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METEOROLOGY AT THE BRITISH ASSOCIATION.

GLASGOW MEETING, 1901.

THE position of Meteorology at the British Association for the Advancement of Science is still very unsatisfactory. There is not at present sufficient original study of the subject in this country to justify an effort to found a new section; and although a day is usually set apart in Section A (Mathematics and Physics) on which meteorological papers are considered, many authors prefer to read their papers in other sections where particular departments or applications of Meteorology are more likely to find an appreciative audience. At the meeting of the Association held in Glasgow from September 11th to 18th, an unfortunate hitch occurred, by which the meteorological papers offered to Section A were partly taken on two days, and the official arrangements for the advancement of our science consequently appeared in a somewhat worse light than usual. The present article is a record and not a criticism, so we postpone any suggestions for improving the condition of things.

The scattered and fragmentary treatment of Meteorology in the sections was, to a certain extent, made up for by the revival of the time-honoured Meteorological Breakfast. Old readers of this Magazine will remember that at the Edinburgh meeting in 1871, Mr. D. Milne Home entertained a large company of meteorologists to breakfast on the day when the meteorological papers were taken in Section A. The breakfast, paid for by the meteorologists themselves for the most part, was repeated annually until 1877, with attendances of from 14 to 20, except at the Glasgow meeting in 1876, when Dr. Muirhead entertained a party of 40. A gap of three years followed; then there was a most successful breakfast at York in 1881, when 40 were present, but an attempt to continue the gathering at Plymouth in 1882 failed in circumstances that can be gathered from the account of that meeting in this Magazine. Dr. Buchan gave a private breakfast to a party of meteorologists at the last Edinburgh meeting, in 1892; but as Mr. Symons had been the leading spirit at all these reunions in the past, we fe t that it was a privilege to co-operate with Mr. Shaw in reviving them at this year's meeting.

The breakfast was held in the Grand Hotel, Charing Cross, Glasgow, at 9 a.m., on Tuesday, 17th September, and in accordance with precedent, we subjoin a list of those who were present. Other meteorological workers would doubtless have been happy to come if it had been possible to obtain sufficient publicity for the invitation :—

Aitken, John, F.R.S.
Alexander, P. Y.
Aspland, W. G.
Becker, Prof. L.
Buchan, Dr. A., F.R.S.
Coates, Henry
Cornish, Dr. Vaughan
Denison, F. Napier
Dickson, H. N.
Dines, W. H., Pres. R.Met.Soc.
Herbertson, Dr. A. J.
Joly, Prof. C. E.
Kitto, E.
Lemaire, Captain
McLeod, Prof. H., F.R.S.
Mill, Dr. H. R.
Milne, Prof. J., F.R.S.
Plummer, W. E.
Rosse, Earl of, F.R.S.
Rotch, A. Lawrence
Shaw, W. N., F.R.S.
Turner, Prof. H. H., F.R.S.

By right of seniority, Dr. Buchan presided, and after a very pleasant hour of conversation he made a short speech full of reminiscences of former meetings of the Association and of the great names which were associated with the study of Meteorology in the middle of the last century. He recalled, amongst our own countrymen, Sabine, Forbes, Brewster, Meldrum and Blanford; Henry, Maury and Myer from the United States; Leverrier and Sourel from France; Quetelet from Belgium; Buys Ballot from Holland; Hofmeyer from Denmark; Hansteen from Norway; Kaemtz from Russia; Jelinek from Austria; Plantamour from Switzerland; Secchi, Donati and Densa from Italy. All these men, now departed, were not only meteorologists, but distinguished physicists as well. He expressed a very strong opinion that meteorological papers as dealing with a branch of Physics, should always be read in the presence of the whole Physical Section A of the British Association.

On account of the impossibility of being in more than one section at one time, no one could hear all the papers of meteorological interest which were read at the meeting; but we reproduce below condensed abstracts of most of them.

In connection with the paper by Mr. Rotch, it is interesting to note that the Association has appointed a committee (Chairman, Mr. Shaw; Secretary, Mr. Dines) to co-operate with the Royal Meteorological Society in initiating experiments on the exploration of the upper air by means of kites, and that a grant of £75 has been given towards the expenses. The following were amongst the papers read :—

On the Seasonal Variation of the Atmospheric Temperature of the British Isles and its Relation to Wind-direction. *By* W. N. SHAW, *M.A., F.R.S., and* R. WALEY COHEN, *B.A.* (Read to Section A).

If the twenty-five year means of temperature for each day of the year at the four principal stations of the British Meteorological Office be plotted the curves do not exhibit a smooth run, but show a number of irregularities—often of considerable magnitude. It is thus difficult to assign any specific number

as the normal mean temperature for a particular day, and the immediate object of the work described below was to obtain a smooth curve to which the actual observed temperature of any day might be referred, and to study its characteristics. The curves of actual daily means were first compared with simple harmonic curves having an annual period, a maximum about July 21st, and the same area as the irregular curves. The comparison at once disclosed a lag of spring and an acceleration of autumn, and a corresponding exaggeration of the summer maximum and moderation of the winter minimum. These features, being essentially characteristic of the combination of a first and second order sine curve with a maximum at the same epoch, suggested the idea of combining two such curves to obtain a normal curve of reference. These combined curves give very satisfactory smoothed curves for the whole year for each station, and show that the periodic variations of atmospheric temperature at Kew may be very approximately represented by the summation of two effects, one of which corresponds to a sine curve with an annual period and an amplitude of 12°·04 F., and the other to a sine curve with a semi-annual period and an amplitude of 1°·4 F. Similar statements with similar numerical magnitudes are true of the other stations. This result has been confirmed analytically.

The curves of daily mean atmospheric temperature have been harmonically analysed for each of the stations, and the values of the harmonic coefficients have been determined in the Meteorological Office by means of Sir R. Strachey's formula.* In each case there is a second order curve whose amplitude is about one-eighth of that of the first order, and the amplitudes of the curves of higher order are so small as to be negligible. The first order curve has a maximum at a date which varies at the four stations from July 23rd to August 1st, and the second order curve has maxima which vary from January 28th to February 3rd, and July 30th to August 5th respectively, and minima about the end of April and October respectively.

