Symons's
Meteorological Magazine.

No. 491. DECEMBER, 1906. Vol. XLI.

FALL OF A WIRELESS TELEGRAPHY TOWER IN A GALE.

By W. A. S. Douglas, M.A.

The first Wireless Telegraphy Station to be erected in Scotland was completed early in 1906 at Machrihanish, a small village, well known to golfers, on the shores of the Atlantic, some eight miles north of the Mull of Kintyre and five miles west of Campbeltown. This tower was blown down on the afternoon of the fifth of December, during a heavy gale from the north-west, and I send a description based on my familiarity with the locality and on reports in local newspapers. The authorities in charge have given no information on the subject.

In order to understand the nature of the catastrophe it is necessary first to consider the tower and its mode of construction. The station was built by the National Electric Signalling Company of Washington, U.S.A., in order to exploit a discovery of Professor Fessenden regarding wireless telegraphy. By his method, Professor Fessenden claims that messages can be sent right across the Atlantic, and the tower was designed for the purpose of communicating with an American station near Boston. In order to insure perfect similarity in the two stations, all the machinery and materials for the station in this country were shipped from America and put together at Machrihanish. The buildings, as shown in the accompanying sketch (fig. 1), consist of a power house, with large engines and dynamos, a receiving and transmitting room, and, lastly, the lofty stalk or tower which has now been destroyed by the wind.

The height of the tower was 420 feet, and the whole structure was built of hollow steel tubes of the uniform diameter of three feet. Each tube was eight feet in length, but as there was three feet of overlap for rivetting purposes as many as eighty-four tubes were used in the construction of the tower. An iron ladder ran up the inside to the top and at each hundred feet there was an outside balcony. The foundation was the most novel feature in the whole construction. The base of the erection, as shown in fig. 3, was a large square of concrete, on the top of which insulators were placed, and then another layer of concrete, in which was embedded a pivot,

and upon this the tower itself rested. Therefore, the tower was free to move in any direction, and when it collapsed no injury was done to the foundation. The stalk was held in an upright position solely by means of stays made of stout wire cable. Four stays were attached to the tower at each of the four balconies and the ground

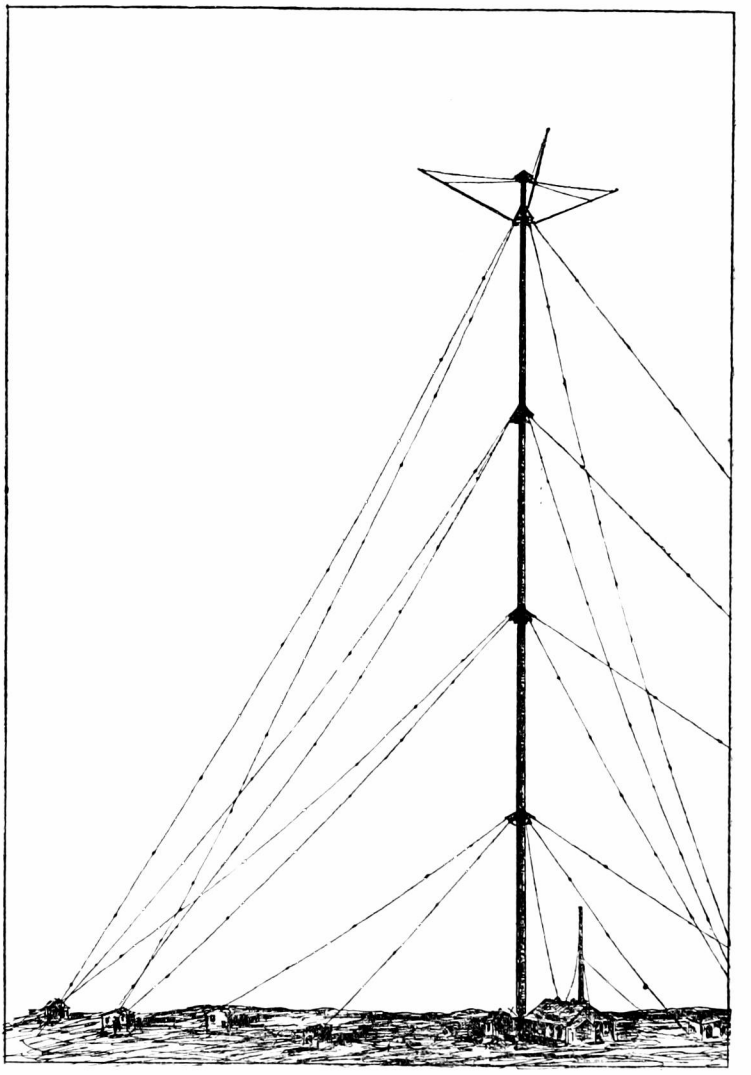


FIG. 1.—SKETCH OF TOWER, SHOWING GENERAL APPEARANCE

ends were fastened to solid concrete foundations (fig. 2), situated at distances of from one to three hundred yards from the base of the tower at points to the east, south, west and north-west of it. By these means it seems to have been thought that the resistance of the

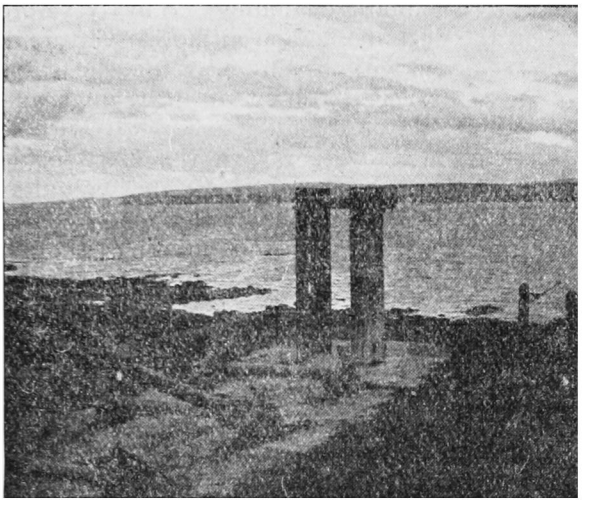


FIG. 2.—CONCRETE BLOCK, IN WHICH STAYS ARE FASTENED (DURING CONSTRUCTION).

tower to the wind would be greatly diminished, and any danger of its buckling obviated.

I have myself been up the tower during a stiff breeze, and even then the swaying was considerable, and the noise of the wind, as it rushed past, was most alarming and indicated that a great resistance was being opposed to its passage.

