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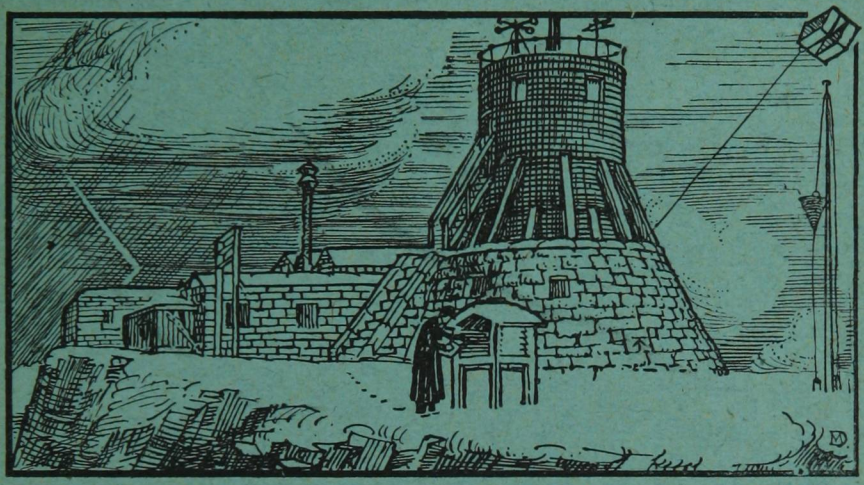
METEOROLOGICAL MAGAZINE

EDITED BY HUGH ROBERT MILL



APRIL, 1911.

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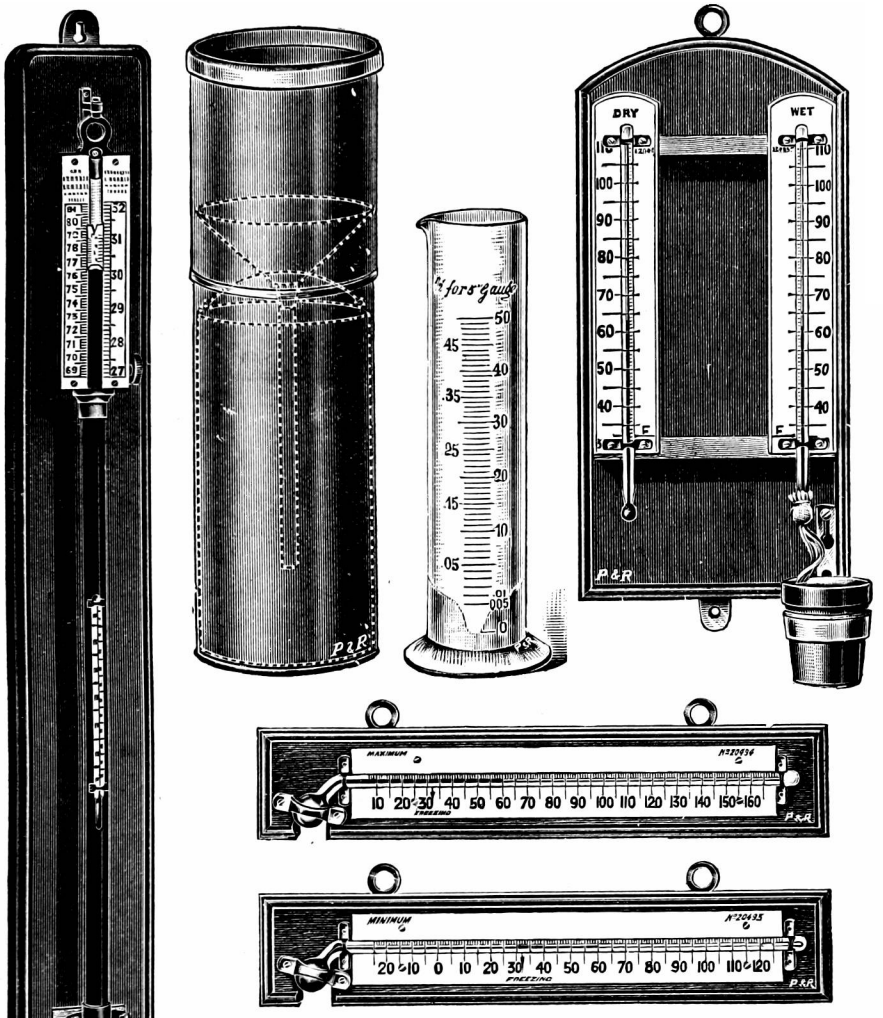

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Meteorological Magazine.

No. 543. APRIL, 1911. Vol. XLVI.

INSURANCE AGAINST RAIN.

The Excess Insurance Company has put forward a scheme of insurance against rain risks which has received a great deal of attention in the press. We are not in possession of any direct information and perhaps we ought not to call attention to such a matter at second hand; but we see no reason to doubt the substantial accuracy of the newspaper reports from which we derive our knowledge of the plan. In order to distinguish the outline of the scheme itself from our comments upon it, we give first in small type an abstract of the articles and notices which appeared in the financial pages of *The Times* in March, 1911, though we cannot, of course, say whether these are official intimations on the part of the company or not.

The scheme depends on the rainfall of 24 hours as recorded by the observer at a rain gauge agreed upon by the insurers and assured, and mentioned in the policy. In the greater number of cases the records will be supplied to the Company by the Town Clerk when there is a municipal rain-gauge; in other cases by observers on the list of the Meteorological Office. Each policy runs for a definite period, at the end of which all claims under it are paid directly to the assured without demand.

At present the scheme applies only to sixty-three seaside towns on the south and east coasts of England, at twenty-three of which there is no municipal or Meteorological Office rain gauge, and the claims arising at these are to be settled by the rain gauge of a neighbouring town, which is named. The most westerly town named is Plymouth on the south coast; the most northerly is Scarborough on the east coast. The specimen form of Policy given in *The Times* is reproduced here:—

THE EXCESS INSURANCE COMPANY, LIMITED.

No..... PLUVIUS POLICY "A."

Whereas of
hereinafter called the Assured has paid £ as Premium or Consideration to The Excess Insurance Company, Limited, hereinafter called the Company.

NOW KNOW YE, that THE COMPANY does hereby bind itself to pay to the Assured

The sum of £ for each separate week during the period

commencing with a.m. / p.m. on the day of , 191 .

and ending with a.m. / p.m. on the day of , 191 .

in which occur more than two days of rain, amounting in each day to over 0·20 of an inch at

IT IS FURTHER UNDERSTOOD AND AGREED that for the purposes of this Policy the daily rainfall readings, as ascertained by the Company from the shall be final and binding on both parties, and any sum due to the Assured in accordance therewith shall be paid to the Assured, without demand, within Seven days of the expiration of this Policy.

IN WITNESS whereof the Secretary of THE COMPANY has subscribed his Name.

Dated in London the day of One Thousand Nine Hundred and

(Signed) *Secretary.*

Under this policy, payment will be made for each separate week in which there is rain on more than two days, amounting on each day to over ·20 in. The premium represents one-eighth of the compensation to be paid per week; thus, £1 per week premium would bring in £8 per week in which more than two days occurred with over ·20 in. each.

There are three other forms of Policy offered. Pluvius B provides for payment for every day on which the rainfall exceeds ·20 in., and the premium per week is one and a half times the compensation payable per day. Thus 30s. per week secures £1 per day, and if there were two days in the week with more than ·20 in., the payment of £1 10s. would secure only £2, as against £12 under Policy A; while if over ·20 in. fell on every day of the week, the return would be only £7, as against £12.

Pluvius C takes account of smaller falls of rain, and offers compensation for the second and each additional rainday in every separate week on which the rainfall exceeds ·15 in. The premium per week is equal to the amount payable per day.

Pluvius D provides for four consecutive days, and under it payment will be made for every day on which the rainfall exceeds ·20 in., and the premium for four days is equal to the compensation to be paid per day.

The Company stipulates that proposals for Policies A, B and C must be made at least seven days, and for Policy D at least two days, before the period commences.

The most remarkable feature of the scheme described above is, that what is termed "compensation" is payable not for damage done to the assured, but for the possibility of damage accruing. So far as the Policy quoted above goes, the assured does not require to show any personal liability to the risk he insures against. As we read it he may take out a policy against rain falling at Plymouth or Scarborough without leaving his home in London, and if the rain is recorded as having fallen, he receives the compensation without requiring to show that he has suffered any loss. This seems to bring

the transaction into line with the "P.P.I." insurance on ships, of which a great deal was heard some time ago; and it has been denounced as giving opportunities for gambling. It was stated, however, by "A Director of the Excess Insurance Company (Ltd.)," in *The Times* of April 7th, that holiday insurance was similar to the insurance of a valuable picture, and he added, "But neither in the case of the 'Pluvius' policy holder nor in that of the picture owner can the insurance be valid unless the insurer has an insurable interest. This is clearly stated in our policy. It is of no use to anybody who might wish to sit at home and gamble on the weather." A method of gambling by rain gauge was referred to in this Magazine, Vol. **37** (1902), p. 181, where it was stated to have been prohibited by the Government of India. The premiums, however, are fixed at such a substantial fraction of the maximum return, that there may not be so much likelihood of an improper use being made of this remarkable development in insurance methods as might appear at first, apart from the Director's disclaimer, unless, indeed, a run of wet weather should create a "boom."

