M.O. 294.

The Meteorological Magazine

Air Ministry :: Meteorological Office

Vol. 62

April 1927

No. 735

LONDON : PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE

To be purchased directly from H.M. STATIONERY OFFICE at the following addresses: ADASTRAL HOUSE, KINGSWAY, LONDON, W.C.2; 120, GEORGE STREET, EDINBURGH; YORK STREET, MANCHESTER; 1, ST. ANDREW'S CRESCENT, CARDIFF; 15, DONEGALL SQUARE WEST, BELFAST; or through any Bookseller.

"The Circulation of Air in Stevenson Screens as shown by Corrosion"

By J. C. HUDSON, M.Sc., D.I.C., A.R.C.S.

These experiments are part of a research on which the author is engaged for the Atmospheric Corrosion Committee of the British Non-Ferrous Metals Research Association. The object of the investigation is to compare the effects of atmospheric exposure, under widely different climatic conditions, on typical non-ferrous materials, and one of the quantitative tests proposed for this purpose is based on a determination of the increase in weight brought about by the reaction of the metals with the atmosphere. This method, introduced by Vernon, has been extensively applied by him to the study of tarnish films in indoor atmospheres* but it is not suitable for complete exposure tests, since the rain falling on the specimens removes some of the corrosion product and vitiates the results. In order to avoid this difficulty, tests have been carried out on specimens sheltered in Stevenson Screens, which were recommended for the purpose on the grounds that uniform conditions of exposure would be obtained.

The results have shown that there is a surprising lack of uniformity in the conditions inside a Stevenson Screen with respect to corrosion. It has been found that the extent to which

* W. H. J. VERNON. *London, Trans. Faraday Soc.* 19 (1923) *p.* 839; 23 (1927) *p.* 113; *London, J. Chem. Soc.* 129 (1926) *p.* 2273.

Wt 69—P 1 1000 4/27 M & C

a specimen is corroded largely depends on its position ; thus there is a progressive diminution in corrosion from the bottom to the top of the screen. The differences observed in the corrosion of similar specimens in different parts of the screen may amount to several hundred per cent. and are much too large to permit of the use of Stevenson Screens for comparative corrosion tests on individual specimens of different materials. It has been shown, however, that corrosion tests may be satisfactorily

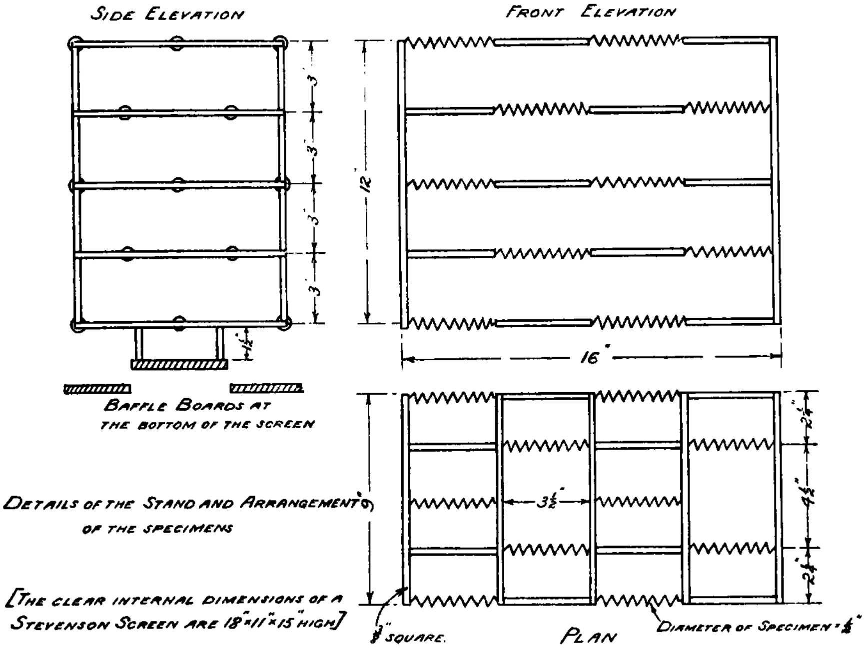


FIG. I.

conducted in a Stevenson Screen, if they are made, not on one, but on several specimens of each material, placed in positions so chosen that, however much the individual results may vary, the aggregate weight increments of each set of specimens are strictly comparable.

The connexion between corrosion and position in the screen was first observed during some experiments carried out on the roof of the Royal School of Mines at South Kensington but the experiments were repeated at the Royal Botanic Gardens, Regent's Park, in order to ensure that the observations were not purely the effect of local conditions. The method of investigation consisted in exposing fifty copper coils in known positions inside the screen ; the specimens were weighed before and after corrosion, and, by this means, a direct calibration of the interior of the screen with regard to corrosion was effected.

The specimens were 160 cm. lengths of 21 S.W.G. copper wire

(0·032 in.), wound into a coil on a half inch mandril. During exposure, the specimens were supported in five horizontal "layers" of ten on a light wooden frame, as shown in Fig. 1. The vertical distance between two layers was 3 in. and the lowest layer was 1½ in. above the baffle board at the bottom of the screen.

The results obtained are shown in Fig. 2, where the weight increments have been inserted in the positions that the specimens occupied on the stand. The weight increments are in milligrams and refer to 14 days' exposure at the Royal Botanic Gardens during the month of January. The large differences in the

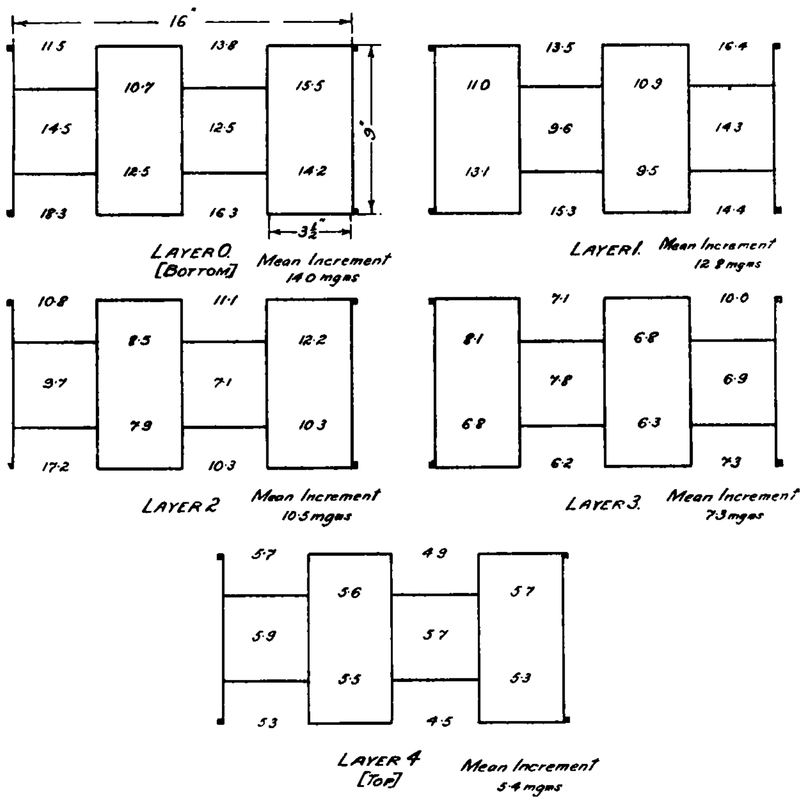


FIG. 2.

corrosion of specimens in different parts of the screen and the marked diminution in corrosion from the bottom upwards are very evident, both from the diagram and from the following table, in which the mean weight increment of the ten coils in each layer has been expressed as a percentage of the mean increment for the whole screen. Two series of figures are given in the table, which refer to 14 and 28 days' exposure respectively; for the second period of 14 days, the stand was replaced in the screen back to front. It will be seen that this reversal of the specimens has had no effect on the vertical distribution of the corrosion differences, but a more detailed study of the individual weight increments showed that the disparity between specimens in the same layer had been considerably reduced.

CORROSION IN EACH LAYER AS A PERCENTAGE OF THE MEAN VALUE FOR THE SCREEN.

