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International Meteorology

No science, especially in its practical application, depends more on international co-operation than does meteorology. There are now two international organizations which deal with meteorology: the International Union of Geodesy and Geophysics, and the International Conference of Directors. By mutual arrangement it has been decided that the former should concern itself only with the scientific side of meteorology, while the practical application should be left entirely to the latter. In conformity with this arrangement it was decided at Utrecht in 1923 that only directors of State meteorological services should be members of the Conference of Directors. The Conferences are held every six years, and at each Conference a number of Commissions are appointed to deal with various aspects of practical meteorology. In the nature of the case, these commissions have to consider a number of scientific problems, and, therefore, membership of commissions is not limited to members of meteorological services, but any man of science whose help would be valuable to the work of any commission is elected a member. During the interval between the meetings of the Conference the authority of the Conference is vested in the International Meteorological Committee, which meets whenever required, and, in any case, once in each three years.

During the eight days September 13th to September 20th, eight Commissions met in Zürich. The attendance was high,

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no less than 45 members of the various Commissions attending the meetings, in which the following British representatives took part: Dr. G. C. Simpson, president of the Commission for the Réseau Mondial; Lt.-Col. E. Gold, president of the Commission for Synoptic Weather Information; Dr. C. Chree, president of the Commission for Terrestrial Magnetism and Atmospheric Electricity; Sir Gilbert Walker; Sir Frederic Stupart (Toronto); Mr. C. J. P. Cave; Mr. C. Stewart (Pretoria); and Mr. R. A. Fisher.

After the meetings of the Commissions in Zürich, the International Meteorological Committee met in Vienna from September 23rd to September 28th, under the presidency of Professor van Everdingen (Holland). The Committee held eight meetings, at which the reports of the Commissions were considered, and about 70 resolutions submitted by the Commissions were adopted and a large number of other resolutions approved. As most of these resolutions deal with practical questions of the collection and distribution of meteorological information, uniformity of observational methods and the fixing of hours of observations, it will be seen that a large amount of international co-ordination of meteorological work was effected. It is impossible here to summarise the resolutions, but the following are amongst the chief decisions reached:

A system of visual gale warning signals, for day and night, was adopted as the system to be used as far as possible in all national services. The vexed question of the velocity equivalents of the Beaufort scale was considered, and at last, after many years of effort, agreement was obtained as to the method to be used in converting velocities read on anemometers into Beaufort Numbers for use in weather telegrams.

The International Cloud Atlas—prepared in 1895 by Messrs. Hildebrandsson, Riggenbach and Teisserenc de Bort—has for some time been out of print. The Cloud Commission under the presidency of General Delcambre (Director of the French Meteorological Service) has considered the question of a new atlas and of the changes in nomenclature and arrangement which experience has shown to be desirable. It was decided to prepare a new atlas, which will contain a new set of photographs and the proposed changes, for the consideration of the Conference of Directors which will meet in 1929. An anonymous donor has generously provided funds for the purpose.

Throughout its history the International Meteorological Committee has had no permanent staff and no funds. All secretarial work and the publication of the reports of the meetings have been undertaken by one or more of the national meteorological offices. The work of the international organization has now grown so large that this is no longer a practical

method, and, in addition, the need for an organization for the interchange of information about changes in codes, times of issue of wireless messages, and other similar matters of general concern, is now acutely felt. It was therefore decided that the time has come to establish a secretariat to look after the records of the Conference, Committees and Commissions, to arrange the meetings, and to publish the records. Only a small staff of two or three persons is contemplated, and a small Committee of three was appointed to work out the details of the proposal.

The Weather of the Past Summer

During the summer half-year, April to September, 1926, the weather as a whole over the British Isles was not strikingly abnormal. The rainfall was above the average for April, May and June, but this excess was partly compensated by a deficit in July, August and September. Similarly, April, July, August and September were warm, but May and June were cold, and the mean temperature for the whole period was only slightly above normal. Perhaps the most general impression of the summer half-year of 1926 concerns the frequency of severe thunderstorms. It is true that at Kew Observatory the total number in the months of April to August was 14, compared with a normal total in these months of 11·6, while in the months of June to August only six storms were recorded, compared with an average of 8·3, but the year 1926 included several storms of considerable severity, notably those of July 18th, August 17th and September 1st.* The heavy storms of July were particularly unfortunate for the wheat crops, which otherwise would have stood a good chance of recovering from the cool, wet and sunless June. The general tendency during the half-year was for warm moist thundery weather.

This type of weather is similar to that associated with the south-eastern quadrant of large shallow depressions, or with the col between two anticyclones. The average distribution of pressure appears to have been favourable on the whole for the frequent establishment of such conditions. The map (Fig. 1) shows the distribution of deviations of pressure from normal during the five months, April to August. Pressure was above normal over the northern part of the North Atlantic Ocean from the north coast of Iceland to beyond Spitsbergen, and also over the northern half of Scandinavia, while another area of pressure above normal included Spain, Portugal and the south of France. Between these two areas of excess a col of relatively low pressure

* See *Meteorological Magazine*, 1926; August, p. 162; September, p. 199, and October, p. 223.

extended across the British Isles and central Europe, expanding westwards into a large area of pressure deficit which covered the greater part of the North Atlantic. Pressure averaged 3·5 mb. below normal at St. John's, Newfoundland, 2·4 mb. below normal at Horta, Azores, and 2·8 mb. below normal at the point 50° N 30° W. This deficit over the North Atlantic persisted in all the individual months, though the details of the distribution over western Europe varied from month to month. In April pressure was 8·9 mb. below normal in 50°N 30° W, and the deficit extended eastwards across central Europe as in the average map. In May the maximum deficit was 4·5 mb. at St. John's, and in June 4·4 mb. at Horta, but the col across the British Isles persisted throughout these three months and numerous depressions crossed these islands unusually far to the southward, often following slow and irregular tracks. In July, however, there was a definite change in the pressure distribution; while the deficit over the Atlantic persisted, the two areas with pressure above normal over Scandinavia and the Iberian peninsula united across the British Isles, giving us a relatively fine month in England and Scotland, though the rainfall was still slightly above normal in Ireland. In August the area of high pressure over these islands strengthened, and the deviation from normal reached +4·3 mb. at Scilly; this month was definitely dry, rainfall averaging only 82 per cent. of normal, and, in England and Wales, only 79 per cent. In September the pressure distribution over western Europe was very similar to that in August, the maximum deviation being +4·4 mb. at Brest, but the area of pressure above normal extended out into the Atlantic some distance to the westward of Ireland, while pressure was more than 5 mb. below normal over the Azores. In this month also, pressure gave way over Iceland and the Arctic Ocean. The rainfall was well below normal over England and Ireland but above normal over Scotland.

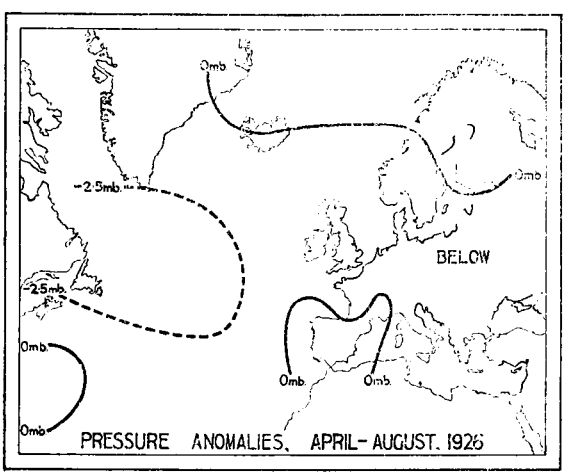

FIG. 1.