For several days before December 5th the wind on the west coast of Scotland was strong and gusty, and Machrihanish always has its full share if any wind is about, but the tower stood the strain well and no one was anxious about its safety. Early on the morning of Wednesday, December 5th, the wind increased greatly and soon was blowing a severe gale from the north-west. As the day advanced the gale became worse and there were frequent squalls of most exceptional severity. About noon the storm seemed to reach its height, and the tower, which was necessarily exposed to the full force of the gale, was observed to be swaying considerably. Everything, however, held fast, although the roar of the wind

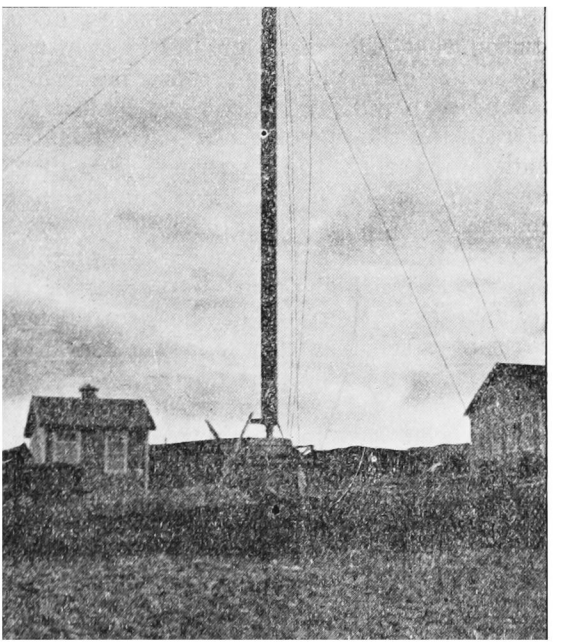


FIG. 3.—FOUNDATION OF TOWER, SHOWING PIVOT ON ON WHICH THE STRUCTURE RESTS.

against the stalk and stays was almost deafening Shortly before one o'clock in the afternoon the gusts became even more severe, and, during one of exceptional velocity, without any warning the stays to the west of the tower were wrenched from their fastenings and immediately the huge erection collapsed bodily, snapping in two as it fell. The noise of its snapping, together with the crash made when it struck the ground, was heard a long distance away, and at once informed the whole village of what had happened.

Fortunately, in falling the tower cleared the buildings, though only by a few inches, and some workmen who were in the power house had a very narrow escape. It is worthy of notice that the stays were arranged so that if any one of them broke, the tower would fall clear of the buildings, and this is what actually happened. As already stated, the stalk buckled in its fall, and the two parts fell in different directions. The first section of one hundred feet, measuring from the base, fell against the wind in a northerly direction, while the top section, composed of the remaining three hundred and twenty feet, fell towards the south. Part of the tower fell on a mound, which caused it to snap yet again. The upper portion is flattened out, owing to the momentum of its fall, and parts of it are buried more than a foot deep in the ground. Many of the tubes, needless to say, are damaged beyond all hope of repair, but it is believed that it will be possible to use some fifty per cent. of them again.

It is characteristic of the energy of those responsible for the station that the manager has got instructions from America to proceed at once with the reconstruction of the tower. This may be taken as an indication that the company's officials are still hopeful of realising the object for which the station was established. It is understood that the experiments, although encouraging, did not come up to the expectations of the inventor, but everything is being conducted so quietly that it is difficult to get trustworthy information. During the summer months, from one till four in the morning, messages were being sent off daily from the station, but how many reached the other side of the ocean it is impossible to learn. The effect at Machrihanish was most remarkable, and it was well worth rising early to see it. Underneath the six acres of ground, leased by the company, a network of wire has been laid, miles of wire having been used for this purpose, and the ground has been railed off with an ordinary wire fence. When messages are being sent off the whole place seems alive with electric sparks: sparks run along the wires of the fence, sparks seem to spring out of the ground, sparks fly through the air from all directions, and their crackling noise mingled with a dull subdued roar can be heard a quarter of a mile away.

It is unfortunately very difficult to say how the accident happened. So closely are the secrets of the company kept, that it is impossible to find out what pressure of wind the tower was built to withstand,

and of course at Machrihanish such things as anemometers are unknown. We can, therefore, only approach the subject indirectly by considering three questions.

First, was the velocity of the wind greater than could have been reasonably anticipated? A north-westerly gale at Machrihanish, coming as it does over an uninterrupted stretch of ocean, is not a thing to be despised, and I was always inclined to agree with the local opinion, that the tower would never survive a winter's gales, but this opinion was entirely unscientific and may be worth little. It is surely not too much to assume that the tower was put up to withstand a greater gale than ever has blown, or is ever likely to blow, on our shores, and we may therefore answer this question in the negative *

Second, was it owing to a mistake in calculating the pressure which the wind would exert on the tower? Without doubt, the tower was put up to resist an enormous pressure, but it seems to me that the effect of an unsteady pressure, such as would be exerted by violent gusts, could not have been sufficiently considered, and that this was the primary cause of the accident.

Third, was defective material used in the construction of the tower? Possibly this should be answered in the affirmative, for the accident undoubtedly happened owing to some of the stays giving way, and this certainly suggests that a defect in one, or some, of the stays may have been the immediate cause of the whole trouble.

LOCAL CLIMATOLOGY IN RELATION TO ORCHARD SITES.

By Alfred O. Walker, F.L.S., F.Z.S.

It is a remarkable fact that, with all the costly meteorological establishments that we possess in this country, and the enormous mass of observations that have been recorded, scarcely any attempt has been made to utilise them for the benefit of Agriculture. Still less, if possible, has any effort been made to compare the climates of the different parts of a restricted area, such as the county of Kent. Yet it will be, I think, generally conceded that in a county in which fruit growing is such an important and increasing industry, it is of the highest importance to know where orchards may be planted with the least danger from spring frosts, such as this year have ruined the plum and damson crops.

* The wind on December 5 was undoubtedly very strong along the whole of our western seaboard. At Malin Head, 60 miles due west of Machrihanish, the Meteorological Office observer estimated it at force 10 of Beaufort's scale at 8 a.m. It is a familiar joke that force 12, the maximum of the scale, can only be recorded when observer and observatory have been blown away.
—Ed. *S.M.M.*

I am well aware of the difficulty of the subject, having studied it for the last thirty years. But, after all, climate is governed by natural laws, and it seems to me that some effort should be made to find out what these are. The object of this article is to show that there is a *primâ facie* case for a properly organised and systematic inquiry into them.

Since I came to live at Ulcombe, on the south slope of the Lower Greensand or "Kentish Rag" hills, in 1899, I have been struck by the following facts:—

(1.) That many tender plants and shrubs will live and thrive with me which are killed by the winter in the immediate neighbourhood of Maidstone and in the Medway valley.

(2.) That the temperatures recorded in the Public Gardens at Maidstone show a climate of much greater extremes (*i.e.*, higher day and lower night temperatures) than with me. To give a recent instance of the latter, the grass temperature at Maidstone on September 28th was 33°, while with me it was 46°.

(3.) As far as can be judged from fruit crops, condition of the surface of the soil during frost, time of flowering of trees and plants in spring, &c., there appears to be a marked difference on the same slope at different heights, the middle portion having the most equable climate. At Ulcombe, the hill being about 300 feet high, the part between 50 feet and 200 feet is the warmest in winter. In this part there was this year quite half a crop of damsons and cherries, and the same was the case in 1903—an equally bad year. The lowest temperatures recorded in April and May were 31° on April 24th, by the shaded thermometer (the only occasion on which it was below 32° since March), and 28°·5 on the grass on April 26th. It is dangerous to generalise from a single locality, but there is no obvious reason why the same conditions should not exist along the whole Lower Greensand range which runs from east to west through the whole county. Probably much the same climate exists on the parallel Chalk range, but the soil may not be suitable for fruit.

It can hardly be denied that some localities are better adapted in climate or soil, or both, than others for fruit culture, and it must surely be worth while to endeavour to ascertain the exact position of these localities. For this purpose I suggest that competent Inspectors should be appointed whose duty it should be to ascertain and record every year those orchards in which the crops were specially good or bad. In time a mass of valuable information on the subject would be acquired, which, if properly utilised, would put an end to the waste of money involved in planting orchards in unsuitable localities. It should also be part of the duty of such Inspectors to examine and report, and perhaps advise, on all cases of insect and fungoid pests affecting fruit trees.

