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A Great French Meteorologist

By SIR NAPIER SHAW, F.R.S.

CHARLES ALFRED ANGOT was Director of the Bureau Central Météorologique of France from 1907, when Mascart retired, until after the war. The meteorological and geophysical services of France were reconstituted in 1920 and the functions of the old bureau divided between an Office National for meteorology and an Institut Géophysique for magnetism and seismology. Angot retired with the title of "directeur honoraire." In his retirement he and his wife were cheered by a bevy of grandchildren, who were an unfailing source of pleasure.

He was born at Paris in 1848, joined the Bureau Central, under Mascart, in 1879, and was also Professor of Physics and Meteorology in the Institut Agronomique National. The Symons medal of the Royal Meteorological Society was awarded to him in 1916, and he was elected an honorary Fellow of the Royal Society of Edinburgh last year.

My first recollection of him, forty-five years ago, pictures him conducting an elaborate investigation into the interpretation of the readings of wet and dry bulb thermometers. I was engaged in the same kind of occupation at the time. He made a parabolic formula to allow for a wide range between wet and dry, and one of the things which I always meant to do and can never do is to ask him whether in his later experience he found the parabolic formula of any practical meteorological advantage.

I learned to know him personally at the Conference on Meteorology at the International Exhibition held at Paris in

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1900. Mascart was presiding in his own admirable way over a cosmopolitan assembly that in one form or other secreted most of the meteorological heresies known to history, and Angot was the urbane and efficient secretary, the interpreter of many maladroit expressions. He had a wonderful gift of catching the meaning of people who, for one reason or another, were unable to express themselves intelligibly, and of putting it in pellucid French. It was a gift which was subsequently placed unreservedly at the service of the International Meteorological Committee, to which he was elected at the close of the meeting, held in Paris in 1907. At the same meeting it became my duty, for the first time, to take the chair at the Committee, and from that time, at many meetings in many countries, he has always been an admirable colleague and an ever-welcome friend. He had English relatives and spoke English fluently.

His scientific education was rigorous and profound, his industry unfailing, and his contributions to meteorology and terrestrial magnetism numerous and effective, as the Annales of his bureau bear witness. His discussion of the diurnal variation of the barometer was at one time the most frequently consulted contribution to meteorological literature in the Meteorological Office, and, since then, besides the official reports which are very elaborate, especially as regards thunderstorms, he has presented memoirs on the Climate of France, the observations on the Eiffel Tower, and Magnetic Charts of France. He was also the author of an excellent Treatise on Meteorology.

The Bureau suffered, as our own Office did, from the towering majesty of the sciences of Astronomy, Physics and Mathematics by which it was surrounded and in part controlled. On both sides of the Channel we were waiting for the genius of a Newton or a Laplace to endow us with a formula. In France, as with us, the daily response to the public demand for forecasts and storm-warnings left the officials with very little of that audacity upon which science like most other enterprises depends. The opportunity for initiative in both countries was left for private enterprise; the official contributions, safe and solid if not exciting, were rather of the nature of concrete foundations undeniably necessary for the ultimate structure, contributions which excite the admiration of the few who know, rather than of the many who think that the daily forecasts represent the whole duty of every meteorologist.

Until September last Angot was President of the International Commissions for Agricultural Meteorology and for Terrestrial Magnetism and Atmospheric Electricity. His retirement from those duties because he was unable to attend the Conference at Utrecht is too speedily followed by his death, which took place at his home in Paris on March 16th.

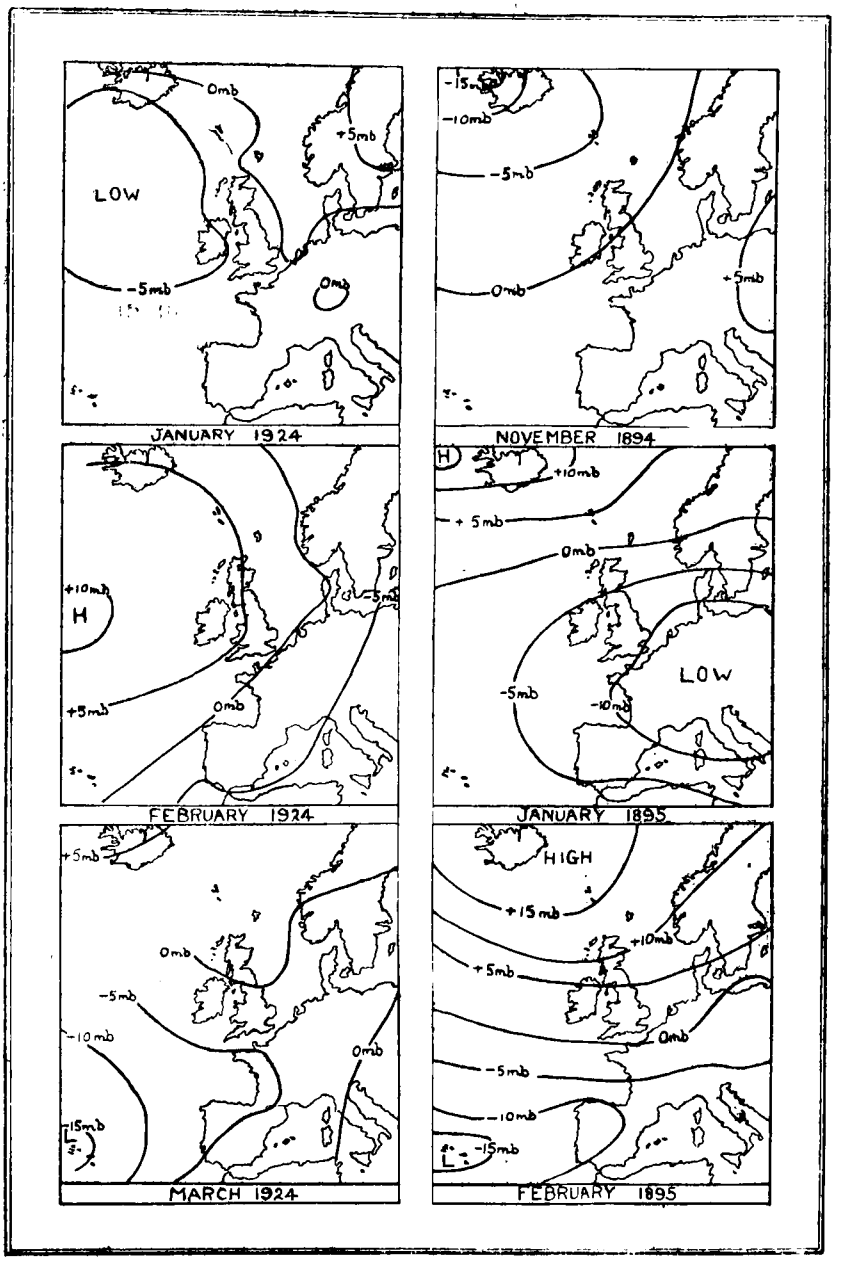
The Abnormal Weather of the Winter and Early Spring, 1923-4

By C. E. P. BROOKS, M.Sc.

THE chief characteristic of the weather during November and December, 1923, and again during February and March, 1924, was the abnormal frequency of northerly and easterly winds. During the first two months there were considerable falls of sleet and snow in different parts of Great Britain, but the average precipitation over the whole country failed to reach the normal; February and March were distinctly dry. All four months had a mean temperature below normal. In sharp contrast to these two periods of rather cold dry weather, January 1924 was mild, unsettled and rather rainy.