The information available about the general meteorological

conditions over the world during the past two years is not yet sufficient to throw much light on the causes of the pressure distribution shown in Fig. 1. The outstanding feature, so far as is known at present, was the abnormal weakness of the south-east trade wind at St. Helena during the last seven months of 1924 when the velocity was the lowest on record during the whole period of 33 years since anemometer records began. Unfortunately, no records are yet available for the early months of 1925. The strength of the north-east trade wind, as indicated by the mean pressures at Horta, Gibraltar and Sierra Leone, was also below normal from June, 1925, until July, 1926, which is the latest month for which information is available. There is evidence that weak trade-winds in the Atlantic result in a weakening of the Gulf Stream, and adversely affect the surface temperature of the North Atlantic one to two years later, and the surface temperature of the North Atlantic is one of the numerous factors which affect the distribution of pressure over the North Atlantic and western Europe. The relation found is that when the surface temperature of the North Atlantic is below normal, pressure tends to be below normal between the Azores and Bergen, but above normal in Iceland and Greenland. Thus the deviations of pressure from normal shown in Fig. 1 are roughly what we should expect from the preceding variations of the Atlantic trade winds. There are, however, so many other factors, the variations of which are not yet known, and especially the amount and distribution of Arctic ice during the spring and summer of 1926, that it would be rash to assume that the pressure deviations of April to August are entirely accounted for by the trade-wind conditions.

In discussing the weather of the winter 1925-26 over the Atlantic and western Europe*, it was remarked that the succession of events during the period December, 1925, to March, 1926, presented a remarkable similarity to the succession during the period January to April, 1912. The abrupt change in 1926 from a rainy February to a dry March, closely resembled the change in 1912 from a wet March to a very dry April. The resemblance persisted for another two months; the pressure distribution during April, 1926, resembled that of May, 1912, and the distribution during May, 1926, resembled that of June, 1912, but after that the parallelism began to break down. August, 1912, was a very wet month, including the famous Norwich floods, and from the holiday point of view it was fortunate that the parallelism between 1912 and 1926 did not persist for eight months instead of six.

C.E.P.B.

* *Meteorological Magazine*, April, 1926, p. 56.

Discussions at the Meteorological Office

October 11th, 1926. *Measurements of the amount of ozone in the earth's atmosphere and its relation to other geophysical conditions.* By G. M. B. Dobson and D. N. Harrison (London, Proc. R. Soc., A. 110, 1926, pp. 660-93). *Opener*—Mr. J. S. Dines, M.A.

Attempts to determine the amount of ozone in the atmosphere by chemical analysis have not been successful. In 1920 Fabry and Buisson used a spectroscopic method, and it is this method which has been adopted and developed at Oxford by the authors of the present paper. Ozone has strong absorption bands in the ultra-violet between 3,300 A° and 2,000 A°. Owing to this absorption no light reaches the earth's surface of wave length less than about 2900 A° and the more ozone there is in the atmosphere the less light is received between this wave length and 3300 A°.

A spectrograph is used to separate out the wave lengths, a very effective light filter of a type devised by the authors being placed in front of the spectrograph to cut out light of longer wave length than 3300 A°, which if allowed to enter would by reason of its intensity and by scattering through the optical system tend to fog the photographic plate. By means of a photometer the intensity of the light received on certain wave lengths in the ozone absorption region is measured from the plate.

On a cloudless day a series of observations can be taken at different solar altitudes and the absorption of light on various wave lengths in the ozone absorption band determined. From these readings the amount of ozone can be deduced but it is necessary to assume that the constitution of the atmosphere remains constant throughout the series of observations.

As cloudless days are rare in this country a short method was worked out by which the amount of ozone can be determined from a single exposure taken at any solar altitude above a certain limiting value. Certain assumptions are necessary but the results obtained are probably of no less accuracy than those given by the series method described above, and readings can be obtained on many days when a series would be impracticable owing to cloud.

The results obtained during 1925 are given in the paper.

The most notable deductions are that the amount of ozone in the atmosphere has an annual variation from the equivalent of a layer 0·3 cm. thick at normal temperature and pressure in the spring to 0·2 cm. thick in late autumn. There is a close connexion with surface pressure in the sense that ozone above the normal is associated with pressure below normal and *vice versa*.

The correlation with pressure at 9 and 12 km. height is also found to be very close. Further observations are proposed for 1926, not only at Oxford but also at various places in Europe, so that the distribution of ozone round various types of pressure systems can be determined.

October 25th, 1926. *The measurement of humidity in closed spaces.* Food Investigation Board, Special Report, No. 8. *Opener*—Mr. E. G. Bilham, B.Sc., D.I.C.

The paper summarises the results of an extensive investigation on the measurement of humidity with special reference to problems relating to storage of food. After a brief summary of the existing methods of humidity control, including a useful account of a chamber in which the humidity can be kept at any required value for testing purposes, the various commercial types of psychrometer and hygrometer are considered in detail. The general conclusions arrived at are :—

(1) That the dew point hygrometer, when carefully designed, is the most accurate and convenient method of determining the atmospheric moisture content.

(2) That ventilated psychrometers of the Assmann type give results normally agreeing to within one per cent. with the dew point apparatus, provided precautions are taken to prevent errors due to the presence of the observer.

(3) That hair hygrometers are normally reliable to within about four per cent., provided that the tension on the hairs is reduced to a minimum and that the zero adjustment is checked at frequent intervals. In instruments in which the hairs are under considerable tension, serious changes of zero are found to occur after the instrument has been exposed either to very low humidity or low temperature.

Certain lesser known methods of measuring humidity, such as the hot wire method, are briefly considered.

The paper forms a convenient and useful summary of existing knowledge on the subject of humidity and its measurement.

The subjects for discussion for the next meetings will be :—

November 22nd. *Atmospheric diffusion shown on a distance—neighbour graph.* By L. F. Richardson (London, Proc. R. Soc., A. 110, pp. 709-37). *Opener*—Mr. N. K. Johnson, M.Sc.

December 6th. *On the theory of monsoon rainfalls in the Far East.* By D. Nukiyama (Tokio, Jap. J. Astron. Geophys. II., pp. 75-90). *Opener*—Mr. R. H. Mathews, B.A.

Royal Meteorological Society

An informal meeting of this Society was held on Wednesday, October 20th, at 49, Cromwell Road, South Kensington, to welcome Dr. T. Okada, Honorary Member, 1925, and Symons Medallist, 1924, Director of the Central Meteorological Observatory, Tokyo, who was paying a short visit to England with Dr. S. F. Fujiwhara, of Tokyo.

A set of lantern slides of cloud forms which have recently been presented to the Society by Mr. G. A. Clarke, of Aberdeen Observatory, were shown, together with slides from the Society's collection.

The meeting was followed by an informal dinner at the Rembrandt Hotel.

Correspondence

To the Editor, *The Meteorological Magazine*

Black Bulb Temperatures

With reference to the article entitled "Extremes of Temperature," in the August number of the *Meteorological Magazine*, it may be of interest to note the following maxima recorded by "black bulb in vacuo" in this country:—

Station.	Latitude North.		Longitude East.		Height above M.S.L.	Highest Temperature.	Date.	Period Examined.
	°	′	°	′	Feet	F°		
Allahabad	25	28	81	54	309	180	24.5.'08	Feb. 1904 to Aug. 1914
Pachpadra	25	55	72	18	380	196.5	8.6.'82	1882 to 1886
Jacobabad	28	17	68	29	186	182	20.5.'83	1878 to 1887
Sirsa ..	29	10	75	46	725	183	29.5.'84	Ditto
Lahore ..	31	34	74	21	702	183	28.4.'86	Ditto
Srinagar	34	6	74	51	5,204	168	6.8.'26	Mar. 1904 to Aug. 1926

It is rather curious that the solar radiation thermometer at Srinagar has hitherto never recorded a temperature higher than 168° F., which is often exceeded at the low level stations. The effect of stronger wind at high levels on imperfect vacuum is a probable explanation.

S. N. SEN.

Assam House, Boileauganj, Simla. October 5th, 1926.

Stereoscopic Effect produced by Motion at Right Angles to the Direction of View

Mr. Clarke's article in the *Meteorological Magazine* for October on the stereoscopic effect of motion at right angles to the direction of view, prompts me to state what I saw off the south-west coast of Spain at sunset in September. The conditions were

almost identical, and produced such an effect that officers and passengers both agreed they had never before seen a sunset like it.