Layer.	Distance from Bottom (in.)	Percentage Corrosion.	
		After 14 days.	After 28 days.
0	1.5	140	136
1	4.5	128	128
2	7.5	105	106
3	10.5	73	70
4	13.5	54	54

The observed differences are too large to be attributed to any mutual protection on the part of the specimens and an explanation may perhaps be found in the fact that the quantity of air flowing over the specimens varies in different parts of the screen. It seems probable that the greater part of the air circulates through the relatively large channels between the baffle boards at the bottom ; if so, the amount of air passing over the specimens will steadily diminish towards the top of the screen and, since the greatest corrosion will undoubtedly be associated with the greatest circulation of air, this will account for the greater corrosion at the bottom. It may be added that this view is confirmed by an examination of the soot deposit on the inner walls of the screen, which also diminishes from the bottom upwards, and it is interesting to note that, in some experiments, definite differences were found in the corrosion at the back and the front of the screen, which were probably due to the direction of the prevailing winds.

There seems to be little doubt, as a result of the corrosion tests, that the conditions inside a Stevenson Screen are not uniform and may vary within much wider limits than has hitherto been realised. Further, it is possible that the differences may not be confined to corrosion. How far this lack of uniformity may affect the observations of temperature, humidity and the other physical measurements, made inside the screen, is a matter for meteorologists to decide.

The author understands that trouble is sometimes experienced from the corrosion of instruments placed in Stevenson Screens. The results of these experiments seem to show that, in some cases, corrosion might be reduced by moving the instruments to a more favourable position. If any alteration in the screen were contemplated, attention might be paid with advantage to the bottom, for it is probable that a reduction in the distance between the baffle boards would diminish the corrosion to an appreciable extent ; the limiting distance would, of course, be determined by the necessity of non-interference with the meteorological functions of the screen and would be a matter for experiment.

As regards the composition of the metallic parts of the instruments, it is probable that the most suitable material will depend on the climate. In a London atmosphere, copper, aluminium and phosphor bronze are definitely superior to most of the other non-ferrous materials, *when exposed in a Stevenson Screen.* The use of perforated metal shields to protect the instruments might be of value ; perhaps copper would be the best material for this purpose, since its corrosion products are relatively non-hygroscopic, whilst, in the case of zinc or brass, copious condensation would occur, which might easily do more harm than good.

The author is indebted to the Council of the British Non-Ferrous Metals Research Association for permission to publish this paper and to his colleague, Dr. W. H. J. Vernon, for much valuable assistance and advice. He would also like to acknowledge his indebtedness to the Director and several members of the staff of the Meteorological Office for their kindness in granting facilities and supplying meteorological data.

The Detonating Meteor of February 25th, 1927

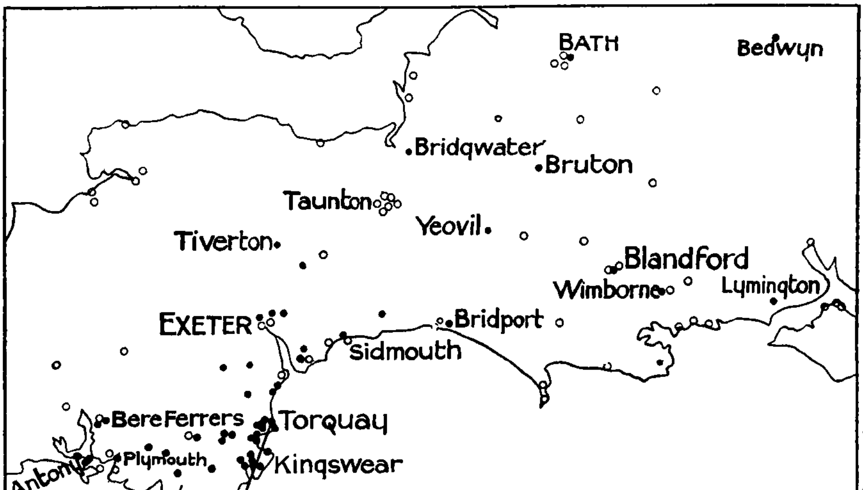
By F. J. W. Whipple, M.A., F.Inst.P.

The brilliant meteor which appeared a few minutes before midnight on February 25th was seen over a large area, including London, the southern and south midland counties of England and south Wales. The first accounts which were published in the London papers came from Herefordshire, where the meteor was not heard, and it was not until ten days later that I learned that there had been detonations audible in Devonshire and elsewhere. A request for further information was then circulated in the newspapers. With the aid of the reports received in response to this request and of information kindly placed at my disposal by Mr. Denning I have been able to prepare a map of the region of audibility.

The final determination of the track of the meteor has not yet been made. The line shown on the map from 14 miles south of Salcombe to Torquay is certainly not much wrong. There is, however, considerable doubt as to the height of the track above ground and it is not safe to give any numerical estimate at present. The inclination of the track to the horizon was about 40°.

The meteor was very brilliant. Mr. Denning summarizes the observations thus: "Suddenly the sky was illuminated with dazzling effect and observers saw a ball of fire slowly traversing a short path, vanishing amid a rain of sparks and with a second outburst of light perhaps equal to the first. . . . Some people estimated the size of the meteor's incandescent head as equal to that of the full moon but all are agreed that its brilliancy greatly exceeded that of our satellite." Of course the illumination was not so strong at great distances. Nevertheless, to an observer as far away as Chatham, nearly 200 miles from Torquay, it was the finest sight he had ever seen in the heavens.

The accounts of the audibility of the meteor are interesting. In several cases the observer thought that he heard a rushing



THE METEOR of FEBRUARY 25th 1927.

The track is shown by the Arrow
AUDIBILITY BY DOTS
INAUDIBILITY BY O's (Reported by Observers who saw the Meteor)

sound whilst the meteor was in sight; numerous observers report that they heard a sound like thunder within a few seconds and it is difficult to decide whether this was an illusion or merely a bad estimate of the time. Unfortunately this difficulty occurs with some of the most interesting records. One is that of Mr. J. Foster who was sailing down the English Channel on the yacht Palatina and was about 10 miles S.E. by S. from the Eddystone Lighthouse. His report runs as follows: "The ship seemed as if she were suddenly put under the rays of a brilliant search-light . . . it travelled at great speed sloping down at an angle of about 45° in a N.N.W. direction lasting for a period of about 5 seconds. While travelling it slightly changed colour; starting white it changed to a pink and finally to a bluish tint;

the best description I can give is to liken its tail to that of a kite. About two or three seconds had elapsed after its disappearance when a slight rumbling noise was heard, one of the crew remarking about it having exploded." Another observer on board the yacht considers that "the noise which resembled distant thunder started quite fifteen seconds after the meteor burst." Yet the nearest point of the meteor's track through the air must have been nearly 40 miles away, so that we should have expected an interval of four or five minutes. Again, the signalman on duty at Bedwyn Signal Box, near Hungerford, saw the meteor and "a few seconds after this heard a noise like thunder at a distance and this disturbed the pheasants in the woods." In both these cases I am inclined to accept the evidence of audibility and ignore the difficulty about the time. Another difficult case is presented by a letter from Portland : " A second or two after I saw the meteor, I and another person who was with me at the time, distinctly heard a report or noise which sounded somewhat like the distant banging of a door." This observation I have not ventured to show on the map.

Most of the accounts of audibility compare the noise to thunder: at Torquay, one observer thought the sound was like the firing of a single cylinder engine ; another says that all observers agree that the roar that followed was subterranean and another states that it was " like the noise that follows shot firing under ground." His curious sensation is described thus by an observer at Paignton: " A rumbling started, it seemed away over the other side of Torquay and came right over us and yet it seemed as if it were through us." At Modbury the sound was thought to come from an earthquake.

At Babbacombe, just north of Torquay, it was estimated that the noise lasted three minutes, and at Teignmouth, the " rumbling seemed as if it might be thousands of drums rolling directly over our heads . . . lasted for quite a minute or two." At Kingswear, there were "a number of loud detonations, which, whilst being distinctly separate, followed one another so quickly as to resemble the abnormally loud rumbling of thunder."

As will be seen from the map the principal area in which the noise was generally audible is well defined. It is bounded on the west by a line from Tiverton, through Exeter and Totnes to Bere Ferrers and thence to Antony, a little west of Plymouth. To the north-east of the end of the track the sounds were heard at Exmouth, Sidmouth, and Colyton, and near Bridport, though a second observer at Sidmouth, two at Budleigh Salterton, and two at Charmouth, heard nothing. Antony and Torpoint are the only places in Cornwall from which there are positive reports, and the sound did not reach the north of Devonshire. There is definite negative evidence from five observers at Taunton, but at Bridgwater one observer reported a rumbling sound.