The sequence of events can be studied from the monthly charts of mean deviation of pressure from the normal, which are now regularly drawn for western Europe, the North Atlantic and North America. October 1923 was a wet stormy month; pressure was more than 15 mb. below normal north of Scotland, the deficit reaching 18 mb. over the Faeroes; a large number of depressions passed in an east-north-east direction between Iceland and the British Isles. Over the greater part of North America pressure was above normal, the excess exceeding 5 mb. west of the Great Lakes. By November, the deficit of pressure had shifted from north of Scotland to the Baltic, where pressure was 10 mb. below normal, and the North Atlantic was occupied by a great area in which pressure was above normal, the excess being 5·6 mb. at Horta and 11·5 mb. at the point 50° N 30° W. Over the British Isles the isanomalies of pressure (lines of equal deviation of pressure from normal) were directed from north to south; northerly winds were abnormally frequent, and the tracks of depressions, although irregular, lay on the whole from north-west to south-east. In December, conditions were somewhat similar, but the area of maximum pressure-deficit had shifted northward and the pressure-excess had moved south-eastward, and was centred between the Azores and Corunna. The monthly maps for January, February and March, 1924, are shown on the left hand half of p. 80. Attention is directed to the map for March, which shows a deficit of pressure exceeding 15 mb. at the Azores. Actually pressure was 15·5 mb. below normal at Horta, and 6·7 mb. above normal at Stykkisholm in Iceland. Since the average pressure difference between these two stations in March is only 12·5 mb., it follows that the normal pressure gradient was completely reversed, and cold easterly winds prevailed over the British Isles.

Since the beginning of observations in 1865 there have been



PRESSURE ANOMALIES IN TWO WINTERS

only two other months in which the mean pressure at the Azores was more than 15 mb. below normal, namely February 1895, and February 1912. The whole winter of 1894 to 1895 was rather similar to that of 1923 to 1924 (see the right hand side of p. 80.) November 1894 was a month of strong southerly and south-westerly winds, and may be compared with January 1924. December 1894 and January 1895 had a similar pressure distribution (only the latter month is illustrated), which resembled that of February 1924 in being favourable to north-easterly winds. February 1895 showed an extraordinary pressure gradient from north to south, resulting in abnormally strong cold, easterly winds and a rainfall much below normal. It will be remembered that skating was general in the east and south of England during this month. It is interesting to note that in 1895 pressure remained high over Iceland and low over the Azores until June, giving the spring drought of that year.*

The conditions both preceding and following February 1912 differed considerably from those preceding and following February 1895. March 1912 was very wet and stormy and, although April was extremely dry, the general conditions during the summer were rainy, so that it is not safe to conclude that we are on the verge of another drought.

The general westerly winds between the Azores and Iceland are accepted as one of the prime facts of the meteorology of the globe, and, if for a whole month they are completely reversed, we are faced with a noteworthy disturbance of the normal circulation, which argues a correspondingly effective cause.

There is another notable abnormality in the weather of the past winter which may have some bearing on the problem, namely the remarkably high air temperature at Spitsbergen. The difference from normal was + 9° F. in October, + 14° F. in November, + 12° F. in December, + 15° F. in January, and + 20° F. in February. The long duration of this high temperature suggests that the layer of warm air was both extensive and deep. The ice conditions in the Arctic Ocean point to unusually high sea temperatures. In the summer and autumn of 1923 the Arctic Ocean was remarkably free from ice ; in the Barents Sea the area ice-covered during August was the least recorded since the beginning of observations in 1895, and in the Kara Sea there was very much less than the normal amount, while during September and October both these seas were practically free of ice. No information is available for the Arctic Ocean after October, but at the end of November the White Sea was still open, which is unusual. The normal gradient for westerly winds

* *Vide* The drought of 1921. *London Q. J. R. Meteor. Soc.*, Vol. xlviii., 1922, p. 139.

in temperate latitudes is attributed to the temperature gradient between the polar regions and the equator, and F. M. Exner * obtained good negative correlation between the temperature at various places in the Arctic and the pressure at Ponta Delgada, so that the mass of warm air in the Arctic Ocean during the past winter may have had a notable effect on the presssure distribution in the North Atlantic.

It is to be remarked that in March the temperature abnormality at Spitsbergen suddenly disappeared. This is perhaps to be attributed to the prolonged north-easterly winds having retarded or reversed the drift of the warm surface waters of the North Atlantic towards the Arctic Ocean. If so, it indicates that the normal westerly circulation is to be restored, or even that the pendulum will swing the other way. These normal conditions in the Arctic will tend to give us normal conditions in the British Isles, but, as the abnormal winds must have disturbed the distribution of temperature throughout the whole of the North Atlantic Ocean, there is no reason to assume that there will not be more spells of anomalous weather. As in most other meteorological phenomena, there are, however, processes at work which automatically bring about a swing of the pendulum, and maintain the balance of our climate from year to year.

Royal Meteorological Society

THE monthly meeting of the Society was held on Wednesday, April 9th, at 49, Cromwell Road, South Kensington, Dr. C. Chree, F.R.S., Vice-President, in the Chair.

I. D. Margary, M.A.—Glaisher Stand versus Stevenson Screen. A comparison of 40 years' observations of maximum and minimum temperature as recorded in both screens at Camden Square, London.

As long as Camden Square was the home of the British Rainfall Organisation the observations of temperature utilised in all published reports were the readings of thermometers exposed on a Glaisher stand. The Glaisher stand is essentially a vertical board mounted in such a way that it can easily be turned by hand so as to keep its back to the sun. It has long been recognised that such an arrangement has two defects. It can only be used where it can be visited two or more times each day and, moreover, the thermometers, though shielded from direct radiation from the sun, are exposed to radiation from the ground and from other bodies in the neighbourhood, so that a true

* Über monatliche Witterungsanomalien auf der nördlichen Erdhälfte im Winter. Wien, *Sitz Ber. Ak. Wiss.*, 122, 1913, p. 1165.

record of air temperature can not be obtained. For comparative purposes a Stevenson screen was set up by Symons near the Glaisher stand, and readings of the two sets of thermometers were taken regularly. When the Royal Meteorological Society took over the climatological station a new Stevenson screen was installed, and the question arose whether the averages which had been worked up for the Glaisher stand observations could be adjusted to serve as a standard of comparison for the new readings. The Society is greatly indebted to Mr. Margary for undertaking the reduction of the accumulated observations. His investigation brings out the desirability of a close control of the observations when small differences in thermometer readings have to be investigated.

Mr. Margary's work shows that on the average the maximum thermometer on the Glaisher stand read 1·3° F. higher than that in the Stevenson screen in July, but it read ·5° F. lower in December. There are indications, however, that these differences are to be attributed in part to errors in the thermometers. We are inclined to differ from Mr. Margary and to take the view that if the thermometer errors could have been eliminated the differences would have been in the same sense at all seasons, the Glaisher readings being the higher by nearly 2° F. in summer and by a small fraction of a degree in winter. As to the minimum thermometer readings, the lower temperatures are always recorded on the open stand, as was to be expected on general principles. Mr. Margary investigated the effect of winds from different directions and found that with northerly winds the temperatures recorded on the Glaisher stand were lowered: the explanation in the case of the maximum readings is that in the daytime the stand is set to face north, and a north wind blows straight on to the thermometers, and a close approximation to the air temperature is obtained: perhaps a similar explanation holds good in the case of the minimum temperatures; at night the stand is turned so that the thermometers are more or less sheltered from the north wind and the effects of radiation are accentuated.

It will be interesting to see how well Mr. Margary's conclusions are supported by the investigation which is now being carried out at Kew Observatory, where a large number of different thermometer exposures are being compared.

Robin Hill.—A Lens for whole sky Photography.

Readers of the *Meteorological Magazine* will remember the beautiful photographs which were reproduced in the November, 1923, number in connection with the account of the International Cloud Week. Mr. Robin Hill exhibited the camera with which these photographs were taken, and showed with the lantern many

other examples of his work. The only drawback to his method of photography, the reproduction of the whole sky on a single plate, is that distortion is inevitable. He showed, however, how his negatives could be used to produce undistorted pictures of parts of the sky. An interesting application of the method is the production of stereoscopic pictures from which a general idea of the relative heights of the clouds can be obtained. One of the most striking of Mr. Hill's photographs showed a halo and a complete mock sun-ring.

F. J. W. Whipple, M.A., F.Inst.P.—The significance of regression equations in the analysis of upper air observations.

This paper is devoted to a criticism of the assumption that a regression equation can show which of two contemporary phenomena is cause and which effect. We will not attempt to summarise the argument.

