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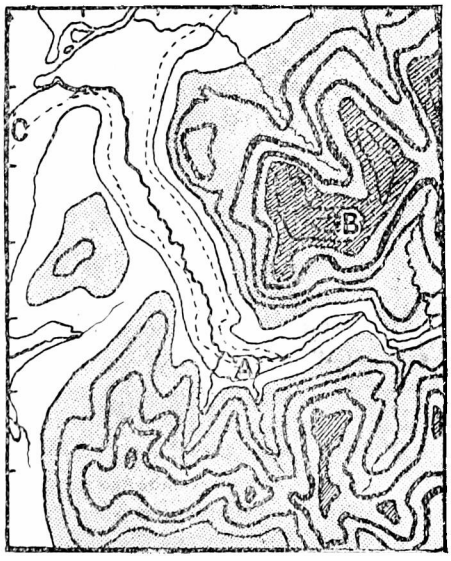
NEW HIGHLAND METEOROLOGICAL STATION.

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

A NEW meteorological station has been established in the wilds of Lochaber, in connection with the two Ben Nevis Observatories. The new station is situated at Achariach, in Glen Nevis, a remarkably steep and narrow valley, 4¼ miles S.E. of the Low Level Observatory at Fort William and 2¼ miles S.W. of the High Level Observatory on Ben Nevis. Bartholomew's Reduced Ordnance Map of Scotland, sheet 15, gives an excellent picture of the depth and narrowness of the valley in which the new station lies, and the accompanying rough sketch will convey some idea of it to the reader. The station on the valley floor is approximately 150 ft. above sea level, while 1¼ miles to the N.N.E. is the Cairn Dearg of Ben Nevis, with a height of 3348 feet, 2 miles to the S.E. is Lgor-a-Mhaim (3601 feet), 2 miles S.S.E. is Stob Ban (3274 feet), and the same distance S.W. Mulloch nan Coircean (3077 feet). On the east the valley is bordered by the precipitous face of the Meall Cumhann (2306 feet) 2½ miles distant. The station is one in which all the peculiarities of valley conditions should be well marked and capable of being studied. I expect that we shall have very low temperatures in winter during anticyclonic



A Achariach. B Ben Nevis summit.
C Fort William Low Level Station.

The map includes 7 miles by 5½; the lines represent intervals of 500 feet; land above 1000 feet is shown in light tint, and above 3000 feet shaded.

weather, as the descending currents of cold air from the glens will converge at the spot, and the cold air will be ponded up, as it were, by a ridge which shuts in the valley to the W. and N.W. When these conditions prevail at low levels, the adjacent summits are in the anticyclonic down draught of air warmed dynamically by compression, giving rise to the well-known phenomenon of the up-bank thaw. The thermal and hygrometric conditions in the valley and on the adjacent hill-sides will accordingly be studied by ascending the mountain sides and making a series of observations at every 100 or 200 feet.

I propose to spend the winter at the station, taking observations daily at 9 a.m., 10 a.m., noon, 2 p.m., 4 p.m., and 9 p.m., with extra readings when exceptional phenomena present themselves. The equipment of the station is as follows:—Two Stevenson screens are placed on a slightly elevated piece of moorland with a fairly dry subsoil; one contains a thermograph and hygrograph, the other a dry and wet bulb and maximum and minimum thermometers. A black bulb solar radiation thermometer fixed in a brass frame is screwed to one of the screens, but as the sun does not shine on the place for 3½ months in winter on account of the steepness of the surrounding hills, there will not be much for it to do. A grass minimum radiation thermometer is placed on the ground, and close to it a 5 inch copper rain gauge. The barometer is a Fortin's standard, and there are also a Richard barograph and two aneroids. Mr. Dines has kindly lent a pressure tube recording anemometer, the use of which may throw some light on the extraordinary fluctuations of temperature and humidity which are constantly occurring even on wet cloudy nights. A sling thermometer, river thermometers, rainband spectroscope, a ship's chronometer, and a pocket dust counter, are also provided, while special observations on snowfall and rainfall will be made by means of a series of cylinders exposed in different positions.

Observations commenced on October 2nd, and they promise to be very interesting and to throw light on the local variations produced by the physical configuration of the land. Rain fell on twenty-nine days in October, and the following verse proving the influence of the Moon on rainfall, though originally penned for an equatorial station, may be adapted to this valley by merely altering the name:—

"Now the weather depends on the Moon as a rule,
And I've found that the saying is true.
In Glen Nevis it rains when the Moon's at the "full,"
And it rains when the Moon's at the "new."
When the Moon's at the "quarter," then down comes the rain;
At the "half" it's no better, I ween;
When the Moon's at "three-quarters" it's at it again,
And it rains besides mostly between."

THE STUDY OF LONDON FOG.

In consequence of a demand for special fog forecasts by the electric lighting companies in London, the Meteorological Council has decided to undertake a new investigation into the occurrence and distribution of London fogs, and has approached the County Council with a view to securing its co-operation. The result is that the Meteorological Council, which is maintained by a direct grant from the Government, has secured a further subvention for this special purpose from the London County Council, which at its meeting on October 22nd adopted the following resolutions :—

(1) That a gentleman of suitable scientific qualifications be engaged by the Meteorological Council for a limited period, to formulate instructions and a scheme of observations, and to conduct the investigation ; (2) that the observations be taken at the various Fire Brigade stations, and by men of the Fire Brigade ; and also, if it can be so arranged, at other institutions of the London County Council ; (3) that the returns be sent from the various stations, and from any other institutions selected, direct to the Meteorological Office ; (4) that the Meteorological Council do arrange with the police authorities for observations to be taken at selected positions outside the County of London ; (5) that all responsibility as to the conduct of the investigation and any published results of such investigation do rest with the Meteorological Council ; (6) that a copy of the complete returns and 12 copies of a report thereon by the Meteorological Council be supplied to the London County Council, and that the London County Council do contribute a sum of £250 for the investigation.

Mr. W. N. Shaw, F.R.S., writing on the subject in *Nature* for October 31st, points out that the main object of the research will be statistical ; but he also expresses the hope that physical investigations may also be arranged to supplement the fairly complete knowledge already possessed as to the nature of fogs. Of these he recognises three types which he calls "steaming water fogs," "cold-surface fogs," and "cloud fogs."

A fog of unusual intensity and duration prevailed over London from the evening of November 2nd to that of November 7th, and reports from other parts of the country show that the phenomenon was very wide-spread. The attention called to the proposed research by the overwhelming exhibition of the raw material for the work, leads us to hope that the investigation may be extended to other large towns, and in fact to the occurrence and distribution of fog in general. The action of the County Council is gratifying in showing that that body is aware of the importance of local meteorological research. We have long thought that it would be extremely desirable to have complete sets of meteorological observations, and especially rainfall observations, carried out in each of the London parks, where alone can perfect conditions of exposure and protection be obtained. The interest of such observations in open spaces surrounded by densely inhabited areas would be very great.

METEOROLOGY AT THE BRITISH ASSOCIATION.

GLASGOW MEETING, 1901.

(*Continued from p.* 147.)

Meteorological Observations on Ben Nevis for 1900—Report of the Committee consisting of Lord M'LAREN, Professor A. CRUM BROWN (*Secretary*), Sir JOHN MURRAY, Professor R. COPELAND, *and* Dr. ALEXANDER BUCHAN. *Drawn up by* Dr. BUCHAN. (Presented to Section A).

THE Committee is appointed for the purpose of co-operating with the Scottish Meteorological Society in making meteorological observations at the two Ben Nevis Observatories. . . . .