To the east we have observations at Lymington, where two observers, husband and wife, both heard a distant rumble. This is the more remarkable as no sound was heard by observers at Cowes, Boscombe, and Southampton. In the same direction a lady at Witchampton, Wimborne, heard distant noises—short sharp detonations—" such as one associates with night firing at sea," but another observer at Wimborne says: " there was no detonation whatever." From Blandford there are two negative reports, but a good positive one. " After the space of about 1½ minutes in the far distance I heard a succession of ' booms ' about four or five in number. It did not sound like thunder but something like a number of guns being fired a great way off. The booms followed each other quickly."

From Lower Odcombe, near Yeovil, we have a report: " almost immediately I heard a noise very much like thunder and a few seconds after that my bed shook so violently I thought someone was in the room shaking it "; and from Bruton, Somerset, we learn of a chauffeur who " heard three distinct explosions. The first woke him up, then two others followed quickly . . . Immediately after the explosions there was a distinct vibration which caused the window in his bedroom to rattle."

It is remarkable that the scattered observations all come from the north-east of the meteor's track. There are no comparable ones from the north of Devonshire, or from Cornwall or Wales. The suggestion of an earthquake at Yeovil and Bruton is of peculiar interest. It looks as if a powerful air-wave came to earth in a small area about 60 miles from the track of the meteor.

The most precise estimate of the interval between the sight and sound of the meteor was made by Mr. W. R. C. Atkins, at Antony, about 5 miles west of Plymouth. He writes: "between 3¼ and 3½ minutes later I heard a dull roar. The duration of the sound was roughly two seconds." It is a pity we have no precise knowledge of the height of the meteor's path to combine with this information. We may note, however, that the short duration of the sounds suggests that they proceeded from the meteor when it was high up in the atmosphere; the meteor was much broken up in the latter part of its career, and then sent out a succession of sound waves.

All the observations seem to be consistent with the ideas which I advocated in my article on the meteor of October 2nd, 1926, *i.e.*, the sounds are due to the waves caused by the meteor driving the air before it and the breaking up of the meteor is due to the centrifugal force generated by spin.

Our discussion has only been concerned with the last incident in the life of a meteor, but the question where meteors come from is of more general interest, and therefore, I want to add a few words about a remarkable theory recently published by Prof. R. Schwinner, of Graz.* The theory is based on the generalization that as no meteorites are found in any but the most recent geological formations† no meteorites can have fallen on the earth until quite recent times. How recent may be judged from the fact that men of the stone age, though they sought diligently for stones and found many varieties, appear not to have discovered any meteoric iron. Schwinner's hypothesis is that some 50,000 years ago the solar system reached a part of space occupied by a swarm of meteorites. We are still making our way through this swarm.

Estimates of the mass of the meteors lost in our atmosphere and of the meteorites which reach the ground are available. A mean value of 6,000 tons per annum is adopted. Making due allowance for the velocity of the solar system, Schwinner finds the average density of meteoric matter in the part of space we are traversing. On the assumption that we have reached the middle he finds the total mass of the meteoric matter to be about 2,000 times that of the earth.

To explain the origin of the meteor swarm, Schwinner postulates the explosion of a star or a large planet. This explosion may have taken place long before the solar system encountered the swarm. Whether cosmogonists will find the theory acceptable remains to be seen. Will they be able to explain why the unfortunate little star came to grief?

Bergen Daily Charts

By C. K. M. Douglas, B.A.

Since February 1st, 1927, the Geophysical Institute at Bergen has issued a special daily weather chart based on observations at 7h., covering the whole of Europe and the eastern Atlantic, and also Greenland and the Azores. In a circular issued at the commencement of the series, it is stated that the fundamental conceptions of the Norwegian meteorologists remain unaltered, and that recent progress has been concerned chiefly with indirect methods of distinguishing different masses of air, and of tracing fronts where they are not very obvious. The fundamental ideas include the division of the chart into areas covered by more or less homogeneous masses of air, separated by surfaces of discontinuity, or belts of steep horizontal temperature gradient. The latter present difficulties for cartographical purposes, but

* Gerlands Beiträge zur Geophysik 16 (1927) pp. 195–222.

† *cf* G. P. Merrill, Proc. Amer. Phil. Soc. 65, p. 119 (quoted in *Nature*, April 2, 1927, p. 508).

J. Bjerknes has recently come to the conclusion that the intermediate air is for the most part not a product of mixing, but consists of degenerate polar air, warmed dynamically by descending motion, in addition to the frequent warming over the sea.* If it is agreed that the line of discontinuity should be drawn at the boundary between the intermediate air and the warm mass of air, the problem of linking up the polar front is much simplified.

The Bergen charts contain all the ordinary features of synoptic charts, and in addition show the various fronts, warm fronts, cold fronts, and occlusions being marked in different colours, and also the associated rain areas. A new and valuable feature consists of descriptions of the different air masses, written in English. These descriptions naturally show considerable variety, and the large size of the maps allows them to be quite long when necessary. We can only refer here to the commonest types of description, which are usually quite brief, *e.g.*, Tropical Air, Genuine Polar Air, Maritime Polar Air, etc.

The following are the main characteristics of the most typical masses of air :—

(A) Tropical Air : used for currents originating in really low latitudes ; it is warm throughout the troposphere, with a stable lapse-rate in the lower layers ; stratus cloud, drizzle and sea fog frequent.

(B) Genuine Polar Air : air arriving directly from Arctic regions ; it is very cold at all heights in the troposphere, and becomes showery when crossing the sea.

(C) Maritime Polar Air : polar air which has crossed a long stretch of warm sea ; it is mild in winter in the lower layers, but has a high lapse-rate and is accompanied by showery weather. This appears to be the most frequently occurring type of air, at least in winter.

(D) Returning Maritime Polar Air : when polar air extends within the boundaries of a sub-tropical "high," it appears to spread into a relatively shallow layer and is also warmed up ; if it then moves north-east it resembles Tropical Air but is less warm, and is apt to have dry anti-cyclonic air above.

(E) Continental Air : superficially cold in winter, warm and dry in summer.

It may be mentioned that warm air is not necessarily "Tropical Air." The abnormally warm air over England about March 17th, when day temperatures rose to 60° F., was marked as " Returning Continental Air." There can be little doubt that the warmth on that occasion, and also on March 21st, when day temperature reached 65° F., was due primarily to descent in the anti-cyclone,

* *Meteorological Magazine* 61 (1926) p. 32.

aided by the warming of the surface layers by solar heating in France. Similar conditions some weeks earlier would have given cold foggy weather in the mornings, and locally all day.

Anyone desirous of really understanding Norwegian methods of forecasting would find these charts of great value. A 24-hour interval is rather long, but the numbering of the fronts enables them to be followed from day to day. The variety of weather conditions is so great that a knowledge of synoptic meteorology can only be obtained by following a long series of charts.

Royal Meteorological Society

The monthly meeting of the Society held on Wednesday evening, March 16th, at 49, Cromwell Road, with Sir Gilbert Walker, C.S.I., F.R.S., President, in the Chair, was devoted to the customary March lecture (The Symons Memorial Lecture).

Professor G. I. Taylor, F.R.S.—Turbulence.

Turbulence is a condition of motion in a stream of fluid which occurs when it flows past solid surfaces or when two layers of fluid flow over one another. Though the details of the motion are too complicated for mathematical analysis many things are known about the effect of turbulence on the condition of the atmosphere and about the mean values of quantities connected with turbulence.

The lecturer discussed the effect of turbulence in propagating heat and water vapour into the atmosphere and its connexion with the friction of the wind on the ground. Turbulence increases the diffusing power of air till it is 100,000 times as great as that of air at rest. In the case of tidal motions in the sea the analogous effect is so great that it is possible to prove that turbulence is responsible for the gradual slowing down of the earth's rotation, and consequent lengthening of the day which astronomers have been able to observe. Some observations of the details of turbulence show that eddying motion in the atmosphere is spread out equally in all directions in space. Records of a universally jointed wind vane were shown proving that at some height above the ground vertical and lateral components of eddying motion are equal.

The lecture was illustrated by an experiment showing the effect of stratification of density in preventing the formation of turbulence.

Errata

February, 1927—p. 24, line 24, *delete* "of 102 m.p.h. at Renfrew." Line 25, the gust of 92 m.p.h. at Pendennis was recorded in the early morning of the 29th.

