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London Fog, January 20th, 1927

By J. FAIRGRIEVE, M.A.

Although fog is a very common phenomenon yet very little has been done to find out the actual distribution and movement of fog on particular days. The accompanying map indicates the distribution of fog over London on January 20th, 1927, at different hours; from this its movement may be inferred. The map has been constructed by plotting information from a very considerable number of non-meteorologists as to whether there was or was not fog at particular times and places. It has been found previously in connexion with investigations of thunderstorms some fifteen years ago that such information in London is extremely accurate, and it is probable that the map is accurate within the limits of cartographic error except possibly on the extreme west of the area shown. Internal evidence also suggests that the map is fairly correct. The information was first plotted for each hour on maps on the scale of an inch to a mile and the fog front on each map transferred to the summary map here reproduced.

At 9 a.m. fog lay densely over the area shaded on the northeast of the map. The Lea valley was covered and the fog extended a considerable distance to the east but its limits in that direction have not been determined. Along its southern front the fog at this time thinned out very quickly but to the west of the fog area, which extended over Highgate, a misty belt stretched over the

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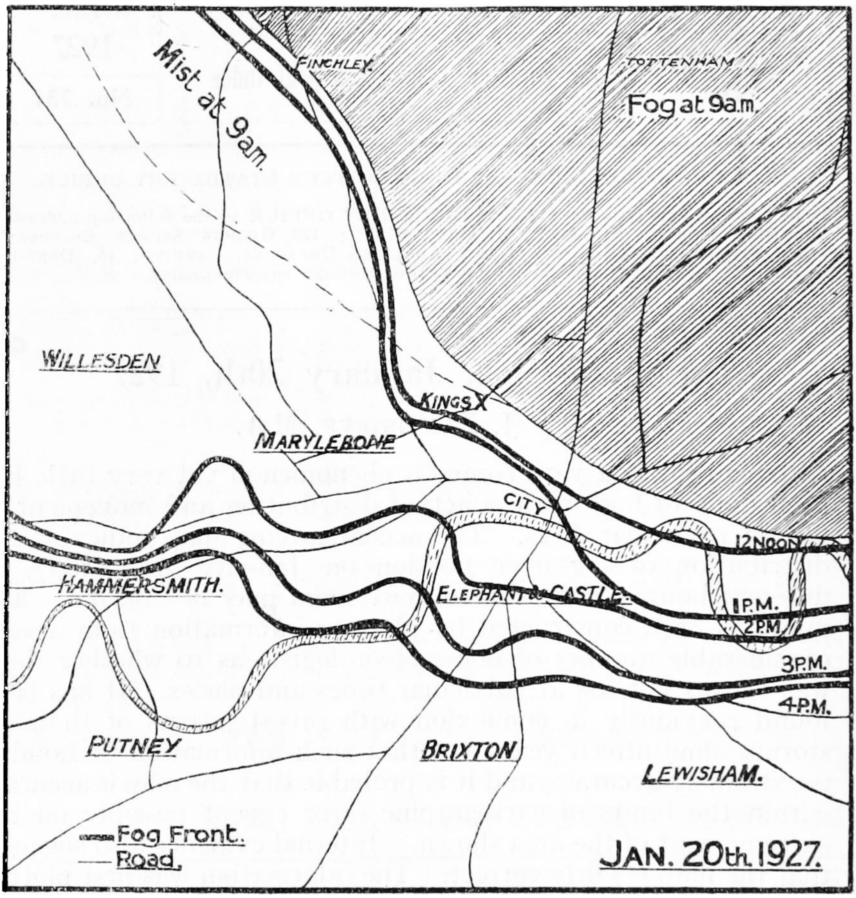
higher ground for some three miles before it gave way to sunshine. Fog was also lying thickly on the Brent Valley between Harrow and Ealing and reached at least to Southall, but further detailed information in this area is lacking. Conditions remained almost unchanged for several hours though on the southern front fog slowly extended through the narrow misty belt, and by 12 noon there was an abrupt transition along a line from Euston



DISTRIBUTION OF FOG.

Road to Liverpool Street and the north of the Isle of Dogs; to the north was dense fog, to the south, bright sunshine. The Brent valley fog also moved a little southward about 9 o'clock but it never topped the Ealing ridge. Finchley and the higher land to north and south remained misty rather than foggy. Then about noon the fog front on the east moved slowly southward while the western front remained steady for an hour, but between one and two moved fairly quickly south-westwards and flooded all over west London though it is not certain that it did go over the north western part of the area shown. Thereafter the whole front moved slowly southwards till about 4 o'clock. It is rather remarkable that the sinuosities on the front remain hour after hour; these sinuosities are shown not only on the hourly maps but on intermediate half-hourly maps (not reproduced). Shortly after 4 o'clock the advance stopped and the fog began to disappear, being apparently blown northwestwards, the east and south clearing first and the north and west remaining foggy for the longest time.

Two problems, at least, present themselves. (1) Air in the fog area probably had a different density from that in the fog-free area. It is curious that the presumably colder air did not push in under the presumably warmer air to the south but that there was a stationary vertical division between the two for some hours. Why? (2) The problem of the continued existence of the sinuosities on the fog front is a minor one but it is also interesting.

An Early Essay in Co-operative Meteorology: The Great Storm of 1703

By C. E. P. Brooks, D.Sc.

On the night of November 26th to 27th, 1703, the southern half of England was visited by a storm which appears to have been without parallel for at least three hundred years, and possibly for far longer. The force of the wind was so great that masses of lead from the roofs were rolled up and carried considerable distances, and enormous numbers of trees were blown down, while during the night the Eddystone lighthouse was destroyed. There was no official meteorological service in those days, but fortunately there was in London an energetic annalist—Daniel Defoe, of *Robinson Crusoe* fame—who immediately set about compiling for posterity a record of the event. His first step was to insert in the public press—the *Gazette*—an advertisement calling for reports from all parts of the country. As a result he received a great number of letters, which he published, with some notes and discussion, in a volume well known to meteorologists.*

The discussion is almost entirely limited to a summary of the damages sustained, but a glance at the volume showed that the material which Defoe had collected might well, in the hands of a Le Verrier, have laid the foundations of synoptic meteorology more than a century earlier than was actually the case. Even

* The Storm: or a Collection of the most Remarkable Casualties and Disasters which happened in the late *Dreadful* Tempest both by Sea and land. London, 1704.

at this distance of time the re-construction of the meteorology of the storm is not without interest and profit. In compiling the following account some additional data collected by Mr. H. Harries have also been utilised.*

It appears that for nearly a fortnight before the fatal date very strong westerly gales had prevailed, suggesting the presence of a deep persistent depression between Iceland and Scotland. We also read that a few days before the 27th there was an unusual tempest on the coast of Florida and Virginia which may have been a West Indian hurricane. Presumably this tempest, following the usual track, passed out into the North Atlantic east of Newfoundland, but of its history over the ocean we have no data because, of the ships which were at sea and presumably encountered it, none returned to report. It seems, however, that a circular storm, whether this or another we cannot tell, appeared south of the main depression as a deep secondary.

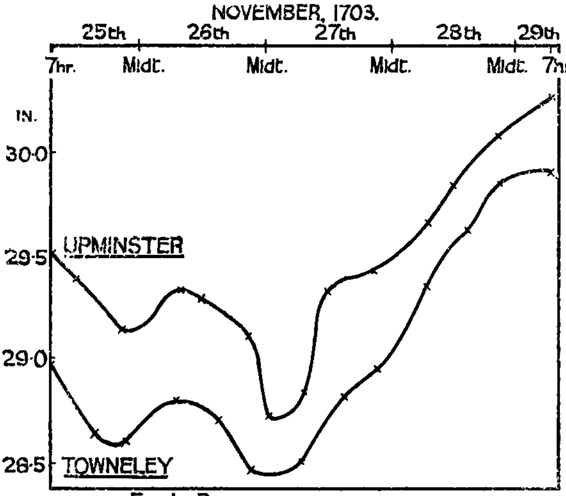


Fig. 1. Barometer readings.

