

Symons's Meteorological Magazine.

No. 484.

MAY, 1906.

VOL. XLI.

THE RAINFALL OF APRIL AND OF THE FIRST FOUR MONTHS OF 1906.

APRIL has been an unusually dry month over the greater part of the British Isles, and a large part of southern England experienced an absolute drought, continued from March, throughout the first fortnight. The variations of rainfall over the country for the month just past, and for the four completed months of 1906 in the aggregate, are amply set forth in the Table on pp. 76-77, and only a few words are required to direct attention to the facts there recorded. As frequently happens in the distribution of rainfall, the north-western part of our islands was subjected to a set of conditions sharply in contrast with those experienced in the south-east. Everywhere to the north of a line drawn from Sligo Bay to a point in the middle of the south shore of the Moray Firth the rainfall of April was above the average. The general rainfall for the month in this wet area had an excess, as nearly as we can estimate it, of 28 per cent., not making it a very wet month it is true, but at least keeping April in harmony with the three months which went before in that part of the country. Over England and the south-east of Scotland and Ireland, where the deficiency of rain declared itself, the general rainfall showed a deficiency of about 43 per cent. There was a large part of England and the south of Scotland over which rather less than half the average amount of rain fell, the driest area extending from Dundee to Chichester and Torquay, on the whole filling the eastern and central parts of the island, although all along the east coast itself there was a slightly higher fall, such as might be expected from the prevalence of wind with an easterly component.

Turning from the relation of rainfall to the average to the actual amounts which fell, we find a remarkable number of returns recording less than one inch for the month. Indeed, from the shores of the North Sea to the borders of Wales, falls of one inch or more only occurred on some isolated patches of high land or in the continuation of the Pennine Chain, and falls exceeding two inches were recorded in only half a dozen isolated patches in what are normally the wettest parts of England and Wales. Fairly heavy falls, however, took place in the north-west of Scotland.

While April has proved a dry month in most places, the fact remains that so far as 1906 has gone it still deserves to be accounted a wet year. The distribution of rainfall has varied each month, no less than the amount. A triangular strip which has missed most of the heavy falls, lies with its apex in the north-east of Ireland and widening across Scotland and England until its base borders the North Sea from Aberdeen to Hull; over this area the average has not been reached, the mean deficiency being 17 per cent. The extreme south of Ireland also seems to have received a little less than the average rainfall; but all other parts of the British Isles show a considerable excess despite the dryness of the last month. The excess is greater than 25 per cent., and rises in places to 43 per cent., in five areas, *viz.*, the north-west of Ireland, the west and north of Scotland, Wales, the south-west of England, and Norfolk and Suffolk. From the general arrangement of the areas of excessive and deficient rainfall, the tendency towards the formation of parallel belts running from north-east to south-west, to which attention was called in our January number when dealing with the rainfall of 1905, seems to continue.

ABSOLUTE DROUGHT IN LONDON, MARCH-APRIL, 1906.

THE following letter appeared in *The Times* of April 30th :—

SIR,—The fall of nearly a quarter of an inch of rain in the early hours of this morning has broken a period of drought which, if neither very prolonged nor very serious, is by no means usual.

What constitutes a drought in popular language I do not know; but the indefiniteness of the expression and the exaggeration of the facts which resulted led, many years ago, to the formulation of two definitions, the usefulness of which is generally acknowledged. An absolute drought is taken as a period of more than 14 consecutive days on which no rain is recorded (the smallest figure recorded in any case being $\cdot 01$ in.), and a partial drought is taken as a period of more than 28 consecutive days, the average rainfall of which does not exceed $\cdot 01$ in. per day. In the 48 complete years' record at this station there have been 53 absolute and 47 partial droughts, so that both occur on the average about once a year.

Absolute droughts occur most often in April and June, partial droughts are most frequent in May and July. On the occasion just passed the absolute drought lasted for 17 days, not a drop of rain having fallen between March 27 and April 12, both inclusive. On Good Friday the skirts of one of the thunder-showers which swept over the country north of London touched this station, and in six minutes just $\cdot 01$ in. of rain was recorded. But for this technical break the absolute drought would have lasted for 23 days, as it did in most parts of London in fact, and over the whole in effect. The

partial drought extended to 34 days from March 24 to April 26, both inclusive, the total rainfall in that period amounting to '34 in.

The uncertainty of weather makes it a safe rule to call no month dry until it is ended; but it is at least probable that April will be much drier than March, which was much drier than February, which in turn was much drier than January. Put roughly to the nearest fifth of an inch, the rainfalls of the first three months of 1906 in London have been respectively 4 in., 2 in., 1 in.; and it is not yet impossible that the fourth month may continue this interesting arithmetical series and be expressible as half an inch.

Your obedient servant,

HUGH ROBERT MILL.

62, Camden Square, London, N.W., April 28.

[The words "arithmetical series" in the last sentence should have been "numerical series." Misled by the adjective, a critic, zealous of the exactitude of mathematical terminology, took the trouble to inform the public that the series quoted was not an "arithmetical progression" but a "geometrical progression," which is true; though in the letter it was not called a "progression."—ED., *S.M.M.*]

Correspondence.

To the Editor of Symons's Meteorological Magazine.

HEAVY FOUR MONTHS' RAINFALL IN CHESHIRE AND NORTHUMBERLAND.

I WAS interested in the recent letter in *The Times*, describing the arithmetical sequence of your London Rainfall. Ours in Cheshire has been very different. In 30 years we have never had such a record of heavy falls for the first third of a year:—

January	3·93 in.
February	3·28 in.
March	2·57 in.
April	2·29 in.

Four months 12·07 in.

Even 1882—which gave us 41·95 in. on the whole year—only gave 9·56 in. to 30th April; and till now no year has surpassed 1903 with its 10·19 in. for the first four months.

EDWARD PEARSON.

Parkside, Wilmslow, May 1st, 1906.

HAVING seen the letter in yesterday's *Times*, I may add that our experiences do not entirely agree with yours in London and many other places—*e.g.* :—

	Rainfall.		Heaviest fall.		Date.		No. of wet days.
January ...	1·88	.....	·58	.....	28th	.....	18
February...	1·15	.....	·28	.....	25th	.....	13
March	1·62	.....	·42	.....	11th	.....	14
April	1·55	.....	·41	.....	16th	.....	12

On Sunday last (29th) we had ·38 in., mostly snow, falling between 10·45 and 3 p.m. or thereabouts, whilst on the Saturday before we had nothing. In Newcastle, I hear, it was wet on Saturday and not on Sunday. The Cheviots were all white at midday on Sunday, and the snow was lying here on the low ground as well, but it worked off the lower ground before dusk; some snow had actually accumulated in the gauge and took some little time to melt. We had no absolute or partial drought, the nearest approach being between March 25th and April 16th, 21 days, both inclusive, when we had only one small shower, ·04 in. on the 7th April; we also had ·32 in. mingled snow and rain on April 25th. I do not think I ever before experienced such a day as Sunday last so late in the season as the end of April, nor such a bitter April.

B. P. SELBY.

Pawston, Mindrum, Northumberland, May 1st, 1906.

APRIL WEATHER.

THE weather of April, 1906, in this district has been remarkable for some extraordinary vagaries.

The first 17 days of the month were rainless, with the exception of the 5th, when rain fell continuously from 6 p.m. to midnight, depositing ·25 in. in the gauge. The remainder of the precipitation for the month, which chiefly occurred in the last week, amounted to 1·17 in., and brought the total to 1·42 in.