Correspondence

To the Editor, *The Meteorological Magazine*

Weather Lore in the Light of Science

ALLOW me to thank you for the kind Review of my little book "Weather Proverbs and Paradoxes" in your January number.

You are quite right in the statement that the numerical values of the probabilities are not given. My chief purpose was to find, so far as I could, the underlying cause or causes of the phenomena in question, and to show the logical positions of these phenomena in the usual sequence of weather conditions. The numerical value of the probable correctness of each proverb doubtless varies from place to place.

The forecasting value of halos, for instance, can be worked up, as you say, without much labour, and has been worked up for several places: see, for instance the *Monthly Weather Review*.* I felt, perhaps mistakenly, that statistics would better be omitted from a book of the kind I was trying to write. Statistics in such a book would seem to me (of course this is just my personal feeling on the subject) much like salt, a mighty tasty condiment, in one's tea or coffee—a good thing, but out of place.

The addition of the expression "and lowering" in connection with the red of the morning sky may be all important. However, in the original Greek, there is no "and." The literal translation, as I have it from a Hellenist, is "reddens lowering." Hence, perhaps, the red itself may, in the morning, constitute the lower-

* Washington, *Monthly Weather Review*, Vol. 42, pp. 446-451; Vol. 43, pp. 444-445; Vol. 44, pp. 67-68; Vol. 46, pp. 119-120 and p. 552.

ing element, based on past experiences of rains. Scattered clouds alone would not, presumably, be called lowering, and a fully overcast sky could not be red. Furthermore, it is quite possible, I am told, that the word translated lowering was put in the original for a stylistic purpose. Certainly, as translated, it, or some other expression, is essential to a graceful termination.

For all these reasons I assumed that whether the sky were clear or partially cloudy, red was the essential feature. In any case, the whole subject of the red sky is not particularly simple and elementary. Perhaps, after all, we should recognize, as did FitzRoy, two kinds of red. We might do this for both morning and evening. A rose-red, clear sky indicating fair weather in the evening, and probably also in the morning; a bull's-blood-red sky, with many clouds, indicating foul weather both morning and evening.

W. J. HUMPHREYS.

Weather Bureau, Washington, February 18th, 1924.

Steaming Roads

CONSIDERABLE surprise was caused in this town this afternoon by a thick mist rising from the ground. At 2h. 15m. or so, there was a hailstorm lasting a considerable time. Before stopping altogether it turned to rain. I was in an upstairs room looking down on an asphalted road and, before the rain stopped, I noticed something blowing up the road: I could not make out whether it was smoke from a brazier out of sight, smoke blown down from a chimney or the shadow of smoke or clouds (as the window faces eastwards I could not see if clouds were blowing across the sun).

About 3 o'clock I was visiting on the side of Stinchcomb Hill, and my attention was drawn to the way the ground in a garden was smoking. I was not convinced at first that it was not thick smoke from a bonfire out of sight, but soon found that the whole hill (except the road where I was standing, which was shadowed or at any rate a great part of it) was "smoking." The "smoke" was white and opaque and did not rise more than a yard or so from the ground. It had ceased, I think, by about 3h. 45m.

LANCELOT ANDREWS.

Dursley, Gloucester, April 10th, 1924.

[Somewhat similar observations were reported in the *Meteorological Magazine* in the issues for July and August, 1922. Such a long spell of steaming as 45 minutes is surely very exceptional. —ED. *M.M.*]

The Propagation of Sound in the Atmosphere

MR. WHIPPLE'S article in the April number of this magazine interested me as it may afford an explanation of the following facts. During 1916 and 1917 the guns on the western front were clearly audible here from April to October but never during the winter months. There is one spot on this hill where on a calm morning I could actually distinguish the sounds of different kinds of guns, and even in bad weather the throbbing was always audible—but never in winter. The distance cannot be less than 150 miles, and it seemed incredible that guns which could not be heard twenty miles behind the line should be so clearly audible here. The earliest date for hearing them was April 8th and the latest about October 15th. Can the differences in mean temperature account for the absence of sound in the winter, during which there are so many warm days?

J. M. ROGERS, Lt.-Col.

Riverhill, Sevenoaks, April 26th, 1924.

[Seasonal variation in the audibility of distant explosions has not yet been explained. The matter was discussed in papers read before the Royal Meteorological Society in 1918 and 1919.—ED. *M.M.*]

Low Velocities in the Upper Air

IN the note on "Pilot Balloon Observations at Barcelona," which appeared in the *Meteorological Magazine* for March, p. 36, records of dead calms reaching to 900 metres and 600 metres are given. There are no records of dead calms reaching to such heights in Egypt, but there are several occasions when the wind has been very light for considerable heights. As an example, on May 1st, 1922, at Helwan, near Cairo, the wind at the surface was 14 kilometres per hour from NE. At 500 metres it had fallen to 8 k.p.h., and from this height up to 6,000 metres (where the velocity was only 2 k.p.h.) it did not at any point exceed 10 k.p.h. There were two reversals of direction, from NE to SW at 500 metres, and from SE to NW at 5,000 metres, while between 2,500 metres and 3,500 metres the wind veered from SW to SE. The observations were made every minute with two theodolites. On September 5th, 1921, a velocity of 10 k.p.h. was not exceeded up to a height of 3,000 metres, and on February 1st, 1922, this velocity was not exceeded below 5,000 metres, although the westerly anti-trades were entered at 3,500 metres.

L. J. SUTTON.

Physical Department, Cairo, April 7th, 1924.

NOTES AND QUERIES

Earwigs and Recording Instruments

IN the *Meteorological Magazine* for September and November, 1922, correspondents drew attention to the trouble experienced by observers in keeping earwigs out of recording instruments, such as automatic rain-gauges. At certain times of the year and especially in the autumn, earwigs, in great numbers, have been known to find their way into the automatic rain-gauge, stop the channels and clog the moving parts. A form of shield designed in the Instruments Division of the Meteorological Office, at the suggestion of the Natural History Museum, has proved to be an effective barrier against insects.

The shield, which is conical in shape, has a diameter of two feet at the top and of one foot at the bottom and is six inches deep. The outside surface is rather smooth and is inclined at an angle of 45° to the horizontal. The lower edge of the shield is to be forced about two inches into the turf round the gauge. Whether earwigs undertake the climb and then fail to negotiate the sharp edge at the top or whether they turn their backs on the obstacle altogether has not been reported. The essential fact is that they do not get into the rain-gauge.

The present price of the shield is 5s. 6d., excluding the cost of packing-case and carriage.

The Green Auroral Line in the Laboratory

AN account of Professor Vegard's experiments in which he produced light by the bombardment of solid nitrogen with cathode rays has been published in the Proceedings of the "Koninklijke Akademie van Wetenschappen te Amsterdam" (Vol. 27, p. 113). The solid nitrogen was a deposit on the end of a copper rod, the other end of which was bathed in liquid hydrogen. The identity of the lines of the resulting spectrum with the principal lines of the aurora is completely established. It appears that the relative strength of the lines depends on the speed of the electrons in the cathode rays. The luminosity of the solid nitrogen is apparently akin to phosphorescence, as it persists for five minutes after the cathode ray bombardment ceases: this characteristic recalls the green afterglow which is observed for five or ten minutes after the production of auroral rays has stopped. Vegard's experiments open up new lines of investigation both in meteorology and in pure physics. Of course it is not yet established that particles of solid nitrogen exist in the upper atmosphere; the light produced in the laboratory might come from ionized monatomic gas emanating from

the solid under the influence of the cathode rays. There is no meteorological difficulty in the assumption that monatomic nitrogen would float in the high atmosphere.

Rainfall Insurance

THERE are few enterprises more likely to be affected by bad weather than the collection of money in the streets for charitable purposes. The promoters of the "Flag-day" on April 30th, 1924, in aid of the "Combined Docklands Settlements," guarded themselves against the dead loss of the expenses of organisation by taking out a policy of insurance against rain occurring between 9 a.m. and 4 p.m. on that day. As it fell out, there was persistent rain, and the amount measured in St. James's Park, ·51 in., was well above the amount of ·1 in. specified in the policy. It is understood that the policy was for £1,500. Of course, this amount is not compensation for the comparative disappointment as to receipts; it merely puts the promoters in a position to cover the expenses for which there was no direct return—a very valuable example of indemnification.