On the 26th the primary depression was centred somewhere near the Shetland Islands, and the secondary lay over Ireland, where the wind backed to SW in the morning, while at Milford Haven it was blowing a hard gale from S by E at 1 p.m., and at the entrance to the English Channel the wind backed from WNW to SW by S early in the day. Over the whole of south-west England from Cornwall to Monmouth and Shaftesbury the storm winds began from SW and veered to NW, and the greatest damage was done by the latter winds. At Wiltmire near Shaftesbury, for example, the north windows of the church were damaged. Over south-eastern England the winds began from SSW and veered to W, but the greatest damage was done by winds from SW or WSW. There are no reports of damage from north of 52½° N, and it is expressly stated that at Hull and Grimsby the storm was not exceptionally severe; unfortunately the direction of the wind cannot be determined. The reports of the time of greatest wind force or damage are sufficiently numerous

* The Great Storm of 1703. An Anniversary Study.

and concordant for isochrones to be drawn. These run from west-northwest to east-southeast in the west and from northwest to southeast in the east. The isochrone of 3 a.m. of the 27th passes from Pembroke towards the Isle of Wight, that of 4 a.m. through Swansea and Bristol, that of 5 a.m. east of Oxford and through London, and that of 6 a.m. through eastern Suffolk. At the Hague the wind blew from SW with great strength from 4 a.m. to 10 a.m. and on the night of the 27th the storm reached Hanover and Copenhagen.

The wind directions about 4 a.m. on November 27th are shown by the arrows in fig. 2. These appear to blow round a point in the midlands, and suggest a secondary depression which at that time was centred somewhere near Nottingham. The information about the veer of the wind and the isochrones of greatest force show that the depression travelled very rapidly along a slightly curved path across central Wales and the Midlands to the Wash. The concentration of the damage to the south of the centre points to a great congestion of isobars there, while to the north the isobars opened out—in fact, Mr. Harries notes that the *Deal Castle* at Scarborough had such light winds at midnight that she set sail to the south, and did not run into bad weather until off Yarmouth. The northerly gale which followed the storm indicates a rapid rise of pressure in its rear.

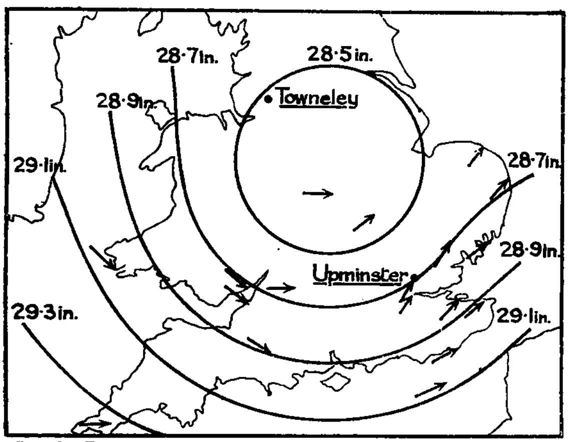


Fig. 2. Pressure and Wind about 4a.m., Nov., 27th, 1703.

Fortunately these conjectures about the pressure distribution can be confirmed by some actual barometer readings at Towneley, in Lancashire, and at Upminster, in Essex. These are shown in Fig. 1. They are presumably uncorrected, but the difference of nearly 0·5 in. between Towneley and Upminster on the 25th is of the correct order of magnitude for a deep depression centred southeast of Iceland, and the relative pressures at the two stations may therefore be accepted as reasonably correct. The Rev. W. Derham, F.R.S., kept an almost continuous watch on his barometer at Upminster, and while the reading of 28·72 in. at 12.30 a.m. was actually the lowest, he states that the mercury remained at nearly the same level for some four hours. The Towneley curve also suggests a flat minimum, and these readings indicate that the secondary had a large open centre or "eye." The rapid rise of pressure at both stations after the centre had passed confirms the steep gradient in the rear of the storm. It will be noticed that as the centre approached, the two curves closed up rapidly, the difference decreasing from 0·55 in. at 7h. on the 26th to only 0·25 in. at about 1h. on the 27th. Evidently the centre passed between Towneley and Upminster, but nearer the former than the latter. Taking the barometer readings at their face value, we may draw an isobar of 28·5 in. passing just to the northwest of Towneley (Fig. 2). Completing a circle with its centre at Nottingham, we find the same isobar passing northwest of Cambridge. Probably an ellipse with its major axis extending from north-northwest to south-southeast would be better than a circle. The isobar of 28·7 in. passes just north of London and continuing with the same gradient, that of 28·9 in, runs across Kent, and that of 29·1 in. along the Channel.

Reading between the lines of Defoe's account, one remarks several peculiarities in the storm. A large number of houses were unroofed, but one finds no mention of the contents being damaged by heavy rain, in fact the great majority of the accounts do not mention rain at all. The chief exceptions are the ships in the English Channel, where the supposed rain may really have been flying spray. It is true that there was a rainstorm at Upminster between 9 and 10 p.m. on the night of the 25th, in which 1·65 lines (ca. 0·15 in.) fell, but that was more than 24 hours before the crisis of the storm, and the next mention of rain in Derham's detailed account is "a hasty shower of rain" at 4 p.m. on the 27th, several hours after the worst of the storm had passed. The high tides in the Severn on the night of the 26th and of the Thames on the 28th were due to the wind and not to heavy rain. Another peculiarity is the rarity of any mention of squalls; the period of strongest wind is generally given as several hours. These two peculiarities, together with the extraordinary strength of the wind, lead one to speculate as to whether the storm was an ordinary secondary depression or whether it may not have been an intense example of a vortex. It presents several points of similarity with the depression of March 24th, 1895, which was described by Sir Napier Shaw* as an example of a rotating column of air: "It began (at Cambridge) about 2 o'clock on the afternoon, and by 6 o'clock many of the oldest and strongest trees had been uprooted, some buildings had been demolished, and a great deal of minor damage done. The remarkable feature of the gale was that, in the Eastern Counties, it was unattended with any rainfall, either before or

* Revolving Fluid in the Atmosphere. *London, Proc. R. Soc., Ser. A*, vol. 94, 1917-18, p. 34. See especially Fig. 5.

during or after the strong wind." If this parallel is correct, the whirl of 1703 must have been on an exceptionally large scale.

Severe gales were subsequently reported from France, Germany, the Baltic, Sweden, Finland and northern Russia, but it is uncertain to what extent these were due to the primary depression, and to what extent to the secondary. Over England the storm was succeeded by an intense anticyclone, for on the 28th there was a north wind of unusual violence in the North Sea, which caused a very high tide in the Thames. This anticyclone held for three weeks or a month, during which the weather was generally fine, a fortunate circumstance in view of the number of houses which had been unroofed.

The storm produced some interesting peculiarities. It was generally accompanied by lightning, though as previously stated the rainfall appears to have been slight. The noise of the wind drowned the sound of the thunder. A veritable "spout" or tornado was observed at 4 p.m. on the 26th near Oxford, while at Tewkesbury and near Shaftesbury the trees which were blown down fell in various directions. In Kent the trees and grass were covered by a deposit of salt as far as 25 miles from the sea. Finally, among the buildings of London the wind produced remarkable eddies, and the damage to the roofs took place mainly on the eastern or leeward sides of the houses.

OFFICIAL PUBLICATIONS

GEOPHYSICAL MEMOIRS—

No. 33. *The Variation of Meteorological elements at St. Helena and at some other places in the Atlantic Region.* By C. E. P. Brooks, D.Sc. (M.O. 286*c*).

In temperate latitudes any "secular" or progressive change of climate which may exist is usually masked by the large irregular variations from year to year. Nearer the equator the irregular changes are smaller, and examples of secular change occasionally show up clearly. An example of this is found at St. Helena, where observations have been carried out since 1892. These show (1) a persistent rise of pressure at the average rate of nearly 0·1 mb. a year ; (2) an increase of wind velocity from 1892 until 1903, followed by a steady decrease averaging 0·2 miles per hour each year ; (3) a steady rise of the mean daily maximum temperature (0·2° F. per year) while the minimum temperature remains unchanged. The changes are attributed to the gradual northward movement, probably combined with an increase in intensity, of the South Atlantic sub-tropical anticyclone. At the same time there appears to have been an increase in the intensity of the North Atlantic sub-tropical anticyclone, but probably without any change of position. It is considered probable that the phenomena form part of some world-wide change during the past thirty years, traces of which have been found in several scattered areas.

Royal Meteorological Society

The monthly meeting of this Society was held on Wednesday, February 16th, 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 Variability of Average Monthly Rainfall throughout the Year.