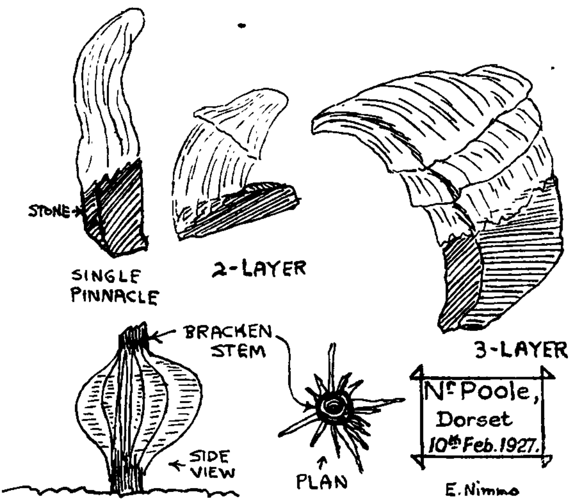
March, 1927, p. 34, line 26, *for* " 1·65 lines (ca. 0·15 in.) " *read* " 0·33 in."

Correspondence

To the Editor, *The Meteorological Magazine*

Ice Pinnacles

After I had read yesterday an article on ice pinnacles in an old number of the *Meteorological Magazine* (April, 1922, p. 71), my brother told me of some he had seen that day. These I inspected this morning and found there were certain differences from the description referred to in the magazine. The soil is sandy, not chalky, and the pinnacles were always on small flints. They showed very clearly the striation mentioned by Mr. Latchmore, but were not hollow, some were much curved and twisted and many showed two or even three distinct layers, as though they had been added to on successive days, and as we have had similar weather three days running this seems possible. Although there were thousands of stones apparently of the same nature and similarly set in the ground the pinnacles only appeared here and there.



I also observed a quite different form, on dead bracken stems. This was a series of roughly semi-circular plates attached to the stem by their diameters and radiating in all directions so that the plan view was like a many-armed star fish ; the " arms " were sometimes straight, sometimes bent or twisted and were all striated at right angles to the diameter of the semi-circle and to the stem. The phenomenon of pushing up crusts of earth, etc., by little ice columns was very common and widespread at the time.

Weather conditions :—

	Grass Min.	Max.	Wind.	
February 8th ..	27	36	NE to E	force 3—5
„ 9th ..	30	35	ENE	„ 2—3
„ 10th ..	27	—	ENE	„ 2

There has been no snow, rain or dew, and the grass is quite dry.

E. Nimmo.

Churley, Grange Road, Broadstone, Dorset. February 10th, 1927.

Frozen Raindrops

The following observation, which is new to me, may interest your readers. On February 13th, after a thick country mist, the trees were dripping heavily with moisture towards nightfall. During the night the temperature in the screen fell to 26°, and the next morning the ground was sprinkled with frozen raindrops, of the size of small hailstones, but transparent, not laminated nor milky in appearance.

F. R. WALTERS.

Pinecroft, Farnham, Surrey. February 17th, 1927.

Snow in the Isle of Wight

On Thursday morning, February 24th, at about 9.30, rain set in with a WSW wind and temperature 42° at Shanklin, Isle of Wight, and continued heavily until about 10.30 when it changed to sleet and wet snow, the temperature falling rapidly to 34° during the afternoon. I mention this because I see no reference to any sleet or snow anywhere that day in the south of England, only a snow shower at Eskdalemuir, in Scotland, and sleet at Birmingham. Can it be that the Isle of Wight had local sleet? Calshot and Southsea only had rain which is rather curious, especially as the Isle of Wight usually escapes these visitations when other south coast resorts have snow or sleet.

J. E. COWPER.

Public Schools Club, 61, Curzon Street, W 1, February 26th, 1927.

Rainfall in Devon

As February and March are two of the driest months of the year the rainfall for the first quarter of this year has been very remarkable. For the first three months the total was 22·37 in. January 9·78 in., February 5·39 in., March 7·20 in.

This station is 855 ft. above sea-level—the ground slopes, with minor undulations, to the English Channel, distant 19 miles—off Plymouth Sound. Two or three miles to the east and north-east the land is from 1,500 to 1,900 ft. high, to the north-west 1,160 ft.

H. K. G. ROGERS.

Seaforde, Mary Tavy, S. Devon. April 1st, 1927.

February Filldyke

The name "Filldyke" applied to February is unfortunate, as it induces those who are unacquainted with the facts to assume that February is a wet month, which of course it is not.

Is there no other explanation for the saying? Can it not have arisen from the melting of the snow filling the dykes, in an already saturated soil? Or may it not possibly refer to the usual filling the dyke, for irrigating the meadows, by farmers, as is customary in that month? According to the reports in the papers the rainfall of February was this year double the average. Surely they refer to London and southeast England and that should be stated. Here with no rain at all from the 8th to the 18th (both inclusive) and a total fall only about $\frac{1}{3}$ in. above average, February was by no means a wet month, many days were brilliantly sunny, and it was a vast improvement on February, 1926.

CHARLES P. HOOKER.

Wyeland House, Hereford, March 4th, 1927.

[The area with double the normal rainfall for February included only the eastern half of the Thames Valley. South of a line from Dolgelly to the Wash the rainfall exceeded normal, north of that line it decreased to about 50 per cent. in Durham. For further details see table on p. 50.—ED. *M.M.*]

NOTES AND QUERIES

Old Fashioned Winters

In connexion with the article by Mr. M. T. Spence on "Old Fashioned Winters" in the *Meteorological Magazine* for January, 1927, the following quotation may not be without interest, since it indicates that the question is by no means new. "We have one of the old fashioned winters, snow and frost, not fulfilling the word of those who were quite sure the seasons were altered." The quotation is taken from *The Weather Calendar*, arranged by Mrs. Henry Head, where it is credited to a letter written by Edward Fitzgerald at Bradfield Rectory on December 27th, 1853.

J.G.

Cloudburst Cavities

In the *Meteorological Magazine* for October, 1924, p. 214, details were given of a cavity found in a field at Cannington, after unprecedented heavy rainfall, when 9·40 inches was recorded for the rainfall day of August 18th, 1924. An investigation showed that there had been little washing away of the top layer of soil, and that the cavity had been caused by a subsidence.

While inspecting some rain-gauges on the moors near the source of the River Wear in Durham, a more striking cavity was pointed out by the local farmer who read the gauges maintained by the Durham County Water Board. The site was at an altitude of about 1,900 feet, between the Wellhope and Burnhope Burns, and about 1 mile from the borders of Cumberland. At that point, the county boundary coincides with the most westerly limit of the catchment area of these streams. Although the damage was done during a heavy afternoon thunderstorm as long ago as 1916, the main features are still apparent. The top layer of grass and peat had been washed away to a depth of about 4 feet over an area about 20 yards by 40 yards, and deposited just below. The gradient was only about 1 in 10, and the catchment area at this point was small, it being only about a quarter of a mile to the summit, Lamb's Head, 2,127 feet high. The cavity appeared to be quite different from the other scars on the moors, which could be accounted for by the sudden rush of water from a large area, or to the undercutting of the hillside by a stream in flood.

These phenomena, due to intense local rains, are by no means uncommon, although they seem apparently to be confined to the wetter parts of the British Isles, and, consequently, to sparsely inhabited regions. Some other examples may be briefly recalled :—

British Rainfall, 1893, p. 14. A description is given of a waterspout on the Cheviots on July 2nd, 1893, when over 30 to 40 acres of the upper layer of peat was ploughed up to a depth of some five feet, and piled in enormous masses.

Meteorological Magazine, 1904, p. 125. On September 9th, 1903, on the steep slope below Llyn Llydaw, in Snowdonia, a waterspout is described as excavating the ground in a semi-circular form to a depth of about 3 feet and measuring about 20 feet across.

British Rainfall, 1907, p. 33. Following the severe thunderstorm of July 22nd, the Rev. R. P. Dansey found a hole 10 to 12 yards across, and about 5 feet deep. The effects of the storm are illustrated by photographs.

