

SYMONS'S METEOROLOGICAL MAGAZINE.

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THE COLD FEBRUARY OF 1902.

THE excessive and long-continued cold of February, 1895, following, as it did, an exceptionally cold January was so very unusual that it forms a "record" not likely soon to be surpassed. But with this exception the recent frost was the most prolonged and severe which has been experienced in February for half a century. It affected the whole of the British Isles, and was accompanied by a heavy snowfall in the north and west, but in the south-east the period of frost was characterised by an almost entire absence of precipitation. The rain that accompanied the milder weather of the last week did not nearly make up the monthly average, so that an unusually dry February has followed an unusually dry January as it did last year.

The duration of the frost may be measured by the number of nights during which the temperature in the shade fell below the freezing point, even though during the day a maximum reading of several degrees above the freezing point was attained. The last week of the month appears to have been free from frost almost everywhere, and in most places the cold weather set in on the 1st, so that speaking generally the frost may be said to have lasted for three weeks. On the coast the influence of sea-winds naturally shortened the period; at Torquay 9 days, at Steyning 11 days, at Eastbourne, Lynmouth, and Haverfordwest 12 days, were the smallest numbers reported to us in Great Britain; while Rendlesham Hall, Suffolk, Goldsborough Hall, Yorkshire, and West Linton, Peebleshire, with 24 days, and Market Overton with 23, showed the longest duration. The accompanying sketch map, which shows diagrammatically the number of days of frost in different parts of the country, is compiled from about 100 well distributed returns.

It distinguishes the regions where the duration of the frost was less than 10 days by a very dark shading, those where it was from 10 to 15 and from 15 to 20 days respectively are lighter, and where the duration exceeded 20 days the map is left unshaded. The data for Scotland are not so full as for England, and it is possible that the western islands had less than 10 days' frost, while the central region of the northern Highlands very likely had more than 15.

The greatest cold experienced occurred in the first week throughout Scotland, and about the middle of the month in most parts of England. The following table shows all the cases of lowest minima



for the month, indicating 20 or more degrees of frost, which have been reported by our correspondents, or published with dates in the Daily or Weekly Weather Reports. We believe that all the temperatures quoted are readings of accurate thermometers properly exposed so as to give the temperature of the air; but on this point we cannot speak with certainty. We do not quote the temperatures mentioned in newspapers, several of which were at or below zero. The order of stations in the table is that used in *British Rainfall*.

Minimum temperatures in

February, 1902, showing over 20° of frost:—

Div.	Place.	Height above Sea. feet.	Min. temp. °	Date.
II.	Sheppey (Newhouse Leysdown)...	50	10·0	15th
„	Newbury (Welford Park)	335	12 0	16th
„	Maidenhead (Cookham Vic.)	90	7·0	16th
IV.	Rendlesham Hall	88	7·0	16th
„	Bury St. Edmunds (Westley)	226	4·8	16th
V.	Alderbury	263	8·0	2nd
VI.	Ross (The Graig)	213	11·4	13th
„	Wem (The Clive Vicarage) ..	299	12·0	12th, 13th
VII.	Loughborough (Forest Road)	147	9·0	12th, 13th, 14th
„	Boston	25	12·0	12th
„	Horncastle, Hemingby	158	4·0	12th
„	Worksop (Hodsock Priory).....	56	5·2	12th
„	Hesley Hall [Tickhill]	61	10·0	12th
VIII.	Neston (Hinderton)	215	4·8	11th
IX.	Goldsborough Hall	—	5·0	12th
X.	W. Hartlepool (Bradgate)	100	5·0	12th
„	Beltingham Vicarage	—	2·0	13th
„	Penrith (Newton Reigny)	—	4·0	13th
XI.	Aberystwith (Gogerddan)	80	11·0	13th
„	Brecknock (Llandefaelogfach).....	660	12·0	14th
„	Abergwesyn Vicarage	904	6·0	11th
XII.	Dalry (The Old Garroch).....	432	7·5	14th
„	Lilliesleaf (Riddell)	550	9·0	8th
XIII.	West Linton (Rutherford Ho.) ...	970	8 0	9th, 10th, 14th
XIV.	Colmonell (Clachanton)	140	8·0	9th
„	Glasgow (Queen's Park)	144	10·0	13th
XVI.	Balquhiddy (Stronvar)	422	9·0	13th
„	Coupar Angus.....	183	10·0	1st
XVII.	Crathes (Pinewood)	—	10·2	1st
„	Braemar	1114	0·0	14th

Div.	Place.	Height above Sea. feet.	Min. temp.	Date.
XXII.	Nairn (School House) ..	84	7·0	1st
XVIII.	Glencarron Lodge.....	504	10·9	14th
XIX.	Lairg	385?	-2·0	14th
"	Wick	77	10·0	2nd
XXII.	Collooney (Markree Obs.) ..	130	12·0	12th
XXIII.	Omagh (Edenfel)	280	4·0	11th

It will be observed that the lowest reading was -2° at Lairg and the next 0° at Braemar. The mean temperature of the month appears to have been from 3° to 5° below the average in all parts of our islands; and for England at least this degree of cold has not been approached since 1895. The meteorological correspondent of the *Scotsman* states that in Scotland February, 1900, was colder than that just passed.

At Camden Square the temperature averages were as follows, comparing the month of February in 1902 with that in 1895, and with the average for 40 years.

February.	Mean of 9 a.m. & 9 p.m.	Average. Max.	Min.	Absolute Min.
1902	35·2	40·5	30·9	15·8
1895	28·8	36·1	22·5	7·3
Mean 1858-97	39·5	45·5	34·7	—

The only cases in the Camden Square record of a lower minimum than 15·8 in February, are 15·4 in 1865, and 7·3 in 1895. The record at Greenwich Observatory shows the following lowest minima in February :—