The distribution of the annual average rainfall throughout the year at stations in the British Isles is not uniform, the winter months being wetter than those of the spring and early summer. The variability of the monthly averages for the 35 years 1881 to 1915 has been calculated for some 350 stations in two ways. In the first the range has been used, *i.e.*, the difference between the largest and smallest monthly averages. It varies from 1 in. at stations along the east coast and in central England, to 9·8 in. at both Glenquoich, in the western Highlands of Scotland, and Seathwaite in the English Lake District. The distribution of the range is shown to bear considerable relation to that of the average daily rainfall, the latter value being adopted in preference to the annual total because of the unequal lengths of the months. Calling the range R and the daily rainfall M, the relation of M and R is given fairly closely by the equation

$$R = -0{\cdot}14 + 19\,M + 41\,M^2.$$

The second method makes use of the mean deviation of average values of M for the individual months from the value of M for the year. This deviation is expressed as a percentage of the annual mean, and varies from 11 per cent. in central England to over 25 per cent. in Dartmoor, the Lake District, parts of Wales and the Western Highlands of Scotland. The distribution presents features unlike that of the map of the average annual rainfall.

The variability of the averages for longer periods is shown to be slightly smaller than that for the 35 years, minor irregularities in the distribution being smoothed out with a longer period.

L. F. Richardson, D.Sc., F.R.S., and Denis Proctor.—Diffusion over Distances ranging from 3 *km. to* 86 *km.* (*Memoir No.* 1.)

See *Meteorological Magazine*, Vol. 61, 1926, p. 192.

The Civil Service Sports Council has awarded the Duke of York's Cup to the Air Ministry as being the Department with the best all-round sports record for 1926.

Correspondence

To the Editor, *The Meteorological Magazine*

Old-fashioned Winters

May I be allowed to comment upon the interesting article appearing in your January issue under the above heading by Mr. M. T. Spence? In the article mentioned he seems to have definitely come to the conclusion that to assume that winters are different now to those experienced (say) 30 to 40 years ago is an entirely erroneous idea.

How does Mr. Spence account for the fact that since that of 1894-95 we have only had *one* winter (1916-17) worthy of the name? Also, why was it that, some thirty to thirty-five years since, ironmongers used to regularly stock a large supply of skates every winter, and now they do not? It is unfortunate that the table kept by the National Skating Club of the number of days skating in Regent's Park goes no further than 1904, because later years would probably show a consistent falling off in the number of those days.

But the most telling point against there being no change in climate is shown by the Brückner Cycle, a cycle of 35 years, accepted, I believe, by most meteorologists. In 1854-5-6, extremely cold winters prevailed; 35 years later, in 1889-90-91, similar conditions were experienced, and I can remember seeing the Thames, near Blackfriars Bridge, completely covered with ice-floes sufficient to impede and finally prevent all river traffic. The old Government vessel "Buzzard" resembled the ship of an Arctic explorer hemmed in by ice. Now, 35 years later, we get cold winters, but instead of more or less continuous temperatures of between 20° and 35° F., we get temperatures of between 30° and 45° F., which makes all the difference between frost and no frost. In the early nineties of the last century there were many days together in London when the thermometer failed to rise above the freezing point; this very seldom happens now.

Did space permit, I could give notes of evidence I have received from time to time from correspondents in all parts of the world—Australia, Egypt and Switzerland, to name a few—from which the only conclusion which can be arrived at is, that a definite "flattening" of extremes of temperature is taking place; in other words, neither is the heat of summer so great, nor the cold of winter so severe as it was even in the latter half of the last century.

Doubtless, as shown by Mr. Spence, mild winters did take place in England in olden times, but then they were the exception, and gave rise to remarks as to their extraordinary nature, now they are the rule, and a cold winter is considered the remarkable phenomenon.

D. W. HORNER.

63, Canute Road, Clive Vale, Hastings, January 27th, 1927.

[Mr. Horner's statement that recent winters have been mild compared with winters 30 or 40 years ago is borne out by the 85 years temperature record at Greenwich. This fact was taken into consideration in the article referred to but in view of the high frequency of mild winter months before 1886, it was cited as giving no proof of a progressive change in climate. It would appear, therefore, that Mr. Horner has interpreted the last paragraph of the article in a way which was not intended. Mr. Horner's interpretation would appear possible only if the term " old fashioned " as applied to cold winters originated from a comparison between the mildness of recent winters and the coldness of winters 30 or 40 years ago. One of the main points of the article, however, was to show how the term might have originated in popular parlance at any time in, say, the last two centuries due to our having " at uncertain intervals a vigorous season of many week's duration attended with deep snows and clear atmosphere common to more northern latitudes " (Luke Howard). Mr. Horner's remarks are, in the writer's view, an illustration of this very point.

With regard to the Brückner Cycle, Professor Turner showed* that a period of 40 years would suit Brückner's table of cold winters at least equally as well as 35 years and that the evidence seemed to show that Brückner adopted too short a period: furthermore the whole range of the 35-year temperature cycle is, according to Brückner, only about 1·3° F. The variations of temperature in two 35-year periods cannot therefore be relied on to reveal changes in climate.

Mr. Horner states that mild winters in olden times gave rise to remarks because of their extraordinary nature. In Lowe's *Chronology of the Seasons* the coldness of winter is more frequently remarked upon than its mildness. M.T.S.

With regard to the question of " flattening of extremes," see the review of Professor W. J. Humphreys' book on p. 45. Ed. *M.M.*]

I was much interested in Mr. Spence's article on the above subject in the January issue of the *Meteorological Magazine*. May I suggest lines on which further investigations might be made.

The average person when speaking of a " change of climate " is usually thinking, not of the past two or three hundred years, but of the comparatively short space of time within his or her own recollection, 50, 60, perhaps 70 years. There may be

* London: *Q.J.R. Meteor. Soc.*, XLI. (1915) p. 323.

readers of this magazine who have access to records dating back to the middle of last century, and could thus compare the 35 years 1855-1890, with the succeeding 35 years, 1890-1925, in respect of the following: (1) Number of days with snow; (2) Number of days snow-lying; (3) Number of days temperature did not exceed 32°; (4) Number of nights with screen frost.

One feels that such an investigation would yield interesting results, and settle the vexed question of "milder winters" once and for all, especially if each month could be dealt with separately.

G. C. WOOLDRIDGE.

Milestone House, Leicester Road, Ashby-de-la-Zouch, January 22nd, 1927.

Rainfall 1926, Bristol District

I read with interest your article on rainfall for 1926 and the various differences of percentage in different parts of the British Isles, and venture to give variations of the fall in so small an area as Bristol, from records of observers north, south, east, west. The late Mr. Robert Sturge's records from 1856 to 1911 show a sequence of probably a three years' system of light, heavier and heaviest following each other with but very few breaks. 1912 apparently altered this, and a two years' sequence set in, continuing up to the present. If, however, we take the Clifton record alone, it shows but a slight increase on the lighter fall of last year, only 0·15 in., while the whole district shows the system still in force. 1925 was 1·29 in. above the normal for the period 1881 to 1915, and 1926 1·48 in., thus showing the necessity of taking the average of a district for rainfall instead of one locality. Clifton itself shows a remarkable difference in the rainfall, and suburbs not half a mile apart much difference, as the following figures will show.

	in.		in.
City	33·56	, Clifton ..	
Bishopston	35·77	Oakfield Road ..	36·19
Redland	34·89	Clifton College ..	34·66
St. Andrews Park ..	36·68	Tyndalls Park Road ..	35·72

These give an average of 35·35 in.—the normal is 33·97 in. for Clifton.

HENRY A. ROGERS.

Redland, Bristol, January 24th, 1927.

Duration of Rainfall. A Query

On June 13th, 1903, rain commenced in London at 1 p.m., and continued without intermission, but with varying intensity, till 11.30 p.m. on the 15th. The total duration as recorded at Camden Square was thus 58½ hours of absolutely unbroken rainfall, although the rain came near to stopping for an hour or two during the forenoon of the 14th, and the total yield during the interval was 3·44 inches. This appears to be London's longest duration of continuous rain ever recorded, and it would, therefore, be a matter of great interest to know if any rainfall observer in the country who possesses a self-recording gauge has ever registered an equal or longer duration. One emphasises the condition of absolute continuity of rain in this query because, of course, it is no very uncommon thing to get several consecutive wet days with but brief intermissions of the rainfall. In view of the comparative paucity of automatic rain-gauges it may be that London holds the "record" among such gauges. But any one at all familiar with the severity of bad weather in the mountainous districts of these islands where rain that ceases in the plains will so often simply change its quality from a heavy type to a driving drizzle with mist, will scarcely doubt that durations of 60 hours of unceasing rain or snow must comparatively often be greatly exceeded.