In each case a large amount of earth has been displaced by some enormous, yet local force. At this stage it is a matter of conjecture whether the sole agent has been exceptionally heavy rain falling practically as a solid mass, *i.e.*, rain (or hail) which would normally fall over a large area, being held up by upward currents and deposited over a very small area after the cessation of these currents. In the Cannington area, where about 8 inches of rain fell in 5 hours, the evidence of erosion caused by the water actually falling over a small area was quite apparent, although far less than that specified in the cases above. If the cavities are caused by rain alone, the amount must be therefore far larger than that recorded in the Cannington area, although it is not possible at this stage to give a closer estimate. Falling rain is entirely held up by currents of air moving upwards with a velocity greater than 24 feet per second. These cavities may in some way be connected with abnormally strong upward currents. In the case of the cavity at Wear Head, the deposit was further down the hillside. This suggested that even if the extremely heavy rain had not been responsible entirely for the actual scooping out of the mass of earth, rain certainly had played some part in moving it.

J.G.

Rime and Associated Phenomena

On Friday, February 11th, when the south of England was covered with fog, there was a great deposit of rime on the trees in Arundel Park and the neighbourhood. On the South Downs some phenomena, which may be well known to those who live in hill country, but which my son and I observed as novelties, are, I think, worth placing on record.

The rime as we saw it on Saturday morning was heavy enough to bend the tree branches. We were told that at Warming Camp (on the Downs to the east of the Arun) boughs are sometimes broken off by the weight. In the light breeze the fragments of rime from the trees pelted the passer-by in no pleasant fashion. In places the rime blown from the trees lay to the depth of an inch. Rime on the ground has not the brilliance of fresh snow: it makes a rather dirty grey. The crystals, formed apparently like so many needles all pointing up-wind, hold together when they fall and lie on the ground side by side. They leave the mother twig quite clean. The first dropping rime that we saw was in front of Arundel Church and there the rime fell as little tablets of ice about a centimetre square; the rime crystals had fused together. In general, the crystals looked as if they could be separated from their neighbours with a little patience.

The heaviest deposits of rime were on the trees exposed to the north-east, and especially where there was a moderate slope up to them on that side. From a distance, however, the grey patches under the trees and bushes were more conspicuous than the unfallen rime. There was of course rime on the grass. The deposit on the wiry grass stalks was curious, however, in that very frequently it changed sides half-way up. The deposit on the lower half of the stalk pointed into the wind (the north-east wind which prevailed when the rime was formed) but on the upper half the deposit was on the lee side, behaving, so to speak, like a flag. Is it possible that the rime can actually at some stage of its growth be blown round without being blown off the stalk?

It is usual to associate "glaze" with rime, both being explained as deposits of ice from super-cooled water drops. I was surprised, however, when my son found pieces of ice embedded in an earth bank. Each of these pieces of ice was encrusted on a fragment of chalk. A chalk fragment about two inches square and half an inch thick might carry a lump of ice or rather a brittle crown of ice about an inch high. This encrustation on the chalk could hardly be called a glaze. The phenomenon occurred close to trees with a very liberal deposit of rime. Unfortunately there were no other stones in the bank where the phenomenon was at its best, so we cannot say whether chalk has any special merits. There was no sign of glaze or frost on the roads, which at the time of the observation, a little after noon, were perfectly dry.

Captain Cave, whose house is on the South Downs, has been so good as to give me his experience of this phenomenon. He writes : " I have frequently seen ice encrusted on chalk ; it used to be common at Ditcham and occurred mostly in rather sheltered places under trees. It certainly did not occur on flints, or I should have noticed it."

With regard to the dirty appearance of rime, Captain Cave writes : " On January 27th and 28th, 1909, there was a great development of rime at Ditcham ; it was extremely black and when melted it made a black liquid. Round the trees where it had fallen, it left a dark mark on the grass, etc., when it had melted. The Meteorologcial Office sent a sample to the Government Laboratory; they reported that the melted sample contained 70 parts per 100,000 of solid matter consisting of soot and 16 parts per 100,000 of resinous matter. I suppose the soot came from London. A neighbour of mine said he had seen the black rime a number of years previously."

F. J. W. WHIPPLE.

The West of England Blizzard in March, 1891

The easterly hurricane of blinding powdery snow which ravaged the south-western counties of England on March 9th and 10th, 1891, and affected more or less the whole of southern England, with a secondary area of great intensity in Kent, has not been so well remembered by meteorologists as the similar, though rather more widespread, visitation of January 18th and 19th, 1881.

It is, therefore, of interest to draw attention to a little known book* published in April, 1891, but now very scarce, of which a copy may be found in the library of the Royal Meteorological Society. There was considerable loss of life, especially at sea along the grim Cornish coast. No comment is needed as to the terrible nature of the visitation when it is mentioned that on the night of March 9th numbers of trains in every part of Cornwall, Devon and West Somerset were not merely blocked but in many instances literally buried in immense drifts, the railway officials and others having to face an almost overpowering situation in

* The Blizzard in the West: Being a Record and Story of the Disastrous Storm which raged throughout Devon and Cornwall, and West Somerset, on the night of March 9th, 1891. With illustrations. London: Simpkin, Marshall, Hamilton, Kent & Co., Ltd. Devonport: A. H. Swiss.

the attempt to bring sustenance to the unfortunate travellers. I have recently verified in the British Museum that the "Zulu Express" of those days, which left Paddington as usual at 3 p.m. on Monday, the 9th, arrived at Plymouth at 8.30 p.m. on the 13th, having been imprisoned for four whole days at Brent on a southern spur of Dartmoor. The plight of the passengers was not known in London till the 14th, nor reported in any detail in the daily press until the 15th or 16th, so complete was the isolation of the western counties through the collapse of telegraph poles and the blocking of road and rail by the enormous accumulations of snow. The cyclone, after depositing what is generally estimated in round numbers as two feet of snow in Cornwall and Devon, and a smaller quantity farther east, passed up the English Channel to Holland; but it was followed in the sore-stricken western counties by a secondary development which caused a renewal of the gale and snowstorm, some localities having had the same amount of snow over again.

The Devonshire lanes remained blocked till the end of March or later, and it is said that the last traces of the snow had not disappeared from the higher parts of Dartmoor and Exmoor until June. It will be recalled that this snow storm followed the great frost from November 25th—January 22nd, 1890-91, which, in respect of duration and low day maxima, was almost the "record" frost of the nineteenth century in southern England. Nor did the March blizzard end this inclement season, for the weather remained generally bleak in England with local falls of snow or sleet, and in the third week of May, after a sudden burst of summer heat the week before, some six inches of snow fell over a wide area in East Anglia.

The similar storm of January 18th and 19th, 1881, was also very severe in the south-western counties, but the area of maximum intensity lay further east than in 1891, namely in Dorset, Wiltshire, Hampshire, and the Isle of Wight. In this case, also, a secondary depression on the 20th doubled the snowfall in the Isle of Wight which had had nearly 2 feet of snow in the main storm—an interesting parallel.

Both January, 1881, and March, 1891, were snowstorms of the first magnitude, and were of a type notably less often seen in the south of England than in the north.

L. C. W. BONACINA.

The Gale of January 28th, 1927

In the article in the February issue of the *Meteorological Magazine* on the "Weather of January, 1927," mention was made of some high wind velocities at certain stations in the British Isles during the exceptionally violent gale on January 28th, the most notable gale experienced in the British Isles during the past winter, which caused the loss of several lives and did considerable damage. The gale, which was associated with a deep depression off the north-west coast of Ireland, affected the greater part of the British Isles but was most severely felt in the western districts. Records of high wind velocities from two other stations in exposed situations have since become available which exceed those already quoted. At Dunfanaghy, on the north coast of Donegal, the wind attained the force of a hurricane for a brief period during the afternoon of the 28th; several gusts exceeding 100 m.p.h. were recorded between 1 p.m. and 2 p.m., and in a gust at 1.40 p.m. the wind attained the remarkable velocity of 109 m.p.h., the highest velocity hitherto recorded in the British Isles with the exception of a gust of more than 110 m.p.h. recorded at Quilty (Clare), on January 27th, 1920, about which doubt exists.* The highest mean velocity for a period of 60 minutes at an exact hour was 74 m.p.h. and ranks next to the highest hourly velocity (measured at an exact hour) ever recorded at a Meteorological Office Anemograph Station, viz., 78 m.p.h. at Fleetwood, on December 22nd, 1894. At Tiree, off the west coast of Scotland, several gusts exceeding 90 m.p.h. occurred between 3 p.m. and 4 p.m. on the 28th, the highest recorded being 108 m.p.h. at 3.30 p.m. (direction, 240° from north). These high velocities were apparently associated with a local increase in the general wind current due to the development of secondary disturbances to the south-east of the main depression.

