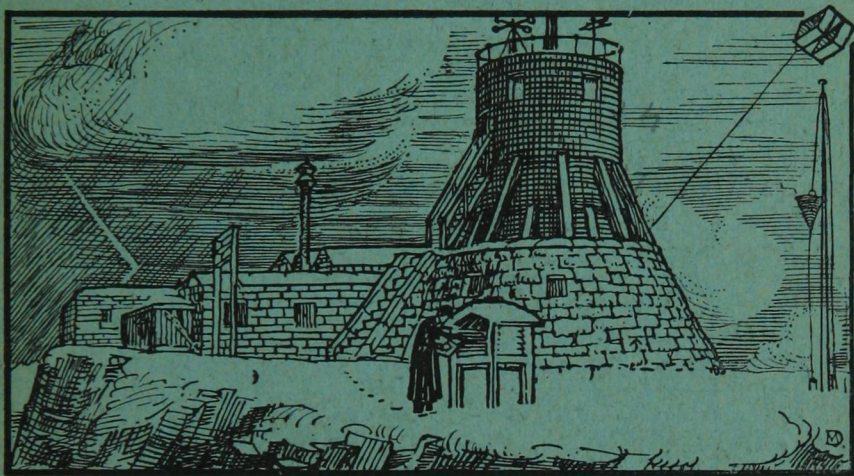


NO. 542 SYMONS'S VOL. 46

METEOROLOGICAL MAGAZINE

.... EDITED BY HUGH ROBERT MILL



MARCH, 1911.

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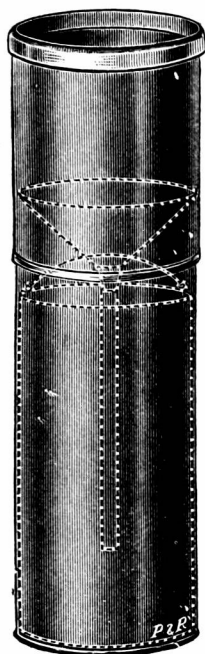
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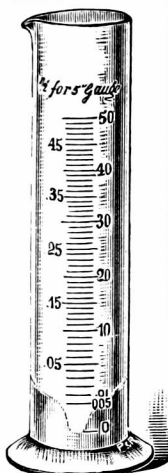
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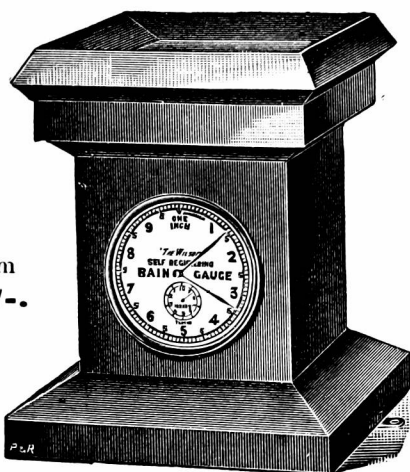
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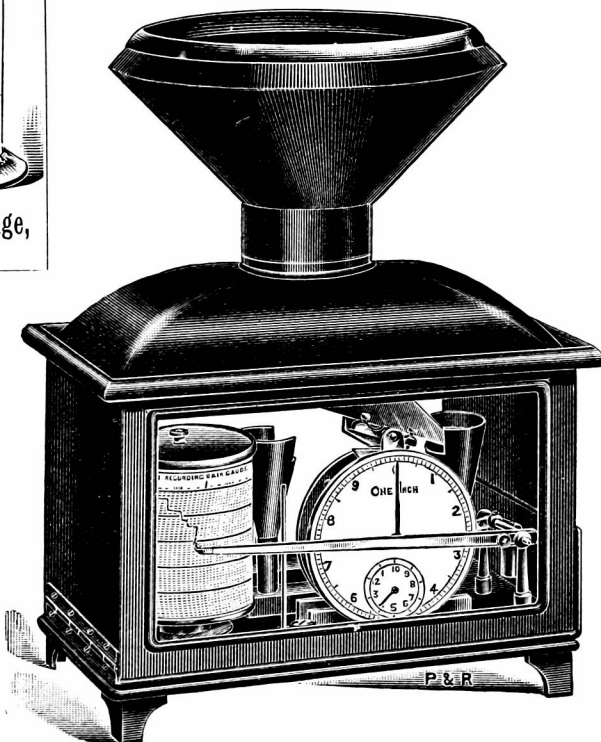
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No. 542.

MARCH, 1911.

VOL. XLVI.

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## Sir Francis Galton, F.R.S.

16th February, 1822—17th January, 1911.

THE name of Francis Galton is familiar in so many fields of science that the services he rendered to Meteorology in the early days of the recognition of the public utility of that science are apt to be forgotten. In later life Sir Francis Galton, who was a cousin of Charles Darwin, turned his attention mainly to anthropological and sociological studies; but we have reason to believe that he never ceased to follow with interest the developments of meteorology, and he remained to the end a representative of the best type of all-round amateur to whom science in the British Isles has always owed so much. His peculiar power seemed to lie in seizing the moment when some particular branch of science was ready to be advanced materially by the adoption of commonsense methods, breaking away from outgrown traditions, and introducing a new, simple and comprehensive classification and terminology. No one who ever met Sir Francis Galton in the course of his scientific work can forget the keenness with which he followed the unfolding of any new idea or the rapidity with which he grasped the kernel of it. For many years the affliction of deafness deprived him of the full enjoyment of intercourse with his fellows; but latterly the ingenuity which had served him so well in devising apparatus available for all the "shifts and expedients" of life in camp and council enabled him to recover, by an electrical arrangement, the power of following conversation. His outlook on life was as keen and full of interest until a few weeks of his death as it was when his "Art of Travel" and "Vacation Tourists" laid the foundation of modern scientific travel more than fifty years before.

As a meteorologist Galton will be remembered chiefly by the interesting experiment in meteorological mapping published in 1863 under the title of "Meteorographica," and by his long service on the Meteorological Council from 1868 to 1901, during which he did much to introduce and improve the methods on which the work of the British Meteorological Office is based. It is to him that we owe the convenient term "anticyclone," a word which familiarity has long since robbed of the uncouthness still occasionally urged against it by those who encounter it for the first time in a newspaper.

By his will Sir Francis Galton left the residue of his large fortune to the University of London to found a chair of Eugenics.

## MONTHLY PRESSURE GRADIENTS AND GALE FREQUENCY.

By L. C. W. BONACINA.

IN the recent second edition of his "Meteorology, Practical and Applied," Sir John Moore discusses, on pages 392-394, the significance of the thirteen maps in the *Meteorological Atlas of the British Islands*, (1883), showing the distribution of mean barometric pressure over the United Kingdom for each month of the year and for the whole year during the twenty years 1861-1880. The mean monthly pressure differences, in inches, between the extreme north of Scotland and the extreme south of England are as follows :—

| Jan. | Feb. | Mar. | Apr. | May  | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|------|------|------|------|------|------|------|------|-------|------|------|------|
| 0·32 | 0·22 | 0·14 | 0·10 | 0·08 | 0·13 | 0·16 | 0·16 | 0·20  | 0·20 | 0·20 | 0·28 |

Dr. R. H. Scott's investigation of gale frequency for the fourteen years 1870-1883, revealed a strongly marked maximum in January, as the maximum pressure difference of 0·32 in. would lead us to expect, but also a decided minimum, not in May, when the minimum pressure difference of 0·08 in. occurs, but in June and July when the pressure difference is increasing. Always bearing in mind that the lack of coincidence between the times of minimum pressure difference and storm frequency is relatively slight, and may even be mainly due to the fact that there are only 14 years for storm frequency as against twenty for pressure gradients, the anomaly is nevertheless probably real, and if so, it admits, I think, of a very interesting and easy explanation. In January, rather than December, the gradient for S.W. winds over the British Isles is steepest as a direct consequence of the pressure over the large continents of the northern hemisphere, being highest in that month, the atmosphere over the North Atlantic being then necessarily left most rarified and favourable to violent cyclonic action; and so the mean January pressure difference of 0·32 in. between North and South Britain represents the month when the disastrous gales which annually take such melancholy toll of human life round our coasts are most frequent. During February, March and April the pressure difference decreases more rapidly than the storm frequency declines, for in March S.W. gales are still frequent, and in both April and May they are more frequent than in July, with a greater pressure difference. The only explanation for the anomaly, if it is real, and not due to insufficient data, is this: in April and May the gradients for S.W. winds on those occasions when they do occur, are steeper than in June and July, but, owing to the preponderance of winds from directions in the northern half of the compass in the former month, the resulting *mean monthly* pressure difference producing a gradient for S.W. winds is smaller than in the latter two months when the *actual* gradients for S.W. winds are slightest. In May the tendency is for northerly and north-westerly winds to prevail in the British Isles rather than for



easterly and north-easterly winds, the months for which are March and April; and if the mean pressure difference for S.W. winds is greater in March and April—the months when the very winds most efficient in tending to neutralize or reverse the mean monthly gradient are most frequent—than in May, it only shows that, at times, when the S.W. gradient actually prevails, the tendency for gales is still pronounced. It is true that gales from points in the northern half of the compass are more common in March, April and May than in June and July, in accordance with the greater prevalence of winds from those directions, but general observation, as well as theoretical considerations, seem to show that the same holds for westerly and south-westerly gales, and I should like to know whether records exist, at the Meteorological Office, of the mean monthly frequency of *south-westerly* or *westerly* gales alone, as I presume Dr. Scott's investigation, quoted by Sir John Moore in the above mentioned book, included storms from all directions.