ROYAL METEOROLOGICAL SOCIETY.

THE opening meeting of this Society for the new session was held on Wednesday evening, November 21st, at the Institution of Civil Engineers, Great George Street, Westminster, Mr. Richard Bentley, President, in the chair.

Dr. H. R. Mill gave an account of the proceedings at the International Congress on Polar Exploration, held at Brussels from September 7th to 11th last, which he attended as the delegate of the Royal Meteorological Society. The resolutions bearing on meteorology which were adopted by the Congress were the following: —

(1) That researches and studies be undertaken in order to construct recording instruments which may be left for longer or shorter periods in uninhabited polar regions.

(2) That Polar Expeditions be furnished with an equipment of kites for the study of the upper air.

(3) The Committee desire to see permanent stations installed in the countries near the poles, wherever it is possible, and to see temporary stations organised at the greatest possible number of points during the continuance of Polar Expeditions.

(4) That Polar Expeditions should be undertaken in the two hemispheres simultaneously.

(5) That during these expeditions meteorological and magnetic observations be made as far as possible exactly in the places where they were made during the international co-operation of 1882–83.

(6) That detailed observations of the phenomena of the upper atmosphere be specially recommended to Polar Expeditions.

(7) In order to secure uniformity in the meteorological and magnetic observations it is desirable that, before their departure, all Polar Expeditions should enter into communication with the permanent International Meteorological Committee.

Mr. W. Marriott read a paper on "The Abnormal Weather of the Past Summer and some of its Effects," which he illustrated with a number of lantern slides. The principal features of the weather over the greater part of England—especially the south-east—were the high state of the barometer throughout the whole of the period, except a portion of August; the high temperature in July, August and September; the great amount of sunshine; and the deficiency of rainfall. Over the south-eastern portion of England more than 900 hours of bright sunshine were recorded during the four months June to September; while at a few stations in the extreme south and on the east coast over 1000 hours were recorded. The sunshine was more than 200 hours above the average over the Thames basin

and on the coasts of Lancashire and North Wales. The most remarkable feature of the weather during the past summer was the exceptional heat wave which occurred between August 30 and September 3. The temperature rose above 90° over a large part of England on the four consecutive days—August 31 to September 3. Mr. Marriott said that he had not been able to find any previous record of readings over 90° for a similar period. The air was very clear, and brilliant sunshine prevailed over nearly the whole of the country. Another remarkable feature connected with this heat wave was the great dryness of the air; for on September 1 and 2, differences of 25° were observed between the readings of the dry and wet bulb thermometers, and relative humidities below 30 per cent. were recorded at many inland places. Owing to the great heat, vegetable matter became very inflammable, and consequently there were more stack fires than usual, and extensive stretches of heather and gorse were also set on fire. The author said that with the advent of the hot weather the death rate increased considerably; and he pointed out that when the mean maximum temperature for the week reached 72° the death rate at once began to rise. The increase of the death rate was made up almost entirely of infants under one year of age. This was shown to be due to the prevalence of epidemic infantile diarrhœa, which sets in when the mean maximum temperature for the week rises above 72°. Attention was called to the effect which the high temperature had in turning milk sour and in rendering it unfit for drinking purposes, unless it had been first Pasteurized or sterilized. Not only was the ordinary milk a source of danger to infants during the hot weather, but the great use which is now made of tinned foods also tended to produce ptomaine poisoning and cause diarrhœa. Owing to the drought "keeping" for cattle was very deficient, and consequently there was a falling off in the milk supply of as much as 30 per cent. The brilliant sunshine and the warm weather had a great effect upon holiday traffic, for more visitors than usual went to the various seaside and holiday resorts, and outdoor entertainments were successfully carried on without any interruption.

Dr. W. N. Shaw, Mr. W. H. Dines, Mr. F J. Brodie, Captain M. W. C. Hepworth, Mr. W. W. Bryant, Dr. H. R. Mill, Mr. F. Druce, Mr. H. Southall, and the President, took part in the discussion on this paper, and Mr. Marriott replied.

The following were elected Fellows of the Society:—Mr. W. R. Baldwin-Wiseman, Assoc. M.Inst., C E., Mr. W. W. Bryant, F.R.A.S., Lieut. Hon. F. G. P. Butler, R.N., Mr. J. R. Gibbs, Mr. H. J. W. Gidley, Prof. J. W. Hoffman, Mr. E. W. Kitchin, Assoc. M.Inst., C.E., Mrs. M. Lane, Mr. C. L. J. M. Parkinson, M.A., Mr. H. J. B. Powell, Assoc. M.Inst., C.E., Mr. A. S. Tuxford, and the Hon. H. A. Wyndham.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

THE GREEN FLASH.

With reference to the letter of Mr. R. C. Cann Lippincott on the Green Ray, in the Magazine for this month, I desire to state that on several occasions I had the opportunity of observing this phenomenon on board the "Durham Castle," while we were passing up the Red Sea. The ray appeared to me to be bluish-green, and I cannot say that I ever observed the emerald-green noticed by others. My physiological studies of subjective colour phenomena led me at first to account for the green or bluish-green ray on the physiological theory; but when I noticed that the phenomenon was seen not when the portion of the sun's disc was red, but when it had a yellowish tinge, and further when I saw the phenomenon at *sunrise*, as described by Dr. Rambaut in his admirable article, I became at once a convert to the physical theory. Dr. Rambaut's arguments are absolutely convincing, and they give a rational explanation which I feel sure will convince anyone who studies them carefully. JOHN G. McKENDRICK.

Maxieburn, Stonehaven, 26th November, 1906.

It is to me very difficult to understand how anyone who has observed the green flash, and has carefully read Professor Rambaut's admirable papers (pp. 21-23 and 41-45), can doubt that the true cause of the phenomenon is atmospheric dispersion. But, as at least one of your correspondents (p. 190) still believes the flash to be merely a subjective colour due to physiological causes, I should like briefly to demonstrate that such cannot be the case. The fact that the flash has often been seen just before sunrise is, as the Editor pointed out (p. 11), a disproof of the hypothesis that the appearance is due to retinal fatigue; but I wish to add from my own experience an even more conclusive disproof.

The sun was sinking behind a low horizontal narrow bank of cloud, between which and the horizon was a strip of clear sky. Just as the top of the sun disappeared behind the upper edge of the cloud, I saw a green flash, and just as the base of the sun appeared below the lower edge of the cloud, I saw a red flash.

Both flashes are simply and completely explained by dispersion, but it is impossible to explain the flashes physiologically, except on the hypothesis that the sun's disc was first red and then, a few minutes later, green! As a matter of fact, the disc was yellow all the time.

Under exceptionally good conditions, the flash is blue rather than green; and I have seen the flash change from green to blue, the blue

being followed by a faint feathery wisp of violet—a rare and beautiful close.

I may add that on clear days I have watched the low sun dozens of times with a telescope (power about 100), and have invariably noticed that the upper part of the disc is fringed with bluish-green, and the lower part with orange-red, the atmosphere acting like a prism, with the refracting edge upward. As the sun sinks, both fringes grow in colour and in breadth, and at sunset—without any breach of continuity—the upper fringe becomes the green flash, always visible in clear weather with a telescope of sufficient power, but not always developed enough to be seen by the naked eye.

