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THE PRESSURE OF THE WIND.

BY R. H. CURTIS.

(Concluded from p. 5).

A wind-force of 30 lbs. per square foot, or a little more, will suffice to overturn an ordinary railway carriage; and, although in some parts of Great Britain these run over very exposed places, where they are in no way shielded from the wind, yet instances of their having been overturned are extremely rare; and even when this has occurred there has generally been some contributory cause, such as inclination of the carriage.

Fortunately, however, the Meteorological Council has begun a series of comparisons at their experimental anemometer station at Holyhead, for the purpose of getting some reliable data upon the point, and in their last report they have published some very interesting results which it may be useful to quote, because the report itself may probably enough never find its way into the hands of many who are interested in the subject.

What the Council has done has been to erect by the side of their other anemometers, on an exposed site in the harbour, a pressure-plate anemometer similar in principle to Osler's, but differing from it in this important respect, that it is not free to oscillate under the varying wind pressure as the other is. A given pressure having been applied to the plate, it is firmly held in the position to which it is moved thereby, until a still stronger force is applied to it, to move it yet further back. Under this arrangement there can be no possible question of the plate "being carried by its momentum beyond the position of equilibrium under the wind-pressure acting at the moment;" it reaches its maximum position step by step, and it will faithfully record the *maximum* pressure whatever it may be.

By the side of this instrument is a Dine's pressure-tube anemometer, and also an anemometer designed by Sir G. G. Stokes, and both of these record, but in different ways, the pressure of the wind also. Put briefly, the result is that the records of these anemometers coincide in a remarkable manner with those of the non-oscillating

pressure-plate; and during the period of three or four years in which they have been at work, a pressure of $20\frac{1}{2}$ lbs. per square foot is the *maximum* which has been registered by either of them.

But during two of these years a similar pressure-tube anemometer has been at work at the Bidston Observatory, by the side of the plate which was responsible for the high pressures that have been already mentioned. The pressures this instrument yielded during this interval were practically the same as those got at Holyhead, the maximum being $22\frac{1}{2}$ lbs., instead of the $20\frac{1}{2}$ lbs. recorded in the same gale at Holyhead; so that one may fairly say that the maximum winds at the two places, although between 60 and 70 miles apart, were of nearly the same strength. Yet, while this was so, the Osler plate at Bidston recorded a *maximum* pressure of 63 lbs. (!) as against the $22\frac{1}{2}$ lbs. by the pressure-tube beside it, and the $20\frac{1}{2}$ lbs. by both the plate and pressure-tube at Holyhead.

A plate similarly arranged to prevent oscillation has also been erected at Southport, and Mr. Baxendell's report upon the comparisons he has been making between it and the two pressure-tube anemometers by its side is awaited with much interest; I believe however, I may say, from some observations Mr. Baxendale has already kindly shown me, that it will fully support the facts observed at Holyhead, and that the non-oscillating plate at Southport has been found to give the same pressures as the pressure-tube anemometers, with no maximum, up to the present time, much exceeding 20 lbs. per square foot. All this tends to throw doubt upon the enormous recorded pressure of 90 lbs., or even 60 lbs., per square foot, and to show that it was not a real phenomenon, but must have been due to the inertia of the plate which registered it.

If this proves to be the fact, then the highest pressure fairly recorded in the British Islands as yet, remains that of 30 lbs. per square foot, corresponding to the velocity of 100 miles per hour, registered by Sir Cuthbert Peek, at Rousdon, in March, 1897. Very possibly this pressure may be exceeded at some time or other, but I venture to think not to any great extent; and it seems that a wind-pressure over a large surface of 30 lbs. per square foot, with of course a fair margin for safety, would be a much more reasonable basis for calculation than the 56 lbs. per square foot recommended by the Wind-Pressure Committee, based as that was upon what appears to have been exaggerated data.*

But, at this point we come back to where we were just now, with reference to the position of the meteorological observer in this matter. As regards some elements, observations are made in abundance, and the difficulty lies in getting people to properly discuss those already obtained, rather than in getting observers to take more. But the

* The Committee consisted of Sir W. G. Armstrong, W. H. Barlow, Sir J. Hawkshaw, Prof. Stokes, and Col. W. Yolland, R.E.

instrumental observation of wind force has certainly been greatly neglected hitherto; partly, perhaps, because the instruments are costly; partly because of difficulties in securing for the instruments a suitable exposure; and also possibly because of a doubt in the minds of some as to the value of the results.

But in the non-oscillating pressure-plate we have referred to, each of these objections or difficulties is fairly met. It is not expensive, or it need not be; it can be easily set up if the site is suitable for wind observations at all, and when erected it requires no more attention than does a thermometer; and, lastly, the observations, if properly made, would be most useful in supplying data which are really needed.

Wind-force is an element which varies greatly in different places. The same force is not experienced inland as on the coast, and it is probably very different on our eastern and western coasts: high or exposed plateaux will often experience winds of a strength seldom or never felt in lower or less open situations; and, therefore, there is a real need for each of these classes of locality to be properly represented by suitably exposed anemometers. There is no doubt that when this need for the work to be done is recognized, it will not be long before those who are in a position to do it will take it up; and, judging from the way in which meteorologists in this country have worked in other directions, when it is undertaken it will certainly be satisfactorily done.

MARCH THUNDERSTORMS.

WE do not know whether the quaint adage as to the effect of the first thunderstorm of this month referred to by Robert Browning—

“The morn when first it thunders in March
The eel in the pond gives a leap, they say,”

has any justification in fact or in popular tradition. But if the poet is right the eel had his leap early this year. Sharp thunderstorms are reported from various places in the south of England on March 1st. Rev. H. A. Boys, of North Cadbury Rectory, Somerset, writes on March 1st: “A short, smart squall of wind, rain and hail, with both thunder and lightning, occurred to-day from 0.26 to 0.35 p.m., passing rapidly from W.S.W. to E.N.E. At 3.15 p.m. there was another sharp squall of rain with two or three claps of thunder.” Thunder and lightning were observed at Brixton about 1 p.m., and a sudden shower fell at the same time in North London. A ketch was struck by lightning and sunk in the Bristol Channel, and a building was damaged in Cornwall. At Stroud a small thunderstorm occurred at 6.30 p.m. on March 2nd. On March 3rd thunder was reported in the east of England; on the 5th, lightning was seen

at Stornoway and Pembroke. London was startled by a sudden hail-shower and a single lightning flash and thunderclap at 11.35 a.m. on the 6th, when a church in Dalston was struck and set on fire. On the 7th lightning was reported "as a rarity" from Sussex; so that, except on the 4th, every day of the first week of March had its thunderstorm or thunderstorms.