At Fort William the mean atmospheric pressure was 29·831 inches, or 0·026 inch under the average. The mean at the top was 25·275 inches, or 0·031 under the average. The mean difference for the two observatories was 4·556 inches. At the top the absolutely highest pressure for the year was 25·974 inches in March, this being the highest hitherto recorded in March, and the lowest 23·972 inches in December; and at Fort William the highest was 30·687 inches, and the lowest 28·411 inches in the same months, the differences being respectively 2·002 inches and 2·276 inches. . . . .

February was the coldest month, the temperature at both observatories being 5°·0 under the average. In this month south-westerly winds were six days short of their average prevalence, and northerly winds four days in excess. Hence the unusually low temperature which was equally felt both at the foot and top of Ben Nevis. On the other hand, temperature was above the average in the four months from June to September, the excess 1°·6 at the top of Ben Nevis, but only 0°·6 at Fort William, the difference being due to the frequent occurrence of the anticyclonic type of weather during the summer of 1900. The absolutely highest temperature for the year at Fort William was 79°·0 on June 13, and at the top 55°·2 on June 12; and the lowest at Fort William 10°·0 on February 10 and 12, and at the top 6°·0 on February 7.

Of the relative humidities the lowest, 16, occurred on March 4 with a dew-point of −12°·9. The lowest dew-point, −19°·7, occurred on February 11, the dry bulb being 12°·9 and the wet bulb 9°·2. A marked feature is the singularly high minimum humidities in April, May, June, July and December.

The rainfall for the year at the top was 210·34 inches, being 52·61 inches, or 33 per cent., above the average. This large rainfall has been exceeded only by that of 1898, which amounted to 240·05 inches. The December amount, 48·34 inches, is the largest monthly fall yet recorded at the Ben Nevis Observatory.

Taking Scotland as a whole, the year 1900 was one of the wettest yet recorded, and has only been exceeded by the rainfall of 1872. Exceptionally heavy daily rainfalls were of frequent occurrence, the two heaviest being 6·81 inches on January 22, and 5·41 inches on December 8. At Fort William the annual rainfall was 82·19 inches, being 5·28 inches, or 7 per cent., above the average. The largest monthly amount was 20·85 inches accompanying the extraordinary prevalence of south-westerly winds during December.

At the top of Ben Nevis the number of rainy days was 276, and at Fort William 246. At the top the maximum monthly was 30 days in January and December, and at Fort William 31 days in December and 28 days in January. In March there were only 15 rainy days at the top and 10 days at Fort William. During the year the number of days on which 1 inch of rain or more

fell at the top was 69, whereas at Fort William the number of days was only 15.

The sunshine recorder on Ben Nevis showed 718 hours out of a possible 4,470 hours, or 16 per cent. of the possible sunshine. The average of the past 17 years being 747 hours, the sunshine of 1900 was 29 hours under the average. The two maximum months are June, 139 hours, and March, 103 hours, and the two minimum months January and December, with 4 hours each. At Fort William the number of hours was 1,040. This is lower than any recorded since these observations began, except in 1896, when the number was 1,036 hours.

At the Ben Nevis Observatory the mean percentage of cloud was 84, and at Fort William 73, both being very nearly the average. At the top the high mean percentages of 97 in December and 96 in January were observed; and at Fort William 88 per cent. in July and 86 in December.

Mr. Omond's time during the past year has been chiefly directed to the utilisation of the observations made at the High Level observatories of Europe viewed in connection with the Ben Nevis observations and their bearing on weather changes. In connection with this work the observations at the following High Level observatories are being utilised.

In France—Barcelonette, 3,714 feet; Servance, 3,990 feet; Gavarnie, 4,452 feet; Puy-de-Dôme, 4,813 feet; Aigoual, 5,099 feet; Mont Ventoux, 6,234 feet; and Pic du Midi, 9,380 feet. *In Germany*—Brocken, 3,766 feet; and Schneekoppe, 5,259 feet. *In Austria*—Semmering, 3,297 feet; Crkvice, 3,599 feet; St. Anton, 4,285 feet; Marienberg, 4,341 feet; Schneeberg, 4,810 feet; Schafberg, 5,827 feet; Rathhausberg, 6,283 feet; Schnittenhöhe, 6,349 feet; Obirgipfel, 6,706 feet; and Sonnblick, 10,154 feet. *In Italy*—Monte Cave, 3,166 feet; and Monteversine, 4,518 feet. *In Switzerland*—Chaumont, 3,701 feet; Rigi Kulm, 5,873 feet; Säntis, 8,094 feet; and Great St. Bernard, 8,130 feet. *In Algeria*—Teniet-el-Haal, 3,738 feet; and Aflou, 4,679 feet. . .

After the above Report had been read by Dr. Buchan, Mr. Rotch, the American meteorologist, said that the observations made on Ben Nevis were unique (1) in being made hourly, (2) in the situation of the mountain in the track of cyclones crossing the Atlantic, and (3) in the close relation of the high-level and low-level stations, which though 4,400 feet apart vertically are within four miles of each other. He was very glad to hear that the observations were to be discussed and published *in extenso* under the able supervision of Dr. Buchan, and that the Observatory would be maintained for special research two years longer.

Mr. W. N. Shaw, F.R.S., Secretary of the Meteorological Council, emphasised the value of the work done and that which remained to be done. The great need now is for more knowledge of the high-level phenomena in relation to the low-level phenomena, for we are nearly at the end of the possibility of further improvement in the methods of forecasting from low-level observations alone. In his reply Dr. Buchan spoke in feeling terms of the great loss sustained in the death of Professor Tait.

In the course of his Address as President of Section E, on "Research in Geographical Science," Dr. H. R. Mill said:—

"With regard to Meteorology, the distribution of temperature and pressure over the British Islands for the year and for the separate months has been

worked out by the experienced hand of Dr. Buchan, and published both in separate memoirs and in the *Meteorological Atlas*, edited by Dr. Buchan and Dr. Herbertson. But such observations as the degree of cloud or of sunshine can as yet be treated only in a superficial and generalised way for want of data. Perhaps the most important and certainly the most difficult of all the atmospheric conditions to discuss fully is precipitation. It depends on so many varying conditions, such as the form and exposure of the land, the altitude above sea-level, the direction and force of the wind, the relative frequency of thunderstorms, the distance from the sea, the direction of the average paths of cyclonic storms, &c., that far more numerous and more long-continued observations are required to establish the normal condition of the country than in the case of either temperature or pressure. When we reflect that the whole water-supply of the country depends directly on rainfall, and when we remember that the value of water-power made available by differences of level promises to be greater in the future than it has been in the past, we can see that a study of rainfall in conjunction with configuration may prove as valuable for the localisation of the manufacturing centres of the future as the geological survey was for those of the present.

"Thanks to the remarkable foresight and the untiring exertions of the late Mr. Symons, the volunteer rainfall observers of this country have been encouraged to organise their efforts, and by working on a common plan have accumulated within the last forty years a mass of observations unrivalled for number and completeness in any other land. But as yet the difficulties in the way of constructing a map of normal rainfall on an adequate scale have not been overcome, and much experimental work will probably be necessary before it can be accomplished. To this task it is my ambition to devote myself. I may be permitted to state that Scotland is far behind England or Wales in the number of rainfall stations per square mile. Thus there is, roughly, one rain-observing station for every 20 square miles of England, one for every 30 square miles of Wales, but only one for every 67 square miles of Scotland, and one for every 170 square miles of Ireland.