Assuming the first order curve to represent the primary solar effect, the purpose of this investigation has been to ascertain the nature and cause of the second order effect. Analysis of the temperature at Vienna shows that it does not exist there either to the same extent or at the same epoch. At Agra there is a second order effect of considerable magnitude, but at an entirely different epoch, and hence in no way analogous to the effect in the British Isles. The effect is thus shown to be meteorological and not planetary.

The effect was first studied for Kew. Its cause was sought in the effects and relative frequency of occurrence of cyclonic and anticyclonic weather. For this purpose the mean temperature of cyclonic days for each month throughout the year during the five years 1876–80, and of anticyclonic days during the same period, were separately calculated, and curves were plotted whose ordinates are proportional to the difference between these values and the mean of the ordinates of the first order curve for each month. Both these curves show the main characteristics of the second order curve, and the curve of difference of temperature between cyclonic and anticyclonic weather shows no sign of it. Moreover, by multiplying the percentage of difference of frequency of cyclonic and anticyclonic weather for each month by the difference in temperature, the total effect of type of weather on temperature is obtained, and its curve shows that it does not in any respect resemble the

* *Proc. Royal Soc.*, vol. xlii. pp. 61–79.

second order effect. It is concluded that although the second order effect has a meteorological origin the type of the weather plays no part in causing it.

The effect of wind direction was next examined for the nine-year period 1876–84. The mean temperature of the air during the prevalence of barometric gradients towards each of eight points of the compass in each month were separately calculated, and curves of divergence from the first harmonic component were drawn for each wind (taken as being at right angles to the gradient) in the same way as for the cyclonic and anticyclonic curves. Each of these curves shows at least some characteristic of the second order curve; but on summing them altogether a curve is obtained which differs somewhat from the total curve of divergence from first order curve values.

The effect is largely accounted for as the combined effect of the seasonal variations in temperature of the several winds, and when this part is eliminated the remainder must be attributed to the relative frequency of winds of different temperature. To show this more clearly the winds were grouped together. The mean temperature divergence of east winds is —3°·1 F.; of north-east winds —4°·0 F.; and of north winds —3°·5 F. These winds were grouped as "cold" winds. Similarly the north-west and south-east winds, only —0°·6 F. and —0°·7 F., respectively, were grouped as "temperate winds," and the west, south-west and south winds, whose mean divergences are + 1°·7 F., + 2°·2 F., and + 2°·5 F. respectively, were grouped as "warm" winds. Temperature curves were drawn for each of these groups analogous to the curves for the separate winds. Each curve again shows a general resemblance to the second order curve, but it is noticeable that the October-November minimum is especially prominent in the curve for the temperate winds. The mean frequencies of occurrence of these groups in each month during the nine years were also calculated and expressed as a percentage of the total number of days; the results were plotted on curves whose ordinates are proportional to these percentage frequencies.

The frequency curve for "cold" winds shows a very remarkable maximum frequency in May and a small maximum in November. The frequency curve for warm winds shows minima at these times and maxima in February and August, and the frequency curve for temperate winds, which become distinctly colder in October-November, shows a very high maximum at the end of October. At that time the temperature of these winds is much below the average relative value, and thus the small maximum of the curve of the cold winds at that time is reinforced by the seasonal coldness of the more prevalent winds.

On Weather Maps. *By* W. N. SHAW, M.A., F.R.S. (Read to Section E.)

All the weather maps for the first day of the twentieth century received by the Meteorological Office were exhibited, and their special features explained. The want of synchronism in the observations on which the British weather maps were constructed and the forecasts issued was pointed out, and reference made to the advantages which would result if all the observations were made at the same hour instead of at various hours from 7 to 9 a.m. as at present. The countries at present issuing weather maps are (beginning at the far west) Canada, United States, Mexico, United Kingdom, Portugal, Spain, Denmark, Germany, Netherlands, Belgium, France, Switzerland, Bavaria, Italy, Algeria, Austria-Hungary, Rumania, Russia, India, Japan and Australia.

On the Effect of Sea Temperature upon the Seasonal Variations of Air Temperature of the British Isles. By W. N. SHAW, M.A, F.R.S. (Read to Section A.)

The paper describes an attempt to utilise the mode of geometrical composition and resolution of sine curves of the same period to resolve the principal seasonal variations of temperature at a station into constituents, which may be called the primary solar constituent, and the constituent due to the surroundings of land and sea respectively.

The analysis of atmospheric temperature shows that there is a considerable lag in the occurrence of the seasonal variations of temperature at coast stations as compared with inland stations, and a still greater lag in the variations of temperature in the sea itself.

The variation in sea temperature is regarded as a periodic cause of variation of atmospheric temperature at coast stations, the effect of which is periodic in the same period, and may be compounded with the primary solar effect to give the resultant seasonal variation.

The effects of these curves of equal period may be represented in magnitude by the numerical value of the amplitudes of the first order curves of the respective temperature variations, and they may be compounded geometrically by means of a triangle whose sides are proportional to these amplitudes, and are inclined at angles corresponding to the relative epochs of the curves. In such a triangle the following elements are known :—

1. A side proportional to the observed amplitude at the station.
2. The difference in epoch between the primary solar cause and the resultant, *i.e.*, the angle between the sides proportional to the amplitudes of the primary solar and of the resultant effects.
3. The angle between the sides proportional to the marine and the primary solar effect.

By assuming the primary solar effect to be the same for places in the same latitude it would thus be possible to analyse seasonal variation of temperature at any place into its elements, and an example is given of this analysis in the case of Kew. A point of some interest arising out of this is the lag in the seasons at sea-coast stations, showing that not only the autumn and winter are late at the sea-coast, but also the spring, so that an early spring is to be sought inland. Another point of interest is the effect of the sea, which is not, as is generally supposed, actually to decrease the amplitude of annual temperature oscillation, but to increase it, although to a less extent than a corresponding surrounding area of land. Thus at Nerchinski-Zavod, in Siberia, the effect (calculated as above) of the secondary cause, *i.e.*, the surrounding land, on annual temperature variation has an amplitude of 55° F. ; whilst at Kew, in the same latitude, the effect of the surrounding land and sea has only an amplitude of 8°·3 F. The figures for sea temperature are inadequate for effective numerical analysis, but they suggest a possibility of arriving on these lines at a definite comparison of inland and marine climates.

