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THE PROBABLE WEATHER OF THE LAST WEEK OF JUNE.

No meteorologist would undertake a fortnight in advance to give a definite forecast of the weather of any particular day; but if a sufficiency of accurate records exist it is not difficult to estimate the probability of certain conditions of weather on a given day. In view of the intensity of the public interest in the weather of June 26th and 27th this year, when the great Coronation processions are to pass through the streets of London, and millions of people will spend the greater part of the day out of doors, we have brought together some information which, although equally applicable to any year, may on this occasion be worthy of special attention.

Mr. E. Mawley treats of one aspect of the question in *The Rosarian's Year Book* for 1902. He considers the probability of any day in June or July being so wet as to ruin the prospects of a rose show, basing his discussion on 23 years' observations of rainfall at Berkhampstead, during which the amount of rain that fell between 9 a.m. and 9 p.m. was distinguished from that which fell in the other half of the 24 hours. He points out that the chances of rain are perhaps a little greater in July than in June, and then sums up—

"If the minimum amount be reckoned as half-an-inch, the chances against rain falling during the day-time to that amount are about 80 to 1.

"If the minimum amount be reckoned as a quarter-of-an-inch the chances against rain falling during the day-time to that amount are about 25 to 1.

"If the minimum amount be reckoned as one-tenth of an inch the chances are increased to 8 to 1.

"If the minimum amount be reckoned as five-hundreths of an inch the chances are 5 to 1.

"If the minimum amount is reckoned as one-hundredth of an inch the chances rise to 2 to 1."

It is further noted that a rainfull exceeding half-an-inch may be classed as an exceptionally wet day in summer; a fall exceeding a

quarter-of-an-inch as a decidedly wet day; a fall of one-tenth of an inch as a few heavy showers, or light rain for several hours; five-hundredths of an inch as a few passing showers; and one-hundreth as insufficient to lay the dust.

We have applied Mr. Mawley's classification for the two days, June 26th and 27th, to the Camden Square record of 45 years (1857-1901)*, and as it must be apparent to everyone who thinks of the matter that there can be no reason but chance for the probability of rain being appreciably greater on one day than on the day immediately following, we have taken the mean of the two days, as applying to either, and the result comes out as follows :—

Rainfall from 9 *a.m. to* 9 *p.m. at Camden Square, on June* 26*th and* 27*th.*

	More than ·50 in.	More than ·25 in.	More than ·10 in.	More than 05 in.	More than ·01 in.
Number of cases in 45	½	1	5	8	10
Chances against	90 to 1	45 to 1	8 to 1	5 to 1	3½ to 1
Mr. Mawley's figure.....	80 to 1	25 to 1	8 to 1	5 to 1	2 to 1

The similarity of the two sets of figures shows that the result is trustworthy. The only notable exception being due to the short period considered. This element of uncertainty may be met by carrying the investigation further back into the past; but in order to do this it is necessary to consider the probability of rain falling at any time in the 24 hours, and not in the twelve hours only.

We applied for data to Mr. R. C. Mossman, of Edinburgh, whose elaborate discussions of the climate of London must be known to most of our readers, and he kindly supplied values for the rainfall and other conditions for a complete century. The observations used were not made at the same place throughout, but it is very unlikely that the change will seriously affect the accuracy of the conclusions. The observations from 1802 to 1839 were made at Sunbury, near Kew, and from 1840 to 1901 at Greenwich Observatory. For the sake of comparison we also give the Camden Square values (1857-1901) for the 12 hours 9 a.m. to 9 p.m., and for the 24 hours, and the Greenwich values for 1857-1901, all calculated as a percentage of the 45 years, so as to be strictly comparable with the actual number of cases in the century under consideration. The chances against each particular value of rainfall are those for the hundred years.

The following table shows that taking the longer period the chances of heavy rain seem distinctly greater, although the chance of any rain falling is appreciably the same as was found for the shorter period. These figures are applicable to either day by itself. We may now consider the chances of one or both days proving wet, and for this purpose it must suffice to take the fall of ·01 in. or more, as constituting a wet day, although as a matter of fact ·01 in. would only mean a trifling shower in some part of the 24 hours.

* The record of 1857 was kept by Mr. Symons in another part of London; but for the present purpose the difference is of no importance.

Rainfall in 24 hours, June 26th or 27th.

	More than ·50 in.	More than ·25 in.	More than ·10 in.	More than ·05 in.	More than ·01 in.
45 years.					
Camden Square, 9 a.m. to 9 p.m., %	1	2⅔	12	16⅔	22
Camden Square, 24 hours, %	2½	6	14	23	32
Greenwich ,, %	2	8	12	15½	32
100 years.					
Greenwich	3½	9	16½	22½	36
Chances against	28 to 1	10 to 1	5 to 1	3½ to 1	2 to 1

In the hundred years from 1802 to 1901, June 26th was quite rainless on 63 occasions, and June 27th on 65; the 26th had some rain on 37 occasions, the 27th on 35. Both days were entirely free from rain on 50 occasions, and at least one of the days was entirely free from rain on 78 occasions. Both days had some rain on 21 occasions. Finally, it may be noted, that the whole of the last week of June was absolutely rainless on 19 occasions, and that rain fell on every day of that week only once, in 1848.

The final conclusion as to the probability of rainless weather, drawn from the records for 100 years, is:—The chances against the whole of the last week of June being rainless are 5 to 1; the chances are equal for both days being dry, or for one at least being wet; the chances against rain falling on both days are 5 to 1; and finally, as already stated, the chances against any rain on either day, considered separately, are practically 2 to 1. Thus it is just as likely that the two days will be wet as that the whole week will be dry; both days are as likely to be dry as not, and either day, considered separately, is twice as likely to be absolutely dry as to have even a single shower. As a matter of mere curiosity on which no suggestion as to the future can be made, it may be pointed out that no rain has fallen at Camden Square between 9 a.m. and 9 p.m. on the 26th of June since the year 1890, a period of 11 years; the longest previous succession of dry days on the 26th, in the 45 years, was 10, from 1862 to 1871. During the 45 years only two consecutive years have ever experienced rain on the 26th, and this has only happened twice. For the 27th the longest succession of dry years has been nine, and once the day was wet on three consecutive years.

Mr. Mossman has also supplied us with details of temperature for 100 years, from the same stations as the rainfall, and with particulars of non-instrumental observations for the 140 years 1763-1901.

As to temperature, the mean of either day is approximately 61°, that is to say, there is as much chance of it proving one, five or ten degrees hotter, as of it proving one, five or ten degrees colder than that figure. The highest mean temperature for either day was 76° in 1820, the lowest was 50° in 1835. The extreme temperatures to be expected are in a sense more important than the mean of the day. The average maximum for either day is about 72°, the average minimum for either night about 52°; but

in 1820 the tremendous maximum of 94° was experienced. On 13 years out of the 100 the maximum exceeded 85°, so that the chances are 7 to 1 against the maximum reaching that figure; the chances against it reaching 88° are 50 to 1. The lowest maximum was 57° in 1835, and on 11 occasions the maximum temperature of the day failed to reached 62°, a temperature below which it is uncomfortably cool to sit long out of doors in light summer clothes. The chances against so low a maximum are 9 to 1. The highest minimum recorded was 62°, in 1811, a delightfully warm night; the lowest was 40°, in 1871, which must have felt very cold indeed. The chance of either extreme occurring is very small; it is 15 years since the night minimum of either day fell below 43°, and 24 years since the day temperature of the 26th or 27th rose above 85°.

Of non-instrumental observations the most important are those on fogs, gales and thunderstorms. Thunderstorms have occurred on June 26th, 14 times in 100 years, and on June 27th, 9 times; but as the hours at which the storms occurred are not obtainable it is better to take an average, say 12 for either day. This shows that the chances against a thunderstorm on either day, considered separately, are about 12 to 1. Gales and fogs are so rare that it is enough to say that observations for a hundred years indicate that the chances against a gale on June 26th or 27th are 50 to 1, and against a fog nearly as high as 100 to 1.