It may be of interest to mention that, with the aid of a telescope, the green flash has also been seen at the setting of the planet Jupiter; and, as the image of every star observed telescopically near the horizon is drawn out into a short vertical spectrum, I see no reason to doubt that, under favourable conditions, the green flash could be telescopically observed at star-set in the case of bright stars.

C. T. WHITMELL.

Leeds, 25th October, 1906.

MR WHITMELL'S letter in your last number indicates what appears to be the best method of attacking the question why the Green Flash is so seldom seen. It is possible to guess at the reasons why he failed to see it on the four occasions specified by him, and if other competent observers were to record their experiences in like manner, it would soon be discovered whether these guesses were correct, or the explanation had to be sought elsewhere. In Nos. 1 and 2 the non-appearance of the flash may have been associated with the colour of the sun, for reasons previously stated. Another of the three determining factors referred to by Mr. Whitmell, viz.: "the refractive condition of the air," may have been responsible for the failure in the case of No. 5, as the sun set behind a ridge of Snowdon, and consequently the atmospheric refraction would not be so great as if it had set at a lower altitude. This factor may also have operated to a slight extent in No. 3, but the bank of cloud seems to have been too low to account fully for the non-appearance of the flash. Perhaps some of the less refrangible rays from the sun, which would otherwise have passed over the observer's head, may have grazed the lower surfaces of minute water drops in the cloud and been reflected downwards so as to reach the eye along with the flash, and thus neutralize its green colour.

If the green flash were a complementary effect, as suggested by Mr. Lippincott, it should be best seen when the sun is of a reddish colour, but the reverse is rather found to be the case.

ALEX. THURBURN.

Keith.

WHY?

THE children in a country school (who keep a rain record) propounded two questions a week or two ago, which I found it difficult to answer. Perhaps you will kindly inform them and me—

(1) Why do rain-drops differ so much in size?

(2) Why is the distant view, across the Severn to the Welsh hills, often so remarkably clear before rain? A. F.

[These questions are easy to ask, but though we could discourse on both topics for a considerable time, we could not formulate concise replies that would have any chance of satisfying the questioners. We invite answers from our readers, but restrict each answer to fifty words as a maximum.—ED. *S.M.M.*]

THE SUMMER RAINFALL OF 1906.

IF it is not too late, I should like to put before your readers some figures of the Mid-Wessex Rainfall Association which will serve to corroborate *both* sides of the contrast given in letters which you have published—from Mr. Horner, of Worthing, in September, and from Earl Waldegrave, of Chewton Priory (on the N. slope of the Mendip Hills) in October, the first affirming a remarkable summer drought, the second a very ample summer rainfall.

Our Association covers an area of about 35 miles diameter, with 32 corresponding members. On its outer edge are found Glastonbury, Cranmore, Mere (Wilts), Shaftesbury, Sturminster Newton, Sherborne, Beaminster, Crewkerne and Langport. If through the centre of this district a line be drawn E. and W., the region to the S. of it is that where most rain was to be expected, and where in January, February, October and November most actually fell. But for seven months in succession, March to September, this condition was most remarkably reversed. Towards Devon and in Dorset the rainfall was very low through all those months. Even in May two stations near the Devonshire border registered less than 2 inches, and in other months totals below 1 inch were common to the S. of the said line. But to the N. of it May gave from 4 to 5½ inches, and in the three summer months there was not even one case of a monthly total below the inch. In September half our stations recorded less than an inch, but all those which reported less than ·80 in. were either on the line or well to the south of it.

The northernmost of our stations is at Cranmore Hall Gardens, 8 miles from Chewton Priory, at the same elevation, *i.e.*, nearly 600 ft., but on the S. side of the Mendip ridge. Here the rainfall for June, July and August was 6·82 in., being the highest but one on our list, and not so very far short of Earl Waldegrave's 8·75 in.

Our southernmost station is Beaminster, ordinarily having much the same rainfall as Cranmore. Its rainfall for the same period was

3·64 in., quite the lowest on our list, and not so very much more than Mr. Horner's 2·97 in.

Careful records have been kept at Cranmore now for 20 years, and Mr. Moore reports that this year's aggregate for the first 11 months has in that time been exceeded only twice—viz., in 1894 and 1903.

H. A. BOYS, F.R.Met.Soc.

North Cadbury Rectory, Somerset, Dec. 4th, 1906.

METEORS AND FIREBALLS.

MR. HUNTLEY has put a "?" after his title "an audible meteor" on p. 190. I do not know whether he doubts that what he saw was a meteor, or that a meteor emits an audible sound. That there is no room for doubt on the latter point is proved by many instances, of which I may recall a few—for memory as to such things is short-lived.

The great meteor of November 20th, 1887, was heard at many points throughout its course from Newmarket to near Swindon. See *Met. Mag.*, Vol **22**, pp. 161–167; also *Trans. Hertford Nat. Hist. Society*, Vol. **5**, part 2.

That of January 25th, 1894 (*Met. Mag.*, Vol. **29**, p. 8) was heard across Herefordshire, Worcester and Gloucestershire.

The Madrid meteor of February 10th, 1896 (*Met. Mag.*, Vol. **31**, pp. 11, 25) produced a sound which lasted two minutes.

The daylight meteor of January 9th, 1900 (*Met. Mag.*, Vol. **35**, p. 6) produced "sounds resembling peals of thunder"; and, elsewhere, "a long trail of smoke with a rumbling noise in the air."

Whether the sounds which accompanied the Hereford earthquake and meteors of December 17th, 1896, were due at all to the latter must remain an open question.

The Editor's note on "The Fireball of May 13th" (p. 191), "that it does not follow that the impression produced on the eye by a sudden light corresponds to the real phenomenon," recalls an occurrence which I received a full account of at the time, but have not hitherto reported.

It happened sometime since at a large isolated house in Herefordshire. A heavy thunderstorm was in progress. A visitor, a scientific observer, was watching it from the dining-room window, which looks east over the lawn and grounds in front of the house away to the Malvern Hills. The servants were in the servants' hall at the back of the house, with windows looking south into a large courtyard surrounded, except to the west, by high buildings. A loud explosion was heard. The visitor in the dining-room saw a large ball of fire apparently descend and burst upon the lawn. At the same moment, the servants saw a similar ball descend and burst upon the woodstack in the S.W. corner of the courtyard. Careful

examination immediately followed. No damage was found to any of the buildings or the lawn, and the woodstack was undisturbed.

Unless we assume a plurality of "fireballs" at the same instant (for there was but one explosion), which seems most improbable, it is obvious that none of the observers saw the actual flash. Their eyes were affected by the effect of the sudden light of the flash (wherever it was) upon the particular point to which their gaze at the moment was directed; in the one case the lawn, in the other the woodstack.

I have long doubted whether the zig-zag lines which we are accustomed to regard as the actual discharges are such in fact; at least in many instances. That we do often see the actual discharge I do not deny. This doubt was borne in upon me while observing a storm at Charlton Kings, August 21st, 1898 (*Met. Mag.*, Vol. **33**, p. 136). The storm with heavy rain approached from the direction of Gloucester. I noticed several flashes all taking, apparently, the same zig-zag path. Suddenly the rain ceased, the nimbus cloud opened in a great rift, revealing behind it a sharply-defined mass of electrical cumulus with an edge, lit by the setting sun, exactly in the position of, and with an outline corresponding to, the apparent path of the flashes which I had been watching. Evidently what I had seen was the reflection from the surface of the cloud of a flash behind or within the cloud.