It should be mentioned that Dunfanaghy and Tiree are new stations, the anemometers having been in regular operation only since the commencement of 1927 and that they provide the first information based on anemograph records regarding the maximum velocities experienced in these districts which are known to be the stormiest in the British Isles. The possibility of even higher velocities than those mentioned having occurred in the north-western districts of the British Isles in some previous year cannot therefore be excluded.

P.I.M.

News in Brief

The University of Cambridge has awarded the Adams Prize for the period 1925-26 to Dr. Harold Jeffreys, F.R.S., for an essay on "The Constitution of the Interior of the Earth and the Propagation of Waves through the Interior and over the Surface of the Earth." The prize is awarded biennually for an essay on some branch of natural philosophy and is of the value of about £250.

* *Meteorological Magazine* 57 (1922) p. 102.

The Weather of March, 1927

The weather of March was on the whole changeable and mild with south-westerly winds prevailing in the southern districts. During the early part of the month conditions were very unsettled and depressions frequently passed over or near the British Isles. Gales were experienced on several parts of the coasts, notably along the English Channel and Irish Sea, and there was heavy rain at times, *e.g.*, 38 mm. (1·51 in.) fell at Delamere, Cheshire, on the 1st, 47 mm. (1·87 in.) at Penrhyn Quarries on the 4th, and 22 mm. (·87 in.) at Lympne on the 10th. Snow was reported from a few northern stations and hail and thunder locally, in particular thunderstorms occurred in many parts of southern England on the 10th. Subsequently an anticyclone passed across Ireland and Scotland to Scandinavia giving north-easterly to easterly winds over England and Ireland, and colder weather generally. On the 14th the temperature did not rise above 38° F. all day at Leafield, or above 40° F. at several other stations. Slight snow fell at Harrogate. The lowest minimum temperatures of the month were also experienced at this period, 18° F. in the screen at Balmoral on the 13th, and 14° F. on the ground at Birr Castle and Rhayader on the 15th. Meanwhile, further depressions approaching from the Atlantic caused a renewal of rough rainy weather in the extreme west, while the withdrawal of the anticyclone southwards across Germany was associated with more southerly winds over Great Britain and higher temperatures. Maximum readings rose above 50° F. again on the 16th and reached or exceeded 60° F. in most parts on the 19th to 21st. On the latter date, 68° F. was recorded in London and Cambridge. On the 22nd cyclonic conditions spread from the west to the eastern counties and an unsettled type of weather prevailed until the end of the month with further high winds and gales at times, frequent rain, local thunderstorms, and hail, but some good sunshine records, *e.g.*, 11·7 hours at Tiree on the 27th, and 11·0 hours at Falmouth on the 29th. The rainfall measurements amounted to 54 mm. (2·11 in.) at Bettws Garmon, Carnarvon, on the 25th, and 52 mm. (2·05 in.) at Delphi, Mayo, on the 31st. Some of the roughest weather of the month occurred on the 31st, when a depression deepened considerably as it moved across southern Ireland to England. Strong gales were experienced in south-west England and a gust of 85 m.p.h. was reported from the Scilly Isles.

Pressure was below normal over western Europe, the greater part of the North Atlantic, Iceland and Spitsbergen, the greatest deficit being 10·2 mb. at Reykjavik, and above normal in the north of Scandinavia, and Russia, in south Europe and at the Azores and Bermuda. This distribution was associated with generally south to southwesterly winds over western Europe. Temperature and rainfall were mainly above normal except in Scandinavia where the rainfall was below normal.

A third landslide occurred at Roquebillière on the night of March 1st, but little damage was done. About the 5th, heavy falls of snow were experienced in the southern part of central France, communications in several places being interrupted. Heavy snow again occurred near Lyons on the 13th, and there were serious floods on the Seine and in south-west and south France about that time. Owing to the hard winter packs of wolves have invaded villages in the mountainous districts of north and central Spain and caused considerable loss among the cattle. Warm sunny weather was enjoyed in Switzerland and north Italy from the 23rd to 28th, but in consequence numerous avalanches of snow occurred in the Swiss Alps.

A fall of hailstones (reported to be as large as oranges) did much damage to railway buildings and to stocks of unhusked rice at Wuntha (Burma) at the beginning of the month. On the 3rd a violent cyclone crossed Madagascar following a line from Tamatave to the north of Antananarivo. Two missionaries and 18 natives are reported to have been killed. Five ships were sunk at Tamatave and the material damage was great. Heavy rain amounting to 12 in. at Blantyre and 17 in. in the Zambesi Valley fell in three days during the week ending the 12th and caused extensive floods. The Zambesi rose 6 ft. very suddenly on the 9th, making a breach 200 ft. long in the railway between Chindio and Zuezue. During a thunderstorm at Pretoria on the 23rd lumps of ice two and three inches in diameter are reported to have fallen over the town for half an hour followed by a deluge of rain.

A severe gale did much damage to shipping in the neighbourhood of Cape Hatteras and off the Virginia coast on the 2nd, and a tornado swept over south-west Arkansas on the 17th, killing seven people. More than 20 lives were lost as the result of floods following on heavy rains in the province of Jujuy, Argentina.

The special message from Brazil states that the rainfall in the northern and central districts was irregular in distribution with averages 22 mm. and 5 mm. below normal respectively, and that in the southern districts the average was 44 mm. above normal. The weather was generally favourable to the crops, especially the cotton, coffee and sugar. Pressure changes were more frequent than in the previous month. Pressure at Rio de Janeiro was 0·5 mb. below normal and temperature 0·4° F. above normal.

Rainfall, March, 1927—General Distribution

England and Wales ..	136	per cent. of the average 1881-1915.
Scotland	93	
Ireland	138	
British Isles	126	