From these data anyone with an instinct for probabilities can frame a forecast of the weather of any particular day, that would be much more likely to be right than wrong, though he could not distinguish one day from the next; but we repeat that it has not yet been shown to be possible to say with any approach to certainty whether the next occasion is or is not to be one of the less probable cases—the exception which proves at least the rule of chance.

THE WEST INDIAN VOLCANIC ERUPTIONS AND ATMOSPHERIC PHENOMENA.

By R. H. Curtis.

The startling accounts which have been received of the recent volcanic outbursts in the West Indies have caused a somewhat widespread curiosity to know whether they will be followed in this country by atmospheric phenomena similar to those which appeared after the great eruption of Krakatoa, in August, 1883.

The most remarkable of those phenomena were the wonderful sky-glows, which, after they had quickly extended themselves round the globe in the tropical zone, made their appearance here towards the end of November, and continued with great persistency for many weeks, and, according to some observers, for many months.

But besides these glows, there were other phenomena, which were not less wonderful, although they were not so evident to "the man in the street," or even to the great majority of those who were careful

and habitual observers of atmospheric occurrences. These phenomena were the result of the enormous atmospheric undulations which were set up by the explosions, and particularly by the final cataclysm on August 27th, when the greater part of the island of Krakatoa appears to have been hurled into space, so that where a mountain peak nearly 2,500 feet high had stood, there was afterwards found to be ocean with a depth of more than 300 fathoms.

Some of these air waves produced sounds which were heard at a distance of 3,000 miles from their place of origin, whilst those of less rapid oscillation had sufficient force to burst in windows and doors, and to crack walls, at a distance of 100 miles, or more, from the volcano. These huge billows of air, spreading outwards in vast circles from Krakatoa, travelled several times round the globe, taking something like eighteen hours to perform the journey from Krakatoa to its antipodes in Colombia, and in transit they literally left their signatures behind them wherever there was a barograph.

It is perhaps too early to say definitely whether the sky-glows are likely to recur over the British Islands as a result of the volcanic outbursts at Martinique and St. Vincent. Some expectant observers have already detected them in sunset effects, seen only a day or two after the eruptions began ; but in their eagerness to be first in making the discovery these correspondents have overlooked the fact that a considerable time must necessarily elapse before the ejected matter necessary to produce the glows could arrive here, even supposing it to be on its way. In the case of the Krakatoa eruption the sky phenomena spread east and west through the tropics far more rapidly than they did polewards, and the glows were seen in the locality of the present outbreak, where therefore the dust must have been present to produce them, at least two months before they were observed in the British Isles. As yet, however, no reliable information has been received of the occurrence of glows, or other optical phenomena due to the volcanic outburst, anywhere outside the more immediate neighbourhood of the eruptions.

There is, however, more difficulty in deciding whether there has been any barometric record in this country of air waves, resulting from the volcanic explosions. The accounts to hand of the outbursts at Martinique and at St. Vincent do not supply information of any outstanding explosions of exceptional violence, and sufficiently distinct from the rest for the time of their occurrence to be localized, in such a way as to afford a basis from which to calculate the time when the passage across the British Isles of resulting air waves might be looked for. There is very little doubt that such atmospheric undulations, of greater or less magnitude, have been set up ; and certain of the photographic barograms from the observatories of the Meteorological Office do exhibit barometric changes which closely resemble those caused by the Krakatoa waves ; but unfortunately it is less easy to connect cause and effect in the present instance than was the case in 1883.

In the absence of other data, such as existed in the case of the Krakatoa outburst, as to the probable time of the origin of the waves, the only means of connecting recorded barometric oscillations with the recent eruptions is to find out whether similar oscillations were recorded elsewhere, and whether the proper intervals of time for their transit required by the positions of the stations occurred between the records. If this connexion cannot be traced the volcanic origin of the oscillations may very well be doubted, and especially if, coincident with them, other meteorological phenomena were observed, such as would, under normal conditions, be regarded as affording in themselves a sufficient explanation of their occurrence.

So far, the attempts which have been made to corelate in this way recent barometric oscillations with the West Indian eruptions have not been very successful. The time required for an atmospheric wave to travel from St. Vincent, or Martinique, to the British Isles, may be taken, nearly enough, as six hours ; and the time at which the portion of the wave which started in the opposite direction might be expected to show itself here would be about 25 hours later. Supposing the wave to have had sufficient energy to make a second circuit, and to record its passage, the second appearance of each phase would probably occur about 37 hours after the first.

None of the unusually numerous barometric oscillations recorded in the British Isles during the latter half of May accord very closely with these hypothetical conditions. Some were recorded at more than one place, but the interval between their occurrence was certainly too long; whilst in one instance in which an oscillation is shown at two stations with a proper time interval between them, no sign of the wave is indicated elsewhere. Probably the nearest approach to the required conditions is shown on the 18th, when two decided oscillations were recorded at Valencia, one at 9 a.m., and the other at about noon; at Falmouth, which is practically the same distance as Valencia from the volcanoes, similar oscillations were shown, but at 3 p.m. and 6 p.m. ; and at Kew one oscillation was felt about 20 minutes later than the first one at Falmouth. At Valencia, and at Falmouth, oscillations which *may* have been the recurrence of these, were again recorded about 42 hours after the first, but at Kew there was nothing to correspond with this ; and no oscillations at all were recorded at either time at the Observatories at Aberdeen and Fort William.

At Kew, a sharp squall, with rain, accompanied the barometric change, and probably there were also accompanying squalls at Valencia and Falmouth, although the traces of the Robinson anemograms at those places does not enable one to say so definitely, and this fact suggests a strictly meteorological origin for the oscillation ; but it may be a point to consider whether the atmospheric conditions indicated by the oscillation, however produced, would not of themselves cause something in the nature of a squall.

Possibly further investigation, with more data, may reveal the volcanic connexion sought for, but at present the probability of its existence does not seem to be very great.

ROYAL METEOROLOGICAL SOCIETY.

THE first of the afternoon meetings of the present session was held at the Society's Rooms, 70, Victoria Street, Westminster, on May 21st, Mr. W. H. Dines, B.A., President, in the chair.

Mr. G. P. Carless, M.Inst.C.E., Mr. J. C. Custodis, and Bahadur K. Ronendra Narayan Roy were elected Fellows.

Capt. D. Wilson-Barker read a report prepared by Mr. Dines and himself on the Wind-Force Experiments which had been made on board H.M.S. *Worcester*, and at Stoneness Point Lighthouse, 817 yards from the ship on the left bank of the River Thames. These experiments were in continuation of those on the exposure of anemometers at different elevations, which were carried out on the *Worcester* a few years ago. All the observations were made with the Dines' pressure-tube anemometers. The general result is that the lighthouse experiences steadier and stronger winds than the *Worcester*, the velocity being about six per cent. greater notwithstanding the fact that the elevation is less than half; but that in both positions the extreme velocities reached in the gusts are about equal.

Dr. R. H. Scott read a summary of the proceedings of the Wind Force Committee from its first appointment in 1885 to the present time.

In the discussion which followed the speakers remarked upon the great advance which had been made in the study of anemometry since the first appointment of the Committee. This was considered to be largely due to Mr. Dines' invention of the pressure-tube anemometer.

Dr. H. R. Mill read a paper on "The Cornish Dust Fall of January, 1902," in which he stated that in consequence of the large number of communications he had received after the publication of a preliminary account of the dust fall in *Symons's Meteorological Magazine* for February, the extent of the area affected had been very clearly indicated. The most important of the additional observations were supplied by the courtesy of the Trinity House, which communicated abstracts of the logs of all the light-houses and light-ships round the coast from Portland Bill to Bardsey Island.

