

# SYMONS'S METEOROLOGICAL MAGAZINE.

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## THE SUN PILLAR OF MARCH 6TH.

THE letters appearing in our Correspondence pages—a few out of the many communications we have received on the subject—are sufficient to show that the sun pillar seen on March 6th was an exceptionally brilliant example of a very beautiful phenomenon. Although rather rare, sun pillars have been seen frequently, and the following instances were recorded in the volumes of this Magazine for the years in which they occurred:—April 4th, 1871, at Sidmouth; May 28th, 1900, at North Cadbury; September 6th, 1900, at Hereford; and 25th June, 1901, at Portland. As in other cases, the sun pillar of March 6th appeared to have been most strikingly visible in the south-west of England; but it was also reported from many points along the south coast and from a few in the interior of the country.

There seems to be no doubt as to the nature of the phenomenon, for, although its singular form and close apparent connection with the sun suggest that it may have a solar or cosmical origin, its real affinity is to the halo rather than the solar corona and the zodiacal light. In Vol. 26 (1891) of this Magazine the Rev. A. K. Cherrill discussed the theory of the origin of halos and sun pillars at some length. In *Knowledge* for 1895 a sun pillar seen in Cumberland on January 30th of that year is described and figured, and a clear account of the theory of its formation is given by the Rev. S. Barber. This theory, which has been generally accepted for more than half a century, is referred to in all text-books on meteorology which treat of sun pillars and halos. Briefly it is that the effect of a luminous shaft is given by reflection from the under surfaces of minute crystals of ice floating horizontally. Such minute crystals form cirrus cloud, and may occasionally descend into strata of the air lower than the usual lofty home of this most airy and graceful of cloud forms. The result is precisely similar, as Mr. Barber points out, to the formation of a long shaft of light by the reflection of the moon on the rippled surface of the sea. A halo, such as those figured in Dr. Buchan's "Handy Book of Meteorology," referred to in Mr. Fox's letter, is

the result of the refraction of sunlight passing through ice crystals, and thus differs in its mode of production from a sun pillar.

Although not common phenomena, sun pillars are probably less rare than is generally supposed. In addition to those referred to above as having occurred in recent years, a fine example was observed and successfully photographed by Captain Wilson-Barker, at Greenhithe, on June 14th, 1901.

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## Correspondence.

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### CONSPICUOUS SUN-PILLAR.

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

A VERY fine specimen of a sun-pillar was visible here last evening (March 6th). At 6.10 it shot upwards  $10^{\circ}$  perpendicularly above the horizon, and its colour was yellow tinted with orange. At 6.25, when its altitude had lessened to  $5^{\circ}$ , it showed a remarkably intense rosy tint. At 6.32 it had diminished to about  $3^{\circ}$ , and at 6.40 scarcely a trace was left. I do not remember noticing one of these sun-pillars where the colours were so brilliant. Is the first actually recorded instance of a sun-pillar the following by Rev. W. Derham, at Upminster, Essex, in 1707? "On the afternoon of Thursday, April 3rd, 1707, I perceived in the west, a quarter of an hour after sunset, a long slender pyramidal appearance, perpendicular to the horizon. The base of this pyramid I judged to be the sun, then below the horizon. Its apex reached  $15^{\circ}$  or  $20^{\circ}$  above the horizon. It was throughout of a misty red colour, and when I first saw it, pretty vivid and strong, but the top part much fainter than the bottom nearer the horizon."

S. J. JOHNSON, F.R.A.S.

*Melplash Vicarage, Bridport, 7th March, 1902.*

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I AM sending you cuttings from yesterday's and to-day's *Western Morning News* respecting the beam of light which was seen by many persons here. It was a very unusual phenomenon, and an explanation in the *Meteorological Magazine* would be valued I feel sure. Is it connected with a parhelion, or of the nature of the upright beam shown in Fig. 58, page 319, of Buchan's Handy Book of Meteorology, 2nd edition?

W. L. FOX.

*Carmino, Falmouth, 10th March, 1902.*

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THE solar phenomenon was particularly well seen at Newquay, and its appearance corresponded in every particular with the descriptions published in the newspapers. I noticed it first about 5.30 p.m. The column was perfectly vertical, and of uniform breadth, if anything slightly diminishing as it extended upward.

Its appearance did not at all correspond to the usual description of the zodiacal light, but it closely resembled the streamers often seen in a fine display of northern lights.

The band of light was perfectly steady, and I did not notice any marked variations in intensity during the time I was able to watch it.

A. HARDWICK, M.D.

*Island House, Newquay, Cornwall, 10th March, 1902.*

THE "Solar Phenomenon" described in yesterday's *Times* was visible here also, but unfortunately it was not till quite near its end that I saw it. At about 6.25 p.m. I noticed, however, a diffused light round about it (though the pillar was itself distinct) of a bluish crimson colour. There was a bank of clouds in the west, and as the pillar was "withdrawn" it was traceable in places through the cloud.

The postman who first noticed it may be able to send you a good description of the appearance.

AGNES FRY.

*Failand House, Failand, near Bristol, 11th March, 1902.*

WHILST doing my round, which is a rural postman's, I noticed the strange phenomenon in the sky at Failand which has been written about in the chief London papers. About 6.20, or before, I noticed in the sky a narrow pillar, which was of deep crimson colour. I had noticed the phenomenon somewhat earlier, when it appeared much lighter, the colour gradually deepening to a rich red. The sunset was brilliant, and at first I thought this was the outcome of the solar phenomenon.

W. C. GABBITASS.

*Fishpond Cottages, Abbots Leigh, near Bristol, 11th March, 1902.*

[See article on p. 33.—Ed. *S.M.M.*]

## WANTED, AN INTERNATIONAL GLOSSARY.

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

A WANT felt during a recent short holiday in France leads me to make an enquiry. Do you, or do any of your readers, know of any comprehensive source from which one can obtain the exact equivalent in, say, the chief European languages of English meteorological terms? For any one language, of course, a dictionary can be consulted, and in it one can find a more or less accurate translation of any term; but I suggest that (if such a work is not in existence) what is needed is a small book giving in as many languages as possible the foreign equivalents of English words and phrases used in meteorology. It should be written by a meteorologist.