Rainfall: March, 1927: England and Wales

CO.	STATION.	In.	mm.	Per-cent. of Av.	CO.	STATION.	In.	mm.	Per cent of Av.
Lond.	Camden Square	2·57	65	141	*War.*	Birminghm, Edgbaston	2·52	64	132
Sur.	Reigate, The Knowle	3·63	92	165	*Leics*	Thornton Reservoir	2·59	66	141
Kent.	Tenterden, Ashenden	3·80	97	178	,,	Belvoir Castle	2·08	53	115
,,	Folkestone, Boro. San.	2·94	75	...	*Rut.*	Ridlington	1·92	49	...
,,	Margate, Cliftonville	1·73	44	109	*Linc.*	Boston, Skirbeck	1·92	49	123
,,	Sevenoaks, Speldhurst.	4·12	105	...	,,	Lincoln, Sessions House	1·51	38	97
Sus.	Patching Farm	3·69	94	172	,,	Skegness, Marine Gdns.	1·52	39	92
,,	Brighton, Old Steyne	3·26	83	161	,,	Louth, Westgate	1·81	46	85
,,	Tottingworth Park	4·99	127	199	,,	Brigg	...	..	...
Hants	Ventnor, Roy. Nat. Hos.	3·17	81	155	*Notts.*	Worksop, Hodsock	2·03	52	120
,,	Fordingbridge, Oaklnds	4·35	110	187	*Derby*	Mickleover, Clyde Ho.	2·31	59	130
,,	Ovington Rectory	4·18	106	161	,,	Buxton, Devon. Hos.	5·25	133	127
,,	Sherborne St. John	3·43	87	153	*Ches.*	Runcorn, Weston Pt.	3·40	86	168
Berks	Wellington College	2·61	66	132	,,	Nantwich, Dorfold Hall	3·10	79	...
,,	Newbury, Greenham	3·66	93	161	*Lancs*	Manchester, Whit. Pk.	3·23	82	143
Herts.	Benington House	...	..	...	,,	Stonyhurst College	4·19	106	113
Bucks	High Wycombe	2·92	74	150	,,	Southport, Hesketh Pk	3·52	89	158
Oxf.	Oxford, Mag. College	2·33	59	152	,,	Lancaster, Strathspey.	3·58	91	...
Nor.	Pitsford, Sedgebrook	2·31	59	131	*Yorks*	Wath-upon-Dearne	1·76	45	101
,,	Oundle	1·57	40	...	,,	Bradford, Lister Pk.	3·13	80	129
Beds.	Woburn, Crawley Mill.	2·09	53	122	,,	Oughtershaw Hall	7·88	200	...
Cam.	Cambridge, Bot. Gdns.	1·72	44	117	,,	Wetherby, Ribston H.	1·62	41	83
Essex	Chelmsford, County Lab	1·97	50	114	,,	Hull, Pearson Park	1·27	32	70
,,	Lexden, Hill House	1·85	47	...	,,	Holme-on-Spalding	1·16	29	...
Suff.	Hawkedon Rectory	2·02	51	106	,,	West Witton, Ivy Ho.	2·84	72	...
,,	Haughley House	1·84	47	...	,,	Felixkirk, Mt. St. John	2·29	58	...
Norf.	Beccles, Geldeston	1·80	46	105	,,	Pickering, Hungate	1·42	36	...
,,	Norwich, Eaton	...	..	...	,,	Scarborough	·97	25	54
,,	Blakeney	1·91	49	117	,,	Middlesbrough	1·83	46	116
,,	Swaffham	...	..	...	,,	Baldersdale, Hury Res.	2·66	68	...
Wilts.	Devizes, Highclere	3·65	93	174	*Durh.*	Ushaw College	1·99	51	90
,,	Bishops Cannings	3·07	78	137	*Nor.*	Newcastle, Town Moor.	1·60	41	76
Dor.	Evershot, Melbury Ho.	4·81	122	162	,,	Bellingham, Highgreen	3·00	76	...
,,	Creech Grange	3·76	96	...	,,	Lilburn Tower Gdns.	3·01	76	...
,,	Shaftesbury, Abbey Ho.	3·65	93	155	*Cumb*	Geltsdale	2·86	73	...
Devon	Plymouth, The Hoe	4·10	104	141	,,	Carlisle, Scaleby Hall	2·87	73	117
,,	Polapit Tamar	5·42	138	182	,,	Seathwaite M.	...	..	...
,,	Ashburton, Druid Ho.	6·71	170	151	*Glam.*	Cardiff, Ely P. Stn.	4·21	107	131
,,	Cullompton	4·69	119	171	,,	Treherbert, Tynywaun	8·76	223	...
,,	Sidmouth, Sidmount	4·19	107	172	*Carm*	Carmarthen Friary	5·03	128	133
,,	Filleigh, Castle Hill	5·34	136	...	,,	Llanwrda, Dolaucothy.	7·44	189	161
,,	Barnstaple, N. Dev. Ath.	3·83	97	146	*Pemb*	Haverfordwest, School	4·11	104	121
Corn.	Redruth, Trewirgie	4·37	111	121	*Card.*	Gogerddan	4·94	125	143
,,	Penzance, Morrab Gdn.	3·97	101	124	,,	Cardigan, County Sch.	3·50	89	...
,,	St. Austell, Trevarna	4·66	118	136	*Brec.*	Crickhowell, Talymaes	5·40	137	...
Soms	Chewton Mendip	5·03	128	141	*Rad.*	Birm. W. W. Tyrmynydd	7·22	183	135
,,	Street, Hind Hayes	3·55	90	...	*Mont.*	Lake Vyrnwy	5·37	136	126
Glos.	Clifton College	2·95	75	117	*Denb.*	Llangynhafal	3·91	99	...
,,	Cirencester, Gwynfa	3·14	80	136	*Mer.*	Dolgelly, Bryntirion	6·11	155	124
Here.	Ross, Birchlea	2·82	72	139	*Carn.*	Llandudno	3·61	92	167
,,	Ledbury, Underdown.	2·20	56	116	,,	Snowdon, L. Llydaw 9	18·17	462	...
Salop	Church Stretton	3·32	84	141	*Ang.*	Holyhead, Salt Island.	4·17	106	159
,,	Shifnal, Hatton Grange	2·32	59	126	,,	Lligwy	3·64	92	...
Staff.	Tean, The Heath Ho.	...	.	...	*Isle of Man*				
Worc.	Ombersley, Holt Lock.	2·29	58	135		Douglas, Boro' Cem.	...	.	...
,,	Blockley, Upton Wold.	3·05	77	142	*Guernsey*				
War.	Farnborough	2·93	74	138		St. Peter P't. Grange Rd	4·07	103	165

Rainfall: March, 1927: Scotland and Ireland

CO.	STATION	In.	mm.	Per-cent. of Av.	CO.	STATION.	In.	mm.	Per-cent of Av.
Wigt.	Stoneykirk, Ardwell Ho	...	..	...	*Suth.*	Loch More, Achfary	5·36	136	83
,,	Pt. William, Monreith	4·09	104	...	*Caith*	Wick	1·61	41	71
Kirk.	Carsphairn, Shiel.	8·00	203	...	*Ork.*	Pomona, Deerness	2·24	57	80
,,	Dumfries, Cargen	4·08	104	113	*Shet.*	Lerwick	3·97	101	126
Roxb	Branxholme	1·94	49	67		————			
Selk.	Ettrick Manse	4·58	116	...	*Cork.*	Caheragh Rectory	6·78	172	...
Berk.	Marchmont House	2·67	68	101	,,	Dunmanway Rectory	6·76	172	138
Hadd	North Berwick Res.	1·74	44	93	,,	Ballinacurra	4·27	108	151
Midl	Edinburgh, Roy. Obs.	1·59	41	89	,,	Glanmire, Lota Lo.	5·42	138	175
Lan.	Biggar	...	..	...	*Kerry*	Valentia Obsy.	...	..	...
,,	Leadhills	5·59	142	...	,,	Killarney Asylum	...	..	...
Ayr.	Kilmarnock, Agric. C.	2·46	63	88	,,	Darrynane Abbey	6·13	156	150
,,	Girvan, Pinmore	6·09	155	161	*Wat.*	Waterford, Brook Lo.	4·46	113	163
Renf.	Glasgow, Queen's Pk.	2·64	67	101	*Tip.*	Nenagh, Cas. Lough	4·33	110	140
,,	Greenock, Prospect H.	4·76	121	97	,,	Roscrea, Timoney Park	4·27	108	...
Bute.	Rothesay, Ardencraig.	5·05	128	141	,,	Cashel, Ballinamona	4·80	122	175
,,	Dougarie Lodge	4·28	109	...	*Lim.*	Foynes, Coolnanes	3·88	99	132
Arg.	Ardgour House	6·96	177	...	,,	Castleconnell Rec.	3·78	96	...
,,	Manse of Glenorchy	5·44	138	...	*Clare*	Inagh, Mount Callan	6·15	156	...
,,	Oban	3·86	98	...	,,	Broadford, Hurdlest'n.	4·02	102	...
,,	Poltalloch	4·29	109	112	*Wexf*	Newtownbarry	6·37	162	...
,,	Inveraray Castle	7·00	178	110	,,	Gorey, Courtown Ho.	5·13	130	222
,,	Islay, Eallabus	3·64	92	95	*Kilk.*	Kilkenny Castle	...	..	...
,,	Mull, Benmore	9·00	229	...	*Wic.*	Rathnew, Clonmannon	3·46	88	...
Kinr.	Loch Leven Sluice	2·81	71	94	*Carl.*	Hacketstown Rectory	5·69	145	203
Perth	Loch Dhu	7·05	179	107	*QCo.*	Blandsfort House	3·73	95	142
,,	Balquhidder, Stronvar.	6·24	158	...	,,	Mountmellick	5·07	129	...
,,	Crieff, Strathearn Hyd.	3·99	101	125	*KCo.*	Birr Castle	3·44	87	143
,,	Blair Castle Gardens	2·62	67	100	*Dubl.*	Dublin, FitzWm. Sq.	3·08	78	159
,,	Coupar Angus School	...	..	...	,,	Balbriggan, Ardgillan	3·27	83	163
Forf.	Dundee, E. Necropolis	2·41	61	117	*Me'th*	Beauparc, St. Cloud	3·85	98	...
,,	Pearsie House	3·85	98	...	,,	Kells, Headfort	3·82	97	139
,,	Montrose, Sunnyside	...	..	...	*W.M*	Moate, Coolatore	...	..	...
Aber.	Braemar, Bank	2·10	53	71	,,	Mullingar, Belvedere	3·48	88	129
,,	Logie Coldstone Sch.	1·91	49	73	*Long*	Castle Forbes Gdns.	4·05	103	137
,,	Aberdeen, King's Coll.	2·04	52	85	*Gal.*	Ballynahinch Castle	8·33	212	163
,,	Fyvie Castle	2·71	69	...	,,	Galway, Grammar Sch.	3·91	99	...
Mor.	Gordon Castle	2·13	54	92	*Mayo*	Mallaranny	7·23	184	...
,,	Grantown-on-Spey	1·87	47	71	,,	Westport House	5·21	132	134
Na.	Nairn, Delnies	1·63	41	87	,,	Delphi Lodge	12·49	317	...
Inv.	Ben Alder Lodge	2·83	72	...	*Sligo*	Markree Obsy.	...	..	...
,,	Kingussie, The Birches	1·32	34	...	*Cav'n*	Belturbet, Cloverhill	3·27	83	118
,,	Loch Quoich, Loan	10·00	254	...	*Ferm*	Enniskillen, Portora	4·24	108	...
,,	Glenquoich	7·84	199	81	*Arm.*	Armagh Obsy.	2·33	59	99
,,	Inverness, Culduthel R.	1·59	40	...	*Down*	Fofanny Reservoir	7·56	192	...
,,	Arisaig, Faire-na-Squir	3·51	89	...	,,	Seaforde	3·29	84	113
,,	Fort William	4·86	123	71	,,	Donaghadee, C. Stn.	3·21	81	146
,,	Skye, Dunvegan	4·82	122	...	,,	Banbridge, Milltown	2·51	64	115
,,	Barra, Castlebay	2·60	66	...	*Antr.*	Belfast, Cavehill Rd.	2·80	71	...
R&C	Alness, Ardross Cas.	1·88	48	58	,,	Glenarm Castle	3·03	77	...
,,	Ullapool	3·65	93	...	,,	Ballymena, Harryville	2·97	75	94
,,	Torridon, Bendamph	6·76	172	90	*Lon.*	Londonderry, Creggan	3·48	88	109
,,	Achnashellach	6·96	177	...	*Tyr.*	Donaghmore	3·07	78	...
,,	Stornoway	2·82	72	69	,,	Omagh, Edenfel	3·53	90	112
Suth.	Lairg	2·30	58	...	*Don.*	Malin Head	2·06	52	89
,,	Tongue Manse	2·15	55	64	,,	Dunfanaghy	3·03	77	83
,,	Melvich School	1·91	49	67	,,	Killybegs, Rockmount	4·77	121	94