If this is so, it explains the phenomena of the ribbon-flash frequently seen in photographs. If a second discharge occurs before the plate is removed a second image of the outline of the cloud would appear at a slight distance from, but parallel to, the former figure, the cloud having moved slightly between the two discharges, and thus the combined images would present the appearances of a ribbon with two bright edges, the interval being affected by a double exposure.

The phenomenon at Morchard Bishop appears to me explicable as follows. The observer looking through the space between the trees could not locate either the distance or the plane of what he thought was the descent of a ball. The apparent breaking up of the ball into sparks of fire would be the lighting up of a low bank of ragged clouds. Those who watched the storm of August 2nd in this year, will see an analogy to the extraordinary coruscations then observed, only those appeared to pass upward instead of downward.

JAMES G. WOOD.

115, Sutherland Avenue, W., November 17th, 1906.

[In justice to Mr. Huntley, we must state that the title of his letter, "?" and all, was editorial, but in justice to ourselves we may point out that in the "Contents" the "?" was removed on the better impulse of a second thought.—Ed., *S.M.M.*]

A LUNAR DOUBLE RAINBOW.

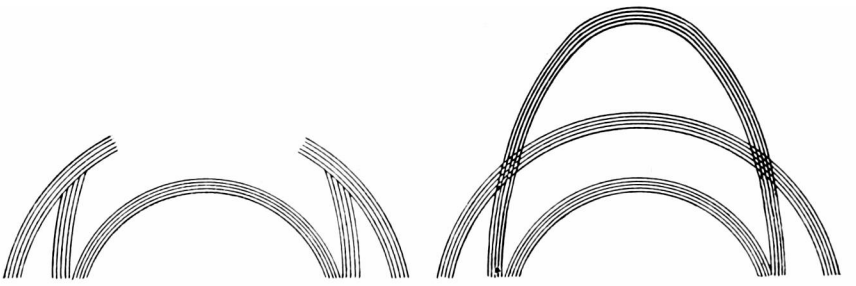
IT may interest your readers to learn that shortly before 8 o'clock of the evening of Thursday, November 29th, a splendid lunar double rainbow with prismatic colours was seen from this, stretching across the western horizon. In the primary bow the several colours of the spectrum were clearly visible. The secondary arch was faint and gave the pale white light usual in lunar rainbows. A moderate W.S.W. gale was blowing at the time, and on it were borne numerous showers of fine rain. While the beautiful bow adorned the western horizon, in the eastern part of the zenith a coloured corona surrounded the moon. A double coloured lunar rainbow is, I believe, very uncommon. The phenomenon was greatly admired by all those who were fortunate enough to observe it.

ARTHUR R. MOORE, B.A., B.L.

40, Fitzwilliam Square West, Dublin, Dec. 4th, 1906.

RAINBOWS.

THIS afternoon we saw a *very* bright, but not perfect, treble rainbow, partly as sketched below (Fig. 1)—the top parts invisible, the lower parts of all three very bright. Some 30 years ago I saw a *perfect* treble rainbow, but cannot quite remember whether the top was pointed or shaped like an egg, as I have sketched (Fig. 2). At that



time there was also another faint round one, making *four*. Are they often seen? W. R. NASH.

Carke-in-Cartmel, 17th October, 1906.

AURORA BOREALIS.

A VERY bright display of Aurora was visible here on November 16th, being first observed at 6 a.m., about an hour and a half before sunrise. The greater part of the sky was covered with thin cirro-stratus, through which the brighter stars were visible. The primary arc of the Aurora spanned the sky from about N.E. to S., and was distinctly brighter on the N.E. side. Beneath the lowest arc the segment of sky was of a greyish hue. It was apparent that several arcs entered into the composition, the lowest being of a deep greenish blue hue, the second a vivid yellow, and the whole being

surmounted by an arc of a rosy hue. From the primary arc there was a frequent display of rays and streamers, varying in colour from pale pink to blood red, and appearing to spring from a centre at about E.S.E. Much of the brilliance of the display was lost, owing to the rapid approach of dawn, but distinct traces of the phenomenon were still visible at 7.15 a.m., and then appeared to be slowly breaking up, the red being the last to disappear. At 9 a.m. on the same day there was a very bright prismatic solar halo, and in the S.E. a peculiar shimmering glow of a pink hue, varying in intensity of colour, with a twitching movement.

It is certainly a somewhat remarkable coincidence that the last brilliant auroral display occurred almost exactly a year ago, November 15th, 1905. (See this Magazine for December, 1905.)

SPENCER C. RUSSELL, F.R.Met.Soc.

Parkside, Ashley Road, Epsom, Nov. 17th, 1906.

METEOROLOGICAL NEWS AND NOTES.

PROFESSOR MASCART is, we learn, retiring from the position of Director of the Central Bureau of Meteorology in Paris, and he will be succeeded in that post by M. Angot.

INFORMAL METEOROLOGICAL DISCUSSIONS have again been arranged at the Meteorological Office, 63, Victoria Street, Westminster, for the purpose of considering important contributions to Meteorological literature, particularly papers by foreign and colonial authors Two meetings have already been held, the remainder are provisionally arranged for the following Mondays in 1907, at 5 p.m.: January 14th and 28th, February 11th and 25th, March 11th and 25th. Dr. Shaw will be glad if any persons interested in meteorology would attend and take part in the discussions.

MR. W. MARRIOTT will lecture on meteorological subjects on behalf of the Royal Meteorological Society at the Literary and Scientific Institution, Highgate, on December 18th, and to the Young People's Society at the Oaklands Congregational Church, Uxbridge, on January 15th.

THE RAINFALL OF NOVEMBER, 1907, in the British Isles, was remarkably uniform over the country, the dry eastern regions showing a large excess over the average, and the wet western regions showing a corresponding deficiency. Ireland was very dry, especially in the south; and the whole of Cornwall, Devon, Somerset, Wales, Cheshire, part of Lancashire, the Southern Uplands, and west coast of Scotland had less than the average, while several stations in Kent had nearly twice the average fall, and some in the north-east of Scotland more than twice. The eleven months of 1907 showed a close approach to average rainfall. The general percentage of the average for England and Wales was 101, for Scotland 108, and for Ireland 95; the British Isles as a whole coming out at 101.