FRANCIS DRUCE.

*65, Cadogan Square, S.W., 1st April, 1902.*

[We have not been able to find any such glossary as Mr. Druce refers to; we believe that it does not exist, and we quite agree that

such a work would be extremely useful. It seems to us that the International Meteorological Committee might very appropriately take action in the matter, as it is essential that the synonyms should be officially approved for each language.—Ed. *S.M.M.*]

### THE DEFINITION OF A RAINY DAY.

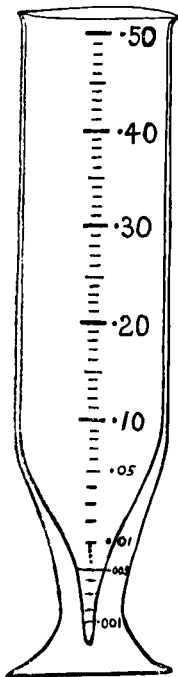
*To the Editor of Symons's Meteorological Magazine.*

REFERRING to your comments on my letter in the February number, I cannot help thinking that it is a mistake to depend upon the doctrine of chances for comparability of results amongst rainfall observers. While the law of probability might have an equalizing effect in balancing the plus and minus differences due to the uncertainty of estimating  $\cdot 005$  in. in a correctly divided measuring glass, it would not prevent a cumulative error from arising if the jar is not correctly divided. And even a small error at  $\cdot 005$  in. of the scale will lead to a considerable difference in the number of rainy days reported for a year, or in the occurrence or length of droughts.

A glance through the columns of *British Rainfall* will show that in towns where there are several observers, a great disparity exists in the number of rainy days recorded, partly arising, no doubt, from the use of uncertified gauges, but probably mostly due to the faulty scale-division at  $\cdot 01$  in. It is probable that all observers in important health resorts would be willing to adopt a special test-glass for small amounts.

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

*Bournemouth, March 31st, 1902.*



WITH regard to the measurement of small rainfalls, how would it do to make the measuring glass somewhat like the annexed sketch, so as to admit of the first hundredth of an inch being sub-divided into two-thousandths, or even one-thousandths, of an inch? The chief objection seems to be that the measure would be more easily broken.

JOHN AITKEN, F.R.S.

*Ardenlea, Falkirk, 18th March, 1902.*

[It is interesting to notice that Professor Hellmann's rain gauges, used officially in Prussia, are furnished with measuring glasses, constructed on the principle suggested by Mr. Aitken. The external diameter, however, is uniform, making them stronger, and not weaker, than ordinary glasses. The first  $\cdot 10$  mm. is fifteen times as long as the others, and can readily be sub-divided to read to hundredths of a millimetre, or less.—Ed. *S.M.M.*].

# THE RAINFALL OF MADEIRA.

MR. HENRY MERCER BELL, the British Vice-Consul in Madeira, has been kind enough to send us a register of rainfall which he has kept at Funchal at a point 250 feet above sea-level and 4 feet above the ground, from September, 1895. The monthly totals for each year, the number of rainy days for each year, and the average monthly falls and number of rainy days for the six years, together with the absolute maximum daily falls recorded in each month, are given in the following tables :—

## *Rainfall at Funchal, Madeira.*

MONTHS.	1896.	1897.	1898.	1899.	1900.	1901.	Average, 1896-1901.
	in.	in.	in.	in.	in.	in.	in.
January .....	3·48	4·83	3·18	2·78	1·07	6·46	3·63
February ...	2·63	·02	·12	6·96	4·45	8·32	3·75
March .....	1·45	·00	3·33	3·84	3·79	3·09	2·58
April .....	·32	1·66	·54	·08	2·64	3·29	1·42
May .....	·00	2·31	·53	·81	·21	·71	·76
June .....	1·51	·02	·24	·16	·10	·10	·36
July .....	·00	·09	·00	·02	·75	·06	·15
August .....	·00	·00	·17	·14	·00	·05	·06
September ...	·16	·12	1·71	·58	3·53	·12	1·04
October .....	8·74	9·85	1·27	6·36	2·07	·66	4·82
November ...	6·66	4·06	2·01	1·29	·13	12·36	4·42
December ...	1·75	3·16	7·54	7·29	·00	3·18	3·82
Year .....	26·70	26·12	20·64	30·31	18·74	38·40	26·81
Per cent. of aver.	100	97	77	113	70	143	100

## *Number of Rainy Days and Max. Falls at Funchal, Madeira.*

MONTHS.	1896.	1897.	1898.	1899.	1900.	1901.	Average	Max. Fall in 24 hours.	
								in.	Year.
January .....	14	15	6	7	3	15	10	1·86	1901
February ...	7	1	2	15	12	10	8	2·38	1901
March .....	6	0	14	9	10	6	7	1·68	1901
April .....	1	2	5	2	8	6	4	1·66	1901
May .....	0	11	3	3	2	4	4	·61	1897
June .....	4	1	3	1	2	1	2	·90	1896
July .....	0	2	0	1	3	1	1	·63	1900
August .....	0	0	1	1	0	1	1	·17	1898
September ...	3	2	5	7	6	2	4	2·45	1900
October .....	8	14	4	15	10	6	10	2·57	1897
November ...	7	11	6	4	2	22	8	2·45	1901
December ...	5	12	5	15	0	12	8	2·37	1898
Year .....	55	71	54	80	58	86	67	...	...
Per cent. of aver.	82	106	81	119	87	128	100		

The wettest month recorded was October, 1895, with a fall of 18·43 in. on 24 days (the amount being practically the same as that for the whole year 1900), and with a maximum fall on one day of 3·10 in. October is on the average the wettest month, though closely followed by November; while August is the driest month, the aggregate for the six Augusts being only ·36 in. falling on three days. In fact, July and August are practically rainless. It will be observed that although individual months vary greatly in their amount of rain, the year is on the average divided sharply into a wet and a dry season of equal length. For the six years in question the average rainfall was 26·81 in., falling on 67 days; the dry season, April to September, having only 3·79 in., falling on 16 days; while the wet season, October to March, had 23·02 in., falling on 51 days. The six dry months thus had 14 per cent. of the total rain and 24 per cent. of the rainy days; the six wet months 86 per cent. of the rain and 76 per cent. of the rainy days, the winter rain being the more intense as well as the more abundant. The wettest year had 43 per cent. more rain and the driest 30 per cent. less rain than the average of the six.