A mass of black cumulus apparently rested on the ocean to the west about 4 miles away, and, extending along whole west horizon, far beyond, was the furnace glow of sunset; the sea in the foreground looked like a river with a shore of mountains, say, about 3,000 ft. high. We were steaming north, *i.e.*, at right angles, at about 15 knots.

The picture in the *Meteorological Magazine* is identical with what we saw, except that water was the foreground, and we were looking from a steamer, not a train.

S. SINGLE.

17, *Kensington Palace Mansions, W. 8. October 21st*, 1926.

Land Waterspout in Northern Nigeria

Whilst trekking across the Bauchi Plateau in December last, I witnessed the very peculiar phenomenon of a waterspout at the beginning of the dry season.

At about 10 a.m. (local mean time) a storm suddenly came up from the south-east, and, soon afterwards, heavy rain began to fall. The wind was blowing very strongly from the west at the time, but gradually backed round to south, then east. A huge vertical column, approximately 200 feet in height, could be seen a few miles away—descending vertically in the centre, and rising in a counter clockwise direction on the outside; at the same time the whole column was moving across the plateau with a velocity estimated at 40 miles per hour.

The local inhabitants informed me that these phenomena are very frequent in this district (Kaleri, Bauchi Province), and occur generally at the end of the tornado season.

The snapshot* shows the break-up of the waterspout.

T. H. FALLOWS.

Survey Department, Nigeria. March 15th, 1926.

Winter Thunderstorms

In December last an appeal was made to readers of the *Meteorological Magazine* for reports of any thunder or lightning they might observe during the first three months of 1926. Efforts were made to secure the co-operation of observers in all parts of the British Islands, and the British Broadcasting Co. kindly broadcasted requests for information on several occasions.

Nearly 2,500 reports were sent in, showing that thunder or lightning occurred somewhere in the British Isles on 49 out of

* See page 229.

the 90 days from January 1st to March 31st, which is eight days less than during the same period in 1925. The number of days for each country is shown in the following table.

1926.	England and Wales.	Scotland.	Ireland.	British Isles.
January	17	4	15	21
February	11	6	5	13
March	9	11	6	15
Totals (3 months)	37	21	26	49

The figures for Scotland and Ireland are very probably still too low on account of the small number of observers in those parts.

The thunderstorm distribution map for England and Wales shows that there were four main districts in which four or more storms were experienced during the three months. One of these was a large area round the Severn Estuary, and another was a smaller district in south-west Yorkshire and south Lancashire. The prominent belt free from storms which in 1925 ran approximately north-east and south-west through the midland counties, appears this year to run east and west. The outstanding storms of the season were those of February 15th to 17th, when almost every place south of a line drawn from Pembroke to King's Lynn and north of one joining Barnstaple and Colchester experienced at least one storm.

In thanking all those who supplied information last winter, it is hoped that many readers will be good enough to assist in the continuation of the storm census during the present season. The investigation was re-commenced on October 1st last. I shall, therefore, be very grateful for records of any storms before April 1st, 1927. Details of the observations needed were published in the *Meteorological Magazine* for October, 1926.

S. MORRIS BOWER.

10, *Langley Terrace, Oakes, Huddersfield. October 30th*, 1926.

The Term "Fireball"

With pleasure I read a note in the September issue of your magazine on the yearly Dutch publication with relation to Thunderstorms and Optical Phenomena, of which another part has been published after the number under review.

I hope you will allow me a short remark with regard to the objection which is made there against the use of the word "fireball" as a heading for a chapter on ball-lightning.

Admitting that the name "fireball" has been given to a

certain class of cosmical meteors, one could say that the character of an electrical discharge has been recognised in a number of cases which present themselves as fireballs.

Now ball-lightnings are so rare, that most people never happen to see one, and, therefore, the average observer cannot be expected to be able to make out in all cases whether what impresses him as a fireball is a ball-lightning or not. In the greater part of the communications on fireballs which the Dutch Meteorological Institute receives, the phenomenon is evidently of a cosmical nature, but by keeping the word fireball, which has been chosen as a heading for the chapter in which those communications are discussed, it is avoided that the observer should decide that the object of his observation has been of a meteoritic character, whereas it could be under certain circumstances a form of an electrical discharge as well.

C. SCHOUTE.

Koninklijk Nederlandsch Meteorologisch Instituut, De Bilt, Holland.

October 7th, 1926.

Iceballs

Dr. Mill's talk by wireless on rain this evening was peculiarly interesting to me because of the phenomenal storm experienced here on Sunday evening, July 18th. Details of this storm* as observed by myself and a friend, are as follows.

At 7 p.m. the south and south-west sky darkened.

At 7.5 a sprinkle of large raindrops fell, followed by heavy rain a few moments after.

At 7.10 ordinary sized hailstones fell. These were quickly followed by iceballs, some of which we measured. They were 1¼ in. in diameter. They flew past the window as if from machine guns. At 7.20, to our amazement, we saw the direction of the hail had reversed to the opposite from the north-west.

The hail was succeeded by dense rain, which lasted a long time during the evening. The floods tore deep courses in the hard road. After the hail ceased, lightning and thunder became incessant, and continued far into the night; the flashes seemed to last two or three seconds, and the zigzags were more arrestingly vivid than any pictures I have seen.

The temperature of the iceballs was such that they lay in shady places till I removed the drifts on the Tuesday following, but some were still lying in a garden a short distance from mine on Wednesday. Apples were shot to pieces, as were leaves of trees. Bark of trees was split and torn into hanging ribbons, and thick twigs split and shattered.

The composition of the iceball resembled a dead eyeball.

* For an account of the general conditions during this storm see *Meteorological Magazine*, 61 (1926), p. 162.

The centre was an ordinary sized hailstone, which was surrounded by half an inch of clearest ice; the rest appeared to be congealed snow or sleet. The appearance suggested to me three different degrees of freezing temperatures.

JOHN D. CATHRALL.

The Cottage, Pantybuarth, Mold, Flintshire. September 29th, 1926.

NOTES AND QUERIES

Large Hailstones

Mr. George F. Lewis, Deputy Fire Marshal of Ontario, has kindly forwarded a photograph of some abnormally large hailstones, which is reproduced in the frontispiece.* The photograph was originally published in the "Factory Mutual Record" for July, 1926, issued by the Associated Factory Mutual Fire Insurance Companies, Boston, Mass., together with a brief description of the storm, from which the following particulars are taken. The hailstones fell at Dallas, Texas, in the early evening of May 8th, immediately after a thunderstorm; it is stated that some of them were as large as baseballs, and weighed over twenty ounces. [The diameter of a baseball is just under three inches, while a sphere of ice weighing twenty ounces would have a diameter of slightly over four inches.] Driven by the wind, which blew with a velocity of 45 miles per hour, these missiles struck with great force, and caused considerable damage throughout the city. At the new Ford assembling works nearly 5,000 panes of glass were broken or cracked. Many of these were wired and were more nearly vertical than horizontal. Some of the wired glass was broken into small pieces, and holes two inches in diameter were formed.†

A peculiar thermal effect was noticed in connexion with this storm. The hailstones piled up a foot deep on the roofs of the Main Building and the Power House. This lowered the temperature so rapidly that the roof covering on the Power House contracted faster then the cement tile beneath, with the result that the roofing was pulled out of place, forming "blisters" several feet long, which were punctured by the hailstones.

Note on a Bora at Trieste

According to an account recently received, a bora, violent but of short duration, was experienced at Trieste on the afternoon of July 22nd, 1926.

* See photograph facing p. 229.

† Readers will recall the experience of Mr. G. A. Livett at Plumstead on July 22nd, 1925, described in the *Meteorological Magazine* for August, when the hailstones were "as large as a man's fist," and weighed over eight ounces.