The 30th was remarkable for a hailstorm, lasting from noon to 0·30 p.m., which deposited ·38 in. of rainfall in the gauge. This amount probably failed to represent the total precipitation, as the hail being about the size of peas and very hard, no doubt to some extent bounced out of the funnel of the gauge. The hail lay on the ground to a depth of over an inch. The temperature fell in the half hour whilst the storm was in progress to the extent of 12°. Just before the storm, the dry bulb stood at 55° and the wet bulb at 50°. Directly it was over, the thermometers were again read and they were 43° and 41° respectively. The barometer, which had been quite steady for two days previously, gave the usual sudden upward movement generally noticed before thunderstorms, but no electrical phenomena were observed here.

Some low temperatures were observed in the latter part of April, which must surely be unusual for the south coast.

Shade Minima.—April.

15th	31°	|	23rd	37°
16th	32°	|	24th	32°
17th	31°	|	26th	33°
19th ..	35°	|	27th	32°
20th	33°	|	29th	32°

It is not to any extremely low reading that I would call attention, but to the continued persistent cold.

D. W. HORNER.

Worthing, May 1st, 1906.

THE THUNDERSTORM OF MAY 8th.

YOU will find the area of the big rain of Tuesday evening, May 8th, a restricted one. It is the largest single fall we have had here since September, 1880 ; July, 1890 ; October, 1893.

The thunderstorm (which lasted six hours, 5.30 to 11.30) was a Thames Valley one, probably extending from Richmond to Reading.

At Upton, from west to east, the readings run :—

	in.
Mr. Warren.....	1·91
Mr. Bentley.....	1·96 westerly gauge.
do.	2·03 easterly gauge.

At Windsor rain was very heavy. Burnham and Farnham (say 4 miles north of this) report none. Bray reported rain. Maidenhead, I think, none or not until late.

RICHARD BENTLEY.

Upton, Slough, Bucks, May 10th, 1906.

AS the amount of rain which fell during Tuesday's thunderstorm seems to have been very variable round about London, I send you the amount that fell here—1·08 in. All of this fell between 6.35 p.m. and 7.7 p.m., a period of 32 minutes. The hailstones were large, but there were not many of them, so that I do not think the gauge lost much by out-splashing.

ERIC L. HAWKE.

10, Frognal, Hampstead, N. W., May 10th, 1906.

[The rain recorded at Mill Hill was ·09 in., that at Camden Square only ·01 in.—ED. S.M.M.]

SNOW ON THE HILL-SIDES.

I HAVE been much interested in the correspondence on this subject. May I be allowed to say a few words on a similar matter ? It is my

fortune to reside on the southern borders of the English Lake District. The hills of this immediate neighbourhood are spurs of the great mountain masses lying further north; other spurs run down towards the sea in more or less parallel ridges, somewhat irregular in height, but all trending generally in a direction from N.N.E. to S.S.W., with valleys of varying width lying between them. Our geological formation is all of the Silurian period, being of slaty material. Some of the hills are of volcanic origin, others due to aqueous agency. For some years I resided on the westerly slope of one of these ridges, opposite to the easterly slope of another ridge, with a valley a mile or more wide intervening. During snowy periods I noted that if the fall was not great—say an inch or two was lying in the morning—by noon or soon after, if the day were sunny scarce a trace of the snow would be left on the slope opposite, while on our side very little difference in the depth of the snow could be seen, and it would often be a day or two longer before it was gone. The explanation being, as it appeared to me, simply that the easterly slope receiving all the morning sunshine and with the sun's rays acting perpendicularly, or nearly so, on it—while the westerly slope receiving scarcely any sunshine at all and that only acting at a very low angle—the snow was bound to disappear more rapidly on one side than on the other, the afternoon sun being not of much account in the winter time. If also we remember that for the same reason the soil of the easterly slope will in all probability be much warmer than that of the westerly slope, we can scarcely think the matter could be otherwise. Another little fact in this connection may also be noted—one, perhaps, that is sometimes lost sight of—viz., the *distribution* of the snowfall on these hill-sides. This varies considerably with the direction of the wind, for if the wind be blowing rather strongly and steadily in one direction during the snow-storm, the hill slopes facing the wind will have a much heavier deposit of snow than will be found on their lee sides. A specially striking example of this occurred during the present month. On the 17th inst. a stormy wind was blowing from the W.S.W. with some rather heavy showers of rain in this immediate locality but heavy snow-storms up among the hills. The following morning I set off with a friend for a walking tour among these hills and valleys. On starting we had immediately in front of us the S.W. side of Coniston Old Man and his fellows and these were all covered with a sheet of snow, but as we proceeded on our way and got to the southern and south-eastern side we found the snow gradually thinned away, till further up on the E.N.E. sides there was absolutely no snow at all on them. We stood on some high ground to the N. of the little town of Hawkeshead and a grand sight presented itself. The whole range of mountains to the N.E.—High Street, Ill Bell, Kidsty Pike and the rest—were absolutely white with snow, but turning round and looking in the opposite direction no snow at all was to be seen, just the dark purple rocks and the masses of

golden brown bracken lying amongst them ; whilst looking due N. or somewhat to the N.W. one side of the mountains could be seen covered with snow, the other side with none at all.

C. P. CHAMBERS.

April 28th, 1906.

THE CYCLONIC STUDY OF RAINFALL.

PERMIT me to thank you for the abstract you give in *Symons's Meteorological Magazine* of my paper on the distribution of precipitation in some American cyclones. Thinking that you might wish to know about those points which I neglected mentioning, I take the liberty of saying that the limit of precipitation I used was that of perceptibility, and that I used all cyclones, large and small, unless there was doubt as to whether the stations averaged were to be referred as being within their gradient or it was clear they were not to be so referred. For example : if there was one cyclone to the west of a station 800 miles from this, and another east 900 miles distant, then the data were averaged in that cyclone of these two, inside of which the station lay. If the "high" separating these two "lows" lay to the west of the station, then the east cyclone was used—or vice versa.

The crescent-shaped distribution of precipitation in the western cyclones I averaged, suggest that your opinion may be right as to the proper way of orienting the diagram with regard to the path of the cyclones. Should these crescents change to a more or less circular area, if the diagram were oriented in that way, it would be pretty strong evidence that yours would be the proper way. I wish I could try this, but I can hardly hope to take the necessary time for it.

I hope others will see the many applications the method is adapted to in obtaining a more exact knowledge of the cyclone. Perhaps the distribution of the rainfall may yet be such as our text-books would have it : the maximum being to the south-east. If so, then there must be a diurnal rotation of the area of greatest precipitation, for it is certainly not in that quarter for the morning hour.

J. A. UDDEN.

Rock Island, Ills., April 9th, 1906.

THE GREEN FLASH.

It should be noted that the green or any other coloured ray is not always seen even when the sun sets at sea on a perfectly clear horizon.

D. WILSON-BARKER.

*H.M.S. Worcester, off Greenhithe, Kent,
May 5th, 1906.*

THE GREEN FLASH IN FICTION.

DR. RAMBAUT'S able articles on the Green Flash on the Horizon must have reminded many readers of the periodical recurrence of interest in this curiously fascinating phenomenon. It is by no means easily seen, for the opportunity of a clear evening and an unobstructed sea-horizon occurs but rarely to the average man. We have seen it only a dozen times in twenty years, though these years afforded many thousand miles of ocean travel. We saw it twice in the Baltic, once in the North Atlantic, once off the west coast of Scotland, twice in the Bay of Biscay, and four or five times in the Indian Ocean, on one occasion on a land horizon rising a few minutes of arc above the sea. The gradual change from a yellowish to a bluish green was apparent on most of these occasions.