Correspondence.

OCEAN RAINFALL BY RAIN GAUGE.

To the Editor of Symons's Meteorological Magazine.

I beg to draw the attention of those interested in Arctic and Antarctic exploration to a Report on Ocean Rainfall by me, which was communicated to the Geographical Societies of Manchester and Liverpool in 1897, apropos of the desirability of registering the rainfall at sea on board ship in high latitudes in both pre-polar regions.

I find that the highest latitudes recorded in the report extend to N. Atlantic 52°, N. Pacific 40°, S. Atlantic 51°, S. Indian 50°, S. Pacific 53°, so that there is left about 20 more degrees up to 70° N. and S. without any registration of rainfall at sea.

This work should be undertaken by means of marine rain gauges only and not by recording days or hours of duration of fall. The gauges should be provided with snow tops to take in that form of precipitation.

W. S. BLACK, F.R.C.S.E., F.R.Met.Soc.

Edinburgh, February, 1901.

THE SEVERE FROST OF JANUARY 8TH AND 9TH.

To the Editor of Symons's Meteorological Magazine.

I see that no London observations are mentioned in your notice of the severe frost in January, nevertheless the extreme cold *was* felt in this neighbourhood as the reading of my verified minimum thermometer on the surface of the snow shows conclusively. It registered 2°·3. Only on three nights in the last twenty-six years have I recorded a lower temperature on the ground, and only three times in that period have I recorded so large a difference (15°·7) between the shade and the grass minimum.

The hour of minimum temperature here must have been much later than it was further west, as the shade temperatures were:— Jan. 8th, 11 p.m., 29°·5, subsequent minimum 18°·0, Jan. 9th, 9 a.m., 28°·0 (when the grass thermometer read 29°·0).

WM. B. BUTLER.

Crouch End, N.

RECURRENCE OF COLD AND WARM WEEKS.

To the Editor of Symons's Meteorological Magazine.

The question as to recurrence of weather at about equal intervals may of course be considered without reference to any outside influence (as, *e.g.*, that of the moon or sun). The following facts from recent records of Greenwich weather may be thought noteworthy in this connection.

By a "cold week" we may understand one in which at least four days are cold; by a "warm week," one in which at least four are warm.*

The week about 28th November, 1890, was a distinctly cold one (all its days cold). Starting from that date, let us measure off a series of intervals of 28 days, and note the character of the week about the terminal date in each case. How far can we thus go, finding a cold week at the end of each interval? The answer is, to 19th February, 1892, *i.e.*, through fifteen months. I may here give the terminal dates:—

1890: 28th Nov., 26th Dec. 1891: 23rd Jan., 20th Feb., 20th Mar., 17th April, 15th May, 12th June, 10th July, 7th Aug., 4th Sept., 2nd Oct., 30th Oct., 27th Nov., 25th Dec. 1892: 22nd Jan., 19th Feb.

Coming to 18th March, we are "pulled up" by a warm week.

Again, the week about 15th October, 1897, was a warm one. Now we find each week about the 15th warm, on to 15th March, 1899, *except* in the two months May and June, 1898.

It is right to point out that the former of these cases of recurrence falls in a period which was undoubtedly cold, with a considerable preponderance of cold days; and the latter in a warm period. And we should make allowance for this. Still, it does not seem to me to account altogether for such persistent repetition.

The following figures seem to show that in the 63 months from October, 1895, to December, 1900, there has been a tendency to warmer weather about the middle of the month, than at the ends:

	+	—
Week, about 15th	48	15
" " 4th	31	32
" " 28th	34	29

Thus, while at the ends, we find the numbers (+ and —) nearly equal, the middle shows more than three times as many warm weeks as cold ones.

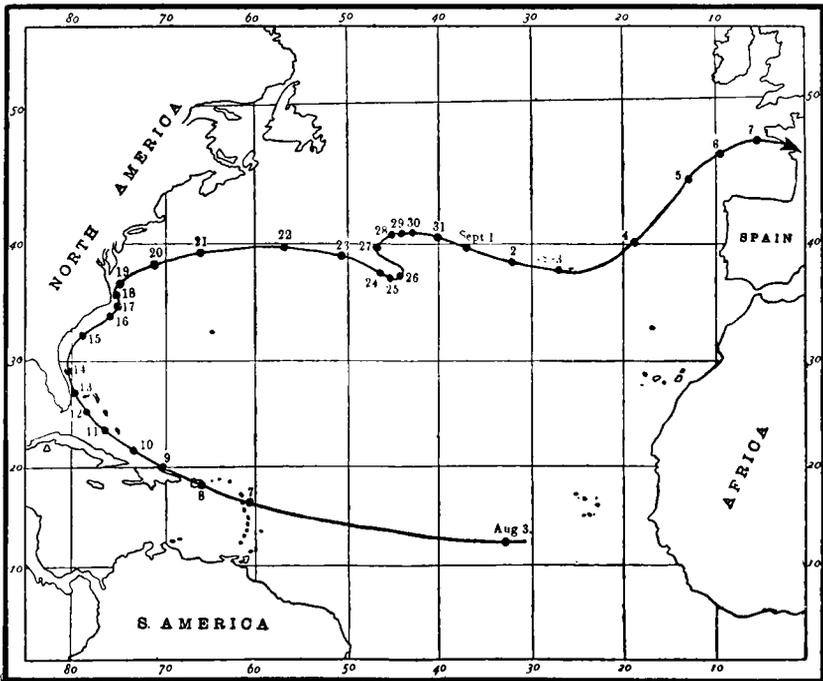
Many practical men, I imagine, must have noticed that the same kind of weather tends to return about the same time in each month, over a considerable period. If we could get some light as to when those long stretches of regular recurrence might be looked for, it would surely be a distinct gain.

