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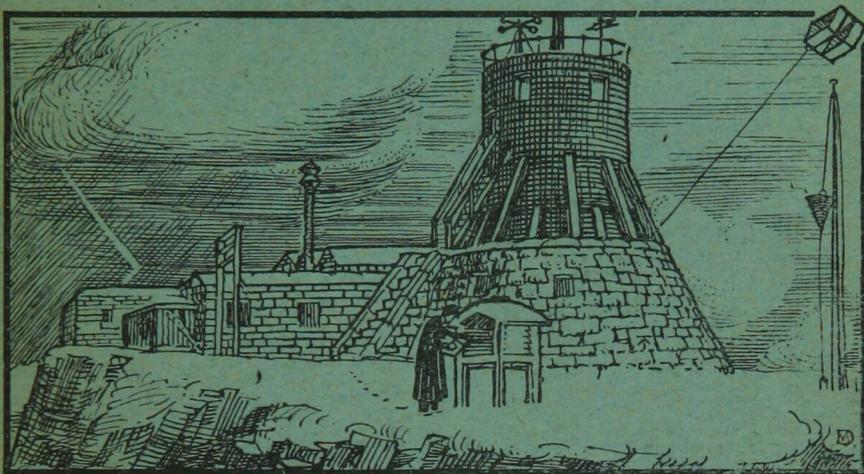
# METEOROLOGICAL



# MAGAZINE



•••• EDITED BY HUGH ROBERT MILL ••••



FEBRUARY, 1911.

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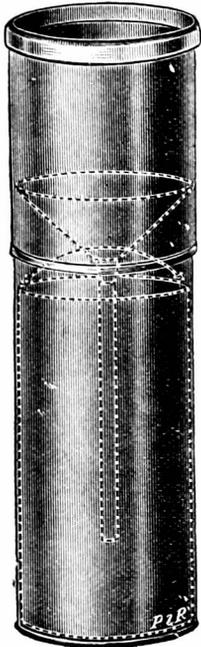
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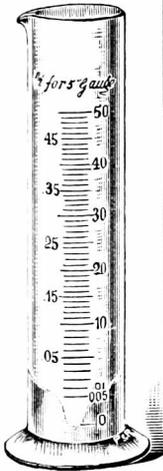
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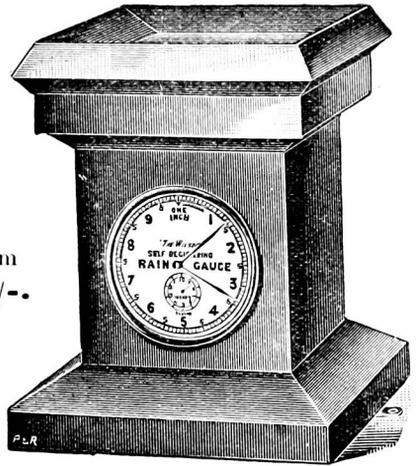


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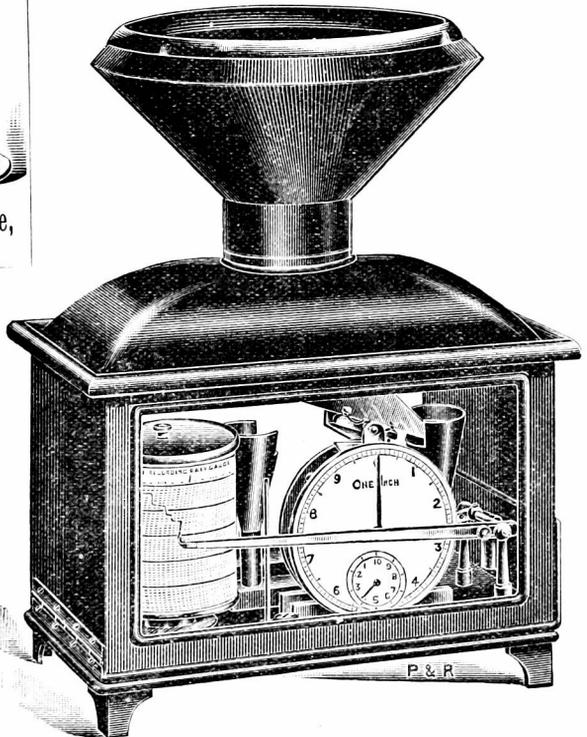


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# Symons's Meteorological Magazine.

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FEBRUARY, 1911.

VOL. XLVI.

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## THE NEW OBSERVATORY AT COLOMBO AND ITS WORK.

BY THE EDITOR.

THE opportunity of a holiday voyage made it possible to pay a visit to the recently established Central Observatory of the Ceylon Meteorological Service, the records of which, and of the earlier station which it has superseded, have appeared month by month in our Table of the Climatology of the British Empire for the last 30 years. All through the Red Sea on the outward voyage the weather was brilliant, the northerly gale of the northern half making the blue waves leap into dazzling plumes of foam : the steady glare and humid heat of the calm belt off Suakin, made doubly welcome the renewed dash and glitter of the sea in the southern part of the Sea in response to the southerly head wind. Dolphins played round the bows like sea-horses harnessed to the ship, and flights of flying fish sprang clattering from the sides, gleaming in the sun like gigantic dragon flies. But all this gave place to dull grey skies, and as leaden a sea as that around the British Isles on a winter day, before the Indian Ocean was crossed. Occasional showers of heavy rain shut out the horizon like a fog through which the steamer had to proceed slowly with whistle blowing and nothing but the heat to show that we were within the tropics and not on the Arctic circle. The glimpse of the rugged coast of southern India on the day before reaching Colombo revealed masses of cloud rolling through the mountain passes in the early morning, and a close covering of dense cloud during the forenoon shrouded the land in the last expiring rains of the south-west monsoon, which had reasserted itself after having apparently ceased for the season. The climate of Colombo was indicated by the palm trees which dominate the gardens, the arcades and deep verandahs which surround the houses and shops, and by the crowds of picturesquely clad and unclad natives of every country of the East. The deep red roads which ran in bewildering ramifications through the rich green of grass and trees were dustless on account of the recurring showers. The journey of three miles out to the Observatory in a rubber-tired rickshaw, was a continuous panorama of the rich and varied life of

the East. There were the great palm leaf woven covers of the bullock carts and the pathetically small oxen, the squatting coolies repairing the roads by filling the hollows with road-metal and earth out of small baskets, patting the mounds smooth with their hands in readiness for the steam-roller, the continuous ringing of rickshaw bells and now and then the hoot of a motor: the trimly kept gardens of the bungalows formed a background, the impudent dark blue scavenger crows were everywhere, and the great black clouds rolling overhead as a grim contrast to the occasional bursts of sunshine which called out all the unfamiliar colours of the scene.

We have seldom known two hours pass so quickly as those in which the kindness of Mr. H. C. Barnard, the superintendent of the Observatory, and of Mr. A. J. Bamford, the chief assistant, enabled us to see the new Observatory and the work done in it on the meteorology of Ceylon. At the present day, as our fellow passengers had been obliging enough to demonstrate by day and night throughout the three weeks' voyage, sport is better understood than science by the ruling race in the East. Curiously enough but for this fact we might very possibly never have reached the Observatory in our rickshaw, and the Observatory itself would have been much less favourably situated, for its eight acres of ground are surrounded on the west, north and east by the links of the Ladies' Golf Club which, of course, is known to every rickshaw coolie, and the golf links being secure against building provide a free horizon on three sides. We feel sure that it will not be Mr. Barnard's fault if the tables are not turned in a few years' time, so that the stranger seeking the golf links will be told that they lie next to the Observatory.

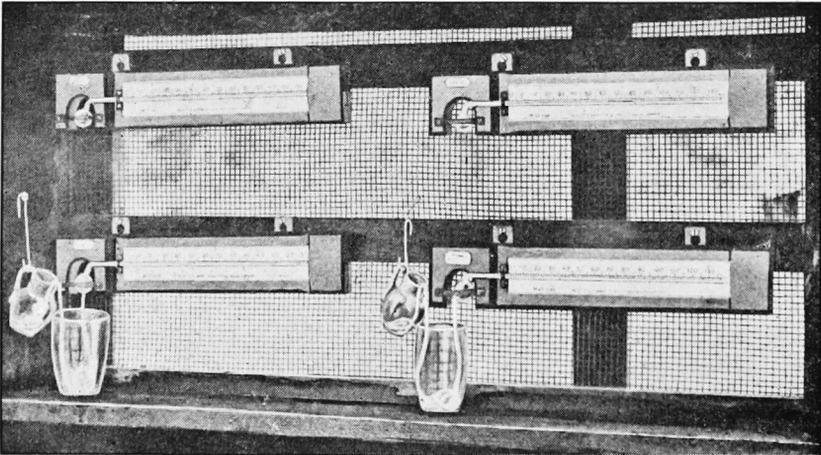


FIG. 1.—THERMOMETERS AS SET UP AT COLOMBO OBSERVATORY.

Although three miles from the sea the site of the Observatory is only 20 feet above sea level, and is fairly characteristic of Colombo. The few trees in the grounds do not interfere with the free movement

of the air. The main building of the Observatory is certainly unpretentious, but it is eminently practical, and has been designed to give as much accommodation as could be provided with the money available. It is one storey high, and consists, as shown in the plan, of three main rooms, with a verandah in front. The large room on the west has accommodation for ten clerks, the central room is a library, and the room on the east is the Superintendent's office, off which there opens a range of three smaller rooms running eastward, and consisting of a transit room, dark room and seismograph room, as the Observatory is so far astronomical as to be charged with the regulation of time. A 12½ in. equatorial reflecting telescope is sheltered in a temporary shed in the grounds, but a proper building with a revolving dome will probably soon be provided for it. The main building is constructed of reinforced concrete, and the transit and

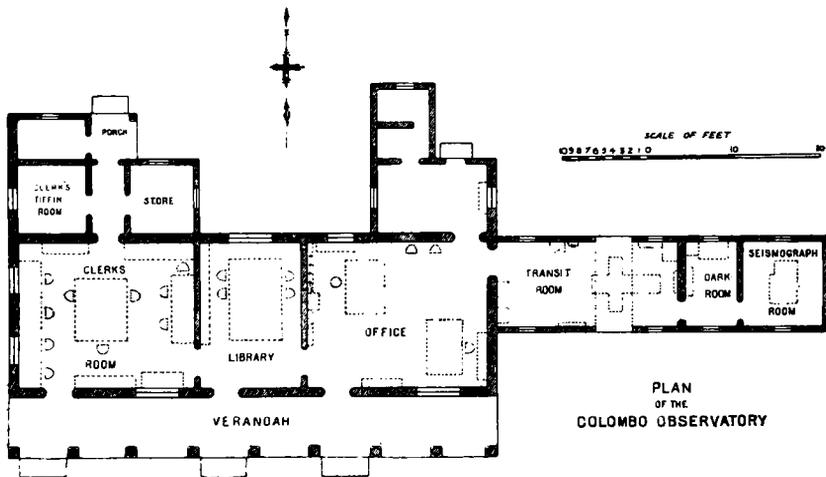


FIG. 2.—PLAN OF THE COLOMBO OBSERVATORY.

seismograph pillars of the same material are carried down, free of the concrete floors, from which they are separated by a two inch space filled with pitch, to foundations on the rock. The standard Fortin barometer is kept in the Superintendent's Office, to which it was transferred on April 27th, 1909, which may thus be taken as the date of opening of the new Observatory. A new form of barometer was devised by Mr. Barnard for use in the out-stations, where the setting of the ivory point in the cistern of the Fortin barometer proved to be an insuperable difficulty. Instead of adopting the narrow fixed cistern of the Kew barometer, which necessitates an arbitrary graduation of the scale, Mr. Barnard secures the absolute readings of the scale by making the cistern of great diameter as compared with the tube, so that in a country where the barometric range is so small as

in Ceylon\* the change of level in the cistern becomes negligible. The area of the cast-steel mercury cistern is about 200 times that of the cross section of the tube (it measures about 7 inches in diameter), and the instruments have been constructed by Messrs. Pastorelli & Rapkin. The recording instruments at present in use are of the Richard pattern, and except the recording rain gauge, which acts well, they are hardly worthy of such an observatory. The anemograph is of the Lander & Smith pattern.

