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The Cold Nights at Garforth

By E. H. GEAKE, M.Sc.

FOR some time it has been noticed that the minimum temperatures registered in the screen at Manor Farm, Garforth (6½ miles east of Leeds) are low compared with those at neighbouring stations; even the 35-year normal published in Section I. of the *Book of Normals* shows this phenomenon conspicuously, the normal minimum for the year being lower at Garforth than at any other station in England and Wales. In fact there are only three stations in Scotland which record lower minimum temperatures and two of these are high-level stations. Fig. 1, in which the mean annual minimum temperature at a selection of these stations is plotted with the latitude clearly shows that the minimum at Garforth is abnormally low for its latitude and height; another station on this diagram which also appears to record lower minima than its surrounding stations is Salisbury, 39·5° F. at a height of 190 ft. In Table I. some striking examples of low minimum temperatures at Garforth in comparison with neighbouring stations are given.

An inspection of the station was carried out in 1921 but the question of the lowness of the minimum temperatures was not raised until 1922, when inquiry in June from the authority in charge of the observations, Prof. R. S. Seton, of Leeds University, elicited the suggestion that the cause of the discrepancy was probably the site as "the instruments are now practically in a wood." Experiments, however, carried out in Germany in

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1897 and described by J. Schubert* and comparisons made in Sweden by H. E. Hamberg† show that the effect of a wood is to

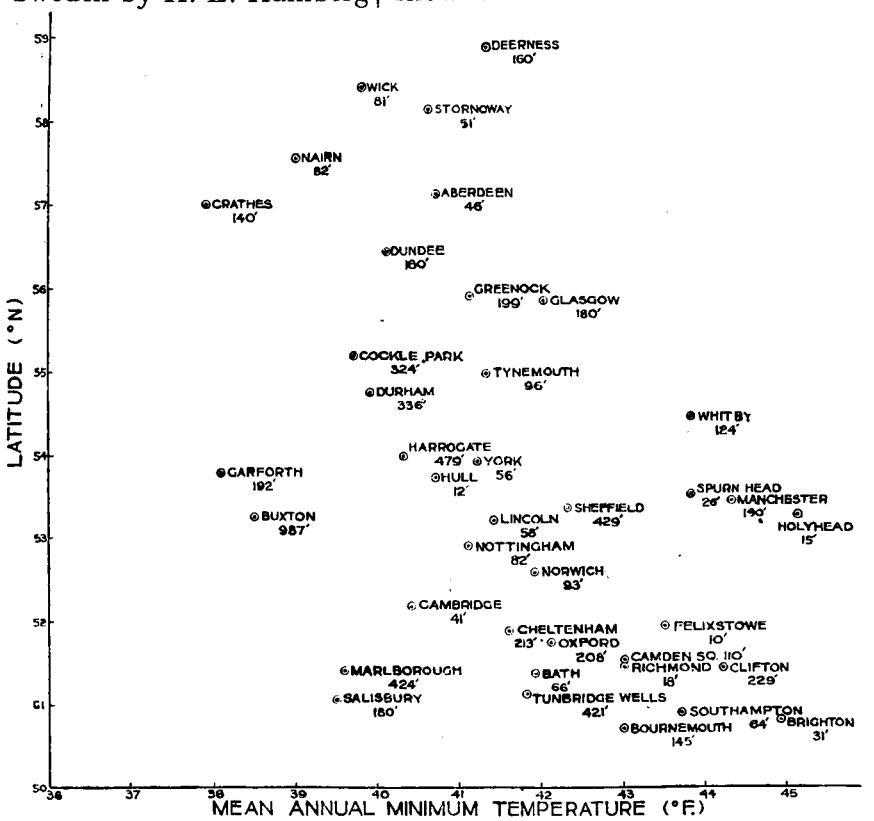


FIG. 1.

raise the minimum temperature, although temperatures taken at other times are lowered, and so it is probable that the low minima at Garforth are due to some cause other than woodedness of site.

TABLE I.

Height of Station	Gar-forth 192 ft.	Wake-field 124 ft.	Brad-ford 439 ft.	Hudders-field 410 ft.	Harro-gate 479 ft.	Garforth Wind at 9 hr.	Garforth Weather since Midnight
1921 Oct. 4th	30	52	50	50	49	N 2	Overcast
,, ,, 17th	33	53	55	55	54	S 2	Fine
,, Dec. 9th	24	50	49	50	48	N 2	Fog
,, ,, 17th	23	47	42	47	46	NE 2	Overcast
1924 Jan. 10th	14	23	22	—	19	E 2	Overcast
,, Mar. 3rd	3	18	19	16	20	W 1	Fine
,, ,, 4th	9	18	21	17	23	Calm	Fine

* *Abhandlungen des Königlich Preussischen Meteorologischen Instituts*, Bd. 1. No. 7, 1901.

† HAMBERG, H. E. Om. Skogarnes inflytande på sveriges klimat. (De l'influence des forêts sur le climate de la Suède). Part II., température. Stockholm, 1896.

The station at Garforth was inspected in June, 1924. After careful examination the inspector was satisfied that the phenomenon was not due to faulty manipulation of the minimum thermometer or to instrumental error. Moreover other experiences of the observer inclined him to think it a genuine feature of the locality as, for example, the complete destruction of potatoes in an adjacent field on an occasion when a suspiciously low minimum had been recorded in the screen. The inspector did not consider the site wooded although it was not an open exposure. The chief wooded areas in the neighbourhood are the lake wood, Hawks Nest Wood about half a mile away, and the Cathills plantation about 700 yards to the south-east. The thermometer screen lies between a hedge and a row of trees which is parallel to the hedge and 10 ft. to the west of it, the line of the hedge and trees being approximately north and south. The trees are 25-30 ft. in height and the hedge had grown to a height of 6-7 ft. in January, 1924, when it was cut. It was 3 ft. high at the time of the inspector's visit in June, 1924. The screen is about 4 ft. from the hedge.

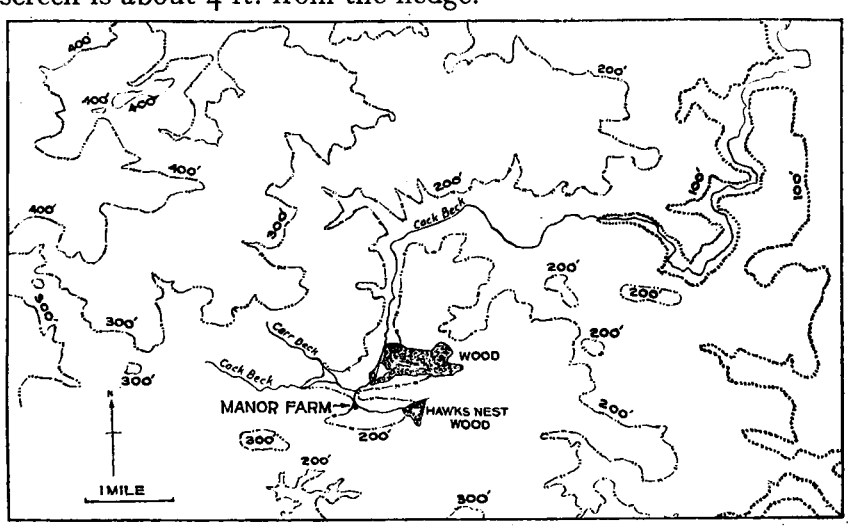


FIG. 2.

As can be seen from the contour map (Fig. 2) the whole station lies in a shallow basin, or rather on a small mound in a shallow basin, with a lake about 700 yards to the north-east by north. It has been suggested that the low minimum temperatures at Garforth may be attributed to the effect of this shallow basin; the inspector says " It seems apparent that the solution of the problem at Garforth lies in the fact that the station is in a shallow basin. On cold calm nights or on nights with light winds the cold air drains down to the lowest levels, collects there and remains stagnant thus giving low minimum tem-

peratures in the screen. Examination of the occasions on which these low minimum temperatures occur show that they have occurred under calm conditions or in light winds. The observer himself has remarked these particularly low minimum temperatures with light northwest winds which blow down the valley of the 'Cock Beck.'"

With this explanation in mind the wind and weather prevailing at Garforth on mornings of low minimum temperatures were investigated. The criterion of low minimum was that the

TABLE II.