It was found that the areas affected by the dust falls in January were (1) Cornwall and a strip of Devonshire measuring altogether 1,400 square miles; (2) North Devon, a very limited district not exceeding 150 square miles; (3) Somerset and the south of Gloucester including, in addition to a considerable stretch of the Bristol Channel, 260 square miles; and (4) South Wales, in the south of Monmouth and Glamorgan, about 340 square miles—a total area of about 2,200 square miles. The hypothesis that the dust was derived from the explosion at Perranporth was shown to be quite inadequate to account for the large area over which the deposit was found.

The date of the appearance of the dust was discussed. At a few stations, chiefly in northern Cornwall, it was observed on the

afternoon of January 21st, at most of the stations where a definite date could be assigned it undoubtedly fell on the 22nd, while in the north of Somerset and the adjoining part of Gloucester the fall was clearly due to a shower on the morning of the 23rd. Dust falls were reported in Normandy on the 22nd, in Portugal on several days about the 20th, and about Madeira on the 17th, when the dust-haze was so thick that the mail steamer *Lagos* was wrecked on the Dezertas. The conclusion arrived at was that the dust came from the African deserts, a portion of it was carried up into the stratum of air above the great anticyclone which lay over western Europe, and when rain happened to be formed in the dust-cloud, or to fall throught it, the muddy drops made themselves apparent on reaching the ground.

Dr. Mill referred gratefully to the very large number of correspondents whose voluntary co-operation made it possible to carry the discussion to a satisfactory conclusion.

After the paper was read a number of Fellows took part in the discussion, Captain Campbell Hepworth pointing out that about the date of the dust-storm the distribution of pressure and winds over North Africa was unusual, and might account for the simultaneous occurrence of dust-storms on the Atlantic and the Red Sea.

Correspondence.

RAINFALL OF FIRST FOUR MONTHS OF 1902.

To the Editor of Symons's Meteorological Magazine.

I SUPPOSE from the grouping of your decades that you consider 1900 to be the first year of the twentieth century! You will see that my decades are in the form 1881–90, not 1880–89. I notice that you take ten year averages, which is as much as most observers can manage; but, as a rule, the last decade has been drier than the two preceding, thus the four months' average for 30 years has been 7·50 in., as compared with 7·00 for the last 10 years. My value for the first four months of 1902 is 58 per cent. of the 30 years' average, or 62 per cent. of the 10 years' average. which is lower than 45 out of your 50 places. On sixteen occasions I have measured more in a single month than in the first four months of this year; and on 34 occasions the fall of a single month has been not less than 4·00 in. As regards the first four months it is interesting to compare 1900, when 11·03 in. of rain fell, with 1902, when the fall was only 4·38 in.

Average Rainfall, January to April.

Periods	1871–80.	1881–90.	1891–1900.	1871–1900.	1902.
Inches	7·64	7·88	7·04	7·52	4·38

The above summary shows the averages of three decades separately, and of 30 years, as compared with the fall of 1902.

ROBERT ELMHIRST.

Farnham Lodge, near Knaresboro', 17th May, 1902.

RAIN GAUGE MEASURING GLASSES.

To the Editor of Symons's Meteorological Magazine.

I HAD a glass made at Negretti and Zambra's, a good many years ago, for measuring small quantities, partly for the sake of eyesight; but Mr. Zambra seemed to think it rather a fad. I have had others, by Casella, graduated on both sides, to ·07 for 8 in. and ·18 for 5 in. gauges, and find them very convenient. They are 9 inches long and $\frac{3}{4}$ in. diameter. Some glasses I have seen do not look as if the first ·01 was carefully measured before the glass was graduated, in fact, I once saw one where the ·01 was almost at zero. One would think that all good makers would test ·01 instead of merely dividing ·10 into ten parts by a scale. For a 5 inch gauge a half inch diameter would be better than mine for reading to thousandths.

J. E. MACE.

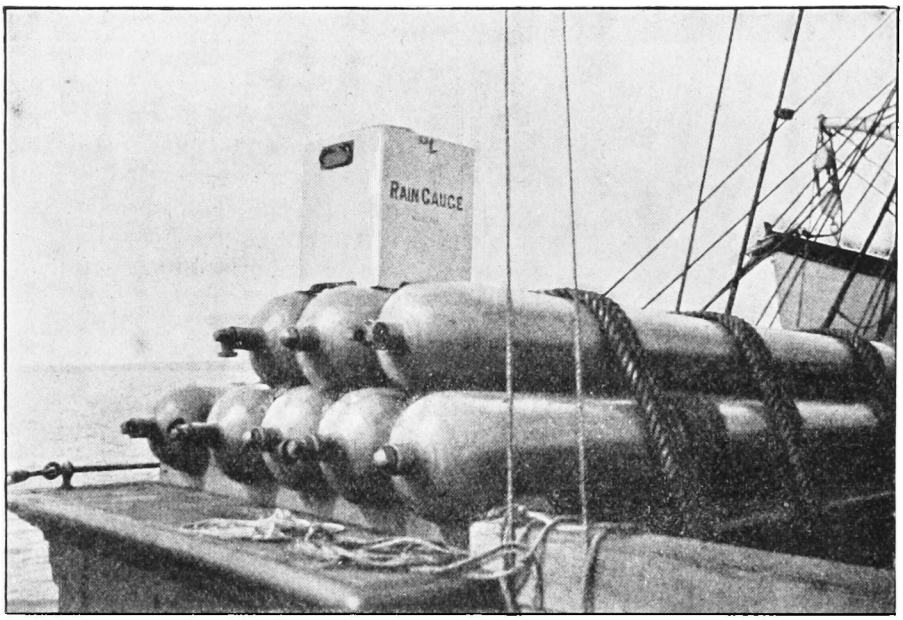
CLOUD CHARACTERS, APRIL–MAY, 1902.

To the Editor of Symons's Meteorological Magazine.

THE recent phenomenally cold weather which, in East Suffolk, gave way on May 23rd, was accompanied by abnormal skies. The type of cloud prevailing may be described as a sheet or pallium of semi-stratified, electrical cumulus. The peculiarity of this sky was as follows: Numerous masses of the cumulus-piles appeared at all points of the compass, often seen through a slight haze, yet showing distinctly the nodulous heads and processes usual in storms, and crossed and intersected by numerous strips and narrow bands of dark stratus. This stratus, called by Ley, Stratus Lenticularis ("Cloudland," plate V.) often assumed unusual forms, sometimes like dark cloudlets or small cumuli drawn out into semi-cylindrical bands, lying across or involved in the folds of the cumulus peaks. But the most striking feature of this "gloomy" time was the ominous and threatening expression of the pallium in its general character, accompanied by almost daily mutterings of distant thunder. The thunder, I believe, occurred amongst *the clouds themselves*, and at a higher than ordinary elevation. I gather this from the fact that people continually remarked that a storm was occurring in a certain direction, yet no account of any particular storm was reported in the local papers.

The Festoon Cloud, or rather, the Festoon-Sheet, was accompanied by a good deal of patchy nimbus and uncertain drizzling. So cold a May was, perhaps, never before known in East Anglia. Respecting this sheet of imperfectly formed festoons, I may here note that I verified the fact that its origin (doubtless the same as that of the perfect cloud) is as follows: The lower stratum of air near the earth becomes saturated with vapour and while it is in this condition the wind in the upper levels shifts *suddenly* to a colder quarter. A number of descending cold currents are then poured down into the lower atmosphere, condensing the vapour in front of them, and presenting a globular form through the spiral movement of the outer ascending envelope of warmer vapour. In the case referred to it went rapidly from about S.W. to N. The bags, or festoons, were quickly formed, and rolled along with the wind.

Elmsett, Ipswich, May, 1902. SAMUEL BARBER.



[*Photograph by* DR. H. R. MILL.