"Rainfall observations only tell the amount of available water; the configuration of the stream-beds must be considered in determining water-power. The only country I know where the horse-power of the rivers has been measured and mapped is Finland, but of course individual rivers, such as the Mississippi, Rhine, Seine, and Thames, have been thoroughly studied. Before many decades have passed it will be a necessary element in the surveys of all countries, though at present the available data are few and scattered.

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"The utilisation of wind- and water-power must increase in importance as mineral fuel diminishes in amount or increases in price. Wind- and water-power will never fail as long as the sun shines and the land remains higher than the sea; but what may fail unless timely precautions are taken is the power of utilising them for the benefit of the community at large. Are the existing laws as to water-rights, and the absence of laws as to the utilisation of wind desirable and satisfactory? The usual answer to such questions is, 'Why trouble about that just now? These matters are not urgent, other things are.' That argument is answerable for many disasters. The inevitable is in many if not in most cases simply another name for the unforeseen. It is inevitable that the country will be impoverished if the utilisation of wind- and water-power and the transport of that power by electricity are not wisely safeguarded and provided for; but when a survey of our resources, the circulation

of the air over our islands, and the effects produced by the interposition of the mountains, plateaus, and valleys upon it, plainly points to the possibility of such a trouble, it only becomes inevitable as a result of culpable negligence.

"It is of the utmost importance, also, to investigate and evaluate the resources of the surrounding seas. The recent International Conference for the exploration of the sea held at Christiania formulated a scheme of research which has been taken up enthusiastically by Belgium, Holland, Germany, Denmark, Russia, Sweden and Norway. Its object is to place the fisheries of Northern Europe on a scientific basis, and to make for that purpose a comprehensive survey of the sea, which will prove of high value to meteorology, and through it to agriculture as well. The recent work by Mr. H. N. Dickson on the circulation of the surface waters of the North Atlantic in conjunction with similar work by Professor Pettersson, in Sweden, shows how hopeful such researches are from the purely scientific standpoint, and their practical importance is no less. It remains with our Government to show that this country is not indifferent to an opportunity, such as has never presented itself before, of placing one of our great national industries on a basis of scientific knowledge. This is in my belief one of the cases in which the expenditure of thousands now will mean the saving of millions a few years hence.

"It is magnificent to send out polar expeditions, and they speak volumes for the greatness of the human mind that can give itself to the advancement of knowledge for the sake of knowledge, knowing that it will bring no material gain; and I trust that such a spirit will continue to manifest itself until no spot of Earth, no land however cold or hot, no depth of sea, no farthest limit of the atmosphere remains unsearched and its lesson unlearnt. But I insist that the full study of our own country is on a totally different footing. Magnificent it may be, too, but sternly practical, since it is absolutely essential for our future well-being, and even for the continuance of the nation as a Power amongst the states of the world. Still, there is every probability that such work will be neglected until the events which it should avert are upon us, and then it will be too late to make provisions which now could be done cheaply, easily and effectively."

Papers were read to Section A by Mr. A. Lawrence Rotch on Meteorological Observations by means of kites at sea (see his letter on the following page) and by Mr. F. Napier Denison on the Seismograph as a sensitive Barometer. Descriptions of instruments for determining terrestrial magnetism were given by Captain E. W. Creak, F.R.S., and Mr. R. T. Glazebrook, F.R.S. The old-established Committee on Underground Temperatures also reported once more. In Section B, Mr. W. Ackroyd read two interesting papers on the Inverse Relation of Chlorine to Rainfall, and on the Distribution of Chlorine over Yorkshire, the subject being largely that of purification of air by rain. In Section G the only paper likely to interest meteorologists was one by Mr. Killingworth Hedges on the protection of buildings from lightning.

A joint meeting of the Geological, Zoological and Geographical sections discussed a scheme for the Complete Survey of the Lakes of the British Islands put forward by Sir John Murray, F.R.S., and Mr. Laurence Pullar. The new survey (the whole expense of which will be borne by Mr. Pullar) will include meteorological observations.

Correspondence.

KITE FLYING AT SEA.

To the Editor of Symons's Meteorological Magazine.

IN your article, "Meteorology on the British Antarctic Expedition," in the September Magazine, you mention that a trial of the kites intended for meteorological observations was made, without the instruments being attached, during the voyage of the "Discovery" to Madeira. The German Antarctic vessel, "Gauss," was likewise equipped with kites and meteorographs, but it is to be feared that, as both these ships are proceeding chiefly under sail, the opportunities for flying kites on the voyage southward will be limited, and, since the importance of their use may not be appreciated, it seems likely that but scanty observations in the upper air will be obtained.

Until last summer it does not appear that kites bearing aloft meteorological instruments have ever been flown from a moving vessel, for I find that the observations of temperature above the Arctic Ocean, referred to in this Magazine, Vol. **30**, p. 10, and Vol. **32**, p. 34, were made with kites sent up from ice-fields. In order to raise the kite-meteorograph, employed at the Observatory on Blue Hill, during the calms that accompany our anticyclones, it occurred to me to make use of the artificial wind created by a small steamboat that could be manœuvred at will, and this experiment, so far as I know the first of its kind, which was successfully performed in Massachusetts Bay last August, is described in *Nature*, Vol. **64**, p. 453. With the aid of an assistant, a trial of the kites was then made upon an eastward-bound transatlantic steamer, and the first records of barometric pressure, air temperature, relative humidity, and wind velocity, obtained a quarter of a mile above the mid-Atlantic, were shown to Section E of the British Association at its recent meeting in Glasgow. Although calm weather prevailed during most of the voyage, the wind created by the motion of the vessel enabled the kites to be flown on five days of the eight, and had it been possible to alter the course of the steamer, as was done in the first experiment, and so increase or diminish the resultant wind, the kites could have been flown every day. However, the records that were obtained show abnormal changes of temperature and humidity with height above the sea, as compared with the changes usually observed over the land. Incidentally, the difficulty of observing accurately temperature and wind on board ship was illustrated. For instance, with a light wind and the meteorograph hung several feet above the upper after-deck and apparently well exposed, a temperature was recorded several degrees higher than when the instrument was held by the kites at the same height clear of the ship. The measurement of wind velocity was also difficult, because in most exposed places, and notably on the bridge, the wind is deflected upward and so its horizontal velocity is diminished.

Under the bridge, on the contrary, too high a velocity was generally recorded, owing to the compression, and consequent acceleration, of the stream of air flowing through the passage.

But the chief value of my experiments is to show that kites carrying meteorological instruments can be flown almost always on ship-board. Observations up to a height of two or three miles can thus be obtained in our latitudes under weather conditions that would prevent the use of kites for the purpose on land; and in this way, also, the general conditions prevailing at equal altitudes above ocean and continent can be compared. In the tropics, kites flown from steamships will furnish information about the upper atmosphere that it has been impossible to obtain hitherto and yet which is of the greatest importance for our knowledge of the circulation of the atmosphere. For example, the source of the trade winds and of the anti-trades has never been satisfactorily demonstrated, but Dr. Hildebrandsson believes now that observations with kites, and with small free balloons to show the direction of the upper currents, continued during three months around the high pressure area of the North Atlantic and across the doldrums to the south-east trades, would solve this most important problem. For this purpose a steamer under the control of the meteorologist—preferably a large yacht—is required, and should any of your readers be willing to put such a vessel at my disposal, I will gladly furnish the apparatus and *personnel* necessary to carry out the investigation.