TEMPERATURE FOR NOVEMBER, 1906.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	TEMPERATURE. Max.		TEMPERATURE. Min.		No. of Nights at or below 32° Shade.	No. of Nights at or below 32° Grass.
		° ′	° ′		°	Date.	°	Date.		
Camden Square	*London*	51 32	0 8	111	60·1	22	29·7	19	3	5
Tenterden	*Kent*	51 4	*0 41	190	60·0	22	31·0	19	1	7
West Dean	*Hampshire*	51 3	1 38	137	59·0	22	22·0	13	5	11
Hartley Wintney	,,	51 18	0 53	222	59·0	22	24·0	12	5	8
Hitchin	*Hertfordshire*	51 57	0 17	238	61·0	22	28·0	13‡	4	...
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	60·0	22	26·0	19	4	11
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	60·5	21	28·5	19	4	...
Brundall	*Norfolk*	52 37	*1 26	66	...	...	...	...	...	...
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	57·0	22	24·7	13	8	12
Torquay (Cary Green)	*Devon*	50 28	3 32	12	59·2	22	32·7	13	0	7
Polapit Tamar [Launceston]	,,	50 40	4 22	315	58·5	22	21·5	13	6	13
Bath	*Somerset*	51 23	2 21	67	60·2	22	24·5	13	7	...
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	60·0	22	29·0	12	4	...
Church Stretton (Woolstaston)	*Shropshire*	52 35	2 48	800	58·0	22, 25	23·5	19	16	...
Bromsgrove (Stoke Reformatory)	*Worcestershire*	52 19	2 4	225	58·0	22	24·0	18	10	...
Boston	*Lincolnshire*	52 58	0 1	25	60·0	22	29·0	19	2	...
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	59·9	22	29·2	6	4	13
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	...	...	...	...	...	...
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	59·0	22	30·5	19	1	10
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	60·0	22	30·0	19	2	9
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	...	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	56·6	24	32·6	19	0	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	..	..	...	...	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	56·5	21	30·2	5	5	12
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	58·0	22	23·0	10	...	...
Llandudno	*Carnarron*	53 20	3 50	72	62·0	22	34·0	14	0	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	56·0	22, 23	29·0	19	4	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	58·0	25	26·0	18	7	14
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	60·3	24	33·4	18	0	4
Colmonell (Clachanton)	*Ayr*	55 8	4 54	140	57·0	21	27·0	9	2	...
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	57·0	21, 22	32·0	5§	4	18
Tighnabruaich	*Argyll*	55 55	5 14	50	...	...	28·0	9	8	9
Mull (Quinish)	,,	56 36	6 13	35	57·0	22	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	58·4	22	32·0	10	1	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	...	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	58·0	24, 28	26·0	20	6	...
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	62·0	23	31·0	21	4	...
Castletown	*Caithness*	58 35	3 23	100	62·0	23	28·0	10‖	8	10
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	63·0	25	29·0	1	...	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	56·5	16, 26	26·0	3	5	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	59·0	25	26·0	19	7	...
Carlow (Browne's Hill)	*Carlow*	52 50	6 53	291	...	...	...	...	...	...
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	64·4	24	33·0	20	0	7
Ballinasloe	*Galway*	53 20	8 15	160	67·0	22, 23	24·0	2	9	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	...	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	55·0	22	29·0	10	4	8
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	59·0	22, 23	27·0	17	9	10

‡ and 19, 20. § and 9, 18, 20. ‖ and 17, 21, 22.

RAINFALL FOR NOVEMBER, 1906.

RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.					
Aver. 1870-99.	1906.	Diff. from Av.	% of Av.	Max. in 24 hours.		No. of Days	Aver. 1870-99.	1906.	Diff. from Aver.	% of Av.	Mean Annual 1870-1899.	STATION.
in.	in.	in.		in.	Date.		in.	in.	in.		in.	
2·45	4·20	+1·75	171	·93	8	17	23·04	22·06	— ·98	96	25·16	Camden Square
3·22	5·80	+2·58	180	·88	4	22	25·62	25·35	— ·27	99	28·36	Tenterden
3·25	4·05	+ ·80	125	·95	8	21	27·19	28·05	+ ·86	103	29·93	West Dean
3·03	3·96	+ ·93	131	·85	8	18	24·55	24·26	— ·29	99	27·10	Hartley Wintney
2·56	4·02	+1·46	157	1·26	8	17	22·61	23·23	+ ·62	103	24·66	Hitchin
2·63	3·89	+1·26	148	1·67	8	14	24·48	23·53	— ·95	96	26·75	Addington
2·50	3·83	+1·33	153	·77	8	16	23·28	24·65	+1·37	106	25·39	Westley
2·71	4·25	+1·54	157	·95	8	22	23·27	26·23	+2·96	113	25·40	Brundall
4·82	4·77	— ·05	99	1·03	20	19	34·87	36·71	+1·84	105	39·00	Winterbourne Stpltn
3·71	3·48	— ·23	94	·78	8	20	31·54	27·00	—4·54	86	35·00	Torquay
4·29	4·17	— ·12	97	·78	20	21	34·46	35·55	+1·09	103	38·85	Polapit Tamar
3·06	3·00	— ·06	98	·85	8	17	27·99	25·37	—2·62	91	30·75	Bath
2·99	3·79	+ ·80	127	1·37	8	16	27·37	25·37	—2·00	93	29·85	Stroud
3·18	3·60	+ ·42	113	·75	8	20	30·12	26·97	—3·15	90	33·04	Woolstaston
2·27	2·33	+ ·06	103	·54	8	10	22·55	21·49	—1·06	95	24·50	Bromsgrove
2·14	2·84	+ ·70	133	·70	8	16	21·51	21·40	— ·11	99	23·30	Boston
2·10	2·72	+ ·62	130	·67	8	16	22·68	20·90	—1·78	92	24·70	Hodsock Priory
2·28	2·60	+ ·32	114	...	...	..	23·90	21·73	—2·17	91	26·18	Derby
3·91	3·74	— ·17	96	·67	16	18	38·24	44·64	+6·40	117	42·43	Bolton
2·23	3·67	+1·44	165	·70	4	20	24·77	25·55	+ ·78	103	26·96	Ribston Hall
6·00	7·70	+1·70	128	1·20	29	25	54·55	62·33	+7·78	114	60·96	Arncliffe Vic.
2·45	3·61	+1·16	147	1·13	8	17	24·66	23·48	—1·18	95	27·02	Hull
2·65	3·32	+ ·67	125	1·03	2	18	25·35	26·35	+1·00	104	27·99	Newcastle
13·91	13·85	— ·06	100	2·30	28	20	117·98	118·91	+ ·93	101	132·68	Seathwaite
4·26	3·85	— ·41	90	·82	20	20	38·38	40·74	+2·36	106	42·81	Cardiff
5·41	4·23	—1·18	78	·86	20	21	42·66	45·56	+2·90	107	47·88	Haverfordwest
4·68	3·09	—1·59	66	·64	18	17	40·92	42·37	+1·45	104	45·41	Gogerddan
3·38	2·46	— ·92	73	·66	18	15	28·03	29·08	+1·05	104	30·98	Llandudno
4·50	3·46	—1·04	77	·54	2	16	38·75	41·25	+2·50	106	43·43	Cargen
3·29	2·88	— ·41	88	·31	1	21	29·86	31·62	+1·76	106	33·04	Riddell House
...	3·61	...	...	·61	7	20	...	30·07	...	...	...	Edinburgh
4·87	3·30	—1·57	68	·74	2	18	40·03	36·94	—3·09	92	44·85	Colmonell
3·48	4·32	+ ·84	124	·57	29	19	32·27	36·59	+4·32	113	35·80	Glasgow
6·21	5·84	— ·37	94	·85	29	21	51·57	60·27	+8·70	117	57·90	Tighnabruaich
6·43	5·43	—1·10	84	·72	21	22	51·05	48·17	—2·88	94	57·53	Quinish
2·76	3·75	+ ·99	136	·85	1	17	26·22	24·95	—1·26	95	28·95	Dundee
3·94	6·72	+2·78	171	...	...	...	32·92	35·04	+2·12	106	36·07	Braemar
3·47	4·34	+ ·87	125	·78	5	19	29·62	31·47	+1·85	106	33·01	Aberdeen
2·65	5·24	+2·59	198	1·06	17	20	26·84	29·98	+3·14	112	29·37	Cawdor
5·98	6·71	+ ·73	112	1·25	29	18	49·33	53·52	+4·19	108	56·00	Invergarry
9·79	11·75	+1·96	120	1·87	17	23	77·46	84·95	+7·49	110	86·50	Bendamph
3·26	8·66	+5·40	266	1·77	19	20	28·21	38·19	+9·98	135	31·60	Dunrobin Castle
...	5·97	...	...	·87	17	28	...	34·47	...	..	...	Castletown
5·85	3·08	—2·77	53	·66	22	23	51·47	41·41	—10·06	80	58·11	Killarney
3·91	2·17	—1·74	56	·71	20	14	34·99	30·93	—4·06	88	39·30	Waterford
3·19	1·58	—1·61	50	·28	20	17	30·10	33·21	+3·11	110	33·47	Hurdlestown
3·14	1·67	—1·47	53	·30	14	14	30·98	25·47	—5·51	82	34·44	Carlow
2·60	1·56	—1·04	60	·26	4	17	25·36	21·00	—4·36	83	27·75	Dublin
3·60	1·62	—1·98	45	·24	29	21	33·41	33·67	+ ·26	101	37·04	Ballinasloe
8·25	5·52	—2·73	67	·60	14	19	71·24	65·14	—6·10	91	80·23	Kylemore House
5·63	3·46	—2·17	61	·78	21	23	44·69	45·42	+ ·73	102	50·50	Enniscoe
3·94	2·74	—1·20	70	·39	19	20	34·97	30·59	—4·38	87	38·61	Seaforde
4·19	4·62	+ ·43	110	·49	19	21	36·89	38·47	+1·58	104	41·20	Londonderry
3 ·53	3·74	+ ·21	106	·45	18, 26	21	34·08	39·00	+4·92	114	37·85	Omagh