The morning was fine and calm with clear blue sky. About noon alto-cumulus clouds appeared, coming from eastward, and an hour later covered half the sky. There were light airs from an easterly direction.

About 13h. 15m. the north horizon became dark, and, soon after, a heavy dark rain cloud was seen approaching from that direction. At the same time, fresh easterly squalls, about force 5, were experienced, causing dust to rise in clouds on shore. Three-quarters of the sky was covered with alto-cumulus cloud. At 14h. the heavy cloud was close and approaching rapidly. The easterly squalls had ceased.

Suddenly just after 14h. the storm broke in a violent squall (estimated variously at force 10 to 12), from north-north-east. Visibility at once fell to about 200 yards, both ashore and afloat, and very heavy rain fell. The storm was very violent for about twenty minutes when the wind decreased to force 8, visibility increased very rapidly, rain decreased, and blue sky began to appear to the northward. In another twenty minutes the sun was shining, the wind had gone round to east-north-eastward and had fallen to force 6 or 7. The sky cleared rapidly and by 23h. the wind had entirely died away.

The barograph record showed a slight rise for about two hours before, and a sudden rise of 2·5 millibars when the storm broke, after which it was steady for four hours, rising fairly rapidly thereafter until next forenoon when it became steady. The thermograph record showed a fall of temperature of 7 degrees between noon and 16h. and a decrease of humidity from nearly 100 % to 77 % in the same period, whereas in the preceding and following undisturbed weather the temperature was several (about 5) degrees higher at 16h. than at noon and the humidity remained approximately constant.

On the morning of the 22nd there was a depression over Finland, which had moved eastwards from the Atlantic, and a shallow depression in the north Adriatic. The cold front of the Finland depression ran down in the neighbourhood of Danzig through Germany to the region of Zürich and was moving eastwards at about 25 miles per hour. Surface temperatures were not noticeably lower behind the front than before it, the surface cold air behind the front having been warmed by the ground; but the mountain station on Säntis showed a temperature fall of 7 degrees from noon of the 21st to noon of the 22nd, and that on Sonnblick a fall of 6 degrees from the morning to the evening of the 22nd. Pressure rose rapidly behind the front, corresponding with this fall of temperature, and when the cold air reached the eastern end of the Alps in the early afternoon of the 22nd, the pressure gradient between the Alps and the north Adriatic increased greatly. The cold air consequently flowed

southwards forming a cold front with a bora squall as it penetrated under the warm air of the Adriatic.

Bora in the Adriatic is normally a winter wind because the conditions producing it, namely a rapid increase in the difference of pressure and temperature between the hinterland and the sea, are most frequent in winter owing to the more frequent occurrence of depressions over Europe and associated depressions in the north Adriatic, while the seasonal difference of temperature between the hinterland and the sea is at its greatest. This instance of bora in the middle of summer is therefore of special interest.

W. A. HARWOOD.

Radiation from the Sky

RADIATION MEASURED AT BENSON, OXON, 1926.

Unit: one gramme calorie per square centimetre per day.

ATMOSPHERIC RADIATION only (dark heat rays)

Averages for Readings

		July	August	Sept.
Cloudless days:—				
Number of readings	n	5	8	9
Radiation from sky in zenith ...	πI	599	556	580
Total radiation from sky ...	J	620	580	624
Total radiation from horizontal black surface on earth ...	X	800	782	818
Net radiation from earth ...	X—J	180	202	194

DIFFUSE SOLAR RADIATION (luminous rays).

Averages for Readings between 9 h. and 15 h. G.M.T.

Cloudless days:—				
Number of readings	n_0	1	1	2
Radiation from sky in zenith ...	πI_0	45	40	39
Total radiation from sky ...	J_0	42	60	61
Cloudy days:—				
Number of readings	n_1	2	2	4
Radiation from sky in zenith ...	πI_1	150	230	140
Total radiation from sky ...	J_1	141	178	126

Unit for I = gramme calorie per day per steradian per square centimetre.

Unit for J and X = gramme calorie per day per square centimetre.

For description of instrument and methods of observation, see *The Meteorological Magazine*, October, 1920, and May, 1921.

The Aurora of October 14th and 15th, 1926

The week October 10th to 16th was characterised by the existence of five spot groups of considerable size, fairly evenly spaced in an almost straight line across the sun's disc. These spots were just large enough to be visible, four at a time, to keen sight without optical aid, a most unusual occurrence.

In connection with this activity there were fine displays of the aurora borealis on the nights of the 14th and 15th of October. Several accounts of the phenomena have been received from stations in Scotland, northern England and northern Ireland, but in the south the sky was generally overcast.

Mr. H. W. L. Absalom, at Eskdalemuir Observatory, Dumfriesshire, observed a good auroral display at 23h. 20m. on the 14th, glows having been noted earlier in the evening. Streamers reached an elevation of about 55° and transient patches of luminosity were noticed at altitudes of 60° to 70°. The interval of greatest brightness was from 23h. 27m. to 23h. 38m., the chief features then appearing between north and northeast. A distinct red colour was noted in the upper portion of a sheaf of streamers about this time. Soon after midnight the display was fainter. At 4h. 30m. on October the 15th a glow was seen between clouds to north. The aurora of the evening of the 15th was considered to be one of the most prolonged, most extensive and, in certain respects, most remarkable that have been witnessed at Eskdalemuir. Outstanding features were the occurrence of a great arch extending from the north-north-east horizon to the west by south horizon through the zenith, and of approximately east-west bands or streaks to the south, sometimes at an elevation of only about 40°. Mr. Absalom watched the aurora from 19h. to 0h. 30m. on October 16th. Edinburgh observers state that it lasted a further two hours. At Eskdalemuir a coronal effect near the zenith was prominent between 19h. 20m. and 19h. 50m., and after 23h. 30m. the combination of the corona and the main arch, which was then directed more to the north, suggested a water cascade. After midnight the display was fainter. One of the most severe magnetic disturbances of the present sunspot cycle began abruptly at 19h. 23m. on October 13th and continued until the 16th, the intensity being greatest between 15h. on the 15th and 4h. on the 16th.

The following account of the aurora on the 14th has been received from Mr. J. S. Kingdom, of Stockton-on-Tees.

"At 10 p.m. a bright light was showing through banks of clouds near the horizon throughout the north-west sector. The remainder of the sky was totally overcast, but clearing. The appearance was that of a full moon (hidden) setting behind banks of clouds. The intensity of the light at this time was

probably as great as, or greater than, at any time later on, as the bulk of the light was hidden behind the clouds.

At 1 a.m. the sky was perfectly clear, and the air cold and fresh. Movements of the aurora were very plain throughout the whole of the north-west sector. The light took the form of a continuous horizontal band just above the horizon, with vertical beams rising from it. These beams were comparatively short, not generally rising to more than 30° or 45° elevation, but occasionally a very bright one would reach to the zenith for a second. One of the most conspicuous features was the rapid rising of nearly horizontal flickering bands of brighter light. Frequently two or more of these bands were visible at once, and three or four would follow each other in rapid succession. The west end of these bands was rather higher than the north end, so that they appeared to commence to rise at a point almost due west, and to rise upwards with an inclination towards north.

This continued until about 3 a.m., when the brilliance commenced to die off: at 3.30 a.m. the light was much diminished. At 4 a.m. and 4.30 a.m. distinct auroral light was still visible, although very weak, but at 5 a.m. it had entirely disappeared, and dawn was beginning to break further round in the north-east.

The colour of the light throughout was from white to a creamy yellow, very much the same as that frequently shown by the moon when low down in the sky."

The description below is quoted from a letter written by Mr. W. J. Gibson, of Waringstown, Co. Down.