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HIGH BAROMETER AND DROUGHT, JANUARY— FEBRUARY, 1911.

AFTER the first ten days of 1911, during which some rain fell generally in most parts of the country, a dry spell set in, lasting till the middle of February, which came under the definition of a partial drought over the greater part of England and Wales. A partial drought is defined as a period of more than 28 consecutive days, the mean rainfall of which does not exceed $\cdot 01$ in. per day. The most unusual feature of the meteorological conditions during this time lay in the barometric pressure. Throughout the whole period from the beginning of the year a belt of high pressure persisted over Western Europe, but the weather of the United Kingdom was disturbed more or less by shallow depressions until the 12th, after which the anti-cyclonic system continued to form the dominating influence without interruption until the middle of February, but with its centre shifted rather more to the north after the end of January. The trace of the Redier barograph at Camden Square shows that the pressure in London rose above 30.00 in. at midnight on January 12th, rose steadily to 30.50 in. by 5 a.m. on the 16th, after which it remained above 30.25 in., and for the most part above 30.50 in., until midnight on February 9th. The pressure was slightly below 30.00 in. for about eleven hours from 2 p.m. on the 10th, but quickly recovered, and was above 30.50 in. for a considerable time between the 13th and the evening of the 15th, after which it fluctuated wildly during the gales which characterised the following week. The mean of the 9 a.m. and 9 p.m. readings from January 13th to February 16th inclusive, a period of five weeks, was 30.48 in.

The partial drought which accompanied this unusually protracted spell of anticyclonic predominance extended over practically the whole

of England and Wales south of Yorkshire, and was most intense in the Midlands, where the duration exceeded 40 days at several stations. The area affected included the south-east of Ireland. Over the western midlands, in the Devon-Cornwall peninsula, in the south-east of Ireland and the south of Scotland there was an absolute drought or period of more than 14 days without rain from about January 12th to February 9th, but the area was more restricted than in the case of the partial drought.

At Camden Square no absolute drought was recorded, and the partial drought lasted for 33 days from January 12th to February 13th, during which time .25 in. of rain fell. It is interesting to compare this with previous droughts at the same season.

Partial Drought in January at Camden Square, 1858-1911.

Year.	Began.	Ended.	Lastest.	Rainfall.
			Days.	in.
1863-4	December 9th ...	January 11th ...	34	.33
1874	January 25th ...	February 24th ...	31	.31
1880	January 1st ...	February 4th ...	35	.31
1882	January 9th ...	February 13th ...	36	.24
1887	January 20th ...	March 10th ...	50	.49
1891	January 31st ...	March 6th ...	35	.07
1896	January 28th ...	February 29th ...	33	.30
1905	January 17th ...	February 18th ...	33	.33
1909	January 16th ...	February 26th ...	42	.40
1911	January 12th ...	February 13th ...	33	.25

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### THE RAINFALL OF FEBRUARY, 1911.

THE month proved dry in the south of England and along the whole east coast of Great Britain, where many places had less than one inch of rain, and very few had more than two inches. The Thames Valley map shows a low rainfall for the month. In the north and west of England and in Wales the rainfall was decidedly above the average; but the most remarkable feature of the rainfall of the month was the contrast between the east and west of Scotland. While a considerable area in Forfarshire and Kincardineshire had less than one inch of rain, a very large stretch of country in the west, reaching from the west of Ross-shire to the Firth of Clyde, had more than 10 inches, and the greater part of it more than 13 inches. Falls exceeding 24 inches were reported from one station in the west of Scotland and from several in the English Lake District. In Ireland there was no great excess of rain, except in the north-east. It is rare to find a month in which the inequality of the rainfall of our islands is so marked as in February, 1911, and the difficulty of mapping the distribution emphasizes the need for additional rainfall stations, especially in the north of Scotland and west of Ireland.



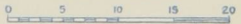
THAMES VALLEY RAINFALL — FEBRUARY, 1911.



ALTITUDE SCALE

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

SCALE OF MILES





## THE WEATHER OF FEBRUARY.

By FRED. J. BRODIE.

FEBRUARY included two clearly marked spells of weather, the first half of the month being cold, cloudy and exceedingly dry, the second half mild, stormy and wet, but with many long intervals of bright sunshine.

The earlier fortnight witnessed a prolongation of the anticyclonic conditions which had prevailed throughout so large a portion of January. During the opening week the central area of the high pressure system lay immediately over the United Kingdom, and on the 1st and 2nd the barometer in all our more northern districts rose above 30·80 in. Sharp frosts were experienced on these days, the sheltered thermometer falling below 20° in nearly all parts of the country, and below 15° at many northern and central stations. In the screen a reading of 11° was recorded at Balmoral and a reading of 13° at Llangammarch Wells; while on the surface of the grass the thermometer sank to within a degree of zero at Llangammarch Wells, to 6° at Birmingham, and to 7° at Newton Rigg. A temporary break in the anticyclone spell occurred on the 9th and 10th, when a "V-shaped" depression passed from west to east across the United Kingdom, and caused slight falls of rain in all districts. The old conditions were, however, soon restored, and between the 10th and 13th sharp frosts were again experienced over the country generally, the sheltered thermometer falling below 25° in many localities and below 20° in central Scotland, Balmoral reporting, for the second time in the month, a reading as low as 11°. On the grass the frost was generally less severe than on the earlier occasion, but readings below 15° were recorded at several northern stations, the exposed thermometer sinking to 8° at Balmoral and to 12° at Newton Rigg and Llangammarch.

After the middle of the month the weather was influenced almost exclusively by deep cyclonic disturbances, whose centres passed across the Iceland-Faeroe region and on to northern Europe. Strong south-westerly to westerly winds, rising frequently to the force of a gale, were therefore experienced very generally, and rain was of almost daily occurrence, the falls being exceedingly heavy in the west of Scotland. The prevalence of a vigorous equatorial current of air resulted in a decided change in temperature, the thermometer in the last fortnight being usually well above the average. On the 17th and 18th the maximum readings were above 55° in many districts, Aberdeen and Bawtry rising to 59°. Similarly high values were recorded over Ireland and North Britain on the 21st (when the thermometer at Dublin also touched 59°), and in several parts of England and Wales on the 25th, when 58° was reached at Raunds. Frost was, however, not entirely wanting. On the nights of the 19th and 20th, when an anticyclonic ridge was formed temporarily over the country, the sheltered thermometer fell below 25° in northern

and central Scotland; while on the night of the 26th a similar development in barometric pressure was accompanied by a more general frost, slight over England and Ireland, but rather sharp in Scotland. On the earlier occasion the thermometer at Balmoral fell to  $21^{\circ}$ , and on the latter to  $22^{\circ}$ .

Over the United Kingdom as a whole the mild weather of the last fortnight was sufficiently pronounced to counteract the effect of the previous cold, and the mean temperature of the month was therefore above the average. In the south of Ireland, the extreme south-west of England, and the Channel Islands, the mean values were slightly below the normal. The duration of bright sunshine was below the average at most places situated in the western half of the kingdom, but above it elsewhere. At Westminster scarcely any sunshine was recorded during the first nine days of the month, but on many subsequent occasions the daily amount was large, and as a result the total for February, 54 hours, was as many as 20 hours in excess of the normal.

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### ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, February 15th, at the Institution of Civil Engineers, Great George Street, Westminster, Dr. H. N. Dickson, President, in the Chair.

A paper on the "Variation of the Depth of Water in a Well at Detling, near Maidstone, compared with the Rainfall, 1885—1909," by Mr. R. Cooke and Mr. S. C. Russell, was read by the latter. The well referred to is on the chalk formation on the southern slope of the range of the North Downs, 558 feet above sea level: its present depth is 118 feet. Weekly plumbings of the water in the well have been taken without interruption since 1885, and the authors have compared these plumbings with the rainfall of the previous week. The extreme variation of the water-level during the whole period was 30 ft. 3 in. Successive weeks of steady rainfall exercise a far greater effect upon raising the water-level than weeks of heavy, but intermittent, rainfall. As a rule, the effect of the autumn rains is not felt on the well until the month of December, but the winter rainfall penetrates most readily. Following a series of wet years a high limit of saturation is attained, and once this condition is thoroughly established the water remains at an almost constant level throughout the seasons, excess or deficiency of rain producing very little effect. With dry years the limit of saturation falls, the water in the well continuing at a low level. This fall in the limit of saturation may be so great as to pass beyond the depth of the well, which consequently becomes dry. The first rains following this condition of things is expended upon raising the level of saturation, and an appreciable time may elapse before there is any rise of water in the well.

Mr. Baldwin Latham said that he had found in measuring the wells



of a district that the water travelled from the highest to the lowest point. Wells on the top of the Downs would show a rise weeks before those in the lower part of the district. When the water began to rise in the high wells, it might be weeks before it got into the lower wells. The rainfall at the top of the hills was much greater than at the lowest point in the valley. The water in some of the high wells of the North Downs would fluctuate more than 100 feet, while near the Wandle, where the water escaped, it would not vary more than a few inches. He mentioned that there was a large increase in infant mortality when the water supply was low.

Mr. E. Gold suggested to the authors that they should take account not only of the rainfall, but also of the motion of the air, the mean temperature, the relative humidity, and the duration of bright sunshine, and find a numerical index of the effect of each of these quantities in a correlation coefficient.

The President observed that, in relation to the attempt to obtain correlation curves with such things as rainfall, humidity, &c., they had a geological problem to deal with, not merely in relation to the permeability of the soil, which would vary considerably, but also to the position of the well. In the case of an underground current subject to wave-like variation, they had to deal with the nature of the waves, the extent to which these waves diminished in amplitude from the upper to the lower levels, and also with the rate at which the actual current movement of water took place.