Assuming that a Pluvius policy is taken out, as the Company intends it to be, with the view of securing compensation for a holiday spoiled by rain, the assured should not expect to be recompensed if he is not damaged; and he will expect to be compensated if he is. Now it is plain that a rainfall less than ·20 in., or even ·15 in., could entirely spoil a holiday if it fell gently at a uniform rate for eight or ten hours in the daytime; while a rainfall much greater than ·20 in. might only take the form of a heavy shower, lasting for a quarter of an hour, and if it occurred at night or at any time when the assured was not out of doors, its only effect upon him would be to enhance the pleasure of his holiday. Again, summer showers, especially those associated with thunderstorms, are extremely irregular in their outlines, and it might very easily happen that the assured was a victim of very heavy rain, while the rain gauge, which is the sole arbiter of the compensation he has paid for, registers less than the critical quantity. The reverse is just as likely to happen, and a well-directed thundershower might secure a handsome bonus to a crowd of holiday makers who remained all the time in sunshine. In these cases the Insurance Company is exposed to a more serious risk than the assured, as a local shower central over the rain gauge would require it to pay compensation to every individual in whose policy that gauge was named, while an individual subjected to un-recorded rain merely loses the fraction of his premium representing the single day.

The crudity of the present system lies in the impossibility of awarding compensation in certain cases of actual damage, or of withholding compensation in certain cases where no damage accrues. This is inevitable in the present condition of rainfall observing, though it could be largely obviated if the municipalities concerned would instal several rain gauges within their boundaries

and supplement them by carefully kept self-recording instruments. Much credit must be given to the Company for the clear way in which they have defined the risks against which they provide, and the method of determining liability. Members of the public unfamiliar with the ways of rain and the manner of its measurement may, however, form wrong impressions and suffer disappointments which, we hope, will turn their minds towards the study of meteorology.

So far we have looked at some of the difficulties connected with the natural history of rain; there are others of a more serious character, involving the human element. Granted that no error is made in transcribing the daily figures, and this in the case of official observers may be done pretty safely, and granted that the hours of which the rainfall day is composed are correctly set out—*i.e.*, 9 a.m. to 9 a.m. or 7 a.m. to 7 a.m., local or Greenwich time, as the case may be—the questions of time and manner of observation have to be considered. When rain is falling at the hour of observation it is quite possible that if the rain gauge is emptied a minute or so before the hour, or a minute or so after the hour, the Insurance Company or the assured may stand to lose or win. It will therefore be the interest of both to secure punctuality on the part of the observer, and, incidentally, correctly regulated public clocks by which the observers' watches may be checked. Again, the honest observer, knowing that the critical values ·20 and ·15 may lead to a considerable sum of money changing hands, will naturally take special care in reading quantities near those points, and should see to it that the measuring glass has been certified as correct, and that a reserve certified glass is available in case the glass in ordinary use meets with an accident. An error of more than ·01 is by no means uncommon in glasses which have not been tested, even when sold by respectable tradesmen who have bought them in good faith, and even a certified glass as at present tested is not required to have a higher degree of accuracy than ·01 in. A special glass of high accuracy might reasonably be demanded for so critical a determination.

Some observers habitually read to three places of decimals, though probably for the purpose of deciding a claim the register used will be in the form usually published, in which the result is entered to two decimal places only. An observer reading to three places would distinguish between ·199 and ·201, but all readings between ·196 and ·204 would be entered in the ordinary way as ·20. Should the reading be ·205 the observer would be justified it giving it either as ·20 or as ·21, and in the ordinary course of transposing to hundredths a daily rain record kept to thousandths of an inch, the computor would keep his total right by raising and lowering alternate entries ending in 5. Thus when he gave ·205 the value of ·21, the next time he met an entry ending in 5 (say ·205 again) he would give it the value of ·20. As a matter of statistics this is perfectly clear, but when he knows that the ownership of an unknown and perhaps large sum of money (there might be a hundred insured excursionists in the

place, or a thousand insured speculators in the country) depends on whether the last ·005 was "tossed up or down," he is very apt to try and avoid the reading of ·005 altogether, and give it as ·204 or ·206. The observer reading to hundredths has to face the same alternative every time the surface of the liquid comes between two marks on the scale, and his custom, if he follows the rule, is to refer the surface to what he takes to be the nearest hundredth line above or below. When the surface comes just half-way he may with equal honesty enter the figure as ·20, and the insurance office saves the premium, or as ·21, and the insurance office has to pay compensation. If the observer knows that a friend of his is insured under a Pluvius policy, what ought he to do in such a dilemma? Again, the personal equation is such that it is quite easy for two equally conscientious observers to differ in reading the same quantity by ·01 in. or more, one observer habitually reading higher than another. In this case the gain or loss might depend on whose turn it was to take the readings on a particular day. The reading of a rain gauge cannot be made with the exactness of the number indicated by the ball in roulette.

In the foregoing we have assumed honesty and freedom from error on the part of the observer and transcriber of the records, and immunity from interference on the part of the rain gauge. The Excess Insurance Company will doubtless exercise its influence with the Municipalities of those resorts which its policies place in a favoured position above their rivals to induce them to use the most accurate instruments, secured against any possible interference, and to employ the most punctual and trustworthy observers. Permanent residents will also, we hope, start new records in various parts of the district, so that the variation of rainfall from place to place may be ascertained each day, and the public interested in the possibilities of the new insurance may in time come to know something of the vast amount of enthusiasm, perseverance, care and skill which has been expended during the last fifty years in the acquisition of data for the scientific study of rainfall in the British Isles by thousands of voluntary observers.

THE USE OF METEOROLOGICAL OBSERVATIONS IN CONNEXION WITH HOLIDAY INSURANCE.

By E. Gold, M.A.

The following note was written some time ago, but it may be of interest in connexion with recent developments in indicating the lines along which holiday insurance must proceed if it is to become an enterprise of permanent value to the community. The assumption at the basis of such assurance is that the benefit which a person derives from a holiday depends on the weather during the period of the holiday, and that the benefit is indirectly translatable into material wealth, either by preventing illness in the working period, or by improving the quality of the work done. If this assumption is

unsound, holiday insurance becomes a pure gamble, and must either fail or do harm. Hitherto meteorological observations have been, on the whole, subject only to personal and chance errors, and there has been little temptation to induce unscrupulous persons to interfere with them in any way. Holiday insurance would introduce a new factor, which might cause fluctuations of importance from the meteorologist's point of view, and against which he would prefer to be protected.

Schemes for holiday insurance appear to be based on rainfall returns alone, and in practice on total daily amount of rainfall. A little consideration shows that this is bound to prove unsatisfactory, although the scheme may be so arranged that the Insurance Company makes only a reasonable profit. "Compensation" will be paid to the man who has had brilliant weather with, perhaps, thunderstorms or sharp rain during a single night or nights, while the man who has spent a wet week shivering over no fire may be quite uncompensated, because the daily total did not exceed a more or less arbitrary limit.

It may be taken as essential that the insurance should be against weather and not against a single element so variable in its character as rainfall. The elements next in importance to rainfall are duration of sunshine, temperature and wind, and the problem may be taken to be to arrange combinations of limits for the values of these elements which shall pass by reasonable steps from good weather to "really bad" weather. We must fix a limit to the mean temperature, combined perhaps with a limit to the mean maximum temperature, at which compensation ought to begin as regards that element, and similarly limits to the duration of sunshine, to the wind velocity, and to the number of days of rainfall must be chosen. Of course the duration of rainfall during holiday hours would be preferable to the total amount of rainfall if it were generally available.