"The display as observed by me, on the night of the 15th in particular, has not been rivalled since that singularly splendid aurora on March 9th last, and the following are some of the salient features which characterized the phenomena of October 15th. At 7.35 p.m. (local time) the north quadrant of the sky was lightly covered with mackerel clouds, through which the stars shone occasionally, except when a streak of cirro-stratus crept in from the west. From the eastern extremity of the constellation Auriga, then just clear of the north-east horizon, passing underneath the bright star Capella, rising with a graceful curve towards Ursa Major, and finally resting beneath Arcturus, there stretched a beautiful arc of pearly green light. Emanating from the arc, and from the horizon itself, there streamed and danced the weird beautiful flames of the Aurora or Northern Morning. About 8 p.m. the display became more tranquil, and the streamers grew fainter, but this lull was only temporary, for the phenomenon was soon afterwards repeated in all its beauty, lasting into the small hours of the 16th. A magnetic storm raged over the earth on October 14th and 15th, dislocating Trans-Atlantic cable services."

Mr. A. J. Crockatt, of Roundhay, Leeds, observed the aurora of the 15th at 23h. when a broad glow extended from west-north-west to north-north-east, being brightest about the north-north-west point. He states that "When first observed it appeared uniform, but soon there appeared dark parallel markings which fluctuated in intensity, sloping up to the left at something over 60° with the horizon. A very bright streak stretched up at the same angle right past Vega and well into Cygnus, and perhaps lasted a couple of minutes. There were next ripplings of light upwards from the horizon and moving areas of brightness. The light was nearly white, but distinctly green tinted."

Aurora was observed on one or both of the above nights at most of the Scottish climatological stations and at Armagh and Aspatria (Cumberland). The observer at Aspatria sent the following note: "23h. 30m., 14th and 15th. Quite distinctly green arch reaching to almost overhead, with red and purple peak reaching out far to south of green arch. Broad green rays like searchlights shooting out beyond the arch."

An unusually fine auroral display was reported from practically the whole of Sweden on the 15th.

E.W.B.

Eastbourne Science Exhibition

A popular science exhibition was held at Eastbourne on October 12th, 13th and 14th. The idea of presenting science on popular lines, illustrated by modern apparatus, proved interesting and instructive to both old and young, and the exhibition was a great success. The sections included, amongst others, astronomy, bacteriology, chemistry, electricity, entomology, geology, mechanics and engineering, meteorology, photography and X-ray.

The loan of instruments by the Meteorological Office and self recording instruments by Messrs. Casella, Negretti & Zambra, and Short & Mason, greatly assisted in making meteorology a very popular section. The collections of cloud photographs lent by the Meteorological Office and Royal Meteorological Society were greatly admired and proved very attractive, and the local annual coloured charts from 1894 showing the principal meteorological observations recalled to the minds of many some outstanding meteorological features. The instruments, charts and diagrams with the constant series of explanations given by those in attendance not only gave much instruction but removed also many erroneous ideas. In addition to demonstrations in the respective sections, several lecturettes were given during each session in a separate lecture room and were very popular.

Pupils of the private schools visited the exhibition in large numbers during the afternoon sessions, but the visitors to the evening sessions, with the exception of a very few, were adults. A special morning session was open free to about 400 children

selected from the elementary schools. The exhibition was a complete success and it was felt that no one visited it without gaining some knowledge. From the receipts small sums were given to two local charities, and a sum of £20 was also given to the local general hospital towards the purchase of some scientific instrument.

A. H. HOOKHAM.

Short Period Oscillations of Pilot Balloons

No one who has observed the ascent of pilot balloons can have failed to note the lack of smoothness in the motion of the balloon in the field of view of the theodolite. When the balloon is not rapidly traversing the field of view, it is possible to estimate with a high degree of accuracy its period of "oscillation." Attention was redirected to the phenomenon of oscillation of pilot balloons, by M. Fontséré, of Barcelona, at the meeting of the International Commission for the exploration of the upper air held in London in April, 1925.* Fontséré's observations at Barcelona showed that the period of the oscillations was apparently independent of the wind velocity, and was not appreciably affected by the height of observation. He found a mean period of about 2·8 seconds and a maximum range of $2\frac{1}{2}$ to 3 diameters of the balloon.

During the month of September of this year several stations in England carried out observations of these oscillations. These observations show that the oscillations are practically always present, but with varying amplitudes. Observers refer to "undulating motion," "an almost circular movement," and "a push-like velocity." It is not clear that any real physical difference enters into these apparent differentiations of type. Probably it is merely a question of whether the general movement of the balloon and the oscillation are in the same direction or not.

Observations at Croydon, Calshot, and Shoeburyness, all show that the mean period of oscillation is usually between 2·0 and 2·6 seconds, and that the average amplitude of the oscillation is about equal to the diameter of the balloon. The Shoeburyness observations show a definite tendency towards an increase of the period with height, but this is not borne out by the other two stations.

The data already accumulated show that the oscillations are not associated with large changes of wind with height. It is hoped, however, that future observations will give sufficient detail to make it possible eventually to determine the cause of the oscillations. At the moment one would be inclined to

* See Report of the meeting, M.O., 281, p. 49.

ascribe the oscillations to oscillations in the form of the balloon, causing alterations in the rate of ascent, and so leading to the jerky motion observed in the theodolite. This suggestion is strengthened by the fact that the periods of oscillation show such slight variability from time to time and from place to place. If the oscillations depended upon the changes of wind or temperature with height, we should anticipate considerable variations in period from day to day, and even from one level to another during the same ascent. The relative constancy of the period of oscillation suggests that the phenomenon depends upon the balloon itself. In view of this it is desirable that future observations should be made with balloons of varying sizes. Fontséré states that the phenomena are independent of the rate of ascent of the balloon.

D. BRUNT.

Review

Deutsches Meteorologisches Jahrbuch, 1925, Freie Hansestadt Bremen. Edited by Prof. Dr. W. Grosse. $12\frac{1}{2} \times 9\frac{1}{2}$, pp. xi. + 75 Bremen 1926

In addition to the bi-hourly data for 1925, this volume contains a full discussion of the records obtained during the lustrum 1921 to 1925, and normals for longer periods. Among the latter may be mentioned monthly normals of all elements for the fifty-year period 1876 to 1925, and monthly averages for each hour of wind velocity (1896 to 1925), and of temperature, pressure, vapour pressure and relative humidity for the two periods 1891 to 1920, and 1921 to 1925. The volume concludes with some results of regular measurements of atmospheric polarisation.

Obituary

We regret to learn of the death on November 3rd, at the age of fifty-seven, of Lord Clonbrock of Clonbrock, Ahascragh, Co. Galway. A rainfall station was started at Clonbrock by his father the fourth baron in 1874 and has been maintained up to the present time.

The Weather of October, 1926.

The first part of the month was generally warm and unsettled but with considerable fair periods whereas the latter part was cold and wintry. After the passage of a secondary depression which caused some heavy rain in Scotland, *e.g.*, 48 mm. (1·89 in.) at Ford on the 1st, an anticyclone became centred over our islands for a few days and though associated with early morning fog locally, it gave good sunshine records in many places. Temperature was high for the time of year, maxima of over 70° F.

being recorded, while 75° F. occurred at Killarney on the 3rd, and 74° F. at Worksop on the 2nd. Thunderstorms occurred in many parts of England on the 5th and 6th, by which time the anticyclone was withdrawing eastwards and low pressure systems spread gradually over the British Isles. Rain fell in most districts on the 8th and 9th and was heavy in the north and west (*e.g.*, 60 mm. (2·35 in.) at Snowdon on the 8th), a comparatively shallow secondary developing rapidly into a deep depression as it moved across Scotland. Widespread gales were experienced on the 9th, gusts of over 70 m.p.h. occurring in parts of Scotland and northern England. Northerly winds in the rear of this disturbance caused a temporary drop in temperature on the 10th, but the quick renewal of southwesterly winds gave further mild weather in the south, with much rain at times in most districts and occasional high winds or gales on exposed parts of the coasts. 51 mm. (2·01 in.) of rain fell at Stonyhurst on the 12th, 50 mm. (1·98 in.) at Montgomery on the 13th, and 45 mm. (1·77 in.) at Achnashellach on the 14th. By the 14th a colder current was spreading southwards and after the passage of a few shallow depressions near the English Channel, an anticyclone south of Iceland extended over the British Isles for a few days. Day temperature remained mostly below 50° F., sharp frost occurred at night and local fog in the morning ; showers of snow, sleet or hail were also experienced in the north. On the 21st depressions were developing over France and near the Hebrides and conditions became generally unsettled with much rain at times and some hail, sleet and snow even as far south as Kent and the Isle of Wight. The passage of a deep depression on the 25th caused heavy rain and high winds and gales in many places; 83 mm. (3·27 in.) fell at Snowdon. "Snow lying" was recorded repeatedly from many parts of Scotland and north-west England between the 22nd and 30th, at Dalnaspidal in Perthshire the depth was reported to be 12 inches on the 28th. At the end of the month an anticyclone approached from the Atlantic giving bright weather in the north and west.