The Mean Temperature of the Atmosphere and the Causes of Glacial Periods. By H. N. DICKSON, B.Sc. (Read to Section E.)

If we suppose that secular variations of climate in the past have been due to changes in the mean temperature of the atmosphere, it is most probable that such changes have been accompanied by large relative alterations in the gradient

of temperature between the equator and the poles. But this difference of temperature is the primary cause of the whole planetary circulation of the atmosphere, the form and intensity of which must have varied with it, both absolutely and relatively to the modifications produced at the Earth's surface by the distribution of land and sea. The general conditions lead to the conclusion that a lowering of the mean temperature would be accompanied by an increase of the equator-poleward gradient, and a rise by a diminution of it. Ferrel's theory of atmospheric circulation would then suggest that in the former case the planetary circulation would become more active, the tropical high-pressure belts would be displaced to lower latitudes, and the modifying influence of great continental areas would be relatively diminished; while in the latter case the circulation would be less energetic, the tropical belts would be farther from the equator, and the contrast between oceanic and continental climates would be more sharply defined.

The probable effects of such changes on the distribution of precipitation, and especially on the position and direction of the great cyclone tracks, are examined, and it is suggested that the greater proportion of rainfall received with easterly winds on the polar sides of cyclones, in lower latitudes than at present, may explain some peculiar features of glacial phenomena. In any case, the aspects of the problem to which attention is drawn deserve fuller recognition than they have received; they indicate that the variations of temperature required to account for climatic changes are of smaller range than has been supposed, and they may, by the exclusion of some surviving theories, assist in determining the true cause.

The Climatology of Africa.—Tenth and Final Report of a Committee consisting of Mr. E. G. RAVENSTEIN (*Chairman*), Dr. H. R. MILL *and* Mr. H. N. DICKSON (*Secretary*). *Drawn up by the Chairman.* (Read to Section E).

Meteorological returns have been received by your Committee in the course of last year from twenty-one stations in Africa, including Asiut and Omdurman; Old Calabar; Blantyre, Lauderdale, Fort Johnston, and Nkata Bay in Nyasaland; Kisimayu, Malindi, Lamu, Takaunga, Mombasa, and Shimoni on the coast of British East Africa; Machako's, Kitui, Nairobi, and Kikuyu in the interior of that Protectorate; and from the four lake stations in Uganda. We are, moreover, enabled to give the results of seven years' observation on the rainfall at Mengo (Uganda), taken from the unpublished journal of the late Mr. A. M. Mackay. A table giving the rainfall since 1890 at a number of stations has been added.

Since the appointment of your Committee in 1891 meteorological reports from as many as seventy-one African stations have been published through its agency, and it may safely be asserted that many of the more valuable of these observations would never have been made or become generally available had it not been through our action. Amongst these stations, however, there are only fifty-six the records of which embrace a full year, and eleven from which we have reeeived full returns for at least five years. These latter are Lauderdale, Dunraven (rainfall only), Kisimayu, Malindi, Lamu, Takaunga (rainfall only), Mombasa, Chuyu (or Shimoni in Wanga), Machako's, Fort Smith (in Kikuyu), and Mengo (Namirembo and Natete). Among stations having a less extended record, but distinguished for the care with which the observations were taken and the interest attaching to the results, are Bolobo in the Congo

State (3¾ years); Zomba (4 years) and Fort Johnston (28 months) in Nyasaland; Kibwezi (18 months) in British East Africa and Old Calabar. We should also refer here to the high value attaching to the observations on the lake level of Victoria Nyanza. . . . . .

Such of the instruments originally issued by us which have not become unserviceable, been lost, or been otherwise disposed of, have been left in the hands of trustworthy observers, with a reversionary claim upon them by the British authorities within whose territory the stations are situated.

Your Committee have likewise published "Hints to Meteorological Observers in Tropical Africa," which, they are happy to say, have been made widely known and freely accepted by observers. Copies may be obtained on application to the Secretary of the Royal Meteorological Society.

The registers received by your Committee, and not claimed by the observers, have been handed over either to the Meteorological Council or to the Secretary of the Royal Meteorological Society, and may be freely consulted by persons interested.

Your Committee, on bringing their ten years' service to a close, desire to direct the attention of the authorities called upon to organise the meteorological service in British Protectorates or Crown Colonies to the following points:—

1.—The instruments supplied should not only be verified before they leave England, but should also be inspected periodically by a competent official, who would pay particular attention to their exposure, inquire into the competency of the persons charged with filling in the registers, and eventually teach them how to observe.

2.—Inasmuch as all officials may occasionally be called upon to fill up the registers, they should be instructed, before they leave England, in handling and reading the usual meteorological instruments. An hour spent at the office of the Meteorological Council, or with the Secretary of the Royal Meteorological Society, would suffice for that purpose.

3.—It is of far greater importance to have a limited number of stations well equipped, and the registers from which can be thoroughly trusted, than a multiplicity of stations provided with defective instruments, carelessly or intermittingly attended to.

4.—Care should be taken that there should be no interruption in the records kept at the principal stations owing to the illness or temporary absence of the observer. Duly qualified native assistants could be obtained from the Meteorological Department of India.

5.—It is most desirable that the hours of observation recommended in our "Hints" should be strictly adhered to, not for the sake of uniformity only, but mainly because they yield a true mean of barometric pressure, temperature, and humidity without making undue or unreasonable demands upon the time of the observers.

6.—Unless local provision is made for the adequate publication of the observations, the registers should be forwarded (through the Foreign or the Colonial Office) to the Meteorological Council, or to the Secretary of the Royal Meteorological Society, in order that abstracts may be prepared and made generally accessible to meteorologists and others interested. Still better would it be if an annual volume containing all these observations were to be published separately. . . . . .

(*To be continued.*)

DEFICIENT RAINFALL IN SEPTEMBER.

EXCEPT in Ireland, where the rainfall has considerably exceeded the average, and in the west of Scotland, September, 1901, has been an exceptionally dry month over the British Islands. The rainfall was below the average over nearly the whole of England, Wales, and the east of Scotland. It was only in the Lake District, Wales, and along the south coast that falls exceeding 2 inches for the month were recorded, and a large area in the north of England had less than 1 inch of rain. This, following upon an unusually dry spring and summer, led to anxiety as to the water-supply of many important towns, and in some of these the situation was becoming serious when it was relieved by the rain that fell during the first ten days of October.