Mr. Carle Salter, Mr. W. B. Tripp and Mr. R. Inwards also took part in the discussion, to which Mr. Cooke and Mr. Russell replied.

Mr. A. W. Clayden read a paper on "The Actinograph: an instrument for observing and recording Changes in Radiation." He said that he had had a barograph at work for many years, and since January, 1908, had also issued a thermograph, in which the movements are derived from a metallic spiral. The latter instrument suggested the apparatus brought before the Society. It occurred to him that if it were possible to arrange two such coils in series, so that the expansion of the second should compensate for that of the first, the result of a mere change of temperature should be *nil*. But if one coil were left bright, and were shaded from radiation by a bright metal cover, while the second was blackened and freely exposed to radiation, there should generally be a difference of temperature which would be shown by the recording pen. He therefore obtained the working parts of a thermograph similar to the one he had been using, together with a duplicate coil, and after a few preliminary trials completed the instrument which had been working almost continuously ever since. He exhibited the instrument to the meeting, and showed a number of interesting records obtained from it.

Mr. W. W. Bryant, Mr. R. Inwards, Mr. J. E. Clark, Mr. E. Gold, and Mr. R. Corless took part in the discussion.

A paper on "A New Set of Cloudiness Charts for the United States" by Mr. K. M. Clark, of Harvard University, U.S.A., was, in

the absence of the author, read by the Secretary. This included a series of thirteen maps showing the mean monthly and annual cloudiness of the United States. The most marked features appeared over the Pacific Coast and the Great Lakes. On the North Pacific coast the combined effect of the coast ranges and the on-shore Westerly winds caused the high percentage of cloudiness, especially in winter, when the northern storm track swings down over this region. The Great Lakes region shows a similar large amount of cloudiness, especially in the winter, because of the location, on or near the northern cyclonic track and the presence of the water surface. The Californian valley, protected from moisture-bearing winds by the coast ranges, showed the minimum of cloudiness for the country. The local high cloudiness at Fresno, in this valley, in winter, was due to Tule fogs. During the late spring, summer, and early autumn, San Diego showed a cloudiness higher than that of adjacent stations. This was due to the occurrence, at these times, of the so-called "permanent Yuma low" over the Colorado River Valley, which produced an in-draft of moisture-laden air from the Pacific across San Diego, causing what was known as "high fog."

The following gentlemen were elected Fellows of the Society:—Mr. A. E. Brounger, Mr. M. E. Yorke Eliot, Assoc.M.Inst.C.E., Mr. S. S. Elliott, Assoc.M.Inst.C.E., Mr. W. Howarth, Mr. H. K. Korgaokar, M.A., Mr. B. G. Pahlajaney, Mr. G. R. Pember, Raw Sahib G. N. Sahasrabudhe, Mr. G. C. Turner, F.L.S., and Mr. C. F. Webb, B.A.

### REVIEW.

*Waves of the Sea and other Water Waves* by VAUGHAN CORNISH, D.Sc. With 50 Photographs taken by the Author. London, 1910. T. Fisher Unwin. Size 9 x 6. Pp. 374. Price 10s. net.

DR. CORNISH enshrines in this handsome volume the researches of fifteen years on waves in water, including much data previously published by him, but bringing it into a more systematic and final form. He deals in Part I. with the size and speed of deep-sea waves, in Part II. with the transporting action of sea-waves on shingle, sand and mud, while in Part III. he goes on to the phenomena of stationary and progressive waves in rivers, including the discussion of bores and of cataracts. The first section is that which enters most intimately into relation with the phenomena, to the study of which this Magazine is devoted, and Chapter IV., which is concerned with the relation of waves to wind is naturally that to which we turn with most interest. The average velocity of the wind for certain periods during which the size of the waves had been observed is calculated, and an attempt made to connect the two. The character of the wave-front in a veering wind, and the influence of gusts and squalls on wave-forms, is dealt with, largely from data collected by the author.

The beautiful illustrations add much to the value of the book, and the style is eminently readable.

## A VISIT TO MEDICINE HAT.

By FELIX J. KOCH, of Cincinnati.

A RECENT dispatch out of Canada West is of interest, the world about, as detailing the passing of Medicine Hat. The editorial fraternity has taken up the item, and protested against such change.

"Every American," one scribe tells us, "is familiar with the popular josh at Medicine Hat—as the 'place the cold waves come from.' Apparently they are even more familiar with this josh in Western Canada. Apparently, too, it is taken quite seriously there; for a movement has sprung up in Medicine Hat to change that city's name.

"All Canada was angry when Kipling called the Dominion 'Our Lady of the Snows.' Canadians thought that sounded too cold for commercial advantage. It is for this same reason that Medicine Hat wants to change its title. The substitute chosen by its leading merchants, we presume, will be Pensacola, Tallahassee, or Vera Cruz.

"It is not yet finally settled, however, that the commercial boomers will be able to change the name of Medicine Hat. Some of the inhabitants of that town, who know a little of the early history of the plains, object; and no less a person than Rudyard Kipling has taken it upon himself to write to the citizens of Medicine Hat protesting against the change. He says, among other things:—

"To my mind the name of Medicine Hat has an advantage over all the names I have quoted. It echoes, as you so justly put it, the old Cree and Black-foot traditions of red mystery and romance, that once filled the prairies. Also, it hints, I venture to think, at the magic that under-lies the city, in the shape of your natural gas.

"Believe me, the very name is an asset, and, as years go on, will become more and more of an asset. It has no duplicate in the world. It makes men ask questions, and, as I know, more than twenty years ago, draws the feet of the young men toward it.

"Men do not think much of a family which has risen in the world, changing its name for social reasons. They think still less of a man who, because he is successful, repudiates his wife, who stood by him in the early struggles. I do not know what I should say, but I have the clearest notion of what I should think of a town that went back on itself."

"All of which is again focussing the eyes of the world on Medicine Hat.

"If there is one place that is perhaps the most feared spot of America, to the average newspaper reader, it is the town of Medicine Hat, where the blizzards come from. The very name has something far away in it, a sort of kinship to Indians and prairies, and then the association of the long, howling blizzards, which bring in their wake terrific snow storms. When the weather man from Medicine Hat sounds his warning, all the country well-nigh, sits up and takes notice."

We dropped into Medicine Hat the other day to see what the place might be like.

On the outskirts, the dry plains of Central Canada hemmed in the settlement. There was no end to them, seemingly. *Couées*, or gulches, as we of the States call them, were likewise on the way, and then, on ahead, lay the town of Medicine Hat. On the nearer borders there was an Indian encampment. The wigwam-like arrangement for cooking and the old-time tepees stood out in the valley, as they did in here two or three centuries before. Then, too, there were some one-room shanties to which the noble red man had renegued. Out of the day of the red man, into the present, we passed by rapid transition, at the rate of sixty miles an hour, as the train was making up time. At nine we were out in the city. Right up at the railway's side there was a street of little stores. One hardly thought of them as one thought of the town—famous for being the one whence the weather comes. One or two-story little shops, built of brick or frame, and stretching off perhaps three squares were these. There was one business street trending away, too, and one noted a tailor and drug store. Romantic fellows these shopkeepers, undoubtedly—think of the material for a novel in "The Lone Tailor of Medicine Hat," or "The Romance of a Lone Land Druggist." A man comes out to the lonesome, sets up shop to hide some dark secret of his past, and lo, to-day, thousands of people are dragged past his doors by the steam cars? Over yonder the American hotel invites, its walls of a sort of cement blocks, and the roof of a black frame. Then there is the Board of Trade, in a little frame where men sit in caps, with pipes, English fashion, outside the door, and ponder on the weather. As the sun shines, so the wheat grows, as the wheat grows so smiles coy Fortune up here in the Northland. But we must be off sight-seeing. We open the note-book and jot down a few things. A harness-shop, a general store, an electric theatre. Yea, even the photographer is here at Medicine Hat.

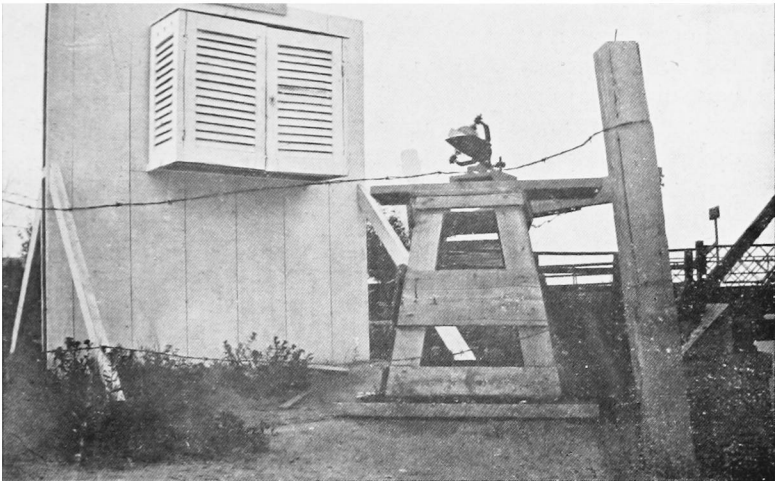
All this West is very modern, withal it so very young. When its history comes to be written, there will be no stirring days of pioneering. Grandad of the future will tell, not of his ride on the Red River carts, across the plains, but, instead of buying a ticket from a scalper in Waterloo, Iowa, where they tell us the law is broken every day of the year, and hie him away to the far-away Northland. A new, two storey, fine stone Custom House is built here, or building, it has the red stone, with lighter shades at the corners, and again about the windows. Then there is the City Hall, of red brick, and in the same style; something about it makes one think of an exhibition building at home. Other buildings, just below, would be regarded as good in any place. There is a modern fire department installed in the City Hall; ahead is the great steel bridge across the river.