THE RAIN GAUGE ON THE "DISCOVERY."

OCEAN RAINFALL ON THE "DISCOVERY."

SURGEON-MAJOR W. G. BLACK, of Edinburgh, whose persevering efforts to establish measurements of rainfall at sea are so well known to meteorologists, supplied one of his special marine rain gauges to the British National Antarctic expedition on board the *Discovery*, and he now sends us for publication the readings of the gauge on the voyage to New Zealand, as taken by Lieut. C. Royds.

The form of the rain gauge may be seen from the accompanying photograph, which represents it mounted on the gas-cylinders on the weather quarter of the *Discovery*. This position was adopted as the result of much anxious consideration, and though it involved shifting the rain gauge every time the ship changed her tack, the advantages are obvious. One advantage is that the rain gauge was never sheltered by the sails; another that the wind always blew over it from the sea, thus, whatever deflecting influence upon the wind the side of the ship exerted was always the same. The eddy of air from the spanker, the only sail which could have any influence on the gauge, is the only variable condition, and that cannot easily be allowed for. The rim of the rain gauge remains horizontal as it is mounted so as to swing freely, and its height above sea-level (about

12 or 14 feet) remains as nearly the same as the motion of the ship allows. The *Discovery* proved to be a very dry ship, and apparently no correction for spray was found necessary.

The positions given in the table are for noon, and the amount of rainfall entered opposite each date is that which was measured at noon on the following day.

The only heavy rainfall recorded was on August 24th and 25th, about lat. 12° N., when the total fall of two days, for it happened to be in progress at noon, and so was divided in the record, was 3·94 in. On this occasion the fresh water tanks of the *Discovery* were replenished by 15 tons of rain-water collected on deck. During the 60 days in the Atlantic Ocean, from August 6th, when the ship left Cowes, to October 4th, when she reached Capetown, there were 16 days on which more than ·01 in. of rain fell, and on only five of these did the fall equal, or exceed, ·25 in. During the 46 days in the Southern Ocean, from October 14th, when she left Simon's Bay, to November 29th, when she reached Lyttelton, there were 30 days with rain, but on only four days was the fall as much as ·25 in., and only on nine as much as ·10 in. It will be noticed that from October 30th to November 12th there were 13 consecutive rainy days. The longest period without rain was 13 days, from August 11th to 23rd.

Rainfall recorded on S.S. "Discovery," England to New Zealand.

1901. Date.	Lat. ° ′	Long. ° ′	Rain in.	1901. Date.	Lat. ° ′	Long. ° ′	Rain in.
Aug. 10	43 45 N.	9 45 W.	·01	Oct. 30	47 38 S.	74 4 E.	·32
,, 24	12 28	20 51	1·79	Nov. 1	46 55	84 21	·07
,, 25	11 7	21 12	2·15	,, 2	46 51	89 28	·05
,, 28	5 35	21 46	·04	,, 3	46 38	93 27	·08
Sept. 4	5 35 S.	29 2	·05	,, 4	47 41	95 51	·27
,, 7	10 32	32 49	·22	,, 5	48 44	100 17	·12
,, 10	15 45	33 11	·41	,, 6	50 9	104 6	·04
,, 15	23 45	27 21	·02	,, 7	51 16	108 50	·072
,, 18	30 43	21 36	·06	,, 8	51 50	112 46	·052
,, 19	32 59	19 40	·54	,, 9	51 40	116 59	·301
,, 20	33 53	17 38	·04	,, 10	50 51	122 35	·025
,, 22	35 10	13 40	·11	,, 11	51 20	126 23	·022
,, 24	36 27	8 20	·48	,, 12	51 49	130 18	·010
,, 25	36 53	5 48	·05	,, 14	57 41	134 50	·023
,, 27	38 12	0 31 E.	·03	,, 15	59 18	138 2	·020
,, 30	37 12	9 30	·09	,, 18	61 9	142 59	·015
Oct. 16	37 16	22 28	·01	,, 21	56 31	156 19	·014
,, 17	38 59	25 54	·10	,, 22	55 12	158 30	·006
,, 21	45 7	36 53	·15	,, 24	52 13	163 53	·016
,, 22	45 0	40 57	·16	,, 25	50 30	166 1	·010
,, 23	45 8	44 47	·06	,, 26	48 54	169 49	·475
,, 24	44 37	48 25	·07	,, 27	47 12	170 32	·235
,, 25	45 35	51 18	·03	,, 28	44 37	172 10	·023

Dr. Black points out that most rain was recorded in the Atlantic equatorial belt, and in the Brave West Winds of the South Indian Ocean, and least in the North and South Atlantic tropical belts. Of the 103 days when the ship was at sea rain fell on 46, the total amount being 8·939 in.

REVIEWS.

Hints to Meteorological Observers. Instructions for taking Observations and Tables for their Reduction, together with a Glossary of Meteorological Terms. Prepared under the direction of the Council of the Royal Meteorological Society, by WILLIAM MARRIOTT, F.R.Met.Soc., Assistant Secretary. Fifth edition, revised and enlarged. London: Edward Stanford, 1902. Size $9\frac{1}{2} \times 6$, pp. 60. Price 1s. 6d.

WE welcome this enlarged edition of a thoroughly practical book, which has long since commended itself to the good opinion of all meteorological observers. In its new form an impression of the reverse of the Symons' medal appears on the cover, and by revision and large additions to the text the instructions are brought thoroughly up to date. A table for the correction of barometer readings for differences in the force of gravity has been added; a fresh chart of magnetic variation is supplied, and the newly-adopted value of the factor for reducing the Robinson anemometer readings to true wind velocity finds a place. New tables of comparison for barometer and rainfall in inches and millimetres will be appreciated by many readers. The most important addition, however, is the glossary of meteorological terms. It has been prepared as a step towards carrying out a resolution of the International Meteorological Congress held at Rome in 1879, to the effect that an International Dictionary of Meteorology should be published. The step certainly cannot be said to be precipitate, but it is in the right direction, and better late than never. The glossary contains 236 terms, with brief definitions, which may help to correct the constant tendency of the human mind to imperceptibly change the meaning of words. While most of the terms defined are English, a few foreign expressions—chiefly the names of instruments or of local winds—find a place.

Loss of Life in the United States by Lightning. By ALFRED J. HENRY, Professor of Meteorology. (Weather Bureau Bulletin No. 30). Washington, 1901. Size 9 × 6. Pp. 22. Maps.

AS the result of investigations extending over the eleven years 1890-1900, the author concludes that from 700 to 800 lives are lost each year by lightning stroke in the United States. The fact that many more cases occur in the country than in towns is accounted for partly by the very small area of the latter and partly by the power of steel-framed buildings, electric light and telegraph wires to dissipate an electric charge harmlessly. The damage done by lightning and the frequency of storms is much greater in the eastern than in the western states, and greatest of all in New England and the Ohio valley. The author lays great stress on the importance of persevering for at least an hour in the attempt to restore animation in persons apparently killed by lightning, the method being similar to that applicable to the apparently drowned; the maintenance of artificial respiration, continuous friction of the limbs and the application of hot bottles, &c.

On the Origin and Propagation of Cyclonic Storms. By A. WALKER, F.R.A.S. (From Trans. Met. Soc. Mauritius, 1902.) Size 9 × 6. Pp. 22.

A COMPARISON of various theories as to the origin and propagation of cyclones, showing that Ferrel's theory of the convectional origin of cyclones by local heating cannot apply to those of the tropical ocean, but that the initial rotatory movement may be accounted for by opposing currents of air.

The Recent Sunsets and Sky-glows. By T. F. CLAXTON, F.R.A.S. (From Proc. Met. Soc. Mauritius, 1901.)