L. C. W. Bonacina.

27, Tanza Road, Hampstead. December 15th, 1926.

Iridescent Cloud

About three o'clock this afternoon the sun was behind a heavy bank of nimbus cloud, causing the cloud to have a "silver edge." High above this bank at about, I should think, five thousand feet, was a layer of alto-stratus slightly ridged or "waved" at the western edge. The cloud would be at an angle of about 45° from the horizontal and I would subtend an angle of something like 35° between it and the sun. As a matter of fact I measured it with a clinometer as well as I could, estimating the probable position of the sun behind the cloud-bank. The sky behind the alto-stratus cloud was blue, but for about 45 minutes the ridged western edge of this cloud was coloured with alternate bands of green and pink. As many as five or six of these could be seen at one time lying normal to a line from them to the sun. The colours had the same limpid translucence of those in rainbows. The pink sometimes darkened into a lavender hue.

While I was watching, an isolated nimbus cloud trailed past at an altitude of perhaps six or eight hundred feet. It seemed to pass through a double band of green and pink light. I would subtend approximately the same angle between it and the sun as I did between the alto-stratus cloud and the sun. Yet the alto-stratus with to-day's ground temperature would almost certainly be composed of ice crystals and the nimbus cloud of drops of water.

Donald E. Webster.

172, Ladykirk Road, Newcastle-on-Tyne. January 2nd, 1927.

The first part of the account is consistent with the hypothesis that the writer is describing iridescent cloud. Stone (*Nature,* 1887, Vol. 35, p. 581, quoted by Pernter-Exner, p. 461) gives 5° to 45° for the distance from the sun. Mr. Webster's idea that the alto-stratus was composed of ice-crystals is natural, but according to Simpson (*London, Q.J.R. Meteor. Soc.*, 1912, p. 296) the iridescence is evidence for the existence of super-cooled drops.

The iridescence over the nimbus cloud is puzzling, however. Could it be an illusion? F.J.W.W.

NOTES AND QUERIES

Halos in India

Mr. A. Nimmo has sent the following note on a halo observed by his nephew, Mr. G. Sherriff, at Ladakh, in the Himalayas.

"I wonder if you can explain the halo round the sun that I saw in Ladakh. There was an ordinary halo round the sun nearly every day, and it always meant snow in an hour or two, but in this case the sun was on the circumference of the halo, not in the centre. I asked the Padre in Leh about it, and he said he had often seen them in the cold weather, as well as other kinds. I made the following note and drew a diagram of it in my diary at the time :—

"'Before the snow started this morning there was a curious halo which I have never seen before. The halo was not round the sun, but the sun was on the circumference of the halo, and the halo had two little patches of rainbow, one on either side of the sun, at 22° from it. The sun was about 40° from the horizon. Probably it is common, but I have never seen it before.'"

The halo phenomenon was the parhelic circle or mock-sun ring. The interesting point about the observation is the absence of any circular halo round the sun. This indicates that the crystals in the air at the time were all prisms with vertical axes : the mock-sun ring would be due to the reflection of light from such crystals, the coloured parhelion to refraction through the crystals. This is not the only way in which a mock-sun ring can be formed. In the March issue of the *Meteorological Magazine*† there is a fine halo complex which is to be attributed to crystals with horizontal axes, and in that case the mock-sun ring appeared; possibly the light was reflected from the vertical planes at the end of the crystals.

As far as I know, the parhelic circle has not been observed before without any circular halo surrounding the sun. This is not stated explicitly by Pernter,* but one gets the impression in reading what he has to say.

F. J. W. WHIPPLE.

† p. 38.

* PERNTER, J. M., AND EXNER, F. M., *Meteorologische Optik*, 2nd Edn. Vienna and Leipzig, 1922, p. 306.

Disastrous Storm at Hongkong, July 18th-19th

By the courtesy of the Director of Naval Intelligence, we have received copies of the *Hongkong Weekly Press* for July 24th, and the *Overland China Mail* for July 29th, containing a full account of the remarkable thunderstorm which visited Hongkong on the night of July 18th to 19th, 1926, in the course of which 19·885 in. of rain fell in a period of eight hours. From the accounts in these periodicals, the following details have been compiled. A number of striking photographs of the damage accompanied these papers.

On Saturday, July 17th, a typhoon—the first of the season—was reported in the China Sea, apparently heading directly for Hongkong, and typhoon warnings were issued. When within a hundred miles of the island, however, it turned northward and crossed the coast of China near Swatow, after which it became stationary and began to fill up. Sunday in Hongkong was dull and overcast, with sharp squalls of rain in the afternoon, but the evening was comparatively fine, and all danger seemed to have passed. Soon after midnight, however, it began to rain again, and between 2 and 3 a.m. 0·545 in. was recorded. At 3 a.m. rain began to fall very heavily, accompanied by violent thunder and lightning. The falls during the next eight hours were as follows :—

a.m.		inches	a.m.		inches	a.m.		inches
3-4	..	1·895	6-7	..	2·640	9-10	..	3·200
4-5	..	3·965	7-8	..	2·005	10-11	..	1·040
5-6	..	2.900	8-9	..	2·240			

From 11 a.m. on the 18th to 11 a.m. on the 19th the fall was 21·435 inches. The rainfall established many records for Hongkong. The total for 24 hours was, in fact, exceeded by a fall of 27·44 inches on May 29th to 30th, 1889, but the largest fall previously recorded in eight hours was 13·48 inches on July 15th, 1886, and the largest fall in an hour 3·48 inches on the same date.

As may be imagined, the storm did an enormous amount of damage. Hongkong is a mountainous island, and immediately behind the city the ground rises steeply to Victoria Peak, at a height of 1,774 feet, which is distant little more than a mile from the coast, and is an important residential centre connected with the harbour by a tramway and several roads. The water poured down the slopes into the city in cataracts, and flooded the low ground in places to a depth of several feet. The regular water channels and drains were quite unable to cope with the run-off, and the roads were torn up for long distances. At two points the mains burst and threw up columns of water as high as the first floors of the buildings, in one case pushing through the stonework a large tree which had been swept down by the torrent. In other cases the water washed away the foundations of the roads and formed underground rivers.

Lightning added to the havoc, especially when about 4 a.m. a firework factory was struck, the fireworks and powder being exploded, fortunately without causing any fatalities. In the harbour two ships were struck. In the whole storm the loss of life appears to have been much smaller than was to be expected, the most serious event being the destruction of a pumping station by a large boulder (" as big as a tramcar ") set free by a landslide, four men being killed and others injured.

The people of Hongkong rose to the occasion, and, in spite of the roads being impassable for wheeled traffic, and in places four feet deep in water and mud, the motto on Monday morning was " business as usual," even though it was necessary to wade to work in a bathing dress and coat, with one's clothes in a parcel on one's back!

Note on the Clyde Floods, November 5th, 1926

On Friday, November 5th, severe flooding, accompanied by a southwesterly gale, occurred at Glasgow, and at other places along the banks of the Clyde. Mr. J. J. Somerville, Meteorologist-in-Charge at Renfrew Aerodrome, has forwarded a note in which he summarises factors contributing to this flooding, which was of an exceptional nature in the Clyde area, as follows:

A deep low appeared off the west of Scotland on the preceding day, and gave heavy rainfall in the Clyde valley in the early morning of the 5th. At Renfrew heavy rain occurred between midnight and 5h. Beginning at 2h., on the 5th, a southerly gale was recorded by the Dines anemometer at the Coats Observatory, Paisley, the wind changing to south-west between 10h. and 11h., and to west-south-west between 11h. and 12h.

In ordinary circumstances a south-westerly gale would impede the discharge of flood water in the Clyde, but in this case there was the additional factor that high tide was due at noon, about half an hour after the gale had changed to a direction almost in a direct line with the advance of the tide. The flooding may thus be attributed to the tidal rise (originated by the gale) in the river which was already rising owing to the heavy rainfall. Such a combination of circumstances seems to be rather rare, as the Harbour Authorities state that the level reached in this case had not been attained since 1882.