ALEX. B. MACDOWALL.

* A "cold" day is assumed to be one the mean temperature of which is below the average for that day of the year, and a "warm" day one with a mean temperature above the average (see the *Weekly Return*).

A FAR-TRAVELLED CYCLONE.

IN the *Monthly Weather Review*, of the United States Weather Bureau, for October, 1900, Mr. C. O. Paullin discusses the history of the disastrous Puerto Rican hurricane, of August, 1899. Thanks to the careful observations made on the British steamer, "Grangense," evidence of the existence of the depression which caused the hurricane was obtained on August 3rd in $11^{\circ} 51' N.$, $35^{\circ} 42' W.$, 1,800 miles E. by S. of the island of Guadeloupe. It is extremely rare to find a tropical cyclone so far to the east, and from the character of the storm, Mr. Paullin believes that it must have originated still nearer the African coast, probably about the longitude of the Cape Verde Islands. The accompanying chart, a reduction of that in the *Weather Review*, shows the track of the storm as it has been determined by innumerable observations both on land and at sea, the figures showing the positions of the centre at Greenwich noon, on successive days. Thus the great atmospheric eddy seems to have preserved its individual existence for at least forty days. The curious hesitancy in its course in mid-Atlantic was associated with an area of high barometric pressure immediately to the north. We are not aware of any other instance on record of a storm having twice crossed the Atlantic, first westward and then eastward.



NORTH ATLANTIC, SHOWING THE TRACK OF THE PUERTO RICA HURRICANE OF 1899.

ROYAL METEOROLOGICAL SOCIETY.

THE Monthly Meeting of this Society was held on February 20th, at the Institution of Civil Engineers, Westminster, the President, Mr. W. H. Dines, B.A., being in the chair

The following gentlemen were elected Fellows :—Mr. P. Y. Alexander, Rev. J. B. Anaman, Mr. A. Baldwin, M.P., Mr. S. B. Bates, Mr. R. Clarke, Mr. J. W. Forrester, Mr. T. Hennell, Mr. L. C. Henry, Mr. G. H. B. Matthews, Mr. J. S. Remington, the Rajah A. V. Jugga Row, and Mr. S. Slefrig.

The President moved that a loyal and dutiful Address of condolence and homage be presented to the King, and on the motion being carried unanimously, the Address was read, the audience standing.

Mr. E. Mawley read his Report on the Phenological Observations for 1900, in which he said that during the greater part of the winter and spring the weather was cold and sunless, but in the summer and autumn the temperature was as a rule high, and there was an unusually high record of bright sunshine. Throughout the whole of the flowering season wild plants were much behind their average dates in blossoming ; indeed, they were later than in any year since 1891. Such spring migrants as the swallow, cuckoo and nightingale were also later than usual in reaching our shores. Taking the British Isles as a whole, the crops of wheat, barley and oats were all under the average. The yield of hay was poor in the southern half of England, but elsewhere varied from a fair to an abundant crop. Turnips and swedes were almost everywhere deficient, but there was a heavy crop of mangolds. Potatoes were under the average. The year was a bountiful one as regards fruit, the yield of apples, plums and all smaller fruits being in excess of the average. Mr. Mawley illustrated his Report with lantern slides showing the state of vegetation at certain periods of the year.

Mr. T. P. Newman said that he had noticed on Christmas day, 1900, at Haslemere, as many as 53 varieties of plants in flower, including roses, which was more than he had ever observed before at that time of the year.

Mr. J. E. Clark described the state of flowering plants at Christmas time around Street, near Glastonbury, where, although the total number of blossoms was more than the average, the number of true spring flowers was less.

The President, Capt. A. Carpenter, Mr. F. C. Bayard, Mr. W. B. Tripp, and Mr. C. Harding, also took part in the discussion.

Mr. A. E. Watson, B.A., read a paper entitled, "A Review of Past Severe Winters in England, with deductions therefrom." From an examination of the records and descriptions of the severe winters of the last 300 years, he had come to the conclusion that they had been most frequent in the years ending with the figures 0-1 and 4-5 in each decade. He was also of opinion that the severe winter

in the middle of each decade was generally a late one (January to March), while that at the beginning or end of each decade was generally an early one (November to January).

A brief discussion followed the reading of this paper, in which the President, Mr. W. B. Tripp, Mr. E. Mawley, Mr. C. Harding, Dr. H. R. Mill, Mr. R. Bentley, Dr. R. H. Scott, and Mr. F. J. Brodie took part.

Mr. W. Marriott exhibited lantern slides of diagrams prepared by Mr. C. Aburrow, M.Inst.C.E., showing the monthly rainfall and the absolute maximum and minimum temperatures at Johannesburg for several years past. From these it appeared that 1900 had been the wettest year since 1894, and that July last had been unusually cold, the maximum temperature for that winter month not exceeding 54°.

REVIEWS AND BOOKS RECEIVED.

Beiträge zur Hydrographie Oesterreichs. Herausgegeben vom k.k. hydrographischen Central-Bureau. IV. Heft. Die Hochwasserkatastrophe des Jahres 1899, im österreichischen Donauegebiete. Wien, 1900. Folio pp. 162. Maps and Plates.