A. LAWRENCE ROTCH.

Blue Hill Meteorological Observatory, U.S.A.,
October 15th, 1901.

THE MOON AND RAINFALL.

To the Editor of Symons's Meteorological Magazine.

IN a recent enquiry into the average distribution of days with rain beyond a certain limit (·40 in. or ·50 in.), in the period of a lunar synodical revolution, there appeared to be a conspicuously wet time (maximum of wetness), as regards the number of such wet days, about the time of new moon, and a conspicuously dry time (minimum of wetness) shortly before the last quarter. The inquiry covered the last 24 years. (See *Nature*, August 29th, 1901).

The following is another aspect of the matter, which may be worth considering.

Limiting our attention to the three days about full moon on the one hand, and the third, fourth and fifth days after full moon, on the other, we calculate, in each of the last 12 years, the average rainfall in those two sets of three days groups (each set having 12 or 13 groups). Calling the average of the groups about new moon *a*, and that of the other *b*, we have the following table.

The uniformity of excess in *a*. seems remarkable. It appears that in those 12 years at least, not only is the number of wet days with ·40 in., or more, consideraly greater about new moon, than about the

middle of the time between full moon and last quarter, but the average rainfall (as above reckoned) is regularly greater.

	a. in.	*b.* in.	Relation of *a* to *b.* in.		*a.* in.	*b.* in.	Relation of *a* to *b.* in.
1889	·19	·09	+·10	1897	·22	·14	+·08
1890	·30	·20	+·10	1898	·13	·10	+·03
1891	·19	·13	+·06	1899	·30	·05	+·25
1892	·28	·15	+·13	1900	·14	·11	+·03
1893	·28	·08	+·20		—	—	—
1894	·17	·15	+·02	Av.	·24	·14	+·10
1895	·32	·27	+·05		—	—	—
1896	·36	·17	+·19				

I hope at some future time to extend this branch of the inquiry further back, but happen to be debarred from doing so at present.

ALEX. B. MACDOWALL.

We cannot let this letter appear without expressing our opinion of the method of research which Mr. MacDowall has been employing with infinite labour, and with a perseverance in itself most exemplary, and we are sorry that the opinion is unfavourable. One is struck first by the fact that the place where the rainfall was measured is not stated; but we assume from the reference to *Nature* that the data are those of Greenwich Observatory. It is well-known that a rainy spell in one part of the British Islands very often coincides with a dry spell in another; hence, in order to prove that the moon exerts any real influence, it would be necessary to consider several stations in different climatic regions, and to discover a parallelism in their curves of variation, which would point to the action of a common cause external to the atmosphere. Indeed, if the phases of the moon coincide with appreciable variations in weather, we should be able to trace simultaneous coincidences in all parts of the world, and especially in the tropics. Again, to be complete, the study of the phenomena at each station would require to be carried out in two ways, (*a.*) by classifying the wet days occurring about certain phases of the moon, and (*b.*) by classifying the lunar phases occurring about all groups of wet days. Six days out of each 28 are discussed in the foregoing table, but what about the wet days which occurred amongst the remaining 22?

Mr. MacDowall points out coincidences which it may be are worthy of careful study; but amongst all his writings we have never seen any of the questions he raises adequately discussed. He finds various successions, coincidences and alternations that remind us of the interesting symmetries that an idle eye can create in the pattern of a common-place wall-paper. He suggests numerous ideas, some, perhaps, contradictory of others, but he deals only in fragments which do not seem to us to be worth the labour bestowed upon them, if their object is to demonstrate a physical influence of the moon on the atmosphere. We should be glad to hear the opinion of our readers on the subject.—[ED. *S.M.M.*]

CLIMATE OF THE BRITISH EMPIRE, 1900.

THE following Table is a summary of the monthly values printed in the *Magazine*, and so far as the stations concerned are representative it conveys an idea of the varieties of climate experienced in the British Empire during the last year of the nineteenth century. It is true that neither the hottest, the coldest, the wettest nor the driest points in the Empire are dealt with, and the reader is warned, as on each previous occasion of presenting this annual summary, not to take the figures as meaning more than they profess to convey.

The maximum temperatures at London and Toronto are the highest noted for these stations since the imperial tables were commenced in 1877. On the other hand the maximum at Malta is lower than has been reported before. The average maximum temperature and the mean temperature for the year at Calcutta and Colombo were slightly higher than in any previous year of our record, and for Calcutta the year also showed the highest rainfall. At Mauritius, on the other hand, a minimum temperature of 53°.0 was recorded, showing a night colder by half a degree than the coldest previously noticed.

With regard to the Australasian stations, the only noticeable "records" are in Adelaide, where a relative humidity averaging 66 per cent. has been recorded, showing the dampest year for that dry city; and in Wellington and Auckland, where relative humidities of 70 and 69 per cent. respectively show the driest years yet figuring in our record for these New Zealand towns.

SUMMARY.

Highest Temp. in shade	112°·2 at Adelaide on January 1st.
Lowest „ „	— 34°·8 at Winnipeg on Feb. 9th.
Greatest Range in year	135°·3 at Winnipeg.
Least „ „	25°·5 at Grenada.
Greatest Mean Daily Range ...	24°·6 at Winnipeg.
Least „ „ „ ...	9°·8 at Grenada.
Highest Mean Temp.	82°·3 at Colombo.
Lowest „ „	36°·9 at Winnipeg.
Driest Station	Adelaide, Fredericton, } mean humidity, 66.
Dampest Station	Ceylon, Colombo, „ „ 81.
Highest Temp. in Sun.....	170°·5 at Adelaide.
*Lowest Temp. on Grass**.....	— 14°·0 at Toronto.
Greatest Rainfall	89.32 in. at Calcutta.
Least „	16·10 in. at Malta.
Most Cloudy Station	Victoria, B.C., average amount 6·4.
Least „ „	Malta, average amount, 2·7.

* The min. on grass is not recorded at the other Canadian stations.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE FOR 1900.