Year	1841	1845	1847	1855	1895	1902
Temp.	12·4	7·7	11·2	11·1	6·9	14·3

From the innumerable newspaper cuttings that have reached us we observe that more than a foot of snow fell in many parts of the north and middle of England, causing much obstruction to street traffic in Liverpool and Manchester. Much snow also occurred in the hilly districts, to the great anxiety of sheep-farmers; while in Orkney snow, which is rare in those islands, absolutely put a stop to inland communications for a considerable time. Much lamentation arose over the stoppage of hunting and football throughout England, only partially assuaged by the jubilation over the exceptional opportunities for curling in the northern kingdom, and for skating throughout the whole country. Skating began on the 9th in the midlands, and was general by the 13th, although the London parks were not opened until the 15th; and on the 21st or 22nd it had ceased, we hope, for the season. The canals of the fen district afforded some splendid stretches of ice, one of as much as 16 miles, from Peterborough to March; and even the largest of the English lakes were frozen from end to end. How they appeared may be gathered from the following poetic description telegraphed on the 15th by Canon Rawnsley, to *The Times* :—

"To-day, from sunrise to sunset, the beauty of Derwentwater has been beyond words. The snow-clad hills shone in silver mail; Skiddaw seemed purple, washed with ivory. The ice in good condition, and the lake from end to end shone like beaten gold. Towards sundown the lake mirror changed from gold to steel and blue, and in the afterglow dark figures of skaters appeared to flit upon a faint lilac floor, that seemed in parts to swim with lucent amber. The frost continues. Apart from skating the beauty of the scene was an experience for life."

ROYAL METEOROLOGICAL SOCIETY.

THE February meeting was held on the 19th ult. at the Society's rooms, 70, Victoria Street, Westminster, Mr. W. H. Dines, B.A., President, in the chair.

The following gentlemen were elected Fellows of the Society:—Mr. E. H. Culley, M.A., Mr. A. E. Hepburn, Mr. J. Hepper, Mr. E. Hoddinott, Mr. J. A. Just, Dr. R. F. Rand, Mr. M. A. Robinson, Mr. J. L. Scott, F.R.A.S., Mr. C. F. Wood, and Mr. N. Wrigley.

Mr. E. Mawley, F.R.H.S., read his "Report on the Phenological Observations for the year 1901." He showed that as affecting vegetation the weather was chiefly remarkable for the scanty rainfall during the growing period of the year. The deficiency was not confined to any part of the British Isles, but was more keenly felt in the English counties than in either Scotland or Ireland. Wild plants came into flower very late, but not quite as late as in the previous phenological year, which was exceptionally backward. The following table shows the mean dates of the flowering of plants in the English districts for each year, from 1891 to 1901, together, with the departures from the average.

Years.	S.W.		S.		MIDLANDS.		E.		N.W.	
	Day of Year.	Var. from Aver.	Day of Year.	Var. from Aver.	Day of Year.	Var. from Aver.	Day of Year.	Var. from Aver.	Day of Year.	Var. from Aver.
		days.		days.		days.		days.		days.
1891	144	+11	144	+16	150	+11	147	+11	150	+8
1892	139	+6	138	+4	144	+5	143	+7	147	+5
1893	118	-15	122	-12	125	-14	123	-13	128	-14
1894	126	-7	130	-4	135	-4	127	-9	137	-5
1895	139	+6	138	+4	141	+2	138	+2	144	+2
1896	125	-8	128	-6	132	-7	130	-6	134	-8
1897	130	-3	132	-2	136	-3	132	-4	142	av.
1898	133	av.	135	+1	138	-1	136	av.	141	-1
1899	136	+3	136	+2	141	+2	138	+2	145	+3
1900	142	+9	141	+7	144	+5	143	+7	152	+10
1901	138	+5	139	+5	141	+2	139	+3	144	+2

— signifies *early*, and + *late*.

The swallow, cuckoo, and other spring migrants were, as a rule, rather behind their usual dates in reaching these Islands.

The crops of wheat, barley and oats, were all, more or less, above average in Scotland and Ireland. On the other hand, in England, although there was a fair yield of wheat, that of barley and oats was very deficient. Hay was everywhere a small crop, and especially so in the southern districts of England. Beans, peas, turnips, swedes, mangolds and potatoes were all more or less under the average in England, but either good or fairly good elsewhere. The yield of hops proved very abundant. Apples, pears and plums were below the average, but the small fruits, as a rule, yielded well. Taking farm and garden crops together, there has seldom been a less bountiful year.

A brief discussion followed the reading of the Report, in which Mr. F. C. Bayard, Mr. A. Brewin, Mr. B. Latham, Mr. C. Harding, Mr. R. Inwards, and Dr. H. R. Mill took part, and Mr. Mawley replied.

Correspondence.

ATMOSPHERIC TRANSPARENCY.

To the Editor of Symons's Meteorological Magazine.

SEEING in your January number an abstract of observations of "Atmospheric Transparency" made at Haslemere by the Hon. F. A. Rollo Russell, I think it may be of interest, mainly as showing the effect produced by London smoke, to give the result of some observations made at a point about as far to the north-east of London, as Haslemere is to the south-west. For some years past I have noted atmospheric transparency, or visibility daily, at 9 a.m., and I find that out of 196 occasions on which "great" or "very great" visibility has been recorded, the distribution according to wind and direction is as follows:—

The form N.—E. is used to indicate wind from any direction between N. and E., and similarly for the other quarters.

Wind	... N.—E.	S.—E.	S.—W.	N.—W.	ALL.
Visibility...	85	32	16	63	196

The percentages of days with each wind on which great invisibility was noted were as follows:—

Wind	... N.—E.	S.—E.	S.—W.	N.—W.
Visibility	... 15·4	5·7	2·5	6·8

The falling off with S.—W. winds needs no explanation, while the decided superiority of N.—E. winds to all others as regards visibility, is, I think, in great measure due to the not infrequent occurrence, especially during April, May and June, of periods of four or five days with E. or N.E. winds, great dryness, low temperature, and remarkable transparency of the atmosphere.

H. S. TABOR, F.R. Met. Soc.

Fennes, Braintree, 6th February, 1902.

DEFINITION OF A RAINY DAY.

To the Editor of Symons's Meteorological Magazine.

REFERRING to Mr. Watson's letter in the *Meteorological Magazine* for February, I once, if my memory serves me, when I lived at Beckenham, Kent, registered $\cdot 04$ inch, from a dense wet fog and mist, not a drop of actual rain.

C. S. PRINGLE.

Whitekirk, Southbourne, 18th February, 1902.