Direction.	Wind at 9 h.					Force.	Wind at 9 h.				
	Total frequency	(a)		(b)			Total frequency	(a)		(b)	
		Total No.	%	Total No.	%			Total No.	%	Total No.	%
N ...	153	55	36	23	15	Calm	82	45	55	19	23
NE ...	104	33	32	11	11	1	206	89	43	31	15
E ...	77	31	40	11	14	2	311	112	36	47	15
SE ...	45	14	31	3	7	3	212	71	33	21	10
S ...	103	41	40	11	11	4	164	36	22	10	6
SW ...	169	44	26	18	11	5	58	9	16	2	3
W ...	228	71	31	27	12	6	33	5	15	2	6
NW ...	123	38	31	13	11	7	3	1	—	—	—
Calm ...	82	45	55	19	23	8	2	1	—	—	—

WEATHER SINCE MIDNIGHT.

	Total frequency.	(a)		(b)	
		Total No.	%	Total No.	%
Fine	402	171	43	67	17
Dull	362	97	27	39	11
Showers	111	27	24	6	5
Rain	77	16	21	6	8
Snow	7	3	40	3	40
Fog	77	38	49	13	17
Mist	15	9	60	3	20
Squall	10	1	10	1	10
Detached cloud	29	14	48	1	3

minimum temperature at Garforth was (*a*) 3° F. or more, lower than that at Wakefield, (*b*) 6° F. or more, lower.‡ Three years were examined, 1924, 1925 and later 1921, as 1921 being a calm year, it was thought it should be favourable for low minima. The results of the 3 years were added together and are given in Table II. This table shows that quiet weather is the most favourable for low minima at Garforth although they do appear to have occurred occasionally with moderate or strong winds. These latter occurrences may, however, be due to a change of

‡ As the minimum thermometer at Garforth reads 0·3°F. too low these differences are actually 2·7°F. and 5·7° F.

weather between the time of the minimum temperature and the 9h. observation of wind. The actual direction of the wind does not seem to be of much importance and there is no sign of north-west winds being particularly favourable as mentioned by the observer. It is worthy of note that the calm year 1921 has 178 occurrences in class (*a*) and 81 in class (*b*) as against totals of 198 and 58 respectively for the two years 1924-5 together. This table rather supports the idea that the low minima at Garforth are due to drainage of cold air into the basin, but if this really is the cause it is rather surprising that no other stations in the British Isles (except perhaps Salisbury) show it to the same extent, as many of them must be situated in valleys. Probably at Garforth there are two effects operating, the effect of the local shallow basin and the effect due to the fact that the ground to the northwest rises to the Yorkshire Moors.

In order to obtain an estimate of the abnormality of the minimum temperatures at Garforth compared with those at other stations, regression equations were obtained connecting the annual mean of the daily minima with the latitude and the height, first at all stations in Great Britain, and second at a selection of inland stations at about the same distance as Garforth from the east coast. The " partial " correlation coefficients were as follows :—

Minimum temperature with	Latitude.	Height.
All stations	—·62	—·56
Inland Stations ..	—·59	—·59

The regression equations were as follows ; the mean annual minimum being expressed in Fahrenheit degrees, the latitude in degrees north of 50° and the height in feet :—

All stations .. Min. temp.=44·5—0·55° (Latitude)—·0047 (Height).
Inland stations .. Min. temp.=42·7—0·47° (Latitude)—·0028 (Height).

The first equation, which includes coast as well as inland stations, naturally gives a higher basal temperature than the second, which deals only with inland stations. The fact that the coastal stations are generally at a relatively low level makes the apparent decrease with height rather rapid when all stations are considered, and the height coefficient obtained from the inland stations only is probably more accurate. In the same way the large number of stations on the south coast makes the apparent effect of latitude too great when all stations are considered. It is curious that even when only the inland stations are considered the decrease of the mean annual minimum with height is practically at the standard rate of 3° F. per 1,000 ft., showing that very few of the low level stations show the " basin effect " appreciably. The mean annual minimum at Garforth calculated from the regression equation for all stations is 41·4° F., and that calculated from the regression equation for inland stations

only is 40·3° F. The observed mean annual minimum is 38·1° F. Garforth thus has its temperature lowered by 2·2° F. which is of about the same amount as the difference between an average inland station and an average coastal station in the same latitude.

The regression equation obtained from the inland stations has been applied to some of the other stations in the *Book of Normals* with the following results :—

Salisbury ..	(180 ft.) 2·2°F. too low.	Buxton ..	(987 ft.) 0·1°F. too high.
Marlborough	(424 ft.) 1·3°F. ,, ,,	Harrogate	(479 ft.) 0·8°F. ,, ,,
Cambridge..	(41 ft.) 1·0° F. ,, ,,		

Salisbury shows the same depression of minimum temperature as Garforth. It is favourably situated for the drainage of cold air, being on lower ground to the south of the high ground of Salisbury Plain and near the centre of convergence of several valleys. A footnote, however, in the *Book of Normals* states that " until recently the thermometers were exposed in a Glaisher Stand." The result of I. D. Margary's comparison of observations taken in a Stevenson screen and a Glaisher Stand at Camden Square* shows that the minimum in the Glaisher Stand is about 1° F. lower than in the Stevenson screen. If this correction is applied, the depression of the minimum at Salisbury becomes 1·2° F., thus leaving Garforth as the station in Great Britain with the lowest minimum for its situation.

It is rather difficult to believe that such large depressions of the minima at Garforth as shown in Table I. are entirely due to drainage of cold air into the basin. Another factor that can be suggested is that the soil may have some effect on the night temperatures. Soils which reflect most of the radiation they receive cannot absorb much and therefore do not radiate much heat at night. Salisbury and Marlborough are examples of this on chalk ; Garforth is on limestone, but until further information is available as to the influence of the subsoil on temperature this question cannot be pursued.

Royal Meteorological Society

THE monthly meeting of this Society was held on Wednesday, April 21st, at 49, Cromwell Road, South Kensington, Sir Gilbert Walker, C.S.I., F.R.S., President, in the Chair.

J. Glasspoole, M.Sc., Ph.D.—The driest and wettest years at individual stations in the British Isles, 1868-1924.

The paper includes statistics and maps which show for all parts of the British Isles (1) the driest year, (2) the wettest year, (3) the percentage fall in the driest year, and (4) the percentage fall in the wettest year. The years 1887 and 1921 are shown to

* *London, Q. J. R. Meteor. Soc.*, 50 (1924) pp. 209-226.

be the driest in the series 1868 to 1924 over 40 and 31 per cent. of the British Isles, and the years 1872 and 1903 the wettest years over 49 and 19 per cent. of the whole British Isles respectively.

The variability of the climate of the British Isles is illustrated by the fact that out of the 57 years under discussion as many as 42 were the driest or wettest at some one or more stations in the British Isles. In addition each of the four years 1875, 1880, 1897 and 1915, occur as the driest in one part of the British Isles and the wettest in the series in another part. The four maps reproduced in the paper form a summary of the extremes of annual rainfall given in the series of annual rainfall maps which are being published by the Society in a Rainfall Atlas.

C. E. P. Brooks, M.Sc.—The meteorological conditions during the glaciation of the present tropics, being some remarks on the climatological basis of Wegener's theory of continental drift.

During the Upper Carboniferous and Lower Permian Periods the distribution of climatic zones was highly abnormal. Over a considerable part of the present tropics, including parts of Australia, India and South America and most of the southern half of Africa, there were extensive ice-sheets, while further north there were coal-measure forests in Europe, Asia and part of North America, and coral reefs in the latitude of the present Mediterranean. Wegener's theory of continental drift overcomes the difficulty caused by this anomalous distribution by supposing that South America, Africa, India and Australia all formed parts of a large continent surrounding the South Pole, which lay close to the south coast of South Africa. According to this reconstruction the equator passed through Europe and North America, and the coal-measures were formed by tropical rain-forests. A number of recent researches in North America have shown, however, that powerful glaciers extended to sea-level in that country also, on the site of Wegener's equator. Thus there are the same climatic objections to Wegener's reconstruction as to that based on the present positions of the continents. In order to see what distribution of climates might be expected from the latter the reconstruction of the Upper Carboniferous given by Th. Arldt (*Handbuch der Palæogeographie*) was taken as a basis, and the probable distribution of warm and cold ocean currents and of winds was discussed. The reconstruction shows an extensive and lofty continent (Gondwanaland) including most of South America, South Africa, India and Australia ; north of this were three small continents occupying parts of North America, Europe and Asia, separated from Gondwanaland by an extension of the present Mediterranean (the " Central Sea " or Tethys), which was open on the east and west to the Pacific Ocean. It was shown that a warm current

would traverse this "Central Sea," thus accounting for the coral reefs and the rich vegetation of the coal-measures. To the south of Gondwanaland the Southern Ocean would have been much colder, giving a permanent monsoon crossing the lofty continent of Gondwanaland, and it was suggested that under certain circumstances—especially a high degree of cloudiness caused by the condensation of moisture from the rising air—snow might fall regularly at a height of 6,000 feet and upwards, thus giving rise to extensive glaciers. The occurrence of the American glaciation is readily explicable owing to the neighbourhood of an arm of the Arctic Ocean. The author regarded it as significant that the only period in which glaciers reached sea-level within the present tropics was also the only period in which the reconstruction of the land and sea distribution based on the present positions of the continents rendered such an event even remotely possible.