STATIONS. *Those in Italics are South of the Equator.*	ABSOLUTE. Maximum. Temp.	Maximum. Date.	Minimum. Temp.	Minimum. Date.	AVERAGE. Max.	Min.	Mean.	Dew Point.	Humidity.	ABSOLUTE. Max. in Sun.	Min. on Grass.	TOTAL RAIN. Depth.	Days.	AVERAGE. Cloud.
	°		°		°	°	°	°		°	°	in.		0—10
England, London ...	95·2	July 16	17·7	February 9	59·6	43·9	51·8	44·1	78	137·1	13·0	23·28	174	6·1
Malta	94·0	June 27	41·2	January 14	73·0	59·6	66·3	57·6	77	149·0	36·1	16·10	70	2·7
Cape of Good Hope.	94·9	January 18	35·1	August 7	70·9	54·3	62·6	53·9	75	...	...	21·25	99	4·3
Mauritius	87·2	December 29	53·0	June 29 & 30	79·5	68·5	74·0	64·7	75	156·7	43·3	31·28	173	5·6
Calcutta	103·6	April 2	50·8	January 14	88·6	71·6	80·1	69·9	73	159·0	41·5	89·32	99	4·2
Bombay	93·4	June 8	61·0	January 25	86·3	75·4	80·9	72·0	75	144·5	51·9	69·12	91	3·6
Colombo, Ceylon ...	95·5	March 27	68·5	January 2 & 3	88·9	75·8	82·3	73·9	81	157·0	65·5	83·66	170	4·5
Melbourne	106·9	January 28	30·2	July 3	66·4	49·3	57·8	47·6	73	161·1	24·0	28·09	139	6·1
Adelaide.....	112·2	January 1	35·4	July 19	72·0	52·8	62·4	47·8	66	170·5	28·3	21·70	137	5·1
Sydney	104·1	December 17	39·3	July 17	69·6	56·4	63·0	52·2	73	153·0	30·0	66·54	170	(5·0)
Wellington	79·0	February 1	34·0	July 13,19,20	61·2	48·9	55·1	45·1	70	137·0	23·0	51·01	182	4·7
Auckland	78·5	February 2 / March 9	40·0	July 10	65·6	53·8	59·7	49·3	69	144·0	36·0	39·15	197	5·6
Jamaica, Halfway Tree.....	...	.....	...	.....	...	...	...	...	...	...	...	...	...	...
Trinidad	98·0	October 8	61·0	September 24	87·9	70·8	79·4	72·3	80	168·0	47·0	67·36	194	...
Grenada	91·5	October 4	66·0	June 27	83·6	73·8	78·7	71·2	74	162·8	...	63·45	251	3·8
Toronto	98·0	August 6	— 9·6	February 26	56·3	38·9	47·6	40·6	76	126·5	—14·0	29·62	141	5·7
New Brunswick, Fredericton.....	92·7	August 26	—29·0	February 3	51·8	29·8	40·8	38·4	66	...	...	50·99	124	5·6
Manitoba, Winnipeg	100·5	June 23	—34·8	February 9	49·2	24·6	36·9	...	...	...	...	18·58	100	5·1
British Columbia, Victoria	79·6	July 31	18·0	February 14	56·4	45·1	50·7	...	...	...	...	24·73	169	6·4

REVIEWS.

Nedböriagttagelser i Norge. Udgivet af det Norske Meteorologiske Institut. [By H. MOHN.] Aargang **6**, 1900. Kristiania, 1901. Size 16 × 11½. Pp. xviii. + 124. *Plates.*

THE short account of the Norwegian rainfall system kindly communicated by Professor Mohn to the June number of this Magazine, makes it unnecessary to devote more than a paragraph to this admirable report. The daily values of rain and snow are given for a large number of stations, and a map shows the rainfall of the whole of Norway by the ingenious device of printing the lines of equal rainfall on transparent paper, which may be laid over any map of the country on the same scale, and so enable the distribution of rainfall to be compared with the physical, political, or any other divisions.

Annales de l'Observatoire météorologique, physique et glaciaire du Mont Blanc. Publiées sous la direction de J. VALLOT. Tomes **4** et **5**. Paris. G. Steinheil, 1900. Size 11 × 9. Pp. 190 and 60 *plates.*

THIS report contains a paper by Dr. M. Andesen on the influence of barometric pressure on the chemical action of light, and some valuable memoirs on the movements of glaciers and mountain torrents.

Annales du Bureau Central Météorologique de France, publiées par E. MASCART. Année 1898. Paris. Gauthier-Villars, 1900. 3 parts. Size 12½ × 10. *Plates.*

THE first part includes a number of memoirs on the meteorological and magnetic phenomena of the year 1898 in France, with numerous plates and maps, including small sketch maps showing the daily progress of all the important storms of the year. The other two parts contain the figures of the actual observations at the stations of the French Meteorological Service.

Deutsche Ueberseeische Meteorologische Beobachtungen gesammelt und herausgegeben von der Deutschen Seewarte. Heft X. Meteorologische Beobachtungen in Deutsch-Ost-Afrika. Von DR. HANS MAURER. [No place, publisher nor date]. Size 13 × 10. Pp. 182. *Plates.*

A SPLENDID record of thorough organisation and persevering work in unfavourable conditions. The German Colonial authorities are very wisely testing the climate of their African possessions by the use of self-recording instruments, some beautiful traces from those at Dar-es-Salam being reproduced as illustrations to the text and tables which summarise the climate of eight stations in German East Africa, some of them extending from 1895 to 1899.

Report of the Chief of the Weather Bureau, 1899-1900. U.S. Department of Agriculture. Washington: 1901. Size 12 × 9. Pp. 436.

THE Chief of the Weather Bureau refers first to the meteorological protectorate which the United States extended over the British West Indies in 1898 and over Mexico in 1899. However we may object on patriotic grounds to see another country undertaking public duties in British territory, we cannot but rejoice on scientific grounds that no dog-in-the-manger policy was permitted to prevent the work being carried out. The total number of stations with paid observers under the Weather Bureau in 1899 was 592, in addition to which about 2500 voluntary stations reported to the Bureau. In addition to the tables of observed values for the various stations, the Report contains an elaborate discussion of the Meteorological work done in Franz Josef Land, in the Arctic regions, in 1898-99, by Mr. Evelyn B. Baldwin, who is at the present time leading a new expedition in that region—the most elaborate, we believe, that has ever attempted to reach the North Pole.

BOOKS RECEIVED.

Results of Meteorological Observations taken in Chester during 1900. By the Rev. J. Cairns Mitchell, B.D. Reprinted from the Proceedings of the Chester Society of Natural Science, &c., for the year 1900–01. Size 8½ × 5½. Pp. 8.

The Croydon Microscopical and Natural History Club. Report of the Meteorological Sub-Committee for 1900. Prepared by the Hon. Sec., F. Campbell Bayard, F.R.Met.Soc. Reprinted from the Transactions of the Club. 1901. Size 9½ × 5½. Pp. [60].

La Tempête du 13-14 Février, 1900, par Albert Lancaster. Extrait des Bulletins de l'Académie royale de Belgique. 1900. Size 8½ × 6. Pp. 20, *Plate.* [This description of the storm of February 13–14, 1900, is kindly forwarded, together with other pamphlets on the meteorology of Belgium. by the author, M. Lancaster, Director of the Belgian Meteorological Service.]

Annuario publicado pelo Observatorio do Rio de Janeiro para o anno de 1901. Anno XVII, Rio de Janeiro, 1901. Size 7 × 5. Pp. 300.

Report on the Kodaikanal and Madras Observatories for 1900-1901 [by C. Michie Smith.] Size 13 × 8½. Pp. 18.

Results of the Magnetical and Meteorological Observations made at the Royal Alfred Observatory, Mauritius, in the year 1899, under the direction of T. F. Claxton. Mauritius, 1900. Size 13 × 8½. Pp. xiv.+98.

Rainfall of South Australia and the Northern Territory during 1898, with weather characteristics of each month, by Charles Todd, K.C.M.G., F.R.S. Adelaide, 1901. Size 13½ × 8½. Pp. 82. Maps. [This includes a finely executed rainfall map in colours].

Rousdon Observatory, Devon. Volume XVII. Meteorological Observations for the year 1900, made under the superintendence of the late Sir Cuthbert E. Peek, Bart. London, 1901. Size 11 × 9. Pp. 58. *Plates.*
[This volume was prepared by Mr. W. Marriott, at the request of the late Sir Cuthbert Peek, whose portrait forms the frontispiece].

Aus dem Archiv der Deutschen Seewarte XXIII., Jahrgang 1900. Hamburg, 1901. Size 11½ × 9.
[Contains a number of seperately-paged memoirs on the Climate of Hamburg and of the German coasts, on the accuracy of measurements with a mercurial barometer, and on the meteorological causes of floods in mountainous districts].

METEOROLOGICAL NEWS AND NOTES.