I WAS much interested in reading Mr. Watson's letter on "The Definition of a Rainy Day" in the February number. Much importance cannot at present be attached to the number of rainy days given in meteorological records for two reasons. (1.) Because, as Mr. Watson clearly shows, the number of days is no guide to the climate of any place, since it includes days on which the precipitation consisted wholly of wet fog or dew. (2.) Because, owing to the possible error in the first division of the scale of the ordinary measuring jar, and the uncertainty of reading correctly to three places of decimals, the number of deposits of $\cdot 01$ inch (with its adopted equivalent of $\cdot 005$ inch) counted as rainy days, may be more or less than the truth, so that results may be incomparable, both in respect to the number of rainy days, and to the determination of periods of drought.

Though it may not be desirable to depart from the accepted definition of a rainy day carefully decided on by Mr. Symons, might not the results be made more comparable if observers possessing certified rain gauges, were required to test all amounts that may affect the value of $\cdot 01$ inch (or $\cdot 02$ inch if that minimum was adopted), by the use of a grain-divided test jar; and if the number of rainy days in "British Rainfall" thus tested, were specially marked?

E. L. M. COLVILE, F.R. Met. Soc.

Bournemouth, February 28th, 1902.

[It would certainly be desirable if all rain gauge readings, especially of small amounts, were taken to three places of decimals, even if, as Mr. Colvile suggests, a special measuring glass were to be used for the purpose. But the first requisite in rainfall work is comparability, and the average observer cannot or will not devote the necessary time and attention to his readings to make the third decimal worth having. Hence, we trust to the much easier reading to two places, and the comfortable doctrine of chances assures us that in the course of a year the number of small falls less than $\cdot 005$ inch, which are not recorded, balances the number of small falls between $\cdot 005$ inch and $\cdot 01$ in. which are entered as $\cdot 01$ inch.—Ed. *S.M.M.*]

THE HIGH PRESSURE IN JANUARY.

To the Editor of Symons's Meteorological Magazine.

MAY I point out a mistake at the top of page 6 of the last number of the Magazine: January 3rd, 1821, should be January 23rd, and the interval 13 days. If this is my error I apologize.

I do not think 30·7 in. should be reckoned an abnormal pressure. I find 34 occasions on which this pressure was exceeded in my register of 23½ years, but only five exceeded 30·85, and these all appear in the list on page 6.

Howard mentions a pressure of 30·89 on February 7th, 1798. (See page 62, Vol. 1, 1833, edition). This is higher than anything in his regular tables; has it been compared with other registers?

CHARLES L. BROOK.

*Harewood Lodge,
March 3rd, 1902.*

[The slip occurred between Mr. Brook's MS., which was correct, and the printed page which was in error, so the direction of the apology has to be reversed, and we express our regret. Applying the correction the average interval becomes 18 days instead of 21. We used 30 700 inches for reference, because Mr. Symons originally selected that value as the limit, above which frequent readings of the barometer should be taken, and it has only been exceeded 21 times in 45 years at Camden square.—ED. S.M.M.]

REVIEWS.

Report on the Water Supply of the County of Essex. By JOHN C. THRESH, D.Sc., M.D., D.P.H., Chelmsford 1901. Size 8½ × 5½. Pp. xvi. + 168.

THE subject dealt with in this work is so vitally important that we should like to see a similar summary prepared for each county of the three kingdoms. Criticism is disarmed by the statement that it was drawn up hurriedly, and our comments are intended rather as suggestions than as strictures. We have most felt the want of guidance as to the arrangement of the matter, and although we have read nearly every word of the book, it would puzzle us to turn up the information as to any specific place.

The first thirteen pages are devoted to introductory matter, including a map of the county, with symbols representing various waterworks. Then come general principles of water supply, combined with much information as to the geology of the county, followed by a detailed summary of the water supplies of the county arranged in districts, those with, and those without an organized water supply being put together in an order which may be clear to local residents, but to which we have failed to find any key. We should like to suggest that the districts be arranged in some simple order such as

N to S or E to W in separate lists of those with, and those without public supplies. This, with an index of place-names, would allow of the information as to any place being found very readily.

The author, while urging the importance of purity, realizes the difficulty, if not the practical impossibility, of obtaining a supply free from suspicion at reasonable cost in many country districts, and we are not sure that the real interests of the community have not sometimes suffered through experts striving after an ideal and unattainable standard, as, for instance, when a Royal Commission stigmatized rain water as water which has washed a more or less dirty atmosphere laden with animal and excrementitious germs, &c. Yet this atmosphere is the one which we all breathe, and we never saw it suggested that everyone should wear a respirator.

Reference is made to the unsatisfactory state of the law as to underground water, but we have seen in many recent sessions a tendency of Parliamentary committees to override the common law. We are glad to see, in reference to wells in the chalk, that the common fallacy that an unlimited supply can be obtained from this source is disproved, though perhaps it might have been combated more strongly.

Another important matter referred to, is the absence of information as to the minor streams of the counties, their character, sources, gradients and flow, and we fear that the same might be said with too much truth of the larger streams also. Personally, we should have greater respect for the County Councils, if they devoted more of their funds to obtaining such information and less to opposing before Parliamentary committees other public bodies seeking to obtain supplies of this prime necessary for the communities dependent upon them.

Perhaps we are likely to be hypercritical in the matter of rainfall, and the amount of space that could be devoted to it is naturally insufficient to deal adequately with so important a matter, but we should like to have seen a word of warning against the information given, being accepted as sufficient. The record for 20 years in the neighbourhood of Chelmsford given on page 4, cannot be taken as representing the mean of the county, while the average of ten years gives a very poor representation of the monthly distribution. At least, five times that period would be required to give an even approximately true monthly mean.

Der Grosse Staubfall vom 9 bis 12 März 1901 in Nordafrika, Süd und Mitteleuropa. [The great Dust-fall of March 9—12, 1901, in North Africa, and in South and Central Europe.] Von G. HELLMANN und W. MEINARDUS. Berlin, Asher & Co., 1901. Size 13 × 10. Pp. 94. Maps. Price 8m.

