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THE CLIMATOLOGICAL ATLAS OF INDIA.

We welcome the largest and most elaborate contribution to the Climatology of the British Empire in the splendid Atlas* by Sir John Eliot, which has just been published.

Volumes 13 and 14 of the *Indian Meteorological Memoirs* gave a summary of the instrumental observations made in India down to 1900, and the data there published in figures are now presented in the more expressive form of maps. Consistency is hard to attain in any large undertaking, and perhaps hardest of all in dealing with observations of the various elements of climate in all parts of a great tropical country, where most of the observers are natives, to whose minds the scientific method is not the most congenial. The Indian Meteorological Service has passed through three stages of evolution, the first prior to 1865, during which such records as existed were the result of local and often spasmodic effort, the second down to 1875, when the importance of the records was realised, and their organization taken in hand by the provincial governments, under different directors, pursuing different methods; and the third since 1875, when the whole system of observations in India was placed under the control of the Imperial Indian Government, and the entire direction confided to one eminent meteorologist. Thus by the close of the nineteenth century there was available for discussion a great amount of meteorological observations, extending over 25 years, obtained under uniform conditions by fairly trained and competently inspected observers. This is the mass of material which is now before us elaborated into 120 plates of beautifully executed coloured maps, and forming a unique storehouse of the climatology of a great unit of tropical land.

The maps are accompanied by a brief explanatory text, which

* *Climatological Atlas of India.* Published by the authority of the Government of India, under the direction of Sir John Eliot, K.C.I.E., F.R.S., late Meteorological Reporter to the Government of India and Director-General of Indian Observatories. Issued by the Indian Meteorological Department, 1906. (Copies of this work may be procured through Messrs. John Bartholomew and Co., The Geographical Institute, Edinburgh. Price, per copy, 27 rupees in India, and 36 shillings in the United Kingdom). Size 18 × 12½. Pp. xxxii. + 120 plates.

adds to their value, and whets the anticipations of the Handbook of the Meteorology of India, which is being compiled as a companion work to the Atlas. There is a mechanical difficulty about the letterpress of this Atlas, which affects the short-sighted reader most unpleasantly: the lines are ten inches long, and in travelling back after following one line to the end, the eye is apt to fall upon the wrong line for the next beginning. Double column printing would have saved a good deal of strain and fatigue to many students.

The first plate in the Atlas is a double page orographical map of India, which brings vividly before the eye the physical contrasts of the country—the low Indo-Gangetic plain in the north, with the huge wall of the Himalaya and the vast plateaus of Tibet and Afghanistan beyond on the northern side, and the moderate elevations of the Deccan filling the peninsula on the southern; and on the east beyond the Bay of Bengal the parallel ranges of south-running mountains in Burma. The main contour lines indicating these all-important features form an unobtrusive background on the maps of meteorological conditions which follow. Then comes a double page map showing the complicated political divisions of India, distinguishing States which remain under native rulers, and thus helping to make clear one of the chief difficulties in securing a uniform system of meteorological observations over a territory which is larger than all Europe outside Russia, and contains more separate units of government. A set of four smaller maps show the rainfall divisions adopted by Mr. Blanford and Sir John Eliot respectively, the medical provinces and the divisions used in the Indian Daily Weather Report.

Pressure and winds are shown in two double page charts of the whole Indian Ocean area for the extreme months January and July. The authority for the winds over the Indian Ocean is not stated, but they are obviously the result of observations and not deduced from the isobars, for in some instances they blow in opposition to the barometric gradients shown; the general scheme of circulation is however perfectly clear, the air flowing from India towards Africa and Australia in January, and towards India from Africa and Australia in July.