Reviews

Das Gewitter. By Prof. Dr. A. Gockel. 8×6, pp. viii. + 316. *Illus*. Berlin and Bonn. Ferd. Dümmlers. Verlag. 1925.

The above work on thunderstorms, by one of the foremost authorities on the subject, is a revision of an earlier edition which appeared under the same title in 1906. So many developments have taken place in atmospheric electricity during the past twenty years that many parts of the book have been re-written and others enlarged. The book is not difficult to read, being of the popular descriptive type, and only the broad outlines of the relevant theoretical considerations are given.

A typical summer thunderstorm is first described in detail, and the varying phenomena are so ably recounted that one immediately pictures some such actual storm, with enhanced effects, from one's own experience. Then follow chapters devoted to the various forms of lightning with their associated meteorological conditions, and several excellent photographs are included. Fork, sheet, ball, bead lightning and St. Elmo's fire are all adequately dealt with in turn. In the author's opinion, it is still difficult to decide whether lightning is oscillatory or not, nor does he attempt a definite explanation of ball lightning, which has always proved puzzling. This kind of lightning is considered as a final stage of fork lightning, and although the idea of a thunderbolt passing through an open door or down a chimney is flouted as an optical illusion, the phenomenon itself cannot be so regarded on account of the large number of authentic observations which have been put on record. In support of this view, twenty-six reliable detailed observations are quoted of ball lightning occurring in Europe—information which should prove of considerable value to anyone making a special study of this phenomenon.

After treating of thunder, the disastrous effects of thunderstorms on life, buildings, shipping, &c., are dealt with, and statistics from many countries have been extracted. When one realises the large number of flashes of lightning which must occur throughout the world in the course of a year, the number which prove destructive must be considered as relatively very small indeed. As a means of protection against lightning, the lightning conductor receives ample treatment as to both its history and development.

From this point the book becomes almost purely meteorological in character, and a short account is given of the earth's electric field, the radio-activity of the atmosphere, and ions, and the part which they play as condensation nuclei.

Several theories for the origin of the electricity of thunderstorms are mentioned, but emphasis is given to the generally accepted theory, due to Dr. Simpson, that a thundercloud is a huge electrical machine capable of generating large quantities of electricity rapidly enough to supply the energy for lightning flashes in the short intervals which occur between flashes. Gockel thinks, however, that sufficient importance has not been attached to the frozen state in which cloud droplets must exist at the low temperatures attained in thunderclouds. Several illustrations are shown of the different stages in the formation of a thundercloud by the undercutting of warm air by cold air, and a few old synoptic charts are introduced to illustrate the weather types associated with widespread thunderstorms on the continent. The daily and yearly variation of thunderstorms are briefly discussed, and an inconclusive comparison with sunspot frequency is quoted. A chapter is also added on the geographical distribution of thunderstorms, but in this connexion a map would have been distinctly useful. Space is also found for the photography of lightning, "atmospherics," and forecasting thunderstorms.

In conclusion, the author exhibits his interest in hail, which so frequently accompanies thunderstorms, by a lengthy account of the formation of hail and the varied characters it assumes, bringing more actual observations to his aid.

Full justice has been done to the subject, and the book forms about as comprehensive a survey of the thunderstorm in all its phases as anyone could wish for.

R.E.W.

Rain Making and other weather vagaries. By W. J. Humphreys, size $5\frac{1}{2} \times 7\frac{1}{2}$, pp. x.+157, London, Baillière, Tindall & Cox ; and Baltimore, The Williams and Wilkins Co. 11s. 6d. net.

Professor Humphreys is very severe in his treatment of what he terms "meteorological mumpsimuses." A mumpsimus (one confesses to a lingering doubt whether the plural should not be "mumpsimi ") is a foolish and futile superstition of the credible, such as a belief in the practical possibility of rain-making, hail-shooting, or the artificial dissipation of fog, and the author shows over and over again, with his customary lucidity, that all such claims are foredoomed to failure, because the power available is insignificant in comparison with the scale of the natural phenomena which it is desired to influence ; moreover, even this small amount of power is seldom applied with full knowledge and efficiency. The "pluviculturalist" of the twentieth century is no nearer to the accomplishment of his object than was his savage prototype the "medicine man," and this scientific and, at the same time, readable account of his shortcomings can do nothing but good.

The latter half of the book deals with other common fallacies, such as the influence of the moon and the planets on the weather, "key-days" such as St. Swithin's, the weather omens of animals and plants, the myth of the old-fashioned winter, &c. With the greater part of these strictures one is heartily in accord, though some allowance might be made for the poetic imagery which inspired many of the sayings. But one feels that the possibility of a change in climate or in the character of the winters has perhaps been dismissed a trifle summarily; small changes of climate, or what comes to the same thing, climatic waves of the order of a hundred years or more, are definitely shown by some long meteorological records. In central Europe the winters of the present century have averaged 4° F. warmer than those of the last half of the nineteenth century (*Meteorological Magazine*, 57, 1922, p. 203). Moreover, even where the means have remained almost unchanged, the weather in many parts of the world has shown a curious tendency to become less variable from year to year in this century than in the last (*Geogr. Rev.*, New York, N.Y., 11, 1921, p. 133). These occasional examples of agreement between popular belief and systematic records are probably purely accidental however, and in no sense contravene the author's conclusion that the source of such persistent popular beliefs lies not in the weather, but in ourselves and our changing outlook with increasing age.

Obituary

Lieutenant-Colonel Henry Mellish.—Col. Mellish, whose sudden death on February 2nd—he had taken his regular meteorological observations as usual in the morning—was reported in the last number of the *Meteorological Magazine*, will be sorely missed both in his own county of Nottingham and by meteorologists in all parts of the country. The son of Lieutenant-Colonel W. L. M. Mellish, he was born at Hodsock Priory on October 31st, 1856; he was educated at Eton, where he became an excellent rifle shot, and at Balliol College, Oxford, where he obtained first classes in Mathematical Moderations in 1877 and in Natural Science in 1879. In 1882 he was called to the Bar by the Inner Temple and joined the Midland Circuit. His father having died, he succeeded to the property on coming of age in 1877, and devoted himself mainly to the encouragement of agriculture and to local government in Nottinghamshire, becoming alderman and vice-chairman of the Notts County Council, a county magistrate and deputy lieutenant, and chairman on the Education Committee. He maintained his interest in rifle shooting, and shot for England in the match for the Elcho Shield on over twenty occasions, while on his private range at Hodsock he carried out ballistic experiments which are described in F. W. Jones's recent book "The Hodsock Ballistic Tables."

Col. Mellish's interest in meteorology dates back for more than fifty years. In 1876 he began rainfall observations at Hodsock Priory, and between 1879, when he became a Fellow of the Royal Meteorological Society, and 1881 he set up a complete climatological station in the beautiful gardens of the Priory. His observations have been published regularly in a series of annual booklets, and in his report for 1925 he was able to include normals for 50 or 45 years for all elements.* The value to meteorology of such a long and completely homogeneous series of observations can hardly be overestimated. In addition to this he took an active part in the work of the Royal Meteorological Society, serving on the Council from 1902 until 1925, and acting as President in 1909 and 1910. His two presidential addresses reflect the character of his interests—" Some relations of meteorology with agriculture " and " The present position of British climatology," the latter including a very valuable bibliography of British climatological literature. " He habitually made the journey from Worksop to attend committee meetings, and was an enthusiastic supporter of the Society, generous with his time, money and energy alike." He was also associated with the development of rainfall observing, and was a trustee of the British Rainfall Organization Fund. In the words of a correspondent of *The Times*, " He will be remembered as an unselfish English gentleman of the finest type, as a first-rate man of business, and as an ideal chairman of a committee, whose lucid commonsense, illuminated always by kindliness, simplified many a difficult decision."

News in Brief

Mr. G. M. B. Dobson, M.A., D.Sc., University lecturer in Meteorology, Oxford, has been recommended by the Council for election into the Royal Society.

According to *Water and Water Engineering* the scheme of Prof. E. H. L. Schwarz for improving the Kalahari district† has been rejected by the Government expedition sent to investigate under Dr. Du Toit. A calculation of the levels at different points in the area has shown that the waters captured by the Zambesi could never have supplied a lake system of any considerable size. A considerable volume of water does flow southwards into the Kalahari under flood conditions but such floods occur infrequently and cannot be relied on.