We believe that Mr. Bell's records represent the actual rainfall conditions of Funchal with considerable accuracy, though on account of the steep slope of the land round the bay the local differences must be well marked.

We may remind our readers that the climate of Madeira, while uniform and free from extremes as regards temperature, is remarkable for its high humidity even in the dry season. The peculiarities of the climate are very far from having been fully investigated, although Dr. Mason's hygrometric investigations there sixty years ago first brought the wet and dry bulb thermometer into general use for measuring relative humidity; and Professor Piazzzi Smyth in his racy little monograph "*Madeira Meteorologic*" called attention in his own characteristic way to the unique problems presented by the climate of the island where, as Ogilby observed in 1670, "the air keeps so even a temperature that neither heat nor cold invade it with excess."

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#### ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on the 19th ult. at the Institution of Civil Engineers, Great George Street, Westminster, Mr. W. H. Dines, B.A., President, in the chair.

Mr. D. Buckney, Mr. A. S. Butterworth, Assoc. M. Inst. C.E., Dr. J. H. C. Dalton, and Dr. A. Thomas, were elected Fellows.

Mr. W. N. Shaw, F.R.S., read a paper entitled "*La Lune mange les Nuages*," the title referring to the disappearance of clouds on a clear moonlight night. The paper was in effect a note on the thermal relations of floating clouds. The author said that the result of warming a mass of floating cloud depends upon the temperature gradient for height of the air in which it floats. If the law of fall of

temperature with increase of height were the adiabatic law, a mass of air at the ground warmed ever so little above its surroundings would continue to rise until it reached the limit of the atmosphere. An inversion of the temperature gradient, on the other hand, would prevent any rise taking place, or speedily arrest it. The precise relation between changes in the temperature of a floating mass of air upon adding or removing heat, and the temperature gradient of the surrounding air, was explained by reference to Hertz's diagram of thermal lines for air. A temperature gradient represented by a line exactly parallel to a saturation line in the diagram would indicate the conditions under which a cloud might receive or lose heat and change its temperature without any evaporation or condensation taking place. He pointed out that, except in cases of inversion of the temperature gradient or of a very slight temperature gradient, meteorologists have to recognise that the ordinary relations between the increase of heat and increase of temperature in a given mass of air must be reversed; in other words, that the warming of the air by producing expansion and rising will bring about a lowering of temperature, while the cooling of the air by leading to contraction and sinking will ultimately produce a rise of temperature.

Mr. Shaw exhibited an apparatus whereby the conditions applicable in the case of a floating cloud can be experimentally realised.

The President, Dr. H. R. Mill, and Captain Wilson-Barker took part in the discussion, and congratulated the author of the paper on the interesting experiment which he showed of the formation of a cloud by warming saturated air, so as to produce expansion.

Mr. W. N. Shaw, in reply to a question, said that he was not prepared to say definitely whether the radiating or absorbing power of a cloud was greater or less than that of the surrounding air. Still, the existence of the cloud showed that there was some difference and he was inclined to think that the cloud had the greater power of absorbing heat.

Mr. F. J. Brodie read a paper on "The Prevalence of Gales on the Coasts of the British Islands during the 30 years 1871-1900." The total number of gales of all kinds dealt with during this period was 1455, the yearly average being 48·5, of which 10·6 were severe. The worst year for gales was 1883, while the quietest year was 1889. The stormiest month was January, 1890. At all seasons of the year, except summer, the prevalence of gales is greater from south-west than from any other quarter. The smallest number occurs in spring, when rather less than 20 per cent. are from south-west, more than half the storms being, however, from points between south-west and north-west. The prevalence of gales from polar directions is greatest in spring, more than 21 per cent. blowing from points between north and east. The highest wind velocities recorded during the whole period were those at Fleetwood during the westerly gales on December 22nd, 1894, and on January 12th, 1899. On

the former occasion for 9 hours the mean velocity was 64 miles per hour, and at 9 a.m. it reached a maximum of 78 miles. It appears that on the average 43 per cent. of the storm systems which visit our coasts advance from some point of the compass lying between south and south-west and travel towards some point lying between north and north-east; and 39 per cent. have an easterly motion, while less than 1 per cent. move westwards. A mean of 264 cases shows that the deep cyclonic systems which visit our islands travel on an average at the rate of 24 miles per hour; in some cases, however, the rate was not more than 8 or 10 miles, while in others it amounted to 40, 50, and even 60 miles per hour.

Mr. Brodie concluded his paper by exhibiting on the screen a series of weather maps showing the progress of some of the most notable gales during the period covered by the discussion

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### THE SCOTTISH METEOROLOGICAL SOCIETY.

THE half yearly general meeting of this Society was held in Edinburgh on March 20th, Sir Arthur Mitchell, K.C.B., in the chair. The Report from the Council of the Society, which was presented by Dr. A. Buchan, F.R.S., stated that the vacancy caused by the death of Professor Tait, one of the representatives of the Royal Society of Edinburgh, had been filled by the appointment, by the Council of the Royal Society of Edinburgh, of Professor Crum Brown. The three vacancies in the Council requiring to be filled up by the meeting were occasioned by the death of the Earl of Moray, the election of Professor Crum Brown to represent the Royal Society, and the retiring by rotation of Professor M'Kendrick. On the recommendation of the Council Professor M'Kendrick was re-elected and the Hon. John Abercromby and Professor Knott were elected to fill the vacancies.

It was stated that the second volume of the Ben Nevis Observations, being Vol. 42 of the *Transactions* of the Royal Society of Edinburgh, was approaching completion. This is the first of the three volumes, for the printing of which the Royal Societies of London and Edinburgh have each voted £500. It contains the observations made at the Ben Nevis and Fort William Observatories from January, 1888, to December, 1892. These are now in type and fill 420 pages. The remainder of the volume, consisting of discussions connected with Ben Nevis, is being rapidly pushed forward. Other discussions, by Mr. J. Aitken, F.R.S., Mr. J. Y. Buchanan, F.R.S., Dr. Herbertson, Dr. Buchan, Mr. Omond, and Mr. Mossman, are ready for the press, and will appear in the volume. Meanwhile, other large researches are being carried on in the Society's Office by Dr. Buchan and Mr. Omond, on lines already indicated to the Society, which will be communicated to future meetings.