SUPPLEMENTARY RAINFALL, NOVEMBER, 1906.

Div.	STATION.	Rain. inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	6·04	XI.	Rhayader, Tyrmynydd	5·62
,,	Ramsgate, West Cliff Villas	4·57	,,	Lake Vyrnwy	4·99
,,	Hailsham	7·26	,,	Llangyhanfal, Plâs Draw	2·18
,,	Crowborough, Uckfield Lodge	8·92	,,	Criccieth, Talarvor	1·91
,,	Osborne, Newbarn Cottage.	4·74	,,	Llanberis, Pen-y-pass	11·90
,,	Emsworth, Redlands	4·73	,,	Lligwy	2·89
,,	Alton, Ashdell	4·81	,,	Douglas, Woodville	4·30
,,	Newbury, Welford Park	5·20	XII.	Stoneykirk, Ardwell House	3·25
III.	Harrow Weald, Hill House.	4·14	,,	Dalry, The Old Garroch	5·99
,,	Oxford, Magdalen College..	3·20	,,	Langholm, Drove Road	4·77
,,	Bloxham Grove	3·59	,,	Moniaive, Maxwelton House	3·93
,,	Pitsford, Sedgebrook	3·60	XIII.	N. Esk Reservoir [Penicuick]	6·60
,,	Huntingdon, Brampton	4·02	XIV.	Maybole, Knockdon Farm..	3·40
,,	Wisbech, Bank House	2·90	XV.	Campbeltown, Witchburn	5·91
IV.	Southend Water Works	4·37	,,	Inveraray, Newtown	7·63
,,	Colchester, Lexden	4·09	,,	Ballachulish House	6·48
,,	Newport, The Vicarage	4·12	,,	Islay, Eallabus	5·00
,,	Rendlesham	4·01	XVI.	Dollar Academy	4·71
,,	Swaffham	3·44	,,	Loch Leven Sluice	4·64
,,	Blakeney	3·78	,,	Balquhidder, Stronvar	...
V.	Bishops Cannings	3·31	,,	Perth, Pitcullen House	3·57
,,	Ashburton, Druid House	4·44	,,	Coupar Angus Station	3·67
,,	Okehampton, Oaklands	4·55	,,	Blair Atholl	4·29
,,	Hartland Abbey	3·17	,,	Montrose, Sunnyside Asylum	3·87
,,	Lynmouth, Rock House	5·20	XVII.	Alford, Lynturk Manse	6·78
,,	Probus, Lamellyn	3·78	,,	Keith Station	7·66
,,	Wellington, The Avenue	3·27	XVIII.	N. Uist, Lochmaddy	4·09
,,	North Cadbury Rectory	2·96	,,	Alvey Manse	6·26
VI.	Clifton, Pembroke Road	2·90	,,	Loch Ness, Drumnadrochit.	3·45
,,	Moreton-in-Marsh, Longboro'	3·51	,,	Glencarron Lodge	11·38
,,	Ross, The Graig	2·42	,,	Fearn, Lower Pitkerrie	5·46
,,	Shifnal, Hatton Grange	3·04	XIX.	Invershin	8·19
,,	Cheadle, The Heath House.	3·03	,,	Altnaharra	8·66
,,	Coventry, Kingswood	2·98	,,	Bettyhill	6·78
VII.	Market Overton	4·01	,,	Watten Station	4·58
,,	Market Rasen	3·85	XX.	Dunmanway, The Rectory..	4·07
,,	Bawtry, Hesley Hall	2·58	,,	Cork	3·14
VIII.	Neston, Hinderton	1·81	,,	Darrynane Abbey	3·50
,,	Southport, Hesketh Park	2·48	,,	Glenam [Clonmel]	2·04
,,	Chatburn, Middlewood	4·59	,,	Ballingarry, Gurteen	1·88
,,	Cartmel, Flookburgh	3·91	,,	Miltown Malbay	3·01
IX.	Langsett Moor, Up. Midhope	5·70	XXI.	Gorey, Courtown House	2·22
,,	Scarborough, Scalby	3·68	,,	Moynalty, Westland	1·91
,,	Ingleby Greenhow	4·86	,,	Athlone, Twyford	1·41
,,	Mickleton	3·85	,,	Mullingar, Belvedere	2·44
X.	Bardon Mill, Beltingham	3·35	XXII.	Woodlawn	2·23
,,	Ewesley, Fallowlees	4·27	,,	Westport, Murrisk Abbey..	2·96
,,	Ilderton, Lilburn Cottage..	2·65	,,	Collooney, Markree Obsy..	2·82
,,	Keswick, York Bank	4·84	XXIII.	Enniskillen, Portora	2·87
XI.	Llanfrechfa Grange	3·55	,,	Warrenpoint, Summer Hill.	2·53
,,	Treherbert, Tyn-y-waun	7·94	,,	Banbridge, Milltown	2·62
,,	Carmarthen, The Friary	4·32	,,	Belfast, Springfield	3·41
,,	Castle Malgwyn [Llechryd].	3·33	,,	Bushmills, Dundarave	3·90
,,	Plynlimon	10·65	,,	Stewartstown, The Square..	2·69
,,	Tall-y-llyn	3·70	,,	Killybegs	7·73
,,	New Radnor, Ednol	4·24	,,	Horn Head	4·88

METEOROLOGICAL NOTES ON NOVEMBER, 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.—Another persistently mild month; the max. temp. failed to reach 50° on 6 days only, and the mean temp. was 46°·7, or 3°·7 above the average. The first and third weeks were decidedly wet, and sunless and gloomy conditions were prevalent almost throughout. Duration of sunshine 29·9* hours and of R 68·3 hours.

Tenterden.—The wettest month since February, 1900, and the wettest November since 1877; but notwithstanding, the well water was at the same level as in August. Mean temp. 47°·1. Duration of sunshine 44·5† hours.

Crowborough.—Gloomy and wet with few sunny intervals. The R was more than double the average of 35 years and the greatest in November since 1877, when 9·04 in. fell. Mean temp. 45°·3.