The Weather of February, 1927

Cold anticyclonic conditions prevailed generally during the first part of the month, but after the 19th the weather became mild and unsettled, with rain at times. On the night of the 1st to 2nd, a secondary depression crossed southern England and some large measurements of precipitation were recorded in the south, 41 mm. (1·61 in.) at Folkestone, and 31 mm. (1·22 in.) at Cullompton being among the greatest. Snow lay on the

* See *Meteorological Magazine*, 61 (1926), p. 117.
† See *Meteorological Magazine*, 60 (1925), p. 262.

ground in many parts of the country, the average depth at Biggin Hill being 8 in., and at Oxford, Hampstead, and Rothamsted, about 3 in. on the 2nd. On the same day a screen minimum of 15° F. was recorded at Eskdalemuir, and a grass minimum of 10° F. at Renfrew. Fresh to strong SW winds veering NW prevailed on the 3rd and 4th, but by the 6th anticyclonic conditions were established and persisted over the greater part of the country until about the 19th. During this period much mist or fog prevailed, particularly from the 11th to 17th, and was especially persistent in the eastern districts of England and in the English Channel. Little or no rain occurred from the 7th to 19th except in the western and north-western districts which came occasionally under the influence of the depression centred near Iceland. Temperature was low from the 8th to 13th, on the 12th the maximum at Leafield was as low as 27°F., and at Birmingham, Hereford and Oundle as low as 29° F., while screen minima below 20° F. were registered at a few places, the lowest 13° F. occurring at West Witton on the 13th. From the 19th onwards conditions became mild and unsettled with rain at times but with some fair colder periods. Hail was reported at several places on the 23rd and snow occurred at Shaftesbury (Dorset) on the 23rd and 24th. The rainfall was heavy locally, 68 mm. (2·67 in.) being recorded at Carnarvon on the 27th. On the 22nd a depression centred off the west of Ireland caused strong winds and gales in the western part of the English Channel, Scilly recording force 9 (49 m.p.h.) at 2h. on the 23rd. Gales were also experienced in the southern part of the country from the 26th to 28th when force 9 was reached at Plymouth (Cattewater) and Falmouth (Pendennis) on the night of the 26th to 27th. The total rainfall for the month varied considerably, being more than twice the normal at many stations in the southern and eastern districts of England and as little as 19 per cent. of the normal at Braemar.

Pressure was above normal over western Europe, the Azores and Bermuda, the excess being as much as 5·5 mb. at Skagen, 5·3 mb. at Bermuda, and 5·2 mb. at Vardo, and below normal over the greater part of the North Atlantic, western Iceland, Greenland and Spitsbergen, the greatest deficit being 5·6 mb. at 50° N, 30° W. Temperature and rainfall were generally above normal except in central Europe where the temperature was a little below normal. In western Svealand the precipitation was twice the normal.

Cold weather was reported from many parts of France about the 10th, with much snow on the Vosges and the western Pyrenees. The temperature fell to 14° F. at Remirecourt, Vosges on the 10th, and the Lake of Annecy was partially frozen over. At the same time much damage was done in the central regions of Corsica by a violent storm followed by a heavy fall of snow.

It is reported that this is the first time on record that avalanches have occurred in Corsica. Eighteen people were killed by the avalanches. Intense cold accompanied by a heavy fall of snow occurred in Constantinople on the 11th and 12th during which time storms made navigation on the Black Sea difficult. After the long cold spell heavy rain fell in Switzerland on the 22nd and 23rd. The Föhn wind began to blow on the 25th and the warmer weather and rain continued until after the 28th, except in the Engadine. Another landslide occurred at Roquebillière on the 26th destroying still further the village which partially disappeared last November.

As the result of the heavy snowfall in North Japan all communications were suspended about the 15th in the Niigata province, where 62 people were killed and 29 are missing. Heavy rains fell in the Malay States causing serious landslides at the beginning of the month.

A cyclone accompanied by very heavy rain struck the northern districts of Queensland at 11 p.m. on the 9th. The rivers overflowed their banks and whole townships were under water. Forty people were drowned. The flood waters did not abate until after the 15th. A sudden change from northerly to southerly winds with a fall of temperature checked, on the 13th, the bush fires which threatened to lay waste large areas in Victoria.

A storm swept the Pacific coast states of America on the 14th and 15th, and the distress and damage in southern California were intensified by the fact that heavy rain and strong winds continued for four days. Road and railway bridges were washed away in the Los Angelos and San Diego districts and large areas flooded. A tornado struck several places in Louisiana and Mississippi on the 17th, and on the 20th a gale coming from the Atlantic passed along the eastern coastal districts. The high tide, made higher by the gale, flooded several of the towns. Sixty-nine people were killed as a result of the three storms.

The special message from Brazil states that the rainfall in the northern and southern districts was very scarce, being 52 mm. and 68 mm. below normal respectively, while in the central districts it was abundant, with 80 mm. above normal. The distribution of pressure was abnormal. The coffee, cotton, and cane crops were in good condition. At Rio de Janeiro pressure was 0·1 mb. below normal and temperature 0·2° F. below normal.

Rainfall, February, 1927—General Distribution

England and Wales ..	134	per cent. of the average 1881-1915.
Scotland	67	
Ireland	88	
British Isles	108	