A suitable period to take as unit would be the week, and it might be assumed as fundamental that unless one of the limits were passed no compensation would be payable. Suppose for example the limits for mean temperature were 60° F. for wind 2 days of occurrence of forces higher than 4, for sunshine a total duration of 30 hours for the week, for rainfall 2 rain days, then compensation would begin as soon as one of these limits was passed. The appropriate amount of compensation would be represented by—

$$ax + by + cz + dw$$

where x is the number of degrees by which the temperature falls short of 60° F., y the excess of the number of rain days above 2, z the excess above 2 of the number of days of wind of Force 5 and upwards, w the number of hours of sunshine below 30. It might be desirable to adopt the idea, suggested by the formula, to take negative values of x, y, z or w as representing to the holiday-maker compensating advantages which should appropriately diminish the amount otherwise payable for the disadvantages arising from the

positive values of the remaining elements. [It might even be eventually arranged that insurance should be compulsory, and that holiday-makers should pay according to the same formula as that devised for compensation, with a small allowance for working expenses. A large reserve fund or a series of good years at the outset would be necessary for such a consummation.] For the information of insurers the statement would be of the simple form. "For each degree of temperature below 60° F., *a* shillings compensation will be paid; for each rain day above 2, *b* shillings; for each windy day above 2, *c* shillings, and for each hour by which the duration of sunshine falls short of 30 hours, *d* shillings [but the total amount payable in any case is to be reduced by *a* shillings for each degree of temperature above 60°, by *b* shillings for the difference of the number of rain days from 2, &c.]"

The reduction for excess of sunshine would partly diminish the unfairness arising from short showers or night rain.

I think if compensation is paid to those whose holidays have been spoiled at the expense of those who have come off better [or at their own expense from previous occasions], meteorological results will be serving a useful and economic purpose. The important thing is to arrange for the compensation to be an indemnity against real loss, and this cannot be satisfactorily attained except by taking into account the different elements which make up weather.

The limits suggested are merely for example. The appropriate values could only be found by investigation.

ROYAL METEOROLOGICAL SOCIETY.

At the meeting of this Society on March 15th, Professor H. H. Turner, F.R.S., Savilian Professor of Astronomy at Oxford, gave a lecture entitled "What can we learn from Rainfall Records?" He began by saying that the origins of a large number of phenomena of the most diverse kinds are indicated by the periods of certain vibrations or oscillations. The familiar advertisement of a terrier hearing "his master's voice" in a gramophone, and the identification of the substance causing the light of a nebula far away in the depths of space, provide us with two examples. In the first the periodicities are those of waves of sound, in the second of waves of light. The periods of vibration are very different, that of sound being, roughly, a billion times that of light. If we lengthen that of sound in a similar ratio, we come to the longest periodicities hitherto studied by our limited experience, viz., those of the planets and variable stars. Here, again, we can recognise causes by their periods; but the machinery for recognition is very different. In the case of light-waves a simple apparatus (viz., a prism) performs the analysis for us; in the case of sound we have the proper delicate apparatus in our own ears; in the case of the longer periods we must use calculation, but the underlying principles are the same; in the calculations there are strict analogies to the "resonance" which the ear employs and to the "bright lines" of a spectrum.

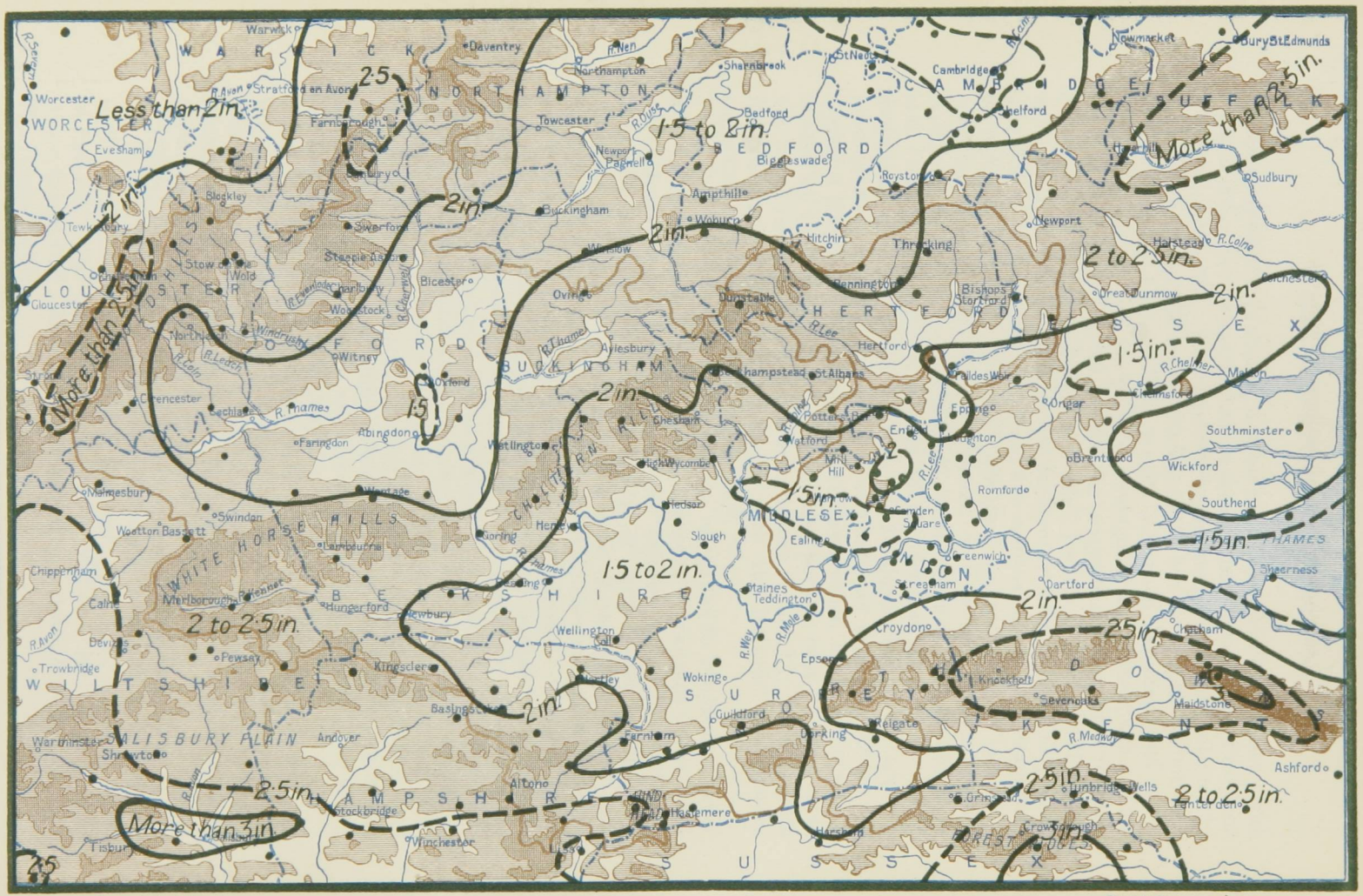
The method of calculation was indicated long ago by Fourier; but a noteworthy new departure was taken some years ago by Professor Schuster in insisting that the calculations must be made, not merely for specially selected or suspected periods, but for *all* periods between certain obvious limits. The result can then be displayed as a "periodogram" which is strictly analogous to a spectrum. This method has been applied under the superintendence of Professor Schuster and the lecturer to the rainfall records of Padua (175 years) and Greenwich (90 years), besides Klagenfurt and Oxford (50 years), all periods between 20 months and five months having been examined, as well as some others. The resulting indications are not very positive, but include several features well worth further study, especially in the Greenwich rainfall, where periodicities of 597 days and 150 days (possibly a quarter of the former) seem to be fairly persistent, as well as a short one of 25 days; but these are not reproduced in the Padua records, at any rate not exactly. There are doubtful periods of 591 days and 147 days, which again are possibly related by the ratio 4 to 1. (The shorter periods near 25 days have not been investigated, as daily records are required.) It is possible that the periodicities change slowly with the latitude, in a manner suggested by the cloud belts on Jupiter.

Dr. W. N. Shaw, in proposing a vote of thanks to Professor Turner for his lecture, said that it was a matter of congratulation that astronomers should have taken the trouble to apply methods, originally astronomical, to the study of rainfall data. Professor Schuster had almost translated the work of the spectroscope into figures; and examination of these had led to the unsuspected period of 33 years in astronomical statistics being detected. Nobody could help regretting that rainfall statistics were so meagre. On looking at the rainfall periods for Greenwich it was perfectly clear that the rainfall data varied, and it was absolutely necessary to ask for data from the western and southern hemispheres, so that they might be able to trace out these variations. They were now concerned with building up the future; looking forward to the foundation and continuation of colonial observations and data from all parts of the world, sufficient to enable astronomers and meteorologists to carry out the subject to a satisfactory conclusion.

Mr. H. Mellish seconded the resolution, and said that they had had brought to their notice a method of dealing with meteorological observations which was quite new to most of them, and this had been illustrated with examples from the sister science which had kept their attention rivetted on the screen.

During the evening the following new Fellows were elected:—Mr. G. G. Becher, B.A., Professor S. Bhattacharya, M.A., Señor José Galbis y Rodriguez, Mr. J. W. Gardner, Mr. A. L. S. Gibb, Assoc. M.Inst.C.E., Mr. M. Kasin, Mr. H. T. McLeod, Mr. V. J. Martin, Assoc.M.Inst.C.E., Mr. M. Spartali, B.Sc., Assoc.M.Inst.C.E., and Mr. Lance Webb.