To give an idea of the trouble caused by too little rain, we may mention the fact that through traffic had to be stopped on the Leeds and Liverpool Canal, while many manufactories and some collieries in Lancashire and Yorkshire had to shorten their hours or stop altogether on account of the failure of the water-supply for the boilers. As a minor incident, an organ recital at Keighley was postponed, as the supply failed for the hydraulic blower.

In Bradford (according to the *Yorkshire Post*, of September 24th), "there was not much more than a week's supply left in the dams." Leeds, on September 27th, had three weeks' supply; Halifax only thirteen days', although the water was cut off at night. In Huddersfield, on October 1st, there was sufficient water to last seventeen days with an eight-hours' service; but this was reduced to six hours, and the supply to manufactories cut off so as to ensure a domestic supply for three weeks. In Manchester, about September 26th, the consumption of water exceeded 26,000,000 gallons per day, and the available supply from Thirlmere being only 8,250,000 gallons, and that entering the reservoirs at Longdendale 4,000,000 gallons, more than half the quantity used had to be taken from the rapidly dwindling stores, which were calculated to meet the requirements for 20 days at most. The supply was restricted to consumers on July 21st, and it is noted that in the excessively dry Jubilee year, 1887, the supply was restricted on July 21st, and not resumed in normal amount until October 13th.

The following table shows the deficit of rainfall at the stations in the north of England quoted in our monthly returns:—

	Hesley Hall.	Derby.	Manchester.	Wetherby.	Skipton.	Newcastle.	Scathwaite.
September fall	·87 in.	·90 in.	·78 in.	·85 in.	2·61 in.	1·02 in.	9·32 in.
,, diff. from average	−1·02 ,,	−1·11 ,,	−2·39 ,,	−1·37 ,,	−2·57 ,,	−1·16 ,,	−3·56 ,,
,, per cent. of average	46·0	44·6	24·3	38·2	50·4	46·6	72·5
Jan.–Sept. fall	14·88 ,,	16·36 ,,	22·45 ,,	17·01 ,,	42·50 ,,	18·29 ,,	91·75 ,,
,, ,, diff. from average	−3·66 ,,	−1·63 ,,	−6·38 ,,	−2·94 ,,	−8·41 ,,	−2·87 ,,	−28·61 ,,
,, ,, per cent. of average	75·5	90·0	71·6	82·8	80·2	84·3	68·9

The meaning of this table will be made clear by taking the case of Skipton, where the first line shows that the rainfall in September was 2·61 in.; the second that this was 2·57 in. less than the average for 1890-99; the third that the fall in September was 50·4 per cent. or scarcely more than half the average fall for the month. The remaining three lines give the same data for the period from January to September inclusive. It thus appears that the scarcity of water was not brought about by absolute droughts in September, for there do not appear to have been any, but rather by an exceptionally dry September following a succession of dry months. June and September were below the average at all the stations cited; January, February and May at all but one station, and in each of the other months there was a deficit at several of the stations and a large overplus at none.

WHIRLWIND OR THUNDERBOLT.

THE *Daily Chronicle* published on September 24th a paragraph headed "Thunderbolt in Bradford," which described "a remarkable atmospheric visitation," which at Horton "took the form of a whirlwind," and in one suburb that of "an electrical discharge, unaccompanied by thunder, which is described as having resembled a 'silent thunderbolt' of unusual extent." Other reports indicated that something unusual had occurred, and we wrote to Mr. A. Wilson, of Ilkley, for further particulars. He replied as follows:—

To the Editor of Symons's Meteorological Magazine.

I gladly give you all the information I can about the "Thunderbolt in Bradford." It was, as you surmise, a whirlwind, which, considering that it passed over a thickly populated part of the city, did comparatively little damage. I enclose a cutting from the *Bradford Observer*, which gives an account of it. As I have not seen any further particulars of damage mentioned in the paper since, I conclude its effects were not seriously felt beyond the localities named, which would indicate a length of path of about 1½ miles. I think that the "electric discharge" was nothing more than the sudden change from smoky gloom and comparative darkness to almost sunshine, as the black clouds and smoke passed off to W.N.W. in the rear of the storm.

I was in central Bradford (about one mile N.N.W. from the parts affected) during the 23rd. The morning was foggy at first, and afterwards mostly dull, but with a few gleams of sunshine. Max. temp. about 66°, with light E.S.E. airs; the atmosphere was damp and close. At 1 p.m. I noticed that thunder clouds were forming, and from 2.30 to about 3.45 it became very dark (though not so dark as I have previously seen it on several occasions during the day in Bradford) and rain fell heavily at intervals.

At about 3.45 I saw the clouds and smoke rapidly pass away to the W.N.W., and it came light again very suddenly. The sun did not actually shine, but the contrast from the previous gloom was quite sufficient to account for the wild statements of persons of unscientific mind who *felt* the whirlwind, and also saw the change in the sky. I heard no thunder, owing, perhaps, to noise of street traffic, but I am told that distant thunder was heard in the outskirts of Bradford, and there was a sharp, but short, thunderstorm at Ilkley during the afternoon, with some near lightning, and a rainfall of ·16 in. The evening was fine and calm. There was no wind in central Bradford during the storm. I am told that there was a great noise along the path of the whirlwind, and some people "thought the world was coming to an end!"

ALBERT WILSON.

Ilkley, September 28th, 1901.

The *Bradford Observer* almost justifies the language of the *Daily Chronicle's* report, but in its additional details shows that the whirlwind alone was the destructive agent. It seems to have developed first in West Bowling, where many glass globes were broken in the cemetary, and then passed over Ripleyville, damaging some roofs and sending the slates flying. Other roofs suffered in the neighbourhood of the Bradford Workhouse; a horse and waggon were blown against a wall, and a perambulator—empty as it happened—was lifted into the air. A gentleman who saw the phenomenon from the West Bowling golf links compared it to a water-spout, although his description indicates a whirlwind which had drawn a quantity of smoke into the vortex. Between Morton East and Morton West, about six miles north-west of Bradford, a very well-marked whirlwind occurred on the same day (no hour being mentioned we cannot say whether it was the same whirl), and it is noted that it "crossed the canal making the water fly as from a hosepipe." The map in "British Rainfall, 1900," p. 18, illustrating the Ilkley flood, shows the places referred to in this notice.