In the early eighties M. Jules Verne made the phenomenon the text of a novel, "*Le Rayon Vert*," (The Green Ray), and it seems not without interest to recall this instance, solitary, so far as we know, of a meteorological phenomenon inspiring a work of creative fancy. The book is peculiar in more ways than one. It partakes of the nature of a guide-book to a tour on the west coast of Scotland and abounds in delightful touches, showing how difficult it is for a stranger to appreciate the full value of local colour.

The story is simple. Two old gentlemen, who in many ways are charmingly simple also, live at Helensburgh with their niece, Helena Campbell, to whom they are devoted, and they have decided that it would be a delightful arrangement for Helena to marry a young scientific man rejoicing in the typical Scottish name of Aristobulus Ursiclos. They broach the subject to the young lady, who laughingly declares that she will make up her mind to marry no one until she has seen—the Green Ray. The uncles had never heard of such a thing, but the niece (at 5 p.m. in Helensburgh, in 1881,) produces the *Morning Post* of that day with this article, which in default of turning up the paper in question we re-translate from the French:—

"Have you ever observed the sun when it is setting beneath a sea-horizon? Yes! without doubt. Have you followed it to the moment when, the upper part of the disk just touching the line of water, it is in the act of disappearing? It is very probable that you have. But have you noticed the phenomenon which appears at the precise moment when the radiant orb shoots forth its last ray if the sky is free from haze and perfect in its purity? Perhaps not. Ah! well, the first time you find the occasion to make this observation—and it presents itself but rarely—it will not be a red ray that will strike your eye, as one might expect; it will be a "green" ray, but a marvellous green, a green that no painter could obtain on his palette, a green of which even Nature itself has never reproduced the shade, neither in the varied tints of vegetation nor in the colours of the most limpid seas! If there is a green in Paradise it can only be that green, which is, without doubt, the very green of Hope!"

The niece, however, did not say, though apparently she knew, that an old Highland legend affirmed that this ray conferred on whoever saw it the magic power of making it impossible to deceive oneself in matters of sentiment, by destroying all illusions and lies, and of seeing clearly into one's own heart and into the hearts of others. If any members of the Society for Psychical Research accompanied the British Association on its African cruise, they might perhaps supplement the physical treatise by developing this attractive thesis. The uncles merely responded, "Let us go and see the green ray"; and next morning they left Helensburgh and betook themselves *via* Crinan to Oban, a route which the uncles did not like. "Au diable ce Rayon-Vert !" said one, "And those who invented it," replied the other; but they went. At Crinan they heard Gaelic spoken, "a language often incomprehensible even to the English." That night the sun set in a cloudless sky, but the steamer at the moment was performing heroic evolutions in the Gulf of Corryvreckan rescuing a small boat which had got caught in the whirlpool, and all eyes were turned on the handsome young man who was rescued at the moment the sun went down. It was Olivier Sinclair, who prevented the sight from being seen: an artist, a poet, a traveller whose sketches of foreign travel were accepted even by the famous *Edinburgh Review*. At Oban Aristobulus Ursiclos joined the party. He brought the melancholy news that "the depression of Swinemunde was moving northwards and deepening considerably. Its centre was at Stockholm to-day and there the barometer had fallen one inch, or, to employ the decimal system used by men of science, twenty-five millimeters." Consequently, the fine weather was not to last. Moreover, at Oban there was no sea-horizon, and excursions had to be made each evening to a neighbouring island to see the sun set. After a fortnight's waiting, an evening arrived when the sun had half set on an absolutely clear horizon but a sailing-boat glided up and blotted out the critical moment of total immersion. Aristobulus Ursiclos was on board.

The party proceeded to Iona, and in waiting for a clear sky Ursiclos announced his intention of writing a memoir on the green ray, which he held derived its colour either from the sea-water or from the contrast with the red of the sun. Olivier Sinclair recommended him also to prepare memoirs on two other important oceanographical and meteorological problems, to wit, "On the influence of the tails of fishes on the waves of the sea," and "On the influence of musical instruments on the formation of storms." Again a clear evening came, and as the last little segment of the solar disk was on the point of vanishing, bang went two shots and a cloud of frightened sea-birds rose like a veil blotting out the view. Aristobulus Ursiclos had fired the shots.

This was too much even for the uncles, who instantly hired a charming yawl and all the good characters set sail for Staffa, marooning the mephistophelian Aristobulus on Iona. At length,

after amazing adventures in Fingal's Cave during a storm, another cloudless evening was about to pass into night; the uncles, the niece, Olivier Sinclair, Partridge, the gillie, and Betsy, the maid, were all assembled. The sun dipped. "The green ray! the green ray!" cried the uncles, Partridge and Betsy in one voice but Helena had only seen the black ray from Olivier's eyes, and Olivier had only seen the blue ray from Helena's, and they all lived happy ever after! Olivier ultimately painted a magnificent picture of the green ray he had never seen.

Such is the gist of 270 very entertaining pages.

Although it is not fiction, we may quote here a question set recently in the examination in Astronomy for the Science degree of the University of which Aristobulus Ursiclos is alleged to have been a distinguished graduate. It runs:—

Being given that the last red ray from the sun disappears when its centre is at a distance a below the horizon, but that if the horizon be clear the blue rays may remain visible until it has sunk to a distance $a+da$, where da is a small quantity whose square may be neglected, show that in latitude $\frac{\pi}{2}-\omega-a-da$ (where ω is the obliquity of the ecliptic) on the night of the summer solstice the blue rays may persist after the red have disappeared for a time h given by the expression

$$2 \sin^2 \frac{h}{2} = \frac{\cos a \, da}{\cos \omega \sin (\omega + a)}$$

DR. W. N. SHAW ON ATMOSPHERIC CIRCULATION.

ON May 1st, at the University of London, Dr. W. N. Shaw delivered the first of his series of four lectures on Meteorology, dealing mainly with the broader features of the general circulation of the atmosphere. By way of introduction he pointed out that a period of stagnation seemed to have followed the rapid development of the cyclonic theory as the basis of weather forecasting, and that the processes now in use differed little from those of a quarter of a century ago. In other directions, however, the progress of meteorological study has been great. The investigator of to-day has not as formerly to work on a more or less conjectural or speculative basis, since during the last 50 years a wealth of observational matter has been gradually and patiently accumulated, and now lies ready to the hand of the student. It is, therefore, possible and most desirable that the subject should be attacked afresh from the wider point of view.

Turning to the immediate subject of the lecture, it was remarked that the circulation of the atmosphere must be looked upon as a single, though complicated, process taking place over the globe as a whole. Discussion confined to any portion of the Earth, as for instance the British Isles, would, therefore, be inadequate.

Owing to the thinness of the atmospheric layer in comparison with the area over which it is spread, the intensity of the horizontal movement is far greater than that of the vertical, and this horizontal action is brought about by a variety of influences. Primarily, disturbances of thermal equilibrium cause disturbances of dynamic equilibrium, and thus the movements of the atmosphere may be looked upon as due to the variable distribution of heat. Such disturbing influences are the movements of the sun, the irregular distribution of land and water, the heat liberated by the condensation of water vapour, actual alterations in the heat of the sun itself, and above all the rotation of the Earth. There are, however, recognisable underlying regularities which are not entirely obscured.