The thermometer screen adopted for Ceylon is a square hut with a double roof, the ground plan being 8 feet square and the height 7 feet to the eaves. The sides are of wire netting, but a screen can be placed on the side on which the sun is shining. It must be remembered that in Colombo in latitude  $7^{\circ}$  N. the sun is for part of the year in the north at noon, though for most of the time it is in the south; but on account of the low latitude the noonday sun is always within  $30^{\circ}$  of the zenith, and it is vertical twice in the year. In these conditions of intense insolation the Stevenson screen could not give satisfactory results, and the free exposure of the instruments inside the open hut appears to be fully satisfactory. The ordinary wet and dry bulb thermometers for direct reading are not used, but instead there are maximum and minimum thermometers, both with dry and wet bulbs. The latter are provided with reservoirs always kept full of water, so that the distance from the water-surface to the bulb does not vary. This is done by means of a wick dipping to a little glass jug hung on the frame, which is so adjusted that it supplies exactly as much water to the cup as is evaporated from the bulb (Fig. 1). In an enclosure near the thermometer screen there are placed the 8-inch rain gauge at 1 foot, which is the standard pattern in the island, the Richard recording gauge and some experimental rain gauges, a series of earth thermometers and radiation thermometers. The Campbell-Stokes sunshine-recorder was found unsatisfactory, as the cards were so strongly burnt as to make the record illegible, but comparable results have been obtained by the use of a Lander and Smith photographic sunshine-recorder.

The "Report on the Colombo Observatory and the Meteorology of Ceylon for 1909," which was published in June, 1910, gives details of the observations at the sixteen meteorological stations in Ceylon situated at elevations varying from 11 to 6188 feet above sea-level, and at the 201 rainfall stations. Maps of the island show the mean rainfall and the rainfall of 1909 for the year and for the respective periods of the south-west and north-east monsoons. In the Observatory we saw a very neat presentation of the rainfall of the previous month on a map of Ceylon, with a glass-headed pin representing each station. The colour of the heads indicated the amount of monthly rainfall, and apart from the graphic representation of

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\* The highest barometer ever recorded in Colombo was 30.096 in., on October 12th, 1904; the lowest ever recorded was 29.607 in., on June 24th, 1892, a total range of .489 in. The greatest range in any month was .243 in., in February, 1881.

rainfall distribution, this afforded a ready means of detecting errors in the returns. The Report contains short notices of several pieces of research; one of these is an interesting study by means of an electric fan and a relief model of the stream lines of air when wind blows against a cliff.

The proximity of India with its vast and highly organized meteorological system, sets a standard of comparison which may well be somewhat discouraging for the Government of Ceylon to contemplate; but bearing in mind the insularity of Ceylon and the supreme importance of an accurate knowledge of its climate with regard to its natural resources, we cannot but view with satisfaction the important step which has been taken in establishing the Colombo Observatory. After having inspected the Observatory and seen the way in which the instruments are kept and the records of the meteorology of the island preserved and discussed, we feel that the time has come for the Colonial Government to consider a complete equipment of first-class instruments, including photographic recorders for barometer, and wet and dry bulb thermometers as employed in the observatories under the Meteorological Office. While the photographic barometer could probably be set up in the Seismograph room, a special building would have to be provided for the photographic thermometers, the usual exposure of which, though suitable for the British Isles, would not be satisfactory in the tropics. Experiments on the subject might very well be made, and we feel sure that a judicious expenditure of public money would repay the Colony many times over, while there is so competent and enthusiastic a meteorologist as Mr. Barnard to deal with the climate of the island.

## INTERNATIONAL BALLOON ASCENTS, IN JULY, 1908.

By W. H. DINES, F.R.S.

*July 2nd, 1908.*

| Starting Point. |             | A      | B    | C      | D    | E      | F          |
|-----------------|-------------|--------|------|--------|------|--------|------------|
|                 |             | miles. | ° F. | miles. | ° F. | miles. |            |
| Manchester....  | England.... | 6·9    | —49  | 7·8    | —44  | 12     | S.E.       |
| Hamburg.....    | Germany.... | 6·7    | —67  | 10·0   | ?    | 74     | S.S.E.     |
| Lindenberg....  | ".....      | 6·8    | —62  | 7·5    | —58  | 29     | S. by E.   |
| Paris.....      | France..... | 6·6    | —74  | 7·7    | —63  | 138    | N.W.?      |
| Strassburg....  | Germany.... | 7·3    | —78  | 8·0    | —62  | 20     | S.E.       |
| Munich.....     | ".....      | 7·3    | —67  | 10·0   | ?    | 48     | S.E. by S. |
| Pavia.....      | Italy.....  | 7·7    | —76  | 8·8    | —69  | 10     | S.E. by S. |
| Kuchino.....    | Russia..... | 8·1    | —26  | 11·5   | —24  | 19     | N.         |

A=Height in miles of commencement of isothermal column.

B=Temperature, F°, at bottom of column.

C=Greatest height of reliable record in miles.

D=Temperature, F°, at greatest height.

E=Distance in miles of point where balloon fell.

F=Bearing of falling point from starting point.

The southern stations show the commencement of the isothermal to be rather above the average and the northern stations rather below. The values for Kuchino are very unusual. Similar values have been reported in England, but were perhaps due to instrumental errors. The barometer was well above its average and fairly uniform.

## THE FÖHN WIND AS IT STRIKES ONE.

By A RESIDENT IN INNSBRUCK.

THOSE destined by fate to live in a windy town accustom themselves by degrees to the discomfort it involves. With the optimism characteristic of human nature they dwell on its bracing qualities if the prevailing wind is north or east, and praise its mildness if it comes from the west or south, suppressing as much as possible the rain-bringing tendencies which in the latter case detract from these advantages.

There is a wind, however, experienced by dwellers in the Alps about which it is not so easy to be optimistic. That wind is the Föhn. The inhabitant of Innsbruck has good cause to be familiar with this wind. So familiar is it in fact, that no other wind counts but this. "Es geht wieder der Wind!" is the laconic greeting of the shopman who is serving you while Föhn gusts are striving to blow in his windows and clouds of dust are obscuring the passers-by. The Föhn is *the* wind par excellence, and though blasts from north, east and south may alternate with its appearance, these have no individuality in comparison with the Föhn.

Its precursors are well known and easily recognisable. The atmosphere becomes pure and limpid, distant hills are a marvellous transparent blue. Soft diaphanous clouds begin to gather in the southern sky; at a lower level, round the summits of the mountains, a few fleecy clouds collect, and at times these develop with incredible swiftness into an opaque wall blotting the southern horizon from view. But the most characteristic feature of this wind is the sudden rise in the temperature which accompanies it. If it is summer the atmosphere becomes stiflingly hot, if winter the keen frosty air turns mild and close. The Föhn blows at times with considerable force, sweeping northwards from the Brenner Valley as a warm, dry, sometimes burning wind, raising clouds of dust in its onrush. For the housewife it is the signal to close all her windows unless she wishes everything to be covered with a thick layer of dust.

If the Föhn only brought such discomforts in its train there would be little to say against it. Its chief drawback lies in its undoubtedly depressing influence on the nervous system. Many of the Innsbruck people, eager to defend the salubrity of their climate, deny that the Föhn exercises any such influence, but facts are against them. Headache, lassitude, depression—a general feeling of not being up to the mark—are the symptoms which in many individuals occur so regularly just before or during the coming of the Föhn, that it is safe to infer a causal connection between the two phenomena, even if allowance be made for the play of coincidence in some cases or of suggestion in others. Those susceptible to such influences are certainly affected by the Föhn, and those who deny such influences either ignore them or are so happily constituted that they do not feel them. Meteorologists admit the fact while declaring it to be overrated, but neither the

hypothesis of Trabert, which attributes it to the action of an approaching barometric depression, nor that of Czermak and others, which refers it to the electrical disturbance of the atmosphere produced by the Föhn, seem adequate to explain it.

Meteorological observations extending over a period of 25 years gives Innsbruck an average of 43 days of Föhn in the year. These are by no means equally distributed over the year as the following table shows :—

| Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | No. of Days. |
|------|------|------|------|-----|------|------|------|-------|------|------|------|--------------|
| 3·1  | 3·4  | 6·0  | 5·9  | 5·1 | 1·5  | 2·2  | 1·4  | 2·0   | 4·6  | 4·3  | 3·0  | 42·5         |

From this it will be seen that Föhn is most frequent in spring and autumn. Though the average shows that no month is without a day of Föhn, yet within the 25 years under observation there were no less than 10 Julys and Augusts without one. To balance this boon of providence the same period shows a month of March with 17 days of Föhn, and an April and May with 15 each.

If the duration of the Föhn were confined to an hour or two of the day, or even to a single day, the complaints about it might be less frequent than they are. What makes it dreaded is the fact that it may continue for two or three days at a time. Here, however, statistics are rather comforting in so far as they show that in Innsbruck a one-day Föhn is far more frequent than one lasting a longer period. The following table records Pernter's observations for the same period of 25 years :—

|                  |     |     |    |    |    |   |   |   |
|------------------|-----|-----|----|----|----|---|---|---|
| Days of Föhn...  | 1   | 2   | 3  | 4  | 5  | 6 | 7 | 8 |
| No. of times.... | 214 | 170 | 61 | 29 | 22 | 5 | 4 | 2 |

This means that 214 times in 25 years there was Föhn lasting a day, while twice in the same period there occurred a Föhn which lasted consecutively for eight days. The average for Innsbruck is, therefore, one or two days, though this does not exclude the possibility of an occasional five-day Föhn.