It was further stated that experiments with kites for meteoro-



logical purposes had been carried on near Edinburgh by Mr. John Anderson for several years. He has now obtained a complete outfit, including a new kite and an oil engine of  $2\frac{1}{4}$  horse power. It is proposed to test this kite, which in some respects has new features to recommend it, very thoroughly in the early summer. Thereafter it will be handed over to the ship of the Scottish Antarctic Expedition for use in the south polar regions.

A paper by Mr. John Aitken, F.R.S., on atmospheric dust, as observed by his dust-counter at Ben Nevis and in many other localities, with reference to the production of haze, was read by Mr. Omond, who also exhibited the kite referred to in the Report from the Council.

Mr. R. C. Mossman gave a preliminary report on his winter's work at Achariach, details of which we hope to publish shortly.

Mr. Andrew Watt, M.A., read a paper on the Rainfall of Ben Nevis and Fort William, in which he paid special attention to the distribution of the amount of precipitation at the High and Low Level observatories throughout the hours of the day. The curves for Fort William and Ben Nevis did not differ much, and lay midway between those for purely coastal climates, where the early morning hours are the wettest, and those for continental climates, where the early afternoon hours are the wettest. The fact that by far the greater part of the rain falling in this country is cyclonic, makes the problem very complex.

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## REVIEWS.

*Report of the Meteorological Council for the Year ending 31st of March, 1901, to the President and Council of the Royal Society.* London: Printed for His Majesty's Stationery Office. 1901. Size  $9\frac{1}{2} \times 6$ . Pp. 162. Price 1s.  $1\frac{1}{2}$ d.

THE new constitution of the Meteorological Council is now officially announced, and we reprint the following letter from Appendix I. as the best way of making it clear to our readers, it being borne in mind that the Royal Society is responsible for the nomination of the Council:—

“THE ROYAL SOCIETY,

“March 26th, 1901.

“SIR,—I am directed to make known to you the following decisions of the President and Council of the Royal Society in regard to the Meteorological Council and Association.

“The President and Council accept the resignation of Mr. Francis Galton as a member of Council, and, in doing so, wish to record their appreciation of his long and valuable services.

“They nominate Sir Richard Strachey, Professor G. H. Darwin, Dr. Buchan, and Mr. Shaw to be, with the Hydrographer to the Admiralty, the

Directors. They further nominate General Sir Richard Strachey as Chairman.

"They have come to the conclusion that it will be desirable to appoint five other persons to bring up the number of members of the Association to ten, and for that purpose nominate as members the Earl of Rosse, Mr. J. Y. Buchanan, for a period of five years, and Mr. Dines, Professor Schuster, and Dr. R. H. Scott, for a period of three years.

"They take it for granted that these additional five members will not be often required to attend meetings of the Council ; possibly one or two meetings a year, in addition to the statutory annual meeting, will be all that is desirable. And they are of opinion that these gentlemen should not receive any honorarium for their attendance. Indeed, they have reason to believe that their acceptance of an honorarium would present legal difficulties.

"I am, &c.,

"M. FOSTER, *Secretary R.S.*

"The Secretary, The Meteorological Council."

It will, of course, be understood that the volume under notice is the last Report of the old Council. As such it gives the usual clear epitome of the work of the Council under the heads of Ocean Meteorology, Weather Telegraphy and Forecasts, Climatology, Library, Miscellaneous Investigations, Publications, and Finance. It is stated that at the close of last year Mr. R. Strachan was granted an annuity under the new scheme of superannuation, after long and meritorious service. Under the head of "Ocean Meteorology," though scarcely falling within the usual acceptation of that term, we are pleased to see that the Meteorological Council has supplied six sets of meteorological instruments for use in British New Guinea, a region from which climatological observations of much importance to Australia, as well as locally, may be expected. Under "Weather Forecasts" we find that in 1900-01 the forecasts made at 8.30 p.m. were completely successful in 57 per cent. of the cases, partially successful in 27 per cent., and complete failures in only 5 per cent., while the special storm warnings were justified in 92 per cent. of the cases.

The appendices contain some new and interesting features. Amongst these is an article on "Conspicuous Meteorological Occurrences in 1900," which deals, though very briefly, with gales, heavy rains, thunderstorms, droughts, &c. Two interesting plates are given, showing the weather charts and the curves of a number of recording instruments for the heavy rain of December 30th and the thunderstorm of July 27th.

Altogether the Report shows that a large amount of excellent work is being done by the Office and made available to the public ; but we confess that the small circulation of the Daily Weather Report does not indicate as much appreciation on the part of the public of the advantages offered to them as we should expect to see.

# METEOROLOGICAL NEWS AND NOTES.

TYPICAL WEATHER MAPS for use in schools have been designed by Dr. R. Börnstein, of Berlin, and a set of twelve is being brought out at a very moderate price by the enterprising German map-publisher, Dietrich Reimer (Ernst Vohsen). We have not seen the maps, but their object is the praiseworthy one of familiarising children with weather types, so that they will be able to understand the daily weather charts and to follow the weather predictions with intelligence. Nothing, we may add, would help towards the improvement of the national weather services more than the creation of an army of intelligent critics in every country.

THE DAILY BAROMETER WAVE has been investigated by Dr. Oliver L. Fassig, of the U.S. Weather Bureau, in a new way, by plotting the mean departure from the daily average height of the barometer for each hour of the day on a synchronous chart which takes in the whole of N. and S. America, the Atlantic Ocean, and half of Europe and Africa. The result is to show the development and westward propagation over the American continents of an area of pressure above the normal during the forenoon, followed by the development and westward propagation of an area of pressure below the normal in the afternoon, giving place to a period of comparatively uniform distribution of pressure during the night hours, which is divisible into two minor periods. The paper, with twenty-five illustrations, appears in the *Monthly Weather Review* for Nov., 1901.