The phenomenon of the diurnal variation of the barometer was excellently illustrated by slides showing a series of barograms produced on board H.M.S. *Leander*, in various parts of the globe, and it was observed that though this was frequently obscured in temperate regions, by analysing the average values from a number of curves, it could be shown that there existed a component oscillation with double maxima at 10 a.m. and 10 p.m., and the corresponding minima at 4 a.m. and 4 p.m., local time, all over the Earth.

Maps of prevailing winds give a good general impresson of the surface circulation of the air, and Dr. Shaw was able to show that the circulation to be inferred from the mean isobars, by the application of Buys Ballot's law, corresponds very satisfactorily with the observed winds. Maps of average pressure, therefore, form the basis of all considerations as to surface conditions.

Another aspect of Buys Ballot's law may be called the numerical aspect. The actual movement of air compared with the disposition of force due to barometric gradient shows that the movement takes place nearly at right angles to the direction of the applied force, namely, nearly parallel to the isobars, with some incurving towards the centres of depressions, and some outcurving away from the centres of anti-cyclonic systems. The maintenance of a state of motion at right angles to the direction of the acting force is familiar to us in various cases of rotation, and in the case of the wind it can be accounted for by the rotation of the Earth. Motion in the revolving Earth without any pressure difference would imply acceleration to the right (in the Northern hemisphere), and thus to keep air moving steadily it requires pressure always to push it towards the left and counteract the effect of the Earth's rotation. It is possible, being given the latitude, to calculate from the velocity of the wind what gradient would be necessary in order to keep air moving along an isobar; or, in other words, to analyse the conditions under which air currents are guided in any particular direction. Several interesting slides were exhibited, showing the distribution of pressure and the calculated paths of air on February 10th-11th, 1899, and from June 13th-20th, 1883.

With regard to the movements of the upper air, one method of

studying them is by observing the movements of dust on such occasions as the great Krakatoa eruption of 1883, and a second by observations of the upper clouds. A number of slides were shown with graphic representations of the average direction of movements of the upper clouds at various stations in India and Europe, and Dr. Shaw went on to say that it is possible to calculate the distribution of the upper air from the known pressure at the surface, by deducting the weight of the lower strata, deduced from pressure, temperature and humidity observations. This was done some years ago by M. Teisserenc de Bort, who drew a map of the pressure distribution at 4000 metres altitude. The results accord well with those deduced from cloud observations.

Several photographs of kites and balloons for investigation of the upper air were also exhibited.

ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, April 18th, at the Institution of Civil Engineers, Great George Street, Westminster, Mr. Richard Bentley, President, in the chair.

Mr. Alfred Hands read a paper on "Some so-called Vagaries of Lightning reproduced experimentally." He said that lightning is an electric discharge, and as such it should act in accordance with the laws that are known to govern discharges. We have, doubtless, much to learn yet as regards electricity, but even though fresh facts and laws may be discovered they can scarcely be in direct opposition to those already known, and, therefore, if an occurrence does not appear to accord with our knowledge, we should try and fathom the mystery and not dismiss it as a vagary. The author, in the course of an extended investigation into the effects of lightning, has come across many cases that have been called vagaries, but which on a close inspection have proved to be extraordinary only in the erroneous way in which they were described, and had they been correctly reported would have appeared perfectly consistent with ideas previously held—in fact, could have been foretold in every case if the conditions that led to those effects had been known before the events occurred.

Mr. Hands reproduced, experimentally, several so-called vagaries of lightning, showing by means of skeleton models the conditions under which they occurred, and by a single discharge producing effects which would be most perplexing if the arrangement of the hidden links in the alternative paths of conduction were not known.

Mr. Baldwin Latham said that he had frequently heard of lightning flashes making their way down chimney stacks, passing through the engine house, and thence seeking the earth, instead of taking a direct path from the top of the chimney shaft to the earth. He thought it would be desirable for those wishing to put up lightning

conductors to seek the best possible advice, so as to avoid the mistakes to which attention had been drawn in the paper.

Mr. J. E. Clark referred to a lightning flash that had fused a gas pipe in a narrow alley close to York Minster.

Mr. W. Marriott said that the Royal Meteorological Society had instituted a number of investigations on the subject, and had been the means of organizing the Lightning Rod Conference in 1878. The recommendations of that Conference for the protection of buildings from lightning still held good.

Mr. A. Hands said that a good earth connection for the lightning conductor was very necessary, but it was not everything, and care should be taken that rival conductors in the form of gas and water pipes were not set up and the discharge divided.

The President remarked that the early Egyptians took precautions to guard against damage by lightning, and the roof of Solomon's Temple was studded with metal points for the same purpose.

Miss C. O. Stevens read a paper on "The Value of a projected image of the Sun for Meteorological Study." She pointed out that by this method it had been ascertained that where the direction of movement of the atmosphere is tangential to the limit of the sun, the phenomenon of "boiling" displays a coursing or rippling character, and that where it is perpendicular to the limb of the sun the character of the movements of distortion is that of springing in and out of the area of the sun's image. Both these elements of movement are continuous, even in the absence of all visible cloud, and it is possible not only to detect but also to distinguish between overlying invisible atmospheric strata.

Mr. R. Inwards, Mr. W. H. Dines, Mr. H. Mellish, Mr. J. E. Clark, and the President, took part in the discussion on the paper, and Miss Stevens replied.

The following were elected Fellows of the Society :—Mr. K. N. Banaji, Mr. R. Cross, Miss E. Halsey, Mr. L. M. Ting, and Rev. F. W. Walter.

REVIEWS.

Report of the Meteorological Council for the Year ending 31st of March, 1905, to the President and Council of the Royal Society. Presented to both Houses of Parliament by Command of His Majesty. London: 1906. Printed for His Majesty's Stationery Office. [Cd. 2829]. Size 9½ × 6. Pp. 228. Price 1s. 5d.

THE last report of the anomalous body which controlled the Weather Service of the United Kingdom up to March 31st, 1905, has appeared rather more than a year after the Council in question has been superseded. The judgment passed upon the organization of the Meteorological Council by the Treasury Committee which sat upon it in 1902 and suggested various measures of reconstruction which have now in part been given effect to, will be remembered by our readers. Fortunately the men who carried on the work of the

Meteorological Office have always been better than the system under which they acted, and this has never been more true than in the last year of the old order of things.

The usual report of work done requires no special comment except that more time has been devoted to the purely scientific aspects of meteorology in the direction of experiment and special observations than in earlier years. The most interesting section of the Report is Appendix II., entitled "An account of the work of the Meteorological Office during the past fifty years." This is the official history of the relations of the British Government with meteorology. In 1855 the Government established a department of the Board of Trade under the charge of Admiral FitzRoy to co-operate in the international study of the meteorology of the oceans initiated by Lieutenant Maury of the United States Navy. The Government grant for this work (partly included in the Board of Trade, partly in the Admiralty votes) amounted to £4200. Co-operation with Kew Observatory in testing instruments was carried out from the first. In 1860, telegraphic weather reports were instituted by Admiral FitzRoy and storm warnings based upon them were issued. Weather forecasts also were prepared and published in the newspapers; but this work, which came to absorb most of the grant, it must be borne in mind, was superimposed upon the original functions of the Meteorological Office, which were international and world-wide. Admiral FitzRoy died in 1865, and a Committee of the Royal Society was appointed to inquire into the whole matter of the work of the Office. This Committee advised the stoppage of weather forecasts, the improvement of storm warnings, the continuation of marine observations for a time, and above all the establishment of "a full, constant and accurate system of showing changes of weather in the British Isles." As a result of this, a grant of £10,000 per annum was secured and the Royal Society appointed a Committee to administer the grant. The Committee, which included gentlemen well known in several walks of science, some of whom had paid special attention to meteorology, appointed Mr. R. H. Scott as Director of the Office, Captain Toynbee as Marine Superintendent, and Mr. Balfour Stewart as Secretary and Director of the Kew Observatory. Under this Committee the land meteorology of the British Isles was greatly extended and the system of daily weather charts and forecasts elaborated. This order of things terminated with the Report of the Treasury Committee of 1874 (*see this Magazine*, Vol. 12 (1877), pp. 17, 33, 97, for much interesting matter supplemental to the official narrative under notice), and the institution of the Meteorological Council of the Royal Society, a body whose constitution has been fully discussed in these pages (*see this Magazine*, Vol. 39 (1904), p. 102).