The frequent occurrence of this wind in spring has a sinister significance for Innsbruck and its neighbourhood as a winter sport place, for frost and snow disappear as if by magic at the touch of the Föhn, and if the great *Schneefresser*, "snow-devourer," is welcomed by the peasant in high alpine valleys as mitigating the rigours of winter and facilitating the coming of spring, it is with quite other feelings that the ski-runner watches the Föhn wiping the snowy cover off the slopes, or the skater sees the ice turning to water beneath his eyes. Recent researches by Dr. von Ficker show too, that the Föhn often lasts longer on the heights above Innsbruck like Igls, Heiligenwasser and Patscherkofel, than in the valley itself, that is in the very parts where the ski-runner is tempted to go if he chooses Innsbruck as a ski-ing centre at all. On the lower levels the Föhn can do little but spoil the ski-runners' sport, but in higher regions, by loosening the avalanche, it may prove his most deadly foe.

Despite the name it has got for Föhn, Innsbruck suffers from very

mild attacks of the wind compared with certain Swiss valleys where the extreme dryness of the wind by reducing all woodwork to the condition of matchwood, increases the danger of fire to such an extent that in certain localities fire of any kind, from that of the kitchen stove to that of a lighted cigarette is strictly prohibited during the Föhn. Again, there are regions where this wind blows with such fury as to uproot trees and leave a devastated track through the forest but such a Föhn never visits Innsbruck.

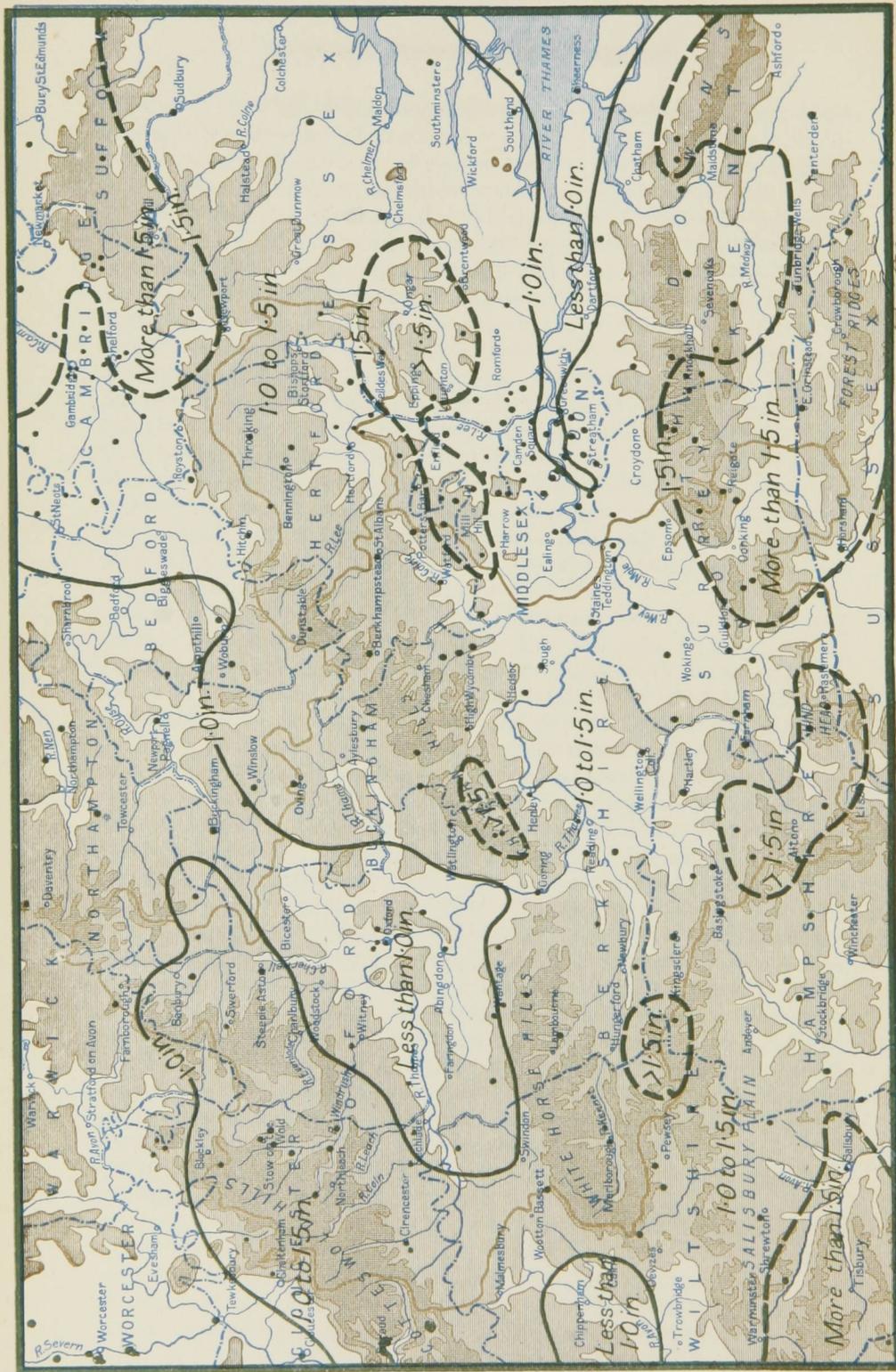
So far we have dwelt on the drawbacks of this wind, it is only fair to mention some of its advantages. These are, perhaps, most noticeable in its effects on vegetation. Innsbruck owes its crops of maize to the Föhn, which renders the temperature such that maize can thrive in it. Maize, however, is of comparatively late importation, but an interesting feature in connection with the Föhn is the survival in the Inn valley, near Innsbruck, of floral types from the inter-glacial period, which succeeded the great Ice Age. It is owing to the mild temperature set up by the Föhn that these relics of a semi-tropical vegetation have been enabled to continue their existence in their present environment.

One peculiarity of the Föhn is the certainty with which one may predict bad weather as its sequel. But the rain or snow which, according to the time of year, almost invariably follows the Föhn—so nearly invariably that in nine cases out of ten it would be safe to prophesy it—can only be welcomed as a wholesome finale to the action of the wind. After the rain comes sunshine again, and that cool, invigorating atmosphere which gives passing visitors the impression that Innsbruck must be as bracing a place as many at a higher altitude. It probably accounts too for the very different opinions one finds prevalent on the climate of Innsbruck. As the tourist is more frequent than the resident visitor he is apt to generalise from his own particular climatic experiences, with the result that such adjectives as—"bracing," "sunny," "exhilarating," "relaxing," "dull," "depressing," are equally used to describe the climate of the town. Only a longer residence can give the experience which justifies an authoritative statement on the subject. The truth lies as usual between the extremes. Neither those who laud the climate to the skies, nor those who execrate it, render the town a service. Unclouded bliss is rarely met with in this life, most of us have to be content with mixed blessings, every paradise has its serpent. The capital of Tyrol is no exception to this rule.

We are indebted to Dr. Heinz von Ficker for the meteorological data in the foregoing article.

---





ALTITUDE SCALE

|                |                 |                  |                 |
|----------------|-----------------|------------------|-----------------|
| Below 250 feet | 250 to 500 feet | 500 to 1000 feet | Above 1000 feet |
|----------------|-----------------|------------------|-----------------|

SCALE OF MILES



## THE WEATHER OF JANUARY.

By FRED. J. BRODIE.

THE old idea which associated the winter anticyclone with the almost invariable presence of long continued frost was rudely assailed many years ago by Mr. Dines, whose conclusions were regarded at the time as those of a veritable iconoclast. Since then the rule has been so often falsified by events that no one is surprised when a striking exception occurs, as it did last month. On January 18th, 1911, the barometer touched 30·8 in. at many places in the South of England, and on the night of the 31st it rose to very nearly the same height over the northern half of the country generally. In London the mean pressure for the month was a trifle above 30·3 in. being nearly three-tenths of an inch above the average. A higher monthly mean pressure has been recorded in the metropolis only ten times in the course of the past 40 years, the highest record of all occurring in February, 1891, when the value was 30·47 in.

Last month opened with cold northerly winds and showers of snow and sleet, and early on the 2nd a smart thunderstorm passed southwards in a narrow track across Norfolk. An anticyclone then extended temporarily over the country from northern Europe, and on the nights of the 2nd—4th sharp frosts were experienced in Ireland and Scotland, the sheltered thermometer falling from 10° to 12° below the freezing point in many places and touching 16° at Balmoral. On the grass the readings were as a rule not much lower than in the screen, but at many inland stations the thermometer sank below 20°, a minimum as low as 9° being recorded at Llangamarch Wells, and a reading of 14° at Balmoral. After the 4th the anticyclone receded to the eastward, and on the 6th a well-defined V-shaped depression passed in a similar direction across the United Kingdom, its disappearance over the North Sea being followed by a brief spell of mild winds from west and south-west. On the 8th and 9th the thermometer rose slightly above 50° in many places, and touched 54° at Killarney. An anticyclone which came in from the Atlantic on the 9th and 10th soon passed away in the face of another "V-shaped" depression, which moved down from the north-westward, and on the 12th a strong northerly gale was experienced very generally, with squalls of snow and sleet. The extension of a new anticyclone from the westward was followed by cold, quiet weather, and between the nights of the 12th and 15th sharp frosts were experienced in most districts, the sheltered thermometer falling 10° or more below the freezing point in several parts of Great Britain. On the grass the minimum readings about this time were as low as 12° at Newton Rigg, 13° at Tunbridge Wells, and 15° at Crathes, Aspatria and Llangamarch Wells. For the remainder of the month the conditions were almost continuously anticyclonic, but owing to the presence of much cloud and mist, which served to check the progress of terrestrial radiation, the nights were seldom very

cold, no further sharp frosts occurring until quite the end of the month. Between the 24th and 26th when the central area of the anticyclone was situated over France and Germany, a mild current of air from the south-westward swept across the United Kingdom, the thermometer rising well above  $50^{\circ}$  in all districts excepting the north of Scotland and exceeding  $55^{\circ}$  in several parts of England and Ireland; at Killarney the maximum reading on the 25th was as high as  $59^{\circ}$ . Early on the 31st a sharp frost was experienced in many parts of Great Britain.