We pass on down the street between the two. They have even a park here along the river, densely set out with young trees. It is



balmy now at Medicine Hat, withal it is cloudy. At the end of the town is a ridge; from it we see a church. Over the river there roll away the desolate *coulées*. Here, on the bluff over the river, at the edge of the field, with more young trees, overlooking the same blue-gray river and the bridge, is the famous weather station.

There is a little area of sun-baked mud or earth enclosed by a barbed wire. At its centre, set diagonally across the space, is a board wall, of heavy planks, white painted. Two uprights at the rear sustain it; an old soap box, too, is nailed behind. By the side of the frame one can see that it is built double, to withstand the wind, the sheaths or walls being perhaps three inches apart. Against the frame, then, at its front, is the usual latticed box of weather bureaux



METEOROLOGICAL STATION AT MEDICINE HAT.

generally. This is locked, to safeguard against thieves. It, too, is white painted, and faces the river. Off at the front stands a little pedestal—on this is a stand, bearing a globe of glass. The glass concentrates the sunlight on a strip of blue paper, marked off in white hour lines. The sun burns its mark upon this, then, at it passes, serving to show the number of hours *per diem* which is shone here. It is daylight here from two in the morning till ten at night, someone tells you. Twilights are very long. At Edmonton, a few hundred miles further north, the twilights almost meet at times. We here are just ninety miles from the American border.

We “run foul” of the weather man and we interview him. He is a reticent fellow; undoubtedly the temperature has got on his nerves. “Yes, indeed, it gets cold here, the end of February and into March is the very coldest time.” Last winter, however, they did not have very cold weather at all.

What did he call very cold weather? “Ah, well, if it got to 10 or

15 degrees below, why, then, it was right smart cold." Things are comparative in travel one must remember. He preferred to talk of the natural gas—here there were limitless amounts of it; one need go down only 1,100 feet. We hail from a town where natural gas is talked till the ears sicken at taint of it. So we swerved again to the weather. This was reported daily at five o'clock p.m. The station belongs to the Canadian Government; the weather report is distributed, however, by the *Associated Press*.

Mr. Crosskill, the Observer, has been here several years, and is wont to stay considerable more, heralding the blizzards which have made notorious bustling Medicine Hat.

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### SCOTTISH METEOROLOGICAL SOCIETY.

A MEETING of the Society was held on Monday evening, February 27th, in St. Andrew's Hall, Edinburgh, Professor A. Crum Brown, F.R.S., President, in the Chair. Mr. R. G. K. Lempfert, Superintendent of the Forecast Division of the Meteorological Office, London, delivered a lecture on "Weather Forecasting." The lecture covered a wide field. The routine work of the Forecasting Division of the Office was first described in detail, and the importance of such recent developments as the extension of the cable from the Shetlands to Faeroe and Iceland, and the co-operation of the Atlantic Shipping Companies by means of wireless telegraphy, was discussed. Thereafter researches made by the lecturer, along with Dr. Shaw, were dealt with, and an effort made, very successfully, to explain the general principles on which the art and practice of forecasting were based.

The lecture was freely illustrated with lantern slides, many of them showing the weather distribution on days which had been more or less memorable. Indeed the occasion was, in a way, a historic one. The numerous messages received in the morning at the Meteorological Office had been re-telegraphed to Edinburgh, and Mr. Lempfert had prepared in the Society's rooms a map showing the weather conditions over our islands and Western Europe for the actual morning of the day of his lecture. This was the first time on which a weather map for the current day had been prepared in Scotland; a lantern slide of the map was thrown on the screen. The lecture was greatly appreciated by a large audience.

Apart from meetings on the usual lines, the Society has recently made the experiment of holding quite informal evening meetings for discussion. Two such meetings have been held, with considerable success; (1) on the evening of 8th December, 1910, jointly with the Physical Research Club, in the Natural Philosophy Department of Edinburgh University, when Dr. G. A. Carse opened a discussion on "Atmospheric Electricity"; (2) in the Society's Rooms on 18th January, when Mr. Fairgrieve opened a discussion on "The Upper Air."

## Correspondence.

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

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## MILLIMETRES OR INCHES.

I HAVE just read a letter signed "Contributor" in your issue for January. It directs attention to a very obvious misprint, viz., 30° F., instead of 32° F., in two places in the Report of the Transvaal Meteorological Department for 1908-09. This mistake, I am glad to say, is not to be found in earlier or later reports, but I do not for one moment think that it would deceive any meteorologist into supposing that some new method of reducing barometer readings had been adopted. "Contributor's" statement that four different systems of reduction are employed is thus rather frivolous.

The general question as to whether pressures should be measured by inches or millimetres has also been raised in this correspondence. The practice at this observatory is, until such time as a uniform system has been adopted, to print pressures both in inches and millimetres. I have a strong expectation that, in the future, it will not be necessary to use inches in this respect. In the Weekly Weather Report of the London Meteorological Office an absolute (metric) unit has been already adopted for observations in the Upper Air. Also in Appendix III. of the Observer's Handbook, 1909, issued by the same office, the use of the "degree of pressure" (1 "degree of pressure" =  $2 \times 10^3$  dynes per sq. cm.) is suggested as a pressure unit, and tables are given for the conversion of barometric readings in millimetres and English inches into "degrees of pressure" and megadynes per square centimetre.

Thus it appears to me that by publishing barometric readings in millimetres and English inches, the Transvaal Meteorological Department is not only keeping step with other British Meteorological Observatories, but is also attending to the interests of future generations of investigators.

R. T. A. INNES, *Director.*

*Johannesburg, 13th February, 1911.*

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## CYCLONES AND THE SUN'S ROTATION PERIOD.

I HAVE read Mr. Henkel's article in your number for January, 1911, with great interest.

Some definition is wanted as to the "date of origin." In the Jamaica Meteorological Reports a complete list of cyclones between 1881 and 1901 will be found; the dates are given on which the barometers began to fall, and also the dates, when having increased in strength, the cyclones swept over or near any island or vessel which may have subsequently reported them. There may be several days between these dates, and I suggest that the first dates should

be adopted. The sudden drop of the barometer, due to a cyclone generating at a distance of 800 miles or so, I have long used as a "wireless message"; so that all places in the West Indies would record the same "date of origin" for any cyclone.

With reference to the sunspot period and terrestrial temperatures, the Jamaica observations confirm those of Mr. Stone at the Cape and Dr. Gould at Cordoba, only that the difference between maximum and minimum temperatures in Jamaica is  $2^{\circ}$  F., instead of  $1\frac{3}{4}^{\circ}$  F. as found at Cordoba (see Weather Report, No. 275, pp. 9, 10). With reference to the sunspot period and the Jamaica rainfall, I believe that the recent reduction of 40 years' observations have proved that a rainfall minimum occurs regularly two years after every sunspot maximum and minimum. The rainfall maxima are more irregular, depending on "flood rains," etc., but of course they fall between two minima. This may remove the contradictory results obtained in different parts of the world.

MAXWELL HALL,

*Jamaica, February 11th, 1911.*

*Government Meteorologist.*

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## THE SUPPOSED COLD OF WINTER ANTICYCLONES.

SINCE Mr. Brodie has mentioned my name in connection with the supposed cold of the winter anticyclone, it may interest your readers if I state the facts on which my objection was founded; since the matter is not one of opinion, but one that can easily be settled by a search through existing records, which are ample for the purpose.

During the 50 years, 1841—1890, the Greenwich records show 74 periods of frost. Out of these 20, which between them gave 216 days of frost, occurred with the mean of the barometer during their continuance below 29.80 in., and 13, giving 93 days, with a mean above 30.20 in. Moreover nearly every frost in the period noted for severity or length, had occurred in the low pressure series. Also for the same period the mean temperature on all the days on which the barometer was above 30.20 in., was  $38^{\circ}3$  F., which is close to the mean winter temperature, the percentage of frosty days (mean below  $32^{\circ}0$  F.) was 15, which is also the percentage for the whole 150 winter months included in the period.

Further, at Christiania, Berlin, and Geneva, no connection between the monthly winter means of the height of the barometer, and of the temperature is shown,—*Royal Met. Soc. Quarterly Journal*, Jan., 1897. Vol. 23, No. 101, and Vol. 25, No. 109.

It is curious how, in the face of this statistical evidence, the "rule" can ever have been formulated. I call it "rule" for I see Mr. Brodie still does so, although he was never one of its warm advocates. The statement is still made in the text books, copied probably one from another, without investigation. Perhaps it is true in drier countries, Asia and North America for instance, but I often wonder if it is. Possibly it arose from the old lettering on the



barometer faces, "rise for north-east winds," for if an anticyclone is another term for a north-east wind, it is doubtless true. Possibly though it may have come from the mistaken notion that an anticyclonic brought down cold air from the upper strata, and therefore ought to be cold. The descending air does occur, but the temperature during an anticyclone a few thousand feet high is unduly warm.

W. H. DINES.

*Pyrtton Hill, Oxon., 1st March, 1911.*

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### GUN-FIRING AND RAINFALL.

WITH reference to the question of the firing of guns causing rain, may I point out that at Shoeburyness, where great guns are being fired almost daily, and very frequently in the day, the average rainfall is, I think, the smallest in the United Kingdom, viz., below 20 inches.

FREDK. GASTER, F.R. Met.Soc.