Climatological Table for the British Empire, October, 1926

STATIONS	PRESSURE: Mean of Day M.S.L. mb.	PRESSURE: Diff. from Normal mb.	TEMPERATURE Absolute: Max. °F.	Absolute: Min. °F.	Mean Values: Max. °F.	Mean Values: Min. °F.	Mean Values: ½ max. and min. °F.	Mean Values: Diff. from Normal °F.	Mean: Wet Bulb. °F.	Relative Humidity %	Mean Cloud Am'nt 0—10	PRECIPITATION: Am'nt mm.	PRECIPITATION: Diff. from Normal mm.	PRECIPITATION: Days	BRIGHT SUNSHINE: Hours per day	BRIGHT SUNSHINE: Percentage of possible
London, Kew Obsy.	1012·9	− 1·1	69	28	54·5	41·4	47·9	− 2·0	42·9	89	6·9	52	− 17	16	2·8	26
Gibraltar	1013·6	− 3·6	80	53	74·0	65·3	69·7	+ 3·6	63·8	81	7·0	188	+104	11	...	...
Malta	1018·1	+ 1·5	83	60	77·1	67·9	72·5	+ 1·6	68·1	83	2·8	5	− 68	2	9·3	82
St. Helena	1014·1	+ 1·9	76	52	61·1	53·8	57·5	− 1·3	54·5	91	3·8	23	− 26	7	...	...
Sierra Leone	1011·3	− 0·3	91	69	87·3	72·5	79·9	− 0·2	75·6	81	5·5	210	−111	24	...	...
Lagos, Nigeria	1009·2	− 2·5	88	70	85·9	75·2	80·5	+ 1·0	77·0	83	7·5	96	−101	11	...	...
Kaduna, Nigeria	1013·7	+ 1·4	93	...	89·1	...	...	...	70·7	61	2·0	70	+ 15	3	...	...
Zomba, Nyasaland	1018·6	+ 1·6	95	50	86·3	62·7	74·5	+ 0·4	...	59	2·2	20	− 18	1	...	...
Salisbury, Rhodesia	1009·3	− 1·5	92	46	86·3	57·4	71·9	+ 1·2	58·8	37	2·0	4	− 25	2	9·1	73
Cape Town	1015·7	− 1·7	83	43	69·3	51·1	60·2	− 1·0	55·2	76	5·3	68	+ 26	12	...	...
Johannesburg	1013·2	− 0·4	87	39	76·6	51·4	64·0	+ 1·3	52·0	48	2·1	38	− 27	5	9·6	76
Mauritius	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bloemfontein	...	...	92	36	79·3	50·1	64·7	+ 0·1	53·8	46	3·6	47	+ 4	4	...	...
Calcutta, Alipore Obsy.	1007·8	− 1·6	91	66	87·9	74·6	81·3	+ 0·6	74·8	83	4·5	102	− 4	7*	...	...
Bombay	1008·7	− 1·1	93	73	87·6	77·2	82·4	+ 0·1	76·1	83	4·9	33	− 9	2*	...	...
Madras	1007·9	− 1·0	99	68	91·3	73·8	82·5	+ 0·2	76·5	79	6·1	187	−111	9*	...	...
Colombo, Ceylon	1008·9	− 1·4	88	72	86·5	76·0	81·3	+ 1·0	77·9	76	7·2	315	− 17	21	6·5	54
Hongkong	1012·9	− 0·7	87	63	79·0	70·9	74·9	− 2·0	68·9	72	6·5	83	− 40	10	5·7	49
Sandakan	...	...	91	73	87·6	75·0	81·3	− 0·2	76·8	85	...	458	+204	18	...	...
Sydney	1009·1	− 5·8	97	46	76·5	55·4	65·9	+ 2·4	58·8	49	3·8	9	− 73	8	8·9	70
Melbourne	1008·0	− 6·7	83	39	68·7	50·0	59·3	+ 1·7	53·4	60	7·0	47	− 19	16	6·1	48
Adelaide	1010·8	− 5·2	90	43	72·7	50·9	61·8	− 0·1	54·4	52	7·1	59	+ 15	11	7·9	61
Perth, W. Australia	1014·0	− 2·8	87	48	69·1	54·2	61·7	+ 0·7	56·9	62	6·5	93	+ 39	19	6·5	51
Coolgardie	1011·8	− 3·4	98	43	80·6	52·2	66·4	+ 2·8	52·9	29	2·1	7	− 12	3	...	...
Brisbane	1012·5	− 3·7	97	50	82·0	60·3	71·1	+ 1·3	62·9	54	3·0	22	− 43	6	9·6	77
Hobart, Tasmania	1001·8	− 8·8	80	38	62·6	47·7	55·1	+ 1·1	49·5	65	7·7	137	+ 80	25	5·6	42
Wellington, N.Z.	1009·2	− 3·9	69	36	60·6	49·5	55·1	+ 0·8	52·3	77	8·0	171	+ 67	20	4·3	33
Suva, Fiji	1012·7	− 0·5	90	67	83·3	70·9	77·1	+ 1·1	72·4	74	7·2	82	−116	15	5·9	47
Apia, Samoa	1011·2	− 0·3	88	66	85·5	72·5	79·0	+ 0·6	75·3	72	5·0	174	+ 20	8	8·4	68
Kingston, Jamaica	1010·7	− 0·8	90	70	87·0	72·9	79·9	− 0·6	72·1	89	5·7	67	−123	8	7·0	59
Grenada, W.I.	1011·2	+ 0·6	89	72	84·8	75·2	80·0	− 0·1	77·5	85	6·3	245	+ 51	25	...	...
Toronto	1013·2	− 4·8	79	30	54·3	40·1	47·2	+ 0·3	42·6	85	6·4	81	+ 19	18	3·8	34
Winnipeg	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
St. John, N.B.	1011·5	− 5·0	64	29	53·3	41·0	47·1	+ 1·8	43·3	77	6·0	239	+124	12	4·2	38
Victoria, B.C.	1016·1	− 1·5	66	42	58·0	47·5	52·7	+ 2·3	49·7	85	7·1	74	+ 9	14	4·4	40

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