THAMES VALLEY RAINFALL MARCH, 1911.



Symons's Meteorological Magazine.

Watershed of River Thames above Teddington, and River Lee above Feildes Weir.

Rainfall Stations reporting

Isohyetals.

THE WEATHER OF MARCH.

By FRED. J. BRODIE.

THE month under review was singularly lacking in features of striking meteorological interest.

The opening days of the month lent no support whatever to the old weather proverb, "March comes in like a lion." With a brisk breeze blowing from the south-westward and an abundance of bright sunshine, the thermometer on the 2nd and 3rd rose well above its average level, shade readings of 55° and upwards being recorded over a large portion of the United Kingdom, and a reading of 60° on the 2nd at Westminster and Raunds. On the 5th and 6th a "V-shaped" depresssion passed eastwards across the country, and in its rear an anticyclone extended temporarily from the south-westward, a rather sharp frost occurring early on the 7th in many western and northern districts. Other "V-shaped" disturbances came over respectively on the 8th-9th and 10th-11th, and occasioned brisk fluctuations in temperature, but no extremes of any importance. Between the 12th and 15th, when low pressure systems appeared over various parts of the continent, a strong wind from north and north-west swept over these islands with showers of sleet or snow. Temperature now fell to a lower level than at any other time of the month, and occasional night frosts were experienced in most places. The sharpest frost occurred rather generally early on the 17th, when the sheltered thermometer fell to 25° or less in several parts of England, Wales and Ireland, and to 22° at Llangammarch Wells. On the surface of the grass readings of 20° or less were registered as far south as Kew, Portsmouth and Guernsey.

During the latter half of the month the type of weather was almost constantly easterly or north-easterly. Over the western half of the kingdom the conditions were influenced mainly by an anticyclone, which lay at first over Iceland, and afterwards between Scotland and the Faeroes, and in some parts of North Britain an absolute drought was experienced, lasting for periods of from 16 to 18 days. Further to the southward the weather was affected by depressions which advanced from the westward over the Bay of Biscay and Spain, and on our south and south-west coasts the easterly wind occasionally increased to the force of a gale. Temperature was usually below its average level, but on the 21st and 22nd a mild air extended westwards from France and occasioned a burst of seasonable warmth over the south-eastern quarter of England, maximum readings of 60° and upwards being recorded in several places. At Greenwich and Margate the thermometer on the 21st rose to 62°, and at Tottenham on the 22nd to 63°. The change was, however, purely temporary, and during the closing week temperature was again below the average, with sharp frosts in the north on the early mornings of the 21st and 22nd, and more generally on the 25th and 26th. Over central and southern England the sheltered thermometer fell only a trifle below

the freezing point, but in many western and northern districts it sank below 25°, a reading as low as 22° being recorded at Balmoral on the 21st, at Fort Augustus on the 22nd, and at Markree Castle on the 26th. On the grass the thermometer sank below 20° in several parts of Scotland and the north of Ireland, to 18° at Balmoral and Armagh.

The mean temperature of the month differed but little from the average. Over the United Kingdom generally there was a slight deficit, but in London, and at a few other places both in the east and south-east of England and in the north and north-east of Scotland, the mean values were above the normal. The duration of sunshine was, as a rule, a little below the average, but in parts of Ireland and the west of Scotland it was in excess. At Stornoway the aggregate of 172 hours exceeded the normal by as many as 69 hours.

INTERNATIONAL BALLOON ASCENTS, IN JULY AND AUGUST, 1908.

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

July 27th.

Starting Point.	Country	A miles.	B ° F.	C miles.	D ° F.	E miles.	F
Limerick	Ireland.....	6·2	—38	11·8	—42	57	E. by N.
Crinan	Scotland	6·6	—49	13·7	—49	103	N.E.
Pyrton Hill....	England	7·1	—76	8·1	—71	98	N.E.
Petersfield	,,	8·1	—72	9·2	—65	114	N.E.
Hamburg.....	Germany....	7·3	—74	9·3	—62	6	E.N.E.
Lindenberg....	,, ...	7·8	—78	11·8	—58	9	S.S.W.
Strassburg	,, ...	8·0	—76	10·8	—58	37	S.
Munich.....	,, ...	7·5	—69	7·7	—65	16	S.S.W.
Pavia.....	Italy.....	7·5	—78	14·3	—58	21	S. by W.

July 28th.

Crinan	Scotland	6·4	—76	10·7	—58	62	E.S.E.
Manchester....	England	7·1	—72	8·4	—67	50	S.E.
Petersfield	,, ...	7·1	—74	9·4	—67	90	E. by S.
Paris	France.....	8·0	—71	9·2	—71	140	N.E.
Strassburg	Germany....	8·1	—78	9·9	—69	12	E.
Zurich	Switzerland..	8·1	—80	9·8	—65	37	S.E.
Munich.....	Germany....	—	—	7·8	—58	16	S.S.W.
Vienna.....	Austria	—	—	6·8	—62	68	S.S.W.
Pavlovsk	Russia	7·1	—69	10·5	—53	36	W.

July 29th.

Limerick.....	Ireland.....	8·0	—76	10·6	—56	66	E.
Crinan.....	Scotland	8·1	—65	9·9	—60	86	E.N.E.
Manchester....	England	7·5	—81	10·6	—71	65	E.S.E.
Pyrton Hill....	,, ...	8·5	—92	14·3	—62	53	S.
Hamburg.....	Germany....	7·5	—65	9·9	—58	7	E.
Paris.....	France.....	6·8	—62	9·9	—65	168	E. by S.
Strassburg	Germany....	6·8	—65	11·1	—53	32	N.W. by W
Munich	,, ...	7·5	—72	8·7	—63	12	N.W.
Pavia	Italy	7·0	—76	8·4	—74	44	N.E. by E.
NizhniOlchidaeff	Russia	7·4	—51	—	—	14	N. by E.

July 30th.

Starting Point.	Country.	A miles.	B ° F.	C miles.	D ° F	E miles.	F
Pyrton Hill....	England	9·5	—92	10·3	—78	70	E.S.E.
Brussels	Belgium	8·1	—90	9·4	—74	37	S.S.W.
Paris	France.....	7·5	—76	8·6	—69	62	S.W.
Strassburg	Germany....	7·8	—78	8·9	—71	27	S.W.
Zurich	Switzerland .	8·1	—69	11·2	—72	18	W.S.W.
Munich	Germany....	7·5	—69	8·5	—60	11	S.W. by S.
Pavia	Italy.....	7·0	—78	8·1	—72	21	N.W.byW
Pavlovsk	Russia	7·2	—76	9·5	—62	11	E.S.E.
Kuchino	„	7·3	—63	10·1	—53	16	S.E.
Nizhni Olchidaeff	„	6·8	—63	9·1	—51	34	N. by W.
Omsk	„	6·5	—56	8·3	—40	—	—
Ekaterinburg..	„	5·5	—51	6·6	—42	53	S.E.

July 31st.

Crinan	Scotland	7·3	—56	9·9	—51	137	S.E.
Manchester....	England	7·8	—58	10·6	—53	111	S.E.
Paris.....	France.....	7·2	—85	8·1	—71	106	S.
Zurich	Switzerland .	8·3	—89	11·3	—65	19	S.S.W.
Munich	Germany....	8·1	—83	8·7	—71	32	S.
Pavia	Italy.....	7·5	—78	10·7	—53	32	W.S.W.
Pavlovsk	Russia	7·6	—72	10·2	—54	11	E.
Nizhni Olchidaeff	„	6·8	—56	10·0	—54	24	N. by E.
Kuchino	„	6·6	—80	9·9	—60	13	S.E.

August 1st.

Limerick.....	Ireland.....	6·2	—58	—	—	38	S. by E.
Manchester....	England	8·1	—65	10·9	—56	117	S.S.E.
Hamburg.....	Germany....	6·9	—51	9·8	—45	99	S.E.
Strassburg	„	7·5	—80	11·0	—53	64	S.E.

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 figures show several points of interest and would repay a careful analysis, for which however there is not space in this Magazine. No large changes of pressure occurred during the week. On the 27th there was an area of high pressure over the Azores and over Lapland. By the 29th the anticyclone over Lapland had disappeared, but the one over the Azores had increased in intensity, and moved to the south of Ireland, and a trough of low pressure extending from S.W. to N.E. lay over Iceland. On the 30th and 31st the high pressure had decreased again in intensity, but still lay over England, with a low pressure area on the 31st over the Gulf of Bothnia. There was little change on August 1st, but a depression was forming over Italy.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

THE "SUPPOSED" COLD OF WINTER ANTICYCLONES.