The remaining maps refer to the Indian Empire alone. They deal with the various meteorological elements with a degree of detail never hitherto attempted. For pressure and wind there are first of all thirteen plates, giving for each month and for the year the conditions prevailing at 8 a.m., and on a smaller scale at 10 a.m. and 4 p.m. The two latter are particularly interesting, for they show the space as well as the time relations of the great and regular diurnal range of pressure in the tropics, (in some parts of India ·170 in. on the average of a month) and in many places we observe the pressure gradients and wind-directions reversed between forenoon and afternoon. In the annual map for instance at 10 a.m. the isobar of 29·800 inches only occupies a small area on the Indus,

and pressures exceeding 29·875 occur in the south-west, while at 4 p.m. the whole of India is subject to a lower pressure than 29·800, and in the north-west it is below 29·675. A second series of thirteen plates gives for each month and the year the mean pressure for the day, and the diurnal range expressed in two ways, first as actually observed, and second as calculated from the readings reduced to sea level. From the uncertainity of reducing the barometer readings of very lofty stations, none above 3000 feet are utilized, the maps only going as far to the north as Peshawar, Simla, and Darjeeling.

Thirteen plates are next devoted to mean temperatures, dealing with the mean of the day, the mean maximum, and the mean minimum for each month and the year, the data being calculated on a 20 years' average, and reduced to sea level by applying the correction of 1° for every 450 feet of elevation (instead of 1° for 300 feet usually adopted for temperature maps of the world). The average temperature of India being 80°, the colouring of all the maps is so adjusted that temperatures above 80° are indicated in red; below it in green. Mean maximum temperatures of over 100° appear in March, and the area they affect is greatest in May when they prevail over the greater part of India, and they appear for the last time in September.

Another set of thirteen plates is devoted to temperature, showing the diurnal range, the absolute maximum and the absolute minimum for each month and the year. Such data as the two last, which depend on various conditions, cannot be expected to yield perfect results when expressed by lines of equal values, but they are graphic representations all the same. The highest extremes occur in the Indus valley, where minima of 25° or less are recorded near Peshawar in December and January, and maxima of 125° and more about Jacobabad, half-way between Peshawar and the sea, in June and July. The greatest diurnal range (averaging 35° over a month) occurs in September, October and November in the same region of the North-west.

The series of 26 plates devoted to humidity include maps for each month and for the year of the mean relative humidity, and of the mean absolute humidity, expressed as vapour pressure; in each case the daily mean, 8 a.m. mean and 4 p.m. mean for the month being given. These are novel maps full of interesting features. The most striking contrasts are exhibited in the maps for 8 a.m., which show relative humidities of over 90 per cent. for almost every month in Eastern Bengal and Assam, while on the opposite side of India the relative humidity varies with the season from 50 per cent. to less than 30 per cent. There is naturally a much greater diurnal variation of relative than of absolute humidity on account of the great diurnal range of temperature.

A beautiful series of cloud maps for the day and for 8 a.m. and 4 p.m. is another novel feature, and the system of colouring from clear blue for less than one-tenth of the sky clouded to a dark

neutral tint for more than seven-tenths is extremely effective. It is surprising to find that an observation so much affected by the personal equation as is the estimation of cloudiness by eye, yields such satisfactory maps; the general map for the year exhibits a steady diminution of cloudiness from south-east to north-west.

Two sets of maps are devoted to rainfall, the first giving for each month and for the year what is termed the normal rainfall, with the number of days on which the rainfall exceeded ·10 in., and the storm tracks; the second giving the seasonal rainfall and the number of rain days, together with maps of the computed atmospheric pressure at 10,000 feet.

We could wish for more practical details as to the data and methods in the introductory text; it would not have taken much more space to give a general statement as to, *e.g.*, the exposure of thermometers, the height of rain-gauges, the exact period used for calculating averages, and in cases where the averages of different periods at different stations are included a short statement of the probable differences in amount between the averages for the various periods. No doubt all these particulars may be gleaned from the Indian Memoirs, but the Atlas is bound to come into the hands of many who have not access to those volumes. In the case of the rainfall maps, which are based on the records of some 2000 stations, all of which cannot have been in operation during the whole period, the want of information as to the precise conditions implied by the word "normal" is particularly felt, and if it had been possible to give a map showing by dots the distribution of all the stations utilized, it would have been very helpful in the effort to deduce from the maps the exact relation of rainfall to configuration and prevailing winds, the general trend of which is very distinctly shown.