WE are indebted to the authors of this memoir for a masterly investigation into the remarkable falls of dust or "blood rain" which were observed over a great part of Europe a year ago, and are

recalled to our attention by the similar phenomenon in the south-west of England to which we referred in these pages last month. Professors Hellmann and Meinardus treat the problem of the falls of dust under the heads of Extent and distribution of the deposit, Meteorological conditions associated with the phenomenon, and Nature of the dust. A short account of a minor dust-fall ten days later is added, and the memoir concludes with a summary of results, a map showing all the places in central and northern Europe where the dust was reported, a map of the rainfall of the same area, and a series of synoptic weather charts showing the distribution of pressure and winds at sea-level, and at a height of 8000 feet once or twice daily for each of the days referred to. The letters of a large number of observers are quoted, some of them containing exceedingly vivid descriptions. The dust rain was reported from 347 places in northern and central Germany, as well as from innumerable points in Italy, Austria-Hungary, and a few in Denmark and Russia. We have reason to believe that it extended also to the British Isles, although, in so attenuated a form, that the fact had not been brought to the attention of the authors.

The region affected by the great fall of March, 9th to 12th, extended from the deserts of Algeria to the Danish islands, over more than 25° of latitude from south to north, that is a distance of about 1800 miles. Some dust also fell in the provinces of Kostroma and Perm in Russia, which lie more than 2500 miles from southern Algeria. The whole of the intervening distances were not visited by the dust; none fell over the greater part of South Germany or the northern states of Austria, and, except for the isolated Russian fall, the dust was only reported from places between 7° and 20° E. long. The total land area on which the dust fell is estimated at about 300,000 square miles, to which may be added 150,000 square miles of the Mediterranean sea; and the weight of the dust which fell in Europe probably amounted to 1,800,000 tons, of which only one-third fell north of the Alps, the intensity of the fall diminishing steadily from south to north. The date of the appearance of the dust was also later from south to north. Dust-storms raged in the south of Algeria from March 8th to 10th, in Sicily and Italy it appeared on the 10th during the forenoon, it reached the Eastern Alps at night, central Germany on the forenoon of the 11th, north-west Germany on the same afternoon and evening, and Denmark before daybreak on the 12th. The average rate at which the dust was carried from south to north in Europe seems to have been about 43 miles an hour. The dust fell dry from the reddish-yellow clouds in Algeria, Tunis, and parts of Italy, but further north it was only brought down with rain or snow.

From the examination of a very large number of specimens, it was proved that the dust was not volcanic, but was composed of very fine particles of sand and clay, the particles being appreciably smaller in the dust collected in the north than in that from the south of

Europe; thus, in Palermo, Sicily, the average diameter of the grain, was $\frac{1}{2000}$ inch, while near Hamburg it was $\frac{1}{4000}$ inch, or only half as much.

The meteorological conditions which accompanied the dust showers were very interesting. Simultaneously with the fall of the dust, a barometric depression moved from Tunis, in Africa, almost due north across Europe to the Baltic shores. It seems probable that the depression was over the Sahara on March 9th, while it certainly lay over Tunis on the 10th, and reached Denmark on the 12th. This indicates a general movement of the lower and middle air from south to north, while the isobars calculated for 8000 feet by Köppen's method from the data of the various high-level observatories in Europe, showed conditions favourable for a northerly current at that elevation also. The absence of dust from South Germany is attributed to the fact that no rain fell there while the dust was passing in the upper air; the very rare occurrence along the Rhine valley and the western border of Germany, where there was heavy rain or snow, is explained by the current of northward flowing dust-laden air not extending so far to the west.

One interesting feature of this research is the proof that not only a centre of low pressure, but a mass of air was transported from the Sahara to northern Europe with the speed of an express train, while the fact that the dust fell mainly on the eastern side of the path of the depression, seems to suggest that the cyclonic circulation was not completed by air of the same origin; but, that while the eastern side drew its supply from the current flowing from the south, the western side of the cyclone throughout its progress was fed by air from a northerly or westerly source.

BOOKS RECEIVED.

Bolton. Annual Report of the Museums and Meteorological Observatory for 1901. By W. W. Midgeley, F.R.Met.Soc., Bolton, 1902. Size $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 16.

The Weather of 1901 at Hodsock Priory, Worksop. By Henry Mellish. Size $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 12.

Hertfordshire Maps: a descriptive catalogue of the Maps of the County, 1579-1900, by Herbert George Fordham. First part. From *Trans. Hertfordshire Nat. Hist. Soc.* Vol. 11. Pt. 1. 1901. Size $10 \times 7\frac{1}{2}$. Pp. 32. *Illustrations.*

Die Alpen in Eiszeitalter [The Alps in the Ice Age] von Dr. Albrecht Penck und Dr. Eduard Brückner. Lieferung 1. Leipzig, Tauchnitz, 1901. Size $10\frac{1}{2} \times 7\frac{1}{2}$. Pp. 112. *Illustrations.*

The Rosarians' Year Book for 1902. Edited by the Rev. H. H. D'Ombraïn. London, Bemrose and Sons. 1902. Size $7\frac{1}{2} \times 5\frac{1}{2}$. Pp. 58. *Plate.*

Actas, Resoluciones y Memorias del Primer Congrese Meteorologico Nacional iniciado por la Sociedad científica "Antonio Alzate" [Transactions of the First Mexican Meteorological Congress.] Mexico, 1901. Size $9\frac{1}{2} \times 7$. Pp. 274. *Illustrations.*

- Brief Sketch of the Meteorology of the Bombay Presidency for 1900-01. By E. A. Kenyon. [No publisher, place or date.] Size $13 \times 8\frac{1}{2}$. Pp. 16.
- On the seasonal variation of Atmospheric Temperature in the British Isles . . . By W. N. Shaw, F.R.S., and R. Waley Cohen. From the Proceedings of the Royal Society. Vol. 69. Size $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 26.
- Remarks on the objects for which the Meteorological Society of Mauritius was established. By T. F. Claxton. (Proc. Met. Soc. Mauritius, 1901). Size $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 12.
- The Mean Temperature of the Atmosphere and the Causes of Glacial Periods. By H. N. Dickson, B.Sc. From the "Geographical Journal" for November, 1901. Size $9\frac{1}{2} \times 5\frac{1}{2}$. Pp. 8.
- Report on the Rainfall of Hertfordshire in the year 1900. By John Hopkinson. From *Trans. Hertfordshire Nat. Hist. Soc.* Vol. 11. Hertford, 1901. Size $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 12.
- Meteorology in Mysore for 1900. By John Cook. Director of Meteorology in Mysore. Bangalore, 1901. Size 12×10 . Pp. 56.
- Indian Weather Review. Annual Summary for 1900. By John Eliot, F.R.S. Calcutta, 1901. Size $14 \times 10\frac{1}{2}$. Pp. 150. *Plates*.
- Meteorological Observations made at the Adelaide Observatory and other places in South Australia during the year 1898, under the direction of Charles Todd, K.C.M.G., F.R.S. Adelaide, 1901. Size $13 \times 8\frac{1}{2}$. Pp. 192. *Maps*.
- Hourly Means of the Readings obtained from the self-recording instruments at the five observatories under the Meteorological Council. London, 1901. Size 12×10 . Pp. 240.