The mean temperature of the month was below the normal in the south-west, including the south of Ireland and the Scilly and Channel Islands. Elsewhere there was a general excess, slight over England but rather large in Scotland. In the west and south the duration of bright sunshine was above the average. In London the excess was slight, while at most northern stations there was a trifling deficiency.

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### THE TALE OF A METEORITE.

*The Times* of December 7th, 1910, published the following note:—

#### METEORITE AT HULL.

Considerable damage was caused at Hull in the early hours of yesterday by a meteorite which crashed through a building in the eastern quarter of the city and buried itself in the earth. One stable was demolished and the roofs of five others were shattered. Eight horses which were in the stables escaped injury.

In connection with this the Rev. C. W. Hony wrote us as follows:

“One gets a remarkable paragraph like this and nothing more is heard of it, and people will quote it as proof of the fall of a meteorite. In a lecture given some few years ago in Bath Sir Robert Ball stated that there was no known fall of a meteor to earth.”

The first point to ascertain was obviously the fact of the damage having been caused by a meteorite which buried itself in the earth, and it is one of the advantages of the British Rainfall Organization that there is an intelligent correspondent interested in meteorology within easy reach in almost every part of the British Isles who may be trusted to enquire into such an occurrence. We accordingly wrote to Mr. H. B. Witty, the Superintendent of Parks for the City of Hull, who visited the owner of the stables in question, and was informed by him that the reporter was under a misapprehension as to the cause of the damage done. The stables were old buildings, and it seemed probable that the collapse was brought about by the use of a gas engine for driving some machinery, the vibration presumably shaking the structure.

This is an excellent example of the danger of accepting statements made by those not expert in the subject of which they speak. Warned in time we express no opinion as to observations of the fall of meteorites having been made, but appeal to Mr. W. F. Denning for light on the subject he has studied so fully.

**ROYAL METEOROLOGICAL SOCIETY.**

THE Annual General Meeting of this Society was held on Wednesday evening, January 18th, at the Institution of Civil Engineers, Westminster, Mr. H. Mellish, President, in the chair.

The Council in their report for the past year, expressed their pleasure that His Majesty The King had graciously consented to continue the patronage which he had accorded to the Society when Prince of Wales. They reported that the experiment had been tried for the first time of holding a meeting out of London, at Manchester, on February 22nd, 1910. The meeting was well attended, and led to a good discussion on the papers read, some of which were communicated by local Fellows. The increased number of applications for lectures on Meteorological subjects, showed that greater interest was now being taken by the general public in meteorological matters. The researches into the meteorological conditions of the upper atmosphere had been continued under the auspices of the joint Committee appointed by the Society and the British Association. The work of the Society in all its branches had been actively carried on, and there had been an increase of 21 in the number of Fellows on the roll during the year.

After the report had been adopted, the thanks of the Society were given to the Council for their services during the past year; to the Auditors; and also to the President and Council of the Institution of Civil Engineers, for allowing the meetings to be held in the rooms of the Institution.

The President then delivered an address on "The Present Position of British Climatology." He said that the third decade since the Society undertook the collection of climatological observations, suggested that the moment was opportune for taking stock of the data which have been collected in the British Isles, and of the progress which has been made in reducing and discussing them. After referring to the data collected and published by the Meteorological Office, the Royal Meteorological Society, the Scottish Meteorological Society, the British Rainfall Organization, &c., he proceeded to describe what had been done in the way of working up the data thus collected. The President mentioned the discussions which had been carried out by Dr. A. Buchan, Mr. F. C. Bayard, the Meteorological Office, Mr. G. J. Symons, Dr. H. R. Mill, Mr. R. H. Curtis, Dr. R. H. Scott, Mr. F. J. Brodie, Mr. W. Marriott, Dr. W. N. Shaw, and others. He concluded by saying: "For the larger question of the Climatology of the country, co-operation between the different organizations collecting and publishing data seems essential if the best results are to be attained. Agreement is necessary as to the form in which the summaries should be prepared, and the period which should be adopted for the determination of normal values. Different workers can then undertake their own branch of the work, knowing that it will fit into its proper place when all the results are

assembled together. Here again mere statistical results cannot be accepted as adequate, we must aim at representation on an adequate scale, by modern cartographical methods; the time seems ripe for such an undertaking, and it would be fitting that the Society should take a leading part in the work."

A hearty vote of thanks was accorded to Mr. Mellish for his Address and for his services as President.

The following gentlemen were elected the Officers and Council for the ensuing year:—*President*—Dr. H. N. Dickson, M.A.; *Vice-Presidents*—Mr. Francis Druce, M.A., Mr. H. Mellish, D.L., J.P., Mr. R. G. K. Lempfert, M.A., Colonel H. E. Rawson, R.E., C.B.; *Treasurer*—Dr. C. Theodore Williams, M.A.; *Secretaries*—Mr. F. C. Bayard, Commander W. F. Caborne, C.B.; *Foreign Secretary*—Mr. R. H. Scott, M.A., D.Sc., F.R.S.; *Councillors*—Mr. W. W. Bryant, B.A., Mr. C. J. P. Cave, M.A., Mr. F. W. Dyson, F.R.S., Mr. E. Gold, M.A., Mr. R. H. Hooker, M.A., Mr. R. Inwards, Capt. C. H. Ley, Mr. R. E. Middleton, M.Inst., C.E., Capt. M. W. C. Hepworth, C.B., Mr. Carle Salter, Mr. J. Wrench Towse, and Capt. R. C. Warden.

During the evening the following new Fellows were elected:—Mr. Bahar-ud-din Ahmed, Mr. J. M. G. Aldape, Mr. C. J. Balding, Mr. P. D. Booth, B.Sc., Mr. S. David, Mr. J. J. Hartley, Mr. B. E. D. Kilburn, M.A., Mr. L. G. de Lima, Mr. J. M. Machattie, Mr. G. H. Marshall, Mr. B. V. Pemberton, Mr. H. C. Rice, Dr. C. W. G. Rohrer, Miss Isolde Tower, Mr. G. J. Weldrick, and Mr. H. S. Wildeblood, M. Inst. C.E.

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## Correspondence.

*To the Editor of Symons's Meteorological Magazine.*

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### THE RECURRENCE OF WARM AND COLD PERIODS.

THE causes which lead to the recurrence in these islands and, for the most part, also in north-western Europe, of periods during which the temperature is considerably above or below the normal for the month, first called attention to by the late Dr. A. Buchan have, I believe, yet to be satisfactorily explained. The cold spells of April and May, which recur in about the second week in these months, may be connected, as they are associated, with the failure of the Gulf Stream Extension to reach our shores; the increase in the activity of the Greenland current at about the same time; and the consequent formation of a ridge of relatively high atmospheric pressure to the westward and north-westward of Ireland and Scotland, accompanied by winds from Polar regions. This correlation of changes in sea temperature and pressure distribution does not,

however, fully account for the yearly return of these periods of abnormally cold weather; and for the almost invariable recurrence of warm and cold periods in other months no causes have, so far as I know, been suggested.

Dr. Van Rijkevorsel, of Rotterdam, has shown that similar periods recur in other parts of the globe;\* and, from the curves of temperature he gives, some of these appear to synchronize with Buchan's periods.

I would ask those of your readers who are astronomers as well as meteorologists to consider whether their recurrence may not perhaps be attributable to cosmical causes: to local modifications in the structure of cosmic matter outside our atmosphere, such as that from which the zodiacal light and Gegenschein are reflected.

The literature in reference to these phenomena is limited, and little appears to be known in regard to the composition and distribution of the bodies which reflect the light or of the place in space their respective masses occupy. We are told that the zodiacal light is probably due to the reflection of solar light from a swarm of bodies, minute and possibly meteoric, which revolve round the sun; and that the Gegenschein is reflected light from meteorites that revolve, not round the Earth, but in an independent orbit, in the neighbourhood of the Earth.

On a number of voyages across the Pacific, between Australasia and British Columbia, during the years 1897—1900, careful observations of the zodiacal light were recorded by one of my officers and myself. On some occasions the light could be traced after sunset from the western horizon to a little beyond the zenith, and before sunrise on the morrow, from the eastern horizon almost to the zenith. Less frequently the zodiacal light could be traced from the western horizon after sunset to the zenith and faintly onward to the eastern horizon. For several successive nights it was visible from sunset to sunrise right across the sky, having a breadth of from  $18^{\circ}$  to  $20^{\circ}$ , and was distinct and clearly outlined.

The fact that the zodiacal light can be traced at times from horizon to horizon through the zenith suggests the question: May not the matter reflecting it encompass, not the sun, but the Earth? Astronomers may reply: The matter extends beyond the earth's orbit. Even in that case is it not conceivable that its density varies in different parts of the ecliptic, and would not such variations in density give rise to corresponding variations in the condition of the Earth's atmosphere, thereby causing climatic changes at its surface of periodic occurrence?

CAMPBELL HEPWORTH.

*2, Amherst Road, Ealing, W., 6th February, 1911.*

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\* Konstant auftretende secundäre Maxima und Minima in dem jährlichen Verlauf der Meteorologischen Erscheinungen.

### FROST DAYS IN THE SECOND HALF YEAR.

IN relation to the idea expressed in one of Bacon's essays, that the same kind of weather tends to come back in about thirty-five years (Brückner's period), the following group of facts is, I think, of interest. It may also, possibly, be useful in forecasting, but of this the reader must judge.

Taking the Greenwich record, from 1841 to 1875 (that being as far as we could go in 1910 with the method used), let us note the years in which the second half had less than the average number of frost days, viz., 18. There were 15. Then note how many frost days were in the second half of the 34th year after in each case. I give the table:—

|             | Frost days<br>(under 18). | 34th year<br>after. | Difference from<br>average. |
|-------------|---------------------------|---------------------|-----------------------------|
| 1.....1842  | 9                         | 9                   | - 9                         |
| 2.....1843  | 13                        | 15                  | - 3                         |
| 3.....1845  | 13                        | 38                  | +20                         |
| 4.....1847  | 10                        | 14                  | - 4                         |
| 5.....1848  | 14                        | 15                  | - 3                         |
| 6.....1850  | 10                        | 11                  | - 7                         |
| 7.....1852  | 2                         | 21                  | + 3                         |
| 8.....1857  | 7                         | 14                  | - 4                         |
| 9.....1861  | 15                        | 14                  | - 4                         |
| 10.....1862 | 11                        | 18                  | 0                           |
| 11.....1863 | 10                        | 8                   | -10                         |
| 12.....1865 | 5                         | 18                  | 0                           |
| 13.....1868 | 14                        | 10                  | - 8                         |
| 14.....1872 | 4                         | 19                  | + 1                         |
| 15.....1873 | 17                        | 6                   | -12                         |
| Average     | 10·3                      | 15·3                |                             |

Thus it appears that where a second half has had less than the average, the 34th second half after has generally been mild, average or excess slight (+3 at most). There is one anomalous case, 1845, followed by 1879, with the coldest second half on record. With the second half of 1910 in prospect, there seemed to be a fair presumption that it would not have more than 21 frost days. For other reasons I thought it likely to have over 12.