GORGEOUS sunsets were visible in Mauritius during June, July and August, 1901, and the author traces them to the dust from the eruption of Keloet in Java. The fact is interesting in its relation to the Krakatoa sunsets of 1883, and to the probable effects of the recent eruptions in the West Indies.

BOOKS RECEIVED.

Journal of the Royal Agricultural Society of England. Vol 62. 1901. Size 9 × 5½. Pp. [vi.] + 404 + cciv. [Contains an article on the Weather during the Agricultural Year 1900–1901.]

Indian Meteorological Memoirs. Published under the direction of John Eliot, M.A., F.R.S., C.I.E. Vol. 12. Pt. 2. Discussion of the results of the hourly observations recorded at 29 stations in India. Calcutta, 1902. Size 14 × 10. Pp. 316.

Jahrbuch des Norwegischen Meteorologischen Instituts für 1901. Herausgegeben von Dr. H. Mohn. Christiania, 1902. Size 13 × 10. Pp. xii. + 122.

Meteorologisch Jaarboek voor 1899 uitgegeven door het Koninklijk Nederlandsch Meteorologisch Instituut. Een en vijftigste Jaargang. [Meteorological Year-book for 1899, published by the Royal Dutch Meteorological Institute; 51st year.] Utrecht, 1902. Size 12½ × 9½. Pp. 252.

Ergebnisse der Meteorologischen Beobachtungen in Potsdam in Jahre, 1899 [Results of the Meteorological Observations in Potsdam for 1899.] Durch . . . Wilhelm von Bezold. Berlin, 1901. Size 13 × 10. Pp. 120.

Results of Observations in Meteorology and Terrestrial Magnetism made at the Melbourne Observatory and other localities in the State of Victoria, Australia. From the 1st of January to the 30th of June, 1901. Under the direction of Pietro Baracchi. Melbourne, 1901. Size 10 × 6. Pp. 48.

Meteorological Observations taken in Hertfordshire in the year 1900, by John Hopkinson, F.L.S., F.G.S., F.R.Met.Soc. [From *Trans.* Hertfordshire Nat.Hist.Soc. Vol. 11. Pt. 3. March, 1902]. Size 8½ × 5½. Pp. 10.

The Farnley Observatory, Southport. Reports and Results of Observations for the year 1901, by Joseph Baxendell, F.R.Met.Soc. Meteorologist to the Southport Corporation. Southport, 1902. Size 9½ × 7½. Pp. 26.

Variation séculaire du magnetisme terrestre, par M. V. Raulin [On the secular variation of terrestrial magnetism]. Extract from Annales de Chimie et de Physique, Mars, 1902. Size 10 × 6½. Pp. 20.

Results of Rain, River and Evaporation Observations made in New South Wales, during 1899, with maps and diagrams. By H. C. Russell, F.R.S. Sydney, 1901. Size 10 × 6½. Pp. lx. + 252. Price 3/6.

METEOROLOGICAL NEWS AND NOTES.

A NEW FORM OF MEASURING GLASS for a 5-in. rain gauge has been submitted to us by Messrs. Casella and Co. It is on the pattern suggested by Mr. Aitken, and figured in our April number, p. 36. While we do not consider that such a refinement is necessary or to be recommended for the ordinary observer, there are some enthusiasts who are prepared to devote an exceptional amount of attention to their readings; and to such as are particular to obtain the precise number of technical "rainy days" in the year, the new glass will no doubt prove acceptable.

SULPHUR RAINS have been reported from several parts of England, and one sample of the yellow dust which gave rise to the belief that sulphur has fallen from the sky has been sent to us. It is not sulphur, however, but an organic substance, almost certainly the pollen of some conifer. "Sulphur rains" are even more frequently recorded than rains of "blood" or "ink," and the cause has been pointed out very frequently. It is extremely unlikely that any volcanic dust resulting from the West Indian eruptions would take the form of so easily oxidisable a substance as sulphur.

HAIL-PREVENTION EXPERIMENTS are now being carried out by the Italian Government in the province of Treviso; and Herr G. Suschnig, of Graz, informs us that the "grelifuge cannon" invented by him and made by his firm, Carl Greinitz Nephews, has been selected for the purpose of bombarding the sky to prevent hail from forming.

LONDON FOGS are to be investigated next winter by the well-known scientific aeronaut the Rev. J. M. Bacon, by means of pilot balloons launched from the summit of various high buildings, in order to test the direction and strength of the upper currents which he has found usually to exist above the stratum of still air in which the fog forms. The work will be carried out in conjunction with the *Daily Express*.

METEOROLOGICAL NONSENSE in the newspapers is only dangerous when it is seriously meant, and we are sorry to think that a correspondent of an evening paper seems to believe the following theory of the cause and consequences of a halo to be illuminating :—

"My opinion is that after a spell of fine or moderate weather the wind which has been northerly commences to travel south by east (dry quarter), and drives in a strong current of damp atmosphere from the south, the wind again going north at night, which counteracts the damp atmosphere, causing white frost. The moon being a round orb reflects a round shadow, or halo, through the damp atmosphere, appearing to the eye to be round the moon. On the second day the wind again traverses the same course, with like results; but on the third day the wind, attracted by the damp atmosphere, backs south by west (wet quarter), as damp attracts damp, hence the rain on third day after halo appeared."

THE FIVE MONTHS' RAINFALL OF 1902.

Aggregate Rainfall for January—May, 1902.

Stations.	Diff. from aver.	Per cent. of aver.	Stations.	Diff. from aver.	Per cent. of aver.	Stations.	Diff. from aver.	Per cent. of aver.
	in.			in.			in.	
London	— ·87	89	Arncliffe	—8·30	64	Aberdeen	+ ·71	106
Tenterden	—2·88	68	Hull	— ·93	89	Cawdor	—1·89	81
Hartley Wintney	—1·41	84	Newcastle	—1·78	79	Strathconan	+1·80	109
Hitchin	—2·02	74	Seathwaite	—13·91	73	Glencarron	+1·89	105
Winslow	—2·10	74	Cardiff	—1·90	86	Dunrobin	— ·77	93
Westley	— ·14	98	Haverfordwest	—2·66	83	Darrynane	—5·32	71
Brundall	+ ·60	107	Aberystwyth	—2·01	87	Waterford	—1·14	92
Blandford	—1·66	86	Llandudno	+1·11	111	Broadford	+1·30	111
Polapit Tamar	—1·30	90	Dumfries	—3·16	81	Carlow	— ·79	94
Stroud	—1·90	80	Lilliesleaf	— ·73	93	Dublin	+ ·19	102
Woolstaston	— ·34	97	Colmonell	— ·51	97	Mullingar	— ·76	94
Worcester	+ ·54	107	Glasgow	—2·38	82	Ballinasloe	+ ·74	106
Boston	+ ·50	107	Islay	— ·63	96	Clifden	—3·86	87
Hesley Hall	+ ·62	109	Mull	— ·76	96	Crossmolina	+ ·90	105
Derby	+ ·89	111	Loch Leven	—4·43	66	Seaforde	+2·09	116
Manchester	...	...	Dundee	—2·89	71	Londonderry	— ·50	96
Wetherby	— ·87	89	Braemar	— ·07	99	Omagh	+3·35	125

May proved a wet month over nearly the whole country, and the rainfall has gone a long way towards making up the serious deficiency referred to last month—indeed, fifteen of the stations quoted above now show an excess.

In Ireland the extreme south-west still shows a considerable deficiency, and two stations in the north show a considerable excess; but on the whole the condition is but little changed during last month.

Over Scotland much less deficiency is to be found, though Fife still appears to have received only two-thirds of the average fall, and it is only in a narrow belt from Aberdeen to opposite the Isle of Skye that the average has been exceeded.