Correspondence.

TEMPERATURE AND SEASONS, 1883–1901.

To the Editor of Symons's Meteorological Magazine.

I SEND the following observations made from a southern county record, the temperatures being taken by a thermometer 4 feet from ground, with a north aspect. The earliest dates of high readings in spring seem to correspond fairly with a warm season. The autumn readings naturally show the opposite conditions. Thus, the last reading in 1890 of 70° or upwards was on August 6th; but in 1886 it was as late as October 4th, and the autumn was very warm. The earliest and latest dates in each season are shown in heavier type as well as the temperatures on these days.

Nineteen Year Record Shade Temperatures.

Year.	1 EARLIEST DATE. 60° or over. I.	2 EARLIEST DATE. 70° or over. II.	3 LATEST DATE. 70° or over. I.	4 LATEST DATE. 60° or over. II.	5 Actual Maximum Shade Temperatures on the given dates. Spring.		Autumn.		6 No. of Days between columns I. and II. Spring.	Aut'mn
					°	°	°	°		
1883...	Apr. 3	May 21	Sept. 19	Oct. 27	64	70	72	60	48	38
1884...	**Mar. 17**	,, 11	,, 18	,, 16	**61**	73	72	61	55	28
1885...	Apr. 18	June 3	Aug. 17	Sept. 29	62	70	75	61	46	43
1886...	Mar. 23	May 8	**Oct. 4**	Oct. 31	60	73	**74**	60	46	27
1887...	Apr. 19	**June 8**	Aug. 28	**Sep. 23**	62	**70**	74	**60**	50	26
1888...	,, 15	May 19	Sept. 24	Oct. 28	62	73	70	61	34	34
1889...	,, 19	,, 5	,, 13	Sept. 27	61	73	75	63	16	14
1890..	,, 30	,, 25	**Aug. 6**	Oct. 6	60	71	**70**	62	25	61
1891...	**May 7**	,, 12	Sept. 13	,, 9	**63**	72	71	60	5	26
1892...	Apr. 2	,, 25	Aug. 24	Sept. 27	60	70	70	62	53	34
1893...	,, 5	**Apr 20**	Sept. 15	Oct. 21	61	**71**	71	60	15	36
1894...	,, 1	June 3	,, 1	,, 11	60	74	70	64	63	40
1895...	Mar. 21	May 9	,, 30	**Nov. 16**	62	74	73	**60**	49	47
1896...	,, 22	,, 11	,, 7	Oct. 15	63	70	71	60	50	38
1897...	,, 23	Apr. 27	Aug. 18	,, 19	60	71	70	65	35	62
1898...	,, 18	May 22	Sept 21	,, 26	61	71	73	61	65	35
1899...	,, 29	,, 31	,, 13	,, 28	61	72	70	61	63	45
1900...	Apr. 14	Apr. 21	,, 18	Nov. 1	63	71	71	60	7	44
1901...	,, 20	,, 23	...	...	64	70	...	...	3	...
Average	April 6	May 15	Sept. 9	Oct. 17	61·6	72·6	71·8	61·2	39	38

A. F. PARBURY.

Chiddingfold, Godalming, Surrey.

THE INVERNESS EARTHQUAKE OF SEPT. 18TH.

To the Editor of Symons's Meteorological Magazine.

I venture to ask the kindly assistance of your readers in my effort to obtain materials for a study of the recent important earthquake in the north of Scotland. I should be very glad to receive accounts, however brief, from any part of the disturbed area, especially from places which seem to be near the boundary of the disturbed area, such as in the extreme north of Scotland, along the western coast, and in the neighbourhood of the line joining Edinburgh and Glasgow. Owing to the hour at which the earthquake occurred, it is most difficult to obtain records of the shock at great distances from the epicentre, and therefore all those received possess a very high value. If any of your readers should be willing to assist me in this work, I shall be pleased to send them forms on which they might enter their own accounts or those of their friends.

CHARLES DAVISON.

16, Manor Road, Birmingham, Sept. 30th.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, APRIL, 1901.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Total Rain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	76·8	23	28·1	2	59·2	39·1	37·6	66	118·3	20·5	2·15	14	4·6
Malta	87·7	12	50·4	21	68·7	55·2	52·6	76	136·8	45·6	·10	1	2·8
Cape Town	92·0	18	43·8	10	73·3	56·1	55·5	72	...	...	·75	4	4·5
Mauritius	85·9	6, 7	61·5	18	82·0	69·7	68·7	80	147·2	54·4	3·43	11	5·1
Calcutta	103·7	16	69·2	21	97·9	76·9	70·7	61	155·2	67·8	1·55	2	4·4
Bombay	93·6	30	76·0	1	89·6	78·8	74·8	74	142·3	69·9	·04	1	2·6
Colombo, Ceylon	93·6	16	73·0	7	90·6	75·2	75·9	85	151·0	72·5	8·71	19	3·3
Melbourne	82·6	9	39·7	18	66·4	49·5	47·4	71	133·9	30·9	6·71	12	6·2
Adelaide	89·2	1	42·4	28	72·0	53·5	47·1	65	145·4	35·1	1·94	8	5·6
Sydney	83·5	15	51·7	24	71·1	58·8	57·2	81	131·9	39·8	10·16	14	5·2
Wellington	74·0	6	37·0	28	64·3	51·5	46·8	67	117·0	30·0	2·35	9	4·2
Auckland	72·5	1	46·5	10	66·2	55·1	49·9	68	138·0	43·0	1·12	10	4·4
Jamaica, Halfway Tree	90·0	24	66·0	13	85·9	69·9	66·8	71	...	...	1·16	4	3·0
Trinidad	94·0	6	62·0	12	89·9	66·7	72·0	81	165·0	53·0	·35	1	...
Grenada	87·0	29	70·8	13	84·3	73·9	70·5	73	148·2	...	·71	5	1·6
Toronto	75·6	29	30·2	12	54·8	37·6	35·9	68	93·0	26·2	3·86	11	6·2
Fredericton New Brunswick,	76·9	26	23·4	13	53·3	32·6	29·6	60	...	...	4·43	11	5·9
Winnipeg, Manitoba	76·4	30	15·0	1	55·4	30·2	...	...	...	...	1·93	6	5·7
Victoria, British Columbia	59·3	30	32·4	7	51·8	40·0		...	...	...	3·01	12	6·4

REMARKS.