METEOROLOGICAL EXAMINATION PAPERS are comparative rarities in the educational world, because meteorology is not often taught in schools or colleges. We once gleaned a few treasures of climatic ignorance from the answers to a paper on the physical geography of India, set to scholars somewhere in the British Isles, sometime within the last ten years, and these may amuse our readers :—

“The S.W. monsoons are very hot, and circular in form.”

“The climate of India is humid and equable ; in Bengal it is dry, salubrious and unhealthy.”

“In Bengal it is very wet in summer, the water rising from about 200 to 220 feet.”

“In some parts of India the temperature differs only about 4° between summer and winter. This of course affects the length of day and night.”

To which may be added, from another paper, this practical hint to those who wish to arrive at an understanding with the weather:—

“The only means to propitiate the climate of our country would be the jointure of the British Isles to the continent.”

## MARCH, 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.	Differ- ence from average 1890-9.		Greatest Fall in 24 hours.			Max.		Min.			
			inches.	inches.	in.	Dpth		Deg.	Date	Deg.	Date.		In shade.
I.	London (Camden Square) ...	1·87	+	·41	·64	14	11	62·2	31	29·5	7	3	10
II.	Tenterden .....	1·32	—	·37	·60	14	12	60·0	31	29·5	5	4	17
III.	Hartley Wintney .....	1·77	+	·21	·60	14	9	60·0	31	25·0	7, 24	8	12
III.	Hitchin .....	1·15	—	·29	·49	14	11	59·0	31	29·0	22	6	...
IV.	Winslow (Addington) .....	1·39	—	·13	·44	14	12	63·0	17	23·0	6	6	12
IV.	Bury St. Edmunds (Westley) .....	2·10	+	·47	·76	1	12	60·5	18 <sup>b</sup>	27·0	6	4	...
V.	Norwich (Brundall) .....	1·07	...	...	·31	14	15	60·0	17	26·2	6	7	17
V.	Winterborne Steepleton .....	2·62	...	...	·82	26	14	57·5	17	26·0	6	6	11
V.	Torquay .....	2·23	...	...	·44	26	13	...	...	...	...	...	...
VI.	Polapit Tamar [Launceston]..	3·01	+	·73	·92	26	20	58·2	6	23·0	6	5	8
VI.	Stroud (Upfield) .....	1·23	—	·45	·58	14	11	59·0	27 <sup>b</sup>	31·0	23	3	...
VI.	Church Stretton (Woolstaston) .....	1·52	—	·25	·72	14	11	59·0	31	30·5	24	4	13
VI.	Worcester (Diglis Lock) .....	1·44	+	·10	·71	14	11	...	...	...	...	...	...
VII.	Boston .....	·90	—	·29	·40	14	8	58·0	31	26·0	6	7	...
VII.	Hesley Hall [Tickhill].....	1·54	+	·14	·86	14	10	57·0	17 <sup>b</sup>	28·0	6	6	...
VII.	Derby (Midland Railway).....	1·41	—	·01	·60	14	15	61·0	31	29·0	23 <sup>c</sup>	6	...
VIII.	Manchester (Plymouth Grove) .....	1·61	—	·46	·20	24	18	56·0	1, 2	30·0	22	3	4
IX.	Wetherby (Ribston Hall) ...	·84	—	·79	·24	24	9	...	...	...	...	...	...
IX.	Skipton (Arncliffe) .....	2·91	—	2·21	·45	20	23	...	...	...	...	...	...
IX.	Hull (Pearson Park) .....	·87	—	·79	·14	24	13	57·0	17	30·0	6, 7	7	12
X.	Newcastle (Town Moor) .....	·84	—	1·10	·40	24	12	...	...	...	...	...	...
X.	Borrowdale (Seathwaite).....	8·76	—	1·90	·98	8	27	53·7	17	27·8	24	5	...
XI.	Cardiff (Ely).....	2·86	+	·30	·55	26	15	...	...	...	...	...	...
XI.	Haverfordwest .....	3·72	+	·98	·87	26	17	56·5	10	28·6	24	3	10
XI.	Aberystwith (Gogerddan) ...	3·20	+	·36	·65	26	23	59·0	17	24·0	5	6	...
XI.	Llandudno.....	2·18	+	·24	·40	24	25	56·5	17	34·0	24 <sup>d</sup>	0	...
XII.	Cargen [Dumfries] .....	2·46	—	·59	·26	3 <sup>f</sup>	17	56·0	7 <sup>b</sup>	25·0	24	6	...
XII.	Edinburgh (Royal Observatory) .....	·82	...	...	·27	19	14	55·9	17	28·8	24	4	12
XIV.	Colmonell .....	3·55	+	·31	·51	8	27	57·0	17	29·0	23	1	...
XV.	Tighnabruaich .....	4·97	...	...	·54	8 <sup>g</sup>	27	51·0	17	25·0	23	7	...
XV.	Mull (Quinish) .....	5·78	+	1·61	·77	19	28	...	...	...	...	...	...
XVI.	Loch Leven Sluices .....	1·55	—	1·03	·31	20	16	...	...	...	...	...	...
XVI.	Dundee (Eastern Necropolis) .....	1·00	—	·98	·20	29	19	58·5	17	26·8	24	8	...
XVII.	Braemar .....	1·92	—	·40	·32	19	19	55·0	17	18·3	24	13	21
XVII.	Aberdeen (Cranford) ...	1·57	—	·63	·22	22	28	60·0	17	25·0	25	13	...
XVII.	Cawdor (Budgate) .....	1·92	—	·32	·38	19	20	...	...	...	...	...	...
XVIII.	Strathconan [Beaully] .....	7·73	+	3·51	1·00	19	14	...	...	...	...	...	...
XVIII.	Glencarron Lodge.....	12·35	+	5·41	1·40	19	26	52·0	1	22·4	24	8	...
XIX.	Dunrobin .....	2·41	—	·03	·40	21	17	58·0	17	25·0	26 <sup>d</sup>	12	...
XIX.	S. Ronaldshay (Roeberry) ...	2·59	—	·10	·40	19	23	50·0	14	28·0	25	10	...
XX.	Darrynane Abbey.....	2·83	—	·29	·74	26	22	...	...	...	...	...	...
XX.	Waterford (Brook Lodge) ...	1·80	—	·72	·46	26	13	61·0	27	30·0	24 <sup>e</sup>	5	...
XX.	Broadford (Hurdlestown) ...	3·01	+	·81	·44	26	23	...	...	...	...	...	...
XXI.	Carlow (Browne's Hill) .....	2·25	+	·04	·44	26	17	...	...	...	...	...	...
XXI.	Dublin (Fitz William Square) .....	1·75	—	·07	·37	24	21	58·7	17	32·8	24	0	5
XXII.	Ballinasloe .....	2·64	+	·22	·40	26	27	69·0	17	28·0	24	8	...
XXII.	Clifden (Kylemore) .....	6·70	+	1·51	·80	22	22	...	...	...	...	...	...
XXIII.	Seaforde .....	1·77	—	·64	·56	24	18	60·0	17	28·0	24	5	10
XXIII.	Londonderry (Creggan Res.) .....	2·77	+	·08	·27	25 <sup>a</sup>	25	...	...	...	...	...	...
XXIII.	Omagh (Edenfel) .....	2·68	+	·10	·60	24	25	56·0	17	28·0	23	5	8