METEOROLOGICAL NEWS AND NOTES.

THE HIGHEST BAROMETER READING yet recorded in the British Isles appears to be that taken at Aberdeen on January 31st of the present year, referred to in our February number, on page 4. We are informed by the Meteorological Office that the true reading was 31.113 in., which is .005 in. higher than the previous highest, which was 31.108 in., recorded at Ochtertyre, on January 9th, 1896.

MR. W. N. SHAW, F.R.S., delivered two remarkable lectures at the Royal Institution, on February 25th and March 4th, his subject being the temperature of the atmosphere, its changes and their causes. He dealt at some length with the extreme variation of temperature which has been recorded in nature, and this he stated to be 212° Fahrenheit on the surface of the Earth, or 222° if the records obtained by the meteorographs attached to unmanned balloons are considered. He showed a series of experiments illustrating the formation of halos by the sun shining through a cloud composed of ice-crystals, the formation of a cloud by the expansion of saturated air, and the cooling effect produced by chilled air flowing down a hillside into a valley with a narrow outlet.

HANN'S "CLIMATOLOGY," is, we are happy to learn, being translated by Professor R. De C. Ward, of Harvard University, and the first volume will be published in the course of the present year. The second and third volumes will not be translated at present, but the first will be a very great acquisition to the scanty collection of meteorological text-books in the English language.

FEBRUARY, 1902.

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.	Difference from average 1890-9.	Greatest Fall in 24 hours.		Max.		Min.					
				Dpth	Date			Deg.	Date	Deg.	Date.		
												inches.	inches.	in.
I.	London (Camden Square) ...	1.13	— .34	.34	24	11	52.7	28	15.8	16	16	22	
II.	Tenterden	1.32	— .38	.30	6	15	53.5	28	14.0	16	...	...
III.	Hartley Wintney .....	.87	— .76	.23	26	9	52.0	27 ^b	14.0	16	21	21
IV.	Hitchin	1.18	— .28	.27	24	11	53.0	28	16.0	16	21	...	
V.	Winslow (Addington)	1.14	— .32	.31	24	12	54.0	28	15.0	16	20	21	
VI.	Bury St. Edmunds (Westley) .....	.98	— .56	.29	14	10	53.0	28	4.8	16	22	...
VII.	Norwich (Brundall) .....	.77	...	.23	26	14	54.0	28	14.0	16	20	23
VIII.	Winterborne Steepleton	2.47	...	.91	22	12	49.7	26	20.0	12	19	21
IX.	Torquay	1.61	...	.47	23	9	54.2	24	26.1	14	9	19
X.	Polapit Tamar [Launceston]..	1.74	— .87	.46	23	12	52.9	28	15.7	14	20	21	
XI.	Stroud (Upfield)	1.02	— .90	.27	22 ^a	10	55.0	28	21.0	13	20	...	
XII.	Church Stretton (Woolstaston) .....	.93	— 1.07	.34	26	13	50.0	28	21.0	14	21	25
XIII.	Worcester (Diglis Lock)	1.40	— .11	.38	23	13	...	...	...	...	...	...
XIV.	Boston	1.24	— .11	.26	23	10	55.0	28	12.0	12	15	...	
XV.	Hesley Hall [Tickhill].....	1.18	— .27	.28	26	14	53.0	28	10.0	12	20	...	
XVI.	Derby (Midland Railway).....	1.54	+ .09	.45	24	12	54.0	28	15.0	12	18	...	
XVII.	Manchester (Plymouth Grove)	1.25	— .61	.30	9, 24	9	55.0	28	17.0	13	14	16	
XVIII.	Wetherby (Ribston Hall) ...	1.28	— .16	.30	26	10	...	...	...	...	...	...
XIX.	Skipton (Arnccliffe)	1.74	— 3.08	.59	24	11	...	...	...	...	...	...
XX.	Hull (Pearson Park)	1.33	— .39	.32	24	16	48.0	23 ^c	13.0	12	19	26	
XXI.	Newcastle (Town Moor)	1.29	— .18	.25	7	15	...	...	...	...	...	...
XXII.	Borrowdale (Seathwaite).....	3.57	— 8.20	.84	27	9	49.0	23	12.5	10	20	...	
XXIII.	Cardiff (Ely).....	1.82	— 1.07	.60	27	13	...	...	...	...	...	...
XXIV.	Haverfordwest	2.25	— 1.09	.69	23	12	52.3	28	18.9	14	12	20	
XXV.	Aberystwith (Gogerddan) ...	1.40	— 1.75	.35	19	7	60.0	28	11.0	13	19	...	
XXVI.	Llandudno.....	1.64	— .31	.45	10	14	59.2	25	23.5	14	12	...	
XXVII.	Cargen [Dumfries]	2.94	— .72	.81	8	7	50.0	25	6.0	11	15	...	
XXVIII.	Edinburgh (Royal Observatory) .....	.82	...	.31	28	11	49.2	24	21.0	14	16	18
XXIX.	Colmonell	1.82	— 1.59	.47	22	11	47.0	23	8.0	9	17	...	
XXX.	Tighnabruach	2.18	...	.40	24	13	44.0	23	20.0	12	16	...
XXXI.	Mull (Quinish)	2.57	— 1.82	.55	15	13	...	...	...	...	...	...
XXXII.	Loch Leven Sluices	1.24	— 1.54	.46	25	8	...	...	...	...	...	...
XXXIII.	Dundee (Eastern Necropolis)	1.30	— .83	.50	24	10	46.6	23	16.7	14	16	...	
XXXIV.	Braemar .....	.79	— 1.79	.33	24	10	46.8	24	0.0	14	11	22
XXXV.	Aberdeen (Cranford) ...	1.22	— 1.19	.44	24	18	45.0	23	14.0	1	15	...	
XXXVI.	Cawdor (Budgate)	1.28	— .66	.52	6	12	...	...	...	...	...	...
XXXVII.	Strathconan [Beaul]	1.70	— 2.49	...	...	...	...	...	...	...	...	...
XXXVIII.	Glencarron Lodge.....	2.25	— 5.07	.57	8	13	52.4	24	10.9	14	14	...	
XXXIX.	Dunrobin	1.10	— 1.32	.18	8	11	46.0	23 ^d	18.0	1	17	...	
XL.	S. Ronaldshay (Roseberry) ...	1.16	— 1.40	.36	20	18	45.0	22	20.0	10	13	...	
XLI.	Darrynane Abbey.....	3.84	— .18	.73	16	16	...	...	...	...	...	...
XLII.	Waterford (Brook Lodge) ...	3.95	+ 1.04	.91	16	12	53.0	28	19.0	12 ^g	10	...	
XLIII.	Broadford (Hurdlestown) ...	2.37	+ .15	.64	16	14	...	...	...	...	...	...
XLIV.	Carlow (Browne's Hill)	2.73	+ .18	.74	26	12	...	...	...	...	...	...
XLV.	Dublin (Fitz William Square)	1.75	— .20	.92	26	10	54.4	28	22.0	12	10	11	
XLVI.	Ballinasloe	2.36	— .07	.58	26	12	65.0	28	16.0	14	18	...	
XLVII.	Clifden (Kylemore)	5.30	— .61	1.01	21	13	...	...	...	...	...	...
XLVIII.	Seaforde	4.17	+ 1.38	1.45	7	10	51.0	28	16.0	13	10	12	
XLIX.	Londonderry (Creggan Res.)	1.41	— 1.30	.31	16	17	...	...	...	...	...	...
L.	Omagh (Edenfel)	2.79	+ .19	.92	7	13	53.0	23	4.0	11	14	21	