MR. DINES hardly does justice to the text-books of Meteorology when he says, on p. 34 of the March number of your Magazine, that they probably copy one from another, without investigation, the statement that winter anticyclones are cold. *The centre of an anticyclone in winter is, in fact, cold*, a focus of cold. That has been proved statistically often enough, and I need only recall the investigations of Hildebrandsson on temperature in cyclones and anticyclones (Upsala, 1883). These have frequently been repeated since, and the coldness of the central part of anticyclones is fully established. (Mean temperature variation in the centre of barometric minima in winter: Upsala,—2°·9; Swinemünde,—2°·2; St. Petersburg, —4°·3, and similarly in Vienna, St. Louis, Mo., &c.). This fact rests on a complete physical foundation. The cold areas arise in winter in anticyclonic regions as a result of radiation favoured, in a high degree, by the clear skies and the dry air of the anticylonic centre. One can say definitely that the cooling of the Earth in the winter half-year is accomplished mainly in the anticyclonic areas of the land surface. Nocturnal radiation is very intense in the dry air, especially when the surface of the ground is covered with snow.

The apparently contradictory results quoted by Mr. Dines rest on a misunderstanding. It is not the absolute height of the barometer which is determinative, but the relative height of the barometer compared with that in the surrounding districts; in short, the state of matters in a barometric maximum. High winter temperatures certainly do occur during periods of high barometer and *vice versâ*. Thus, for example, I have investigated the 12 coldest and 12 warmest years in Central Europe during the 30 winters, 1851-1880, in relation to the simultaneous pressure variations from the normal. The pressure variations of the cold winters were positive on seven occasions and negative on five, "very cold winter months occurred with almost equal frequency during high as during low pressure." The extreme winter months in Central Europe show no constant relation to the variations of pressure in Central Europe itself, though it is characteristic of such extreme months that the pressure is abnormally high in the north and north-east.* The cold thus comes mostly by "advection" from the north and north-east, as can easily be understood from the relation of Europe to the focus of cold in northern Asia, for it is there that the cold centres originate in the region of the great continental anticyclones. It is only in exceptional cases,

* Hann, "Die Verteilung des Luftdruckes über Mittel- und Sudeuropa," Vienna, 1887, pp. 59-61.

such as the winter of 1879-80, that Central Europe itself is the seat of a great persistent anticyclone, but when this occurs we experience an altogether abnormally cold winter.

As the British Isles usually remain on the western side of the European anticylones, and thus have southerly and south-easterly winds with the high barometer, it follows that high temperatures quite often accompany the higher barometer; but at the same time it is cold on the continent in the centre of the European anticyclone.

J. HANN.

Vienna, 20th March, 1911.

FALL OF METEORITES TO THE EARTH.

In your February number reference is made to the reported fall of a meteorite at Hull on December 6th, 1910. False reports of this character frequently get into the newspapers, and induce scepticism as to the genuine meteorites which sometimes descend upon the Earth's surface.

Meteorites have frequently been seen to fall, accompanied with loud detonations, and they have been immediately afterwards dug out of the holes made, while still in a heated condition. To give details of individual cases would make serious inroads upon your limited space, so I must ask those interested in the subject to consult scientific books in which the information is given.

"An Introduction to the Study of Meteorites," by Mr. L. Fletcher, is a sixpenny pamphlet of about 120 pages, giving a large array of facts concerning meteoric stones and irons, and particularly those in the mineral department of the British Museum. There are about 600 specimens here weighing from a few grains to several tons.

The evidence collected during the last century conclusively proved once for all that stones occasionally, and irons more rarely, fall from the sky. The earliest undoubted phenomenon of the kind occurred on November 16th, 1492, in Alsace, when a stone of 262 pounds descended with a loud noise, and was thereafter suspended in the church of Ensisheim as an object of curiosity and veneration.

Many statements as to falling meteors, aerolites or thunderbolts, are published in the press on mere hearsay evidence, and before suitable investigation has been made as to the facts. Chimerical stories of this kind are easily disproved when proper enquiries are instituted, but they furnish no negative to veritable meteorites such as those which fell at Rowton, Shropshire, on April 20th, 1876, at Middlesbrough, Yorks, on March 14th, 1881, at Crumlin, Ireland, on September 13th, 1902, and at many other places and dates. We have not only the evidence of those who witnessed the events, but the objects themselves attest the reality of the phenomena.

W. F. DENNING.

Bristol, February 18th, 1911

THE TALE OF—A GUST.

In connection with *The Times* report of the fall of a meteorite at Hull on December 6th, 1910, your determination, and the outcome thereof, as described on page 10 of your February issue, deserve sincere congratulations.

I hope you will see your way to take a similar course with reference to a report from Bradford, which appeared in the daily papers recently. A gust of wind is said to have carried a girl to a height of twenty feet or so, whence she fell with fatal result. Onlookers seem to have experienced no inconvenience at all. Surely on the face of it a more preposterous story never appeared in print. What was the strength of the gale: and did nothing else of consequence happen owing to the wind at Bradford on the morning of 23rd February?

WILLIAM GODDEN.

143, Chapter Road, Cricklewood, N.W., 26th February, 1911.

[Acting on this suggestion, we communicated with Mr. H. Lander, the rainfall observer at Lister Park, Bradford, who kindly sent us a copy of the *Yorkshire Observer* for February 25th, in which there was a fairly full report of the inquest on the school-girl who was undoubtedly killed by a fall from a great height in an extremely exposed playground during very gusty weather. One witness saw the girl enter the playground from the school at 8.40 a.m., and saw her carried in three minutes later. Another witness saw the girl in the air parallel with the balcony of the school 20 feet above the ground, her arms extended, and her skirts blown out like a balloon. He saw her fall with a crash. The jury found a verdict, "Died as the result of a fall caused by a sudden gust of wind."—Ed. *S.M.M.*]

THE USE OF DAILY WEATHER MAPS.

Daily weather maps, such as those of the Meteorological Office, are of special interest to travellers who can note weather conditions in different parts of the area covered by them.

I have just returned after a short stay in the south of France. On March 3rd, my starting date, an anticyclone covered the Bay of Biscay, and the wind in London was W. and the weather cloudy. On arriving near the Mediterranean coast the next day the weather was found to be brilliantly fine and the wind N.E.

This state of things lasted practically the whole of the fortnight I was at Mentone, with, however, some variations, the reasons for which it is easy to discover on reference to the maps—*e.g.*, light rain fell on the 13th, under the influence of a depression over Belgium, and a thunderstorm, with a beautiful display of lightning, on the night of the 14th, due to a depression secondary to the one mentioned. Rain fell at Mentone in this storm, and after it snow lay some inches deep on the hills at the back, with almost cloudless weather.

On the 17th conditions set in which may be described as practically

the reverse of those prevailing on the 3rd. The Bay was covered by a depression which lay over that and the near regions during the remainder of the time I was abroad. Rain did not set in over the Littoral until the 19th. I was crossing France from that day to the 22nd, and rain fell during parts of the 19th, 20th, and 21st, with a very warm southerly current of air. On reaching Paris on the 22nd, the wind was about S.E., and between there and the coast were evident signs in the clouds of thunderstorms. The wind was N.E. in the Channel and the weather fair.

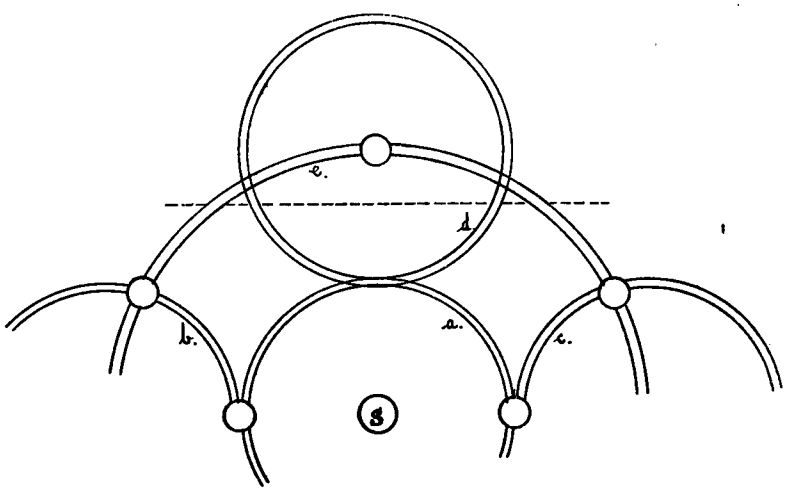
Certainly the weather conditions at Mentone were those generally associated with the "South of France"—brilliant sun, clear skies, and an azure sea.

F. DRUCE.

65, Cadogan Square, S.W., 26th March, 1911.

COMPLEX SYSTEM OF HALOS, MARCH 8th.