THE floods in the Alpine provinces of Austria during September, 1899, will long be remembered, for they dispute with those of 1897 the bad eminence of being the worst experienced in the nineteenth century. Enormous damage was done, and over 400 square miles of land were submerged, a very serious matter when one recollects that most of the agriculture and the population of the Eastern Alps is concentrated in the narrow valley bottoms of the Danube tributaries which overflowed their banks. This volume contains a full history of the floods, with the readings of all the rain-gauges in the districts affected, and a fine coloured map on the scale of 12 miles to an inch, showing the rainfall of the week September 8-14, with separate transparent sheets bearing lines of equal rainfall for three of the individual days, intended to be laid over the general map to show the changes in the areas of heaviest rain. There are also readings of river levels from a great number of stations and innumerable tables of statistics showing the total volume of rain-water which fell in each of the tributary river-basins, on each day and for the whole period. The heaviest fall recorded was 11·30 in. in a gauge 7 feet above the ground at Mühlau, a station at an altitude of 2,470 feet; and the heaviest fall for the whole wet period of seven days was 26·20 in. at Altaussee, which is at an elevation of 3,100 feet. Both stations are surrounded by lofty mountains.

The Austrian Government established a flood-intelligence system in June, 1899, the plan of which includes three central offices to which the level of the water in the upper tributaries is telegraphed daily, and from which warnings are issued to the inhabitants of the

valleys down-stream when a flood is impending. The two country centres report to Vienna, where the rising of the Danube can thus be foreseen in advance. Experiments made with the object of holding back flood-water by weirs are being tried, and at Nussdorf the expense of an elaborate structure is said to have been saved in this one flood by the preservation from damage of the lower part of the valley. Numerous photographs and other illustrations diversify the statistics of the report.

It is interesting to note that amongst the disturbing causes of the climate of Europe at the time of the floods was the remarkably long-lived cyclone which is referred to on page 22 of this month's Magazine. It reached the centre of France on September 8th, and then seemed to die out, the immediate cause of the heavy rains being another low-pressure area in the east of Europe.

Report of the Meteorological Service of Canada for the year ending December 31st, 1897, by R. F. STUPART. Ottawa, 1900. 4to. pp. 292. *Illustrations.*

THIS report contains an introduction describing the mode of exposure of thermometers in the official Canadian screen made of sheet-iron louvres, with a special sunshade facing the south. The weather forecasts of 1897 were verified in 85.5 per cent. of the cases. Forecasts are disseminated not only by telegraph, but by conspicuous signals on the luggage vans of trains traversing agricultural districts.

Atmospheric Radiation, by FRANK W. VERY. U.S. Department of Agriculture, Weather Bureau. Washington, 1900. 4to, pp. 134. *Diagrams.*

A STUDY, with laboratory experiments and the discussion of observations in the free air, of the effects of radiation in the atmosphere, investigating the protective power of the air in retarding the rate of gain or loss of heat on the Earth's surface.

Ceylon. Administration Reports, 1899. Part II.: Scientific Meteorology. Report of Mr. F. H. GRINLINTON. *Maps and Diagrams.* [Colombo, 1900].

MAPS of Ceylon are given, showing the mean annual rainfall, and the mean rainfall for the S.W. monsoon period (February–July), and the N.E. monsoon period (August–January).

Sounding the Ocean of Air, by A. LAWRENCE ROTCH. London: Society for Promoting Christian Knowledge. 1900. pp. viii. + 184. *Illustrations.* Price 2s. 6d. (*To be reviewed*),

The Distribution of Rainfall over the Land, by ANDREW J. HERBERTSON, Ph.D. *Maps and Plate.* London: John Murray. 1901. pp. iv. + 70. (*To be reviewed*).

City of Nottingham. The Meteorology of Nottingham for the year 1900. By ARTHUR BROWN and PHILIP BOOBYER. *With large chart comparing death-rate with meteorological conditions.*

- Observations Météorologiques Suédoises. Redigées sous la direction de l'Institut Central de Météorologie. Vol. 37, 1895. Stockholm, 1900. 4to, pp. 158.
- Jahrbuch des Königl. sächsischen meteorologischen Institutes, 1898. Jahrgang 16, I. Abtheilung. Von. Prof. Dr. PAUL SCHREIBER. Chemnitz, 1900. 4to, pp. 78.
- The State of the Ice in the Arctic Seas, 1900. Special print of the Nautical Meteorological Annual of the Danish Meteorological Institute, [Copenhagen, 1901]. 4to, pp. xviii. *Maps.*

METEOROLOGICAL NEWS.

PROFESSOR S. C. HEPITES, Founder and Director of the Meteorological Service of Rumania, celebrated his fiftieth birthday on February 17th, at Bukharest. Letters of congratulation were addressed to him on the occasion, according to the pleasant continental custom, by his fellow-workers in Meteorology in all countries.

AMONGST the many fatal ice accidents of February, peculiar sadness attaches to that on Airthrey Loch, in Stirlingshire, where, on the 15th, Mr. F. P. Pullar, F.R.Met.Soc., lost his life in a heroic attempt to save others. Mr. Pullar, although only twenty-five years of age, had been a meteorological observer for more than five years, and had fitted up a very complete set of instruments, including deep earth-thermometers at his father's house, The Lea, Bridge of Allan. He recently presented a meteorological outfit to one of the field hospitals going out to South Africa. For several years Mr. Pullar had been engaged, together with Sir John Murray, of the *Challenger*, in making a complete survey of the Scottish lochs, sounding them and studying the distribution of temperature in the water. Few at so early an age have shown equal promise of a life of scientific usefulness.

THE METEOROLOGICAL COUNCIL will, commencing in April next, issue a monthly Pilot Chart of the North Atlantic and Mediterranean similar in its main features to the well-known Pilot Charts of the United States Hydrographic Office. A specimen, showing the general character of the new chart, has been issued, and the work appears well calculated to be useful to mariners and interesting to meteorologists. The advantage to British shipping, of a chart constructed on this side of the Atlantic from the data available at the Meteorological Office, is obvious; and if there is a friendly rivalry with the American charts it will be a guarantee that neither will be allowed to fall behind the other. The increasing importance attached to the study of oceanographical questions in relation to meteorology will ensure the hearty reception of the new chart by scientific workers. The price has been fixed at the moderate rate of 6d. monthly.

OUR NOTICE of the changes in the Meteorological Office,

incidental to the retirement of Dr. R. H. Scott, was inadvertently erroneous. Mr. Shaw did not vacate his seat on the Council on his appointment as Secretary, while Professor G. H. Darwin has been a member of the Council since 1885.