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

a—and 26. b—and 28. c—and 24, 28. d—and 24. e—and 16. f—and 13. g—and 14.

SUPPLEMENTARY TABLE OF RAINFALL,
FEBRUARY, 1902.

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Uxbridge, Harefield Pk..	1.35	XI.	Castle Malgwyn	2.02
II.	Dorking, Abinger Hall.	1.32	„	Builth, Abergwesyn Vic.	2.46
„	Sheppey, Leysdown	1.45	„	Rhayader, Nantgwillt ...	2.24
„	Hailsham	1.53	„	Lake Vyrnwy	1.93
„	Crowborough	1.92	„	Ruthin, P. âs D. âw ...	1.54
„	Ryde, Beldornie Tower..	1.47	„	Criccieth, Talarvor	1.26
„	Emsworth, Redlands ...	2.08	„	L. o' Anglesey, Lligwy..	1.42
„	Alton, Ashdall	1.17	„	Douglas, Woodville	3.66
„	Newbury, Welford Park	1.37	XII.	Stoneykirk, Ardwell Ho.	2.66?
III.	Oxford, Magdalen Coll..	1.13	„	Dalry, Old Garro h	3.75
„	Banbury, Bloxham	1.55	„	Monnaive, Maxwelton Ho.	2.93
„	Pittsford, Sedgebrook ...	1.71	„	Lilliesleaf, Riddell	1.81
„	Huntingdon, Brampton.	1.08	XIII.	N. Esk Res. [Penicuik]	1.35
„	Wisbech, Bank House...	1.21	XIV.	Glasgow, Queen's Park..	1.65
IV.	Southend	1.72	XV.	Inveraray, Newtown ...	1.23
„	Colchester, Lexden .....	.86	„	Ballachulish, Ardsheal...	2.10
„	Saffron Waldon, Newport	.94	„	Islay, Eallabus	2.30
„	Rendlesham Hall .....	.64	XVI.	Dollar	1.68
„	Swaffham	1.13	„	Balquhider, Stronvar...	2.03
V.	Salisbury, Alderbury ...	2.06	„	Coupar Angus Station...	1.07
„	Bishop's Cannings	1.10	„	Blair Atholl ... ..	.91
„	Blandford, Whatcombe ..	2.17	„	Montrose, Sunnyside ...	1.69
„	Ashburton, Druid House	3.24	XVII.	Keith H.R.S. ....	.29?
„	Okehampton, Oaklands	1.80	XVIII.	Fearn, Lower Pitkerrie..	.85
„	Hartland Abbey	1.25	„	S. Uist, Askernish	1.77
„	Lynmouth, Rock House	1.36	„	Invergarry .....	.88
„	Probus, Lamellyn	2.25	„	Aviemore, Alvie Mansr.	.82
„	Wellington, The Avenue	1.73	„	Loch Ness, Drumnadrochit	1.13
„	North Cadbury Rectory	1.01	XIX.	Invershin .....	.39
VI.	Clifton, Pembroke Road	.95	„	Bettyhill	2.84
„	Ross, The Graig	1.01	„	Watten H.R.S.	1.51
„	Shifnal, Hatton Grange	1.21	XX.	Dunmanway, Coolkelure	7.91
„	Wem, Clive Vicarage ...	1.13	„	Cork, Wellesley Terrace	5.92
„	Cheadle, The Heath Ho.	1.90	„	Killarney, District Asyl.	4.08
„	Coventry, Priory Row ...	1.61	„	Caher, Duneske	3.39
VII.	Market Overton	1.62	„	Ballinagarry, Hazelfort..	1.86
„	Grantham, Stainby	1.40	„	Miltown Malbay	1.75
„	Horncastle, Bucknall ...	1.21	XXI.	Gorey, Courtown House	2.41
„	Worksop, Hodsck Priory	1.41	„	Moynalty, Westland ...	3.01
VIII.	Neston, Hinderton	2.11	„	Athlone, Twyford	2.37
„	Southport, Hesketh Park	1.40	„	Mullingar, Belvedere ...	2.50
„	Chatburn, Middlewood.	1.38	XXII.	Woodlawn	2.52
„	Duddon Val., Seathwaite Vic.	4.64	„	Westport, Murrisk Abby	2.77
IX.	Baldersby	1.37	„	Crossmoluna, Enniscoe ..	2.79
„	Scalby, Silverdale	1.78	„	Collooney, Markree Obs.	2.09
„	Ingleby Greenhow Vic..	1.40	XXIII.	Enniskillen, Model Sch.	...
„	Middleton, Mickleton ...	.87	„	Warrenpoint	4.04
X.	Beltingham	1.12	„	Banbridge, Miltown	2.46
„	Bimburgh	1.15	„	Belfast, Springfield	2.50
„	Keswick, The Bank	1.91	„	Bushmills, Dundarave..	1.42
XI.	Llanfrechfa Grange	2.26	„	Stewartstown	1.99
„	Treherbert, Tyn-y-waun	3.94	„	Killybegs	1.66
„	Llandovery	1.25	„	Horn Head	1.91

METEOROLOGICAL NOTES ON FEBRUARY, 1902.