When November brought forth 16 frost days, this forecast appeared to be doomed. But, to my surprise, it has been verified by an extremely mild December (adding only three frost days). Did the figures warrant expectation of this mild month?

Turning to the case of second halves with an excess of frost days, I may say that where there have been more than 22 frost days the 34th second half after has shown excess (over average) in 9 cases against 3.

In seeking light from all quarters on future weather, it is well, in some cases, I think, to go on with certain proved relations until they clearly fail us (which may seem a possible contingency with rather scant data); and this may be a case of the kind.

ALEX. B. MACDOWALL.

## REVIEW.

*Monthly Distribution of Australian Rainfall*, Bulletin No. 4 (issued December, 1909) . . . . under the direction of H. A. Hunt, Commonwealth Meteorologist, Melbourne. Size 12 × 9. Pp. 10. 2 plates and map.

THE pamphlet before us is hardly so lucid as those which have preceded it from the Commonwealth Bureau of Meteorology. The letterpress consists for the most part of general statements from other authorities, and the tables and curves hardly receive sufficient detailed discussion to bring out their value. We do not care for the notation which gives rainfall in hundredths of an inch without inserting the decimal point, *e.g.*, 2808 instead of 28.08, and we think a clearer warning should have been given of the danger of comparing average rainfalls when the periods vary from 8 to 42 years. A diagram of the hourly incidence of rainfall at Melbourne, Adelaide, Perth and Sydney for the year ending June 30th, 1909, shows that generally speaking for Melbourne and Adelaide least rain fell between 8 p.m. and 1 a.m., while for Sydney and Perth (between which one hardly expected to find parallelism) most rain fell between those hours. We feel that on the whole it would be wiser to separate general statements based largely on general principles from the discussion of data accumulated in Australia.

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**METEOROLOGICAL NEWS AND NOTES.**

RAIN-FAKING FOOLISHNESS is the phrase applied by the Editor of the *Evening Post* of Wellington, N.Z., to the way in which "poor Oamaru and the adjacent drought-stricken parts are about to make themselves a jest for the scientific world," and it deplors the fact that the New Zealand Government had ignored the advice of its own Meteorological Office, and voted a sum of money "towards the cost of explosives for the farce." In sending us the paper, from which we have quoted a few powerful phrases, the Rev. D. C. Bates observes that good rain fell in the thirsty region before the bombs were fired. It was a narrow escape, for if the rain had held off a little longer a far larger sum of public money would doubtless have been demanded on the strength of a successful demonstration. Our readers will remember Mr. Bates's able description of the earlier Oamaru experiments in vol. 43 (1908), pp. 107, 137, 156.

MEDICINE HAT, in Western Canada, a typical town of the Great Plains, is we learn from a chance reference in a newspaper of the United States credited with a unique reputation for the origin of blizzards, no doubt as baseless as the reputation of Comrie in Perthshire for earthquakes, if not as malicious as the heading "Notes from Markinch" which once figured in a Fifeshire newspaper for a column of statements which strained credulity. Markinch was, we understand, the place of publication of a rival sheet.

## RAINFALL TABLE FOR JANUARY, 1911.

| STATION.                             | COUNTY.              | Lat.<br>N. | Long.<br>W.<br>[*E.] | Height<br>above<br>Sea.<br>ft. | RAINFALL<br>OF MONTH           |              |
|--------------------------------------|----------------------|------------|----------------------|--------------------------------|--------------------------------|--------------|
|                                      |                      |            |                      |                                | Aver.<br>1875—<br>1909.<br>in. | 1911.<br>in. |
| Camden Square.....                   | London.....          | 51 32      | 0 8                  | 111                            | 1'83                           | 1'38         |
| Tenterden.....                       | Kent.....            | 51 4       | *0 41                | 190                            | 2'14                           | 1'51         |
| Arundel (Patching).....              | Sussex.....          | 50 51      | 0 27                 | 130                            | 2'59                           | ...          |
| Southampton (Cadland) ...            | Hampshire.....       | 50 50      | 1 22                 | 52                             | 2'75                           | 1'30         |
| Oxford (Magdalen College).....       | Oxfordshire.....     | 51 45      | 1 15                 | 186                            | 1'78                           | '68          |
| Wellingborough (Croyland Abbey)..... | Northampton.....     | 52 18      | 0 41                 | 174                            | 1'89                           | '76          |
| Shoeburyness.....                    | Essex.....           | 51 31      | *0 48                | 13                             | 1'33                           | '90          |
| Bury St. Edmunds (Westley).....      | Suffolk.....         | 52 15      | *0 40                | 226                            | 1'70                           | 1'74         |
| Geldeston [Beccles].....             | Norfolk.....         | 52 27      | *1 31                | 38                             | 1'53                           | 1'77         |
| Polapit Tamar [Launceston].....      | Devon.....           | 50 40      | 4 22                 | 315                            | 3'59                           | 1'33         |
| Rousdon [Lyme Regis].....            | ".....               | 50 41      | 3 0                  | 516                            | 2'94                           | '98          |
| Stroud (Upfield).....                | Gloucestershire..... | 51 44      | 2 13                 | 226                            | 2'33                           | 1'32         |
| Church Stretton (Wolstaston).....    | Shropshire.....      | 52 35      | 2 48                 | 800                            | 2'51                           | '61          |
| Coventry (Kingswood).....            | Warwickshire.....    | 52 24      | 1 30                 | 340                            | 2'22                           | '86          |
| Boston.....                          | Lincolnshire.....    | 52 58      | 0 1                  | 25                             | 1'54                           | 1'57         |
| Workop (Hodsock Priory).....         | Nottinghamshire..... | 53 22      | 1 5                  | 56                             | 1'70                           | '89          |
| Macclesfield.....                    | Cheshire.....        | 53 15      | 2 7                  | 501                            | 2'66                           | 1'29         |
| Southport (Hesketh Park).....        | Lancashire.....      | 53 38      | 2 59                 | 38                             | 2'55                           | '80          |
| Wetherby (Ribston Hall).....         | Yorkshire, W.R.....  | 53 59      | 1 24                 | 130                            | 1'89                           | 1'35         |
| Arncliffe Vicarage.....              | ".....               | 54 8       | 2 6                  | 732                            | 6'26                           | 4'15         |
| Hull (Pearson Park).....             | " E.R.....           | 53 45      | 0 20                 | 6                              | 1'70                           | 1'32         |
| Newcastle (Town Moor) ...            | Northumberland.....  | 54 59      | 1 38                 | 201                            | 1'90                           | 1'67         |
| Borrowdale (Seathwaite) ...          | Cumberland.....      | 54 30      | 3 10                 | 423                            | 1'3'4                          | 11'17        |
| Cardiff (Ely).....                   | Glamorgan.....       | 51 29      | 3 13                 | 53                             | 3'65                           | 1'90         |
| Haverfordwest.....                   | Pembroke.....        | 51 48      | 4 58                 | 95                             | 4'69                           | 3'00         |
| Aberystwyth (Gogerddan).....         | Cardigan.....        | 52 26      | 4 1                  | 83                             | 3'91                           | 2'26         |
| Llandudno.....                       | Cardarvon.....       | 53 20      | 3 50                 | 72                             | 2'51                           | '70          |
| Cargen [Dumries].....                | Kirkcudbright.....   | 55 2       | 3 37                 | 80                             | 4'10                           | 2'54         |
| Marchmont House.....                 | Berwick.....         | 55 44      | 2 24                 | 498                            | 2'40                           | 1'40         |
| Girvan (Pinnmore).....               | Ayr.....             | 55 10      | 4 49                 | 207                            | 4'78                           | 3'42         |
| Glasgow (Queen's Park) ...           | Renfrew.....         | 55 53      | 4 18                 | 144                            | 3'53                           | 2'74         |
| Inveraray (Newtown).....             | Argyll.....          | 56 14      | 5 4                  | 17                             | 7'34                           | 7'48         |
| Mull (Quinish).....                  | ".....               | 56 34      | 6 13                 | 35                             | 5'55                           | 5'02         |
| Dundee (Eastern Necropolis).....     | Forfar ..            | 56 28      | 2 57                 | 199                            | 2'01                           | '62          |
| Braemar.....                         | Aberdeen.....        | 57 0       | 3 24                 | 1114                           | 2'92                           | 1'44         |
| Aberdeen (Cranford).....             | ".....               | 57 8       | 2 7                  | 120                            | 2'36                           | 1'55         |
| Cawdor.....                          | Nairn.....           | 57 31      | 3 57                 | 250                            | 2'28                           | 1'19         |
| Fort Augustus (S. Benedict's).....   | E. Inverness ..      | 57 9       | 4 41                 | 68                             | 5'58                           | 3'02         |
| Loch Torridon (Bendamph).....        | W. Ross.....         | 57 32      | 5 32                 | 20                             | 9'26                           | 8'88         |
| Dunrobin Castle.....                 | Sutherland.....      | 57 59      | 3 56                 | 14                             | 2'75                           | 2'14         |
| Wick.....                            | Caithness.....       | 58 26      | 3 6                  | 77                             | 2'48                           | 1'89         |
| Killarney (District Asylum).....     | Kerry.....           | 52 4       | 9 31                 | 178                            | 5'94                           | 1'76         |
| Waterford (Brook Lodge).....         | Waterford.....       | 52 15      | 7 7                  | 104                            | 3'78                           | 1'68         |
| Nenagh (Castle Lough).....           | Tipperary.....       | 52 54      | 8 24                 | 120                            | 3'88                           | 1'67         |
| Miltown Malbay.....                  | Clare.....           | 52 52      | 9 26                 | 400                            | 4'01                           | 2'16         |
| Gorey (Courtown House) ..            | Wexford.....         | 52 40      | 6 13                 | 80                             | 3'19                           | 1'25         |
| Abbey Leix (Blandsfort).....         | Queen's County.....  | 52 56      | 7 17                 | 532                            | 3'15                           | 1'68         |
| Dublin (Fitz William Square).....    | Dublin.....          | 53 21      | 6 14                 | 54                             | 2'14                           | '64          |
| Mullingar (Belvedere).....           | Westmeath.....       | 53 29      | 7 22                 | 367                            | 3'10                           | 2'12         |
| Ballinasloe.....                     | Galway.....          | 53 20      | 8 15                 | 160                            | 3'35                           | 2'14         |
| Crossmolina (Enniscoe).....          | Mayo.....            | 54 4       | 9 18                 | 74                             | 5'35                           | 2'46         |
| Collooney (Markree Obsy.).....       | Sligo.....           | 54 11      | 8 27                 | 127                            | 3'87                           | 2'53         |
| Seaforde.....                        | Down.....            | 54 19      | 5 50                 | 180                            | 3'41                           | 1'12         |
| Bushmills (Dundarave).....           | Antrim.....          | 55 12      | 6 30                 | 162                            | 3'19                           | 1'55         |
| Omagh (Edenfel).....                 | Tyrone.....          | 54 36      | 7 18                 | 280                            | 3'46                           | 2'71         |