A VERY perfect system of halos was visible here on March 8th, reaching its greatest degree of completeness about 8.30 a.m. The time of sunrise at Greenwich was 6.54 a.m., but the portion of halos beyond the dotted line was first seen at 6.45 a.m. The sky was covered with fibrous cirrus, tending to cirro-stratus, and radiating from a V point at S. The halo (*a*), round the true sun, was brilliantly



prismatic, the halos (*b* and *c*), to the left and right, of a pure white colour. The whole was surmounted by a further halo (*d*), which, like the primary one, was prismatic, being again cut by a further very broad halo (*e*), of a yellowish colour. Very pronounced rainbow tints were visible in the neighbourhood of the mock suns. The sketch illustrates the phenomenon at 8.28 a.m.. By 9 a.m. only a typical halo, white in colour, was visible round the sun.

SPENCER C. RUSSELL.

Parkside, Ashley Road, Epsom, March 8th, 1911.

RAINFALL TABLE FOR MARCH, 1911.

STATION.	COUNTY.	Lat. N. ° ′	Long. W. [*E.] ° ′	Height above Sea. ft.	RAINFALL OF MONTH. Aver. 1875—1909. in.	1911. in.
Camden Square	*London*	51 32	0 8	111	1·70	1·73
Tenterden	*Kent*	51 4	*0 41	190	1·95	2·30
Arundel (Patching)	*Sussex*	50 51	0 27	130	1·95	2·02
Southampton (Cadland)	*Hampshire*	50 50	1 22	52	2·17	2·01
Oxford (Magdalen College)	*Oxfordshire*	51 45	1 15	186	1·45	1·51
Wellingborough (Croyland Abbey)	*Northampton*	52 18	0 41	174	1·69	1·84
Shoeburyness	*Essex*	51 31	*0 48	13	1·19	1·58
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	1·71	2·42
Geldeston [Beccles]	*Norfolk*	52 27	*1 31	38	1·57	2·26
Polapit Tamar [Launceston]	*Devon*	50 40	4 22	315	2·74	2·22
Rousdon [Lyme Regis]	,,	50 41	3 0	516	2·30	2·74
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	2·01	2·27
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	2·19	1·82
Coventry (Kingswood)	*Warwickshire*	52 24	1 30	340	1·89	1·92
Boston	*Lincolnshire*	52 58	0 1	25	1·47	1·62
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	1·70	1·13
Macclesfield	*Cheshire*	53 15	2 7	501	2·50	2·15
Southport (Hesketh Park)	*Lancashire*	53 38	2 59	38	2·11	1·16
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	1·92	1·34
Arncliffe Vicarage	,, ,,	54 8	2 6	732	5·17	5·11
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	1·84	2·19
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	2·10	2·32
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	10·63	6·15
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	2·89	2·40
Haverfordwest	*Pembroke*	51 48	4 58	95	3·16	3·91
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	3·04	2·59
Llandudno	*Carnarvon*	53 20	3 50	72	2·13	1·58
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	3·33	·85
Marchmont House	*Berwick*	55 44	2 24	498	2·64	2·53
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	3·62	1·33
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	2·61	1·34
Inveraray (Newtown)	*Argyll*	56 14	5 4	17	5·41	2·85
Mull (Quinish)	,,	56 34	6 13	35	4·28	2·17
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	2·06	1·14
Braemar	*Aberdeen*	57 0	3 24	1114	2·87	2·70
Aberdeen (Cranford)	,,	57 8	2 7	120	2·65	1·92
Cawdor	*Nairn*	57 31	3 57	250	2·35	1·50
Fort Augustus (S. Benedict's)	*E. Inverness*	57 9	4 41	68	3·79	3·13
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	7·29	6·42
Dunrobin Castle	*Sutherland*	57 59	3 56	14	2·64	2·01
Wick	*Caithness*	58 26	3 6	77	2·24	1·77
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	4·51	3·28
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	2·64	2·32
Nenagh (Castle Lough)	*Tipperary*	52 54	8 24	120	2·99	1·53
Miltown Malbay	*Clare*	52 52	9 26	400	3·11	2·21
Gorey (Courtown House)	*Wexford*	52 40	6 13	80	2·28	1·39
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	2·59	1·82
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	1·98	1·66
Mullingar (Belvedere)	*Westmeath*	53 29	7 22	367	2·64	2·01
Ballinasloe	*Galway*	53 20	8 15	160	2·66	1·94
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	4·36	3·27
Collooney (Markree Obsy.)	*Sligo*	54 11	8 27	127	3·33	2·31
Seaforde	*Down*	54 19	5 50	180	2·84	1·62
Bushmills (Dundarave)	*Antrim*	55 12	6 30	162	2·73	1·31
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	2·98	1·78

RAINFALL TABLE FOR MARCH, 1911—*continued.*

RAINFALL OF MONTH (*con.*)					RAINFALL FROM JAN. 1.					
Diff. from Av. in.	% of Av.	Max. in 24 hours. in.	Max. in 24 hours. Date.	No. of Days	Aver. 1875—1909. in.	1911. in.	Diff. from Aver. in.	% of Av.	Mean Annual 1875-1909. in.	STATION.
+ ·03	102	·47	12	18	5·19	4·59	— ·60	88	25·11	Camden Square
+ ·35	118	·71	12	17	5·99	5·14	— ·85	86	27·64	Tenterden
+ ·07	104	·93	12	16	6·71	5·19	—1·52	77	30·48	Patching
— ·16	93	·95	12	11	7·20	5·15	—2·05	72	31·87	Cadland
+ ·06	104	·45	12	15	4·85	3·48	—1·37	72	24·58	Oxford
+ ·15	109	·47	12	17	5·27	3·77	—1·50	72	25·17	Croyland Abbey
+ ·39	132	·43	12	16	3·71	3·13	— ·58	84	19·28	Shoeburyness
+ ·71	142	·47	12	17	5·00	5·12	+ ·12	102	25·40	Westley
+ ·69	144	·37	12	19	4·51	5·27	+ ·76	117	23·73	Geldeston
— ·52	81	·55	10	20	9·28	5·53	—3·75	60	38·27	Polapit Tamar
+ ·44	119	1·04	12	13	7·74	5·60	—2·14	72	33·54	Rousdon
+ ·26	113	·61	12	21	6·46	5·01	—1·45	78	29·81	Stroud
— ·37	83	·38	12	20	6·87	4·87	—2·00	71	32·41	Wolstaston
+ ·03	102	·48	12	13	6·12	4·16	—1·96	68	28·98	Coventry
+ ·15	110	·29	23	19	4·54	4·48	— ·06	99	23·35	Boston
— ·57	66	·17	13	19	5·04	2·80	—2·24	56	24·46	Hodsock Priory
— ·35	86	·39	12	15	7·46	6·03	—1·43	81	34·73	Macclesfield
— ·95	55	·23	10	11	6·73	4·81	—1·92	71	32·70	Southport
— ·58	70	·21	13	18	5·52	4·54	— ·98	82	26·87	Ribston Hall
— ·06	99	1·73	1	21	16·31	21·13	+4·82	130	61·49	Arncliffe
+ ·35	119	·48	13	22	5·32	4·86	— ·46	91	26·42	Hull
+ ·22	110	·37	16	22	5·63	4·65	— ·98	83	27·94	Newcastle
—4·48	58	2·41	1	15	35·03	37·89	+2·86	108	129·48	Seathwaite
— ·49	83	·64	10	17	9·61	8·86	— ·75	92	42·28	Cardiff
+ ·75	124	1·01	10	19	11·27	9·92	—1·35	88	46·81	Haverfordwest
— ·45	85	·67	12	19	10·04	8·63	—1·41	86	45·46	Gogerddan
— ·55	74	·53	12	14	6·75	4·38	—2·37	65	30·36	Llandudno
—2·48	26	·36	3	4	10·85	8·81	—2·04	81	43·47	Cargen
— ·11	96	·32	17	20	7·19	5·83	—1·36	81	33·76	Marchmont
—2·29	37	·38	3	14	12·27	11·04	—1·23	90	49·77	Girvan
—1·27	51	·48	1	14	8·84	9·97	+1·13	113	35·97	Glasgow
—2·56	53	·78	1	15	18·46	22·76	+4·30	123	68·67	Inveraray
—2·11	51	·52	5	13	14·28	13·99	— ·29	98	56·57	Quinish
— ·92	55	·31	18	17	5·98	2·86	—3·12	48	28·64	Dundee
— ·17	94	...	...	...	8·34	7·24	—1·10	87	34·93	Braemar
— ·73	72	·28	13	22	7·37	4·78	—2·59	65	32·73	Aberdeen
— ·85	64	·28	12, 16	13	6·69	5·58	—1·11	83	29·33	Cawdor
— ·66	83	·68	1	18	13·57	12·96	— ·61	95	44·53	Fort Augustus
— ·87	88	1·26	10	14	24·08	26·17	+2·09	109	83·61	Bendamph
— ·63	76	·36	12	12	7·97	7·02	— ·95	88	31·90	Dunrobin Castle
— ·47	79	·30	1	21	6·95	6·41	— ·54	92	29·88	Wick
—1·23	73	·48	31	22	15·44	8·51	—6·93	55	54·81	Killarney
— ·32	88	·51	10	19	9·60	6·61	—2·99	69	39·57	Waterford
—1·46	51	·30	10	16	9·76	6·84	—2·92	70	39·43	Castle Lough
— ·90	71	·51	3	18	10·33	7·62	—2·71	74	45·11	Miltown Malbay
— ·89	61	·35	10	16	8·22	4·64	—3·58	57	34·99	Courtown Ho.
— ·77	70	·26	10	16	8·29	6·38	—1·91	77	35·92	Abbey Leix
— ·32	84	·27	30	17	6·05	3·29	—2·76	54	27·68	Dublin
— ·63	76	·45	3	19	8·41	7·73	— ·68	92	36·15	Mullingar
— ·72	73	·63	3	19	8·51	7·91	— ·60	93	36·64	Ballinasloe
—1·09	75	·72	3	20	13·91	9·92	—3·99	71	52·87	Enniscoe
—1·02	69	·63	3	13	10·40	8·61	—1·79	83	42·71	Markree
—1·22	57	·55	3	13	9·06	6·52	—2·54	72	38·91	Seaforde
—1·42	48	·43	3	14	8·48	6·84	—1·64	81	37·56	Dundarave
—1·20	60	·50	3	17	9·12	8·50	— ·62	93	39·38	Omagh