The funds at the disposal of the Council were increased, and under the chairmanship of Professor Henry Smith and then of Sir Richard Strachey and the secretaryship of Dr. R. H. Scott and later of Dr. W. N. Shaw, the Council proceeded to do much valuable work,

the main outlines of which are sketched in this history. The Weekly Weather Report was one of the first results of this reorganization and one which has proved singularly successful. The variation in the number of First Order Stations, or completely equipped meteorological observatories, is duly noted, and the fact that the Council yielded to external pressure and revoked the death sentence on Falmouth Observatory makes one regret that a little more pressure was not applied in the case of Fort William. The record altogether is one of solid, steady and increasing work, and we look forward with confidence to the new organization, which has been in force for more than a year, showing still greater progress. There are several matters waiting for reform in the future ; amongst others, the hardship which the more experienced members of the staff labour under in the absence of any proper system of pensions, or of reasonable prospects of promotion to the higher posts.

Modern Lightning Conductors. An illustrated supplement to the Report of the Lightning Research Committee of 1905, with notes as to the Methods of Protection and Specifications. By KILLINGWORTH HEDGES. London : Crosby, Lockwood & Son, 1905. Size 10 x 6. Pp. viii. + 120.

WE have not been so fortunate as to see the Report of the Lightning Research Committee, of which Mr. Hedges was the honorary secretary, nor does the present volume state where that Report may be obtained. The Committee was organised jointly by the Royal Institution of British Architects and the Surveyors' Institution, so that its objects were of a thoroughly practical nature, and the subject is certainly one well deserving of attention. It is probably our ignorance of the Report that makes Mr. Hedges's book appear to us to be confused in its arrangement and difficult to follow in its conclusions. It is sometimes hard to tell whether the author is giving the opinions of the Committee or his own comments upon them, and some of the chapters read like a random pile of newspaper cuttings bearing on lightning in fact and fancy. The letter-press would be improved by revision, and some of the historical statements might be verified. We did not know, for instance, that Benjamin Franklin had been knighted (p. 105).

Chapter III. gives a summary of the suggestions and recommendations of the Lightning Research Committee, and so far as these differ from the findings of the Lightning Rod Conference arranged by the Royal Meteorological Society in 1878 they are likely to prove disquieting to those responsible for the protection of buildings. The instances quoted by the author of serious damage caused to "protected" buildings by lightning and the apparent scepticism of the Lightning Research Committee as to the possibility of securing complete protection, might almost induce some people to run the risk of having no lightning conductor at all rather than incur that of installing a possibly insufficient system.

TEMPERATURE FOR APRIL, 1906.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	TEMPERATURE.				No. of Nights at or below 12°	
					Max.		Min.			
					°	Date.	°	Date.	Shade.	Glass.
Camden Square.....	London.....	51 32	0 8	111	73·0	12	30·1	15 +	5	17
Tenterden.....	Kent.....	51 4	*0 41	190	72·5	11	28·0	24	9	18
West Dean.....	Hampshire.....	...	...	137	67·0	12	24·0	16	13	28
Hartley Wintney.....	".....	51 18	0 53	222	73·0	12	24·0	15, 16	9	19
Hitchin.....	Hertfordshire.....	51 57	0 17	238	70·0	11, 12	26·0	14	14	...
Winslow (Addington).....	Buckinghamsh. r.	51 58	0 53	309	72·0	12	25·0	20	9	21
Bury St. Edmunds (Westley).....	Suffolk.....	52 15	*0 40	226	73·0	11	27·0	20	14	...
Brundall.....	Norfolk.....	52 37	*1 26	66	...	...	...	...	...	...
Winterbourne Steepleton.....	Dorset.....	50 42	2 31	316	64·8	12	25·0	14, 24	10	17
Torquay (Cary Green).....	Devon.....	50 28	3 32	12	64·8	13	33·9	3	0	11
Polapit Tamar [Launceston].....	".....	50 40	4 22	315	66·9	11	26·9	16	10	12
Bath.....	Somerset.....	51 23	2 21	67	68·5	12	26·0	27	7	...
Stroud (Upfield).....	Gloucestershire.....	51 44	2 13	226	66·0	13	32·0	30	1	...
Church Stretton (Woolstaston).....	Shropshire.....	52 35	2 48	800	69·5	13	23·0	19	17	...
Bromsgrove (Stoke Reformatory).....	Worcestershire.....	52 19	2 4	225	68·0	12	22·0	14, 26	12	...
Boston.....	Lincolnshire.....	52 58	0 1	25	70·0	12	26·0	20	12	...
Workshop (Hodsock Priory).....	Nottinghamshire.....	53 22	1 5	56	70·1	13	23·5	10	17	27
Derby (Midland Railway).....	Derbyshire.....	52 55	1 28	156	73·0	11	29·0	14, 26	9	...
Bolton (Queen's Park).....	Lancashire.....	53 35	2 28	390	63·6	12	29·5	27	4	18
Wetherby (Ribston Hall).....	Yorkshire, W.R.	53 59	1 24	130	...	...	...	...	...	...
Arncliffe Vicarage.....	".....	54 8	2 6	732	...	...	...	...	...	...
Hull (Pearson Park).....	"..... E.R.	53 45	0 20	6	69·0	13	29·0	3 +	11	24
Newcastle (Town Moor).....	Northumberland.....	54 59	1 38	201	...	...	...	...	...	...
Borrowdale (Seathwaite).....	Cumberland.....	54 30	3 10	423	69·3	11	30·1	18	5	...
Cardiff (Ely).....	Glamorgan.....	51 29	3 13	53	...	...	...	...	...	...
Haverfordwest (High Street).....	Pembroke.....	51 48	4 58	95	67·6	12	26·7	16	6	21
Aberystwyth (Gogerddan).....	Cardigan.....	52 26	4 1	83	71·0	12	21·0	18	19	...
Llandudno.....	Carnarvon.....	53 20	3 50	72	62·0	4	32·5	27	0	...
Cargen [Dumfries].....	Kirkcudbright.....	55 2	3 37	80	69·0	12	27·0	3, 19	10	...
Lilliesleaf (Riddell House).....	Roxburgh.....	55 31	2 46	550	65·0	12	23·0	2	20	27
Edinburgh (Royal Observatory).....	Midlothian.....	55 55	3 11	442	65·8	10	28·5	19	4	16
Colmonell (Clachanton).....	Ayr.....	55 8	4 54	140	63·0	12	23·0	18	14	...
Glasgow (Queen's Park).....	Renfrew.....	55 53	4 18	144	67·0	11	27·0	18	10	27
Tighnabruach.....	Argyll.....	55 55	5 14	50	56·0	7	28·0	18	17	19
Mull (Quinish).....	".....	56 36	6 13	35	...	...	...	...	...	...
Dundee (Eastern Necropolis).....	Forfar.....	56 28	2 57	199	63·2	13	27·0	19	13	...
Braemar.....	Aberdeen.....	57 0	3 24	1114	...	...	...	...	...	...
Aberdeen (Cranford).....	".....	57 8	2 7	120	61·0	9, 10	25·0	23, 29	18	...
Cawdor (Budgate).....	Nairn.....	57 31	3 57	250	...	...	...	...	...	...
Invergarry.....	E. Inverness.....	57 4	4 47	130?	...	...	...	...	...	...
Loch Torridon (Bendamph).....	W. Ross.....	57 32	5 32	20	...	...	...	...	...	...
Dunrobin Castle.....	Sutherland.....	57 59	3 56	14	60·0	9	29·5	24	...	7
Castletown.....	Caithness.....	58 35	3 23	100	64·0	12	29·0	17, 19	3	22
Killarney (District Asylum).....	Kerry.....	52 4	9 31	178	67·0	13	28·0	15, 19	...	...
Waterford (Brook Lodge).....	Waterford.....	52 15	7 7	104	63·0	11	29·0	15	7	...
Bradford (Hurdlestown).....	Clare.....	52 48	8 38	167	63·0	12	28·0	13	12	...
Carlow (Browne's Hill).....	Carlow.....	52 50	6 53	291	...	...	...	...	...	...
Dublin (Fitz William Square).....	Dublin.....	53 21	6 14	54	63·5	12	32·0	19	1	18
Ballinasloe.....	Galway.....	53 20	8 15	160	65·5	11	22·0	3	20	...
Clifden (Kylemore House).....	".....	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe).....	Mayo.....	54 4	9 18	74	...	...	...	...	...	...
Seaford.....	Down.....	54 19	5 50	180	63·0	12	30·0	9	7	18
Londonderry (Creggan Res.).....	Londonderry.....	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel).....	Tyrrone.....	54 36	7 18	280	66·0	10, 11	27·0	18	6	17