*Tankerton, 25th February, 1911.*

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### METEOROLOGICAL NEWS AND NOTES.

THE ARTICLE ON MEDICINE HAT which we publish this month comes to us as an unsolicited contribution from an American writer. We retain pleasant recollections of Medicine Hat in its earlier days, passing through it some fourteen years ago, and its rapid growth from the wooden abodes of those days to the fine stone structures of the present is a striking example of the prosperity accruing from the utilization of the wonderful soil and climate of the western plains. The passing of the old names, Rat Portage, Moose Jaw, Medicine Hat, which gave an air of romance and a glimpse of historical vistas to the railway journey across Canada, is a source of lively regret to all who appreciate the flickering of the old northern lights on commonplace modern prosperity. But we are inclined to doubt the American editor's opinion that Medicine Hat wishes to change its name in order to escape from the reproach of breeding blizzards.

COLLIERY WARNINGS based on the probability of the rapid escape of gas from the cold seams in certain conditions of weather have been made the subject of some unusually severe criticism in *The Times* and *Nature*, to which a very spirited rejoinder has been made by the anonymous author of the warnings. It is not a little surprising that no one should know who is responsible for warnings which have been issued through the Press Association for many years; but the anonymity and absence of authority at least give a good opportunity for judging the whole matter on its merits. We should value the views of any of our readers who may have consulted these warnings.

## RAINFALL TABLE FOR FEBRUARY, 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                            | 1'66                           | 1'48        |
| Tenterden.....                       | Kent.....            | 51 4       | *0 41                | 190                            | 1'90                           | 1'33        |
| Arundel (Patching).....              | Sussex.....          | 50 51      | 0 27                 | 130                            | 2'17                           | 1'68        |
| Southampton (Cadland) ..             | Hampshire.....       | 50 50      | 1 22                 | 52                             | 2'28                           | 1'84        |
| Oxford (Magdalen College).....       | Oxfordshire.....     | 51 45      | 1 15                 | 186                            | 1'62                           | 1'29        |
| Wellingborough (Croyland Abbey)..... | Northampton.....     | 52 18      | 0 41                 | 174                            | 1'69                           | 1'17        |
| Shoeburyness.....                    | Essex.....           | 51 31      | *0 48                | 13                             | 1'19                           | '65         |
| Bury St. Edmunds (Westley).....      | Suffolk.....         | 52 15      | *0 40                | 226                            | 1'59                           | '96         |
| Geldeston [Beccles].....             | Norfolk.....         | 52 27      | *1 31                | 38                             | 1'41                           | 1'24        |
| Polapit Tamar [Launceston].....      | Devon.....           | 50 40      | 4 22                 | 315                            | 2'95                           | 1'98        |
| Rousdon [Lyme Regis].....            | „.....               | 50 41      | 3 0                  | 516                            | 2'50                           | 1'88        |
| Stroud (Upfield).....                | Gloucestershire..    | 51 44      | 2 13                 | 226                            | 2'12                           | 1'42        |
| Church Stretton (Wolstaston).....    | Shropshire.....      | 52 35      | 2 48                 | 800                            | 2'17                           | 2'44        |
| Coventry (Kingswood).....            | Warwickshire.....    | 52 24      | 1 30                 | 340                            | 2'01                           | 1'38        |
| Boston.....                          | Lincolnshire.....    | 52 58      | 0 1                  | 25                             | 1'53                           | 1'29        |
| Workshop (Hodsock Priory).....       | Nottinghamshire..... | 53 22      | 1 5                  | 56                             | 1'64                           | '78         |
| Macclesfield.....                    | Cheshire.....        | 53 15      | 2 7                  | 501                            | 2'30                           | 2'59        |
| Southport (Hesketh Park).....        | Lancashire.....      | 53 38      | 2 59                 | 38                             | 2'07                           | 2'85        |
| Wetherby (Ribston Hall) ..           | Yorkshire, W.R.....  | 53 59      | 1 24                 | 130                            | 1'71                           | 1'85        |
| Arnccliffe Vicarage.....             | „.....               | 54 8       | 2 6                  | 732                            | 4'88                           | 11'87       |
| Hull (Pearson Park).....             | „ E.R.....           | 53 45      | 0 20                 | 6                              | 1'78                           | 1'35        |
| Newcastle (Town Moor) ..             | Northumberland.....  | 54 59      | 1 38                 | 201                            | 1'63                           | '66         |
| Borrowdale (Seathwaite) ..           | Cumberland.....      | 54 30      | 3 10                 | 423                            | 10'96                          | 20'57       |
| Cardiff (Ely).....                   | Glamorgan.....       | 51 29      | 3 13                 | 53                             | 3'07                           | 4'56        |
| Haverfordwest.....                   | Pembroke.....        | 51 48      | 4 58                 | 95                             | 3'42                           | 3'01        |
| Aberystwyth (Gogerddan).....         | Cardigan.....        | 52 26      | 4 1                  | 83                             | 3'09                           | 3'78        |
| Llandudno.....                       | Carnarvon.....       | 53 20      | 3 50                 | 72                             | 2'11                           | 2'10        |
| Cargen [Dumtries].....               | Kirkcudbright.....   | 55 2       | 3 37                 | 80                             | 3'42                           | 5'42        |
| Marchmont House.....                 | Berwick.....         | 55 44      | 2 24                 | 498                            | 2'15                           | 1'90        |
| Girvan (Pinmore).....                | Ayr.....             | 55 10      | 4 49                 | 207                            | 3'87                           | 6'29        |
| Glasgow (Queen's Park) ..            | Renfrew.....         | 55 53      | 4 18                 | 144                            | 2'70                           | 5'89        |
| Inveraray (Newtown).....             | Argyll.....          | 56 14      | 5 4                  | 17                             | 5'71                           | 12'43       |
| Mull (Quinish).....                  | „.....               | 56 34      | 6 13                 | 35                             | 4'45                           | 6'80        |
| Dundee (Eastern Necropolis).....     | Forfar.....          | 56 28      | 2 57                 | 199                            | 1'91                           | 1'10        |
| Braemar.....                         | Aberdeen.....        | 57 0       | 3 24                 | 1114                           | 2'55                           | 3'10        |
| Aberdeen (Cranford).....             | „.....               | 57 8       | 2 7                  | 120                            | 2'36                           | 1'31        |
| Cawdor.....                          | Nairn.....           | 57 31      | 3 57                 | 250                            | 2'06                           | 2'89        |
| Fort Augustus (S. Benedict's).....   | E. Inverness.....    | 57 9       | 4 41                 | 68                             | 4'20                           | 6'81        |
| Loch Torridon (Bendamph).....        | W. Ross.....         | 57 32      | 5 32                 | 20                             | 7'53                           | 10'87       |
| Dunrobin Castle.....                 | Sutherland.....      | 57 59      | 3 56                 | 14                             | 2'58                           | 2'87        |
| Wick.....                            | Caitness.....        | 58 26      | 3 6                  | 77                             | 2'23                           | 2'75        |
| Killarney (District Asylum).....     | Kerry.....           | 52 4       | 9 31                 | 178                            | 4'99                           | 3'47        |
| Waterford (Brook Lodge).....         | Waterford.....       | 52 15      | 7 7                  | 104                            | 3'18                           | 2'61        |
| Nenagh (Castle Lough).....           | Tipperary.....       | 52 54      | 8 24                 | 120                            | 2'89                           | 3'64        |
| Miltown Malbay.....                  | Clare.....           | 52 52      | 9 26                 | 400                            | 3'21                           | 3'25        |
| Gorey (Courtown House) ..            | Wexford.....         | 52 40      | 6 13                 | 80                             | 2'75                           | 2'00        |
| Abbey Leix (Blandsfort).....         | Queen's County.....  | 52 56      | 7 17                 | 532                            | 2'55                           | 2'88        |
| Dublin (Fitz William Square).....    | Dublin.....          | 53 21      | 6 14                 | 54                             | 1'93                           | '99         |
| Mullingar (Belvedere).....           | Westmeath.....       | 53 29      | 7 22                 | 367                            | 2'67                           | 3'60        |
| Ballinasloe.....                     | Galway.....          | 53 20      | 8 15                 | 160                            | 2'50                           | 3'83        |
| Crossmolina (Enniscoe).....          | Mayo.....            | 54 4       | 9 18                 | 74                             | 4'20                           | 4'19        |
| Collooney (Markree Obsy.).....       | Sligo.....           | 54 11      | 8 27                 | 127                            | 3'20                           | 3'77        |
| Seaforde.....                        | Down.....            | 54 19      | 5 50                 | 180                            | 2'81                           | 3'78        |
| Bushmills (Dundarave).....           | Antrim.....          | 55 12      | 6 30                 | 162                            | 2'56                           | 3'98        |
| Omagh (Edenfel).....                 | Tyrone.....          | 54 36      | 7 18                 | 280                            | 2'68                           | 4'01        |