THE METEOROLOGISCHE ZEITSCHRIFT for December, 1900, reprints from the *Annalen der Physik* an article on "Globe Lightning," by Max Toepler. Although, the author says, the phenomena of no known method of electric discharge are exactly identical with those of globe lightning, great similarities are presented by the new and little-known method "Büschellichtbogen," a word that may be described as a "bunch-of-light arc," but which cannot be translated. This takes place in the free air, not in a vacuum tube, and masses of light separated from one another by extensive dark spaces form successively upon the discharging surface, either noiselessly or with a loud terminal spark. The changes in this form of discharge, due to the conductivity and number of the electrodes, are comparable, though on a small scale, to the various phenomena of globe lightning, which may thus be looked upon as resulting from the different grouping of the clouds and the Earth's surface when a state of electric tension exists between them.

RED RAIN fell in Sicily and many parts of southern Italy on Sunday, March 10th, alarming the peasants on account of its resemblance to blood. The red colour was due, it would appear, to dust or fine sand raised from the Sahara, and carried across the Mediterranean by a sirocco.

"CLIMAT," a new meteorological journal devoted to practical weather prediction, is announced as shortly to appear. The editor, Mr. N. A. Demchinsky, has discovered "that the chief factor in the weather is the moon's attraction," and he is bold enough to base upon this discovery, fortnightly predictions of the weather for Europe and North America, to be published a month in advance. "Climat" is to be issued in St. Petersburg, and the whole magazine will appear in parallel columns, giving the Russian, French, English, and German rendering of every article. We look forward to this magazine with some hope, for if the predictions are clear enough to be compared with the actual weather, we shall either be furnished with a storehouse of refutations of lunar influence, or else convinced of the truth of Mr. Demchinsky's discovery; while if they are not clear enough to be verified or confuted by comparison with facts, the system will stand condemned at the outset.

TERMS derived from the Greek, however convenient they may prove to the man of science, or however luminous they may be to the scholar, do not always escape the danger of being incomprehensible to the "Man in the Street." We note that a London daily paper, which it would be unkind to name, announced on February 21st, that Mr. Mawley had read a communication on "The *Phrenological* Observations of 1900" to the Royal Meteorological Society. (See p. 23).

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, SEPTEMBER, 1900.

STATIONS. <i>(Those in italics are South of the Equator.)</i>	Absolute.				Average.				Absolute.		Total Rain.		Aver. Cloud.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
London, Camden Square	80·4	16	42·6	4	70·4	50·1	50·8	75	120·3	39·9	·79	7	4·4
Malta	92·4	10	63·8	26	83·3	68·7	67·1	77	148·4	59·0	·10	1	3·1
<i>Cape of Good Hope</i>	84·5	9	42·1	1	67·4	50·7	52·0	77	...	...	1·42	7	4·3
<i>Mauritius</i>	78·8	30	57·0	27	75·2	63·9	59·1	72	143·2	48·0	·48	5	4·9
Calcutta	94·4	12	73·0	24	87·1	77·6	77·1	86	150·2	72·6	45·55	16	8·2
Bombay	87·4	6	75·2	21	85·1	77·5	75·9	84	137·5	71·8	7·49	21	6·4
Colombo, Ceylon	89·7	28	73·3	1	86·9	76·5	74·3	83	146·5	72·0	4·00	16	5·6
Melbourne	75·0	20	35·3	5	59·7	46·0	44·7	80	130·9	28·3	2·91	17	6·9
Adelaide	76·7	19	37·9	4	63·7	45·8	45·0	69	139·2	29·4	1·18	14	5·1
Sydney	73·0	19	44·5	2, 4	64·5	49·9	46·9	75	127·7	38·7	2·31	19b	4·5
Wellington	68·0	13	35·0	8	55·9	44·3	40·9	71	113·0	27·0	6·09	20	5·3
Auckland	64·5	19	42·5	22	60·7	49·2	44·9	69	134·0	39·0	5·19	19	6·0
Jamaica, Halfway Tree	91·0	21	69·0	22	86·9	72·0	71·2	82	...	...	8·86	11	4·7
Trinidad	92·0	11a	61·0	24	89·5	71·9	74·4	83	165·0	60·0	5·52	16	...
Grenada	91·0	12	72·0	19	85·4	75·4	72·8	76	162·0	...	4·79	20	4·0
Toronto	91·7	2	44·0	19	74·3	55·1	57·2	78	109·2	39·0	1·43	7	4·9
Fredericton	92·2	3	29·5	20	68·1	45·9	46·9	65	...	...	2·64	7	5·3
New Brunswick	79·1	7	30·0	27	63·6	43·6	...	81	...	...	4·22	16	5·7
Winnipeg, Manitoba													
Victoria, British Columbia													
	77·2	11	39·0	30	62·9	48·6	..	...	...	...	1·15	10	5·1

a—and 13, 30. b—and dew 4 days.

REMARKS.

MALTA.—Mean temp. of air 74°·8, or 0°·2 below average. Mean hourly velocity of wind 6·9 miles, or 0·8 below average. Temp. of sea 77°·4. TSS on 4th and 15th, L on 19th. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·7, dew point 0°·8, and rainfall ·56 in. below, their respective averages. Mean hourly velocity of wind 10·1 miles, or 1·8 below average; extremes, 26·0 on 1st and 2·8 on 6th, 24th and 27th, prevailing direction E. S. E. T. F. CLAXTON.

CEYLON, COLOMBO.—Mean temp. of air 0°·2 below, dew point 1°·1 above, and rainfall 1·01 in. below, their respective averages. Max. intensity of R 2·40 in. per hour for about 6 minutes on 30th. Mean hourly velocity of wind 9½ miles, prevailing direction S. W. A shock of earthquake was felt over the southern portion of the island at 4.15 a.m. on the 10th; average duration 10 seconds, average direction S. E. to N. W. H. O. BARNARD.

Adelaide.—Mean temp. of air 2°·3, below the average for 43 years. Rainfall ·56 in. below the average. C. TODD, F. R. S.