MALTA.—Mean temp. of air 60°·6, or 1°·1 above the average. Mean hourly velocity of wind 2·8 miles or 1·7 below average. Mean temp. of sea 62°·9. L on 26th.
J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·2 below, of dew point equal to, and R 1·86 in. below their respective averages. Mean hourly velocity of wind 9·4 miles, or 1·2 below the average; extremes, 27·6 on 23rd and 0·0 on 2nd; prevailing direction S.E. by E. and E.S.E. L and T on 5 days; T on 1st, and L on 3 days. T. F. CLAXTON.

COLOMBO, CEYLON.—Mean temp. of air 0°·6 below, of dew point 1°·5 above, and R 2·72 in. below, their respective averages. Mean hourly velocity of wind 6·0 miles; prevailing direction S.E. to S.W. TSS occurred on 4 days. L was seen on 3 days.
W. C. S. INGLES.

Adelaide.—Mean temp. of air 1°·2 below the average of 44 years; R about normal, but the month was dry over inland parts of the state. C. TODD, F.R.S.

Sydney.—Mean temp. of air 0°·4 above, humidity 3·3 above, and R 4·54 in. above, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—Mean temp. of air 0°·9 above, and R 1·18 in. below, their respective averages. Generally fine; occasional showers of rain, but small total fall. Prevailing N.W. winds, generally moderate. T on 25th. Earthquake on 1st at 8.45 a.m., smart E. and W. shock, and on 3rd, at 8.50 p.m., very slight. R. B. GORE.

Auckland.—Mean temp. 1° below the average. A remarkably fine month. R not one-half the average of the previous 33 years. T. F. CHEESEMAN.

TORONTO.—Heavy fall of snow on 20th. R. F. STUPART.

WINNIPEG.—Ice began to move down the river on 9th. R. F. STUPART.

SUPPLEMENTARY TABLE OF RAINFALL, AUGUST, 1901.

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Uxbridge, Harefield Pk..	1·09	XI.	Castle Malgwyn	4·33
II.	Dorking, Abinger Hall .	2·62	,,	Builth, Abergwesyn Vic.	4·18
,,	Sheppey, Leysdown	·89	,,	Rhayader, Nantgwillt ...	...
,,	Hailsham	1·03	,,	Lake Vyrnwy	2·08
,,	Crowborough.....	1·80	,,	Corwen, Rhug	...
,,	Ryde, Beldornie Tower..	2·25	,,	Criccieth, Talarvor	2·53
,,	Emsworth, Redlands ...	2·23	,,	I. of Anglesey, Lligwy..	1·67
,,	Alton, Ashdell	1·58	,,	Douglas, Woodville.....	3·27
,,	Newbury, Welford Park	2·36	XII.	Stoneykirk, Ardwell Ho.	3·49
III.	Oxford, Magdalen Coll..	2·01	,,	New Galloway, Glenlee	5·68
,,	Banbury, Bloxham	1·33	,,	Moniaive, Maxwelton Ho.	4·77
,,	Pitsford, Sedgebrook ...	1·63	,,	Lilliesleaf, Riddell	1·49
,,	Huntingdon, Brampton.	1·01	XIII.	N. Esk Res. [Penicuick]	1·65
,,	Wisbech, Bank House...	·87	XIV.	Glasgow, Queen's Park..	2·85
IV.	Southend	1·20	XV.	Inveraray, Newtown ...	6·30
,,	Colchester, Lexden	·83	,,	Ballachulish, Ardsheal...	6·65
,,	Saffron Waldon, Newport	1·35	,,	Islay, Eallabus..... ...	4·77
,,	Rendlesham Hall	·88	XVI.	Dollar.....	2·11
,,	Swaffham	1·21	,,	Balquhidder, Stronvar...	8·43
V.	Salisbury, Alderbury ...	2·52	,,	Coupar Angus Station...	1·76
,,	Bishop's Cannings	1·84	,,	Blair Atholl	3·97
,,	Blandford, Whatcombe .	5·19	XVII.	Keith H.R.S.....	1·01
,,	Ashburton, Druid House	4·66	,,	Forres H.R.S.	1·20
,,	Okehampton, Oaklands.	2·45	XVIII.	Fearn, Lower Pitkerrie..	·71
,,	Hartland Abbey	2·66	,,	S. Uist, Askernish	3·88
,,	Lynton, Glenthorne ...	...	,,	Invergarry.....	2·35
,,	Probus, Lamellyn	3·95	,,	Aviemore, Alvie Manse.	·78
,,	Wellington, The Avenue	1·94	,,	Loch Ness, Drumnadrochit	1·41
,,	North Cadbury Rectory	2·39	XIX.	Invershin	1·97
,,	Clifton, Pembroke Road	1·96	,,	Durness.....	...
VI.	Ross, The Graig	1·73	,,	Watten H.R.S.....	·86
,,	Wem, Clive Vicarage ...	1·09	XX.	Dunmanway, Coolkelure	11·85
,,	Wolverhampton, Tettenhall	...	,,	Cork, Wellesley Terrace	7·81
,,	Cheadle, The Heath Ho.	1·22	,,	Killarney, District Asyl.	6·59
,,	Coventry, Priory Row ..	1·32	,,	Caher, Duneske	6·13
VII.	Market Overton	·86	,,	Ballingarry, Hazelfort...	4·36
,,	Grantham, Stainby	1·01	,,	Limerick, Kilcornan ...	4·14
,,	Horncastle, Bucknall ...	1·06	,,	Miltown Malbay	6·26
,,	Worksop, Hodsck Priory	·69	XXI.	Gorey, Courtown House	4·51
VIII.	Neston, Hinderton	...	,,	Moynalty, Westland ...	3·78
,,	Southport, Hesketh Park	·86	,,	Athlone, Twyford	5·43
,,	Chatburn, Middlewood.	·96	,,	Mullingar, Belvedere ...	5·48
,,	Duddon Val., Seathwaite Vic.	4·42	XXII.	Woodlawn	6·28
IX.	Baldersby	1·26	,,	Crossmolina, Enniscoe ..	8·85
,,	Scalby, Silverdale	·60	,,	Collooney, Markree Obs.	5·16
,,	Ingleby Greenhow Vic..	·99	XXIII.	Enniskillen, Model Sch.	4·00
,,	Middleton, Mickleton ...	1·09	,,	Warrenpoint.....	3·54
X.	Haltwhistle, Unthank H.	...	,,	Miltown, Banbridge.....	3·48
,,	Bamburgh	1·51	,,	Belfast, Springfield	3·67
,,	Keswick, The Bank.....	3·45	,,	Bushmills, Dundarave..	3·31
XI.	Llanfrechfa Grange	2·87	,,	Stewartstown	3·64
,,	Treherbert, Tyn-y-waun	5·76	,,	Killybegs	5·06
,,	Llandovery	2·91	,,	Horn Head	3·22