RAINFALL TABLE FOR JANUARY, 1911—*continued.*

| RAINFALL OF MONTH ( <i>con.</i> ) |          |                   |       |             | RAINFALL FROM JAN. 1. |           |                      |          | Mean Annual 1875-1909. | STATION.         |
|-----------------------------------|----------|-------------------|-------|-------------|-----------------------|-----------|----------------------|----------|------------------------|------------------|
| Diff. from Av. in.                | % of Av. | Max. in 24 hours. |       | No. of Days | Aver. 1875-1909. in.  | 1911. in. | Diff. from Aver. in. | % of Av. |                        |                  |
|                                   |          | in.               | Date. |             |                       |           |                      |          |                        |                  |
| - .45                             | 75       | .32               | 6     | 12          | ...                   | ...       | ...                  | ...      | 25.11                  | Camden Square    |
| - .63                             | 71       | .58               | 11    | 16          | ...                   | ...       | ...                  | ...      | 27.64                  | Tenterden        |
| ...                               | ...      | ...               | ...   | ...         | ...                   | ...       | ...                  | ...      | 30.48                  | Patching         |
| -1.45                             | 47       | .43               | 6, 11 | 12          | ...                   | ...       | ...                  | ...      | 31.87                  | 2 Cadland        |
| -1.10                             | 38       | .17               | 6, 11 | 12          | ...                   | ...       | ...                  | ...      | 24.58                  | Oxford           |
| -1.13                             | 40       | .21               | 6     | 10          | ...                   | ...       | ...                  | ...      | 25.17                  | 4 Croylard Abbey |
| - .43                             | 68       | .21               | 4     | 12          | ...                   | ...       | ...                  | ...      | 19.28                  | Shoeburyness     |
| + .04                             | 102      | .39               | 2     | 13          | ...                   | ...       | ...                  | ...      | 25.40                  | Westley          |
| + .24                             | 116      | .40               | 11    | 18          | ...                   | ...       | ...                  | ...      | 23.73                  | Geldeston        |
| -2.26                             | 37       | .37               | 5     | 14          | ...                   | ...       | ...                  | ...      | 38.27                  | Polapit Tamar    |
| -1.96                             | 33       | .21               | 6     | 11          | ...                   | ...       | ...                  | ...      | 33.54                  | Rousdon          |
| -1.01                             | 57       | .34               | 6     | 14          | ...                   | ...       | ...                  | ...      | 29.81                  | Stroud           |
| -1.90                             | 24       | .15               | 6     | 9           | ...                   | ...       | ...                  | ...      | 32.41                  | Wolstaston       |
| -1.36                             | 39       | .39               | 6     | 9           | ...                   | ...       | ...                  | ...      | 28.98                  | Coventry         |
| + .03                             | 102      | .35               | 6     | 17          | ...                   | ...       | ...                  | ...      | 23.35                  | Boston           |
| - .81                             | 52       | .24               | 11    | 9           | ...                   | ...       | ...                  | ...      | 24.46                  | Hodsock Priory   |
| -1.37                             | 49       | .43               | 6     | 12          | ...                   | ...       | ...                  | ...      | 34.73                  | Macclesfield     |
| -1.75                             | 31       | .34               | 5     | 9           | ...                   | ...       | ...                  | ...      | 32.70                  | Southport        |
| - .54                             | 71       | .34               | 2     | 14          | ...                   | ...       | ...                  | ...      | 26.87                  | Ribston Hall     |
| -2.11                             | 66       | .56               | 24    | 21          | ...                   | ...       | ...                  | ...      | 61.49                  | Arneliffe        |
| - .38                             | 78       | .29               | 11    | 16          | ...                   | ...       | ...                  | ...      | 26.42                  | Hull             |
| - .23                             | 88       | .52               | 11    | 14          | ...                   | ...       | ...                  | ...      | 27.94                  | Newcastle        |
| -2.27                             | 83       | 3.43              | 10    | 17          | ...                   | ...       | ...                  | ...      | 129.48                 | Seathwaite       |
| -1.75                             | 52       | .60               | 5     | 15          | ...                   | ...       | ...                  | ...      | 42.28                  | Cardiff          |
| -1.69                             | 64       | .91               | 5     | 18          | ...                   | ...       | ...                  | ...      | 46.81                  | Haverfordwest    |
| -1.65                             | 58       | .96               | 8     | 16          | ...                   | ...       | ...                  | ...      | 45.46                  | Gogerddan        |
| -1.81                             | 28       | .20               | 8     | 8           | ...                   | ...       | ...                  | ...      | 30.36                  | Llandudno        |
| -1.56                             | 62       | .76               | 5     | 10          | ...                   | ...       | ...                  | ...      | 43.47                  | Cargen           |
| -1.00                             | 58       | .54               | 11    | 14          | ...                   | ...       | ...                  | ...      | 33.76                  | Marchmont        |
| -1.36                             | 72       | 1.10              | 5     | 18          | ...                   | ...       | ...                  | ...      | 49.77                  | Girvan           |
| - .79                             | 78       | .63               | 10    | 18          | ...                   | ...       | ...                  | ...      | 35.97                  | Glasgow          |
| + .14                             | 102      | 1.75              | 10    | 22          | ...                   | ...       | ...                  | ...      | 68.67                  | Inveraray        |
| - .53                             | 90       | 1.19              | 10    | 21          | ...                   | ...       | ...                  | ...      | 56.57                  | Quinish          |
| -1.39                             | 31       | .17               | 11    | 12          | ...                   | ...       | ...                  | ...      | 28.64                  | Dundee           |
| -1.48                             | 49       | ...               | ...   | ...         | ...                   | ...       | ...                  | ...      | 34.93                  | Braemar          |
| - .81                             | 66       | .26               | 5     | 16          | ...                   | ...       | ...                  | ...      | 32.73                  | Aberdeen         |
| -1.09                             | 52       | .18               | 8     | 9           | ...                   | ...       | ...                  | ...      | 29.33                  | Cawdor           |
| -2.56                             | 54       | .77               | 24    | 21          | ...                   | ...       | ...                  | ...      | 44.53                  | Fort Augustus    |
| - .38                             | 96       | 1.47              | 5     | 23          | ...                   | ...       | ...                  | ...      | 83.61                  | Bendamph         |
| - .61                             | 78       | .59               | 9     | 17          | ...                   | ...       | ...                  | ...      | 31.90                  | Dunrobin Castle  |
| - .59                             | 76       | .60               | 10    | 19          | ...                   | ...       | ...                  | ...      | 29.88                  | Wick             |
| -4.18                             | 30       | .44               | 8     | 19          | ...                   | ...       | ...                  | ...      | 54.81                  | Killarney        |
| -2.10                             | 44       | .48               | 5     | 11          | ...                   | ...       | ...                  | ...      | 39.57                  | Waterford        |
| -2.21                             | 43       | .49               | 5, 21 | 12          | ...                   | ...       | ...                  | ...      | 39.43                  | Castle Lough     |
| -1.85                             | 54       | .50               | 21    | 15          | ...                   | ...       | ...                  | ...      | 45.11                  | Miltown Malbay   |
| -1.94                             | 39       | .58               | 5     | 8           | ...                   | ...       | ...                  | ...      | 34.99                  | Courtown Ho.     |
| -1.47                             | 53       | .76               | 5     | 10          | ...                   | ...       | ...                  | ...      | 35.92                  | Abbey Leix       |
| -1.50                             | 30       | .19               | 5     | 10          | ...                   | ...       | ...                  | ...      | 27.68                  | Dublin           |
| - .98                             | 68       | .79               | 5     | 17          | ...                   | ...       | ...                  | ...      | 36.15                  | Mullingar        |
| -1.21                             | 64       | .84               | 21    | 17          | ...                   | ...       | ...                  | ...      | 36.64                  | Ballinasloe      |
| -2.89                             | 46       | .61               | 22    | 18          | ...                   | ...       | ...                  | ...      | 52.87                  | Enniscoe         |
| -1.34                             | 65       | .39               | 21    | 17          | ...                   | ...       | ...                  | ...      | 42.71                  | Markree          |
| -2.29                             | 33       | .34               | 5     | 11          | ...                   | ...       | ...                  | ...      | 38.91                  | Seaforde         |
| -1.64                             | 49       | .61               | 5     | 12          | ...                   | ...       | ...                  | ...      | 37.56                  | Dundarave        |
| - .75                             | 78       | .52               | 5     | 18          | ...                   | ...       | ...                  | ...      | 39.38                  | Omagh            |