Apia Observatory, Samoa

THE Government of New Zealand is responsible to the League of Nations for the Mandated Territory of Western Samoa. The third annual report recently communicated to the League contains an account of the meteorological work which is being done at the Apia Observatory. A brief account of the history of this Observatory, and the circumstances under which it was being carried on by New Zealand, with the aid of a grant from the British Government, was given in the *Meteorological Magazine* for 1921, pp. 100 and 225.

We now learn that the Observatory is undertaking extensive work in connection with marine meteorology. Weather reports are broadcasted twice daily, and more frequently during the transit of a cyclone. Moreover, in the case of the cyclone of March, 1923, it was found practicable to give the position of the storm centre and the direction of its path. Between June and December, 1923, eighty pilot balloon flights were made, the highest recorded flight being 21,000 metres. The Apia Observatory has been made the station for the receiving, analysing and publishing of the weather data from Suva (Fiji) and Nukualofa (Tonga), Norfolk Island, Vila (New Hebrides), Tutuila (American Samoa), Papeete (Society Islands), and Noumea (New Caledonia). This initiation of a weather service for the western Pacific is to be welcomed.

The document contains a brief summary of the meteorological observations made during 1922, but full reports are being printed separately.

Radiation from the Sky

RADIATION MEASURED AT BENSON, OXON, 1924.

Unit: one gramme calorie per square centimetre per day.

ATMOSPHERIC RADIATION only (dark heat rays).

Averages for Readings about time of Sunset.

		Jan.	Feb.	Mar.
Cloudless days:				
Number of readings	n	8	4	7
Radiation from sky in zenith ...	π I	446	416	464
Total radiation from sky ...	J	473	440	497
Total radiation from horizontal black surface on earth ...	X	633	638	673
Net radiation from earth ...	X—J	160	198	176

DIFFUSE SOLAR RADIATION (luminous rays).

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

Cloudless days:—				
Number of readings	n_0	4	2	1
Radiation from sky in zenith ...	πI_0	16	15	27
Total radiation from sky ...	J_0	20	23	23
Cloudy days:—				
Number of readings	n_1	5	4	0
Radiation from sky in zenith ...	πI_1	26	31	—
Total radiation from sky ...	J_1	25	25	—

Unit for I = gramme calorie per day per steradian per square centimetre.
Unit for J and X = gramme calorie per day per square centimetre.
For description of instrument and methods of observation, see *The Meteorological Magazine*, October, 1920, and May, 1921.

A "Maximum" Anemometer

A SIMPLE anemometer for indicating the maximum strength of the wind is described by Dr. P. L. Mercanton, of Lausanne, in *La Nature*, February 23rd, 1924. A Pitot tube is mounted on a vane. The tube, which contains liquid paraffin, has two arms, one connected to an opening which faces up wind, the other to an opening in the wall of a little channel parallel to the wind. In the latter arm, which is not very steep, there are little pockets. The stronger the wind, the higher the liquid reaches up this arm and the larger the number of pockets that are filled. The anemometer is calibrated by comparison with an ordinary pressure gauge.

The Jamaica Weather Service

A USEFUL summary of the observations taken in the West Indies has recently been published by Mr. J. F. Brennan, the Government Meteorologist.

The Jamaica Weather Service was established in 1880, owing to the initiative of the late Maxwell Hall, and in 1881 the important station at Kingston commenced observations. The Service was disestablished in 1902, and although other stations continued in operation, and an annual grant of £50 was made for the publication of the Jamaica Weather Report, the station at Kingston was closed. This was partly owing to the establishment of a station at Halfway House by the U.S. Weather Bureau. In March 1902 the publication of the Report was transferred to the Office of the Island Chemist, and it was not till 1907 that the Weather Service was re-established. In July 1907 the Weather Bureau station at Halfway House was closed, but with the co-operation of the Weather Bureau the station at Kingston was reopened in 1908.

The new series of observations covers 15 years. The summaries now published extend over the 33 years for which fairly complete observations are available. May we regard this as the prelude to the establishment of a first-class meteorological observatory in Jamaica? It is hardly creditable to the meteorologists of the British Empire that there should be no station in the British West Indies with a reliable continuous record of pressure and other meteorological elements.

To determine the correction to be applied to barometer readings at assigned hours to obtain the daily means Mr. Brennan had to fall back on figures based on the records of a photographic barograph which was only in operation for 12 months about 30 years ago!

Birmingham and Midland Institute

THE meteorological observations at the Observatory at Edgbaston, Birmingham, were published *in extenso* from 1891 to 1897. Publication is now being resumed: the pamphlet containing the 1923 observations has been issued recently. The averages for the station for the past 36 years are given in a convenient form.

The instrumental equipment at the Observatory has recently been improved by the addition of a Dines anemograph. The vane is above the cups of the Robinson anemograph on the Observatory Tower, more than 100 feet above ground. The direction-recorder is of the Box and Cox pattern, in which there are two pens; one of which is at rest when the other is active.

Underground Water Level: Slow Recovery after Drought

MR. SPENCER RUSSELL'S report on observations of the level of the water in various wells indicates that in the North Downs the effects of the drought of 1921 are still felt. At the deep wells on the hills above Maidstone the water remained during 1923 far below the average level. At Little Pett Farm the mean level for 1923 was 27 ft. 7 ins. below average, at Hucking (Old Forge) 18 ft. 2 ins., and at Stockbury 8 ft. 11 ins. On the other hand at Chilgrove, Sussex, on the South Downs, there was no marked departure from the average level. Mr. Spencer Russell attributes the difference between the behaviour of the wells of the North and South Downs to the difference between the rates of percolation in the Middle Chalk of the North Downs and the Upper Chalk of the South Downs.

The Reverse of Daylight Saving

IT is announced that on May 1st clocks at Moscow were to be put back one hour, the standard of time being changed from 3 hours ahead of Greenwich to 2 hours ahead. Thus the standard time for Moscow (37° 36′E) is now practically the mean time of Leningrad (the former St. Petersburg), which is in longitude 30° 20′E. The effect of the change is to deprive the citizens of Moscow of an hour's daylight each evening.

A Florid Weather Diary, Worcestershire, 1703

THROUGH the courtesy of the Provost and Fellows of Lancing College, a weather diary for the year 1703, kept by J. Whiston, was recently lent to the Meteorological Office. We are indebted to Mr. Zealley for a true copy of the diary and for an introduction from which the following notes have been gathered.

A summary of the weather for each day of the year is given, usually occupying about six lines, and always accompanied by the wind direction for the day in question. This wind direction, observed from a wind vane, appears to have been the only regular instrumental observation. For most days a very elaborate description of the weather follows, together with discourses and theories on certain phenomena. Frequent mention is made of " Mr. Boyle " and of his experiments.

It was difficult at first to establish the exact place where Whiston's observations were taken. However, towards the end of the volume, there is an indication that the place was called Egioke. . . " I love Egioke as a Title and Residence to our ancesters " . . . Mr. Zealley consulted old maps of Worcestershire, dating from 1500 onwards, but Egioke was

not marked on any. However, on visiting the district he found that about two miles east-south-east of the village of Feckenham, in the county of Worcestershire, there was a small group of houses now known as Edgiock. No doubt this is the site where most of the observations were taken.

From an agricultural point of view the diary is of great interest, many references being made to the harvest, crops and farming. Phenological observations are also made, as for instance: "March 4th. . . 1st Butterfly I saw to-day morn flying in ye air. . ."

Most elaborate descriptions are given, as for example (under June 19th)—

> . . . "Evening lovely fresh delicate serene and Fragrent, Regaling ye soul with all ye essences of natures preparations, yeilding a 1000 cordiall vitall smells, as a breath wafted from Paradise, Pacific Repose of air, stuft with Richest odoriferous effluvia, and heightned with a celestiall illapsed Flavour, Body of Botanic perfumes and Relishes raised by and now showring down in cool and Precious bath of dew: Flower and choicest concocted honey of ye day. ."