C. E. P. Brooks, M.Sc.—The variation of pressure from month to month in the region of the British Isles.

A chart of the deviation of means of pressure from normal in any month usually shows "centres" of maximum excess or maximum deficit. The changes in the positions of these centres from one month to the next have been studied on nearly 500 monthly charts of pressure deviations. It is found that centres of excess of pressure tend to move along fairly well-defined tracks. A statistical investigation shows that in the majority of instances the movement takes place from west to east. The main track runs from Alaska south-eastward to the centre of the United States, then eastward to the Azores, north-eastward to the British Isles or Scandinavia and again eastward to northern Russia or the Kara Sea. The whole journey would take about six months, though no single centre was found which persisted long enough to travel from Alaska to Russia. Centres of deficit are somewhat more variable in their movements, but also tend to move from west to east. The causes of these movements were briefly discussed, and were attributed to the movements of large "warm" anticyclones and of foci of cyclonic activity.

Correspondence

To the Editor, *The Meteorological Magazine*

Halos and Parhelion

AT 7.10 a.m. (B.S.T.) to-day I noticed a rather bright tangential arc forming to the 23° halo, which itself only developed later and did not become very clear. Looking higher there were no signs of the large halo, but a large stretch of its tangential circumzenithal arc quickly became bright, with colours clearly developed,

finally increasing to more than a semi-circle. The arc of the smaller halo disappeared in about ten minutes, but there was still a portion of the other arc at 7.30, when also a bright but rather irregular parhelion was conspicuous east of the sun, lasting some little time.

The eastern sky had been clear at sunrise except for a few fleecy cloudlets, but then a grey haze began developing over the whole heavens, changing to thin cirrus. Before 8 o'clock the whole of this had given way to fleecy clouds similar to those at sunrise.

J. EDMUND CLARK.

41, *Downscourt Road, Purley, Surrey. April 20th*, 1926.

A Horizontal Rainbow

AT 11 a.m. to-day a great, highly coloured rainbow was observed by three persons at the same time. It was lying horizontally on the floor of the Suir Valley. The summit of the arch lay against the hills on the north side of the valley and the ends curved round and lay against the south side immediately below the three observers who were on a road which rose obliquely up the hill side, the observers being 350 ft. or 400 ft. above the tidal level in the valley below. The sun shone above and behind them. The bow was of a woolly appearance, purple, blue, green and orange from the observers outwards and northwards. Some of the objects in the valley could be seen through the richly coloured woolly bow which appeared to be 40 or 50 ft. thick and to cover from end to end, measured around the bow, 16 or 19 miles of country according as the measurement was estimated on the inner or outer edge of the bow.

J. ERNEST GRUBB.

Seskin, Carrick-on-Suir, Ireland. April 8th, 1926.

Horizontal Rainbow from a Street Lamp

THE following notes on a horizontal rainbow formed by a street lamp on a wet road and pavement may be of interest. The bow took the form of an almost semi-circular band of white light which was visible on the road a few feet in front of the observer as he stood with his back to the lamp and at a short distance from it. The centre of the semi-circle was the shadow of the observer's head, the bow only being visible on the side nearest to the observer. As one walked away from the lamp the bow increased its distance from the observer only slightly and was always stronger on the smooth surface of the pavement than it was on the rougher surface of the road. Measurement showed that when standing at 43 ft. from the lamp the nearest point of the rainbow was $4\frac{1}{2}$ ft. in front of the observer, which gives a

deviation of the lamp's light of approximately 142°, whereas the deviation in the case of a rainbow, with the source of light at infinity, is 140° to 130°.

The night, November 17th, 1925, was fine but there were drifting fog banks in places, although by suitably screening off a part of the lamp light it was judged that the fog was not responsible for the rainbow. There was no frost on the ground. Similar rainbows were noticed with other street lamps in this neighbourhood during the two or three hours preceding midnight.

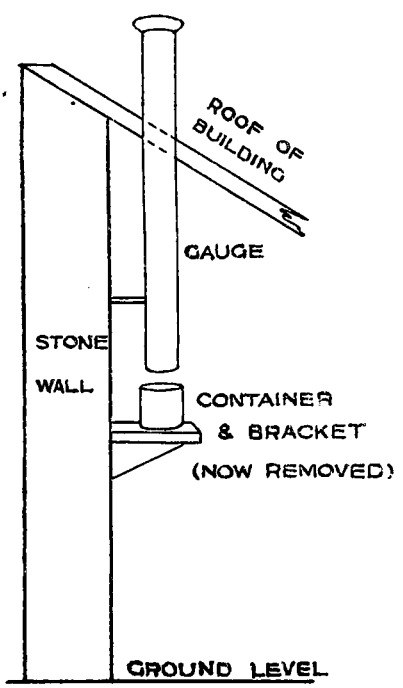
I am indebted to Mr. F. J. W. Whipple for the explanation of the phenomenon.

S. MORRIS BOWER.

10, *Langley Terrace, Oakes, Huddersfield.* *March 31st*, 1926.

A Curious Old Rain Gauge

AT Synone House, 4 miles north of Cashel, are the remains of the old rainfall recorder, of which I give a sketch from memory. The date of its establishment is uncertain, but probably the late owner of the place, Mr. Johnson, who was a scientific farmer, was responsible for its construction. He died about 20 years ago, and the gauge has been disused since; it is probably 60 or 70 years old. The present occupier, Mr. K. C. Fitzgerald, is an observer of rainfall, but uses a more modern type of instrument.



The gauge consists simply of a metal cylinder, resembling a section of the pipe commonly used to convey rain-water down from the eaves of a building, but slightly larger in diameter. It passes through the roof of one of the outbuildings and might easily be taken for a chimney. There is a considerable lip at the top, but no appearance of any funnel. The container rested on a bracket attached to the inner wall of the building, which has now been removed, and evidently the rain was measured with a gauged glass, in the same way as at present. It is probable that Mr. Johnson established the instrument for his own information in connection with farming operations and that the returns were never sent to the British Rainfall Organization, or any other Society. In this case

absolute accuracy in the readings might not be required, but it seems as if evaporation from the inner surface of the long cylinder would cause a considerable loss of the rainfall. I have never seen or heard of a similar type of rain-gauge and this is certainly interesting as a primitive style.

E. W. MONTAGU MURPHY.

Ballinamona, Cashel, Co. Tipperary. March 19th, 1926.

The Dry Spring

THE month of March proved the driest month of that name in 20 years' observations at this station, total rainfall 0·38 in. A partial drought prevailed from February 24th to April 6th, a period of 42 days, with rainfall 0·39 in. A dry spell also occurred from March 5th to April 6th, a period of 33 days, none of which had more than 0·03 in.

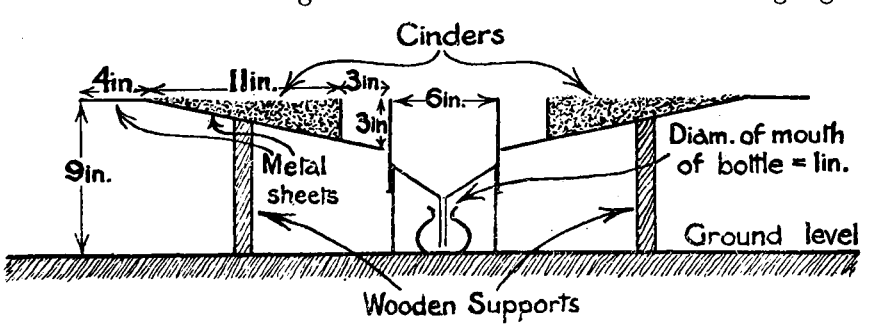
R. P. DANSEY.