## SUPPLEMENTARY RAINFALL, JANUARY, 1911.

| Div.  | STATION.                   | Rain<br>inches | Div.   | STATION.                     | Rain<br>inches |
|-------|----------------------------|----------------|--------|------------------------------|----------------|
| II.   | Warlingham, Redvers Road   | 1·82           | XI.    | Douglas                      | ...            |
| „     | Ramsgate                   | 1·57           | XII.   | Stoneykirk, Ardwell House    | 1·95           |
| „     | Hailsham                   | 1·76           | „      | Dalry, The Old Garroch       | 5·21           |
| „     | Totland Bay, Aston House.  | 1·16           | „      | Langholm, Drove Road         | 3·54           |
| „     | Stockbridge, Ashley        | 1·19           | „      | Beattock, Kinnelhead         | 4·06           |
| „     | Grayshott                  | 1·49           | XIII.  | St Mary's Loch, Cramilt Ldge | 2·98           |
| „     | Reading, Calcot Place      | 1·08           | „      | North Berwick Reservoir      | ·98            |
| III.  | Harrow Weald, Hill House.  | 1·56           | „      | Edinburgh, Royal Observty.   | ·75            |
| „     | Pitsford, Sedgebrook       | ·69            | XIV.   | Maybole, Knockdon Farm       | 3·15           |
| „     | Somersham Vicarage         | 1·10           | XV.    | Campbeltown, Witchburn       | 3·44           |
| „     | Woburn, Milton Bryant      | 1·03           | „      | Glenreaddell Mains           | 3·31           |
| IV.   | Colchester, Lexden         | 1·07           | „      | Holy Loch, Ardnadam          | 8·36           |
| „     | Newport                    | 1·47           | „      | Ballachulish House           | 8·60           |
| „     | Rendlesham                 | 1·56           | „      | Islay, Eallabus              | 3·95           |
| „     | Swaffham                   | 1·61           | XVI.   | Dollar Academy               | 2·01           |
| „     | Blakeney                   | 1·40           | „      | Balquhiddy, Stronvar         | 5·15           |
| V.    | Bishops Cannings           | 1·06           | „      | Coupar Angus                 | ·55            |
| „     | Winterbourne Steepleton    | 2·21           | „      | Glenlyon, Meggernie Castle   | 3·83           |
| „     | Ashburton, Druid House     | 1·90           | „      | Blair Atholl                 | 1·24           |
| „     | Okehampton, Oaklands       | 2·05           | „      | Montrose, Sunnyside Asylum   | 1·31           |
| „     | Cullompton                 | ...            | XVII.  | Alford, Lynturk Manse        | 1·53           |
| „     | Hartland Abbey             | ...            | „      | Fyvie Castle                 | 1·52           |
| „     | Lynmouth, Rock House       | 2·04           | „      | Keith Station                | 1·93           |
| „     | Probus, Lamellyn           | 1·34           | XVIII. | Glenquoich, Loan             | 14·40          |
| „     | North Cadbury Rectory      | 1·17           | „      | Skye, Dunvegan               | 5·98           |
| VI.   | Clifton, Pembroke Road     | 1·23           | „      | N. Uist, Lochnaddy           | 4·14           |
| „     | Ross, The Graig            | ·67            | „      | Alvey Manse                  | 1·07           |
| „     | Shifnal, Hatton Grange     | ·55            | „      | Loch Ness, Drumnadrochit     | 1·83           |
| „     | Blockley, Upton Wold       | 1·18           | „      | Glencarron Lodge             | 8·39           |
| „     | Worcester, Boughton Park   | ·57            | XIX.   | Invershin                    | 2·00           |
| VII.  | Market Overton             | 1·30           | „      | Loch Stack, Ardhullin        | 5·95           |
| „     | Market Rasen               | 1·72           | „      | Bettyhill                    | 1·86           |
| „     | Bawtry, Hesley Hall        | ·77            | XX.    | Skibbereen Rectory           | 2·07           |
| „     | Derby, Midland Railway     | ·77            | „      | Dunmanway, The Rectory       | 2·36           |
| VIII. | Nantwich, Dorfold Hall     | ·53            | „      | Cork                         | ·76            |
| „     | Chatburn, Middlewood       | 1·97           | „      | Mitchelstown Castle          | 1·62           |
| „     | Cartmel, Flookburgh        | 1·98           | „      | Darrynane Abbey              | 2·86           |
| IX.   | Langsett Moor, Up. Midhope | 2·43           | „      | Glenam [Clonmel]             | 1·60           |
| „     | Scarborough, Scalby        | 2·09           | „      | Newmarket-on-Fergus, Fenloe  | 1·80           |
| „     | Ingleby Greenhow           | 2·00           | XXI.   | Laragh, Glendalough          | 3·14           |
| „     | Mickleton                  | 1·38           | „      | Balbriggan, Ardgillan        | 1·07           |
| X.    | Bardon Mill, Beltingham    | 2·02           | „      | Moynalty, Westland           | 1·74           |
| „     | Ilderton, Lilburn Cottage  | 1·67           | XXII.  | Cong, The Glebe              | 4·10           |
| „     | Keswick, The Bank          | 3·21           | „      | Westport, St. Helens         | 2·37           |
| XI.   | Llanfrechfa Grange         | 1·46           | „      | Achill Island, Dugort        | 5·73           |
| „     | Treherbert, Tyn-y-waun     | 5·05           | „      | Mohill                       | 1·84           |
| „     | Carmarthen, The Friary     | 2·39           | XXIII. | Enniskillen, Portora         | 1·84           |
| „     | Castle Malgwyn [Llechryd]  | 1·99           | „      | Dartrey [Cootehill]          | 1·75           |
| „     | Plynlimon                  | 7·30           | „      | Warrenpoint, Manor House     | 1·84           |
| „     | New Radnor, Ednol          | ·86            | „      | Banbridge, Milltown          | ·60            |
| „     | Rhayader, Tyrmynydd        | 2·36           | „      | Belfast, Springfield         | 1·79           |
| „     | Lake Vyrnwy                | 2·72           | „      | Glenarm Castle               | 2·72           |
| „     | Llangyhanfal, Plás Draw    | ·81            | „      | Londonderry, Creggan. Res.   | 1·70           |
| „     | Dolgelly, Bryntirion       | 2·65           | „      | Killybegs                    | 3·93           |
| „     | Bettws-y-Coed, Tyn-y-bryn  | 2·49           | „      | Horn Head                    | 1·68           |
| „     | Lligwy                     | 1·51           |        |                              |                |

## METEOROLOGICAL NOTES ON JANUARY, 1911.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow; F for number of days Frost in Screen; f on Grass.

LONDON, CAMDEN SQUARE.—The persistent R of December continued into January, falls being recorded on each of the first 12 days except the 3rd. Thereafter the month was dry but with scanty sunshine records. The unusual height of the bar. throughout the month was remarkable, the mean being 30·333 in., which has been exceeded in only eight months during the preceding 53 years' record. Duration of sunshine, 30·5\* hours, and of R 44·4 hours. Mean temp. 38°·6, or exactly the average. Shade max. 52°·1 on 26th; min. 25°·6 on 14th. F 8, f 16.

TENTERDEN.—Duration of sunshine, 59·5† hours. Shade max. 51°·5 on 26th; min. 25°·0 on 15th. F 10, f 16.

TOTLAND BAY.—Mean bar. 30·339 in. Duration of sunshine, 76·2\* hours. Shade max. 51°·0 on 28th; min. 27°·6 on 15th, F 5, f 13.

PITSFORD.—R ·97 in. below the average. Mean temp. 37°·2. Shade max. 52°·4 on 26th; min. 24°·5 on 30th and 31st. F 16.

NORTH CADBURY.—High bar. almost throughout and very calm for a great part of the month, especially 14th to 24th. Shade max. 55°·0 on 28th. min. 24°·5 on 15th. F 10, f 17.

ROSS.—The least January R since 1896. Shade max. 54°·5 on 26th; min. 24°·6 on 31st. F 15, f 21.

HODSOCK PRIORY.—Shade max. 54°·7 on 26th; min. 18°·3 on 31st. F 12, f 26.

SOUTHPORT.—Bar. above the average on 29 days of the month. Duration of sunshine, 45·1\* hours, and of R 27·3 hours. Mean temp. 40°·1, or 1°·5 above the average. Shade max. 51°·8 on 28th; min. 26°·4 on 31st. F 6, f 15.

HULL.—Unsettled throughout, with much cloud and little sunshine. Mild periods at times, others cold and winterly, squally with S or H. Fogs prevailing. Shade max. 53°·0 on 25th and 26th; min. 27°·0 on 31st. F 8, f 19.

HAVERFORDWEST.—Duration of sunshine, 62·4\* hours. Shade max. 50°·9 on 26th.

LLANDUDNO.—Shade max. 53°·8 on 28th; min. 30°·5 on 31st. F 3.

EDINBURGH.—Shade max. 51°·0 on 25th; min. 26°·9 on 31st. F 7, f 15.

COUPAR ANGUS.—The lowest January R since 1882, excepting only 1905. The mean temp., 38°·3, has only been exceeded twice in the same period, in 1898 and 1906. Shade max. 53°·5 on 26th; min. 23°·5 on 31st.

FORT AUGUSTUS.—Shade max. 50°·0 on 26th; min. 23°·4 on 31st. F 7.

CORK.—Remarkably dry month, the R being 3·43 in. below the average. Shade max. 50°·0 on 25th; min. 27°·0 on 13th, 14th and 23rd. F 12, f 16.

DUBLIN.—A dry, generally mild month of anticyclonic S.W. winds. The bar. rose to 30·748 in. at 9 a.m. on 18th, and its mean height was 30·292 in. Mean temp. 41°·4. Shade max. 55°·4 on 25th; min. 28°·9 on 13th. F 5, f 13.

MARKREE.—The finest and driest January for many years. Shade max. 53°·9 on 25th; min. 24°·7 on 31st. F 14, f 18.

WARRENPOINT.—Fine and fairly dry month, but with a good deal of fog. Shade max. 53°·0 on 28th; min. 28°·0 on 31st. F 1, f 7.

\* Campbell-Stokes.

† Jordan.