Sydney.—Mean temp. of air 1°·7 below, humidity 5·2 per cent. above, and rainfall ·73 in. below, their respective averages. H. C. RUSSELL, F. R. S.

Wellington.—Mean temp. of air 0°·8 below, and rainfall 1·83 in. above, their respective averages. A showery month, prevailing winds southerly or northerly, generally moderate; fog on 15th and 26th. R. B. GORE.

Auckland.—Mean temp. of air close to the average; rainfall 1·10 in. above the average. A stormy and squally month. T. F. CHEESEMAN.

TRINIDAD.—Rainfall 2·01 in. below the 30 years' average. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL,
FEBRUARY, 1901.

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Uxbridge, Harefield Pk..	1·18	XI.	Castle Malgwyn	2·73
II.	Dorking, Abinger Hall .	2·51	„	Builth, Abergwesyn Vic.	2·14
„	Birchington, Beresford Lge.	·89	„	Rhayader, Nantgwilt ...	2·62
„	Hailsham	2·23	„	Lake Vyrnwy	2·12
„	Crowborough.....	2·25	„	Corwen, Rhug	1·56
„	Ryde, Thornbrough .....	...	„	Criccieth, Talarvor	1·65
„	Emsworth, Redlands ...	1·48	„	I. of Anglesey, Lligwy..	1·61
„	Alton, Ashdell	2·40	„	I. of Man, Douglas	2·51
„	Newbury, Welford Park	1·85	XII.	Stoneykirk, Ardwell Ho.	1·64
III.	Oxford, Magdalen Coll..	1·22	„	New Galloway, Glenlee	1·60
„	Banbury, Bloxham	1·59	„	Moniaive, Maxwellton Ho.	1·36
„	Northampton, Sedgebrook	1·24	„	Lilliesleaf, Riddell	1·19
„	Huntingdon, Brampton.	·94	XIII.	N. Esk Res. [Penicuick]	2·30
„	Wisbech, Bank House...	1·17	XIV.	Glasgow, Queen's Park..	1·40
IV.	Southend	·72	XV.	Inveraray, Newtown ...	2·58
„	Colchester, Lexden	·76	„	Ballachulish, Ardsheal...	2·59
„	Saffron Waldon, Newport	1·12	„	Islay, Eallabus.....	3·08
„	Rendlesham Hall	·92	XVI.	Dollar.....	·86
„	Swaffham	1·19	„	Balquhider, Stronvar...	1·72
V.	Salisbury, Alderbury ...	1·83	„	Coupar Angus Station...	1·14
„	Bishop's Cannings	1·21	„	Blair Atholl	1·07
„	Blandford, Whatcombe .	1·56	XVII.	Keith H.R.S.....	4·16
„	Ashburton, Druid House	1·81	„	Forres H.R.S.	2·22
„	Okehampton, Oaklands.	1·86	XVIII.	Fearn, Lower Pitkerrie..	2·01
„	Hartland Abbey	1·67	„	S. Uist, Askernish	·91
„	Lynton, Glenthorne ...	...	„	Invergarry	3·35
„	Probus, Lamellyn	1·94	„	Aviemore, Alvie Manse.	1·20
„	Wellington, The Avenue	1·18	„	Loch Ness, Drumna drochit	2·80
„	North Cadbury Rectory	1·00	XIX.	Invershin	3·12
„	Clifton, Pembroke Road	1·01	„	Durness	3·40
VI.	Ross, The Graig	·99	„	Watten H.R.S.....	3·00
„	Wem, Clive Vicarage ...	1·50	XX.	Dunmanway, Coolkelure	2·57
„	Wolverhampton, Tettenhall	1·66	„	Cork, Wellesley Terrace	1·44
„	Cheadle, The Heath Ho.	1·27	„	Killarney, District Asyl.	1·03
„	Coventry, Priory Row ...	1·72	„	Caher, Duneske	1·51
VII.	Market Overton	1·38	„	Ballingarry, Hazelfort...	1·58
„	Grantham, Stainby	2·65	„	Limerick, Kilcornan ...	...
„	Horncastle, Bucknall ...	1·81	„	Miltown Malbay	·49
„	Worksop, Hodsock Priory	1·03	XXI.	Gorey, Courtown House	1·84
VIII.	Neston, Hinderton	1·40	„	Moynalty, Westland ...	1·30
„	Southport, Hesketh Park	1·57	„	Athlone, Twyford	1·09
„	Chatburn, Middlewood.	1·52	„	Mullingar, Belvedere ...	1·81
„	Duddon Val., Seathwaite Vic.	3·55	XXII.	Woodlawn	1·18
IX.	Melmerby, Baldersby ...	1·30	„	Crossmolina, Enniscoe ..	1·84
„	Scalby, Silverdale	3·19	„	Collooney, Markree Obs.	2·00
„	Ingleby Greenhow Vic..	2·99	XXIII.	Enniskillen, Model Sch.	1·38
„	Middleton, Mickleton ...	·84	„	Warrenpoint.....	1·76
X.	Haltwhistle, Unthank H.	...	„	Miltown, Banbridge.....	1·43
„	Bamburgh	1·91	„	Belfast, Springfield	2·04
„	Keswick, The Bank	1·67	„	Bushmills, Dundarave..	1·66
XI.	Llanfrehfa Grange	1·21	„	Stewartstown	1·14
„	Treherbert, Tyn-y-waun	3·39	„	Killybegs	2·76
„	Llandovery	1·24	„	Horn Head	2·83