The Atlas taken in conjuction with the Memoirs published already, and the Manual that is to follow, will give the completest account of the climatology of a large country which we possess, and apart from any other publication the Atlas alone is a magnificent acquisition, a very mine of meteorological relationships, for which we cannot be too grateful to the enlightenment of the Indian Government, the patient labour of Sir John Eliot and his assistants, and the technical perfection of the Edinburgh Geographical Institute.

A PLEA FOR THE TEACHING OF METEOROLOGY.

By R. H. Curtis.

The growth of an intelligent interest in meteorology on the part of the general public is manifesting itself in several ways. One very unmistakeable sign of it, which everyone may note, is to be found in the amount of attention which is now paid to the subject of the weather by the daily press, and particularly to the forecasts of the weather published every morning. Not so very long ago there were comparatively few people who troubled themselves to look at these forecasts at all, and the majority of those who did do so regarded

them as little more than guesses,—generally good guesses, perhaps, because they were understood to have been made by people who had given more than ordinary attention to the subject, and presumably had by dint of long practice acquired more skill in reading the signs of coming changes in the weather than ordinary folk possessed; but they were rated as guesses nevertheless, with no more really scientific basis than existed for the predictions of "Old Moore." But to-day the change is great. The forecast is the first thing looked at by thousands of men and women when they open their morning paper at breakfast, or in the train, or on their way to business; and these forecasts are treated with respect as being scientific deductions from observed conditions of the atmosphere, considered in relation to the laws, as far as they are known, by which the movements of the atmosphere are governed. That is the gist of the reply which probably the majority of those who study the forecasts would make if asked to give their opinion about them, although, likely enough, very few could go a step further and give even the most elementary account of the laws themselves. It is, however, a step in advance that the public mind is beginning to accept the fact that there are any "laws" at all in the matter, and to recognize that the daily sequence of weather is not simply fortuitous,—the result of the purest chance. When so much is admitted, a desire on the part of many to get some sort of acquaintance with the laws is sure to follow, and the day when all ordinarily well-educated people will possess at least some elementary ideas of a sound nature about meteorology will thereby be brought considerably nearer.

But signs of the spread of this spirit of enquiry are not wanting even now, and its progress would seem to be more real than possibly many meteorologists suppose. Indeed it may not be amiss to express the hope that some meteorologists may themselves be stirred to acquire a better knowledge of the theoretical side of the subject than they already possess, for it is not an unknown experience to meet with men who make daily observations of the barometer and of temperature, who have a rain gauge, and know all about the rainfall of the district in which they live, and who locally have the reputation of being "meteorologists," but who nevertheless would be sorely puzzled if asked to describe a typical "depression," or to explain what is known as "Buys Ballot's law."

Anyone passing the Meteorological Office in Victoria Street might see at almost any time in the day people stopping at the door, not merely to scan the forecasts exhibited there, but also to study the charts hung by their side, upon which the forecasts are based. Not infrequently when friends are examining these charts together, an interesting discussion, or perhaps explanation, may be heard regarding the relation of the forecast to the conditions indicated by the chart; it is not always that these explanations proceed upon orthodox lines, although frequently they do, but be that as it may they show that the broad principles of the subject are receiving

some attention, and to that extent they are welcome indications of progress to all who are interested in the furtherance of the study of meteorology.