Kentchurch Rectory, Hereford. April 7th, 1926.

NOTES AND QUERIES

Experiments with a Shielded Rain Gauge

SOME experiments have been carried out by Mr. P. F. Jarrold at Aberdeen Observatory with a shielded rain gauge, the daily catch being compared with that from an unshielded gauge. The comparison covered the year May, 1924 to May, 1925, the gauges being set up in a field, 4 yards apart. The sketch represents a vertical section through the centre of the shielded rain gauge.



The shield was designed to prevent up-draught near the mouth of the gauge, while cinders were used to minimise the chance of insplashing.

For the whole period the following values were obtained: Shielded gauge 771 mm., and unshielded gauge 735 mm. The records from the unshielded gauge were in agreement with those of the standard gauge at the Observatory. Thus the effect of the shield was to increase the catch by 5 per cent. The daily falls were grouped into light, moderate and heavy rains as judged

from personal observations and from the traces of the Beckley automatic gauge, and also according to the general intensity of the wind as recorded by the Dines pressure-tube anemograph. The results are set out below :—

PERCENTAGE EXCESS OF SHIELDED OVER UNSHIELDED GAUGE.

Rains.	Winds.			
	Force 0-2 Calms.	Force 3-4 Moderate.	Force 5-6 Strong.	Means of Percentages.
Light ..	0	10	9	6
Moderate ..	2	5	6	4
Heavy ..	3	2	0	2
Means of Percentages ..	2	6	5	4

Mr. Jarrold suggests that the effect of eddying in the unshielded gauge would be most pronounced with high winds and with light rains—light rain being more easily blown about than heavy rain. The analysis above indicates that with high winds and light rains the shielded gauge does catch more than the unshielded gauge. Mr Jarrold concludes therefore that the effect of the shield is to minimise any loss due to eddying. The results of the observations suggest that insplashing is a negligible factor. When the amounts are classified according to the wind direction there is very little difference in the relative catch. This may be due to the similarity of the exposures in all directions.

The results would have been more valuable if Mr. Jarrold had used standard gauges. He is nevertheless to be congratulated on making a comparison which can only be undertaken at stations where automatic records of rainfall and wind are available.

The Aurora of March 9th, 1926

THE following interesting accounts of the Aurora seen on March 9th were received too late for inclusion in the April number of the Magazine.

Mr. W. J. Gibson, of Waringstown, Co. Down, writes that "At 7.30 p.m. I noticed a strong brightness in the north, and therefore waited for further developments, knowing it to be an auroral display in its early stages. A passing shower at 7.35 p.m. intervened and obscured everything, but by 7.45 all was clear again, and the entire north quadrant of the sky presented the appearance of a sanguineous sunrise. A well defined greenish white arc spanned the boreal horizon, from which sheaves of auroral flame were diffused in all directions, red was the

predominating colour. At 8 p.m. the heavens were aflame including the north, east and west, right overhead, and even a portion of the south. The scene at this time was tremendously grand, the beauty being accentuated by a general undulation of the masses of light. A kind of fiery corona was formed at the zenith, and in the east where the constellations of Boötes and Corona were rising, there was a green pillar of suffused flame. In the western quadrant, the constellations of Auriga, Gemini, Orion, Taurus and Canis Minor and Major, were in a sea of fire, whilst a procession of coloured streamers passed from west to east. I have been a close observer of the heavens for many years and with the exception of the auroral display in January, 1907, I have never seen one of the same magnitude as the display of March 9th, 1926. On March 9th, two sun spots were visible. There has been tremendous solar activity since January and several auroral displays. The April activity, however, so far appears to indicate a temporary wane."

Dr. F. R. Walters, of Farnham, Surrey, describes the occurrence near Waverley Abbey, in these words. "A band of pale green sky and over this a broad band of red extending about 50° or 60° upwards and over nearly half a circle, the brightest part being to the north. The red glow was interrupted by streaks radiating upwards, the main streaks—about 6 or 8 in number—being white. Much more numerous smaller streaks, white, bluish white and greenish white, filled up the intervals and extended for a much shorter distance upwards."

Aeroplane Struck by Lightning.

THE *Aeroplane* of April 21st, 1926, reports that Mr. F. L. Barnard while flying from Paris to London on April 16th with his fourteen passengers, had an alarming experience. He ran into a thunderstorm over Picardy between Beauvais and Poix. Suddenly there was a loud report as a flash of lightning struck the machine. A large patch of fabric on the lower plane was burnt, the compass was put entirely out of action and one engine started missing, as apparently the permanent field of one of the magnetos had been upset. Mr. Barnard did not like to land immediately, thinking that the machine might have become highly charged with electricity, and in landing might spark to earth and ignite the machine. He therefore flew on and eventually reached Lympne in safety and without sparking to earth. On examination it was found that in addition to the hole in the fabric one of the main spars was scorched, all the bonding was fused and one of the ailerons damaged. Mr. Barnard had not let out his aerial as he had found earlier in the day that atmospherics were so bad that wireless speech was impossible.

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

		Jan.	Feb.	Mar.
Cloudless days:—				
Number of readings	n	8	2	4
Radiation from sky in zenith ...	πI	414	431	435
Total radiation from sky ...	J	438	474	466
Total radiation from horizontal black surface on earth ...	X	620	702	705
Net radiation from earth ...	X—J	182	228	239

DIFFUSE SOLAR RADIATION (luminous rays).

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

Cloudless days:—				
Number of readings	n_0	2	1	1
Radiation from sky in zenith ...	πI_0	20	20	30
Total radiation from sky ...	J_0	30	38	44
Cloudy days:—				
Number of readings	n_1	3	3	5
Radiation from sky in zenith ...	πI_1	64	73	79
Total radiation from sky ...	J_1	65	72	71

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.

"Medium Range" Forecasting

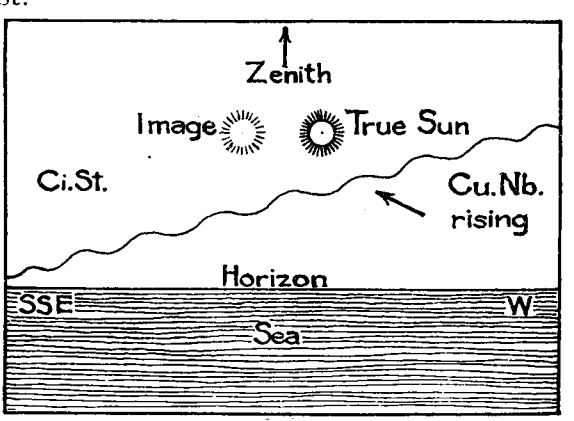
Monsieur J. Jaumotte, Director of the Institut Royal Meteorologique of Belgium, gives in *Ciel et Terre* for January, 1926, a brief description of an experiment which has been carried out since the beginning of 1926 by the "Service du Temps" for forecasting for a few days in advance. The forecasts, which are based on the method of the polar front, are made for at least three days, but if at the end of this time no change is expected, the forecast is renewed for a further period. The forecast is generally in less detail than the daily forecast and usually only refers to one or two elements such as temperature and wind direction. Four such forecasts were made between January 1st

and February 11th and were all successful. The two cold spells and the two periods of warm weather with a south-west wind and intermittent rain were predicted.

An Unusual Mock Sun

Dr. C. C. Vigurs, of Newquay, sends us the following note which he has received from his son. No explanation of this curious phenomenon has been suggested.

Tuesday, Feb. 16th, 1926. S.S. "Manchester Civilian" on passage from U.S.A. to Avonmouth, in Lat. 51° 32′ N Long. 6° 34′ W. Hook Point, Waterford bearing 339° (clockwise from North) and distant 38 miles, and St. Ann's Head bearing 80½° and distant 54 miles. Barometer 29·54 in. falling slowly. Dry bulb 47·2° F. Wet bulb 46·0° F. Wind W'S, force 5, Cloud 7, cirro-stratus around the sun and to the south and cumulo-nimbus below the sun and to the west; clear blue arc of sky to the north-northwest.