CLIMATIC DISCIPLINE is claimed by Professor Alleyne Ireland, of Chicago University, in a paper read to the British Association, as the cause of the superiority of the races of the temperate zone to all others. He says :—

"Briefly the question resolves itself into one of climatic discipline. In Europe the extreme range of temperature demands variety of clothing, and to this necessity we may attribute the growth of industry in early times. A winter season, during which the food cannot be obtained directly from the soil, involved an excess of labour above the daily need during the season of crops, and from this we adduce the development of thrift and foresight. To these two factors, and to their innumerable and far-reaching corollaries, must be attributed the general character of European civilisation. In the development of the tropical man neither of these great agencies has been at work, nor, except in a few special instances, can it be foreseen that they will come into operation.

MATHEMATICAL METEOROLOGY is too little studied in this country, but in the *Monthly Weather Review* Professor Abbé continues to translate important papers by foreign physicists, among which an important place must be given to Prof. E. Pockel's "Theory of the formation of Precipitation on Mountain Slopes," in the numbers for April and July, published in June and October. It discusses the influence of a mountain slope on the amount of the precipitation from air rising from sea-level, and moving towards the slope.

RAINGAUGES ON MOUNTAINS are much at the mercy of their exposure for giving correct readings. Dr. Herman Stade, in a recent number of *Das Wetter*, describes the results of nearly three years' observations on the summit of the Brocken (3,766 ft.), in the Harz Mountains, Germany. He had three large rain gauges, with a special rim for snow, placed at 65 ft. distance from the north, east and south walls of the hotel, which stands on the summit of the hill, so that at least one was exposed to the wind, and at least one sheltered from it, on every occasion. The result was that for rain when the wind-force was between 1 and 2, all gauges caught the same amount; but when the wind force was 3 to 4, the exposed gauge caught only three-quarters, and when the wind-force was 9 to 11, scarcely more than half as much as the sheltered gauge. For snow, in wind-force 1–2 the exposed gauge caught only three-quarters, in force 3–4 only a half, and in force 9–11 less than one-quarter of the amount caught in the sheltered gauge.

THE METEOROLOGICAL SOCIETY OF MAURITIUS has just published Vol. I. of a new series of Proceedings and Transactions, the first since the appearance of Vol. VI. of the old series in 1864. No meeting was held between 1894 and 1896, when the members came together to bid farewell to the late Dr. Meldrum. The Society has since met frequently, and the volume now published by the Secretary, Mr. T. F. Claxton, contains several papers on the weather of Mauritius, and a valuable series of descriptions of cyclones in the Indian Ocean.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, MAY, 1901.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	TotalRain. Depth.	TotalRain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, CamdenSquare	83·8	29	36·8	18	67·0	44·6	43·9	68	125·8	30·7	·85	6	4·3
Malta	77·8	30	50·6	13	71·2	57·2	55·0	78	139·4	46·0	1·54	6	2·8
Lagos	92·0	4, 7	70·0	9, 25	87·9	76·4	76·2	80	148·0	56·0	13·05	20	...
Cape Town	82·0	6	41·8	18	66·2	51·4	50·2	73	...	...	6·52	14	5·1
Mauritius	84·1	4	62·9	7	80·2	68·5	65·8	76	139·2	54·1	1·94	12	5·3
Calcutta	104·0	9	70·2	19	96·3	77·0	73·8	68	157·0	66·8	6·22	6	3·4
Bombay	93·3	14	80·0	10	91·4	82·4	76·3	72	143·2	74·7	·01	1	2·9
Colombo, Ceylon	92·7	12	73·5	11*a*	90·5	77·4	76·2	84	150·0	70·0	6·28	19	5·9
Melbourne	73·0	3	36·9	30	62·6	48·1	46·2	72	130·3	29·9	·45	8	6·6
Adelaide	82·2	6	42·7	23	69·5	51·1	45·0	59	141·0	31·6	1·18	8	5·6
Sydney	75·5	20	43·9	23	66·0	52·0	48·2	81	120·2	32·7	1·96	13	3·9
Wellington	66·0	19	36·0	26	60·2	47·2	42·6	65	111·0	29·0	1·94	10	4·3
Auckland	66·5	22	42·0	26	61·5	49·0	48·4	78	125·0	38·0	·98	18	5·5
Jamaica, Halfway Tree	91·0	31	69·0	6	87·4	71·5	69·2	71	...	...	·40	5	3·1
Trinidad	96·0	11	62·0	14	89·9	70·9	72·7	79	165·0	58·0	6·45	12	...
Grenada	88·0	12	73·8	10*b*	84·8	75·2	69·8	72	148·2	...	4·87	17	3·1
Toronto	79·2	5	33·0	15	63·9	45·9	46·3	75	96·5	28·4	3·54	18	6·9
Fredericton, N.B.	85·7	22	30·0	6	64·3	42·1	40·8	60	...	...	2·88	14	6·6
Winnipeg, Manitoba	91·5	17	28·0	8	73·1	43·4	...	...	...	...	·36	7	3·3
Victoria, B.C.	76·6	25	37·6	6	58·9	46·3	..	...	...	...	·98	13	6·5

a—and 18. *b*—and 11.

REMARKS.

MALTA.—Mean temp. of air 62°·8, or 1°·4 below the average. Mean hourly velocity of wind 9·6 miles or 0·5 below average. Mean temp. of sea 65°·8. TSS on 13th and 14th. L on 19th. H on 12th J. F. DOBSON.

Mauritius.—Mean temp. of air 1°·5, of dew point 1°·0, above, and R 2·19 in. below their respective averages. Mean hourly velocity of wind 11·9 miles, or 1·6 above average; extremes, 30·1 on 24th and 1·9 on 31st; prevailing direction S.E. by E. to E. by S. T. F. CLAXTON.

COLOMBO, CEYLON.—Mean temp. of air average, dew point 1°·1 above, and R 5·76 in. below, their respective averages. Mean hourly velocity of wind 8·6 miles; prevailing direction S.W. TSS occurred on 9 days. L was seen on 7 days. W. C. S. INGLES.

Adelaide.—Mean temp. of air 2°·9 above the average. The mean max. temp. was 4°·6 above the average, and is a record for May. On 10 days max. in shade was over 75°; while on the average it is only two days. Very dry over State, but drought partially relieved later by good coastal rains. C. TODD, F.R.S.

Sydney.—Mean temp. of air 0°·6 above, R 3·39 in. below, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—Mean temp. of air 1°·7 above, and R 2·95 in. below, their respective averages. Fine weather on the whole. Prevailing winds N.W. and stormy at times. R. B. GORE.

Auckland.—Mean temp. 2°·0 below the average. Cool and cloudy through most of the month, with numerous slight showers, but total R small, and not quarter of the average for the previous 33 years. T. F. CHEESEMAN.

TRINIDAD.—R 2·80 in. above the 30 years' average. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, OCTOBER, 1901.