FEBRUARY, 1901.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					TEMPERATURE.				No. of Nights below 32°.		
		Total Fall.	Difference from average 1890-9.	Greatest Fall in 24 hours.		Days on which '01 or more fall.	Max.		Min.			In shade.	On grass.
				Dpth	Date		Deg.	Date	Deg.	Date.			
I.	London (Camden Square) ...	1·21	— ·26	·62	4	9	53·3	28	17·9	14	16	23	
II.	Tenterden	1·84	+ ·14	·70	4	14	49·0	28	18·0	16	17	20	
III.	Hartley Wintney	1·85	+ ·22	·85	4	16	51·0	28	17·0	14	15	17	
IV.	Hitchin	1·04	— ·42	·27	28	11	50·0	28	16·0	13	18	...	
V.	Winslow (Addington)	1·07	— ·39	·31	4	13	51·0	28	15·0	14	17	22	
VI.	Bury St. Edmunds (Westley)	·85	— ·69	·27	21	11	52·0	28	17·0	14	22	...	
VII.	Norwich (Brundall)	2·16	...	·66	11	19	52·6	25	9·2	14	20	23	
VIII.	Winterbourne Steepleton ...	1·53	...	·46	28	10	48·4	25	21·0	14	18	21	
IX.	Torquay (Cary Green)	1·23	...	·50	28	9	52·7	28	25·5	15	8	...	
X.	Polapit Tamar [Launceston]..	1·86	— ·75	·58	26	11	51·3	28	18·4	15	17	22	
XI.	Stroud (Upfield)	1·51	— ·41	·38	26	12	51·0	28	21·0	13	17	...	
XII.	Churchstretton (Woolstaston)	1·16	— ·84	·31	28	12	53·0	28	17·5	14	20	26	
XIII.	Worcester (Diglis Lock)	1·12	— ·39	·47	26	15	...	...	...	...	...	...
XIV.	Boston	1·27	— ·08	·35	26	12	50·0	25	24·0	7	21	...	
XV.	Hesley Hall [Tickhill].....	·91	— ·54	·15	28	14	52·0	25	18·0	14b	16	...	
XVI.	Derby (Midland Railway).....	1·15	— ·30	·26	26	17	53·0	28	16·0	14	16	...	
XVII.	Manchester (Plymouth Grove)	1·48	— ·38	·31	28	16	50·0	28	20·0	16	16	19	
XVIII.	Wetherby (Ribston Hall)	1·94	+ ·50	·60	4	12	...	...	...	...	...	...
XIX.	Skipton (Arncliffe)	2·49	— 2·33	·73	26	16	...	...	...	...	...	...
XX.	Hull (Pearson Park)	2·03	+ ·31	·42	18	17	51·0	25	20·0	15	19	24	
XXI.	Newcastle (Town Moor)	1·08	— ·08	·17	24	18	...	...	...	...	...	...
XXII.	Borrowdale (Seathwaite).....	5·34	— 6·43	1·40	24	13	45·5	23	19·4	14	17	...	
XXIII.	Cardiff (Ely).....	1·09	— 1·80	·27	4	12	...	...	...	...	...	...
XXIV.	Haverfordwest	2·25	— 1·09	·64	1	12	49·9	28	22·0	15	11	22	
XXV.	Aberystwith (Gogerddan) ...	2·71	— ·44	1·18	1	13	50·0	25	18·0	14	19	...	
XXVI.	Llandudno.....	1·37	— ·58	·32	4	15	47·0	9.25	25·5	14	4	...	
XXVII.	Cargen [Dumfries]	1·20	...	·54	26	6	48·0	23	20·0	14	17	...	
XXVIII.	Edinburgh (Royal Observatory)	·99	...	·40	26	14	46·7	24	25·5	12c	12	19	
XXIX.	Colmonell	3·19	— ·22	·75	4	9	60·0	8	20·0	14	...	...
XXX.	Tighnabruaich	2·95	...	·83	24	11	45·0	27	23·0	13c	16	...	
XXXI.	Mull (Quinish).....	3·33	— 1·06	·73	26	20	...	...	...	...	...	...
XXXII.	Loch Leven Sluices	1·55	— 1·23	·45	2a	4	...	...	...	...	...	...
XXXIII.	Dundee (Eastern Necropolis)	1·35	— ·78	·65	24	11	46·5	16	20·8	14	19	...	
XXXIV.	Braemar	1·41	— 1·17	·30	25	14	40·6	9	0·5	14	25	27	
XXXV.	Aberdeen (Cranford)	2·65	+ ·24	·63	24	24	48·0	8	13·0	13	23	...	
XXXVI.	Cawdor (Budgate)	2·02	+ ·08	·42	24	19	...	...	...	...	...	...
XXXVII.	Strathconan [Beaul]	4·32	+ ·13	1·05	6	8	...	...	...	...	...	...
XXXVIII.	Glencarron Lodge.....	4·41	— 2·91	·74	24	22	45·0	26	20·4	14	16	...	
XXXIX.	Dunrobin	2·50	+ ·08	·68	24	11	47·8	8	25·0	14	15	...	
XL.	S. Ronaldshay (Roeberry) ...	2·34	— ·22	·47	25	25	46·0	22	24·0	11	16	...	
XLI.	Darrynane Abbey.....	·78	— 3·24	·21	28	8	...	...	...	...	...	...
XLII.	Waterford (Brook Lodge) ...	1·93	— ·98	·90	25	9	51·0	28	23·0	15	14	...	
XLIII.	Broadford (Hurdlestown) ...	·96	— 1·26	·20	1	16	66·0	11	22·0	14	12	...	
XLIV.	Carlow (Browne's Hill)	1·79	— ·76	·70	25	14	...	...	...	...	...	...
XLV.	Dublin (Fitz William Square)	1·20	— ·75	·42	28	12	51·8	25	28·0	15	9	17	
XLVI.	Ballinasloe	·98	— 1·45	·24	1	15	58·0	26a	18·0	12d	22	...	
XLVII.	Clifden (Kylemore)	4·00	— 1·91	1·03	28	12	...	...	...	...	...	...
XLVIII.	Seaforde	1·46	— 1·33	·28	28	16	48·0	25	24·0	13	13	14	
XLIX.	Londonderry (Creggan Res.)..	2·26	— ·45	·73	1	23	...	...	...	...	...	...
L.	Omagh (Edenfel)	2·07	— ·53	·48	1	17	50·0	28	23·0	20	14	17	

+ Shows that the fall was above the average ; — that it was below it.
a—and 27. b—and 15. c—and 14. d—and 15.

METEOROLOGICAL NOTES ON FEBRUARY, 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.