The phenomenon was first seen at 15h. 46m. G.M.T. when the true sun, with an altitude of 14° and bearing 227° was shining brightly with good limb in medium sextant shade, and a heavy squall was moving from west to south-southeast with the upper edge of the cumulo-nimbus cloud at a point vertically below the sun and having an altitude of 8°. The phenomenon was an uncoloured image of the true sun at the same altitude and at an angular distance of 10° to the left, certainly not 22°. It was fairly well defined, sufficiently so for an azimuth bearing, but not enough for anything but a doubtful sextant altitude. The image had the appearance of the true sun shining through denser layers of cloud, although the cirro-stratus was fairly uniform in density; but with a slightly mottled appearance. No image was seen to the right of the true sun, and probably, though not certainly, the corresponding position to the right of the sun was already occupied by the moving cumulo-nimbus. No halo or mock-sun-ring was observed.

The image dimmed as the squall approached the true sun and disappeared when the true sun became covered.

J. T. C. VIGURS, 2nd Officer.

The Weather Map for the 16th shows a low of less than 966 mb. between Iceland and the Faroes and a high of more than 1,026 mb. over Portugal, etc., with regular isobars between and moderate southwest winds over St. George's Channel. At Valencia pressure fell slightly from 1h. to 7h. and rose again; at St. Ann's Head it rose from 7h. to 18h. and fell afterwards; the passage of a small secondary eastwards seems to be suggested.

[It would seem probable that the bright uncoloured spot observed was on the parhelic circle. The phenomenon may possibly have been produced by reflection from ice crystals of such formation as to tend to send much light to an observer, from a point on the parhelic circle about 10°, in azimuth, from the sun. Bright uncoloured spots, known as the parhelia of 120°, have occasionally been seen on the parhelic circle 120° from the sun. The origin of these is uncertain but it has been suggested that they are due to reflection from the faces of indentations in tabular crystals.—Ed. *M.M.*]

Reviews

Atlas elemental de Núvol. By Prof. E. Fontseré. With a French translation by Ph. Wehrlé. Size $11\frac{1}{4} \times 8\frac{3}{4}$, pp. xi.+30 (Catalan)+16 (French) (*illus.*), 32 plates, Barcelona, Gustau Gili, C. Enric Granados 45, 1925.

Of recent years there has been much discussion upon the adequacy of the illustrations given in the *International Cloud Atlas*, and the best proof that these could be considerably improved upon has been given by the publication lately in several countries of what are really "national" atlases of clouds. Of these the present volume is the most recent. In criticising the cloud pictures in the International Atlas, it should be remembered that these photographs were obtained at a time when photographic methods were, relatively speaking, in their infancy, and that, therefore, the pictures then obtained were highly creditable to their authors. But a glance at the very fine pictures in Prof. Fontseré's atlas will convince anyone of the inestimable benefit meteorology has received by the introduction of the panchromatic plate and of filter-screen methods of recording colour-contrast.

In his appreciative preface to the present volume, General Delcambre comments upon the scant attention clouds have received in the past, and expresses the opinion that their more complete observation will be of great advantage to meteorology in the future.

The text of the present atlas is written in Catalan, but there is also a literal translation in French by M. Ph. Wehrlé, one of the authors of the now famous *Systèmes Nuageux*. The text

itself consists of the " International " definitions of each cloud type enlarged by further notes upon the types and their variations ; these definitions are accompanied by small reproductions in two tints, blue and grey, of portions of the plates which follow ; by this novel and effective means, very realistic pictures of the cloud-types are produced. The rather unusual method is adopted of giving the definitions, not in the order found in the International Atlas, but in groups which contain the basic names, cirrus, stratus, cumulus, and nimbus, quite irrespective of the altitude of the clouds. The thirty-two plates in the atlas cannot be too highly commended, and the photographers, Senors Pons, Campo, and Pulvé, are to be congratulated upon their work. Some very fine skies are shown, particularly of fracto-cumulus, flat alto-cumulus, delicate cirro-cumulus, and massive cumulo-nimbus ; but perhaps the finest is the wonderful representation on Plate XXIV of a cumulo-nimbus, consisting of a huge mass of cumulus topped by a finely-developed " anvil," the edges of which exhibit mammillation ; the whole picture most beautifully rendered by its author Senor Campo.

If a word of criticism might be added, it is that the examples of strato-cumulus shown in Plates XXI and XXII seem to the writer to be closed-up cumuli arranged in lines, but then strato-cumulus is always the cloud-type upon which divergence of opinion among observers is greatest. To criticise such a splendid atlas would seem most ungracious.

GEO. A. CLARKE.

Los Huracanes de las Antillas. By S. Sarasola, S.J., (Observatorio Nacional de San Bartolomé de Bogotá, Notas Geofisicas y Meteorologicas, Numero II.) Size $12\frac{1}{4} \times 8$, pp. vi. + 173 (*illus.*). Bogota, 1925.

THE hurricanes of the West Indies have been the subject of several detailed official publications during the course of the present century, but this work by Father S. Sarasola strikes a new note. It contains little statistical material, but is full of the results of practical experience gained by the author during twenty years of meteorological work in Cuba, before he took over the duties of Director of the Observatorio Nacional of Bogota, Colombia, in 1922. This personal acquaintance is supplemented by wide reading, and the whole is directed towards the problem of forecasting hurricanes in the West Indies, particularly in Cuba. The book is divided into two parts, of which the first is entitled : " Scientific bases for the prediction of hurricanes," and the second " Recent advances in forecasting atmospheric perturbations." The first part deals with the general meteorology of the Antilles, the structure of tropical cyclones, including the upper currents, with what may be called the " prognostications " of hurricanes,

with recent advances in forecasting due to the introduction of wireless telegraphy, and with practical seamanship during the hurricane season.

The second part of the book is more controversial. After a brief reference to the Norwegian school of forecasting, and to the methods of Guilbert, the author devotes three chapters to the method of forecasting variations of pressure from the analysis of periodicities. The theses are developed that "there is a periodical inversion of pressure at intervals of thirty days," and that "depressions occur periodically at intervals of 20 days." It is stated that the occurrence of barometric depressions can be predicted by means of these principles, but not their intensity. Vercelli's method of forecasting by the analysis of barograms is then discussed, and the need for further research is remarked. It is concluded that "barometric waves appear to be periodic, but the causes are not yet known." Finally we have a reference to the work of H. H. Clayton, and a somewhat optimistic account of the possibility of forecasting hurricanes by means of sunspots. This part of the work is of great interest, but it shows up the chaos which reigns in the subject of long-range forecasting at present.

Books Received

Seismological Report of the Apia Observatory, Samoa, 1923. July to 1924, December, pp. 9, Samoa, 1925.

Rainfall Types in India in the cold weather period, December 1st to March 15th. By Sir Gilbert T. Walker, C.S.I., F.R.S., and J. C. Kamesvararav, D.Sc. Ind. Met. Memoirs. XXIV., 1925. Part XI., pp. 347-354. Calcutta, 4 annas. 5d.

Monthly Rainfall of India for 1923. Published by the various Provincial Governments and issued by The Meteorological Department, Calcutta. 2 rupees, 8 annas ; 4s. 6d.

Obituary

Admiral Sir John Franklin Parry, K.C.B.—Admiral Sir John F. Parry, whose death occurred on April 21st, was Hydrographer of the Navy and an ex-officio member of the Meteorological Committee from August, 1914, to August, 1919.

Born in 1863, he entered the Royal Navy in 1877, and had a very distinguished career in the surveying branch of the Service. In 1910 he was made Assistant Hydrographer of the Navy and while holding this appointment he performed many valuable services outside the ordinary routine of his office ; amongst them the following may be mentioned. He represented the Admiralty at the Conference on the observation of ice by vessels in the North Atlantic, held in 1912, after the loss of the *Titanic* ; he

represented Great Britain at the French Conference on the use of wireless telegraphy in connection with time and weather; he was also chairman of an important Admiralty Committee dealing with charts.

His tenure of office as Hydrographer, which covered the period of the War, was the most remarkable of recent years, and contributed greatly to the advancement of nautical science. During the War the work of the Hydrographic Department proved invaluable. It was not only concerned with safeguarding our ships from ordinary maritime disasters, but the newer forms of sea warfare such as mine-laying were found to be almost entirely dependent on the accuracy of surveying work.

Sir John Parry became President of the International Hydrographic Bureau on its formation, a post which he held until his death. He presided at the International Hydrographic Conference held in London during 1919, when 45 delegates, representing 25 nations, assembled to endeavour to apply the lessons and experiences of war to the needs of peace, and made considerable progress towards standardising international practice.

We regret to learn of the death of Major H. W. Buddicom, J.P., who kept a barograph station at Penbedw, Flint, for over 25 years.