Whiston's most vivid passage describes the great thunderstorm of September 10th.

Some outstanding features of the year were:—

July	12th, 13th and 14th	Hottest days almost ever known.
Aug.	25th	Exceptional visibility.
Aug.	27th, 28th and 29th	Early heavy frosts (with ice).
Sept.	10th	Violent thunderstorm raged.
Nov.	10th, 11th and 12th	Floods after much rain.
Nov.	18th	Tempestuous wind.
Nov.	25th	Violent wind and storm.
Nov.	26th	High wind and heavy rain.
Nov.	27th	Hurricane and rain causing floods.
Dec.	14th	Thick fog, very hard frost and ice.
Dec.	15th	Thick fog, very hard frost and ryme.
Dec.	20th	Exceptionally hard frost.

At the end of the volume there is a "General supplement and application of the year," treating of the price of grain—hay—fruit—sheep—season and temperature. The last item is an "Essay Philosophicall of Cause of unequall Growth in Vegetables."

Review

The Evolution of Climates. By Marsden Manson. 8vo. 9¼ by 6¼, pp. 66. Baltimore. The Lord Baltimore Press, 1922.

THE author of this little book has seized upon a few fundamental facts of geological history, and has drawn from them some

far-reaching conclusions. Terrestrial climate, as is well known, has passed through a number of vicissitudes, in which long spells of mild conditions have alternated with short periods of glaciation, including two of outstanding importance—the Permo-Carboniferous and the Quaternary. The Quaternary glaciation developed mainly in cold-temperate latitudes, and has generally been accepted as having occurred under modern zonal conditions, slightly modified towards a lower temperature or an increased snowfall. The Permo-Carboniferous glaciation developed in low latitudes, while high latitudes escaped, and has hitherto defied adequate explanation. Another fact, which has received less attention, is that throughout the long course of geological history these were the only occasions on which a zonal differentiation of climate was manifest, and, except for a few small fluctuations, the oceans appear to have been uniformly warm throughout.

We know that the surface of the larger planets is covered by an almost unbroken layer of cloud, and the author assumes that this must have been the case with the earth also in past times, and in fact comparatively recently. Through this cloud canopy the sun's rays could not penetrate, and as a factor in meteorology the sun was almost inoperative. The earth was radiating more than it was absorbing, and the sources of this outgoing energy were the original supply of earth-heat and radio-active minerals. Owing to the poorly conducting crust earth-heat was liberated, not in a steady stream, but in spasms during periods of volcanic action and crustal movement.

Let us start with one of these liberations of earth heat. Within its protecting cloud canopy the surface, oceans and continents alike, was warm from equator to poles, but the land surfaces cooled more quickly than the heat-conserving oceans, and in due course, while the warm oceans were still supplying enough moisture to maintain the cloud canopy intact, the land surfaces began to freeze and ice-sheets developed. Apart from some local glaciations in the centres of the larger continents this stage was first reached on a planetary scale in the Permo-Carboniferous period; this glaciation coincided more or less with the present sub-tropical high pressure belts, and the reason is stated to be that "cold anticyclonic winds" cooled the land most rapidly in those belts. The cooling of the oceans continued, and, with decreasing evaporation, a stage was reached in which these high pressure areas, to-day possessing the clearest skies of the world, ceased to be mantled in clouds, the sun broke through and deglaciation commenced.

Now followed a period of dual control, solar energy prevailing near the equator, earth-heat towards the poles. In spite of fluctuations the latter gradually diminished, and just before the Pleistocene glaciation the polar oceans became cold

for the first time. Then the second planetary glaciation occurred, centred in the cold temperate belts of greatest precipitation, at this time the only regions which were permanently overcast. The cooling of the oceans continued, and evaporation ceased to supply enough moisture for even this limited cloud belt, the sun shone over the whole world, deglaciation again commenced and is still continuing.

The theory is interesting, but meteorologists will find some insuperable difficulties. With warm oceans and an unbroken cloud canopy the land surfaces, unless at an immence altitude, could not possibly freeze ; the conditions are most nearly realised at present in the equatorial rain belt, in which the land is maintained at the same temperature as the neighbouring oceans. " Cold anticyclonic winds " presuppose cooling by radiation ; even if under world-wide isothermal conditions the pressure distribution could remain unaltered, which is highly improbable, we must suppose either that the anticyclone would break down the cloud canopy, in which case the tropical sun would certainly prevent glaciation, or that the clouds would remain in spite of the anticyclone, in which case the descending air would not be cold. There are also geological difficulties, such as the existence even in very early geological times of " fossil deserts," which could hardly have been found without solar control and clear skies. Past weather must have differed from present weather, just as past geography has differed from present geography, but we cannot accept such radical changes in the laws of meteorology as are set out in this book. C.E.P.B.

Obituary

Mr. Richard Strachan.—At the advanced age of 90 Mr. Richard Strachan died on Easter day, April 20th, 1924. Strachan was educated at the Greenwich Hospital Nautical School, and afterwards taught Navigation at the Sailors' Home, Poplar. He entered the Board of Trade, and was soon transferred to the Meteorological Department organised under the superintendence of Admiral FitzRoy in 1855, being responsible for work in connection with the supply to ships of the Royal Navy and mercantile marine of the instruments required for the keeping of meteorological logs. The Meteorological Register, which he designed for the use of private observers, was first published about the end of 1863 and is still in use.

In 1864 a monthly journal, *The Meteorological Magazine*, was started. The magazine was " printed and published for the proprietors " by Williams and Strahan. There is no statement in the magazine as to the identity of the proprietors, but it is understood that credit must be given to Strachan for initiating the enterprise as well as for his excellent work as editor. The

only four numbers of the magazine to be published are still of great interest, and it must have been very disappointing to Strachan to find that for lack of financial support publication could not be continued. Two years later Symons started *Symons's Meteorological Magazine* on more modest lines and was able to make it a success. The present *Meteorological Magazine* is, of course, the sequel to Symons's.

Strachan was elected a Fellow of the Royal Meteorological Society in 1865, and was a Fellow for nearly 60 years; he served on the Council, and contributed several communications to the Society's Journal. He also contributed many articles to the *Horological Journal*, chiefly on meteorological instruments. He carried out several official discussions, notably those embodied in the series of reports on the weather of the Arctic and Antarctic regions which he compiled from the observations of early navigators. Strachan retired from the Meteorological Office in 1900 after long and meritorious service. Ten years after his retirement he published a collection of essays on meteorological subjects, and, indeed, until comparatively recently, he showed his vigour by taking part in the discussions at the Meteorological Office.

News in Brief

We regret to learn of the death, at Vienna, of Professor F. H. Bigelow, late Professor of Meteorology in the Argentine Meteorological Office.

We are informed that Professor Pilgrim, Director of the Meteorological Department of the Würtemberg Statistical Office, and Professor Meyer, Director of the Würtemberg State Meteorological Office, have retired, and that Professor E. Kleinschmidt has been appointed in succession to them both.

In a match between the Air Ministry and War Office Chess Clubs, the Air Ministry won by five games to one. Three out of the six players in the Air Ministry team were from the Meteorological Office, and all won.

According to the *Daily Chronicle* the local "experts" at Pantchevo, near Belgrade, have declared that, since the establishment of an important air station there, there has been an extraordinary absence of any normal rainfall, and an inquiry has been begun by the Academy of Science in Belgrade.

The official times for the explosions at La Courtine (*vide M.M.*, April, 1924, p. 49) are as follows:—May 15th, 7.30 p.m., May 23rd, 8.0 p.m., May 25th, 9.0 p.m. British Summer Time. The air-waves should take about 30 minutes to reach the south of England.

On April 16th at 11h. 30m. (G.M.T.), a waterspout in the whirling spray stage was observed in the harbour at Stornoway. It was travelling seawards. The base was about 10 feet across, and the height up to 50 feet. During the previous few days the weather had been very wild, and on the day of the observation hail showers occurred with a NNW wind, force 8 or 9, in squalls.