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.

ENGLAND.

LONDON, CAMDEN SQUARE.—Dry and cold. A bitter N.E. gale on 1st was followed by S showers on 2nd and 3rd. Gloomy weather prevailed, with darkness on 5th and 8th, till the commencement of the frost on 9th. Thaw on 18th, the remainder was cloudy, whilst practically the whole of the month's R fell during the last week. Mean temp. $35^{\circ}\cdot5$, or $4^{\circ}\cdot3$ below the average.

TENTERDEN.—Very cold except the last week; several days with S. On 16th the lowest temp. for seven years occurred, grass $5^{\circ}\cdot5$, ground $8^{\circ}\cdot0$, and screen $14^{\circ}\cdot0$. Duration of sunshine $81\cdot5$ hours.

SHEPPEY, LEYSDOWN.—Very fine with little wind. Sharp frosts from 10th to 15th, the temp. falling to 10° . About two inches of S on 14th.

CROWBOROUGH.—Continuous frost, with a slight thaw on 6th, lasting from January 29th till 20th. By a curious coincidence there was a similar frost from January 29th to February 21st in 1901. S fell on eight days, the heaviest fall being on 6th. There were ten days without any sunshine.

HARTLEY WINTNEY.—For the first fortnight the wind was N.W. to N.E. and bitterly cold; frost every night until 23rd. The last two days were mild and springlike. Fog from 20th to 23rd; ozone on five days with a mean of $4\cdot0$.

WINSLOW, ADDINGTON.—The max. temp. was very low; from 2nd to 6th between 30° and 34° . Frost every night till 20th, and intense from 10th to 17th.

PITSFORD, SEDGEBROOK.—R $\cdot18$ in. below the average of ten years. S on 2nd and 7th. Mean temp. $34^{\circ}\cdot1$. T on 28th.

NORWICH, BRUNDALL.—Uniformly cold and wintry till 22nd. The exposed thermometer fell below 20° on eight successive nights between 10th and 18th; on 16th as low as $7^{\circ}\cdot8$. Mean temp. $34^{\circ}\cdot9$. S on five days.

TORQUAY, PIER.—R $1\cdot12$ in. below the average. Mean temp, $3^{\circ}\cdot7$ below the average. Duration of sunshine $11\cdot6$ hours; twelve sunless days. Mean amount of ozone $3\cdot7$, highest $7\cdot5$ on 23rd with S.S.E. wind, lowest $1\cdot0$.

POLAPIT TAMAR [LAUNCESTON].—Rather dry and very cold. Grass frosts daily from 1st to 19th, the min. being $12^{\circ}\cdot5$ on the 14th.

LYNMOUTH, ROCK HOUSE.—A spell of cold weather lasted from 2nd to 21st inclusive. Fine lunar rainbow, with distinct colour, on 22nd.

NORTH CADBURY RECTORY.—Gale on 1st; extreme gloom and low maxima, but no frost, till 7th; frost and brilliant sunshine till 17th, gloomy till 20th with slow and dry thaw, then much milder with wind and rain to the end.

CLIFTON, PEMBROKE ROAD.—Frost without intermission till 20th. Some bright sunshine from 10th to 17th. R $1\cdot45$ in. below the average. S on three days.

ROSS, THE GRAIG.—The drought which set in on January 5th continued till February 21st, 48 days yielding $\cdot63$ in. or 10 per cent. of the average. The mean temp. of the 28 days ending February 21st was 11° lower than that of the preceding 28 days. The last week in February was $13^{\circ}\cdot3$ warmer than the previous week. S on four days.

MANCHESTER, PLYMOUTH GROVE.—The first part was very wintry. Heavy S on 8th and dense fog on 13th, 14th, 15th and 18th. From 21st onward the weather was mild with some sunshine.

WALES AND THE ISLANDS.

HAVERFORDWEST.—The cold weather of the last days of January was prolonged with keen E. wind till 8th, when S covered the country; the frost increased in severity and continued till 20th. Cold R with gloom till 27th.

ABERYSTWITH, GOGGERDAN.—A dry month, very wintry, with little S, though it lay a long time.

DOUGLAS, WOODVILLE.—Wintry weather during the first fortnight with severe frosts; daily S storms from 7th to 12th; but an unusual amount of bright sunshine. The second fortnight was very wet. Min. on grass $8^{\circ}\cdot0$ on 12th.

SCOTLAND.

DALRY, THE OLD GARROCH.—Cold, frosty and snowy, without much wind. Five inches of S on 7th.

CUPAR ANGUS.—Remarkable for low night temp., bright sunshine and bracing atmosphere. A change to higher temp. on 20th brought clouds and damp, which continued to the end. E 80 in. below the average. Mean temp. 32°·5.

WATFEN, H.R.S.—Much S in the first half, lying 12 to 14 inches deep, and drifting little. Gentle thaw during the latter half.

S. RONALDSHAY, ROEBERRY.—Very cold and snowy. Total E 1·24 in. below the average of 35 years. Mean temp. 35°·0, or 3°·8 below the average.

IRELAND.

CORK, WELLESLEY TERRACE.—E 2·54 in. above the average. Mean temp. 5°·5 below the average, that of the first 15 days being 31°·3, and that of the last 13 days, 43°·0. Fog on and about 17th.

DARRYNANE ABBEY.—Very cold to 13th, with S from 6th to 9th. Hard frost 8th to 14th. The rest of the month was mild and wet.

MILTOWN MALBAY.—Cold, with little rain; but agricultural work hampered by 8 days of S, with severe frosts at night, followed by thaw and dripping E.