Another and still more promising indication of progress may also be noticed at the door of the Meteorological Office, at a particular part of the day, when the students from a neighbouring training college for schoolmasters going for, or returning from, their daily walk, gather in small groups round the charts, discussing the sequence of changes shown during the past few days, and sketching in their note books the present distribution of pressure and of temperature, and the wind circulation, with a view to subsequent class lectures on the subject. In the direction which this fact indicates lies, we think, the great hope of popularizing the science of meteorology. Hitherto it has been almost entirely omitted from the curricula of our schools, and from the training of the teachers. Smatterings of it have found their way into that olla-podrida of the sciences which under the name of "physiography" has for years been a favourite subject with school teachers in the annual South Kensington Science examinations; but since in addition to meteorology the paper in this subject usually embraces questions in astronomy, geology, vulcanology, chemistry, and possibly other branches of science as well, it is obvious that the modicum of knowledge of each which a student who aspired to grapple with such a "general knowledge" paper would probably acquire, would be insufficient to enable him to teach any of them.

But why should not meteorology now be regarded as a science sufficiently mature to be able to stand upon its own feet, and why should not school teachers be encouraged to take a course of study in meteorology as complete as is now usual in the case of botany or of physiology? Teachers would then have a real acquaintance with the subject, and would be able to impart their knowledge satisfactorily to their pupils; and without doubt both teachers and taught would find the subject at once interesting and useful.

There are teachers who have already made this discovery and have profited by it. Of course in some schools, such as those for young seamen, or those for students of agriculture, meteorology naturally secures a prominent place; but in some "public elementary" schools the subject is also taught so far as first principles are concerned, and the interest of the pupils is further secured by getting them to observe instruments which have been provided as part of the school equipment.

In this country we, as a rule, move slowly, and although the inclusion of meteorology in the ordinary curriculum of school instruction has been advocated for many years, very little has yet been done to bring it about. But the growth of general interest in the subject to which we have drawn attention should we think aid materially in its accomplishment, and with the further development of that interest the time when meteorology shall form a common subject in schools of all grades should not be very distant.

THE RAINFALL OF OCTOBER AND OF 1906.

OCTOBER is normally the wettest month in the year over the greater part of the British Isles, and the month recently ended has exceeded its reputation, for as the mean of 52 well distributed stations the general rainfall of the British Isles has exceeded the average by 42 per cent. The value given for Londonderry in the Table is not supported by other stations, and it seems possible that a mistake has been made in copying the record. Assuming that this is so, the only place where the rainfall of October fell below the average was the extreme north-east of Scotland, where the month was comparatively dry at the stations in Sutherland and Caithness. The excess in the West Highlands was slight, and there were patches in the Lake District, in Wales, Cornwall and Devon, and round the Thames estuary, where the excess did not exceed 25 per cent. London, with only 11 per cent. excess, was one of the driest parts of the country, but the higher land of the Thames valley was nearly the wettest, the rainfall in parts showing an excess of more than 66 per cent. The wettest part of the country, except for a solitary high reading at Aberdeen, was the belt from the Humber to the Severn, where for so many months there has been the greatest drought.

During October there was an exceptionally large number of wet days, but none of excessive wide-spread wetness. Falls of an inch or more in 24 hours occurred only at 25 stations of the 52 under consideration, and at these they were experienced in the track of one or other of the numerous depressions which crossed the country, over 1 inch being measured on the 1st, 2nd, 11th, 18th, 19th, 25th, 26th, 27th, 28th and 30th. The month may thus be classed as generally wet, by whatever standard one cares to employ.

The result of this wet month on the average rainfall of so much of the year as has passed is to wipe out the deficiency of rainfall produced by the dry summer, and up to October 31st the rainfall of the British Isles as a whole was exactly equal to the average. There was very little variation throughout the country, the only large area still uncompensated for the summer drought being the east, south-east, and centre of England, where the deficiences ranged from 5 to 13 per cent. of the average. The extreme rainfall of the first fortnight of November has made it extremely probable that 1906 will have to be classed as a "wet year."