RAINFALL FOR APRIL, 1906.

RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.				Mean Annual 1870-1899.	STATION.
rer. 0-99.	1906.	Diff. from Av. in.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99.	1906.	Diff. from Aver. in.	% of Av.		
n.	in.			in.	Date.		in.	in.			in.	
'69	·51	-1·18	30	·22	27	10	6·82	7·50	+·68	110	25·16	Camden Square
'77	1·44	-·33	81	·45	18	9	7·87	9·07	+1·20	115	28·36	Tenterden
'99	·98	-1·01	49	·38	5	7	8·73	11·53	+2·80	132	29·93	West Dean
'69	·64	-1·05	38	·15	27	7	7·91	8·43	+·52	107	27·10	Hartley Wintney
'62	·66	-·96	41	·19	27	9	6·50	7·66	+1·16	118	24·66	Hitchin
'33	·84	-·99	46	·21	13	10	7·23	7·90	+·67	109	26·75	Addington
'54	·85	-·69	55	·24	27	13	6·43	9·00	+2·57	140	25·39	Westley
'68	·70	-·98	42	·24	27	13	6·49	9·38	+2·89	145	25·40	Brundall
'60	1·14	-1·46	44	·43	24	8	12·02	15·74	+3·72	131	39·00	Winterbourne Stptm
'45	·85	-1·60	35	·44	24	10	10·96	11·87	+·91	108	35·00	Torquay
'23	1·46	-·77	65	·42	24	11	11·35	16·28	+4·93	143	38·85	Polapit Tamar
'05	1·24	-·81	60	·30	24	11	8·63	9·28	+·65	108	30·75	Bath
'05	·81	-1·24	40	·16	5	11	8·50	8·86	+·36	104	29·85	Stroud
'14	1·27	-·87	59	·32	29	12	9·23	9·48	+·25	103	33·04	Woolstaston
'66	1·09	-·57	66	·35	26	11	6·56	6·96	+·40	106	24·50	Bromsgrove
'59	·58	-1·01	36	·30	27	7	6·09	7·24	+1·15	119	23·30	Boston
'69	·62	-1·07	37	·17	22	12	6·56	6·77	+·21	103	24·70	Hodsock Priory
'72	·60	-1·12	35	·22	23	10	6·82	7·96	+1·14	117	26·18	Derby
'15	2·43	...	...	·53	27	14	...	16·77	...	...	42·43	Bolton
'98	·66	-1·32	33	·20	22	8	7·35	8·19	+·84	111	26·96	Ribston Hall
'32	2·17	-1·15	65	·44	28	14	19·42	24·19	+4·77	124	60·96	Arncliffe Vic.
'72	·87	-·85	51	·25	28	12	7·17	6·73	-·44	94	27·02	Hull
'79	1·57	-·22	88	·82	29	14	7·43	6·28	-1·15	85	27·99	Newcastle
'27	4·09	-2·18	65	1·01	27	14	43·13	42·74	-·39	99	132·68	Seathwaite
'34	1·38	-·96	59	·55	24	14	12·11	16·19	+4·08	134	42·81	Cardiff
'67	1·16	-1·51	43	·29	27	11	14·53	15·53	+1·00	107	47·88	Haverfordwest
'39	1·85	-·54	77	·65	27	14	12·22	17·05	+4·83	140	45·41	Gogerddan
'82	1·10	-·72	60	·28	27	10	8·33	11·07	+2·74	133	30·98	Llandudno
'30	1·04	-1·26	45	·46	21	9	13·47	10·90	-2·57	81	43·43	Cargen
'96	·92	-1·04	47	·32	21	13	9·37	6·94	-2·43	74	33·04	Riddell House
...	·81	...	...	·42	16	7	...	6·90	...	...	...	Edinburgh
'25	1·81	-·44	80	·58	20	11	13·62	12·16	-1·46	89	44·85	Colmonell
'77	1·23	-·54	70	·50	20	12	9·88	12·37	+2·49	125	35·80	Glasgow
'89	3·27	+·38	113	·47	27	17	17·68	22·01	+4·33	125	57·90	Tighnabruaich
'80	2·95	+·15	105	·40	27	20	17·38	17·09	-·29	98	57·53	Quinish
'94	·95	-·99	49	·45	16	9	8·06	4·75	-3·31	59	28·95	Dundee
'18	1·73	-·45	79	...	...	...	10·21	11·19	+·98	110	36·07	Braemar
'22	1·55	-·67	70	·50	16	10	9·40	7·84	-1·56	83	33·01	Aberdeen
'49	2·06	+·57	138	·46	16	12	7·65	9·92	+2·27	130	29·37	Cawdor
'68	2·87	+·19	107	·65	20	7	19·03	21·12	+2·09	111	56·00	Invergarry
'31	6·44	+2·13	149	1·20	16	20	26·21	36·16	+9·95	138	86·50	Bendamph
'81	2·18	+·37	120	·35	21	12	9·29	13·27	+3·98	143	31·60	Dunrobin Castle
...	2·34	...	...	·40	25	15	...	13·89	...	...	...	Castletown
'71	2·34	-1·37	63	·41	29	15	19·75	15·84	+3·91	80	58·11	Killarney
'56	1·34	-1·22	52	·49	4	9	12·47	11·70	-·77	94	39·30	Waterford
'17	1·41	-·76	65	·44	4	17	9·51	11·90	+2·39	125	33·47	Hurdlestown
'34	1·43	-·91	61	·51	5	11	10·36	10·47	+·11	101	34·44	Carlow
'00	1·83	-·17	92	·61	29	18	7·99	9·12	+1·13	114	27·75	Dublin
'32	1·58	-·74	68	·41	4	20	10·74	12·90	+2·16	120	37·04	Ballinasloe
'74	4·34	-·40	92	·95	4	17	24·35	24·93	+·58	102	80·23	Kylemore House
'90	3·48	+·58	120	·84	4	20	15·86	18·93	+3·07	119	50·50	Enniscoe
'59	2·09	-·50	81	·67	24	17	11·75	10·08	-1·67	86	38·61	Seaforde
'32	3·62	+1·30	156	·47	28	21	11·67	16·72	+5·05	143	41·20	Londonderry
'25	3·18	+·93	141	·41	24	20	10·55	15·12	+4·57	143	37·85	Omagh