SEPTEMBER, 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) ...	1·62	— ·45	·65	16	6	77·6	8	40·4	16	0	0
II.		Tenterden	·86	— 1·53	·38	16	9	75·0	29	41·0	27	0	...
,,		Hartley Wintney	·95	— 1·25	·44	16	11	75·0	12	41·0	30	0	...
III.		Hitchin	1·39	— ·74	·67	16	7	71·0	29	39·0	5, 13	0	...
,,		Winslow (Addington)	1·50	— ·76	·41	16	7	72·0	29*b*	36·0	16	0	0
IV.		Bury St. Edmunds (Westley)	1·15	— 1·34	·32	8	8	73·7	29	40·0	6	0	...
,,		Norwich (Brundall)	·86	...	·31	17	12	76·0	29	41·8	2	0	0
V.		Winterbourne Steepleton ...	4·34	...	1·72	16	13	69·0	29	38·2	6	0	2
,,		Torquay (Cary Green)	4·42	...	1·62	22	15	68·1	29	49·0	26	0	0
,,		Polapit Tamar [Launceston]..	2·71	— ·59	·62	22	16	68·9	30	39·1	15	0	0
VI.		Stroud (Upfield)	1·61	— ·83	·50	16	11	71·0	10	47·0	15	0	...
,,		Church Stretton (Woolstaston)	1·25	— 1·16	·36	16	12	70·0	9	40·5	5	0	...
,,		Worcester (Diglis Lock)	1·12	— ·70	·37	16	8	...	...	...	...	...	...
VII.		Boston	1·06	— ·92	·35	8	6	71·0	9	42·0	1	0	...
,,		Hesley Hall [Tickhill].....	·87	— 1·02	·31	16	8	73·0	25	37·0	1, 7	0	...
,,		Derby (Midland Railway).....	·90	— 1·11	·40	16	9	73·0	25	42·0	1	0	...
VIII.		Manchester (Plymouth Grove)	·78	— 2·39	·17	7	11	74·0	9	46·0	15	0	...
IX.		Wetherby (Ribston Hall) ...	·85	— 1·37	·21	21	9	...	...	...	...	...	...
,,		Skipton (Arncliffe)	2·61	— 2·57	·42	8	16	...	...	...	...	...	...
,,		Hull (Pearson Park).	·78	— 1·45	·25	16	9	73·0	10	38·0	2, 16	0	1
X.		Newcastle (Town Moor)	1·02	— 1·16	·20	19	17	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	9·32	— 3·56	2·70	27	16	66·5	11	36·3	16	0	...
XI.	WALES.	Cardiff (Ely).....	3·65	— ·10	1·08	13	18	...	...	...	...	...	...
,,		Haverfordwest	6·13	+ 2·33	1·44	16	20	67·8	12	41·0	15	0	0
,,		Aberystwith (Gogerddan) ...	2·49	— 1·58	·75	13	12	75·0	1	33·0	14	0	...
,,		Llandudno.....	1·28	— 1·59	·21	29	17	71·0	8	46·0	1	0	...
XII.	SCOTLAND.	Cargen [Dumfries]	3·97	+ ·22	1·24	19	17	69·0	11	34·0	2	0	0
XIII.		Edinburgh (Royal Observatory)	·92	...	·24	13	12	68·1	28	43·7	5	0	0
XIV.		Colmonell	4·61	+ ·62	1·26	19	16	70·0	23	31·0	2	...	...
XV.		Tighnabruaich	4·06	...	·65	19	16	63·0	24	41·0	29	0	...
,,		Mull (Quinish).....	5·65	+ ·53	·92	18*f*	20	...	...	...	...	...	...
XVI.		Loch Leven Sluices	2·80	— ·11	·64	7	14	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	1·50	— ·73	·30	25	17	70·6	9	38·4	16	0	...
XVII.		Braemar	2·11	— 1·01	·70	19	19	64·7	11	29·5	16	2	5
,,		Aberdeen (Cranford)	1·50	— 1·23	·35	8, 17	20	69·0	9	41·0	16*c*	0	...
,,		Cawdor (Budgate)	1·36	— 1·73	·80	28	12	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	1·55	— 2·93	·65	30	9	..	...	...	...	...	...
,,		Glencarron Lodge.....	3·92	— 4·61	1·12	28	12	67·5	24	34·0	2	0	...
XIX.		Dunrobin	1·58	— 1·01	·55	28	13	66·0	29	39·0	2	0	...
,,		S. Ronaldshay (Roeberry) ...	1·58	— 1·89	·37	28	17	63·0	24	43·0	17	0	...
XX.	IRELAND.	Darrynane Abbey.....	6·25	+ 2·08	1·32	19	24	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	5·28	+ 2·15	1·27	15	21	67·0	8	39·0	14	0	...
,,		Broadford (Hurdlestown) ...	5·97	+ 3·10	1·15	21	22	68·0	8	42·0	14*d*	0	...
XXI.		Carlow (Browne's Hill)	5·05	+ 2·32	1·12	22	19	...	...	...	...	...	...
,,		Dublin (Fitz William Square)	3·69	+ 1·57	·83	16	18	70·7	8	43·3	1	0	0
XXII.		Ballinasloe	4·80	+ 1·66	·75	15	20	70·0	8, 9	36·0	1	0	...
,,		Clifden (Kylemore)	11·74	+ 4·90	2·65	7	22	...	...	...	...	...	...
XXIII		Seaforde.....	4·11	+ ·96	·64	7, 19	21	67·0	2	43·0	12*e*	0	...
,,		Londonderry (Creggan Res.).	3·18	— ·69	·33	25	23	...	...	...	...	...	...
,,		Omagh (Edenfel)	4·71	+ 1·00	·48	22*a*	23	68·0	8	36·0	29	0	...