RAINFALL TABLE FOR FEBRUARY, 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 | Date. | Aver. 1875-1909.      | 1911. | Diff. from Aver. in. | % of Av. |                        |                 |
|                                   |          | in.               |             |       | in.                   | in.   |                      |          | in.                    |                 |
| — .18                             | 89       | .39               | 27          | 14    | 3.49                  | 2.86  | — .63                | 82       | 25.11                  | Camden Square   |
| — .57                             | 70       | .30               | 28          | 15    | 4.04                  | 2.84  | —1.20                | 70       | 27.64                  | Tenterden       |
| — .49                             | 77       | .48               | 27          | 12    | 4.76                  | 3.17  | —1.59                | 67       | 30.48                  | Patching        |
| — .44                             | 81       | .46               | 27          | 11    | 5.03                  | 3.14  | —1.89                | 63       | 31.87                  | Cadland         |
| — .33                             | 80       | .29               | 27          | 14    | 3.40                  | 1.97  | —1.43                | 58       | 24.58                  | Oxford          |
| — .52                             | 69       | .19               | 18†         | 14    | 3.58                  | 1.93  | —1.65                | 54       | 25.17                  | Croyland Abbey  |
| — .54                             | 55       | .21               | 27          | 14    | 2.52                  | 1.55  | — .97                | 61       | 19.28                  | Shoeburyness    |
| — .63                             | 60       | .26               | 27          | 12    | 3.29                  | 2.70  | — .59                | 82       | 25.40                  | Westley         |
| — .17                             | 88       | .24               | 11          | 20    | 2.94                  | 3.01  | + .07                | 102      | 23.73                  | Geldeston       |
| — .97                             | 67       | .47               | 27          | 16    | 6.54                  | 3.31  | —3.23                | 51       | 38.27                  | Polapit Tamar   |
| — .62                             | 75       | .39               | 27          | 14    | 5.44                  | 2.86  | —2.58                | 53       | 33.54                  | Rousdon         |
| — .70                             | 67       | .29               | 18          | 13    | 4.45                  | 2.74  | —1.71                | 62       | 29.81                  | Stroud          |
| + .27                             | 112      | .43               | 18          | 15    | 4.68                  | 3.05  | —1.63                | 65       | 32.41                  | Wolstaston      |
| — .63                             | 69       | .38               | 18          | 9     | 4.23                  | 2.24  | —1.99                | 53       | 28.98                  | Coventry        |
| — .24                             | 84       | .34               | 21          | 16    | 3.07                  | 2.86  | — .21                | 93       | 23.35                  | Boston          |
| — .86                             | 48       | .16               | 18          | 12    | 3.34                  | 1.67  | —1.67                | 50       | 24.46                  | Hodsock Priory  |
| + .29                             | 113      | .43               | 21          | 14    | 4.96                  | 3.88  | —1.08                | 78       | 34.73                  | Macclesfield    |
| + .78                             | 138      | .59               | 21          | 17    | 4.62                  | 3.65  | — .97                | 79       | 32.70                  | Southport       |
| + .14                             | 108      | .42               | 21          | 17    | 3.60                  | 3.20  | — .40                | 89       | 26.87                  | Ribston Hall    |
| +6.99                             | 243      | 2.05              | 21          | 19    | 11.14                 | 16.02 | +4.88                | 144      | 61.49                  | Arneliffe       |
| — .43                             | 76       | .26               | 21          | 16    | 3.48                  | 2.67  | — .81                | 77       | 26.42                  | Hull            |
| — .97                             | 40       | .12               | 23          | 13    | 3.53                  | 2.33  | —1.20                | 66       | 27.94                  | Newcastle       |
| +9.61                             | 188      | 3.65              | 18          | 19    | 24.40                 | 31.74 | +7.34                | 130      | 129.48                 | Seathwaite      |
| +1.49                             | 149      | 1.25              | 27          | 17    | 6.72                  | 6.46  | — .26                | 96       | 42.28                  | Cardiff         |
| — .41                             | 88       | .47               | 26          | 16    | 8.11                  | 6.01  | —2.10                | 74       | 46.81                  | Haverfordwest   |
| + .69                             | 122      | .74               | 10          | 15    | 7.00                  | 6.04  | — .96                | 86       | 45.46                  | Gogerddan       |
| — .01                             | 100      | .35               | 28          | 14    | 4.62                  | 2.80  | —1.82                | 61       | 30.36                  | Llandudno       |
| +2.00                             | 158      | 1.14              | 18          | 16    | 7.52                  | 7.96  | + .44                | 106      | 43.47                  | Cargen          |
| — .25                             | 88       | .52               | 22          | 12    | 4.55                  | 3.30  | —1.25                | 73       | 33.76                  | Marchmont       |
| +2.42                             | 162      | 1.60              | 18          | 20    | 8.65                  | 9.71  | +1.06                | 112      | 49.77                  | Girvan          |
| +3.19                             | 218      | 1.42              | 17          | 19    | 6.23                  | 8.63  | +2.40                | 139      | 35.97                  | Glasgow         |
| +6.72                             | 218      | 2.41              | 17          | 21    | 13.05                 | 19.91 | +6.86                | 152      | 68.67                  | Inveraray       |
| +2.35                             | 153      | .98               | 17          | 21    | 10.00                 | 11.82 | +1.82                | 118      | 56.57                  | Quinish         |
| — .81                             | 58       | .20               | 21          | 18    | 3.92                  | 1.72  | —2.20                | 44       | 28.64                  | Dundee          |
| + .55                             | 122      | ...               | ...         | ...   | 5.47                  | 4.54  | —1.03                | 83       | 34.93                  | Braemar         |
| —1.05                             | 55       | .20               | 13‡         | 14    | 4.72                  | 2.86  | —1.86                | 61       | 32.73                  | Aberdeen        |
| + .83                             | 140      | .60               | 17          | 12    | 4.34                  | 4.08  | — .26                | 94       | 29.33                  | Cawdor          |
| +2.61                             | 162      | 1.14              | 21          | 19    | 9.78                  | 9.83  | + .05                | 101      | 44.53                  | Fort Augustus   |
| +3.34                             | 144      | 1.45              | 21          | 21    | 16.79                 | 19.75 | +2.96                | 118      | 83.61                  | Bendamp         |
| + .29                             | 111      | .36               | 19§         | 16    | 5.33                  | 5.01  | — .32                | 94       | 31.90                  | Dunrobin Castle |
| + .52                             | 123      | .50               | 23          | 18    | 4.71                  | 4.64  | — .07                | 99       | 29.88                  | Wick            |
| —1.52                             | 70       | .67               | 22          | 17    | 10.93                 | 5.23  | —5.70                | 48       | 54.81                  | Killarney       |
| — .57                             | 82       | .48               | 14          | 15    | 6.96                  | 4.29  | —2.67                | 62       | 39.57                  | Waterford       |
| + .75                             | 126      | .52               | 18          | 18    | 6.77                  | 5.31  | —1.46                | 78       | 39.43                  | Castle Lough    |
| + .04                             | 101      | .64               | 26          | 17    | 7.22                  | 5.41  | —1.81                | 75       | 45.11                  | Miltown Malbay  |
| — .75                             | 73       | .52               | 26          | 13    | 5.94                  | 3.25  | —2.69                | 55       | 34.99                  | Courtown Ho.    |
| + .33                             | 113      | .44               | 18          | 17    | 5.70                  | 4.56  | —1.14                | 80       | 35.92                  | Abbey Leix      |
| — .94                             | 51       | .21               | 18          | 17    | 4.07                  | 1.63  | —2.44                | 40       | 27.68                  | Dublin          |
| + .93                             | 135      | .75               | 18          | 15    | 5.77                  | 5.72  | — .05                | 99       | 36.15                  | Mullingar       |
| +1.33                             | 153      | .65               | 26          | 19    | 5.85                  | 5.97  | + .12                | 102      | 36.64                  | Ballinasloe     |
| — .01                             | 100      | .68               | 23          | 19    | 9.55                  | 6.65  | —2.90                | 70       | 52.87                  | Enniscoie       |
| + .57                             | 118      | .45               | 18          | 19    | 7.07                  | 6.30  | — .77                | 89       | 42.71                  | Markree         |
| + .97                             | 134      | 1.38              | 18          | 16    | 6.22                  | 4.90  | —1.32                | 79       | 38.91                  | Seaforde        |
| +1.42                             | 155      | .54               | 18          | 21    | 5.75                  | 5.53  | — .22                | 96       | 37.56                  | Dundarave       |
| +1.33                             | 150      | .64               | 18          | 19    | 6.14                  | 6.72  | + .58                | 109      | 39.38                  | Omagh           |

† and 27 ‡ and 21. § and 25. || 26 and 27.