SUPPLEMENTARY RAINFALL, APRIL, 1906.

Div.	STATION.	Rain. inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	·77	XI.	Rhayader, Tyrmynydd	1·92
„	Ramsgate, West Cliff Villas	·48	„	Lake Vyrnwy	1·59
„	Hailsham	1·62	„	Llangyhanfal, Plâs Draw....	·60
„	Crowborough, Uckfield Lodge	1·19	„	Criccieth, Talarvor.....	1·54
„	Osborne, Newbarn Cottage.....	1·14	„	Llanberis, Pen-y-pass	4·00
„	Emsworth, Redlands.....	·77	„	Lligwy	1·25
„	Alton, Ashdell	·85	„	Douglas, Woodville	1·82
„	Newbury, Welford Park ...	1·02	XII.	Stoneykirk, Ardwell House	1·02
III.	Harrow Weald, Hill House.....	·47	„	Dalry, The Old Garroch ...	1·83
„	Oxford, Magdalen College..	·34	„	Langholm, Drove Road.....	2·00
„	Bloxham Grove	·62	„	Moniaive, Maxwellton House	1·51
„	Pitsford, Sedgebrook	·42	XIII.	N. Esk Reservoir [Penicuik]	1·70
„	Huntingdon, Bampton.....	·56	XIV.	Maybole, Knockdon Farm..	1·52
„	Wisbech, Bank House	1·05	„	Campbeltown, Witchburn... ..	1·85
IV.	Southend Water Works.....	·73	XV.	Inveraray, Newtown	3·59
„	Colchester, Lexden.....	·88	„	Ballachulish House.....	4·45
„	Newport, The Vicarage.....	1·04	„	Islay, Eallabus	3·02
„	Rendlesham	·57	XVI.	Dollar Academy	1·51
„	Swaffham	·72	„	Loch Leven Sluice	1·05
„	Blakeney	·59	„	Balquhider, Stronvar	2·59
V.	Bishops Cannings	1·04	„	Perth, Pitcullen House.....	·90
„	Ashburton, Druid House ...	·96	„	Coupar Angus Station	·92
„	Okehampton, Oaklands.....	1·67	„	Blair Atholl.....	1·30
„	Hartland Abbey	1·29	„	Montrose, Sunnyside Asylum	1·14
„	Lynmouth, Rock House ...	1·32	XVII.	Alford, Lynturk Manse ...	1·76
„	Probus, Lamellyn	1·31	„	Keith Station	2·01
„	Wellington, The Avenue ...	·98	XVIII.	N. Uist, Lochmaddy	2·90
„	North Cadbury Rectory ..	1·23	„	Alvey Manse	2·21
VI.	Clifton, Pembroke Road ...	1·36	„	Loch Ness, Drumnadrochit..	1·91
„	Moreton-in-Marsh, Longboro' ..	·75	„	Glencarron Lodge	7·26
„	Ross, The Graig	·93	„	Fearn, Lower Pitkerrie.....	1·46
„	Shifnal, Hatton Grange.....	1·77	XIX.	Invershin	2·71
„	Cheadle, The Heath House.....	1·83	„	Altnaharra	2·33
„	Coventry, Kingswood	·46	„	Bettyhill	1·73
VII.	Market Overton	·57	„	Watten Station	1·52
„	Market Rasen	·83	XX.	Dunmanway, The Rectory..	1·62
„	Bawtry, Hesley Hall.....	·60	„	Cork	1·06
VIII.	Neston, Hinderton.....	·81	„	Darrynane Abbey	2·14
„	Southport, Hesketh Park... ..	1·02	„	Glenam [Clonmel]	1·51
„	Chatburn, Middlewood	1·30	„	Ballingarry, Gurteen	2·02
„	Cartmel, Flookburgh	1·65	„	Miltown Malbay.....	1·62
IX.	Langsett Moor, Up. Midhope ..	1·18	XXI.	Gorey, Courtown House ...	1·38
„	Scarborough, Scalby	1·06	„	Moynalty, Westland	1·30
„	Ingleby Greenhow	1·08	„	Athlone, Twyford	1·56
„	Mickleton.....	·76	„	Mullingar, Belvedere.....	1·85
X.	Bardon Mill, Beltingham ...	1·19	XXII.	Woodlawn	2·21
„	Ewesley, Fallowles	1·06	„	Westport, Murrisk Abbey..	2·68
„	Ilderton, Lilburn Cottage..	1·00	„	Collooney, Markree Obsy..	3·01
„	Keswick, York Bank.....	1·36	XXIII.	Enniskillen, Portora	2·15
XI.	Llanfdechfa Grange.....	1·17	„	Warrenpoint, Summer Hill..	1·59
„	Treherbert, Tyn-y-waun ...	1·68	„	Banbridge, Milltown	2·29
„	Carmarthen, The Friary.....	1·17	„	Belfast, Springfield	2·57
„	Castle Malgwyn [Llechryd]..	1·56	„	Bushmills, Dundarave	3·13
„	Plynlimon.....	3·50	„	Stewartstown, The Square..	2·46
„	Tall-y-llyn.....	1·40	„	Killybegs	4·68
„	New Radnor, Ednol	1·39	„	Horn Head	2·87

METEOROLOGICAL NOTES ON APRIL, 1906.

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.

LONDON, CAMDEN SQUARE.—Apart from the low temp. a very fine month, with an extraordinarily large amount of sunshine and practically no rain until the last week. Absolute drought from March 27th to April 12th, and partial drought from March 24th to April 26th, 34 days with '34 in. of R. The temp. was rather low under the influence of persistent polar winds, the mean being $47^{\circ}\cdot 2$, or $0^{\circ}\cdot 9$ below the average. Duration of sunshine $192\cdot 9^*$, and of R $9\cdot 9$ hours.

CROWBOROUGH.—No R fell from March 27th till April 17th, with delightfully warm and sunny days. The latter part was wintry with frequent H and S. R '99 in. below the average of 35 years. Mean temp. $45^{\circ}\cdot 4$.

HARTLEY WINTNEY.—The driest April since 1893. Genial weather prevailed for the first fortnight, but afterwards it was bitterly cold with many frosts.

TORQUAY.—Duration of sunshine $258\cdot 8^*$ hours, or $82\cdot 8$ hours above the average; no sunless days and 14 days with more than 10 hours. Mean temp. $46^{\circ}\cdot 8$, or $1^{\circ}\cdot 9$ below the average.