The Weather of April, 1924

WITH the exception of a spell of warm sunny weather at Easter the conditions during April were generally cloudy and cool. At the beginning of the month, pressure was high over Scotland, and a few days of bright sunshine were experienced in the west and north, but, after the 4th, the high pressure withdrew westwards to the Atlantic, and then moved south, giving cool northerly winds, backing to west over the whole kingdom. Very little precipitation occurred during this period, there being only slight showers of snow, sleet or hail at a few places. Temperature was low generally, but rose to about 60° F. in parts of eastern England and the Midlands. On the 7th, at Geldeston (near Beccles) and at Scarborough, 63° F. was reached. Subsequently a cold current from Arctic regions spread down the western coasts of Europe and caused a renewal of cool weather. Secondary depressions developed near the Hebrides and were associated with considerable rain, snow, sleet and local thunderstorms as they moved south-east. Meanwhile further depressions were approaching from the Azores. On the night of the 8th-9th, 3 inches of snow fell at Achnashellach, followed by $2\frac{1}{2}$ inches on the night of the 10th-11th, and "snow lying" was reported from a few stations for several days. Rain fell repeatedly further south; 71 mm. (2·80 ins.) at Holne (Devon) and 52 mm. (2·03 ins.) at Tynywaun (Glamorgan), on the 13th, were among the largest amounts recorded. On the 16th an anticyclone spread northwards from France, and fine sunny warm weather prevailed (except in the extreme north) from then until after Easter. Temperature rose above 60° F. on the 18th, 19th and 20th, and reached 76° F. at Greenwich and 75° F. at S. Farnborough on the 21st (Easter Monday). After this, further depressions approaching from the Atlantic brought a renewal of cloudy, rainy conditions, though bright intervals intervened. Thunderstorms occurred locally in southeast and east England on the 26th, and gales were experienced in the English Channel on the 27th. The heavy rains during the latter part of the month brought the total precipitation for the month up to 189 mm. (7·45 ins.) at Cray (Brecon) and to 164 mm. (6·46 ins.) at Blaenau (Brecon). At Kew Observatory the total of 87 mm. has only once (in 1878) been exceeded in April since 1866.

The outstanding feature of weather abroad during the early part of April was the continuation, over various parts of Europe and America, of the heavy rainfalls and flood of the latter part of March. In Italy heavy rain and hail storms caused considerable damage and loss, and the River Po rose steadily. In Switzerland heavy falls of snow caused obstruction in many of the Alpine passes, but the floods caused at the end of March by the melting of the snow, were checked by the low temperature which prevailed during the first days of the month. The torrential rains reported last month in Spain have caused extensive landslides in the province of Granada: olive groves have moved downhill and many buildings have collapsed. Seville was flooded and many lives lost. At Rio de Janeiro nine and a half inches of rain were reported to have fallen in five hours on the 4th. Several lives were lost through the floods and the consequent collapse of small houses.

Bengal was suffering from exceptionally early hot, dry weather in March, and no relief was felt this month, very high temperatures being recorded during the first week. In Calcutta temperature in the shade exceeded 110° F. on some occasions. On April 25th, at Pihani, in the Hardoi district of Oudh, India, a tornado, about 300 yards in diameter, swept from west to east for a distance of six miles. Three villages were destroyed, and many people killed.

Towards the end of the month severe storms were experienced on the north-western and northern coasts of Europe. On the 30th a series of tornadoes swept across the south-eastern United States from Louisiana to Virginia. The storms were most violent in South Carolina, Alabama and Georgia. The town of Fickling in Georgia is reported to have been entirely destroyed. Many lives were lost.

The special message from Brazil states that in the north there was a great deficit of rain in the Amazon and Para States, but that in the other States the rainfall was unusually heavy, being over 200 mm. above normal. Disastrous floods occurred with much loss of life in all the States, including the drought region. In central and southern Brazil the rainfall was very irregular and the averages were 17 mm. under and 32 mm. above normal respectively. The cotton crop is badly affected by the boll weevil. At Rio de Janeiro pressure was 0·9 mm. under normal for the month, and temperature 0·8° C. above normal.

Rainfall April, 1924: General Distribution

England and Wales	145	per cent. of the average 1881-1915.
Scotland	95	
Ireland	125	
British Isles	128	

Rainfall: April, 1924: England and Wales.

CO.	STATION.	In.	mm.	Per-cent. of Av	CO.	STATION.	In.	mm.	Per-cent. of Av.
Lond.	Camden Square.....	3·14	80	204	*War.*	Birminghm, Edgbaston	3·04	77	175
Sur .	Reigate, Hartswood...	3·50	89	226	*Leics*	Leicester Town Hall...	1·95	49	...
Kent.	Tenterden, View Tower	2·95	66	182	,, .	Belvoir Castle.....	1·67	42	109
,, .	Folkestone, Boro. San.	2·34	59	...	*Rut .*	Ridlington.....	2·19	56	...
,, .	Broadstairs	2·09	53	151	*Linc.*	Boston, Skirbeck	1·80	46	133
,, .	Sevenoaks, Speldhurst.	4·01	102	...	,, .	Lincoln, Sessions House	1·32	33	95
Sus .	Patching Farm.....	3·04	77	174	,, .	Skegness, Estate Office.	1·49	38	111
,, .	Eastbourne, Wilm. Sq.	1·59	66	87	,, .	Louth, Westgate	1·65	42	99
,, .	Tottingworth Park....	3·64	93	197	,, .	Brigg	1·22	31	78
Hants	Totland Bay, Aston...	2·53	64	154	*Notts.*	Worksop, Hodsock....	1·42	36	97
,, .	Fordingbridge, Oaklnds	3·53	90	193	*Derby*	Mickleover, Clyde Ho..	2·38	61	138
,, .	Portsmouth, Vic. Park.	2·46	62	157	,, .	Buxton, Devon. Hos...	2·68	68	91
,, .	Ovington Rectory	4·16	106	220	*Ches.*	Runcorn, Weston Pt...	2·27	58	131
,, .	Grayshott	3·84	98	196	,, ..	Nantwich, Dorfold Hall	2·01	51	...
Berks	Wellington College...	3·28	83	204	*Lancs*	Bolton, Queen's Park .	2·06	52	...
,, .	Newbury, Greenham..	3·34	85	183	,, ..	Stonyhurst College....	1·80	46	66
Herts.	Bennington House....	2·93	74	192	,, ..	Southport, Hesketh...	1·43	36	77
Bucks	High Wycombe	3·39	86	216	,, ..	Lancaster, Strathspey.	1·65	42	...
Oxf..	Oxford, Mag. College..	2·45	62	159	*Yorks*	Sedbergh, Akay	2·59	66	80
Nor .	Pitsford, Sedgebrook..	3·02	77	196	,, .	Wath-upon-Dearne ...	1·52	39	96
,, .	Eye, Northolm.....	1·65	42	...	,, .	Bradford, Lister Pk...	2·07	53	103
Beds.	Woburn, Crawley Mill.	2·97	75	198	,, .	Oughtershaw Hall	3·15	80	...
Cam.	Cambridge, Bot. Gdns.	2·88	73	212	,, .	Wetherby, Ribston H..	1·66	42	94
Essex	Chelmsford, CountyLab	3 16	80	...	,,	Hull, Pearson Park ...	1·49	38	95
,, .	Lexden, Hill House...	2·62	67	...	,, .	Holme-on-Spalding ...	1·93	49	...
Suff .	Hawkedon Rectory ...	2·64	67	171	,, .	Lowthorpe, The Elms.	1·74	44	104
,, .	Haughley House.....	2·42	61	...	,, .	West Witton, Ivy Ho..	1·90	48	...
Norf.	Beccles, Geldeston....	2·42	61	165	,, .	Pickering, Hungate ...	2·10	53	...
,, .	Norwich, Eaton	2·05	52	120	,, .	Middlesbrough	1·79	45	131
,, .	Blakeney	1·48	38	116	,, .	Baldersdale, Hury Res.	2·08	53	87
,, .	Swaffham	2·18	55	147	*Durh.*	Ushaw College	1·75	44	93
Wilts.	Devizes, Highclere....	3·27	83	172	*Nor .*	Newcastle, Town Moor.	1·71	43	104
Dor .	Evershot, Melbury Ho.	3·71	94	157	,, .	Bellingham Manor....	1·59	40	...
,, .	Weymouth, Westham..	2·49	63	150	,, .	Lilburn Tower Gdns...	1·49	38	...
,, .	Shaftesbury, Abbey Ho.	2·73	69	128	*Cumb*	Penrith, Newton Rigg..	1·85	47	89
Devon	Plymouth, The Hoe...	3·34	85	151	,, .	Carlisle, Scaleby Hall .	1·99	50	102
,, .	Polapit Tamar	3·94	100	168	,, .	Seathwaite	5·75	146	77
,, .	Ashburton, Druid Ho..	5·54	141	182	*Glam.*	Cardiff, Ely P. Stn....	3·40	86	134
,, .	Cullompton	3·73	95	164	,, .	Treherbert, Tynywaun	8·15	207	...
,, .	Sidmouth, Sidmount ..	2·78	71	131	*Carm*	Carmarthen Friary....	4·33	110	158
,, .	Filleigh, Castle Hill ...	3·70	94	...	,, .	Llanwrda, Dolaucothy.	5·15	131	156
,, .	Hartland Abbey.....	2·76	70	...	*Pemb*	Haverfordwest, Portf'd	...	...	...
Corn.	Redruth, Trewirgie ...	3·99	101	138	*Card.*	Gogerddan.....	2·54	65	97
,, .	Penzance, Morrab Gdn.	2·95	75	121	,, .	Cardigan, County Sch. .	3·33	85	...
,, .	St. Austell, Trevarna..	3·65	93	129	*Brec .*	Crickhowell, Talymaes	4·00	102	...
Soms	Chewton Mendip	5·16	131	174	*Rad .*	Birm.W.W.Tyrmynydd	5·72	145	155
,, .	Street, Hind Hayes ...	2·46	63	...	*Mont.*	Lake Vyrnwy	4·89	124	162
Glos..	Clifton College	3·25	83	151	*Denb.*	Llangynhafal	1·83	47	...
,, .	Cirencester	2·91	74	152	*Mer .*	Dolgelly, Bryntirion..	4·66	118	128
Here .	Ross, County Obsy.	2·49	63	132	*Carn.*	Llandudno	2·01	51	111
,, .	Ledbury, Underdown.	2·87	73	158	,, .	Snowdon, L. Llydaw 9	9·07	230	...
Salop	Church Stretton.....	4·10	104	190	*Ang .*	Holyhead, Salt Island.	2·81	71	135
,, .	Shifnal, Hatton Grange	3·30	84	196	,, .	Lligwy	2·42	61	...
Staff.	Tean, The Heath Ho...	3·03	77	152	*Isle of Man*				
Worc.	Ombersley, Holt Lock.	2·92	74	192		Douglas, Boro, Cem...	3·75	95	154
,, .	Blockley, Upton Wold.	4·28	109	221	*Guernsey*				
War.	Farnborough.....	3·14	80	160		St. Peter Port Grange .	3·34	85	166