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

a—and 27. b—and 31. c—and 24. d—and 25. e—and 14. f—and 22. g—and 19.

SUPPLEMENTARY TABLE OF RAINFALL,  
 MARCH, 1902.

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Uxbridge, Harefield Pk..	1·81	XI.	Castle Malgwyn .....	3·45
II.	Dorking, Abinger Hall ..	2·02		Builth, Abergwesyn Vic.	4·70
„	Sheppey, Leysdown .....	1·04	„	Rhayader, Nantgwillt ...	3·55
„	Hailsham .....	1·80	„	Lake Vyrnwy .....	3·06
„	Crowborough .....	1·96	„	Ruthin, Plâs Drâw .....	1·70
„	Ryde, Beldornie Tower..	1·68	„	Criccieth, Talarvor .....	2·89
„	Emsworth, Redlands ...	2·03	„	I. of Anglesey, Lligwy..	2·14
„	Alton, Ashdell .....	2·36	„	Douglas, Woodville .....	1·93
„	Newbury, Welford Park ..	1·96	XII.	Stoneykirk, Ardwell Ho.	2·05
III.	Oxford, Magdalen Coll..	1·17	„	Dalry, Old Garroch .....	3·90
„	Banbury, Bloxham .....	1·57	„	Moniaive, Maxwellton Ho.	3·14
„	Pitsford, Sedgebrook ...	1·42	„	Lilliesleaf, Riddell .....	1·31
„	Huntingdon, Bampton..	1·51	XIII.	N. Esk Res. [Penicuik]	3·10
„	Wisbech, Bank House...	·98	XIV.	Glasgow, Queen's Park..	2·39
IV.	Southend .....	1·20	XV.	Inveraray, Newtown ...	6·15
„	Colchester, Lexden .....	1·29	„	Ballachulish, Ardsheal...	8·30
„	Saffron Waldon, Newport	1·17	„	Islay, Eallabus .....	3·62
„	Rendlesham Hall .....	1·00	XVI.	Dollar .....	1·87
„	Swaffham .....	1·59	„	Balquhiddier, Stronvar...	5·83
V.	Salisbury, Alderbury ...	1·87	„	Coupar Angus Station...	·95
„	Bishop's Cannings .....	1·89	„	Blair Atholl .....	1·66
„	Blandford, Whatcombe ..	2·39	„	Montrose, Sunnyside ...	·76
„	Ashburton, Druid House ..	3·12	XVII.	Keith H. R. S. ....	3·33
„	Okehampton, Oaklands..	3·52	XVIII.	Fearn, Lower Pitkerrie..	1·22
„	Hartland Abbey .....	3·00	„	S. Uist, Askernish .....	4·11
„	Lynmouth, Rock House ..	2·87	„	Invergarry .....	5·24
„	Probus, Lamellyn .....	2·75	„	Aviemore, Alvie Manse..	1·84
„	Wellington, The Avenue ..	1·82	„	Loch Ness, Drumnadrochit	2·71
„	North Cadbury Rectory ..	1·92	XIX.	Invershin .....	3·87
VI.	Clifton, Pembroke Road ..	1·85	„	Bettyhill .....	3·47
„	Ross, The Graig .....	1·53	„	Watten H. R. S. ....	1·38
„	Shifnal, Hatton Grange ..	1·24	XX.	Dunmanway, Coolkelure ..	4·05
„	Wem, Clive Vicarage ...	1·29	„	Cork, Wellesley Terrace ..	1·73
„	Cheadle, The Heath Ho.	2·17	„	Killarney, District Asyl.	4·72
„	Coventry, Priory Row ..	1·77	„	Caher, Duneske .....	...
VII.	Market Overton .....	1·08	„	Ballingarry, Hazelfort...	2·40
„	Grantham, Stainby .....	1·50	„	Miltown Malbay .....	1·75
„	Horncastle, Bucknall ...	1·54	XXI.	Gorey, Courtown House ..	1·70
„	Worksop, Hodsck Priory ..	1·61	„	Moynalty, Westland ...	2·36
VIII.	Neston, Hinderton .....	1·73	„	Athlone, Twyford .....	2·00
„	Southport, Hesketh Park ..	1·97	„	Mullingar, Belvedere ...	1·84
„	Chatburn, Middlewood..	3·27	XXII.	Woodlawn .....	2·53
„	Duddon Val., Seathwaite Vic.	6·56	„	Westport, Murrisk Abbey ..	4·99
IX.	Baldersby .....	·80	„	Crossmolina, Enniscoe ..	5·92
„	Scalby, Silverdale .....	1·64	„	Collooney, Markree Obs.	3·04
„	Ingleby Greenhow Vic..	1·07	XXIII.	Enniskillen, Model Sch.	...
„	Middleton, Mickleton ...	1·83	„	Warrenpoint .....	1·87
X.	Beltingham .....	2·04	„	Banbridge, Miltown .....	1·58
„	Bamburgh .....	·97	„	Belfast, Springfield .....	2·46
„	Keswick, The Bank .....	2·91	„	Bushmills, Dundarave..	2·65
XI.	Llanfrehfa Grange .....	2·45	„	Stewartstown .....	2·17
„	Treherbert, Tyn-y-waun ..	5·07	„	Killybegs .....	4·01
„	Llandoverly .....	3·58	„	Horn Head .....	3·81

## METEOROLOGICAL NOTES ON MARCH, 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.—Fog was very prevalent until the 10th, with fine intervals and little R. On 14th occurred the heaviest R of the year so far, followed by a beautiful summerlike day on 16th. From 20th showery and unsettled weather lasted until the end of the month. Sharp TS on 21st with heavy H. H on 22nd. Mean temp.  $45^{\circ}\cdot 1$ , or  $3^{\circ}\cdot 0$  above the average.