NORTH CADBURY.—Abnormally warm until 17th, and as abnormally cold from 18th to 30th, but cold nights throughout. Partial drought from March 16th to April 23rd, 39 days with '39 in. of R.

CLIFTON.—Mostly anticyclonic weather with N. and N.E. winds. Fine till 20th with cold nights, and the last 10 days very cold with ground frosts.

ROSS.—The first half was splendid and warmer than the average, but the latter half was the coldest in 27 years, except 1884 and 1887.

BOLTON.—Brilliantly fine and warm till about 17th, with almost entire absence of R. The latter part was cold and wet, with 8 showers and ground frosts. Duration of sunshine $119\cdot 5^*$ hours, or $8\cdot 6$ hours above the average. Mean temp. $43^{\circ}\cdot 8$, or $0^{\circ}\cdot 2$ below the average.

SOUTHPORT.—Dry and sunny with light E. airs till 12th, W. winds later with R. Mean temp. $45^{\circ}\cdot 2$, or $0^{\circ}\cdot 7$ below the average. Duration of sunshine $209\cdot 8^*$ hours, or $30\cdot 8$ hours above the average. R '70 in. below the average. Duration of R $24\cdot 9$ hours.

CARMARTHEN.—Unusually cold and dry with bitter N. and E. winds. The season was generally backward and R was everywhere badly wanted.

HAVERFORDWEST.—Fine, cold and very dry, with frost on many nights and S on 28th. Vegetation was backward and R much needed. Duration of sunshine $244\cdot 8$ hours.

DOUGLAS.—Brilliantly fine, dry and very cold to 15th, when the drought, which had lasted 21 days, broke up and was succeeded by wild wintry weather with cold R, frequent S, H and sleet and almost nightly frost.

DUMFRIES.—The promise of early spring growth during the exceptionally mild weather of the first two weeks completely disappeared with the low temp. and withering winds of the second half, when frost caused much havoc.

COUPAR ANGUS.—R again below the average, this being the third successive month with a deficit. Cold nights and warm days; mean temp. $42^{\circ}\cdot 7$, or slightly below the average. Vegetation was practically stationary.

DARRYNANE ABBEY.—R 60 per cent. of the average, and less than that of any April except 1872, 1873, 1896 and 1903.

DUBLIN.—A cold month, the mean temp. being $45^{\circ}\cdot 9$, or $1^{\circ}\cdot 8$ below the average. The first half was very dry, the latter notable for frequent H.

OMAGH.—The first fortnight, although accompanied by polar and easterly winds, was dry and often brilliant, and a highly favourable seed time, but it is seldom we have had more raw, wet, inclement, and generally unfavourable April weather than that from 13th to the end. There were more frosts and S than in any winter month, and vegetation was checked by the cold.

* Campbell-Stokes.

Climatological Table for the British Empire, November, 1905.

STATIONS. <i>(Those in italics are South of the Equator.)</i>	Absolute.				Average.				Absolute.		Total Rain.		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	55·2	26	24·2	21	47·4	36·2	39·6	92	75·8	17·5	3·08	19	6·8
Malta.....	78·1	21	51·3	28	70·8	58·9	55·5	78	118·4	46·8	1·14	7	4·9
Lagos.....	90·0	30	74·0	24	86·4	75·3	75·4	78	141·0	62·5	3·65	9	6·5
Cape Town	81·2	18	45·7	21	71·3	54·9	53·1	70	...	...	·89	5	3·4
Durban, Natal	89·1	3	54·4		77·8	63·3	...	...	151·5	...	6·87	16	6·4
Johannesburg	84·8	30	42·0	7	73·0	52·7	51·9	72	159·2	43·0	6·05	13	4·0
Mauritius.....	89·0	17	60·5	2	83·4	67·3	65·7	74	149·7	53·1	4·09	13	6·6
Calcutta.....	87·0	12	57·1	17	83·1	63·6	62·4	70	149·0	51·5	·00	0	1·8
Bombay.....	93·2	8	68·3	27	88·9	74·9	69·2	67	142·3	61·9	1·04	3	3·0
Madras	89·5	2	67·9	5	85·8	73·7	72·1	81	140·8	63·8	10·99	16	5·8
Kodaikanal	65·1	1	41·8		60·8	49·5	50·8	88	134·8	35·3	7·77	20	6·3
Colombo, Ceylon.....	90·8	6	73·0	6	87·4	75·1	73·4	82	157·5	69·0	5·12	18	5·3
Hongkong.....	84·5	3	59	5	73·6	65·0	57·1	66	138·1	...	·28	8	4·8
Melbourne.....	93·5	8	41·5	13a	71·0	49·6	47·8	67	152·3	32·0	1·25	6	5·5
Adelaide	92·4	15	42·9	5	75·5	51·1	47·3	56	151·0	34·1	·15	2	3·6
Coolgardie	107·2	24	43·4	11	87·9	56·0	45·7	39	169·1	39·2	·21	3	2·2
Sydney	98·1	17	45·8	1	76·6	58·7	52·9	60	134·9	38·8	·63	14	4·5
Wellington	71·8	18	43·8	9	62·4	50·5	46·6	68	132·0	39·0	3·32	15	6·7
Auckland	71·0	30	45·0	10	64·9	53·7	49·8	72	136·0	39·0	2·20	14	5·0
Jamaica, Negril Point..	88·9	20	68·9	28b	86·6	71·6	73·0	81	...	...	5·75	10	...
Trinidad .....	...	...	...	...	...	...	...	...	...	...	...	...	...
Grenada.....	86·2	6	71·8	26	83·7	74·9	80·8	95	154·0	...	12·23	25	4·7
Toronto	54·0	11	12·7	30	43·6	30·2	30·1	77	68·0	8·2	1·78	13	6·3
Fredericton	56·8	25	—2·5	15	43·2	23·7	24·3	62	...	...	3·58	11	6·3
Winnipeg	59·5	10	—21·0	30	35·1	18·2	...	...	...	...	1·13	7	5·5
Victoria, B.C.	59·2	12	27·9	28	49·0	40·5	...	90	...	...	·91	11	7·1
Dawson	46·0	10	—20·0	26	15·9	4·8	...	...	...	...	·31	5	6·4

a and 29. b and 29.

MALTA.—Mean temp. of air 63°·6, or 1°·7 above average. Mean hourly velocity of wind 10·0 miles, or 0·6 above average. Mean temp. of sea 67°·9.

MAURITIUS.—Mean temp. of air 0°·6 below, of dew point 1°·4, and R 2·26 in. above, averages. Mean hourly velocity of wind 9·3 miles, or 1·4 below average.

MADRAS.—Bright sunshine 160·5 hours.

KODAIKANAL.—Bright sunshine 114 hours.

COLOMBO.—Mean temp. of air 80°·8, or 0°·9 above, of dew point 1°·1 above, and R 7·06 in. below, averages. Mean hourly velocity of wind 5·7 miles.

HONGKONG.—Mean temp. of air 69°·2. R 1·43 in. below average. Mean direction of wind E. by N., and mean hourly velocity 12·4 miles. Bright sunshine 209·0 hours.

ADELAIDE.—Mean temp. of air 3°·9 below, and R ·85 in. below, averages; one of the driest Novembers on record. Mean min. temp. lowest on record for 48 years.

SYDNEY.—R 2·42 in. below, mean temp. 0°·8 above, and humidity 9 below, averages.

AUCKLAND.—R not quite two-thirds of the average of previous 37 years.