Rainfall: April, 1924: Scotland and Ireland.

CO.	STATION.	In.	mm.	Per-cent. of Av.	CO.	STATION.	In.	mm	Per-cent of Av.
Wigt.	Stoneykirk, Ardwell Ho	2·67	68	127	*Suth.*	Melvich School.....	2·39	61	103
,, .	Pt. William, Monreith .	1·90	48	...	*Caith*	Loch More, Achfary...	5·74	146	118
Kirk.	Carsphairn, Shiel.	3·83	97	...	,, .	Wick	1·03	26	52
,, .	Dumfries, Cargen.....	3·33	85	125	*Ork .*	Pomona, Deerness	1·81	46	87
Dum	Drumlanrig	3·00	76	122	*Shet .*	Lerwick	5·41	137	237
Roxb	Branxholme	1·73	44	91	*Cork.*	Caheragh Rectory	4·81	122	...
Selk .	Ettrick Manse.....	3·75	95	...	,, ..	Dunmanway Rectory.	3·80	97	92
Berk.	Marchmont House	1·24	31	61	,, ..	Ballinacurra	2·14	54	83
Hadd	North Berwick Res....	0·76	19	54	,, ..	Glanmire, Lota Lo. ...	2·45	62	87
Midl	Edinburgh, Roy. Obs..	1·04	26	76	*Kerry*	Valencia Obsy.	3·06	78	83
Lan .	Biggar	1·52	39	88	,, .	Gearahameen	6·50	165	...
Ayr .	Kilmarnock, Agric. C..	2·25	57	109	,, .	Killarney Asylum.....	3·03	77	92
,, .	Girvan, Pinmore.....	5·45	138	183	,, .	Darrynane Abbey	2·02	51	59
Renf.	Glasgow, Queen's Pk..	2·14	54	109	*Wat .*	Waterford, Brook Lo..	2·73	69	107
,, .	Greenock, Prospect H..	3·42	87	94	*Tip .*	Nenagh, Cas. Lough...	3·16	80	126
Bute.	Rothesay, Ardencraig.	3·81	97	128	,, .	Tipperary	2·32	59	...
,, .	Dougarie Lodge	3·59	91	...	,, .	Cashel, Ballinamona ..	2·44	62	98
Arg .	Glen Etive.....	5·21	132	...	*Lim .*	Foynes, Coolnanes	3·05	77	125
,, .	Oban	3·10	79	...	,, .	Castleconnell Rec.	3·32	84	...
,, .	Poltalloch	3·67	93	125	*Clare*	Inagh, Mount Callan ..	3·12	79	...
,, .	Inveraray Castle.....	4·21	107	92	,, .	Broadford, Hurdlest'n.	4·00	102	...
,, .	Islay, Eallabus.....	3·88	99	135	*Wexf*	Newtownbarry	3·61	92	...
,, .	Mull, Benmore	8·70	221	...	,, .	Gorey, Courtown Ho...	2·58	65	118
Kinr.	Loch Leven Sluice	1·65	42	86	*Kilk.*	Kilkenny Castle	2·35	60	108
Perth	Loch Dhu	4·95	126	104	*Wic .*	Rathnew, Clonmannon	2·86	73	...
,, ..	Balquhidder, Stronvar.	3·14	80	70	*Cars.*	Hacketstown Rectory .	3·46	88	131
,, ..	Crieff, Strathearn Hyd.	2·84	72	130	*QCo..*	Blandsfort House.....	3·20	81	123
,, ..	Blair Castle Gardens ..	1·76	45	...	,,	Mountmellick	2·86	73	...
,, .	Coupar Angus School..	1·51	38	91	*KCo.*	Birr Castle.....	3·31	84	154
Forf.	Dundee, E. Necropolis.	1·83	47	108	*Dubl.*	Dublin, FitzWm. Sq...	1·70	43	89
,, .	Pearsie House.....	2·20	56	...	,, .	Balbriggan, Ardgillan .	2·81	71	142
,, .	Montrose, Sunnyside..	1·56	40	86	*Me'th*	Drogheda, Mornington	2·45	62	...
Aber.	Braemar Bank	1·55	39	67	*W.M*	Mullingar, Belvedere	3·68	93	155
,, .	Logie Coldstone Sch. ..	1·24	31	62	*Long*	Castle Forbes Gdns....	4·18	106	175
,, .	Aberdeen, Cranford Ho	1·92	49	94	*Gal .*	Galway, Waterdale ...	2·20	56	...
,, .	Fyvie Castle	0·90	23	...	,, .	Ballynahinch Castle ..	4·52	115	...
Mor .	Gordon Castle.....	0·88	22	50	*Mayo*	Mallaranny.....	3·55	90	...
,,	Grantown-on-Spey....	0·47	12	24	,, .	Westport House.....	2·66	68	98
Na .	Nairn, Delnies.....	0·50	13	33	,, .	Delphi Lodge	5·21	132	...
Inv..	Ben Alder Lodge	2·31	59	...	*Sligo*	Markree Obsy.	4·75	121	180
,, .	Kingussie, The Birches	1·23	31	...	*Ferm*	Enniskillen, Portora ..	4·36	111	...
,, .	Fort Augustus	1·71	43	67	*Arm.*	Armagh Obsy.	2·51	64	119
,, .	Loch Quoich, Loan....	9·30	236	...	*Down*	Warrenpoint	3·32	84	...
,, .	Glenquoich	...	...	...	,, .	Seaforde	3·94	100	150
,, .	Inverness, Culduthel R.	0·80	20	...	,, .	Donaghadee	2·58	66	129
,, .	Arisaig, Faire-na-Squir	...	...	...	,, .	Banbridge, Milltown .	2·37	60	116
,, .	Fort William.....	3·26	83	74	*Antr.*	Belfast, Cavehill Rd..	3·38	86	...
,, .	Skye, Dunvegan.....	2·89	73	....	,, .	Glenarm Castle.....	2·53	64	...
,, .	Barra, Castlebay	1·87	47	...	,, .	Ballymena, Harryville	2·48	63	94
R&C	Alness, Ardross Cas. ..	1·47	37	61	*Lon .*	Londonderry, Creggan	4·13	105	161
,, .	Ullapool.....	2·59	66	...	*Tyr .*	Donaghmore	3·22	82	...
,, .	Torridon, Bendamph..	4·45	113	85	,, .	Omagh, Edenfel	3·32	84	126
,, .	L. Carron, Plockton...	3·38	86	...	*Don .*	Malin Head	3·67	93	186
,, .	Stornoway	2·87	73	95	,, .	Rathmullen.....	...	...	...
Suth.	Dunrobin Castle.....	...	...	...	,, .	Dunfanaghy	4·66	118	173
,, .	Lairg	1·91	49	...	,, .	Narin, Kiltoorish	4·47	113	...
,, .	Tongue Manse.....	2·51	64	96	,, .	Killybegs, Rockmount.	6·98	177	194