ABINGER HALL.—Mild and open generally though the latter part was colder. Great need of R; many wells are being sunk, but the yield is small.

TENTERDEN.—A genial month, with less wind than usual and generally dry. Duration of sunshine 135 hours. S.W. gale on night of 14th, and violent N.N.W. gale on morning of 25th.

CROWBOROUGH.—On the whole distinctly mild, with several quite warm days, and except for three slight white frosts, quite free from frost and S. Much mist; slight H showers on 22nd, 23rd and 24th.

EMSWORTH, REDLANDS.—Rough weather, with great variations of temp. Gale from S.W. on 20th, and from W. on 24th.

HARTLEY WINTNEY.—A dry and warm month. Foggy and calm with dull days until 14th. The latter half was more showery; distant TS on 21st. No ozone was registered throughout.

PITSFORD, SEDGEBROOK.—Warm and pleasant, but somewhat changeable. R  $\cdot 28$  in. below the average. Mean temp.  $44^{\circ}\cdot 1$ .

BURY ST. EDMUNDS, WESTLEY.—Mild and very favourable to agriculture. Heavy TS on 1st.

NORWICH, BRUNDALL.—The warmest March since 1897. Mild throughout; although there were no abnormal maxima, there was an unusually large number of moderately mild days. A splendid Easter concluded a beautiful month, with but few features of the unpleasant character with which March is usually associated. L on 2nd. T and L on 21st.

BISHOPS CANNINGS.—R  $\cdot 08$  in. above, and rainy days 4 below, the average.

TORQUAY, CARY GREEN.—R  $\cdot 31$  in. below the average; mean temp.  $3^{\circ}\cdot 6$  above the average. Duration of sunshine  $43\cdot 5$  hours below the average: 7 sunless days. Mean amount of ozone  $5\cdot 3$ ; max.  $9\cdot 5$  on 24th with S.S.W. wind, min.  $1\cdot 0$  on 5th, 6th, 7th and 10th.

POLAPIT TAMAR [LAUNCESTON].—Rather wet and stormy but mild. H on 22nd. Thick fog on 4 days, slight on one day.

LYNMOUTH, ROCK HOUSE.—Not very much sunshine and a good deal of fog and mist. A short period of strong N.W. winds and H storms just before and after the equinox. S.W. breezes during the last week with gale on 25th.

WELLINGTON, THE AVENUE.—Generally genial, with little of the characteristic E. winds. R slightly below the average.

NORTH CADBURY RECTORY.—A most unusual March. W. winds throughout, till the last eight days, singularly quiet and dry. Absolutely none of the typical N.E. wind. No S.

CLIFTON, PEMBROKE ROAD.—Mild and on the whole dry, though without much sunshine. The month was marked by the absence of the keen E. winds which so often prevail at this time. A rather violent "equinoctial gale" sprang up suddenly on the afternoon of 24th. R nearly half-an-inch below the monthly average, and for the first quarter of 1902  $3\cdot 17$  in. deficient.

ROSS, THE GRAIG.—There were many brilliant days, but not like those of March, 1893 or 1894. No S occurred, and temp. in the screen only descended to  $32^{\circ}$  on 4 occasions, much less than the usual number. Vegetation was making rapid progress at the close.

COVENTRY, PRIORY ROW.—For the most part mild and pleasant. The ground was fairly dry and good for the spade and plough. Not so much wind or dust as March usually brings. Mild and springlike at the end.

SEATHWAITE VICARAGE.—Generally cold, with a large number of rainy days but with no heavy fall of R and less than  $1\frac{1}{2}$  inches of S.

# WALES AND THE ISLANDS.

LLANFRECHFA GRANGE.—S.W. winds prevailed and the atmosphere was very damp. Agricultural work was much impeded, it being impossible to sow oats and prepare the land.

HAVERFORDWEST.—March came in very quietly, and continued, on the whole, calm, mild and rather damp. From 21st to 25th, however, was a rather stormy and cold period. Vegetation was generally backward.

DOUGLAS, WOODVILLE.—Generally mild until the last week, which was cold with strong N.W. winds. R below the average, though there were 19 rainy days and the ground was full of moisture, perhaps a result of the marked absence of E. winds. Hills well covered with S on 24th and 25th. Vegetation forward.

# SCOTLAND.

LILLIESLEAF, RIDDELL.—An average month, with a good deal of wind and rather less R than usual. Probably also rather colder and more disagreeable than usual, with a good deal of S on 24th and 25th. The frost and S came on earlier this winter and terminated later than for many years.

TIGHNABRUACH.—A dripping month. R nearly every day. S on 25th.

BALLACHULISH, ARDSHEAL.—R 2.51 in. above the average.

MULL, QUINISH.—A very cold, wet and stormy month.

COUPAR ANGUS.—The R, which was 1.08 in. below the average, was equable but exceptionally light, this being the third month in succession with deficient R. Mean temp.  $41^{\circ}.5$ , or  $3^{\circ}.0$  above the average, due to the mildness of the first three weeks, for severe weather ruled during the last week.

WATTEN, H.R.S.—The first week was fine. Cold winds and stormy showers of R, sleet and S during the rest of the month. Frosty nights.

S. RONALDSHAY, ROEBERRY.—A very fair month. Mean temp.  $39^{\circ}.5$ , or  $0^{\circ}.5$  above the average of 12 years.