In England the alarming deficiency so general at the end of April had disappeared by the end of May, except in two areas which have little else in common, and lie at opposite extremities of the kingdom —Kent and the Lake District. There the total rainfall so far was still under three-quarters of the average. The whole of central England, from the Ribble and Humber in the north to Worcester and Norwich in the south, has now had about nine per cent. more than its average fall. South of the wet belt, however, the deficiency was still very considerable, varying from 10 to about 30 per cent.

It may be said generally that so far as agriculture is concerned, more rain is not now urgently required; while as regards water-storage the exceptionally low temperature of May and early June has kept down evaporation, and so permitted a larger proportion of the rainfall to be utilized than is to be expected at this season.

MAY, 1902.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1890-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	2·60	+ 1·04	·53	17	22	72·3	31	31·4	14	1	11
II.		Tenterden	1·75	— ·06	·28	17*a*	19	73·0	31	29·5	14	3	14
,,		Hartley Wintney	2·73	+ ·87	·63	17	24	72·0	25	26·0	13*d*	7	11
III.		Hitchin	2·13	+ ·39	·38	23	22	67·0	27*b*	28·0	14	7	...
,,		Winslow (Addington)	1·90	+ ·19	·32	22	17	70·0	24	29·0	14	6	9
IV.		Bury St. Edmunds (Westley)	2·80	+ ·96	·34	16	21	70·8	27	29·8	14	6	...
,,		Norwich (Brundall)	4·39	...	·67	3	25	72·8	31	31·2	14	1	12
V.		Winterborne Steepleton	2·21	...	·51	31	17	70·4	24	27·3	14	3	15
,,		Torquay	1·39	...	·42	31	15	69·9	24	36·2	7	0	0
,,		Polapit Tamar [Launceston]..	2·20	— ·04	·40	17	19	63·0	26	27·2	11	4	8
VI.		Stroud (Upfield)	2·36	+ ·47	·41	22	20	72·0	24	34·0	13	0	...
,,		Church Stretton (Woolstaston)	3·37	+ 1·07	·63	17	22	67·5	24	31·5	7	1	7
,,		Worcester (Diglis Lock)	2·47	+ ·73	·69	30	15	...	...	...	...	...	...
VII.		Boston	3·04	+ 1·54	·53	31	20	70·0	24	30·0	7	6	...
,,		Hesley Hall [Tickhill].....	2·35	+ ·81	·44	31	21	69·0	23	31·0	10	2	...
,,		Derby (Midland Railway).....	2·63	+ ·78	·50	22	20	70·0	31	33·0	7	0	...
VIII.		Manchester (Plymouth Grove)	3·08	+ ·99	·50	22	21	...	...	...	...	...	...
IX.		Wetherby (Ribston Hall) ...	2·41	+ ·74	·57	31	19	...	...	...	...	...	...
,,		Skipton (Arncliffe)	2·70	— ·69	·42	2, 16	24	...	...	...	...	...	...
,,		Hull (Pearson Park).....	2·75	+ ·94	·75	30	24	...	...	...	...	...	...
X.		Newcastle (Town Moor)	2·43	+ ·68	·60	30	21	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	5·79	— 1·55	1·46	27	25	61·8	23	30·3	11	2	...
XI.	WALES.	Cardiff (Ely).....	2·46	+ ·11	·40	16	20	...	...	...	...	...	...
,,		Haverfordwest	1·74	— ·55	·31	31	17	63·7	23	32·5	10	0	6
,,		Aberystwith (Gogerddan) ...	4·40	+ 1·88	1·27	22	17	78·0	31	26·0	6*g*	8	...
,,		Llandudno.....	2·98	+ 1·15	·80	22	24	62·8	24	38·0	11	0	...
XII.	SCOTLAND.	Cargen [Dumfries]	2·46	— ·18	·40	16	13	66·0	23	28·0	10	13	...
XIII.		Edinburgh (Royal Observatory)	2·11	...	·36	31	21	63·1	24	32·9	14	0	8
XIV.		Colmonell	3·00	+ ·54	·44	30	18	64·0	24	28·0	9	6	...
XV.		Tighnabruaich	4·03	...	·54	27	22	61·0	23	30·0	9, 20	9	...
,,		Mull (Quinish).....	2·58	— ·57	·60	27	19	...	...	...	...	...	...
XVI.		Loch Leven Sluices	2·18	— ·11	·37	31	18	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	2·10	+ ·34	·35	16	23	74·8	23	32·0	10*d*	2	...
XVII.		Braemar	3·48	+ 1·29	·48	4	25	68·3	23	23·2	10	6	17
,,		Aberdeen (Cranford)	4·35	+ 2·34	·78	31	25	75·0	23	31·0	1, 4*e*	4	...
,,		Cawdor (Budgate)	2·35	+ ·25	·30	3	27	...	...	...	...	...	...
XVIII		Strathconan [Beauly]	3·81	+ ·49	1·00	29	9	...	...	...	...	...	...
,,		Glencarron Lodge.....	6·13	+ ·88	1·23	27	26	55·0	23	28·6	10	5	...
XIX.		Dunrobin	2·91	+ ·98	·42	18	19	64·0	23	28·5	16	9	...
,,		S. Ronaldshay (Roeberry) ...	1·88	— ·18	·38	27	23	60·0	24	29·0	4, 12	7	...
XX.	IRELAND.	Darrynane Abbey.....	2·42	— ·02	·56	14	22	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	1·88	— ·77	·51	31	17	69·0	23	33·0	6	0	...
,,		Broadford (Hurdlestown) ...	2·36	+ ·13	·65	27	20	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	1·71	— ·59	·22	18	18	...	...	...	...	...	...
,,		Dublin (Fitz William Square)	2·80	+ ·90	·62	30	22	67·9	24	36·0	7	0	0
XXII.		Ballinasloe	2·23	— ·22	·20	14	19	71·0	23	32·0	6*f*	3	...
,,		Clifden (Kylemore)	2·87	— 1·75	·78	15	17	...	...	...	...	...	...
XXIII		Seaforde.....	4·05	+ 1·74	·70	30	19	60·0	21*c*	32·0	9	1	5
,,		Londonderry (Creggan Res.).	4·48	+ 1·84	·64	30	27	...	...	...	...	...	...
,,		Omagh (Edenfel)	4·70	+ 2·16	·85	15	26	62·0	24	32·0	9	1	6

+ Shows that the fall was above the average ; — that it was below it.

a—and 22. *b*—and 31. *c*—and 22, 30. *d*—and 14. *e*—and 6. *f*—and 10, 21. *g*—and 10.

SUPPLEMENTARY TABLE OF RAINFALL, MAY, 1902.