Pressure was above normal over most of the North Atlantic, Iceland, Greenland, Spitsbergen and the western British Isles, the excess being as much as 12·3 mb. at Isafjord, and below normal over most of Europe and the Azores. This distribution favoured north-easterly winds in north-west Europe. Temperature and rainfall were below normal in northern and western Europe, but above normal in the centre and south. In Sweden temperature was about 5° F. below normal at most stations, while rainfall, except in Norrland, was slightly in excess.

During the first days snow fell on the mountains in south-east France and in the eastern Pyrenees and on the 10th another

series of landslips occurred on the Dent du Midi owing to heavy rain in the preceding few days. Gales occurred on the southern North Sea on the 10th and 12th and several trawlers were sunk. During the storms the island of Marken in the Zuider Zee was flooded. It was reported on the 16th that Touraine was enjoying a second spring, the fruit trees on the banks of the Cere and the chestnuts in Tours being in blossom again. Rain fell in Lisbon on the 21st putting an end to the drought during which, since May, only 2 mm. of rain have fallen. Severe gales and heavy rain occurred generally from the 20th to 26th in Switzerland and northern Italy doing considerable material damage, and a sudden drop in the temperature about the 24th injured the wine harvest which was not complete. Heavy snow occurred generally in central Europe and in the region of the Puy de Dôme after the 24th.

Ten vessels were wrecked and twenty people drowned in the vicinity of Yeterofu Island in the Kuriles in a severe storm on the 13th. A hurricane is said to have occurred to the south of Australia on the same day, but no damage was reported.

Owing to heavy rains at the beginning of the month, floods extending over a wide area in Oklahoma, Kansas, Missouri and Illinois, have done considerable damage to the crops. Three people were drowned. A passenger and freight steamer was sunk at the mouth of the St. Lawrence on the 15th, owing to bad weather. On the 20th a hurricane swept across Cuba attaining its greatest force just before noon. Over 600 people were killed, and ten or more towns and villages destroyed, the material damage being estimated at £20,000,000. On the 22nd a hurricane, said to be the worst for years, struck Bermuda at 9 a.m. and lasted until 3 p.m. During the storm the H.M.S. Valerian foundered 18 miles south of Bermuda.

Heavy gales occurred repeatedly on the North Atlantic from the 17th to 28th. The "Minnedosa" experienced a wind of force 10 (59 m.p.h.) at 18h. on the 27th in 52° N, 20° W.

The special message from Brazil states that the rainfall in the southern regions was 30 mm. below normal, while in the central regions it was irregular in distribution with 26 mm. below normal. Many depressions passed across the southern part of the country. The coffee, cane and vegetable crops suffered from lack of rain but not the cotton. At Rio de Janeiro pressure was 1·6 mb. below normal and temperature 1·4° F. above normal.

Rainfall, October, 1926—General Distribution

England and Wales ..	86	per cent. of the average 1881-1915.
Scotland	151	
Ireland	96	
British Isles	104	

Rainfall: October, 1926: England and Wales

CO.	STATION	In.	mm.	Per-cent. of Av.	CO.	STATION.	In.	mm.	Per-cent of Av.
Lond.	Camden Square	2·21	56	84	*War.*	Birminghm, Edgbaston	2·37	60	85
Sur .	Reigate, The Knowle..	2·39	61	76	*Leics*	Thornton Reservoir ..	2·72	69	97
Kent.	Tenterden, Ashenden..	2·61	66	75	,, .	Belvoir Castle.....	2·74	70	101
,, .	Folkestone, Boro. San.	4·23	107	...	*Rut .*	Ridlington.....	1·98	50	...
,, .	Margate, Cliftonville..	3·10	79	106	*Linc.*	Boston, Skirbeck	1·95	50	71
,, .	Sevenoaks, Speldhurst.	2·64	67	...	,, .	Lincoln, Sessions House	1·93	49	76
Sus .	Patching Farm.....	2·57	65	65	,, .	Skegness, Marine Gdns.	...	..	...
,, .	Brighton, Old Steyne .	2·42	61	63	,, .	Louth, Westgate	2·88	73	89
,, .	Tottingworth Park....	2·75	70	66	,, .	Brigg	2·60	66	87
Hants	Ventnor,Roy.Nat.Hos.	4·50	114	115	*Notts.*	Worksop, Hodsock....	1·74	44	66
,, .	Fordingbridge, Oaklnds	3·60	91	87	*Derby*	Mickleover, Clyde Ho..	2·78	71	103
,, .	Ovington Rectory	...	..	...	,, .	Buxton, Devon. Hos...	4·05	103	83
,, .	Sherborne St.JohnRec.	...	..	...	*Ches.*	Runcorn, Weston Pt...	3·81	97	111
Berks	Wellington College...	2·45	62	75	,, ..	Nantwich, Dorfold Hall	2·75	70	...
,, .	Newbury, Greenham..	2·54	65	73	*Lancs*	Manchester, Whit. Pk.	3·40	86	103
Herts.	Benington House	...	..	...	,, ..	Stonyhurst College....	5·37	136	119
Bucks	High Wycombe	2·58	66	82	,, ..	Southport, Hesketh Pk	3·18	81	90
Oxf..	Oxford, Mag. College..	2·10	53	75	,, ..	Lancaster, Strathspey.	3·56	90	...
Nor .	Pitsford, Sedgebrook..	2·46	62	92	*Yorks*	Sedbergh, Akay	4·45	113	89
,, .	Eye, Northolm.....	...	..	...	,, .	Wath-upon-Dearne ...	2·24	57	81
Beds.	Woburn, Crawley Mill.	2·66	67	100	,, .	Bradford, Lister Pk...	3·66	93	105
Cam.	Cambridge, Bot. Gdns.	2·37	60	100	,, .	Wetherby, Ribston H..	3·05	77	102
Essex	Chelmsford, CountyLab	2·61	66	107	,, .	Hull, Pearson Park ...	3·81	97	128
,, .	Lexden, Hill House...	2·47	63	...	,, .	Holme-on-Spalding....	2·20	56	...
Suff .	Hawkedon Rectory ...	3·02	77	112	,, .	West Witton, Ivy Ho..	...	..	...
,, .	Haughley House.....	2·78	71	...	,, .	Felixkirk, Mt. St. John	2·54	65	88
Norf.	Beccles, Geldeston....	2·74	70	97	,, .	Pickering, Hungate ...	3·51	89	...
,, .	Norwich, Eaton	2·78	71	89	,, .	Scarborough.....	3·18	81	102
,, .	Blakeney	2·85	72	109	,, .	Middlesbrough	2·70	69	90
,, .	Swaffham	2·16	55	75	,, .	Baldersdale, Hury Res.	3·81	97	...
Wilts.	Devizes, Highclere....	3·42	87	110	*Durh.*	Ushaw College	3·48	89	101
,, .	Bishops Cannings	2·80	71	84	*Nor .*	Newcastle, Town Moor.	2·73	69	85
Dor .	Evershot, Melbury Ho.	2·96	75	64	,, .	Bellingham, Highgreen	3·25	83	...
,, .	Creech Grange	5·09	129	...	,, .	Lilburn Tower Gdns...	4·76	121	...
,, .	Shaftesbury, Abbey Ho.	2·54	65	65	*Cumb*	Geltsdale.....	3·07	78	...
Devon	Plymouth, The Hoe...	2·73	69	69	,, .	Carlisle, Scaleby Hall .	3·48	88	104
,, .	Polapit Tamar	3·39	86	71	,, .	Seathwaite M.	8·25	210	69
,, .	Ashburton, Druid Ho..	3·93	100	65	*Glam.*	Cardiff, Ely P. Stn.....	4·31	109	90
,, .	Cullompton	2·89	73	70	,, .	Treherbert, Tynywaun	8·80	224	...
,, .	Sidmouth, Sidmount ..	2·48	63	67	*Carm*	Carmarthen Friary....	3·72	94	65
,, .	Filleigh, Castle Hill ...	3·75	95	...	,, .	Llanwrda, Dolaucothy.	4·87	124	77
,, .	Barnstaple,N.Dev.Ath.	2·97	75	65	*Pemb*	Haverfordwest, School	3·72	94	69
Corn.	Redruth, Trewirgie ...	3·47	88	66	*Card.*	Gogerddan.....	4·01	102	76
,, .	Penzance, Morrab Gdn.	3·26	83	70	,, .	Cardigan,County Sch. .	4·72	120	...
,, .	St. Austell, Trevarna..	3·50	89	66	*Brec.*	Crickhowell, Talymaes	4·00	102	...
Soms	Chewton Mendip	6·11	155	127	*Rad .*	Birm.W.W.Tyrmynydd	6·07	154	92
,, .	Street, Hind Hayes ...	4·37	111	...	*Mont.*	Lake Vyrnwy	6·34	161	111
Glos..	Clifton College	4·54	115	120	*Denb.*	Llangynhafal	3·09	78	...
,, .	Cirencester, Gwynfa..	2·62	67	77	*Mer .*	Dolgelly, Bryntirion..	4·97	126	82
Here.	Ross, Birchlea	2·77	70	84	*Carn.*	Llandudno	3·23	82	90
,, .	Ledbury, Underdown.	2·60	66	84	,, .	Snowdon, L. Llydaw 9	10·45	265	...
Salop	Church Stretton	2·89	73	80	*Ang .*	Holyhead, Salt Island.	3·43	87	86
,, .	Shifnal, Hatton Grange	2·21	56	78	,, .	Lligwy	4·63	118	...
Staff.	Tean, The Heath Ho...	2·48	63	77	*Isle of Man*				
Worc.	Ombersley, Holt Lock.	2·62	67	98		Douglas, Boro' Cem...	3·93	100	87
,, .	Blockley, Upton Wold.	2·55	65	78	*Guernsey*				
War.	Farnborough	2·27	58	72		St. Peter P't, Grange Rd	3·57	91	79