DUBLIN, FITZWILLIAM SQUARE.—For the third time in succession February proved cold, and distinctly colder than January. The "cold snap" which set in on January 24th lasted till February 21st. The mean temp. of the week ending 15th was as low as 31°·4. Monthly mean temp. 39°·3, or 3°·5 below the average. Fog on 10 days. S or sleet on 7th and 8th: H on 8th.

COLLOONEY, MARKREE OBSERVATORY.—E below the average, but little bright sunshine. Sharp frosts every night from 9th to 15th. S on 5 days.

STEWARTSTOWN, THE SQUARE.—The deepest fall of snow for 66 years, yielding 1·00 in., occurred on 7th.

OMAGH, EDENFEL.—Cold and dry at first, with sharp night frosts. On 7th the heaviest S fall for many years took place, averaging 6 inches, with drifts reaching to as many feet. A temp. of zero on the surface of the S was reached on 11th; but the heavy coating of S saved vegetation from much damage.

GENERAL WEATHER IN GLEN NEVIS, FEBRUARY, 1902.

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

Deduced from observations at 9 a.m. and 9 p.m.	<i>Ben Nevis.</i>	<i>Achiarach.</i>	<i>Fort William.</i>
Height	4407 feet.	150 feet	42 feet
Rainfall	3·36 ins.	1·76 in.	1·10 in.
No. of days	13	15	14
Max. fall in 24 hours	0·59 in., 16th	0·40 in., 5th	0·18 in., 5th
Highest temp. in shade	37°·1, 2nd	51°·5, 24th	54°·6, 24th
Lowest " "	8°·1, 11th	7°·7, 14th	11°·2, 14th
Mean temp (Mean daily max. & min.)	27°·2	34°·6	35°·4
Temp. in shade below 32°	on 28 nights	14 nights	14 nights
Below 32° on grass	?	15	15
Bright sunshine	64 hours	11·3 hours	62·2 hours
Sunless days	12	14	12
Mean relative humidity	74	78	81
Mean amount of cloud	7·7	7·2	6·6

Rainfall at head of Glen Nevis, and 357 feet above the sea, 1·72 in.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, SEPTEMBER, 1901.

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	77·6	8	40·4	16	68·0	50·6	51·2	78	121·0	34·8	1·62	6	5·2
Malta.....	90·3	4	60·7	2	84·2	68·7	67·8	74	149·6	56·5	·19	2	2·7
Lagos, W. Africa	87·0	26 ^a	72·0	11 ^d	83·5	77·2	74·2	84	150·0	53·0	15·94	21	5·8
Cape Town	84·5	27	42·1	10 ^e	65·8	51·1	49·3	70	...	...	1·99	10	4·1
Mauritius.....	80·8	23	55·3	28	77·5	62·0	59·0	70	150·2	48·0	·98	10	4·8
Calcutta.....	94·0	16	74·1	30	88·9	78·0	76·7	82	148·0	72·8	19·08	12	6·5
Bombay.....	89·1	30	73·3	12	86·7	77·8	75·4	81	142·7	69·6	1·81	8	5·3
Colombo, Ceylon	90·7	10	74·5	16	88·3	78·2	73·6	78	151·0	71·0	3·93	15	6·1
Melbourne.....	76·1	13	40·0	17	63·7	48·5	45·1	73	138·0	32·0	1·47	11	6·9
Adelaide	83·5	13	41·0	9	67·4	50·2	46·4	65	134·0	34·1	1·48	15	5·8
Sydney	87·2	14	45·8	10	70·0	58·9	50·0	69	132·5	36·2	2·42	11	4·4
Wellington	68·5	16	39·0	9	58·6	46·9	44·2	73	113·0	30·0	5·32	16	4·8
Auckland .....	...	...	...	...	...	...	...	...	...	...	·85	12	...
Jamaica, Halfway Tree	90·0	11	70·0	24	86·0	71·7	71·9	81	...	...	10·79	15	5·1
Trinidad	92·0	14 ^b	70·0	sev.	88·8	71·9	73·2	75	164·0	65·0	4·26	10	...
Grenada.....	89·0	10 ^c	72·0	2	85·3	75·9	73·2	80	154·0	...	8·29	21	2·5
Toronto	86·0	7	35·6	19	70·7	52·5	54·5	79	109·0	30·9	3·05	10	4·4
St. John, N.B.	80·3	5	40·0	26	62·0	50·1	52·0	74	...	...	3·35	12	4·5
Winnipeg, Manitoba ...	89·3	3	26·0	28	63·0	41·1	...	...	...	...	3·80	17	5·9
Victoria, B.C.	75·2	18	39·3	30	62·8	49·3	...	...	...	...	·90	8	5·1

a—and 21, 24. *b*—and 27. *c*—and 24. *d*—and 19. *e*—and 17.

REMARKS.

MALTA.—Mean temp. of air 75°·6, or 0°·6 above the average. Mean hourly velocity of wind 8·6 miles, or 0·9 above the average. Mean temp. of sea 78°·0. L on seven days. J. F. DOBSON, S.J.

Mauritius.—Mean temp. of air 0°·5, of dew point 0°·9, and R ·41 in. below their respective averages. Mean hourly velocity of wind 12·1 miles, or 0·2 mile above average; extremes, 27·9 on 25th and 2·0 on 19th; prevailing direction E. by S. to S.E. by E. T. F. CLAXTON.

COLOMBO, CEYLON.—Mean temp. of air 82°·5 or 1°·7 above, dew point 0°·4 above and R 1·05 in. below, their respective averages. Mean hourly velocity of wind 7·4 miles; prevailing direction S.W. W. C. S. INGLES.

Adelaide.—Mean temp. of air 1°·7 above the average and the highest since 1887. R ·24 in. below average. The R over the state was satisfactory, though somewhat irregular inland. C. TODD, F.R.S.

Sydney.—Mean temp. of air 3°·1 above, R ·58 in. below, humidity 0·9 below, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—Mean temp. of air 1°·9 above, and R 1·06 in. above, their respective averages. A showery month, especially during the latter part. Prevailing winds S. and N.W. and often strong. Earthquake on 19th at 10.30 p.m. slight. R. B. GORE.

TRINIDAD.—R 3·27 in. below the 30 years' average. J. H. HART.