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Uxbridge, Harefield Pk..	1·96	XI.	Castle Malgwyn	2·51
II.	Dorking, Abinger Hall .	2·46	,,	Builth, Abergwesyn Vic.	...
,,	Sheppey, Leysdown	2·31	,,	Rhayader, Nantgwillt ...	3·89
,,	Hailsham	2·15	,,	Lake Vyrnwy	4·49
,,	Crowborough.....	3·09	,,	Ruthin, Plâs Dráw	4·17
,,	Ryde, Beldornie Tower..	1·84	,,	Criccieth, Talarvor	3·74
,,	Emsworth, Redlands ...	2·64	,,	I. of Anglesey, Lligwy..	3·24
,,	Alton, Ashdell	2·71	,,	Douglas, Woodville.....	3·40
,,	Newbury, Welford Park	3·04	XII.	Stoneykirk, Ardwell Ho.	2·91
III.	Oxford, Magdalen Coll..	1·66	,,	Dalry, Old Garroch	3·23
,,	Banbury, Bloxham	1·78	,,	Moniaive, Maxwelton Ho.	2·55
,,	Pitsford, Sedgebrook ...	2·02	,,	Lilliesleaf, Riddell	3·19
,,	Huntingdon, Brampton.	3·01	XIII.	N. Esk Res. [Penicuick]	3·10
,,	Wisbech, Bank House...	3·63	XIV.	Glasgow, Queen's Park..	2·15
IV.	Southend	2·72	XV.	Inveraray, Newtown ...	3·76
,,	Colchester, Lexden	2·52	,,	Ballachulish, Ardsheal...	4·13
,,	Saffron Waldon, Newport	3·34	,,	Islay, Eallabus.....	3·06
,,	Rendlesham Hall	2·52	XVI.	Dollar.....	1·61
,,	Swaffham	3·62	,,	Balquhidder, Stronvar...	3·43
V.	Salisbury, Alderbury ...	2·34	,,	Coupar Angus Station...	1·36
,,	Bishop's Cannings	2·59	,,	Blair Atholl	1·54
,,	Blandford, Whatcombe .	2·36	,,	Montrose, Sunnyside ...	2·20
,,	Ashburton, Druid House	2·03	XVII.	Keith H.R.S.....	4·12
,,	Okehampton, Oaklands.	2·52	XVIII.	Fearn, Lower Pitkerrie..	2·42
,,	Hartland Abbey	1·84	,,	S. Uist, Askernish	2·28
,,	Lynmouth, Rock House	2·49	,,	Invergarry.....	3·21
,,	Probus, Lamellyn	1·99	,,	Aviemore, Alvie Manse.	3·37
,,	Wellington, The Avenue	2·09	,,	Loch Ness, Drumnadrochit	3·68
,,	North Cadbury Rectory	2·38	XIX.	Invershin	2·79
VI.	Clifton, Pembroke Road	2·02	,,	Bettyhill	1·59
,,	Ross, The Graig	1·81	,,	Watten H.R.S.....	1·61
,,	Shifnal, Hatton Grange	...	XX.	Dunmanway, Coolkelure	2·45
,,	Wem, Clive Vicarage ...	2·83	,,	Cork, Wellesley Terrace	...
,,	Cheadle, The Heath Ho.	2·51	,,	Killarney, District Asyl.	3·41
,,	Coventry, Priory Row ..	2·38	,,	Caher, Duneske	...
VII.	Market Overton	3·06	,,	Ballingarry, Hazelfort...	2·69
,,	Grantham, Stainby	2·57	,,	Miltown Malbay	2·02
,,	Horncastle, Bucknall ...	2·13	XXI.	Gorey, Courtown House	2·23
,,	Worksop, Hodsck Priory	2·72	,,	Moynalty, Westland ...	2·94
VIII.	Neston, Hinderton	3·75	,,	Athlone, Twyford	2·42
,,	Southport, Hesketh Park	3·39	,,	Mullingar, Belvedere ...	2·83
,,	Chatburn, Middlewood.	2·83	XXII.	Woodlawn	2·27
,,	Duddon Val., Seathwaite Vic.	4·21	,,	Westport, Murrisk Abbey	2·17
IX.	Baldersby	2·32	,,	Crossmolina, Enniscoe ..	4·02
,,	Scalby, Silverdale	2·62	,,	Collooney, Markree Obs.	3·13
,,	Ingleby Greenhow Vic..	2·68	XXIII.	Enniskillen, Model Sch.	...
,,	Middleton, Mickleton ...	2·06	,,	Warrenpoint.....	2·85
X.	Beltingham	2·19	,,	Banbridge, Milltown ...	3·46
,,	Bamburgh	2·49	,,	Belfast, Springfield	3·71
,,	Keswick, The Bank.....	2·53	,,	Bushmills, Dundarave..	3·01
XI.	Llanfrechfa Grange	1·81	,,	Stewartstown	4·55
,,	Treherbert, Tyn-y-waun	3·99	,,	Killybegs	4·54
,,	Llandovery	3·65	,,	Horn Head	4·16

METEOROLOGICAL NOTES ON MAY, 1902.

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.

ENGLAND.

LONDON, CAMDEN SQUARE.—Cold and unsettled, the only fine days being between the 24th and 29th. T, L and H were fairly frequent during the first half, and from 17th to 23rd an almost perpetual drizzle continued. Mean temp. 50°·3, or 3°·7 below the average.

ABINGER HALL.—Showery. The first half was very cold; 10° of frost on the morning of the 13th did great damage to all fruit crops. TS of short duration on 18th. The L struck a fine oak but did not do much damage.

TENTERDEN.—Showery, without much R. The coldest May for many years; no night so cold as the 14th since May 3rd, 1877. Potatoes, black currants and cherries were badly injured, and the first leaf of oak trees was quite cut off in valleys and colder places. Duration of sunshine 163 hours.

CROWBOROUGH.—Up to the 20th very cold and unsettled, with R every day from 2nd to 19th. Pleasant and warm after 20th. During the first 20 days all growth of foliage was retarded, and in the valleys damage was done by the cold winds and frost, but the warmth of the latter part of the month made up in some measure, and growth of vegetation was rapid. H storms on six days, and TSS on 3rd and 30th. S fell at 1.45 p.m. on 6th, in very large flakes.

HARTLEY WINTNEY.—A peculiarly cold month, with a persistent northerly wind until 27th, and slight showers of H and R daily. TSS, with H, on 3rd, 7th, 16th and 17th. Temp. a little higher during the last few days, but still showery. Ozone on every day, with a mean of 4·1.

PITSFORD, SEDGEBROOK.—The greater part of the month was rough and cold. Mean temp. 48°·4. R ·03 in. below the average. T on 3rd and 17th.

COLCHESTER, LEXDEN.—Remarkably cold and unsettled till the 23rd, after which it was very mild. Few bright days. S in the neighbourhood on 6th and 8th. Large H on 18th. Slight TS on 3rd, and sharp on 31st.

BURY ST. EDMUNDS, WESTLEY.—Cold and winterly till 21st, with S on 5th, 6th, 7th and 14th. Mild and very growing from 21st. T on four days.

NORWICH, BRUNDALL.—The coldest May since 1887, and the wettest since 1878. R fell daily on the first 22 days, and S on 6th, 12th and 13th. Mean temp. of the first 22 days 44°·5, of the month 48°·2. TSS on five days.

TORQUAY, CARY GREEN.—R ·59 in. below the average, and for the first five months of the year 4·38 in. below the average. Mean temp. 51°·6, or 1°·5 below the average. Duration of sunshine 235·2 hours, or 4·8 hours above the average; one sunless day. Mean amount of ozone 5·4; max. 7·5 on 21st, with W.S.W. wind, and min. 3·0 on 24th, with N.W. wind.

LYNMOUTH, ROCK HOUSE.—Very cold up to 22nd. Although R fell on a greater number of days than in any of the preceding four Mays, the total was 1·75 in. lower than the average of that period, whilst that of the first five months was 4·41 in. below the average. T, L and H on 6th; heavy H on 17th.

NORTH CADBURY RECTORY.—Very cold, cloudy and showery, yet not wet. The weather was undisguisedly miserable till the 23rd, then four beautiful days, and four very damp and showery days till the end.

CLIFTON, PEMBROKE ROAD.—Cold and ungenial, with a prevalence of N. winds, but a great and sudden rise of temp. occurred on 23rd. Though R was ·30 in. below the average, the number of rainy days was five above it.

ROSS, THE GRAIG.—The coldest, except 1879. Max. temp. about 6° below the average, and the min. 4°·5 below, from 1st to 21st. No max. reached 60° till 23rd; on 24th, however, a max. of 74° caused a burst of vegetation.

HULL, PEARSON PARK.—Very cold and cheerless weather. N.N.E. and W. winds prevailed, with frequent showers. T on 17th. H on 9th and 18th.

WALES AND THE ISLANDS.

HAVERFORDWEST.—One of the most ungenial in a record of 53 years, but notably exceeded in severity by the Mays of 1876, 1877 and 1879. Remarkable for the persistency of cold N.E. winds, uniformly low temp., absence of R, and dry harsh air. Duration of sunshine 164·3 hours. Vegetation backward.