News in Brief

Sir Napier Shaw, F.R.S., formerly Director of the Meteorological Office, has been elected an honorary member of the Norwegian Academy of Sciences, Oslo, in the class for Mathematics and Natural Science.

The last two lectures on "Past Ice Ages of the World, and their control of animal and plant life, with special reference to the Australian evidence," which were to have been given by Sir T. W. Edgeworth David, C.M.G., D.S.O., F.R.S., at Imperial College, Royal School of Mines, at 5.15 p.m., on Mondays, May 10th and 17th, will now be given at 5.15 p.m. on Mondays, May 31st and June 7th.

The *British Gazette* for May 11th states that Lieut.-Comm. R. Byrd, of the United States Navy, reports that he successfully flew from Spitsbergen over the North Pole and back again, the flight lasting 16½ hours. He did not land.

On April 26th, the Air Ministry Lawn Tennis team (two members of which belong to the Meteorological Office) won the Interdepartmental Winter mixed doubles Tournament.

The Weather of April, 1926

Apart from two short spells of fine warm weather, one at the beginning of the month and one near the middle, the conditions during April were generally cloudy and unsettled. Under the influence of light southerly breezes between an anticyclone over the continent and a depression on the Atlantic temperature rose to about 70° F. in many places during the first few days: 72° F. at Kew Observatory on the 2nd was the highest reading there in the first half of April since 1871, while 76° F. at Geldeston on the 4th (Easter Sunday) was the highest on record there for the whole of April. A secondary depression moving northeast from the Bay of Biscay caused heavy local rain and thunderstorms on the 3rd and 4th, 47 mm. (1·85 in.) being reported from Guernsey on the 3rd and 38 mm. (1·49 in.) from Kelvedon (Essex) on the 4th. Subsequently temperature fell gradually but on the whole remained above the average until the middle of the month. Further secondary depressions caused a fair amount of rain in southern England about the 7th to 8th, but an anticyclone which passed across the British Isles during the next few days gave the second short spell of dry sunny weather with local frost at night. A grass minimum temperature of 15° F. was registered at Rounton (Yorkshire) on the 12th. Day temperature did not rise as high as during the first spell, 68° F. on the 13th and 14th being the highest maximum recorded. The approach of a depression from the Atlantic caused a renewal of unsettled weather about the 14th. Much rain fell, 130 mm. (5·13 in.) being registered at Snowdon (Carnarvon) and 64 mm. (2·50 in.) at Dungeon Ghyll (Westmoreland) on the 14th, and secondaries near the southwest coasts were associated with high winds at times. Pressure later became low to the north and east of the British Isles giving more northerly winds and changeable showery weather with local thunderstorms and hail. On the 25th a depression over France caused high winds and gales in and near the southern part of the North Sea, and considerable rain in eastern England and Scotland on the 25th and 26th. From then until the end of the month unsettled rainy weather continued with sunny intervals but a low temperature.

The total rainfall for the month was more than twice the normal in parts of south-east England. In northern England, Wales, Ireland and most of Scotland it was below normal, the greatest deficit being in Wales and Yorkshire.

Pressure was below normal over the Atlantic and the western sea-board of Europe (the deficit amounting to 8·1 mb. at St. Johns, Newfoundland, and 8·9 mb. at 50° N. 30° W.) and above normal over southern Europe, Sweden, northern Norway and Spitsbergen. Temperature and rainfall were generally above normal except that temperature in Spain and rainfall in the

extreme north of Norway were below normal. In Sweden the lowest temperature −28° F. was observed at Gällivare on the 7th. The total precipitation was more than twice the normal in north Sweden but about half the normal in the south. Owing to the rapid thaw of the heavy snows of last winter serious floods occurred in the neighbourhood of Baghdad about the middle of the month and in various parts of European Russia towards the end. The Tigris broke its bank near the Royal Palace at Baghdad on the 9th and parts of the city were under 6 ft. of water on the 11th. Blocks of drifting ice also helped to cause the Moskva river to overflow. The low lying parts of Leningrad, Moscow, and many other towns were all under water on the 25th. On the 24th a strong gale occurred in the Bay of Naples doing some damage. Snow is reported to have fallen in the Auvergne district on the 25th, while a heat wave occurred in Berlin on the 25th and 26th when the maximum temperatures for both these days reached 79° F., 2° F. below the record for April. Heavy rain occurred in Normandy on the 27th to 28th.

At the beginning of the month ten fishing boats capsized in a storm off Mororan, Hokkaido, Japan.

Good rains were reported throughout Victoria, Australia, early in the month, more than 3 in. being registered up to the 5th in the Mallee district. The total rainfall in Australia was about normal in Western and South Australia and Tasmania, below normal in Queensland and above normal in New South Wales and Victoria.

On the 7th a disastrous fire occurred at the Union Oil Company's tank farm at San Luis Obispo, California. Two oil reservoirs were struck by lightning during an early morning thunderstorm and the fire spread to the other reservoirs and tanks. The damage is estimated at £3,000,000. In Chicago heavy snow occurred during the first week which is unusual for this time of the year.

The special message from Brazil states that the rainfall was abundant in all districts, being 44 mm., 102 mm. and 92 mm. above normal in the northern, central and southern districts respectively. The anticyclones moved on less meridional tracks than in the previous month. Vegetables and the tobacco, coffee and cotton crops are suffering from excess of rain. At Rio de Janeiro pressure was 0·5 mb. below normal and temperature 0·4° F. under normal.

Rainfall, April, 1926—General Distribution

England and Wales ..	134	per cent. of the average 1881-1915.
Scotland	108	
Ireland	88	
British Isles	118	