## SUPPLEMENTARY RAINFALL, FEBRUARY, 1911.

| Div.  | STATION.                   | Rain<br>inches | Div.   | STATION.                     | Rain<br>inches |
|-------|----------------------------|----------------|--------|------------------------------|----------------|
| II.   | Warlingham, Redvers Road   | 1.85           | XI.    | Douglas                      | 4.64           |
| „     | Ramsgate                   | .89            | XII.   | Stoneykirk, Ardwell House    | 3.31           |
| „     | Hailsham                   | 1.92           | „      | Dalry, The Old Garroch       | 9.25           |
| „     | Totland Bay, Aston House.  | 1.40           | „      | Langholm, Drove Road         | 7.76           |
| „     | Stockbridge, Ashley        | 1.56           | „      | Beattock, Kinnelhead         | 8.53           |
| „     | Grayshott                  | 2.03           | XIII.  | St Mary's Loch, Cramilt Ldge | 5.90           |
| „     | Reading, Calcot Place      | 1.43           | „      | North Berwick Reservoir      | 1.18           |
| III.  | Harrow Weald, Hill House.  | 1.61           | „      | Edinburgh, Royal Observty.   | 1.87           |
| „     | Pitsford, Sedgebrook       | 1.10           | XIV.   | Maybole, Knockdon Farm       | 5.77           |
| „     | Somersham Vicarage         | .55            | XV.    | Campbeltown, Witchburn       | 5.59           |
| „     | Woburn, Milton Bryant      | 1.65           | „      | Glenreadell Mains            | 5.99           |
| IV.   | Colchester, Lexden         | 1.00           | „      | Holy Loch, Ardnadam          | 14.06          |
| „     | Newport                    | 1.20           | „      | Ballachulish House           | 12.81          |
| „     | Rendlesham                 | .70            | „      | Islay, Fallabus              | 6.00           |
| „     | Swaffham                   | 1.56           | XVI.   | Dollar Academy               | 5.67           |
| „     | Blakeney                   | 1.65           | „      | Balquhider, Stronvar         | 12.31          |
| V.    | Bishops Cannings           | 1.71           | „      | Coupar Angus                 | 1.69           |
| „     | Winterbourne Steepleton    | 2.75           | „      | Glenlyon, Meggernie Castle   | 8.92           |
| „     | Ashburton, Druid House     | 2.94           | „      | Blair Atholl                 | 2.87           |
| „     | Okehampton, Oaklands       | 3.37           | „      | Montrose, Sunnyside Asylum   | .79            |
| „     | Cullompton                 | 2.34           | XVII.  | Alford, Lynturk Manse        | 1.05           |
| „     | Hartland Abbey             | 1.72           | „      | Fyvie Castle                 | ...            |
| „     | Lynmouth, Rock House       | 3.01           | „      | Keith Station                | 2.71           |
| „     | Probus, Lamellyn           | 1.71           | XVIII. | Glenquoich, Loan             | 2.46           |
| „     | North Cadbury Rectory      | 1.98           | „      | Skye, Dunvegan               | 8.73           |
| VI.   | Clifton, Pembroke Road     | 2.74           | „      | N. Uist, Lochmaddy           | 4.07           |
| „     | Ross, The Graig            | 1.13           | „      | Alvey Manse                  | 2.97           |
| „     | Shifnal, Hatton Grange     | 1.51           | „      | Loch Ness, Drumnadrochit     | 5.31           |
| „     | Blockley, Upton Wold       | 1.49           | „      | Glencarron Lodge             | 12.99          |
| „     | Worcester, Boughton Park   | 1.58           | XIX.   | Invershin                    | 3.02           |
| VII.  | Market Overton             | 1.59           | „      | Loch Stack, Ardochullin      | 8.12           |
| „     | Market Rasen               | 1.20           | „      | Melvich                      | 3.78           |
| „     | Bawtry, Hesley Hall        | .70            | XX.    | Skibbereen Rectory           | 4.61           |
| „     | Derby, Midland Railway     | 1.70           | „      | Dunmanway, The Rectory       | 6.25           |
| VIII. | Nantwich, Dorfold Hall     | 1.93           | „      | Cork                         | 2.37           |
| „     | Chatburn, Middlewood       | 6.65           | „      | Mitchelstown Castle          | 3.47           |
| „     | Cartmel, Flookburgh        | 5.46           | „      | Darrynane Abbey              | 4.33           |
| IX.   | Langsett Moor, Up. Midhope | 5.38           | „      | Glenam [Clonmel]             | 3.00           |
| „     | Scarborough, Scalby        | 1.58           | „      | Newmarket-on-Fergus, Fenloe  | 3.09           |
| „     | Ingleby Greenhow           | 1.15           | XXI.   | Laragh, Glendalough          | ...            |
| „     | Mickleton                  | 3.11           | „      | Balbriggan, Ardgillan        | 2.39           |
| X.    | Bardon Mill, Beltingham    | 2.93           | „      | Moyalty, Westland            | 3.67           |
| „     | Ilderton, Lilburn Cottage  | 1.07           | XXII.  | Cong, The Glebe              | 6.08           |
| „     | Keswick, The Bank          | 6.64           | „      | Westport, St. Helens         | 4.72           |
| XI.   | Treherbert, Tyn-y-waun     | 3.92           | „      | Achill Island, Dugort        | 6.86           |
| „     | Carmarthen, The Friary     | 10.46          | „      | Mohill                       | 3.63           |
| „     | Castle Malgwyn [Llechryd]  | 3.47           | XXIII. | Enniskillen, Portora         | 4.04           |
| „     | Castle Malgwyn [Llechryd]  | 1.93           | „      | Dartrey [Cootehill]          | 3.73           |
| „     | Plynlimon                  | 9.50           | „      | Warrenpoint, Manor House     | 3.68           |
| „     | New Radnor, Ednol          | 3.45           | „      | Banbridge, Milltown          | 2.13           |
| „     | Rhayader, Tyrmynydd        | 5.11           | „      | Belfast, Springfield         | 3.60           |
| „     | Lake Vyrnwy                | 6.19           | „      | Glenarm Castle               | 4.61           |
| „     | Llangyhanfal, Plâs Draw    | 1.43           | „      | Londonderry, Creggan. Res.   | 3.63           |
| „     | Dolgelly, Bryntirion       | 4.57           | „      | Killybegs                    | 5.87           |
| „     | Bettws-y-Coed, Tyn-y-bryn  | 5.75           | „      | Horn Head                    | 4.04           |
| „     | Lligwy                     | 2.42           |        |                              |                |

## METEOROLOGICAL NOTES ON FEBRUARY, 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 first half was unusually dry, only .14 in. of R having fallen by the 13th, on which day a partial drought of 33 days with .25 in. of R ended. Frequent showers occurred in the latter half, alternating with brilliant sunshine except on the last two days, which were wet and inclement. Duration of sunshine, 65.5\* hours, and of R 39.2 hours. Mean temp. 41°·2, or 1°·5 above the average. Evaporation .32 in. Shade max. 55°·6 on 18th; min. 20°·5 on 1st. F 8, f 15.

TENTERDEN.—Generally dry until the last week. Duration of sunshine, 87.0+ hours. Shade max. 55°·0 on 17th; min. 22°·0 on 14th. F 9, f 14.

TOTLAND BAY.—Almost an entire absence of wind in the first half. Duration of sunshine, 88.9\* hours. Shade max. 54°·0 on 25th; min. 27°·0 on 2nd. F 4, f 7.

PITSFORD.—R .89 in. below the average. Mean temp. 40°·1. Shade max. 57°·6 on 18th; min. 13°·5 on 2nd. F 9.

NORTH CADBURY.—Quiet anticyclonic weather prevailed up to 17th. Hardly any wind in the first 8 days save on 4th, but afterwards a high wind average. There was an absolute drought of 17 days ending on 9th, and 33 days' partial drought ending on 13th. Shade max. 56°·0 on 25th; min. 20°·0 on 2nd. F 9, f 13.

ROSS.—Shade max. 56°·5 on 18th and 25th; min. 18°·3 on 1st.

HODSOCK PRIORY.—An absolute drought of 25 days ended on 13th, and a partial drought of 39 days with .29 in. of R on 20th. Shade max. 60°·3 on 18th; min. 15°·9 on 1st. F 9, f 16.

SOUTHPORT.—Duration of sunshine, 63.1\* hours, and of R 62.1 hours. Mean temp. 40°·8, or 1°·2 above the average. Shade max. 53°·9 on 28th; min. 20°·0 on 1st. F 4, f 17.

HULL.—Dull and light generally with light R to 13th. Then more frequent R and squally and stormy periods to the end. Shade max. 58°·0 on 18th; min. 21°·0 on 1st. F 6, f 16.

HAVERFORDWEST.—Fine and cold to 12th, then wet, mild and stormy. Duration of sunshine, 69.2\* hours. Shade max. 53°·3 on 25th.

LLANDUDNO.—Shade max. 57°·5 on 21st; min. 25°·5 on 2nd. F 3.

CARGEN.—The first 10 days were rainless, but thereafter R fell frequently and copiously. Strong W. winds prevailed during the latter half, and there was a severe gale on 23rd. Shade max. 51°·0 on 17th, 18th and 28th; min. 18°·0 on 2nd. F 7.

EDINBURGH.—Shade max. 56°·9 on 21st; min. 21°·3 on 3rd. F 6, f 12.

COUPAR ANGUS.—An ideal month with light R and a high mean temp. Shade max. 55°·0 on 16th; min. 15°·0 on 2nd.

FORT AUGUSTUS.—Shade max. 53°·0 on 16th; min. 13°·7 on 1st. F 9.

CORK.—An absolute drought of 16 days, and a partial drought of 29 days, both ended on 8th. Shade max. 53°·0 on 25th; min. 22°·0 on 2nd. F 10, f 12.

DUBLIN.—The first part was calm, dry and cold owing to an anticyclonic distribution of pressure. From 12th to the close the weather was stormy, with frequent but not heavy R. Mean temp. 43°·3, or 0°·9 above the average. Shade max. 59°·1 on 21st; min. 26°·8 on 1st. F 4, f 9.

MARKREE.—The first part was dry, with severe frosts on each night, but from 12th to the close R, H and high winds prevailed. Shade max. 55°·9 on 21st; min. 17°·6 on 1st. F 10, f 14.

WARRENPOINT.—The first half was fine, but the latter half mild and wet. Northerly winds prevailed in the first half and westerly in the latter half. Shade max. 54°·0 on 17th, 18th and 21st; min. 28°·0 on 1st. F ?, f 6.