TENTERDEN.—A cold month, S on 8 days, but heavy falls only on the 4th and 5th, when most of the precipitation was rain. Duration of sunshine 58 hours.

HARTLEY WINTNEY.—The temp. was below the average, but there was less than the usual amount of fog, and S, although falling on 10 different days, never lay long on the ground. Bitter N. wind prevailed from the 3rd to 24th, with wet weather latterly. Ozone was noted on 6 days with a mean of 4·0.

WINSLOW, ADDINGTON.—A dry cold month with several sharp frosts of short duration. The weather was very variable throughout. The day temp. was generally low. A very dense fog occurred on the afternoon of the 19th; and on the 27th, a most unusual darkness was experienced about noon.

BURY ST. EDMUNDS, WESTLEY.—A cold wintry month with S on 6 days.

NORWICH, BRUNDALL.—The coldest February since 1895, and the most severe frost since that year. S fell on 13 days, was a foot deep on level ground on 13th; it covered the ground from 1st to 8th, and from 11th to 24th inclusive, 22 days in all.

WINTERBOURNE STEEPLTON.—Cold and generally dry. The mean temp. was 36°·0, whereas that of January was 38°·8. Fog on 28th.

TORQUAY, CARY GREEN.—Mean temp. 4°·3 below the average. Duration of sunshine 12·7 hours above the average; only four sunless days. Mean amount of ozone 2·8; range from 7·5 on 28th to 0·5 on several days with N.E. wind.

POLAPIT TAMAR [LAUNCESTON].—A dry cold month with comparatively light winds. Thick fog till noon on 1st. H storms at night on 4th. Distant T on 11th.

MANCHESTER, PLYMOUTH GROVE.—S and sleet on 3rd and 4th, S on 18th and 20th. Dense fog on seven days.

WALES.

HAVERFORDWEST.—A cold month with small R and very little S. A very heavy gale occurred blowing with the force of a storm between 8 and 10 p.m. on the 4th, and continued on the 5th, a good deal of damage being done. During the remainder of the month it was usually calm. Bright sunshine for 64·3 hours; six sunless days. Agricultural operations were well advanced.

ABERYSTWICH, GOGERDDAN.—A very changeable month with little sunshine. Two inches of S on the 3rd,

SCOTLAND.

COLMONELL, CLACHANTON.—Mean temp. 37°·5 or 1°·2 below the average of 26 years. Three inches of snow on the 4th.

TIGHNABRUAICH, CRAIGANDARAICH.—A good winter month. The average max. temp. was 39°·8, min. 31°·7, or about 3° higher than in February, 1900; this may be due to the number of days of unbroken sunshine.

ABERDEEN, CRANFORD.—In the first part of the month S fell from W. and N.W.; in the latter part from N.W. and N.N.W.

S. RONALDSHAY, ROEBERRY.—The first part was cold, rough, and very changeable with S, sleet and R, the latter part bitterly cold. Mean temp. 36°·5, or 3°·5 below the average of 11 years.

IRELAND.

DARRYNANE ABBEY.—Except May, 1876, with 44 in., and November, 1879, with 75 in., this was the driest month ever registered. Up to 24th the weather was bright and very fine. The last few days were showery and gloomy. Sharp frost at night on 4th, 5th and 6th.

BROADFORD, HURDLESTOWN.—A very fine month. A little S on 12th. Dense fog on 20th, 21st and 22nd.

DUBLIN, FITZWILLIAM SQUARE.—Cold, cloudy and rather dull, with a small rainfall distributed over 12 days ; of the total R nearly 61 per cent. fell on the first and last days. Like February, 1900, the month was much colder than the preceding January. Mean temp. $39^{\circ}2$, or $3^{\circ}6$ below the average. Foggy on four days. The amount of cloud 7.2 was much above the average. High winds were noted on 5 days, reaching the force of a gale on the 4th and 28th. H fell on 13th and 16th, and S or sleet on five days.

LONDONDERRY, CREGGAN RESERVOIR.—S on 3rd, 4th, 5th and 15th.

OMAGH, EDENFEL.—Although there were 11 rainless days and a total fall of .37 in. under the average, the month was generally damp and raw, with a low mean temp. There was no S or any settled frost, although the temp. on grass fell below 32° on 17 nights.

“EXTRAORDINARY RAINFALL.”

THE following paragraph, which appeared in several evening papers of March 11th, quite deserves its heading :—

“EXTRAORDINARY RAINFALL.

“During the month of February there was a remarkable rainfall in Cumberland. On the top of Helvellyn and also upon Whiteside and Ullscarf, two points of the same range, at an approximate height of 2,000 ft. above sea level, the rainfall during the month was recorded as 3 ft. 5 in., 3 ft. 6 in., and 3 ft. 3 in., respectively. At Dale Head Hall, in the valley, near the shores of Thirlmere, a depth of 3 ft. 3 in. also was recorded, yet upon Armbboth Fells, which rise from the side of the lake farthest from Helvellyn to a height of 1,650 ft., the rain gauge registered 9 ft. 2 in. as the depth of rain which had descended in February. The details have given rise to the belief that a series of water-spouts, or of especially heavily charged storm-clouds, burst over the fells and about Wythburn, which did not affect the neighbouring heights.”

Probably some weekly paper has by this time converted the feet into inches, as more fitting for rain records, and we may expect to be haunted for years by a spectral “record rainfall” of 110 inches in one month (and that the shortest of the year), at Armbboth Fells. The explanation will never, in all probability, succeed in overtaking the error ; but it appeared, also on March 11th, in the *Manchester Courier*, and runs thus :—

“THE THIRLMERE RAINFALL.

“The details of the rainfall at Thirlmere during February were given erroneously in a paragraph in our issue of Saturday. By an unfortunate inadvertence feet and inches were named as the measurements, instead of inches and tenths of inches, which were the quantities recorded by the various rain gauges referred to.”

Errata in “Met. Mag.” February, 1901.

Page 14, fourth column of table, in heading, for “1880-9,” read “1890-9.”
Page 8, line 28, for “9th,” read “8th.”