Ballynahinch, Jan. 6·82 ins., 173 mm., Feb. 2·70 ins., 69 mm., Mar. 3·30 ins., 84 mm.

Climatological Table for the British Empire, November, 1923

STATIONS	PRESSURE		TEMPERATURE							Relative Humidity	Mean Cloud Am'nt	PRECIPITATION			BRIGHT SUNSHINE	
			Absolute		Mean Values				Mean							
	Mean of Day M.S.L.	Diff. from Normal	Max.	Min.	Max.	Min.	½ max. and min.	Diff. from Normal	Wet Bulb.			Am'nt	Diff. from Normal	Days	Hours per day	Percentage of possible.
	mb.	mb.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	%	0—10	mm.	mm.			
London, Kew Obsy.	1009·2	— 5·4	58	23	44·2	33·3	38·7	— 5·3	37·9	85	6·4	37	— 19	11	2·4	28
Gibraltar	1015·0	— 1·5	72	46	63·8	52·1	57·9	— 1·8	54·2	76	5·3	217	+ 56	12	...	...
Malta	1016·0	+ 0·3	77	57	70·2	62·3	66·2	+ 3·2	61·1	77	5·9	95	+ 14	10	5·5	54
Sierra Leone	1011·7	+ 0·9	91	71	87·9	74·0	80·9	— 0·3	76·2	78	4·9	122	— 12	16	...	...
Lagos, Nigeria	1009·7	— 1·1	90	71	88·5	76·6	82·5	+ 1·2	78·3	75	6·5	69	+ 3	6	...	...
Kaduna, Nigeria	1013·7	+ 2·4	94	...	90·5	...	...	...	67·0	53	2·5	0	— 1	0	...	...
Zomba, Nyasaland	1007·9	— 1·1	100	63	91·7	68·6	80·1	+ 5·0	...	81	3·3	6	—136	3	...	...
Salisbury, Rhodesia	1007·0	— 3·0	99	51	91·8	58·6	75·2	+ 4·3	63·1	42	3·3	20	— 72	6	...	...
Cape Town	1014·8	— 0·9	88	50	74·3	57·4	65·9	+ 2·8	62·5	70	4·7	82	+ 55	8	...	...
Johannesburg	1009·9	— 0·5	89	49	78·5	56·7	67·6	+ 4·2	56·3	52	4·5	113	+ 5	13	8·7	65
Mauritius	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bloemfontein	...	...	93	43	83·7	55·5	69·6	+ 1·2	57·4	47	4·1	72	+ 14	5	...	...
Calcutta, Alipore Obsy.	1012·4	— 0·9	89	53	83·2	65·3	74·3	+ 1·2	65·3	77	4·5	18	+ 4	*1	...	...
Bombay	1011·4	— 0·5	92	67	86·4	72·4	79·4	— 0·9	69·5	75	1·8	0	— 10	*0	...	...
Madras	1011·1	— 0·2	92	66	86·3	72·5	79·4	+ 0·7	73·9	77	4·7	92	—233	*4	...	...
Colombo, Ceylon	1010·6	+ 0·5	88	72	86·0	73·9	79·9	— 0·4	76·7	71	7·9	222	— 85	24	6·9	58
Hong Kong	1016·0	— 1·6	83	60	75·6	68·3	71·9	+ 2·2	65·7	72	5·2	10	— 26	2	6·7	61
Sandakan	...	...	90	73	86·8	75·1	80·9	— 0·1	76·8†	80†	...	224	—149	14	...	...
Sydney	1012·3	— 1·4	100	49	74·4	56·2	65·3	— 1·7	57·0	58	3·4	35	— 38	8	10·4	75
Melbourne	1013·1	— 1·1	101	42	68·8	50·0	59·4	— 1·9	52·9	57	6·0	71	+ 15	17	...	...
Adelaide	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Perth, W. Australia	1016·9	+ 1·6	95	47	77·7	55·6	66·7	+ 0·9	58·6	60	3·2	1	— 19	1	9·2	67
Coolgardie	1014·4	+ 1·3	107	44	88·7	57·5	73·1	+ 2·3	60·1	31	2·7	0	— 17	0	...	...
Brisbane	1013·4	— 0·9	95	58	82·3	64·2	73·3	— 0·3	66·4	62	3·8	31	— 61	9	9·4	70
Hobart, Tasmania	1008·3	— 1·1	84	38	62·2	46·9	54·5	— 2·7	49·5	65	7·4	173	+109	18	6·8	47
Wellington, N.Z.	1017·2	+ 5·6	73	39	66·9	53·9	60·4	+ 3·5	54·8	68	5·9	19	— 73	8	7·2	50
Suva, Fiji	1010·6	— 0·5	84	63	80·3	69·4	74·9	— 2·3	71·9	75	7·0	348	+106	19	...	...
Kingston, Jamaica	1012·5	— 0·2	92	66	88·3	70·9	79·6	+ 0·3	...	70	5·5	30	— 50	2	...	...
Grenada, W.I.	1012·2	+ 1·6	88	73	85·2	74·7	79·9	+ 0·6	75·3	75	4·9	149	— 59	20	...	...
Toronto	1018·0	+ 1·2	58	22	45·1	33·0	39·1	+ 2·8	35·2	80	6·8	84	+ 9	11	2·6	27
Winnipeg	1014·4	— 2·3	64	2	42·5	26·2	34·3	+13·5	30·8	82	5·2	23	— 1	11	3·0	33
St. John, N.B.	1017·3	+ 3·4	57	15	45·7	33·0	39·3	+ 2·6	36·8	86	6·1	116	+ 4	10	3·0	32
Victoria, B.C.	1019·1	+ 3·6	57	36	50·7	42·9	46·8	+ 2·4	45·0	95	7·5	74	— 90	21	2·8	30

* For Indian stations a rain day is a day on which 0·1 in. (2·5 mm.) or more rain has fallen. † Mean of observations at 9h., 15h., 21h., from April, 1923.