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Uxbridge, Harefield Pk..	1·86	XI.	Castle Malgwyn	4·25
II.	Dorking, Abinger Hall .	2·50	,,	Builth, Abergwesyn Vic.	5·06
,,	Sheppey, Leysdown	1·42	,,	Rhayader, Nantgwillt ...	3·81
,,	Hailsham	3·22	,,	Lake Vyrnwy	4·04
,,	Crowborough.....	3·07	,,	Corwen, Rhug	...
,,	Ryde, Beldornie Tower..	2·82	,,	Criccieth, Talarvor	4·33
,,	Emsworth, Redlands ...	2·15	,,	I. of Anglesey, Lligwy..	5·15
,,	Alton, Ashdell	3·37	,,	Douglas, Woodville.....	6·40
,,	Newbury, Welford Park	1·39	XII.	Stoneykirk, Ardwell Ho.	5·28
III.	Oxford, Magdalen Coll..	1·19	,,	New Galloway, Glenlee	7·49
,,	Banbury, Bloxham	1·47	,,	Moniaive, Maxwelton Ho.	6·11
,,	Pitsford, Sedgebrook ...	1·51	,,	Lilliesleaf, Riddell	2·50
,,	Huntingdon, Brampton.	1·78	XIII.	N. Esk Res. [Penicuick]	2·80
,,	Wisbech, Bank House...	1·51	XIV.	Glasgow, Queen's Park..	3·88
IV.	Southend	1·53	XV.	Inveraray, Newtown ...	8·86
,,	Colchester, Lexden	1·35	,,	Ballachulish, Ardsheal...	8·32
,,	Saffron Waldon, Newport	1·96	,,	Islay, Eallabus.....	5·22
,,	Rendlesham Hall	1·80	XVI.	Dollar.....	4·03
,,	Swaffham	2·65	,,	Balquhidder, Stronvar...	7·11
V.	Salisbury, Alderbury ...	2·53	,,	Coupar Angus Station...	2·00
,,	Bishop's Cannings	1·62	,,	Blair Atholl	3·79
,,	Blandford, Whatcombe .	2·61	XVII.	Keith H.R.S.....	3·39
,,	Ashburton, Druid House	2·51	,,	Forres H.R.S.	...
,,	Okehampton, Oaklands.	3·28	XVIII.	Fearn, Lower Pitkerrie..	2·52
,,	Hartland Abbey	3·96	,,	S. Uist, Askernish	6·39
,,	Lynton, Glenthorne ...	...	,,	Invergarry.....	5·88
,,	Probus, Lamellyn	3·19	,,	Aviemore, Alvie Manse.	2·84
,,	Wellington, The Avenue	2·11	,,	Loch Ness, Drumnadrochit	2·52
,,	North Cadbury Rectory	1·91	XIX.	Invershin	4·03
,,	Clifton, Pembroke Road	1·57	,,	Durness.....	...
VI.	Ross, The Graig	1·23	,,	Watten H.R.S.....	2·76
,,	Wem, Clive Vicarage ...	2·42	XX.	Dunmanway, Coolkelure	4·81
,,	Wolverhampton, Tettenhall	...	,,	Cork, Wellesley Terrace	2·82
,,	Cheadle, The Heath Ho.	2·86	,,	Killarney, District Asyl.	5·21
,,	Coventry, Priory Row...	1·49	,,	Caher, Duneske	2·46
VII.	Market Overton	1·75	,,	Ballingarry, Hazelfort...	2·40
,,	Grantham, Stainby	1·63	,,	Limerick, Kilcornan ...	...
,,	Horncastle, Bucknall ...	2·55	,,	Miltown Malbay	5·36
,,	Worksop, Hodsck Priory	1·54	XXI.	Gorey, Courtown House	3·45
VIII.	Neston, Hinderton	2·97	,,	Moynalty, Westland ...	3·45
,,	Southport, Hesketh Park	2·92	,,	Athlone, Twyford	3·39
,,	Chatburn, Middlewood.	3·73	,,	Mullingar, Belvedere ...	3·44
,,	Duddon Val., Seathwaite Vic.	9·38	XXII.	Woodlawn	3·81
IX.	Baldersby	1·65	,,	Crossmolina, Enniscoe ..	5·40
,,	Scalby, Silverdale	1·69	,,	Collooney, Markree Obs.	4·81
,,	Ingleby Greenhow Vic..	2·00	XXIII.	Enniskillen, Model Sch.	3·48
,,	Middleton, Mickleton ...	2·29	,,	Warrenpoint.....	3·58
X.	Haltwhistle, Unthank H.	...	,,	Miltown, Banbridge.....	2·59
,,	Bamburgh	1·61	,,	Belfast, Springfield	4·73
,,	Keswick, The Bank	5·60	,,	Bushmills, Dundarave..	4·07
XI.	Llanfrechfa Grange	1·88	,,	Stewartstown	5·00
,,	Treherbert, Tyn-y-waun	5·11	,,	Killybegs	...
,,	Llandovery	3·67	,,	Horn Head	4·73

OCTOBER, 1901.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1890-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date	Min. Deg.	Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	1·92	— ·67	·41	16	15	74·4	1	33·1	27	0	3
II.		Tenterden	2·11	— ·88	·47	15	12	72·5	1	32·0	26	1	8
,,		Hartley Wintney	3·16	+ ·27	·95	16	14	72·0	1, 2	26·0	27	4	8
III.		Hitchin	1·81	— ·76	·41	16	15	70·0	1, 2	29·0	25	3	...
,,		Winslow (Addington)	1·65	— 1·04	·45	17	15	73·0	1	26·0	26	4	6
IV.		Bury St. Edmunds (Westley)	2·43	— ·23	·50	18	15	74·0	1	31·5	26	...	...
,,		Norwich (Brundall)	2·07	...	·46	6	15	75·5	1	28·6	27	1	6
V.		Winterbourne Steepleton ...	4·52	...	1·00	3	14	67·0	1	29·6	27	4	11
,,		Torquay (Cary Green)	1·50	...	·43	17	15	65·9	2	40·5	27	0	0
,,		Polapit Tamar [Launceston]..	3·51	— 1·03	·80	1	15	64·0	1	29·0	27	3	4
VI.		Stroud (Upfield)	1·09	— 1·69	·20	3	18	67·0	1	35·0	22	0	...
,,		Church Stretton (Woolstaston)	2·34	— 1·16	·39	3	19	62·0	1, 4	38·0	26	0	6
,,		Worcester (Diglis Lock)	1·38	— 1·27	·31	3	16	...	...	...	...	...	...
VII.		Boston	2·13	— ·14	·83	1	10	70·0	1	30·0	26	...	...
,,		Hesley Hall [Tickhill].....	1·69	— ·88	·38	6	17	66·0	1, 2	27·0	26	2	...
,,		Derby (Midland Railway).....	1·62	— ·92	·30	3	16	67·0	2	29·0	26*b*	2	...
VIII.		Manchester (Plymouth Grove)	2·82	— ·65	·70	4	15	65·0	1, 3	34·0	20	0	...
IX.		Wetherby (Ribston Hall) ...	2·08	— ·72	·35	18	13	...	...	...	...	...	...
,,		Skipton (Arncliffe)	4·07	— 2·57	·67	5	19	...	...	...	...	...	...
,,		Hull (Pearson Park).....	1·91	— 1·13	·38	16	13	64·0	1, 3	27·0	26	4	16
X.		Newcastle (Town Moor)	2·11	— ·61	·37	21	17	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	15·97	+ 2·55	2·47	27	24	63·0	2	34·5	26	0	...
XI.	WALES.	Cardiff (Ely).....	2·53	— 1·90	·41	1	24	...	...	...	...	...	...
,,		Haverfordwest	5·45	+ ·37	·85	15	24	63·9	1	35·2	23	0	4
,,		Aberystwith (Gogerddan) ...	4·79	— ·77	·59	3	22	65·0	3	30·0	25	4	...
,,		Llandudno.....	3·17	— ·83	·43	3	23	68·0	1	39·2	26	0	...
XII.		Cargen [Dumfries]	5·60	+ 1·17	·86	17	22	65·0	2	30·0	20	5	...
XIII.		Edinburgh (Royal Observatory)	1·52	...	·57	28	17	63·6	2	37·6	26	0	1
XIV.		Colmonell	5·64	+ 1·30	·71	16	19	64·0	21	30·0	12	...	...
XV.		Tighnabruaich	7·93	...	1·36	1	23	57·0	2	33·0	15	0	...
,,		Mull (Quinish).....	9·82	+ 4·25	1·43	17	26	...	...	...	...	...	...
XVI.		Loch Leven Sluices	2·45	— 1·12	·52	29	18	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	2·20	— ·56	·75	28	17	63·3	2	31·1	26	2	...
XVII.		Braemar	3·04	— ·84	·46	18	23	58·8	2	23·3	26	8	12
,,		Aberdeen (Cranford)	3·06	— ·30	·60	3	21	63·0	1, 2	28·0	20*c*	11	...
,,		Cawdor (Budgate)	2·74	— ·20	1·00	28	15	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	3·50	— 2·15	·95	7	11	...	...	...	...	...	...
,,		Glencarron Lodge.....	8·92	— ·37	1·58	28	25	62·5	1	29·2	31	2	...
XIX.		Dunrobin	3·52	+ ·24	·62	5	18	61·5	27*a*	32·0	26	1	...
,,		S. Ronaldshay (Roeberry) ...	3·03	— 1·15	·42	18	20	57·0	27	36·0	29	0	...
XX.	IRELAND.	Darrynane Abbey.....	2·88	— 2·33	·48	13	25	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	4·93	+ 1·03	1·55	17	19	63·0	2	30·0	13	1	...
,,		Broadford (Hurdlestown) ...	3·08	— ·02	·51	7	24	62·0	3	32·0	21	1	...
XXI.		Carlow (Browne's Hill)	2·90	— ·50	·39	3	21	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	2·40	— ·63	·57	29	21	61·9	10*a*	35·7	22	0	3
XXII.		Ballinasloe	3·82	+ ·42	·85	28	25	63·0	28	28·0	16	4	...
,,		Clifden (Kylemore)	5·56	— 2·38	1·07	28	24	...	...	...	...	...	...
XXIII		Seaforde.....	2·53	— 1·06	·38	3	21	62·0	2*a*	32·0	10	1	8
,,		Londonderry (Creggan Res.).	4·18	+ ·10	·64	29	27	...	...	...	...	...	...
,,		Omagh (Edenfel)	4·73	+ ·82	·62	28	29	60·0	1	27·0	15	3	8