SUPPLEMENTARY RAINFALL, MARCH, 1911.

Div.	STATION.	Rain inches	Div.	STATION.	Rain inches
II.	Warlingham, Redvers Road	2·30	XI.	Lligwy	1·72
,,	Ramsgate	2·08	,,	Douglas	...
,,	Hailsham	2·94	XII.	Stoneykirk, Ardwell House	1·21
,,	Totland Bay, Aston House.	1·91	,,	Dalry, The Old Garroch	2·26
,,	Stockbridge, Ashley	2·48	,,	Langholm, Drove Road	2.22
,,	Grayshott	2·63	,,	Beattock, Kinnelhead	*1·45*
,,	Reading, Calcot Place	1·87	XIII.	StMary'sLoch,CramiltLdge	2·42
III.	Harrow Weald, Hill House.	1·68	,,	North Berwick Reservoir	1·72
,,	Pitsford, Sedgebrook	1·79	,,	Edinburgh, Royal Observty.	·90
,,	Somersham Vicarage	1·32	XIV.	Maybole, Knockdon Farm..	*1·38*
,,	Woburn, Milton Bryant	2·11	XV.	Campbeltown, Witchburn	1·48
IV.	Colchester, Lexden	1·96	,,	Glenreasdell Mains	1·72
,,	Newport	...	,,	Holy Loch, Ardnadam	2·69
,,	Rendlesham	1·96	,,	Ballachulish House	5·24
,,	Swaffham	2·34	,,	Islay, Eallabus	1·56
,,	Blakeney	2·06	XVI.	Dollar Academy	2·36
V.	Bishops Cannings	2·40	,,	Balquhidder, Stronvar	2·59
,,	Winterbourne Steepleton	3·29	,,	Coupar Angus	·99
,,	Ashburton, Druid House	3·93	,,	Glenlyon, Meggernie Castle.	2·36
,,	Okehampton, Oaklands	2·73	,,	Blair Atholl	1·38
,,	Cullompton	2·35	,,	Montrose,SunnysideAsylum	1·22
,,	Hartland Abbey	2·47	XVII.	Alford, Lynturk Manse	2·49
,,	Lynmouth, Rock House	2·16	,,	Fyvie Castle	1·55
,,	Probus, Lamellyn	3·29	,,	Keith Station	1·79
,,	North Cadbury Rectory	2·42	XVIII.	Glenquoich, Loan	*11·50*
VI.	Clifton, Pembroke Road	2·78	,,	Skye, Dunvegan	3·53
,,	Ross, The Graig	1·53	,,	N. Uist, Lochmaddy	2·04
,,	Shifnal, Hatton Grange	1·32	,,	Alvey Manse	1·96
,,	Blockley, Upton Wold	2·35	,,	Loch Ness, Drumnadrochit.	2·95
,,	Worcester, Boughton Park.	1·85	,,	Glencarron Lodge	4·72
VII.	Market Overton	1·82	XIX.	Invershin	2·38
,,	Market Rasen	1·92	,,	Loch Stack, Ardchullin	4·93
,,	Bawtry, Hesley Hall	1·12	,,	Melvich	3·44
,,	Derby, Midland Railway	1·39	XX.	Skibbereen Rectory	4·47
,,	Buxton	2·80	,,	Dunmanway, The Rectory..	5·31
VIII.	Nantwich, Dorfold Hall	1·29	,,	Cork	2·81
,,	Chatburn, Middlewood	1·81	,,	Mitchelstown Castle	2·78
,,	Cartmel, Flookburgh	1·41	,,	Darrynane Abbey	3·88
IX.	Langsett Moor, Up. Midhope	1·84	,,	Glenam [Clonmel]	2·96
,,	Scarborough, Scalby	3·06	,,	Newmarket-on-Fergus,Fenloe	1·65
,,	Ingleby Greenhow	2·36	XXI.	Laragh, Glendalough	3·37
,,	Mickleton	2·17	,,	Balbriggan, Ardgillan	1·78
X.	Bardon Mill, Beltingham	2·37	,,	Moynalty, Westland	1·85
,,	Ilderton, Lilburn Cottage	2·37	XXII.	Cong, The Glebe	2·58
,,	Keswick, The Bank	1·85	,,	Westport, St. Helens	2·78
XI.	Llanfrechfa Grange	2·83	,,	Achill Island, Dugort	3·81
,,	Treherbert, Tyn-y-waun	3·82	,,	Mohill	1·93
,,	Carmarthen, The Friary	3·01	XXIII.	Enniskillen, Portora	1·72
,,	Castle Malgwyn [Llechryd].	2·76	,,	Dartrey [Cootehill]	2·09
,,	Plynlimon	*7·00*	,,	Warrenpoint, Manor House	1·45
,,	New Radnor, Ednol	2·37	,,	Banbridge, Milltown	1·25
,,	Rhayader, Tyrmynydd	3·13	,,	Belfast, Cave Hill Road	1·21
,,	Lake Vyrnwy	2·62	,,	Glenarm Castle	1·50
,,	Llangyhanfal, Plâs Draw	1·58	,,	Londonderry, Creggan. Res.	2·05
,,	Dolgelly, Bryntirion	3·78	,,	Killybegs	2·80
,,	Bettws-y-Coed, Tyn-y-bryn	2·58	,,	Horn Head	1·76

Buxton .....January 2·00
,, ...February 4·11

Glenquoich, Loan (February) *24·60*
not 2·46

METEOROLOGICAL NOTES ON MARCH, 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 month opened with brilliant sunshine but was changeable throughout, fine sunny days alternating with R and cloud. Winds from some westerly point prevailed in the first half of the month, but in the latter half the direction was N. or N.E. Duration of sunshine, 78·2* hours, and of R 59·1 hours. Mean temp. 42°·2, or 0°·1 below the average. Evaporation ·59 in. Shade max. 61°·5 on 22nd; min. 28°·8 on 17th. F 4, f 15.

TENTERDEN.—A cold month with but few bright days but no severe frost. Duration of sunshine, 103·0† hours. Shade max. 62°·0 on 21st; min. 30°·0 on 8th and 10th. F 8, f 13.

TOTLAND BAY.—Duration of sunshine, 115·1* hours, or 21·7 hours less than the average. Shade max. 56°·2 on 20th; min. 29°·7 on 17th. F 1, f 10.

PITSFORD.—R ·09 in. above the average. Mean temp. 44°·9. Shade max. 57°·4 on 2nd; min. 29°·5 on 8th. F 19.

NORTH CADBURY.—Temp. was a little above the average and ground frosts unusually few, but this was due to excess of cloud. Many nights were cold and many days were gloomy and raw. Shade max. 67°·0 on 31st; min. 28°·0 on 17th. F 7, f 11.

ROSS.—Shade max. 60°·0 on 2nd; min. 27°·3 on 17th. F 5.

HODSOCK PRIORY.—Rather dull and dry with cold days, but mild nights, and a large proportion of northerly winds. Shade max. 58°·6 on 2nd; min. 28°·9 on 5th. F 8, f 17.