Rainfall: April, 1926: England and Wales

CO.	STATION.	In.	mm.	Per-cent. of Av.	CO.	STATION.	In.	mm.	Per-cent of Av.
Lond.	Camden Square.....	3·15	80	204	*War.*	Birminghm, Edgbaston	2·42	61	139
Sur .	Reigate, Hartswood...	3·94	100	254	*Leics*	Thornton Reservoir ..	2·23	57	131
Kent.	Tenterden, Ashenden..	3·50	89	218	,, .	Belvoir Castle.....	1·63	41	107
,, .	Folkestone, Boro. San.	3·10	79	...	*Rut .*	Ridlington.....	2·26	57	...
,, .	Margate, Cliftonville..	2·69	68	199	*Linc.*	Boston, Skirbeck	1·71	43	127
,, .	Sevenoaks, Speldhurst.	4·30	109	...	,, .	Lincoln, Sessions House	1·79	45	129
Sus .	Patching Farm.....	2·83	72	162	,, .	Skegness, Marine Gdns.	1·56	39	116
,, .	Brighton, Old Steyne .	3·45	88	213	,, .	Louth, Westgate	1·77	45	106
,, .	Tottingworth Park....	4·14	105	224	,, .	Brigg	1·92	49	122
Hants	Ventnor,Roy.Nat.Hos.	3·28	83	195	*Notts.*	Worksop, Hodsock....	1·87	47	127
,, .	Fordingbridge, Oaklnds	4·56	116	249	*Derby*	Mickleover, Clyde Ho..	1·86	47	108
,, .	Ovington Rectory	3·31	84	175	,, .	Buxton, Devon. Hos...	2·25	57	77
,, .	Sherborne St.JohnRec.	...	..	...	*Ches.*	Runcorn, Weston Pt...	·82	21	47
Berks	Wellington College...	2·77	70	172	,, ..	Nantwich, Dorfold Hall	1·25	32	...
,, .	Newbury, Greenham..	3·13	80	172	*Lancs*	Manchester, Whit. Pk.	1·53	39	80
Herts.	Benington House	2·87	73	188	,, ..	Stonyhurst College....	1·89	48	70
Bucks	High Wycombe	3·01	76	192	,, ..	Southport, Hesketh...	1·22	31	66
Oxf..	Oxford, Mag. College..	2·54	65	165	,, ..	Lancaster, Strathspey.	1·78	45	...
Nor .	Pitsford, Sedgebrook..	2·82	72	184	*Yorks*	Sedbergh, Akay	2·37	60	73
,, .	Eye, Northolm.....	1·85	47	...	,, .	Wath-upon-Dearne ...	1·25	32	79
Beds.	Woburn, Crawley Mill.	2·59	66	173	,, .	Bradford, Lister Pk...	1·47	37	73
Cam.	Cambridge, Bot. Gdns.	3·00	76	221	,, .	Wetherby, Ribston H..	1·20	30	68
Essex	Chelmsford, CountyLab	4·55	116	356	,, .	Hull, Pearson Park ...	2·00	51	128
,, .	Lexden, Hill House...	4·28	109	...	,, .	Holme-on-Spalding ...	1·80	46	...
Suff .	Hawkedon Rectory ...	3·24	82	210	,, .	West Witton, Ivy Ho..	1·77	45	...
,, .	Haughley House.....	3·04	77	...	,, .	Felixkirk, Mt. St. John	0·65	17	39
Norf.	Beccles, Geldeston....	2·58	66	266	,, .	Pickering, Hungate ...	1·00	25	...
,, .	Norwich, Eaton	2·81	71	164	,, .	Scarborough.....	1·16	29	74
,, .	Blakeney	2·46	62	192	,, .	Middlesbrough	1·20	30	88
,, .	Swaffham	2·10	53	142	,, .	Baldersdale, Hury Res.	1·87	47	80
Wilts.	Devizes, Highclere....	3·32	84	175	*Durh.*	Ushaw College	1·13	29	60
,, .	Bishops Cannings	3·08	78	152	*Nor .*	Newcastle, Town Moor.	1·04	26	63
Dor .	Evershot, Melbury Ho.	2·83	72	120	,, .	Bellingham, Highgreen	2·11	54	...
,, .	Creech Grange	4·74	120	...	,, .	Lilburn Tower Gdns...	2·09	53	...
,, .	Shaftesbury, Abbey Ho.	3·56	90	170	*Cumb*	Geltsdale.....	3·09	78	...
Devon	Plymouth, The Hoe...	2·28	58	100	,, .	Carlisle, Scaleby Hall .	2·66	68	136
,, .	Polapit Tamar	2·11	54	90	,, .	Seathwaite Field	7·71	196	104
,, .	Ashburton, Druid Ho..	3·25	83	107	*Glam.*	Cardiff, Ely P. Stn.....	2·22	56	88
,, .	Cullompton	2·24	57	99	,, .	Treherbert, Tynywaun	4·65	118	...
,, .	Sidmouth, Sidmount ..	2·15	55	101	*Carm*	Carmarthen Friary....	2·36	60	86
,, .	Filleigh, Castle Hill ...	2·40	61	...	,, .	Llanwrda, Dolaucothy.	3·77	96	114
,, .	Barnstaple,N.Dev.Ath.	1·77	45	89	*Pemb*	Haverfordwest, School	2·26	57	86
Corn.	Redruth, Trewirgie ...	2·59	66	90	*Card.*	Gogerddan.....	1·99	51	76
,, .	Penzance, Morrab Gdn.	2·66	68	109	,, .	Cardigan,County Sch. .	1·67	42	...
,, .	St. Austell, Trevarna..	2·94	75	101	*Brec .*	Crickhowell, Talymaes	4·00	102	...
Soms	Chewton Mendip	3·72	94	125	*Rad .*	Birm.W.W.Tyrmynydd	3·42	87	93
,, .	Street, Hind Hayes ...	2·50	64	...	*Mont.*	Lake Vyrnwy	...	..	...
Glos..	Clifton College	2·56	64	116	*Denb.*	Llangynhafal	1·76	45	...
,, .	Cirencester, Gwynfa..	3·65	93	190	*Mer .*	Dolgelly, Bryntirion..	2·60	66	71
Here.	Ross, Birchlea.....	2·73	69	144	*Carn.*	Llandudno	0·81	21	45
,, .	Ledbury, Underdown.	2·48	63	136	,, .	Snowdon, L. Llydaw 9	8·45	215	...
Salop	Church Stretton.....	2·15	55	100	*Ang .*	Holyhead, Salt Island.	1·66	42	80
,, .	Shifnal, Hatton Grange	1·46	37	87	,, .	Lligwy	1·73	44	...
Staff.	Tean, The Heath Ho...	1·83	46	92	*Isle of Man*				
Worc.	Ombersley, Holt Lock.	1·88	48	124		Douglas, Boro' Cem...	1·54	39	62
,, .	Blockley, Upton Wold.	4·43	113	228	*Guernsey*				
War.	Farnborough.....	3·24	82	165		St. Peter P't,Grange Rd	4·58	116	228

Rainfall: April, 1926: Scotland and Ireland

CO.	STATION	In.	mm.	Per-cent. of Av.	CO.	STATION.	In.	mm.	Per-cent of Av.
Wigt.	Stoneykirk, Ardwell Ho	1·50	38	71	*Suth.*	Loch More, Achfary...	3·66	93	75
,, .	Pt. William, Monreith .	1·69	43	...	*Caith*	Wick	2·71	69	136
Kirk.	Carsphairn, Shiel.	3·72	94	...	*Ork .*	Pomona, Deerness	3·80	97	184
,, .	Dumfries, Cargen.....	2·39	61	90	*Shet .*	Lerwick	1·68	43	74
Roxb	Branxholme	2·80	71	148					
Selk .	Ettrick Manse.....	4·09	104	...	*Cork.*	Caheragh Rectory	3·49	89	...
Berk.	Marchmont House	3·30	84	163	,, ..	Dunmanway Rectory.	3·12	79	75
Hadd	North Berwick Res....	1·66	42	119	,, ..	Ballinacurra	2·37	60	92
Midl	Edinburgh, Roy. Obs..	1·55	39	112	,, ..	Glanmire, Lota Lo. ...	2·41	61	86
Lan .	Biggar	2·58	66	149	*Kerry*	Valencia Obsy.	3·74	95	102
,, .	Leadhills.....	3·58	91	...	,, .	Gearahameen	3·30	84	...
Ayr .	Kilmarnock, Agric. C..	1·67	43	81	,, .	Killarney Asylum.....	3·65	93	110
,, .	Girvan, Pinmore.....	2·50	64	84	,, .	Darrynane Abbey	2·59	66	75
Renf.	Glasgow, Queen's Pk..	2·34	59	119	*Wat .*	Waterford, Brook Lo..	2·29	58	90
,, .	Greenock, Prospect H..	2·73	69	75	*Tip .*	Nenagh, Cas. Lough...	2·63	67	105
Bute.	Rothesay, Ardencraig.	2·84	72	95	,, .	Tipperary	2·63	67	...
,, .	Dougarie Lodge	2·42	61	...	,, .	Cashel, Ballinamona ..	2·29	58	92
Arg .	Ardgour House	4·99	127	...	*Lim .*	Foynes, Coolnanes	2·72	69	111
,, .	Manse of Glenorchy..	2·72	69	...	,, .	Castleconnell Rec.	2·54	65	...
,, .	Oban	3·18	81	...	*Clare*	Inagh, Mount Callan ..	4·01	102	...
,, .	Poltalloch	2·30	58	76	,, .	Broadford, Hurdlest'n.	3·13	80	...
,, .	Inveraray Castle.....	3·76	96	82	*Wexf*	Newtownbarry	...	..	...
,, .	Islay, Eallabus.....	2·57	65	90	,, .	Gorey, Courtown Ho...	1·86	47	85
,, .	Mull, Benmore	3·90	99	...	*Kilk.*	Kilkenny Castle	1·92	49	88
Kinr.	Loch Leven Sluice	2·20	56	115	*Wic .*	Rathnew, Clonmannon	1·59	40	...
Perth	Loch Dhu	4·45	113	94	*Carl.*	Hacketstown Rectory .	1·95	50	74
,, ..	Balquhidder, Stronvar.	3·10	79	69	*QCo..*	Blandsfort House.....	2·16	55	83
,, ..	Crieff, Strathearn Hyd.	2·67	68	122	,,	Mountmellick	...	..	...
,, ..	Blair Castle Gardens ..	2·01	51	95	*KCo.*	Birr Castle.....	1·87	47	87
,, .	Coupar Angus School..	1·99	51	120	*Dubl.*	Dublin, FitzWm. Sq.. ,	1·70	43	89
Forf.	Dundee, E. Necropolis.	2·07	53	122	,, .	Balbriggan, Ardgillan .	1·71	43	86
,, .	Pearsie House.....	2·75	70	...	*Me'th*	Drogheda, Mornington	1·14	29	...
,, .	Montrose, Sunnyside..	1·73	44	95	,, .	Kells, Headfort.....	2·02	51	81
Aber.	Braemar, Bank	2·04	52	86	*W.M*	Mullingar, Belvedere .	...	..	...
,, .	Logie Coldstone Sch. ..	2·85	72	142	*Long*	Castle Forbes Gdns....	2·02	51	85
,, .	Aberdeen, King's Coll..	2·44	62	131	*Gal .*	Ballynahinch Castle ..	3·57	91	101
,, .	Fyvie Castle	2·72	69	...	,, .	Galway, Grammar Sch.	1·89	48	...
Mor .	Gordon Castle.....	2·12	54	121	*Mayo*	Mallaranny.....	3·40	86	...
,,	Grantown-on-Spey....	3·30	84	168	,, .	Westport House.....	3·03	77	112
Na .	Nairn, Delnies.....	1·15	29	77	,, .	Delphi Lodge	5·43	138	...
Inv..	Ben Alder Lodge	2·85	72	...	*Sligo*	Markree Obsy.	2·65	67	100
,, .	Kingussie, The Birches	2·02	51	...	*Cav'n*	Belturbet, Cloverhill..	1·85	47	81
,, .	Loch Quoich, Loan....	6·00	152	...	*Ferm*	Enniskillen, Portora ..	2·30	58	...
,, .	Glenquoich	4·57	116	70	*Arm.*	Armagh Obsy.	1·82	46	87
,, .	Inverness, Culduthel R.	1·76	45	...	*Down*	Warrenpoint	1·98	50	...
,, .	Arisaig, Faire-na-Squir	...	..	...	,, .	Seaforde	2·10	53	80
,, .	Fort William.....	4·49	114	101	,, .	Donaghadee, C. Stn...	1·79	45	89
,, .	Skye, Dunvegan.....	3·18	81	...	,, .	Banbridge, Milltown .	...	..	...
,, .	Barra, Castlebay	1·42	36	...	*Antr.*	Belfast, Cavehill Rd.	2·49	63	...
R&C	Alness, Ardross Cas. ..	3·27	83	135	,, .	Glenarm Castle.....	1·76	45	...
,, .	Ullapool.....	2·36	60	...	,, .	Ballymena, Harryville	2·05	52	78
,, .	Torridon, Bendamph..	4·47	114	86	*Lon .*	Londonderry, Creggan	2·54	65	99
,, .	Achnashellach	4·66	118	...	*Tyr .*	Donaghmore	1·88	48	...
,, .	Stornoway	2·32	59	77	,, .	Omagh, Edenfel	2·15	55	82
Suth.	Lairg	2·41	61	...	*Don .*	Malin Head	1·14	29	58
,, .	Tongue Manse.....	1·91	49	73	,, .	Dunfanaghy	...	..	...
,, .	Melvich School.....	1·72	44	74	,, .	Killybegs, Rockmount.	2·84	72	79