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

a—and 28. *b*—and 27. *c*—and 25.

METEOROLOGICAL NOTES ON OCTOBER, 1901.

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.—The first week was somewhat unsettled, with a fair amount of bright sunshine but much R. Damp and unpleasant weather, relieved by a few brilliant days, characterised the remainder of the month. Dense white fogs on the mornings of 20th, 21st, 22nd and 26th. Mean temp. 50°·3 or 0°·5 above the average.

TENTERDEN.—Another dry month, except for the 4 days 15th to 18th when 1·46 in. of R fell. Not quite so warm as the last two Octobers. Duration of sunshine 107·5 hours. W. to N.W. gale on 6th.

HARTLEY WINTNEY.—The first week was very wet, the remainder drier. Foggy mornings from 20th to the end. L on 1st and 6th, TS on 2nd, Westerly gale on 6th. A very mild month and owing to the absence of much frost forest trees were still wearing luxuriant foliage at the end. Swallows last seen on 14th.

WINSLOW, ADDINGTON.—R much below the average of the last ten years, less having been only once registered in October. A good deal of fog. Flowers remained untouched by frost till the morning of 26th when a min. of 26° was registered. A very beautiful autumn, the trees being full of foliage and richly tinted.

BURY ST. EDMUNDS, WESTLEY.—A mild month with little frost. Great want of water, springs being dry which had never been known to fail before.

NORWICH, BRUNDALL.—At the close the R for the year was 7·23 in. deficient. L on 2nd and 7th; T and L on 6th.

WINTERBOURNE STEEPLETON.—The temp. was well maintained except the night minima between 20th and 27th. A thorough growing month, so that all meadows were well covered and grass was abundant. Heavy T on 1st.

TORQUAY, CARY GREEN.—Duration of sunshine 6·1 hours above the average. R 2·55 in. below the average and mean temp. 2°·0 above the average. Mean amount of ozone 4·5, highest 9·0 on 8th with S.W. wind and lowest 1·0 on 13th with N.E. wind.

POLAPIT TAMAR [LAUNCESTON].—Comparatively dry; however, the total for the 10 months was only ·10 in less than the average. Violent TS on 1st.

WALES.

HAVERFORDWEST.—Wet and mild with only three bright days and with R on 24 days. Temp. was high. Large quantities of corn still in the fields were ruined and potato crops suffered great damage. Hours of bright sunshine 89·3. TS of considerable magnitude on 21st lasting from 7 p.m. to 4 a.m., L very vivid, but T mostly distant.

ABERYSTWITH, GOGERDDAN.—Another wet month with very little sun. Dull and showery throughout with very unsettled bar. Boisterous wind on 6th and 7th.

SCOTLAND.

CARGEN [DUMFRIES].—Dull, damp and sunless; difference between dry and wet bulb only 1°. T and L on 1st, L on 21st, T on 22nd.

CLACHANTON, COLMONELL.—Mean temp 47°·1 or 0°·6 above the average of 25 years. L on 16th, 21st and 22nd; T on 14th.

TIGHNABRUAICH, CRAIGANDARAICH.—Similar to October, 1900 in number of wet days. Most of the R fell during the night and generally the wind changed twice in 24 hours.

ABERDEEN, CRANFORD.—On the whole a very fine month; everything safely gathered in.

S. RONALDSHAY, ROEBERRY.—A very good month upon the whole. Mean temp. 46°·1 or 0°·6 below the average.

IRELAND.

DARRYNANE ABBEY.—A month of frequent R but few really wet days.

BROADFORD, HURDLESTOWN.—A wet October. Much hay was still in the fields at the close, as it could not be got dry enough to put it in. The tobacco crop was also very late in cutting from the same cause. Potato crop very good.

DUBLIN, FITZWILLIAM SQUARE.—As in October, 1900, the weather was changeable, rainy and damp. Atmospheric pressure was in very unstable equilibrium. Cold till 27th when it became remarkably warm. A good deal of T and L occurred on 21st and 22nd. Mean temp. 49°·8 or 0°·1 above the average. High winds on 11 days attaining the force of a gale on 6th and 8th. More or less foggy on 8 days. Duration of sunshine 115·3 hours.

OMAGH, EDENFEL.—In the 36 years during which a record has been kept there has never before been recorded so prolonged or persistent a wet period as that which commencing on 16th September continued without intermission till 29th October; a fall of 8·21 in. on 44 rainy days. The amount of R has been surpassed but not the persistence of it for so long a period, yet things are very little the worse for it. The temp. was above the average and the "fall of the leaf" the latest known.

NOTE ON THE CLIMATOLOGICAL TABLE.

WE are indebted to His Excellency Sir William MacGregor, Governor of Lagos, for the addition of Lagos to the stations representing the climates of the British Empire in our monthly tables. The new station at Lagos Hospital is situated almost in the same latitude as Colombo, Ceylon, with the record of which its returns are sure to be compared with much interest. The small difference between the climatic conditions of the two regions seems to indicate that the notoriously unhealthy nature of the Niger Delta is not due to the direct effects of climate.

ERRATUM.

In October number, p. 153, Supplementary Table of Rainfall, *for* AUGUST *read* SEPTEMBER.