DOUGLAS, WOODVILLE.—Cold, wet and windy, and in every way abnormal. From April 24th to May 21st, N.W. winds, harsh, cold, always strong, and often reaching the force of a gale. Three mild and springlike days from 22nd to 24th alone redeemed it, but the spring was very backward. A S.W. gale on 27th wrought cruel havoc among foliage and blossom, followed by a furious N.E. gale on 30th, lasting 50 hours, which completed the destruction.

SCOTLAND.

LILLIESLEAF, RIDDELL.—Exceptionally cold, with much S and sleet, and a succession of half-gales. Ground frost occurred nightly, with few exceptions. R 1·19 in. above the average. The effect on the blossom, &c., was, however, trifling, probably owing to the exceptional dryness.

INVERARAY, NEWTOWN.—Very cold. The first three weeks were fine and dry, though cold, with N. wind. It was no warmer when the R came.

ISLAY, EALLABUS.—Very cold, and vegetation from 10 to 14 days late.

COUPAR ANGUS.—R like that of the four preceding months, about ·50 in. short of the average, but number of rainy days excessive. Mean temp. 46°·3, or about 2°·0 below the average. During the first three weeks frost occurred almost every morning, and the cold of the month was unequalled in 20 years.

DRUMNADROCHIT.—Uncommonly miserable and inclement. Not one summer-like day. A neighbouring hill was covered with S until about the 20th. Vegetation was from three weeks to a month behind. H on three days.

WATTEN, H.R.S.—Cloudy and cold. Blighting N. and E. winds, with frosts at night. Vegetation far behind the average.

S. RONALDSHAY, ROEBERRY.—Cold and changeable. Mean temp. 42°·3, being 5°·0 below the average, and the lowest in 12 years.

IRELAND.

DUNMANWAY, COOLKELURE.—Remarkable for very low temp. R light, and plant growth restricted. Wind principally between N.N.W. and N.N.E.

MILTOWN MALBAY.—The coldest May in memory. R scarcely appreciable, save on four or five days from 13th to 17th, and then mostly in H showers, but 26 days of drizzle and fog. A frosty air prevailed nearly all the time, doing damage to fruit and early potatoes.

DUBLIN, FITZWILLIAM SQUARE.—The converse of May, 1901, for it proved dull, showery and unseasonably cold. Duration of sunshine only 178·8 hours. N. and N.W. winds showed a remarkable predominance, and so cold a May has not been experienced since 1869. Mean temp. 49°·9, or 2°·1 below the average. High winds on 7 days. H fell on 6 days; T and L on 17th.

WESTPORT, MURRISK ABBEY.—Temp. very variable. Sunless days and heavy leaden clouds. Vegetation backward, with little promise of a fruit crop. H showers, night frosts and a constant N. wind caused much damage.

OMAGH, EDENFEL.—There is no record here (37 years) of such a May. The disastrous year of 1879 bears the closest resemblance, each having being about 3° under the average in temp.; but R for May, 1879, was 3·35 in. on 18 days, compared with 4·70 in. on 26 days for May, 1902, an amount not before approached and more than twice the average of 30 years. There has not been one fine or pleasant day. On every day the winds were strong, and on 25 from polar or easterly points, but all were inclement, ungenial and wet.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, DECEMBER, 1901.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. 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	55·7	7	23·3	20	44·3	33·9	35·9	87	64·1	24·1	3·07	17	6·4
Malta	67·7	16	40·3	1	62·9	51·2	49·4	77	119·8	36·9	1·94	9	4·0
Lagos, W. Africa	96·1	8	70·0	14	89·1	80·0	74·9	76	139·0	69·0	·00	0	7·3
Cape Town	88·5	19	50·4	30	77·6	58·3	55·4	65	...	...	·31	3	3·2
Mauritius	87·1	22*a*	67·2	7	84·3	71·6	69·1	76	150·2	62·0	6·10	20	6·3
Calcutta	81·7	1	51·2	24	77·5	55·9	54·5	66	133·0	44·0	·00	0	2·4
Bombay	90 3	1	68·1	15	86·5	71·9	65·6	65	137·3	56·2	·00	0	2·7
Colombo, Ceylon	90·6	12	69·3	14	88·4	73·4	70·1	76	154·8	65·5	3·40	8	3·3
Melbourne	103·8	28	43·8	25	76·4	54·3	50·3	61	158·0	34·9	·68	5	6·0
Adelaide	108·3	27	48·6	23	87·7	61·1	49·9	43	163·0	42·4	·98	4	3·6
Sydney	104·0	17	54·7	8	77·5	62·2	55·4	59	157·1	45·8	·52	7	5·1
Wellington	75·5	28	44·0	17	66·9	52·1	47·7	67	134·0	34·5	3·94	18	5·9
Auckland	75·5	7	51·0	18	67·7	55·7	49·8	65	139·0	48·0	3·57	14	5·0
Jamaica, Halfway Tree	...	...	...	...	...	...	...	...	...	...	2·07	6	...
Trinidad	90·0	19	69·0	5	85·9	71·7	72·5	83	166·0	61·0	4·33	16	...
Grenada	87·0	22	70·0	20	82·0	72·9	72·3	79	150·0	...	13·17	27	4·5
Toronto	56·2	14	0·3	21	33·2	20·6	24·3	82	58·0	—5·2	3·61	15	7·3
Fredericton, N.B.	54·7	14	—11·5	7	32·8	12·6	13·5	65	...	...	6·42	13	...
Winnipeg, Manitoba	37·5	22	—32·7	13	18·3	0·4	..	...	...	...	·43	6	6·3
Victoria, B.C.	53·2	22	29·5	12	46·1	39·9	...	...	...	...	3·46	20	7·5
Dawson, Yukon	20·6	16	—50·0	31	—1·7	—14·1	...	...	...	...	1·85	6	5·0

a—and 29.

REMARKS.

MALTA.—Mean temp. of air 56°·9, or 0°·6 above the average. Mean hourly velocity of wind 12·0 miles, or 0·9 above the average. Mean temp. of sea 65°·5. TSS on 15th. L on 6th and 22nd. H on 15th and 27th. J. F. DOBSON

LAGOS.—The Harmattan season commenced on the 4th, and the peculiar haziness of the atmosphere, due to the presence of Harmattan dust, continued more or less throughout the month. ARTHUR CLEMINSON.

Mauritius.—Mean temp. of air 0°·8 below, dew point 1°·1 below, and rainfall 1·35 in. above, their respective averages. Mean hourly velocity of wind 11·6 miles, or 0·7 miles above average; extremes 30·1 on 4th, and 2·0 on 21st; prevailing direction E. by N. to E.S.E. L on 11th. T and L on 12th and 31st. T. F. CLAXTON.

COLOMBO, CEYLON.—Mean temp. of air 79°·8 or 0°·7 above, dew point 0°·9 below, and R 2·95 in. below, their respective averages. Mean hourly velocity of wind 9·8 miles; prevailing direction N.W., N. and N.E. TSS occurred on the 18th and 19th. W. C. S. INGLES.

Adelaide.—A warm month. Mean temp. 74°·4, or 3°·0 above average, and mean max. 4°·0 in excess. Only coastal rains were registered, Adelaide having ·16 in. in excess of 44 years' average. C. TODD, F.R.S.

Sydney.—Mean temp. of air equal to average, R 1·98 in. below, humidity 9·5 below, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—Mean temp. 0°·8 above, and R ·55 in. below, their respective averages. A showery month, prevailing winds N.W., rather strong gales on 15th and 18th. T on 16th and 18th. Earthquakes on 1st, 2nd and 29th. Aurora on 28th, coinciding with a sudden dip in barograph curve. R. B. GORE.

Auckland.—An unusually cold and showery December. Mean temp. quite one degree under the average, and R 1·25 in. above the average. T. F. CHEESEMAN.