SOUTHPORT.—Duration of sunshine, 127·5* hours, and of R 42·2 hours. Mean temp. 42°·3, or 0°·8 above the average. Shade max. 54°·9 on 30th; min 31°·9 on 26th. F 1, f 16.

HULL.—Mild at the beginning and the end, with a winterly period between of cold, squally winds and S showers, and a large amount of cloud. Shade max. 57°·0 on 3rd; min. 30°·0 on 13th. F 5, f 13.

HAVERFORDWEST.—Cold, wet, and stormy. Agricultural operations were backward. Duration of sunshine, 121·7* hours.

LLANDUDNO.—Shade max. 53°·2 on 29th; min. 35°·5 on 8th.

CARGEN.—The month was remarkable for the extremely low R, which, with the exception of 1890, was the smallest fall registered in March in the past 52 years. There was no R after the 7th. Strong piercing E. winds continued uninterruptedly from 14th to 31st. Shade max. 52°·0 on 2nd; min. 29°·0 on 13th. F 5.

EDINBURGH.—Shade max. 52°·8 on 3rd; min. 30°·7 on 13th. F 2, f 13.

COUPAR ANGUS.—R ·75 in. below the average. The noteworthy features were the almost entire absence of frost at night and the cold and sunless days. Shade max. 54°·0 on 3rd; min. 26°·0 on 24th.

FORT AUGUSTUS.—The first half wet with prevailing S.W. winds, and the second half was dry with N.E. winds. Shade max. 54°·3 on 29th; min. 22°·2 on 22nd. F 8.

CORK.—Shade max. 56°·0 on 2nd; min. 29°·0 on 16th. F 8, f 20.

DUBLIN.—Opening with a few warm days and S.W. winds, the month ultimately proved cold and dull. N.W. winds prevailed from 11th to 17th and then N.E. or E. to the close. Mean temp. 43°·3. Shade max. 57°·2 on 2nd; min. 31°·6 on 17th. F 3, f 6.

MARKREE.—The finest March for many years. Shade max. 56°·0 on 2nd; min. 22°·3 on 26th. F 7, f 19.

WARRENPOINT.—N. and N.W. winds prevailed in the first half and E. winds in the latter half. Shade max. 55°·0 on 2nd; min. 33°·0 on 25th. F 0, f 5.

* Campbell-Stokes. † Jordan.

Climatological Table for the British Empire, October, 1910.

STATIONS (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Total Rain Depth.	Days.	Aver. Cloud.
								0-100			inches		
London, Camden Square	72·8	2	41·6	21	60·6	48·3	50·0	89	107·8	36·3	2·00	13	8·7
Malta	88·5	10	61·0	21	77·9	67·3	63·2	76	147·0	...	·71	5	4·2
Lagos	88·0	15	69·0	17	84·7	72·8	74·1	77	155·0	69·0	7·00	12	...
Cape Town	87·9	28	43·1	16	70·9	52·9	52·2	71	...	...	1·48	10	3·6
Durban, Natal ...	81·0	9	53·7	12	74·9	60·9	...	...	139·5	...	4·39	18	6·3
Johannesburg	78·2	4	41·2	11	67·5	48·5	49·2	77	142·8	40·0	4·57	17	4·5
Mauritius	83·2	21	60·4	6, 8	80·3	64·7	60·9	69	155·2	50·5	1·62	9	6·1
Calcutta...	90·7	6	67·7	31	86·7	74·9	75·0	85	...	62·5	6·82	14	6·2
Bombay...	90·6	25	72·3	22	87·3	75·8	73·4	79	137·9	64·9	·62	3	3·7
Madras	97·4	2	72·5	23	89·4	76·1	74·0	82	142·7	72·4	9·64	16	5·2
Kodaikanal	66·0	11	48·0	6	62·3	51·7	53·6	92	134·6	34·6	12·86	27	7·7
Colombo, Ceylon ...	87·2	5*	71·2	15	85·0	74·9	73·4	80	155·5	68·8	16·83	19	6·6
Hongkong	88·0	8	66·4	13	79·7	72·0	65·6	72	141·9	...	·05	2	4·4
Melbourne	83·6	24	37·2	10	63·9	47·5	44·1	65	143·5	33·4	2·80	18	6·5
Adelaide	88·1	16	36·8	10	68·1	48·7	46·1	64	153·7	33·1	1·80	12	5·1
Coolgardie	91·0	13	38·0	2	71·9	46·6	31·7	56	156·3	34·9	·39	5	3·7
Perth	74·3	11	42·1	1	66·9	48·8	36·6	70	135·2	33·4	2·12	9	3·4
Sydney	93·9	25	47·8	12	70·5	54·4	50·5	63	149·9	36·3	3·80	21	4·8
Wellington ...	65·0	25	40·0	7	59·8	51·3	46·6	72	116·0	30·0	3·95	14	7·6
Auckland	68·5	25	46·0	30	63·8	52·3	52·0	79	135·0	43·0	2·19	19	7·0
Jamaica, Kingston ..	91·6	3	69·3	26	87·2	72·0	71·6	79	...	...	11·30	15	.
Grenada	90·0	26	71·0	sev.	85·0	74·0	72·0	80	142·0	...	10·39	17	4·5
Toronto	73·3	18	25·4	30	60·0	42·4	...	81	96·6	21·8	2·31	11	4·3
Fredericton	77·5	6	22·8	31	53·9	34·9	...	83	...	...	2·86	12	6·0
St. John, N.B. ...	61·5	11	30·7	22	52·7	41·2	...	...	...	...	3·82	17	5·8
Victoria, B.C.	62·7	15	35·7	26	55·9	45·8	...	84	...	...	5·09	16	8·0
Dawson	49·0	13	—3·0	8	31·7	18·7	...	...	...	...	1·67	12	7·3

* 7, 8, 11, 12 and 13.

MALTA.—Mean temp. of air 72°·0. Average bright sunshine 8·3 hours per day.

Johannesburg.—Bright sunshine 251·5 hours.

Mauritius.—Mean temp. of air 0°·4, of dew point 0°·9, and R ·01 in., below averages. Mean hourly velocity of wind 9·8 miles, or 1·2 miles below average.

KODAIKANAL.—Bright sunshine 89 hours. TS on 20 days.

COLOMBO.—Mean temp. of air 76°·8, or 3°·2 below, of dew point 0°·3 above, and R 2·25 in. above, averages. Mean hourly velocity of wind 6·0 miles. TS on 26th.

HONGKONG.—Mean temp. of air 75°·3. Bright sunshine 237·9 hours, or 26 hours above, and R 4·51 in. below, averages. Mean hourly velocity of wind 14·4 miles.

Melbourne.—Mean temp. of air 1°·8 below, and R ·14 in. above, averages.

Adelaide.—Mean temp. of air 3°·5 below average.

Coolgardie.—Mean temp. of air 4°·6, and R ·34 in., below averages.

Perth.—Mean temp. of air 3°·2, and R ·23 in., below averages.

Sydney.—Mean temp. of air 0°·9 below, and R ·94 in. above, averages.

Wellington.—Mean temp. of air 1°·4 above, and R ·29 in. below, averages. Bright sunshine 153·1 hours.

Auckland.—R 1·25 in. below average.

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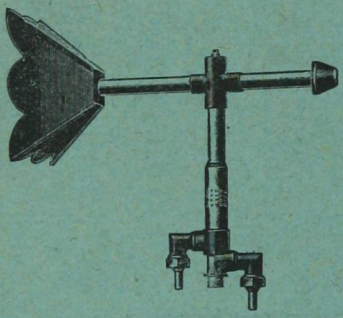

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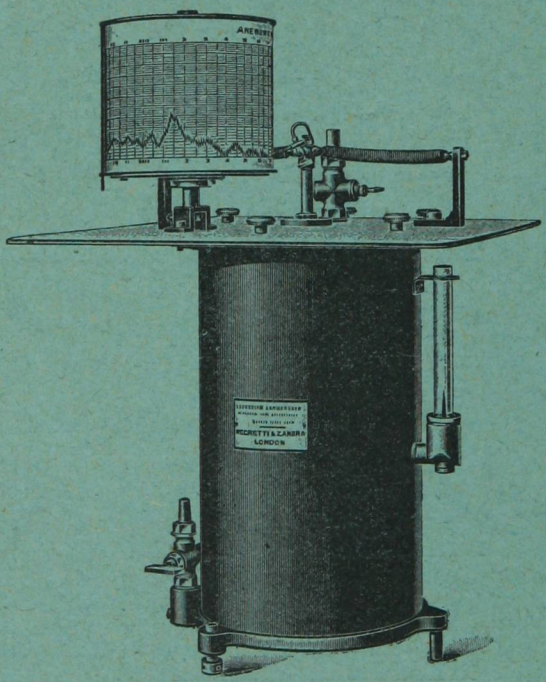

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