Rainfall: February, 1927: England and Wales

CO.	STATION.	In.	mm.	Per-cent. of Av.	CO.	STATION.	In.	mm.	Per-cent. of Av.
Lond.	Camden Square	3·34	85	200	*War.*	Birminghm, Edgbaston	2·89	73	171
Sur.	Reigate, The Knowle	4·68	119	228	*Leics*	Thornton Reservoir	2·06	52	123
Kent.	Tenterden, Ashenden	3·83	97	195	,,	Belvoir Castle	2·00	51	120
,,	Folkestone, Boro. San.	4·10	104	...	*Rut.*	Ridlington	2·32	59	...
,,	Margate, Cliftonville	2·84	72	206	*Linc.*	Boston, Skirbeck	2·20	56	151
,,	Sevenoaks, Speldhurst.	4·77	121	...	,,	Lincoln, Sessions House	1·39	35	96
Sus.	Patching Farm	4·22	107	191	,,	Skegness, Marine Gdns.	1·90	48	124
,,	Brighton, Old Steyne	3·26	83	160	,,	Louth, Westgate	1·87	47	97
,,	Tottingworth Park	4·40	112	187	,,	Brigg	1·60	41	93
Hants	Ventnor, Roy. Nat. Hos.	3·87	98	184	*Notts.*	Worksop, Hodsock	...	...	...
,,	Fordingbridge, Oaklnds	4·26	108	171	*Derby*	Mickleover, Clyde Ho.	1·46	37	88
,,	Ovington Rectory	5·36	136	206	,,	Buxton, Devon. Hos.	2·63	67	70
,,	Sherborne St. John	4·44	113	202	*Ches.*	Runcorn, Weston Pt.	1·19	30	64
Berks	Wellington College	3·81	97	202	,,	Nantwich, Dorfold Hall	1·42	36	...
,,	Newbury, Greenham	4·28	109	195	*Lancs*	Manchester, Whit. Pk.	1·41	36	73
Herts.	Benington House	...	...	...	,,	Stonyhurst College	2·07	53	62
Bucks	High Wycombe	4·26	108	230	,,	Southport, Hesketh Pk	1·91	49	91
Oxf.	Oxford, Mag. College	3·98	101	252	,,	Lancaster, Strathspey.	2·94	75	...
Nor.	Pitsford, Sedgebrook	3·02	77	181	*Yorks*	Wath-upon-Dearne	·99	25	60
,,	Oundle	1·86	47	...	,,	Bradford, Lister Pk.	1·58	40	68
Beds.	Woburn, Crawley Mill.	2·87	73	194	,,	Oughtershaw Hall	4·20	107	...
Cam.	Cambridge, Bot. Gdns.	2·73	69	213	,,	Wetherby, Ribston H.	·88	22	51
Essex	Chelmsford, CountyLab	3·42	87	231	,,	Hull, Pearson Park	1·25	32	75
,,	Lexden, Hill House	3·01	76	...	,,	Holme-on-Spalding	1·46	37	...
Suff.	Hawkedon Rectory	3·05	77	200	,,	West Witton, Ivy Ho.	1·50	38	...
,,	Haughley House	2·15	55	...	,,	Felixkirk, Mt. St. John	1·29	33	...
Norf.	Beccles, Geldeston	1·98	50	145	,,	Pickering, Hungate	1·45	37	...
,,	Norwich, Eaton	2·11	54	129	,,	Scarborough	1·15	29	68
,,	Blakeney	2·10	53	142	,,	Middlesbrough	·56	14	43
,,	Swaffham	2·15	55	137	,,	Baldersdale, Hury Res.	1·23	31	...
Wilts.	Devizes, Highclere	4·37	111	220	*Durh.*	Ushaw College	·85	22	53
,,	Bishops Cannings	3·68	93	174	*Nor.*	Newcastle, Town Moor.	·60	15	38
Dor.	Evershot, Melbury Ho.	4·45	113	142	,,	Bellingham, Highgreen	1·28	33	...
,,	Creech Grange	3·46	88	...	,,	Lilburn Tower Gdns.	·76	19	...
,,	Shaftesbury, Abbey Ho.	3·79	96	164	*Cumb*	Geltsdale	1·29	33	...
Devon	Plymouth, The Hoe	3·21	81	108	,,	Carlisle, Scaleby Hall	1·74	44	78
,,	Polapit Tamar	3·68	93	115	,,	Seathwaite M.	12·11	308	102
,,	Ashburton, Druid Ho.	5·10	130	108	*Glam.*	Cardiff, Ely P. Stn.	3·57	91	119
,,	Cullompton	4·38	111	157	,,	Treherbert, Tynywaun	7·40	188	...
,,	Sidmouth, Sidmount	2·79	71	112	*Carm*	Carmarthen Friary	3·56	90	96
,,	Filleigh, Castle Hill	4·25	108	...	,,	Llanwrda, Dolaucothy.	5·25	133	120
,,	Barnstaple, N. Dev. Ath.	3·38	86	125	*Pemb*	Haverfordwest, School	3·76	96	108
Corn.	Redruth, Trewirgie	3·45	88	91	*Card.*	Gogerddan	3·97	101	125
,,	Penzance, Morrab Gdn.	2·91	74	87	,,	Cardigan, County Sch.	3·21	82	...
,,	St. Austell, Trevarna	3·73	95	97	*Brec.*	Crickhowell, Talymaes	4·60	117	...
Soms	Chewton Mendip	4·80	122	142	*Rad.*	Birm. W. W. Tyrmynydd	5·82	148	111
,,	Street, Hind Hayes	3·29	84	...	*Mont.*	Lake Vyrnwy	4·08	104	90
Glos.	Clifton College	3·44	87	146	*Denb.*	Llangynhafal	2·09	53	...
,,	Cirencester, Gwynfa	4·00	102	172	*Mer.*	Dolgelly, Bryntirion	5·25	133	118
Here.	Ross, Birchlea	3·17	81	158	*Carn.*	Llandudno	1·50	38	72
,,	Ledbury, Underdown.	2·83	72	156	,,	Snowdon, L. Llydaw 9	11·73	298	...
Salop	Church Stretton	3·16	80	144	*Ang.*	Holyhead, Salt Island.	2·91	74	119
,,	Shifnal, Hatton Grange	1·62	41	100	,,	Lligwy	2·28	58	...
Staff.	Tean, The Heath Ho.	...	...	...	*Isle of Man*				
Worc.	Ombersley, Holt Lock.	2·51	64	153		Douglas, Boro' Cem.	2·71	69	85
,,	Blockley, Upton Wold.	3·27	83	144	*Guernsey*				
War.	Farnborough	3·69	94	179		St. Peter P't, Grange Rd	2·06	52	84

Rainfall: February, 1927: Scotland and Ireland

CO.	STATION	In.	mm.	Per-cent. of Av.	CO.	STATION.	In.	mm.	Per-cent. of Av.
Wigt.	Stoneykirk, Ardwell Ho	2·13	54	81	*Suth.*	Loch More, Achfary...	2·66	68	40
,,	Pt. William, Monreith.	2·66	68	...	*Caith*	Wick	1·98	50	87
Kirk.	Carsphairn, Shiel.	4·84	123	...	*Ork*	Pomona, Deerness	2·19	56	73
,,	Dumfries, Cargen.....	3·21	82	83	*Shet.*	Lerwick	3·22	82	102
Roxb	Branxholme	1·07	27	41		————			
Selk.	Ettrick Manse.........	2·52	64	...	*Cork.*	Caheragh Rectory	3·47	88	...
Berk.	Marchmont House	1·03	26	50	,,	Dunmanway Rectory.	3·31	84	57
Hadd	North Berwick Res....	·98	25	63	,,	Ballinacurra	3·11	79	83
Midl	Edinburgh, Roy. Obs..	1·05	27	66	,,	Glanmire, Lota Lo. ...	3·01	76	76
Lan.	Biggar	...	..	...	*Kerry*	Valentia Obsy.	4·02	102	77
,,	Leadhills	3·43	87	...	,,	Killarney Asylum.....	2·96	75	57
Ayr.	Kilmarnock, Agric. C..	2·23	57	78	,,	Darrynane Abbey	3·38	86	73
,,	Girvan, Pinmore.......	2·78	71	65	*Wat.*	Waterford, Brook Lo..	1·74	44	53
Renf.	Glasgow, Queen's Pk..	1·97	50	67	*Tip.*	Nenagh, Cas. Lough...	2·55	65	82
,,	Greenock, Prospect H..	4·25	108	76	,,	Roscrea, Timoney Park	3·79	96	...
Bute.	Rothesay, Ardencraig.	3·20	81	80	,,	Cashel, Ballinamona ..	3·02	77	94
,,	Dougarie Lodge	2·59	66	...	*Lim.*	Foynes, Coolnanes	3 09	79	97
Arg.	Ardgour House	6·73	171	...	,,	Castleconnell Rec.	2·75	70	...
,,	Manse of Glenorchy..	4·51	115	...	*Clare*	Inagh, Mount Callan ..	3·71	94	...
,,	Oban	3·62	92	...	,,	Broadford, Hurdlest'n.	3·11	79	...
,,	Poltalloch	4·00	102	93	*Wexf*	Newtownbarry	3·49	89	...
,,	Inveraray Castle......	7·05	179	104	,,	Gorey, Courtown Ho...	2·69	68	96
,,	Islay, Eallabus.......	3·51	89	84	*Kilk.*	Kilkenny Castle	2 51	64	99
,,	Mull, Benmore	9·40	239	...	*Wic.*	Rathnew, Clonmannon	2·73	69	...
Kinr.	Loch Leven Sluice	1·79	45	63	*Carl.*	Hacketstown Rectory.	4·85	123	162
Perth	Loch Dhu	5·80	147	78	*QCo.*	Blandsfort House.....	3·49	89	130
,,	Balquhidder, Stronvar.	2·43	62	...	,,	Mountmellick	3 34	85	...
,,	Crieff, Strathearn Hyd.	2·15	55	61	*KCo.*	Birr Castle...........	2·43	62	106
,,	Blair Castle Gardens ..	1·26	32	45	*Dubl.*	Dublin, FitzWm. Sq...	2·49	63	132
,,	Coupar Angus School..	...	..	...	,,	Balbriggan, Ardgillan.	2·67	68	136
Forf.	Dundee, E. Necropolis.	1·31	33	70	*Me'th*	Beauparc, St. Cloud ..	2·54	65	...
,,	Pearsie House........	1·85	47	...	,,	Kells, Headfort......	2·79	71	103
,,	Montrose, Sunnyside..	1·56	40	85	*W.M*	Moate, Coolatore.....	...	..	...
Aber.	Braemar, Bank	...	..	...	,,	Mullingar, Belvedere.	3·19	81	115
,,	Logie Coldstone Sch. ..	1·17	30	56	*Long*	Castle Forbes Gdns....	2·99	76	105
,,	Aberdeen, King's Coll..	1·83	47	89	*Gal.*	Ballynahinch Castle ..	6·15	156	120
,,	Fyvie Castle	1·10	28	...	,,	Galway, Grammar Sch.	2·75	70	...
Mor.	Gordon Castle........	1·20	30	63	*Mayo*	Mallaranny..........	5·48	139	...
,,	Grantown-on-Spey....	·76	19	36	,,	Westport House......	3·21	82	81
Na.	Nairn, Delnies........	·99	25	55	,,	Delphi Lodge	8·29	211	...
Inv.	Ben Alder Lodge	...	..	...	*Sligo*	Markree Obsy.	2·70	69	77
,,	Kingussie, The Birches	·94	24	...	*Cav'n*	Belturbet, Cloverhill..	1·70	43	65
,,	Loch Quoich, Loan....	...	..	...	*Ferm*	Enniskillen, Portora ..	2·64	67	...
,,	Glenquoich	...	..	...	*Arm.*	Armagh Obsy.	1·40	36	66
,,	Inverness, Culduthel R.	·94	24	...	*Down*	Fofanny Reservoir ...	5·84	148	...
,,	Arisaig, Faire-na-Squir	2·94	75	...	,,	Seaforde	3·07	78	101
,,	Fort William.........	4·14	105	55	,,	Donaghadee, C. Stn...	1·89	48	82
,,	Skye, Dunvegan......	4·52	115	...	,,	Banbridge, Milltown.	1·35	34	65
,,	Barra, Castlebay	1·72	44	...	*Antr.*	Belfast, Cavehill Rd.	1·69	43	...
R&C	Alness, Ardross Cas. ..	...	..	...	,,	Glenarm Castle.......	2·65	67	...
,,	Ullapool.............	1·53	39	...	,,	Ballymena, Harryville	1·93	49	60
,,	Torridon, Bendamph..	3·53	90	45	*Lon.*	Londonderry, Creggan	2·12	54	66
,,	Achnashellach	3·20	81	...	*Tyr.*	Donaghmore	2·40	61	...
,,	Stornoway	2·13	54	48	,,	Omagh, Edenfel	2 06	52	69
Suth.	Lairg	1·90	48	...	*Don.*	Malin Head	1·60	41	66
,,	Tongue Manse.......	1·25	32	36	,,	Dunfanaghy	2·21	56	62
,,	Melvich School.......	1·74	44	58	,,	Killybegs, Rockmount.	4·38	111	88