# IRELAND.

CORK, WELLESLEY TERRACE.—The lion and the lamb appear to have lost their way as March was accompanied by neither either on coming in or going out. R .80 in. below the average. Mean temp.  $44^{\circ}.0$ , or  $1^{\circ}.0$  above the average, being the first month since July, 1901, with temp. reaching average.

DARRYNANE ABBEY.—Fine and mild till 18th. thereafter wet. Cold and wild 19th to 24th with H from 19th to 22nd.

WATERFORD, BROOK LODGE.—Mean temp.  $46^{\circ}$ . Max. range in 24 hours  $23^{\circ}$ . S.W. to N.W. gale on 19th and N.W. gale on 24th. H on 20th and 23rd.

MILTOWN MALBAY.—With R almost every day though of small quantity, and continuous cold biting winds, this proved the worst March for agricultural purposes for some decades. H showers from 17th to 23rd. N.W. to N. gale on 24th.

DUBLIN, FITZWILLIAM SQUARE.—Unlike March, 1900 and 1901, it was singularly mild, the mean temp. being  $46^{\circ}.7$  or  $3^{\circ}.6$  above the average. The only cold spell occurred from 20th to 26th inclusive. At first also the weather was dry, but from 8th onward R fell frequently though not heavily, except on 24th and 26th. W. and S.W. winds were most prevalent. Duration of bright sunshine 94 hours. More or less foggy on 6 days. High winds on 10 days reaching the force of a gale on 19th. S or sleet on 3 days and H on 5 days.

COLLOONEY, MARKREE OBSERVATORY.—Rather wetter than the average, but mean temp.  $44^{\circ}.7$  or above the average. Bright sunshine very deficient, being only 71.6 hours. S fell on 24th.

OMAGH, EDENFEL.—During the first fortnight although R fell slightly on almost every day the weather was suitable for agricultural work, but the latter half was generally raw, cold, inclement and wet, with less vegetation apparent on April 1st than on March 1st.

KILLIBEGS.—Although the total fall was not very great R was noted on every day of the month, an unprecedented occurrence in March since the record commenced in 1886.

## CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, OCTOBER, 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.									
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	74·4	1	33·1	27	58·1	43·7	45·7	85	107·2	30·9	1·92	15	6·0
Malta.....	83·5	8	52·2	27	76·3	60·3	61·1	81	140·9	48·1	5·67	16	3·7
Cape Town ...	88·8	13	42·4	5	70·9	53·7	50·0	61		50·2	·76	7	4·2
Mauritius.....	85·7	13	58·7	10	81·4	65·7	62·7	71	147·6	65·8	·79	12	5·5
Calcutta.....	93·5	19	69·8	22	89·3	75·5	74·4	77	146·4	66·3	1·99	6	3·7
Bombay.....	93·2	31	74·5	17	87·4	77·0	75·4	82	138·0	71·0	·39	3	2·8
Colombo, Ceylon .....	91·8	22	72·8	28	87·9	76·9	73·7	80	151·0	32·0	3·91	13	5·7
Melbourne.....	83·5	19	37·2	24	65·8	48·6	48·9	80	142·9	35·3	4·31	12	6·7
Adelaide .....	84·8	5	41·0	2, 3	70·6	50·4	47·2	64	139·5	40·3	1·59	13	5·8
Sydney .....	94·3	26	48·6	2	71·1	56·4	52·5	66	144·8	...	1·90	12	5·0
Wellington .....	...	...	...	...	...	...	...	...	...	41·0	...	...	...
Auckland .....	72·0	29	44·0	9a	63·4	50·7	45·1	64	137·0	...	3·11	10	5·0
Jamaica, Halfway Tree	88·0	28	69·0	10	86·4	71·4	71·8	84	...	...	10·19	12	4·0
Trinidad .....	...	...	...	...	...	...	...	...	...	...	...	...	...
Grenada.....	90·0	6	71·4	11	84·5	75·4	73·4	79	160·0	22·7	9·65	22	3·0
Toronto.....	72·0	23	27·8	20	58·1	39·0	41·8	76	88·0	...	·54	...	4·8
Fredericton, N.B. ....	69·8	31	20·9	26	55·4	35·9	37·4	71	...	...	3·40	7	4·8
Winnipeg, Manitoba ...	77·0	22	18·0	27	57·6	31·8	...	...	...	...	·46	7	4·3
Victoria, B.C. ....	69·0	22	44·2	16	60·5	48·3	...	...	...	...	1·65	10	6·4
Dawson, Yukon .....	46·8	2	-1·2	31	33·9	23·0	...	...	...	...	2·25	7	5·2

a—and 19.

## REMARKS.

MALTA.—Mean temp. of air 68°·1, or 1°·5 below the average. Mean hourly velocity of wind 8·5 miles, or 0·4 below the average. Mean temp. of sea 71°·6. TSS on 13th, 21st and 26th. L on 6 days. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·5, of dew point 0°·6, above, and R ·78 in. below, their respective averages. Mean hourly velocity of wind 11·6 miles, or 0·5 miles above average; prevailing direction E. by N. to S.E. by E. No sun spots from 1st to 9th, and 13th to 27th, two on 10th to 12th, one small group consisting of from one to three spots from 28th to 31st. The spots observed on October 10th to 12th were the first since June 26th, and counting these as a group the tenth since the beginning of the year. T. F. CLAXTON.

COLOMBO, CEYLON.—Mean temp. of air 81°·7 or 0°·9 below, dew point 0°·7 above and R 10·45 in. below, their respective averages. Mean hourly velocity of wind 5·7 miles; prevailing direction S.W. TS on 28th and 29th. W. C. S. INGLES.

Adelaide.—Mean temp. of air 1°·0 below, R ·16 in. below, their respective averages. Fine agricultural rain this month, which was the wettest October since 1894. C. TODD, F.R.S.

Sydney.—Mean temp. of air 0°·3 above, R ·88 in. below, humidity 2·1 below, their respective averages. H. C. RUSSELL, F.R.S.

Auckland.—Barometrical pressure and mean temp. both considerably above the average of the previous 33 years. Heavy falls of R on 3rd and 31st, month otherwise remarkably dry, and total fall quarter of an inch below the average. T. F. CHEESEMAN.

DAWSON.—First ice appeared on river on the 20th. R. F. STUPART.