If the relationship between autumn rainfall and the following wheat harvest holds good the prospects for next year are not promising, but on the other hand the replenishment of springs and wells has been going on apace, and the storage of underground water—a subject on which we know far too little—should be satisfactorily advanced for the season.

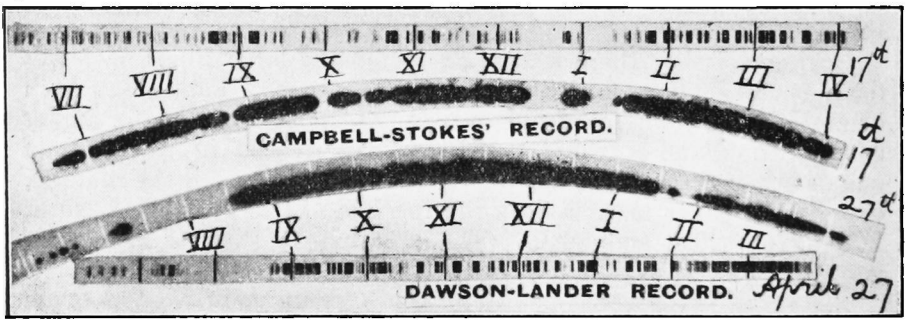
Correspondence.

To the Editor of Symons's Meteorological Magazine.

PHOTOGRAPHIC SUNSHINE RECORDERS.

YOU ask for the opinions of your readers on the relative merits of the photographic and burning sunshine recorders. I have made a careful comparison of these instruments for many years, and my opinion is that the Meteorological Office should have condemned the ferroprussiate paper instead of the recorder. I am convinced that ferroprussiate paper is quite unsuitable. Besides the difficulty of making different batches equally sensitive, it is impossible to keep this sensitiveness for very many months. An observer, who has both recorders, recently showed no less than 200 hours too little sunshine in one year compared with the Campbell-Stokes, and when I asked him the reason, he said it was the paper.

After much experiment I determined that a special kind of collodio-chloride of silver paper was the most suitable, and this has



now been used for some years in my sunshine-recorders all over the world. Gelatino-chloride of silver is useless, as the damp sets up a mouldy growth in the gelatine which soon spoils the paper, but collodion is quite unaffected by damp. If, as you suggest, there is to be a fresh comparison of sunshine-recorders, I trust that this paper will be used. I have modified the aperture of the Jordan pattern recorder to suit this paper, and also to enable, if desired, the same strip of paper to be used for a week. This makes a very simple and inexpensive sunshine-recorder, and is much superior to the Campbell-Stokes. The latter instrument is good enough on a clear bright day with no passing clouds, but if any of your readers at mid-day in summer expose a chart for only *10 seconds* they will find that the record measures nearly *10 minutes*. Therefore, on days with much passing cloud the burns spread and run into each other, and

give a very erroneous record. This is well shown in the photograph. The Campbell-Stokes recorder at 6 a.m. on April 27th gave a correct record, the sun's rays at that early hour not being very hot, but later in the day the record is one of almost continuous sunshine, instead of being a typical April day—showers and sunshine. Some years ago when I pointed out this fault of the Campbell-Stokes to the Meteorological Office, I was told that *uniformity* was more essential than *accuracy*. I admit that uniformity is absolutely essential, but I totally fail to see why it must be *uniformity of error*.

A. LANDER.

Canterbury.

THE GREEN FLASH.

I READ with much pleasure Mr. Thurburn's very thoughtful contribution to this subject in your September issue (pp. 150–1). I have waited until your October number came out in the hope that some correspondent, more competent than myself, would have dealt with the matter. The points brought forward by Mr. Thurburn to account for the absence of the green flash when circumstances appear favourable deserve to be very carefully considered, and I think that they furnish at least a partial solution of the problem.