Rainfall: October, 1926: Scotland and Ireland

CO.	STATION	In.	mm.	Per-cent. of Av.	CO.	STATION.	In.	mm.	Per-cent of Av.
Wigt.	Stoneykirk, Ardwell Ho	4·76	121	131	*Suth.*	Loch More, Achfary...	10·18	259	131
,, .	Pt. William, Monreith .	5·02	128	...	*Caith*	Wick	6·24	159	211
Kirk.	Carsphairn, Shiel.	8·51	216	...	*Ork .*	Pomona, Deerness	8·62	219	228
,, .	Dumfries, Cargen.....	...	..	...	*Shet .*	Lerwick	2·68	68	68
Roxb	Branxholme	3·06	78	94					
Selk .	Ettrick Manse.....	5·82	148	...	*Cork.*	Caheragh Rectory	4·85	123	...
Berk.	Marchmont House	4·54	115	119	,, ..	Dunmanway Rectory.	4·94	125	82
Hadd	North Berwick Res....	3·65	93	123	,, ..	Ballinacurra	2·54	65	63
Midl	Edinburgh, Roy. Obs..	3·35	85	129	,, ..	Glanmire, Lota Lo. ...	2·88	73	69
Lan .	Biggar	3·88	99	129	*Kerry*	Valencia Obsy.	3·21	81	58
,, .	Leadhills.....	6·23	158	...	,, .	Gearahameen	2·70	69	...
Ayr .	Kilmarnock, Agric. C..	4·86	124	138	,, .	Killarney Asylum.....	2·96	75	55
,, .	Girvan, Pinmore.....	6·25	159	125	,, .	Darrynane Abbey	4·07	103	81
Renf.	Glasgow, Queen's Pk..	4·83	123	149	*Wat .*	Waterford, Brook Lo..	2·71	69	69
,, .	Greenock, Prospect H..	9·20	234	171	*Tip .*	Nenagh, Cas. Lough...	2·65	67	78
Bute.	Rothesay, Ardencraig.	9·17	233	208	,, .	Tipperary	...	..	...
,, .	Dougarie Lodge	6·30	160	...	,, .	Cashel, Ballinamona ..	2·21	56	61
Arg .	Ardgour House	7·88	200	...	*Lim .*	Foynes, Coolnanes	3·53	90	93
,, .	Manse of Glenorchy..	8·89	226	...	,, .	Castleconnell Rec.	3·41	87	...
,, .	Oban	7·01	178	...	*Clare*	Inagh, Mount Callan ..	5·70	145	...
,, .	Poltalloch	9·54	242	193	,, .	Broadford, Hurdlest'n.	3·47	88	...
,, .	Inveraray Castle.....	10·15	258	144	*Wexf*	Newtownbarry	3·51	89	...
,, .	Islay, Eallabus.....	8·43	214	177	,, .	Gorey, Courtown Ho...	4·39	112	124
,, .	Mull, Benmore	...	..	...	*Kilk.*	Kilkenny Castle	2·20	56	70
Kinr.	Loch Leven Sluice	5·01	127	146	*Wic .*	Rathnew, Clonmannon	3·01	76	...
Perth	Loch Dhu	9·50	241	133	*Carl .*	Hacketstown Rectory .	3·06	78	81
,, ..	Balquhidder, Stronvar.	4·73	120	...	*QCo..*	Blandsfort House.....	2·24	57	64
,, ..	Crieff, Strathearn Hyd.	6·74	171	172	,,	Mountmellick	2·69	68	...
,, ..	Blair Castle Gardens ..	5·54	141	179	*KCo.*	Birr Castle.....	2·19	56	75
,, .	Coupar Angus School..	4·97	126	174	*Dubl.*	Dublin, FitzWm. Sq...	2·89	73	108
Forf.	Dundee, E. Necropolis.	5·12	130	192	,, .	Balbriggan, Ardgillan .	2·28	58	84
,, .	Pearsie House.....	6·23	158	...	*Me'th*	Drogheda, Mornington	...	..	...
,, .	Montrose, Sunnyside..	...	..	...	,, .	Kells, Headfort.....	2·68	68	80
Aber.	Braemar, Bank	5·93	151	158	*W.M*	Mullingar, Belvedere .	3·40	86	109
,, .	Logie Coldstone Sch. ..	5·52	140	170	*Long*	Castle Forbes Gdns....	2·68	68	82
,, .	Aberdeen, King's Coll..	5·23	133	174	*Gal .*	Ballynahinch Castle ..	5·69	145	95
,, .	Fyvie Castle	6·18	157	...	,, .	Galway, Grammar Sch.	3·22	82	...
Mor .	Gordon Castle.....	4·13	105	131	*Mayo*	Mallaranny.....	7·67	195	...
,,	Grantown-on-Spey....	5·06	129	170	,, .	Westport House.....	4·94	125	110
Na .	Nairn, Delnies.....	3·28	83	140	,, .	Delphi Lodge	8 20	208	...
Inv..	Ben Alder Lodge	6·56	167	...	*Sligo*	Markree Obsy.	4·00	102	97
,, .	Kingussie, The Birches	5·17	131	...	*Cav'n*	Belturbet, Cloverhill..	2·77	70	95
,, .	Loch Quoich, Loan....	9·00	229	...	*Ferm*	Enniskillen, Portora ..	3·29	84	...
,, .	Glenquoich	...	..	...	*Arm.*	Armagh Obsy.	2·84	72	104
,, .	Inverness, Culduthel R.	3·00	76	...	*Down*	Warrenpoint	...	..	...
,, .	Arisaig, Faire-na-Squir	5·51	140	...	,, .	Seaforde	3·56	90	100
,, .	Fort William.....	5·70	145	80	,, .	Donaghadee, C. Stn...	3·61	92	125
,, .	Skye, Dunvegan.....	6·52	166	...	,, .	Banbridge, Milltown .	2·53	64	99
,, .	Barra, Castlebay	5·74	146	...	*Antr.*	Belfast, Cavehill Rd. .	4·34	110	...
R&C	Alness, Ardross Cas. ..	6·76	172	176	,, .	Glenarm Castle.....	4·60	117	...
,, .	Ullapool.....	5·55	141	...	,, .	Ballymena, Harryville	5·10	130	138
,, .	Torridon, Bendamph..	9·58	243	120	*Lon .*	Londonderry, Creggan	5·55	141	151
,, .	Achnashellach	8·24	209	...	*Tyr .*	Donaghmore	3·76	96	...
,, .	Stornoway	5·75	146	111	,, .	Omagh, Edenfel	3·21	82	87
Suth.	Lairg	4·61	117	...	*Don .*	Malin Head	6·24	158	212
,, .	Tongue Manse.....	7·14	181	170	,, .	Dunfanaghy	5·68	144	129
,, .	Melvich School.....	6·71	170	183	,, .	Killybegs, Rockmount.	8·27	210	148