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

| STATIONS.<br><br>(Those in italics are<br>South of the Equator.) | Absolute. |       |          |       | Average. |       |               |           | Absolute.       |                   | Total Rain |       | Aver. |
|------------------------------------------------------------------|-----------|-------|----------|-------|----------|-------|---------------|-----------|-----------------|-------------------|------------|-------|-------|
|                                                                  | 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                                            | 76°·3     | 28    | 40°·0    | 21    | 66°·2    | 49°·6 | 50°·6         | 82        | 114°·7          | 36°·2             | ·58        | 5     | 5·9   |
| Malta ... ..                                                     | 93°·7     | 21    | 62°·0    | 26†   | 75°·5    | 67°·2 | 63°·2         | 77        | 147°·3          | ...               | 2·45       | 5     | 4·7   |
| Lagos ... ..                                                     | 86°·2     | 7     | 70°·0    | 21    | 84°·2    | 73°·2 | 73°·4         | 77        | 154°·0          | 74°·0             | 4·92       | 12    | ...   |
| Cape Town ... ..                                                 | 79°·0     | 13    | 37°·5    | 6     | 66°·4    | 51°·1 | 50°·1         | 71        | ...             | ...               | 1·38       | 5     | 3·3   |
| Durban, Natal ... ..                                             | 89°·5     | 3     | 48°·4    | 1     | 72°·6    | 57°·8 | ...           | ...       | 136°·2          | ...               | 3·84       | 9     | 5·0   |
| Johannesburg ... ..                                              | 82°·0     | 27    | 35°·1    | 4     | 68°·9    | 46°·8 | 39°·5         | 67        | 139°·6          | 26°·8             | 2·71       | 6     | 2·5   |
| Mauritius ... ..                                                 | 79°·3     | 19*   | 55°·3    | 2     | 77°·7    | 62°·6 | 59°·6         | 72        | 150°·3          | 47°·1             | 1·13       | 16    | 6·3   |
| Calcutta... ..                                                   | 93°·3     | 2     | 74°·6    | 27    | 89°·1    | 78°·3 | 77°·8         | 86        | ...             | 73°·8             | 12·95      | 13    | 7·6   |
| Bombay... ..                                                     | 87°·1     | 9     | 73°·8    | 19    | 83°·8    | 76°·7 | 75°·2         | 86        | 130°·2          | 71°·7             | 18·84      | 23    | 7·7   |
| Madras ... ..                                                    | 95°·1     | 7     | 71°·7    | 13    | 91°·9    | 77°·1 | 73°·7         | 77        | 143°·5          | 71°·8             | 3·79       | 14    | 6·2   |
| Kodaikanal ... ..                                                | 65°·6     | 16    | 48°·7    | 6     | 62°·0    | 51°·6 | 51°·6         | 86        | 136°·9          | 41°·3             | 4·32       | 15    | 7·2   |
| Colombo, Ceylon ... ..                                           | 86°·3     | 8, 13 | 72°·2    | 22    | 84°·8    | 75°·9 | 73°·0         | 79        | 149°·5          | 70°·0             | 2·15       | 13    | 6·6   |
| Hongkong ... ..                                                  | 90°·1     | 5     | 72°·1    | 28    | 84°·1    | 76°·3 | 73°·6         | 82        | 140°·1          | ...               | 15·95      | 19    | 7·5   |
| Melbourne ... ..                                                 | 75°·0     | 24    | 36°·6    | 14    | 63°·0    | 47°·0 | 45°·0         | 69        | 130°·4          | 33°·2             | 4·20       | 16    | 6·6   |
| Adelaide ... ..                                                  | 81°·3     | 24    | 41°·7    | 27    | 65°·4    | 49°·6 | 48°·5         | 72        | 140°·5          | 35°·7             | 2·81       | 12    | 5·5   |
| Coolgardie ... ..                                                | 91°·8     | 23    | 35°·2    | 15    | 71°·8    | 46°·8 | 32°·7         | 59        | 156°·0          | 33°·0             | ·29        | 6     | 3·4   |
| Perth ... ..                                                     | 84°·9     | 21    | 42°·9    | 9     | 67°·3    | 51°·7 | 41°·6         | 72        | 137°·8          | 37°·0             | 3·55       | 14    | 4·2   |
| Sydney ... ..                                                    | 74°·8     | 19    | 45°·5    | 3     | 67°·2    | 53°·8 | 50°·5         | 72        | 124°·6          | 34°·9             | 2·41       | 23    | 4·0   |
| Wellington ... ..                                                | 62°·0     | 8     | 37°·0    | 25    | 57°·9    | 46°·3 | 39°·6         | 62        | 110°·0          | 31°·0             | ·60        | 7     | 5·0   |
| Auckland ... ..                                                  | 63°·0     | 22    | 44°·0    | 28    | 60°·4    | 48°·6 | 48°·4         | 79        | 149°·0          | 41°·0             | 2·49       | 16    | 6°·0  |
| Jamaica, Kingston ..                                             | 91°·8     | 1     | 70°·7    | 30    | 89°·3    | 72°·5 | 72°·0         | 80        | ...             | ...               | 5·12       | 12    | 5·3   |
| Grenada ... ..                                                   | 88°·6     | 17+   | 73°·0    | 1, 28 | 85°·2    | 75°·3 | 72°·5         | 77        | 141°·0          | ...               | 7·05       | 24    | 4°·0  |
| Toronto ... ..                                                   | 81°·3     | 6     | 38°·7    | 22    | 69°·8    | 50°·0 | ...           | ...       | 96°·8           | 34°·2             | 3·89       | 7     | ...   |
| Fredericton ... ..                                               | 75°·0     | 5     | 32°·5    | 30    | 65°·3    | 43°·7 | ...           | 86        | ...             | ...               | 2·50       | 7     | 5·5   |
| St. John, N.B. ... ..                                            | 73°·0     | 18    | 44°·5    | 10    | ...      | ...   | ...           | ...       | ...             | ...               | 1·62       | 11    | ...   |
| Victoria, B.C. ... ..                                            | 77°·4     | 19    | 41°·2    | 25    | 64°·9    | 48°·2 | ...           | 74        | ...             | ...               | 1·59       | 6     | 5°·0  |
| Dawson ... ..                                                    | 71°·0     | 12    | 14°·0    | 21    | 54°·6    | 34°·0 | ...           | ...       | ...             | ...               | 1·34       | 12    | 6°·5  |

\* and 23. † and 18. ‡ and 27.

MALTA.—Mean temp. of air 71·3. Average bright sunshine 8·7 hours per day.

Johannesburg.—Bright sunshine 274·9 hours.

Mauritius.—Mean temp. of air 0·4, of dew point 0·6, and R ·31 in., below averages. Mean hourly velocity of wind 10·4 miles, or 1·6 miles below average.

KODAIKANAL.—Bright sunshine 137 hours.

COLOMBO.—Mean temp. of air 76·8 or 3·9 below, of dew point 0·3 below, and R 2·53 in. below, averages. Mean hourly velocity of wind 7·6 miles.

HONGKONG.—Mean temp. of air 79·7. Bright sunshine 161·3 hours, or 35 below average. Mean hourly velocity of wind 13·1 miles. R 6·30 in. above average.

Melbourne.—Mean temp. of air 1·1, and R 1·90 in. above, averages.

Adelaide.—Mean temp. of air 0·5, and R 1·05 in. above, averages.

Coolgardie.—Mean temp. of air 1·1 above, and R ·39 in. below, averages.

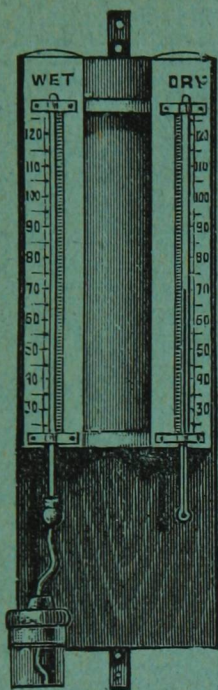
Perth.—Mean temp. of air 1·5 above, and R ·23 in. below, averages.

Sydney.—Mean temp. of air 1·7 above, and R ·49 in. below, averages.

Wellington.—Mean temp. of air 0·8 above, and R 3·66 in. below, averages. Bright sunshine 227·2 hours.

Auckland.—Temp. slightly above, and R quite one inch above, averages.





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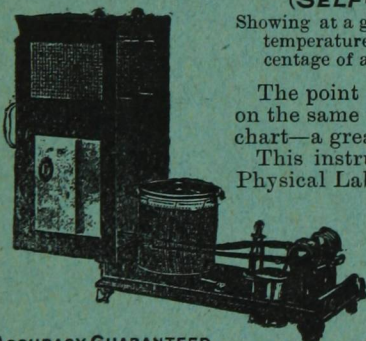
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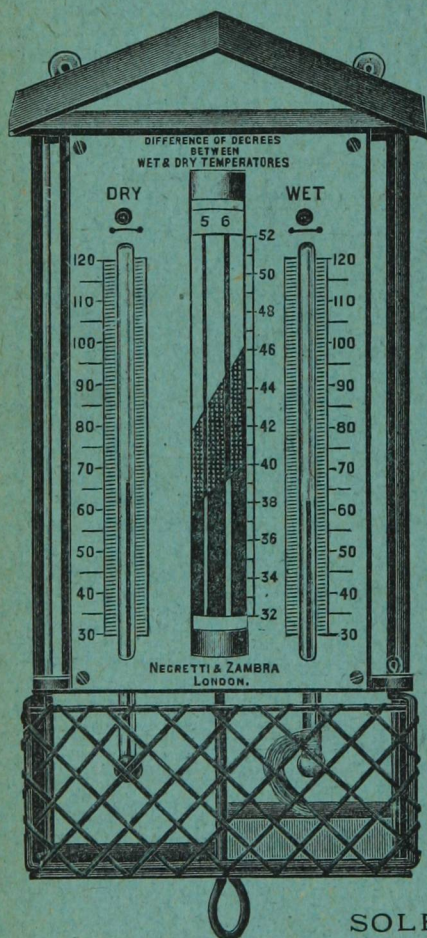
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