St. Edmunds (Westley)	2.49	+	.25	.79	6	11	57.0	5	21.0	23	...	...	
"	Norwich (Brundall)	2.31	...	...	.46	6	14	56.0	4, 18	26.2	31	5	13
V.	Winterbourne Steepleton ...	4.76	...	...	1.06	6	20	54.1	5, 26	25.0	31	6	14	
"	Torquay (Cary Green) ...	3.79	...	...	.96	27	16	56.4	5, 26	34.6	21	0	3
"	Polapit Tamar [Launceston]..	4.73	+	.50	.82	6	24	56.9	26	27.4	21	2	7			
VI.	Stroud (Upfield)	3.20	+	.75	.93	6	14	57.0	8	28.0	22	5	...			
"	Churchstretton (Woolstaston)	2.46	—	.59	.65	26	18	56.0	5	30.0	24c	5	14			
"	Worcester (Diglis Lock)	2.56	+	.58	.60	26	18	...	...	...	...	...	...
VII.	Leicester (Rotherby Hall) ...	...	...	...	...	...	...	...	...	...	...	...	...
"	Boston	1.69	—	.16	.51	9	10	62.0	11	27.0	23	8	...			
"	Hesley Hall [Tickhill].....	1.45	—	.53	.42	26	10	57.0	5	25.0	31	8	...			
VIII.	Manchester (Plymouth Grove)	3.27	—	.17	.90	27	21	58.0	27	30.0	23	...	...	
IX.	Wetherby (Ribston Hall) ...	2.63	+	.19	.65	29	14	...	...	...	...	...	...
"	Skipton (Arncliffe)	8.92	+	2.11	1.16	26	27	...	...	...	...	...	...
"	Hull (Pearson Park)	2.20	—	.07	.40	26	14	58.0	5, 6	26.0	31	6	15			
X.	Newcastle (Town Moor)	1.09	—	1.21	.45	29	14	...	...	...	...	...	...
"	Borrowdale (Seathwaite).....	23.72	+	8.91	2.51	9	27	...	...	...	...	...	...
XI.	Cardiff (Ely)	5.40	+	.85	1.24	6	22	...	...	...	...	...	...
"	Haverfordwest	5.74	+	.75	1.53	26	24	56.0	6	33.1	30	0	8			
"	Aberystwith (Gogerddan) ...	7.43	+	2.55	2.75	26	21	54.0	5	...	...	...	...
"	Llandudno	2.90	—	.06	.86	26	23	61.0	5	34.0	30c	0	...			
XII.	Cargen [Dumfries]	8.00	+	3.98	1.12	26	22	56.0	11	24.0	31	4	...			
XIII.	Edinburgh (Blacket Place)...	1.91	...	...	.29	5	19	57.5	5	26.0	31	3	9
XIV.	Colmonell	4.52	...	...	.62	27	28	57.0	5	24.0	29	...	...	
XV.	Tighnabruach	8.78	...	...	.98	4	28	50.0	4b	28.0	29	5	...
"	Mull (Quinish)	9.64	+	2.07	1.26	4	30	...	...	...	...	...	...
XVI.	Loch Leven Sluices	4.40	+	1.09	1.00	4	14	...	...	...	...	...	...
"	Dundee (Eastern Necropolis)	1.35	—	.73	.20	3a	19	57.5	5	24.5	31	5	...			
XVII.	Braemar	5.22	+	2.75	1.37	27	25	52.1	5	16.0	31	9	21			
"	Aberdeen (Cranford)	2.18	...	...	.38	31	27	57.0	4	21.0	30	9	...
"	Cawdor (Budgate)	4.32	+	1.86	.66	4	27	...	...	...	...	...	...
XVIII.	Strathconan [Beaully]	9.44	+	3.67	1.04	10	17	...	...	...	...	...	...
"	Glencarron Lodge	21.65	...	...	1.76	1	28	53.4	26	25.7	30	4	...	
XIX.	Dunrobin	6.24	+	2.87	.69	17	23	56.0	12	29.0	29	3	...			
"	S. Ronaldshay (Roeberry) ...	5.92	+	2.26	.71	1	29	52.0	11	30.0	29	4	...			
XX.	Darrynane Abbey	3.95	...	...	.58	28	26	...	...	...	...	...	...
"	Waterford (Brook Lodge) ...	3.01	—	.63	1.02	26	19	56.0	2	23.0	20	3	...			
"	O'Briensbridge (Ross)	4.06	...	...	.41	26	24	...	...	...	...	...	...
XXI.	Carlow (Browne's Hill)	2.00	—	1.12	.74	26	21	...	...	...	...	...	...
"	Dublin (FitzWilliam Square)	1.07	—	1.09	.26	26	21	58.8	5	32.1	20	0	6			
XXII.	Ballinasloe	3.22	—	.20	.42	26	28	54.0	5, 25	31.0	20	2	...			
"	Clifden (Kylemore)	12.44	...	...	2.97	22	30	...	...	...	...	...	...
XXIII.	Waringstown	2.69	—	.35	.46	28	20	55.0	11	45.0	10	4	6			
"	Londonderry (Creggan Res.) ..	4.54	+	.33	.87	4	27	...	...	...	...	...	...
"	Omagh (Edenfel)	3.90	+	.22	.37	28	25	55.0	4, 5	27.0	29	9	9			