Climatological Table for the British Empire, May, 1926

STATIONS	PRESSURE		TEMPERATURE							Relative Humidity	Mean Cloud Am'nt	PRECIPITATION			BRIGHT SUNSHINE	
			Absolute		Mean Values				Mean							
	Mean of Day M.S.L.	Diff. from Normal	Max.	Min.	Max.	Min.	½ max. and min.	Diff. from Normal	Wet Bulb.			Am'nt	Diff. from Normal	Days	Hours per day	Percentage of possible.
	mb.	mb.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	%	0—10	mm.	mm.			
London, Kew Obsy.	1012·4	— 3·5	75	35	59·2	45·3	52·3	— 1·1	46·8	82	7·1	44	0	16	4·7	31
Gibraltar	1015·4	— 0·7	85	50	72·5	55·9	64·2	— 1·3	55·1	79	3·3	37	— 7	6	...	...
Malta	1012·4	— 2·6	79	57	70·0	60·3	65·1	— 0·8	61·0	82	5·0	21	+ 11	2	8·7	62
St. Helena	1014·6	+ 3·5	74	57	66·0	58·5	62·3	— 1·3	60·0	86	3·5	64	— 41	17	...	...
Sierra Leone	1011·5	+ 0·3	95	70	91·3	75·0	83·1	+ 1·6	77·1	78	5·4	178	—113	13	...	...
Lagos, Nigeria	1009·5	— 1·5	92	73	87·9	76·7	82·3	+ 0·5	78·3	82	8·5	348	+ 82	22	...	...
Kaduna, Nigeria	1012·0	— 1·1	98	66	89·6	70·1	79·9	+ 0·5	73·3	72	2·3	94	— 57	17	...	...
Zomba, Nyasaland	1021·8	+ 0·7	86	51	76·4	56·6	66·5	+ 0·8	...	79	4·8	3	— 24	3	...	...
Salisbury, Rhodesia	1015·6	— 0·8	82	39	75·7	48·4	62·1	+ 1·5	55·0	60	2·3	9	— 5	2	9·7	86
Cape Town	1017·9	— 0·1	87	39	69·2	51·4	60·3	+ 1·4	52·6	85	6·3	92	— 5	10	...	...
Johannesburg	1018·9	— 0·1	73	34	65·1	46·6	55·9	+ 1·5	46·8	53	1·4	43	+ 24	6	8·4	78
Mauritius	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bloemfontein	...	...	77	30	71·8	36·7	54·3	+ 1·6	44·1	69	3·0	6	— 24	1	...	...
Calcutta, Alipore Obsy.	1004·7	+ 1·2	102	72	96·5	76·7	86·6	+ 0·6	79·0	79	5·8	129	— 17	6*	...	...
Bombay	1008·0	+ 0·6	93	78	91·1	80·6	85·9	0·0	77·4	74	3·7	3	— 11	1*	...	...
Madras	1006·1	+ 0·7	108	73	98·5	81·8	90·1	+ 0·2	79·7	65	6·7	3	— 24	1*	...	...
Colombo, Ceylon	1008·5	— 0·1	91	74	87·9	76·9	82·4	— 0·1	79·0	80	9·0	659	+330	29	5·5	44
Hongkong	1008·9	— 0·5	89	67	80·9	72·7	76·8	— 0·6	72·9	81	8·1	146	—149	9	5·0	37
Sandakan	...	...	93	76	90·7	77·1	83·9	+ 1·3	77·8	77	...	115	— 35	10	...	...
Sydney	1015·5	— 3·1	75	47	65·5	51·9	58·7	— 0·1	52·6	71	5·2	75	— 55	15	5·8	56
Melbourne	1016·9	— 2·6	64	37	58·9	47·3	53·1	— 1·0	48·8	79	7·6	62	+ 7	17	3·1	33
Adelaide	1018·6	— 1·5	70	42	62·7	48·9	55·8	— 2·1	50·5	72	6·2	110	+ 40	17	4·5	44
Perth, W. Australia	1016·5	— 2·0	75	44	68·2	52·6	60·4	— 0·2	54·5	65	6·6	162	+ 38	16	5·2	50
Coolgardie	1018·6	— 1·2	80	37	66·3	45·0	55·7	— 1·9	48·9	60	4·0	64	+ 29	6	...	...
Brisbane	1015·2	— 3·6	87	47	74·2	56·6	65·4	+ 0·9	57·7	67	5·0	32	— 40	9	6·1	57
Hobart, Tasmania	1014·1	— 1·5	64	34	54·8	42·8	48·8	— 1·6	44·2	77	6·5	67	+ 20	15	4·6	47
Wellington, N.Z.	1008·5	— 7·1	71	35	59·7	48·8	54·3	+ 1·6	51·0	77	6·4	121	+ 2	20	4·3	44
Suva, Fiji	1012·7	— 0·1	87	66	81·5	70·9	76·2	— 0·3	73·7	85	5·7	212	— 46	14	6·5	58
Apia, Samoa	1009·6	— 1·5	89	71	86·8	74·0	80·4	+ 2·0	76·5	77	4·6	31	—109	8	8·2	71
Kingston, Jamaica	1012·9	— 0·2	92	69	89·0	72·7	80·9	+ 1·2	72·4	78	4·7	24	— 86	6	...	...
Grenada, W.I.	1013·7	+ 1·2	90	73	86·6	75·9	81·3	+ 1·7	75·5	74	6·1	31	— 86	7	...	...
Toronto	1013·2	— 1·6	80	29	62·9	42·6	52·7	0·0	45·2	62	3·5	33	— 43	8	9·2	63
Winnipeg	1011·6	— 2·7	90	22	76·4	45·2	60·8	+ 9·2	...	...	3·8	21	— 37	10	8·9	58
St. John, N.B.	1009·2	— 4·8	68	31	53·9	38·8	46·3	— 1·4	42·8	75	6·3	85	— 9	15	5·9	40
Victoria, B.C.	1016·5	+ 0·1	82	42	60·8	48·0	54·4	+ 1·3	50·6	72	7·0	47	+ 14	19	6·9	45

*For Indian stations a rain day is a day on which 0·1 in. (2·5 mm.) or more rain has fallen.