At every clear sunset the telescope shows us the sun's upper limb fringed with the more refrangible colours—the green and blue. Whether, when the sun's tip disappears, this effect of atmospheric dispersion will give rise to a green flash visible to the naked eye will depend (I think) upon three factors—the brightness, the extent, and the duration of the flash. The duration may be largely affected by the observer's latitude and the extent by the refractive condition of the air. Mr. Thurburn has well pointed out conditions that may affect the brightness.

I append a list of a few recent observations made this year. The letter O denotes an opera glass, power three; the letter B a binocular, power nine.

(1.) *11th June*, 8 h. 25 m. p.m., Leeds, distant land horizon. Sun red. No flash seen. Used O.

(2.) *8th July*, 8 h. 28 m. Locality as in (1). Sun deep yellow. No flash. Used O. Evening beautifully clear.

(3.) *24th July*, 8 h. 0 m. Locality as in (1), but sun set behind a low bank of cloud with a slightly frizzy edge. No flash. Used B.

(4.) *31st July*, 8 h. 0 m. Locality as in (1). A faint, but unmistakable green flash. Evening very clear. Used B. In the morning there had been a thunderstorm.

(5.) *22nd August*, 7 h. 0 m. Pass of Llanberis. Land horizon, formed by a ridge of Snowdon. Perfectly clear. No flash. Used B.

It will be noticed that though aided by a glass, I saw the flash only once in these five attempts.

C. T. WHITMELL.

Invermay, Leeds, 18th October, 1906.

THE duration of the visionary image produced by looking at a bright coloured object depends on several conditions; as, for example, the condition of the atmosphere, the condition and direction of the eye of the observer, the time the object is looked at, etc.

When the eye is in a condition of complete repose, and therefore susceptible, as in the evening twilight or on waking in the morning, it will, if a bright-coloured object is looked at for a moment, produce out of itself a visionary image of this object in the complementary colour. This visionary image will itself last only a second or so, and may well be described as a "flash."

The reason that the phenomenon is so seldom seen is probably due to the fact that special conditions are necessary for its production. The condition of the atmosphere must be suitable; the physical and other features of the place where the sun is rising or setting, and of the district between the observer and the sun must be favourable. The eye of the observer must be susceptible, and it must be properly directed and so on.

It must be remembered that the rising or setting sun makes a notch in the horizon. This is probably the reason why the tips of the segment may appear red, changing to green in the complementary image, while the middle is white or yellowish. It may perhaps be seen better through a telescope, because the telescope brings the sun and the portion of sky near it closer to the observer.

One cannot expect everyone to think alike, and here is an example: The very same phenomenon, which I am convinced is physiological, some others consider to be physical and due to refraction.

I cannot believe that the phenomenon has ever been seen, unless the red edge or red colour or red ray of the rising or setting sun has been first seen above the horizon.

R. C. CANN LIPPINCOTT.

Over Court, Almondsbury, Bristol, 5th November, 1906.

AN AUDIBLE METEOR?

BETWEEN half-past ten and a quarter to eleven on the night of August 7th last I was riding home on my bicycle, when I distinctly heard a faint but clear sound above my head like that made by a rocket as it passes through the air at a considerable distance. On

looking up I saw a shooting-star still on the move, but leaving a streak of light behind it. It is difficult to describe, but when I first looked up there was a streak of light which got increasingly longer from one end until after quite an appreciable time the moving end suddenly stopped. The streak seemed to remain still for a while, and then quite gradually ceased to exist, the light diminishing from both ends and then going out.

I should like to know whether you think the sound heard had anything to do with what I saw, as the combination of the two things struck me as being very odd. I may add that the night was a fine one and very still.

E. HUNTLEY.

Friars Street, Sudbury, Suffolk, September 13th, 1906.

FIREBALL.