## Climatological Table for the British Empire, August, 1910.

| STATIONS.<br><i>(Those in italics are<br/>South of the Equator.)</i> | Absolute. |       |          |       | Average. |      |               |           | Absolute.       |                   | Total Rain |       | Aver.<br>Cloud. |
|----------------------------------------------------------------------|-----------|-------|----------|-------|----------|------|---------------|-----------|-----------------|-------------------|------------|-------|-----------------|
|                                                                      | Maximum.  |       | Minimum. |       | Max.     | Min. | Dew<br>Point. | Humidity. | Max. in<br>Sun. | Min. on<br>Grass. | Depth.     | Days. |                 |
|                                                                      | Temp.     | Date. | Temp.    | Date. |          |      |               |           |                 |                   |            |       |                 |
| London, Camden Square                                                | 77.7      | 12    | 48.9     | 7     | 70.9     | 54.2 | 55.4          | 82        | 125.0           | 44.6              | 1.64       | 21    | 7.1             |
| Malta ... ..                                                         | 89.2      | 1, 17 | 68.5     | 15    | 83.8     | 73.9 | 67.4          | 73        | 149.6           | ...               | .02        | 1     | 1.4             |
| Lagos ... ..                                                         | 86.0      | *     | 68.2     | 17    | 83.1     | 73.1 | 72.9          | 82        | 152.0           | 69.0              | 2.82       | 17    | ...             |
| <i>Cape Town</i> ... ..                                              | 77.7      | 7     | 39.5     | 6     | 62.2     | 46.2 | 47.7          | 80        | ...             | ...               | 2.92       | 16    | 5.5             |
| <i>Durban, Natal</i> ... ..                                          | 94.3      | 15    | 47.5     | 4     | 72.3     | 55.9 | ...           | ...       | 130.3           | ...               | 1.04       | 3     | 3.7             |
| <i>Johannesburg</i> ... ..                                           | 79.4      | 24    | 32.9     | 31    | 67.6     | 45.8 | 40.4          | 63        | 129.9           | 32.0              | .00        | 0     | 1.3             |
| <i>Mauritius</i> ... ..                                              | 78.1      | 24†   | 53.5     | 21    | 75.4     | 60.6 | 58.0          | 73        | 143.6           | 45.1              | 2.52       | 17    | 5.5             |
| Calcutta... ..                                                       | 93.9      | 23    | 75.8     | 24    | 89.1     | 79.1 | 78.2          | 86        | ...             | 74.5              | 11.05      | 17    | 8.2             |
| Bombay... ..                                                         | 86.9      | 19    | 75.4     | 1     | 83.7     | 77.2 | 76.1          | 87        | 129.6           | 73.0              | 16.89      | 27    | 8.6             |
| Madras ... ..                                                        | 96.9      | 13    | 72.7     | 17    | 91.2     | 77.4 | 73.8          | 77        | 139.4           | 70.8              | 5.13       | 14    | 6.3             |
| Kodaikanal ... ..                                                    | 65.4      | 12    | 51.1     | 2     | 61.8     | 52.6 | 52.7          | 90        | 133.4           | 41.1              | 10.23      | 26    | 7.9             |
| Colombo, Ceylon ... ..                                               | 87.1      | 11    | 73.2     | 5     | 84.6     | 76.2 | 73.5          | 80        | 135.1           | 68.1              | .84        | 9     | 7.3             |
| Hongkong ... ..                                                      | 9.3       | 29    | 75.1     | 4     | 86.8     | 78.6 | 76.6          | 83        | 143.5           | ...               | 11.16      | 17    | 7.0             |
| <i>Melbourne</i> ... ..                                              | 66.6      | 29    | 35.3     | 28    | 59.6     | 45.4 | 42.3          | 68        | 121.0           | 27.7              | .89        | 17    | 6.5             |
| <i>Adelaide</i> ... ..                                               | 72.0      | 15    | 40.9     | 27    | 63.3     | 47.2 | 47.1          | 76        | 133.5           | 30.5              | 1.71       | 14    | 5.8             |
| <i>Coolgardie</i> ... ..                                             | 79.0      | 13    | 35.0     | 19    | 65.5     | 42.9 | 40.3          | 59        | 146.0           | 32.0              | .43        | 5     | 3.1             |
| <i>Perth</i> ... ..                                                  | 76.6      | 12    | 44.3     | 1     | 63.8     | 40.1 | 48.8          | 75        | 125.7           | 34.7              | 4.58       | 17    | 5.7             |
| <i>Sydney</i> ... ..                                                 | 74.0      | 30    | 42.9     | 28    | 65.5     | 49.1 | 43.8          | 70        | 123.1           | 30.1              | .25        | 12    | 3.9             |
| <i>Wellington</i> ... ..                                             | 59.2      | 20    | 35.2     | 2     | 54.2     | 45.2 | 41.1          | 72        | 104.0           | 28.0              | 4.65       | 19    | 7.0             |
| <i>Auckland</i> ... ..                                               | 66.0      | 18‡   | 39.0     | 11    | 59.8     | 46.7 | 47.4          | 84        | 136.0           | 33.0              | 5.97       | 25    | 6.5             |
| Jamaica, Kingston .. ..                                              | 94.1      | 21    | 70.9     | 8     | 89.7     | 73.4 | 71.6          | 77        | ...             | ...               | 3.39       | 11    | 5.0             |
| Grenada ... ..                                                       | 88.6      | 26    | 71.0     | 5     | 84.3     | 74.9 | 72.6          | 78        | 140.0           | ...               | 14.32      | 26    | 4.5             |
| Toronto ... ..                                                       | 85.1      | 14    | 47.7     | 27    | 77.5     | 57.7 | ...           | ...       | 105.3           | 43.3              | 3.65       | 9     | ...             |
| Fredericton ... ..                                                   | 83.6      | 25    | 37.8     | 31    | 75.0     | 51.2 | ...           | 79        | ...             | ...               | 4.55       | 9     | 5.9             |
| St. John, N.B. ... ..                                                | 78.0      | 15    | 47.7     | 30    | 68.0     | 55.4 | ...           | ...       | ...             | ...               | 2.53       | 11    | 4.4             |
| Victoria, B.C. ... ..                                                | 80.3      | 18    | 43.2     | 24    | 68.5     | 49.8 | ...           | 71        | ...             | ...               | .36        | 4     | 4.0             |
| Dawson ... ..                                                        | 74.0      | 6     | 25.0     | 29‡   | 63.6     | 38.5 | ...           | ...       | ...             | ...               | 1.67       | 11    | 6.2             |

\* Various. † and 28. ‡ and 22. || and 7, 13. ‡ and 30.

MALTA.—Mean temp. of air 77° 9. Average bright sunshine 11.4 hours per day.

*Johannesburg*.—Bright sunshine 302.1 hours.

*Mauritius*.—Mean temp. of air 0° 8, of dew point 1° 4 below, and R .21 in. above, averages. Mean hourly velocity of wind 10.5 miles, or 1.8 below average.

KODAIKANAL.—Bright sunshine 95 hours.

COLOMBO.—Mean temp. of air 77° 1 or 3° 5 below, of dew point 0° 2 above, and R 2.71 in. below, averages. Mean hourly velocity of wind 7.2 miles.

HONGKONG.—Mean temp. of air 82° 2. Bright sunshine 190.3 hours. R 3.04 in. below average, Mean hourly velocity of wind 7.8 miles.

*Melbourne*.—Mean temp. of air 1° 6 above, and R .95 in. below, averages.

*Adelaide*.—Mean temp. of air 1° 5 above, and R .68 in. below, averages.

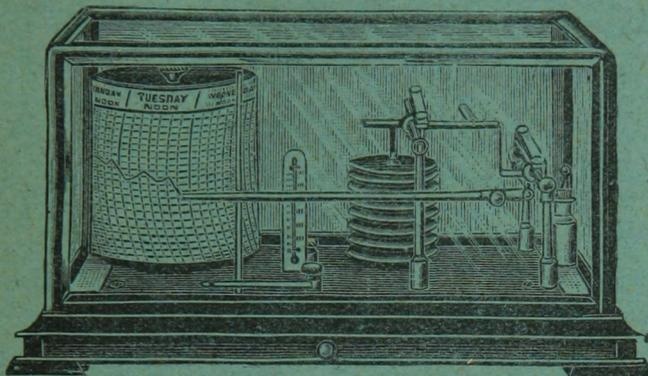
*Coolgardie*.—Mean temp. of air 1° 0 above, and R slightly below, averages.

*Sydney*.—Mean temp. of air 2° 4 above, and R 2.96 in. below, averages.

*Wellington*.—Mean temp. of air 1° 5 above, and R .24 in. below, averages. Bright sunshine 143.4 hours.

*Auckland*.—Mean temp. of air slightly above, and rainfall considerably above, averages. Violent S.W. gale on 28th.

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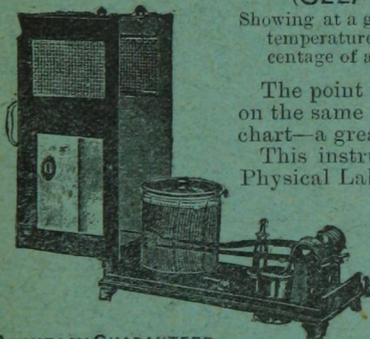
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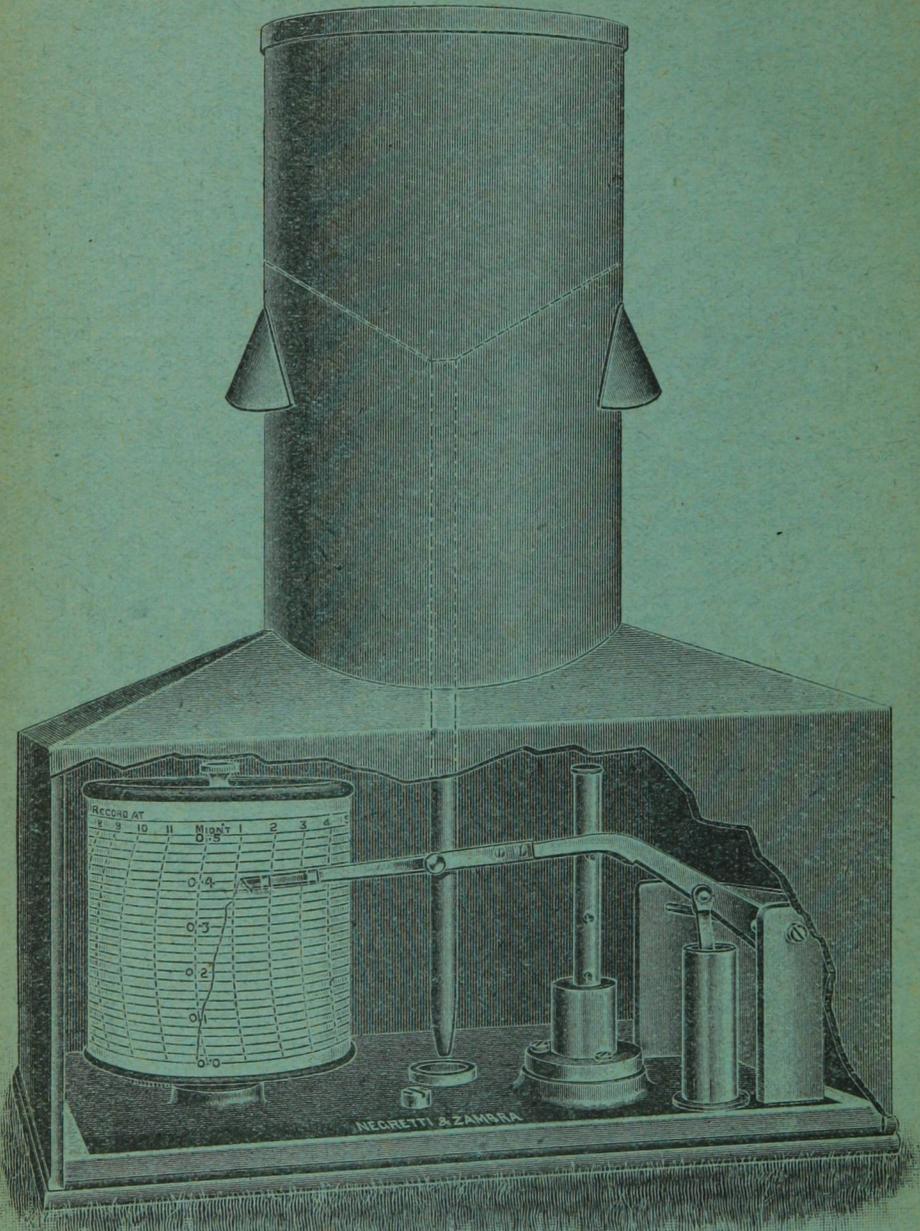
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