Climatological Table for the British Empire, September, 1926

STATIONS	PRESSURE: Mean of Day M.S.L.	PRESSURE: Diff from Normal	TEMPERATURE: Absolute Max.	TEMPERATURE: Absolute Min.	TEMPERATURE: Mean Values Max.	TEMPERATURE: Mean Values Min.	TEMPERATURE: Mean Values ½ max. and min.	TEMPERATURE: Mean Values Diff. from Normal	TEMPERATURE: Mean Wet Bulb.	Relative Humidity	Mean Cloud Am'nt	PRECIPITATION: Am'nt	PRECIPITATION: Diff. from Normal	PRECIPITATION: Days	BRIGHT SUNSHINE: Hours per day	BRIGHT SUNSHINE: Percentage of possible.
	mb.	mb.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	%	0—10	mm.	mm.			
London, Kew Obsy.	1019·6	+ 2·2	84	39	68·0	52·5	60·3	+ 3·2	53·9	92	7·1	37	− 11	10	4·3	34
Gibraltar	1018·0	+ 0·7	89	64	79·6	69·8	74·7	+ 2·2	67·9	82	5.1	2	− 33	2	...	...
Malta	1018·6	+ 1·7	88	61	81·4	71·9	76·7	+ 0·7	71·6	85	3·4	28	− 4	3	9·2	74
St. Helena	1014·8	+ 1·5	61	50	57·7	53·2	55·5	− 2·4	53·9	95	4·3	69	− 8	23	...	...
Sierra Leone	1012·6	+ 0·4	89	69	85·4	72·5	78·9	− 0·2	75·0	86	7·5	644	− 79	25	...	...
Lagos, Nigeria	1010·9	− 1·9	84	71	82·1	73·4	77·7	− 0·7	74·7	86	8·4	281	+147	18	...	...
Kaduna, Nigeria	1013·9	+ 1·1	89	62	86·1	66·6	76·3	+ 1·0	70·8	78	1·9	348	+ 56	24	...	...
Zomba, Nyasaland	1019·2	− 0·7	90	50	84·0	58·6	71·3	+ 1·9	...	55	2·0	0	− 8	0	...	...
Salisbury, Rhodesia	1011·9	− 1·5	89	41	82·3	53·9	68·1	+ 1·7	56·0	42	0·8	0	− 7	0	9·0	75
Cape Town	1020·2	+ 1·1	81	42	65·5	48·6	57·1	− 0·8	51·5	83	5·0	46	− 12	10	...	...
Johannesburg	1016·6	− 1·0	81	36	70·4	47·4	58·9	− 0·5	47·4	48	2·1	19	− 5	1	9·3	78
Mauritius	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bloemfontein	...	...	89	27	73·5	40·1	56·8	− 2·3	84·6	47	2·7	17	− 6	5	...	...
Calcutta, Alipore Obsy.	1004·2	− 0·3	94	76	89·0	79·1	84·1	+ 1·1	79·6	89	7·8	155	− 96	12*	...	...
Bombay	1006·4	− 1·6	88	75	85·5	77·7	81·6	+ 0·8	77·1	87	6·6	228	− 43	13*	...	...
Madras	1006·0	− 0·5	99	71	93·6	77·0	85·3	+ 0·2	77·3	77	7·6	43	− 84	5*	...	...
Colombo, Ceylon	1009·0	− 1·0	88	73	86·1	77·0	81·5	+ 0·6	78·0	77	8·3	240	+ 91	19	5·1	42
Hongkong	1007·7	− 0·7	92	74	86·4	77·6	82·0	+ 1·0	77·3	77	6·3	439	+185	17	7·1	58
Sandakan	...	...	91	73	87·8	74·9	81·3	− 0·4	76·5	85	...	277	+ 38	17	...	...
Sydney	1020·7	+ 4·7	85	44	68·6	50·9	59·7	+ 0·5	54·4	63	4·1	41	− 32	6	7·6	64
Melbourne	1020·2	+ 4·4	84	37	65·9	47·8	56·9	+ 2·8	51·8	67	5·6	29	− 32	14	5·7	48
Adelaide	1020·0	+ 2·7	88	41	69·2	50·5	59·9	+ 2·8	53·0	61	6·1	61	+ 9	13	6·6	56
Perth, W. Australia	1018·0	+ 0·1	85	43	68·0	49·9	58·9	+ 0·6	55·1	68	4·6	99	+ 14	17	7·5	64
Coolgardie	1017·6	+ 0·5	89	35	74·7	47·7	61·2	+ 2·6	50·2	39	2·1	20	+ 5	5	...	...
Brisbane	1021·5	+ 4·2	86	49	74·4	55·3	64·9	− 0·4	59·1	60	4·3	61	+ 9	12	8·1	68
Hobart, Tasmania	1016·8	+ 6·1	82	31	59·3	44·6	51·9	+ 1·1	46·3	65	7·1	47	− 7	17	5·3	45
Wellington, N.Z.	1014·8	+ 0·2	65	32	57·9	45·8	51·9	+ 0·3	48·7	68	5·4	49	− 52	14	5·1	43
Suva, Fiji	1014·9	+ 0·6	86	63	79·4	69·9	74·7	+ 0·2	71·4	84	8·7	345	+168	21	2·9	24
Apia, Samoa	1012·9	+ 0·8	88	71	85·0	74·4	79·7	+ 1·5	76·5	77	5·0	84	− 46	11	7·8	65
Kingston, Jamaica	1011·5	− 0·7	92	69	88·0	73·0	80·5	− 1·0	72·5	87	5·3	74	− 30	8	6·4	52
Grenada, W.I.	1012·1	+ 0·4	92	70	86·9	76·0	81·5	+ 1·3	77·8	81	6·4	187	− 23	17	...	...
Toronto	1018·9	+ 1·1	80	36	66·8	51·2	59·0	− 0·2	53·8	85	6·9	145	+ 64	12	4·8	38
Winnipeg	1015·7	+ 0·9	79	26	60·1	42·8	51·5	− 1·9	...	...	6·7	96	+ 38	13	5·3	42
St. John, N.B	1020·0	+ 2·5	74	38	62·1	47·5	54·8	− 1·1	50·9	79	5·5	64	− 31	11	6·6	52
Victoria, B.C.	1015·8	− 0·7	77	40	64·4	48·5	56·5	+ 0·9	51·7	70	4·1	23	− 28	7	8·4	66

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