+ Shows that the fall was above the average ; — that it was below it.

a—and 5, 26. b—and 5, 10, 11, 12. c—and 31.

METEOROLOGICAL NOTES ON DECEMBER, 1898.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

TENTERDEN.—Remarkably warm for the first 19 days, then a few sharp frosts before Christmas; dry from 10th to 26th. Mean temp. $45^{\circ}0$, and only one day with the max. below 40° . Gales on 27th and 29th. Duration of sunshine 50 hours 40 mins.

HARTLEY WINTNEY.—The early part of the month was mild and wet, and though no R fell from 17th to 26th, the total is $\cdot 12$ in. above the average. S.W. winds were prevalent, and a S.W. gale occurred on 27th. Ozone was registered on 11 days. Robins' and wrens' nests with eggs were found on 17th. Christmas rose, violets and wallflowers were in bloom on 18th.

WINSLOW, ADDINGTON.—A mild month, the only cold period being from the 20th to the 24th, when the day temp. was low, but the min. did not fall below 26° . On 18 days the max. ranged from 50° to 56° . The wind was very high on the 2nd, 5th and 27th.

WESTLEY, BURY ST. EDMUNDS.—The first three weeks were mild, followed by six frosty days. Violent gales occurred in the last week.

NORWICH, BRUNDALL.—Extraordinarily mild, the mean temp. of the first 18 days being as high as $47^{\circ}5$; while on the 5th the max. was $55^{\circ}6$ and the min. $53^{\circ}6$; on 6th, max. $55^{\circ}2$ and min. $52^{\circ}4$; and on 18th, max. $56^{\circ}0$ and min. $50^{\circ}4$. Gales from S.W. on 2nd and 27th. Distant L in N.E. on evening of 7th, L in N. on evening of 28th. H on 20th.

WINTERBOURNE STEEPLETON.—The month was wet and mild, the nights being especially warm. The mean minima in shade and on grass were $40^{\circ}4$ and $34^{\circ}1$ respectively, or $5^{\circ}1$ and $5^{\circ}0$ above their averages. Fog on 17th and 21st. H on 27th.

TORQUAY, CARY GREEN.—R $\cdot 15$ in. above the average. Mean temp. $48^{\circ}8$, or $5^{\circ}8$ above the average. Duration of sunshine 59 hours 5 mins., being 4 hours 20 mins. above the average; 9 sunless days.

POLAPIT TAMAR [LAUNCESTON].—The whole month was very wet and the first half stormy, but the temp. was high. S.W. gale at night on 26th and early on 27th. H on 7th, 28th and 31st. T at 6 a.m. on 9th.

WOOLSTASTON.—A mild, warm month, the night temperatures for the first 18 days being unusually high. A wild gale raged on 26th, and the remainder of the month was stormy. Mean temp. $44^{\circ}3$.