Climatological Table for the British Empire, November, 1925

STATIONS	PRESSURE		TEMPERATURE							Relative Humidity	Mean Cloud Am'nt	PRECIPITATION			BRIGHT SUNSHINE	
			Absolute		Mean Values				Mean Wet Bulb.							
	Mean of Day M.S.L.	Diff. from Normal	Max.	Min.	Max.	Min.	½ max. and min.	Diff. from Normal				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.	1014·3	— 0·3	60	24	45·0	36·3	40·7	— 3·3	37·8	91	6·3	38	— 18	12	2·6	30
Gibraltar	1014·6	— 3·4	76	45	64·0	52·6	58·3	— 2·2	52·5	83	6·3	501	+339	14	...	...
Malta	1012·4	— 4·1	75	51	69·3	60·5	64·9	+ 1·0	61·6	87	8·3	82	— 9	11	4·8	47
Sierra Leone	1012·9	+ 2·1	90	69	86·4	73·2	79·8	— 1·4	75·9	83	5·6	188	+ 54	14	...	...
Lagos, Nigeria	1010·3	— 0·5	91	72	88·3	75·4	81·9	+ 0·6	76·8	81	8·2	73	+ 7	7	...	...
Kaduna, Nigeria	1013·0	+ 1·7	92	...	89·4	...	...	...	...	...	3·0	13	+ 10	1	...	...
Zomba, Nyasaland	1009·3	— 0·3	92	61	86·5	64·9	75·7	+ 0·5	...	74	6·1	170	+ 30	11	...	...
Salisbury, Rhodesia	1008·4	— 0·7	91	53	84·3	59·5	71·9	+ 1·0	62·2	52	2·3	74	— 18	10	9·5	74
Cape Town	1016·0	+ 0·1	84	51	72·2	55·8	64·0	— 0·2	57·9	72	5·0	49	+ 23	9	...	...
Johannesburg	1013·1	+ 0·8	84	41	74·4	53·7	64·1	+ 0·7	54·6	59	4·2	102	— 6	13	8·2	62
Mauritius	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bloemfontein	...	...	94	35	84·3	52·2	68·3	— 0·1	57·7	55	3·3	43	— 15	8	...	...
Calcutta, Alipore Obsy.	1014·7	+ 1·4	87	58	82·6	65·5	74·1	+ 1·0	65·7	82	1·9	8	— 9	2*	...	...
Bombay	1011·7	— 0·3	93	71	90·5	77·1	83·8	+ 3·3	73·2	71	2·9	9	— 2	2*	...	...
Madras	1011·9	+ 0·6	88	63	83·9	72·8	78·3	— 0·6	74·7	85	6·7	422	+ 60	15*	...	...
Colombo, Ceylon	1010·0	— 0·1	89	70	85·9	73·6	79·7	0·0	76·7	76	8·0	640	+361	22	5·8	49
Hong Kong	1017·9	+ 0·3	83	61	76·9	68·6	72·7	+ 3·1	65·5	64	6·5	28	— 15	4	6·8	62
Sandakan	...	...	88	73	86·3	74·9	80·6	— 0·4	76·6	78	...	435	+ 62	19	...	...
Sydney	1017·2	+ 3·3	97	51	72·5	59·5	66·0	— 1·1	62·3	64	6·8	121	+ 49	11	7·0	50
Melbourne	1018·6	+ 4·4	97	42	70·7	51·3	61·0	— 0·3	55·8	60	6·6	51	— 5	10	6·3	45
Adelaide	1018·9	+ 3·8	105	44	79·7	56·0	67·9	+ 1·0	56·9	41	4·7	10	— 19	4	9·2	66
Perth, W. Australia	1017·7	+ 2·4	102	51	80·2	59·1	69·7	+ 3·7	61·5	53	3·9	6	— 14	4	10·1	74
Coolgardie	1016·5	+ 3·4	101	47	87·7	58·6	73·1	+ 2·3	58·9	42	3·4	15	— 2	4	...	...
Brisbane	1017·0	+ 2·5	86	53	79·0	63·4	71·2	— 2·4	66·6	65	5·8	217	+124	17	7·2	54
Hobart, Tasmania	1016·1	+ 6·7	84	38	64·9	47·4	56·1	— 1·1	50·3	61	7·4	19	— 45	11	7·6	52
Wellington, N.Z.	1011·7	+ 0·1	69	40	63·4	50·9	57·1	+ 0·3	52·7	66	5·8	40	— 48	15	7·3	51
Suva, Fiji	1015·0	+ 3·9	86	68	81·5	70·9	76·2	— 1·0	72·2	73	7·9	105	—137	18	...	...
Apia, Samoa	1011·0	+ 1·5	89	70	85·5	74·5	80·0	+ 1·3	76·8	74	6·4	211	— 25	17	5·5	43
Kingston, Jamaica	1012·5	+ 0·1	91	68	86·2	71·3	78·7	— 0·6	70·0	88	5·5	45	— 35	10	...	...
Grenada, W.I.	1012·5	+ 1·9	88	70	84·1	74·3	79·2	— 0·1	75·9	80	6·3	235	+ 27	18	...	...
Toronto	1017·6	+ 0·8	56	15	43·3	31·9	37·6	+ 1·3	33·2	84	6·3	93	+ 18	11	3·1	32
Winnipeg	1019·2	+ 2·5	58	—7	31·8	17·8	24·8	+ 4·0	20·6	85	5·1	6	— 18	6	3·9	43
St. John, N.B.	1015·6	+ 1·7	55	2	41·3	28·7	35·0	— 1·7	31·9	85	5·0	100	— 12	10	4·4	46
Victoria, B.C.	1018·1	+ 2·6	55	35	48·5	41·0	44·7	+ 0·3	42·3	88	8·0	45	—119	20	2·7	29

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