Osborne.—R 50 per cent. above the average of 48 years.

Torquay.—Duration of sunshine 72·9* hours, or 3·6 hours above average. Mean temp. 47°·6, or 0°·2 above the average. Mean amount of ozone 4·1.

Ross.—The last week was very fine and warmer than ever known so late in November. The max. temp., 60°·7 on 22nd, was also a record. Much fog.

Bolton.—Generally mild and open, with deficiency of sunshine. The duration of sunshine was only 14·1 hours, or 9·7 hours below the average. Mean temp. 44°·7, or 1°·9 above the average.

Southport.—Characterized by numerous trying changes of temp., including an unusually low min. and an exceptionally high max. Mean temp. 45°·4, or 1°·4 above the average. Duration of sunshine 45·6* hours, or 3·4 hours below the average, and of R 43·1 hours.

Carmarthen.—Generally wet, gloomy and dull, with few fine dry days. Mild, with only slight frosts, the foliage remained unusually long on the trees.

Douglas.—Wet and sunless, with an almost unbroken series of gales, especially severe at night. Cold to 22nd, but very mild thereafter, the temp. exceeding the average by upwards of 6° in the last week.

Coupar Angus.—The mean temp., as in the three preceding months, was above the average, being 43°·4. R ·73 in. above the average.

Blair Atholl.—Remarkably mild, especially from 21st to 29th. On 12th and 13th ripe raspberries were gathered in the open garden.

Lynturk.—The R was much above the average, 3·00 in. falling on 1st and 2nd and 4·63 in. on the first five days. Strong winds in the latter half.

Drumnadrochit.—R ·33 in., and rain days 6, above the average of 20 years. The whole month was genial with high temp., and its chief feature was the extraordinary rise of temp. on the morning of 22nd.

Watten.—Wet and stormy with fine and mild intervals; little frost.

Dunmanway.—A mild month, especially from 21st to 29th, with little frost. The R was not large for November, but the atmosphere was extremely damp from 21st to the end.

Cork.—R ·92 in. below, and mean temp. 1°·3 below, the average.

Darrynane.—R 68 per cent. of the average.

Markree Observatory.—On the whole mild and damp, but the R was not above the average. Several gales with H from 15th to the end.

Dublin.—Open, cloudy and windy, but with quiet cold spells at the beginning and from 17th to 21st. On the latter date a remarkable period of warmth began suddenly, lasting till the close. The mean temp. of 22nd was 60°·0, or 16°·0 above the average, and the mean temp. of the month was 47°·6, or 2°·2 above the average. Sharp TS on 4th.

Omagh.—The month commenced damp and humid, giving way in the second week to a spell of remarkably fine and rainless weather. Another wet, cold and stormy interval occurred from 13th to 21st, but the mildness of the remainder of the month was quite extraordinary.

* Campbell-Stokes. † Jordan.

Climatological Table for the British Empire, June, 1906.

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	80·9	20	39·8	5	71·7	49·5	51·5	75	131·9	32·9	2·89	8	...
Malta	89·0	30	58·3	11	80·3	64·6	62·3	75	...	52·1	·07	2	2·9
Lagos	87·5	11	71·0	15	83·9	73·9	78·6	80	137·0	69·0	22·30	21	8·1
Cape Town	75·2	15	40·6	27	62·6	50·1	48·8	76	...	...	2·63	13	5·3
Durban, Natal	82·4	17	50·8	27	76·7	54·6	...	...	132·4	...	1·02	5	1·9
Johannesburg	66·5	21	25·7	24	59·6	41·5	35·1	63	124·8	21·2	·00	0	0·9
Mauritius	79·1	12	53·5	30	76·4	62·1	59·8	75	138·0	46·4	1·80	16	6·3
Calcutta	100·2	2	74·7	7	93·2	79·1	77·8	80	158·7	72·1	6·38	9	7·4
Bombay	93·2	6	75·2	13	87·8	79·0	77·1	82	138·8	73·9	13·20	22	7·8
Madras	106·1	2	75·8	14	97·3	80·8	73·9	69	149·5	74·5	2·40	6	6·4
Kodaikanal	74·6		50·7	16	65·6	53·8	51·5	77	145·6	39·2	2·06	16	7·8
Colombo, Ceylon	88·2	2,3,5	73·4	22	86·7	78·2	74·0	80	149·0	72·8	3·66	18	6·7
Hongkong	90·6	20	74·2	2	87·2	78·9	75·4	79	145·6	...	5·90	16	6·5
Melbourne	69·0	2	33·7	11	59·6	46·7	45·1	78	118·7	28·0	1·51	10	6·3
Adelaide	70·2	2	44·5	11	62·7	50·1	48·7	78	122·1	37·1	5·18	16	6·5
Coolgardie	75·9	13	36·0	17	63·6	44·6	42·8	66	136·8	29·9	1·31	6	4·4
Sydney	68·9	19	43·1	25	62·4	49·5	45·5	79	102·4	31·9	1·83	25	4·2
Wellington	58·5	6	34·5	26	54·2	44·0	42·7	78	101·0	25·0	2·42	12	5·2
Auckland	63·0	8	39·0	11	56·7	47·1	44·9	80	112·0	32·0	1·54	11	5·7
Jamaica, Negril Point	89·7	23	70·4	30	86·0	74·3	74·5	82	...	...	8·24	12	...
Trinidad	...	...	...	...	...	...	...	...	...	...	...	...	...
Grenada	86·0	1	70·0	22	83·1	73·8	71·2	81	143·0	...	12·90	29	5·2
Toronto	91·0	29	42·2	12	...	...	...	...	...	...	3·80	16	6·0
Fredericton	88·7	19	33·5	12	...	...	...	55	...	...	2·53	10	4·0
Winnipeg	84·8	14	42·2	4	...	...	...	72	...	...	6·30	13	6·0
Victoria, B.C.	77·5	24	42·4	14	...	...	...	...	...	...	·65	14	5·0
Dawson	...	...	...	...	...	...	...	...	...	...	...	...	...

MALTA.—Mean temp. of air 71°·0, or 0°·6 below the average. Mean hourly velocity of wind 9·2 miles, or 0·5 above average. Mean temp. of sea 70°·9.

LAGOS.—On the 26th, 8·30 in. R fell.

Mauritius.—Mean temp. of air 0°·3, dew point 1°·3, relative humidity 2 per cent., and R ·26 in. below, averages. Mean hourly velocity of wind 9·4 miles.

KODAIKANAL.—Bright sunshine 90 hours. Much cloud and R below average.

COLOMBO.—Mean temp. of air 81°·9, or 0°·8 above, of dew point 0°·1 below, and R 4·39 in. below, averages. Mean hourly velocity of wind 9·7 miles.

HONGKONG.—Mean temp. of air 82°·4. Bright sunshine 246·5 hours or 95·3 hours above, and R 10·9 in. below, averages. Mean hourly velocity of wind 10·3 miles.

Adelaide.—Mean temp. of air 56°·4, or 3°·0 above, and R 2·22 in. above, average. Only one wetter June in the 50 years, viz., 6·02 in 1887.

Sydney.—Mean temp. of air 1°·6 above, and R 3·51 in. below, averages.

Wellington.—Mean temp. of air 0°·4 below, and R 2·65 in. below, averages.

Auckland.—Mean temp. of air 2°·0 below, R one-third of the average and the lowest rainfall for June except 1890.