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

a—and 25. *b*—and 30. *c*—and 17. *d*—and 29. *e*—and 15, 18. *f*—and 28.

METEOROLOGICAL NOTES ON SEPTEMBER, 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 generally fine, with no R. Showery weather set in on 8th, and continued more or less till 21st. A considerable amount of fog occurred during the last week, but there were several very beautiful days. Mean temp. 58°·4, or 0°·7 above the average.

TENTERDEN.—A dry month, but grass freshened up a little. Remarkably even max. temp., none being below 61°, and only five above 70°. Duration of sunshine 167 hours.

HARTLEY WINTNEY.—Another remarkably fine and dry month, with only a few showers during the third week, yielding a R far below the average. Fog on 29th and 30th. Ozone on nine days, with a mean of 2·5.

WINSLOW, ADDINGTON.—A fine month. Thick fog on the mornings of 16th and 25th; 29th and 30th were brilliant days.

BURY ST. EDMUNDS, WESTLEY.—A hot, dry month. Max. temp. only once below 62°. Great want of water was felt in W. Suffolk. T on 11th.

NORWICH, BRUNDALL.—Another dry month. The total R for Jan.—Sept. amounts to 12·47 in. only, or 6·25 in. below the average. L on evening of 10th.

TORQUAY, CARY GREEN.—R 2·11 in. above the average. Mean temp. 1°·6 above the average. Duration of sunshine 37·2 hours below the average, with four sunless days. Mean amount of ozone 4·6; highest 7·0 on 8th, with S.S.W. wind, and on 17th with W.S.W. wind, lowest 2·0 on 29th, with N.N.W. wind.

POLAPIT TAMAR [LAUNCESTON].—Warm, calm and dry. The total fall for the first nine months of the year was ·89 in. below the average.

MANCHESTER, PLYMOUTH GROVE.—Fine autumn weather prevailed during the greater part of the month. Full supply of water only turned on from 6 p.m. to 6 a.m., owing to the effects of drought.

A particularly brilliant meteor was observed from Ross (Hereford), on September 14th, at 9.15 p.m., describing a parabola, which ended about 40° to the west of Ursa Major. It had a fine comet-like tail, and was of a slightly yellow colour.

WALES.

HAVERFORDWEST.—The first week was fine, with three almost cloudless days. From 8th to 27th R fell every day except 12th. Temp. was moderate generally, the max. being below 60° on two days only. Grass was plentiful everywhere. A good deal of corn was damaged by the wet, and the potato crop was anything but sound. Duration of sunshine 97·4 hours.

ABERYSTWITH, GOGERDDAN.—This month showed no improvement compared with its forerunner, as there was much cloud and R, and the bar. was very unsettled throughout. Wind chiefly S. and S.W., getting into N. and N.E. for a short time early in the month.

SCOTLAND.

CARGEN [DUMFRIES].—Dull and sunless, remarkable for high night temp.

CLACHANTON, COLMONELL.—Mean temp. 1°·8 above the average of 25 years.

TIGHNABRUAICH, CRAIGANDARAICH.—R fell on the same number of days as in September, 1900, and chiefly about the equinox on both occasions.

MULL, QUINISH.—Crops were generally secured with unusual ease by the middle of the month.

S. RONALDSHAY, ROEBERRY.—A very fine month. Mean temp. 53°·1, or 1°·5 above the average of 11 years.

IRELAND.

DARRYNANE ABBEY.—A very wet month, the total R having been exceeded in September only three times in 22 years. The fall exceeded an inch on two days.

WATERFORD, BROOK LODGE.—The wettest September since 1896. The max. daily range of temp. was 23°.

BROADFORD, HURDLESTOWN.—The wettest September on record here. S. gale on 29th.

DUBLIN, FITZWILLIAM SQUARE.—Although warm, it was very unsettled, stormy and rainy. The mean temp. was 57°·7, or 1°·9 above the average, being about the same as that of September, 1900, but in no other respect did the weather of that beautiful month reproduce itself. Only during the first few days did quiet summer-like conditions prevail. For the rest atmospheric depressions, sometimes of great size and depth swept northward along the W. coast of Ireland, causing strong S.E. to S. and S.W. winds, and frequent R. High winds were noted on 14 days, and attained the force of a gale on five. Foggy on 2nd.

OMAGH, EDENFEL.—The month began in fine weather, and during the first fortnight some fine days enabled most of the harvest, fortunately an early one, to be saved in fair order. Had it not been so the constant and saturating R of the last fortnight, accompanied as they were by a sweltering, humid atmosphere, would have been destructive even to the oat crop.

METEOROLOGICAL NEWS AND NOTES.

SIR JOHN MURRAY, F.R.S., is at present organizing a complete survey of the lakes of the British Islands, the funds for which have been provided by Mr. Laurence Pullar, to whose son, the late Mr. F. P. Pullar of Bridge of Allan, the completed work will form a memorial.

APPLIED METEOROLOGY will be in a class by itself at the Local and International Agricultural Exhibition to be held at Mons in Belgium in 1902. We are requested to state that this exhibition is being organized by the local Agricultural Society, with the support of the town of Mons, the authorities of the neighbouring provinces and of the Belgian Government. Applied Meteorology is to form a class of the section on Agricultural Science, and amongst the subjects to be specially dealt with are enumerated—(1) Plans for the organization of a cheap and effective service for distributing weather forecasts in country districts; (2) Means of preventing damage by hail; (3) Means of protection against white frosts. Full particulars may be obtained from Monsieur Albert Mahien, Erquennes par Dour, Belgium.