WALES.

HAVERFORDWEST.—Extremely mild and wet, with very little sunshine, and only one day of clear sky. Up to the 18th the weather was almost continuously wet, with but one slight frost; from 19th to 23rd, colder and drier weather prevailed, but afterwards every day was wet to the end. Very high temp. prevailed throughout, and the minima on grass on 25th and 26th were $51^{\circ}6$ and $52^{\circ}2$ respectively, while the lowest grass min. was $25^{\circ}0$ on 31st. Gales on 10 days. Spring flowers in bloom, and fruit trees budding.

GOGERDDAN.—Very wet and very mild throughout.

SCOTLAND.

CARGEN [DUMFRIES].—Stormy, wet, unsettled weather characterised the month. The mean temp., $44^{\circ}5$, is $5^{\circ}9$ above the average, and the highest recorded in December since observations commenced in 1860, the nearest approach being $43^{\circ}9$ in 1873. Frost was registered on only 4 days, and the temp. rose above 50° on 17 days. Only in 1872, 1876 and 1897 did the fall of R exceed that of December, 1898. Southerly winds were most prevalent; a severe gale blew on 5th, and stiff breezes on 3rd and 4th. The duration of sunshine, although exceeding the average of the last 3 years by 12 hours, is 8 hours less than the December mean. Pastures present quite a spring-like appearance, and snowdrops were in bloom at the end of the month.

EDINBURGH, BLACKET PLACE.—Very mild, the mean temp. ($44^{\circ}0$) being $5^{\circ}7$ above the average. The only milder Decembers since 1764 were those of 1842, 1843 and 1857, with mean temps. of $45^{\circ}6$, $47^{\circ}8$ and $46^{\circ}5$ respectively. Duration of sunshine only one-fifth of the average; but rainfall slightly below the mean. The max. temp. on 5th, $57^{\circ}5$, is the highest recorded in December since 1864, while the mean temp. of the day, $54^{\circ}0$, is higher than any recorded in December, January or February for at least 42 years. A very heavy W.S.W. gale occurred on 27th, and a little S and sleet fell on 31st.

COLMONELL.—R 1.64 in. below, and mean temp. $8^{\circ}0$ above, the average of 22 years, the mean temp. being the highest recorded in that period.

TIGHNABRUACH.—The R was most persistent and excessive, and accompanied by high winds from all points of the compass.

MULL, QUINISH.—A very wet and stormy month from first to last, with gales from all points of the compass. T and L on 26th and 27th.

ABERDEEN, CRANFORD.—The month was very mild, with a strong S.W. gale on 27th.

S. RONALDSHAY, ROEBERRY.—A very rough, wet month. Mean temp. $41^{\circ}7$, being $1^{\circ}9$ above the average of 8 years.

IRELAND.

DARRYNANE ABBEY.—A dry and remarkably mild month, most of the R which fell being mere drizzle. Very strong W.N.W. gale on 27th. H on 31st.

WATERFORD, BROOK LODGE.—The month was very mild. Several unusual plants were in bloom in the garden, and the fences golden with furze bloom. W.S.W. gale on 4th, and gale from W. with H on 27th. Fog on 17th.

DUBLIN, FITZWILLIAM SQUARE.—The warmest December on record for many decades, the mean temp. being $6^{\circ}3$ above the average. There was scarcely a trace of frost, S, sleet and H were entirely absent and S.W. or W. winds prevailed throughout. The R was not half the average, while the number of rainy days much exceeded it. Lunar halo on 28th. High winds on 22 days, reaching the force of a gale on 5. Fog on 3 days.

CLIFDEN, KYLEMORE HOUSE.—T and L on 3rd. Great R on 22nd, causing floods on that and the two following days. In the last ten days of the month 8.44 in. of R fell.

OMAGH, EDENFEL.—Although the temp. fell to or below freezing-point on 9 nights, the cold was of the most fleeting kind, and hardly affected the continued mild character of the month and the season generally. R was frequent and heavy, accompanied mostly by strong winds, reaching the force of a gale on 27th, occasioning considerable damage over a wide area.