On Sunday, 13th May, 1906, I was watching the heavy rain, hearing the rattling of the large hailstones and listening to the near and deafening noise of the rumbling thunder, when suddenly I thought "How strange, I have not seen one flash of lightning!" I leaned forward to have a wider range through the open window, when I saw a large, dark egg-shaped ball swiftly falling straight down from the sky in the open space between two elm trees on the lawn and a fir-tree. When the ball came to about the height of the latter, it suddenly collapsed and sparks of fire flew about in all directions like a magnificent firework. I was so startled that I fell back, but afterwards looked out to see if there was any impression made on the ground. I could see nothing, sheep, lambs, the cob and pony, were grazing, but not near the spot. Two miles away glass was broken and grass burned during the storm.

When the ball split, a solid lump of rather *light* looking fire (like the colour of a blaze) issued forth, at first more from the bottom than the sides, and this emitted thousands of red-hot (bright deep red) sparks which flew in all directions, taking a circular shape. It all happened in the wink of an eye. It seemed to my sight the size of a goose's egg, but my naturally long sight is defective from age. The servant describes it as "a large globe." She is near-sighted.

S. E. L. G.

East Woolsery, Morchard Bishop.

[There is a great deal of uncertainty in the records of all sudden appearances of short duration, and it does not follow that the impression produced on the eye by a sudden light corresponds to the real phenomenon. The above description, however, appears worthy of being placed on record.—Ed., *S.M.M.*]

STORM CLOUDS ON NOVEMBER 3rd.

POSSIBLY readers may have studied the remarkable cloud forms which brought the heavy rain of November 3rd.

At Ide Hill, near Sevenoaks, the forenoon was mild and sunny, and the woodland foliage, having at length after several weeks succumbed to the chill embrace and waning light of autumn, was all aglow in shades of gold, orange, russet and carmine, with warm and gentle sunshine. But in accordance with the inclemency of late autumn, this fitful gleam of sunshine proved of short duration, and in less than three hours the air was becoming harsh and cold, whilst dark lowering cumulus clouds of bold and mountainous form, with patches of glaucous sky interspersed, were moving rapidly from the southward, causing the coloured landscape to assume an expression at once sombre, impressive and beautiful.

About 3 p.m. heavy rain, accompanied by occasional thunder and lightning of slight intensity, commenced to fall, and continued till late in the evening. I may add that as I was walking after dark in the heavy rainstorm from Ide Hill to Sevenoaks, pheasants in the woods were calling vehemently.

The electric potential gradient during the day over the south of England must have been very steep, and we may presume that but for the absence of a dry stratum of air between the thunderclouds and the ground, equilibrium would have restored itself by violent disruptive discharges, instead of by a nearly quiet flow of electricity along the moist conducting paths.

The weather chart for 8 a.m. on November 3rd shows a distribution of pressure favourable to thunderstorms.

L. C. W. BONACINA.

November 4th, 1906.

HEAVY RAINFALLS.

THE rainfall at Sunderland for the 24 hours ending at 8 a.m. on October 19th amounted to 2·13 inches. This is the second time this year that the amount for 24 hours exceeded 2 in. (see this Magazine, p. 92). The same occurred in 1900. From September 25th, 1888, inclusive, this is the eighth time a fall has exceeded 2 inches, but it is remarkable that between September 19th, 1859, when over 2 inches fell, and that date, there was no such fall.

T. W. BACKHOUSE.

West Hendon House, Sunderland, 22nd October, 1906.

RAINFALL TERMINOLOGY.

RE term for a rainy period. Why not use "Drench"? Is it not quite as appropriate as "Drought"?

CH. P. HOOKER.

Dollarward House, Cirencester.

THE RAINFALL OF BEIRA.

THE Companhia de Moçambique has forwarded to us the readings of rainfall taken at Beira, from August, 1901, to July, 1906. We quote below the four complete years of this record, which is remarkable for the extreme variability of the monthly values. It would appear that the five months from November to March constitute the wet season, the seven months from April to October being dry. The two parts of the year divided in this way give the following totals of rainfall.

	1901-2.	1902-3.	1903-4.	1904-5.	1905-6.	Average.
November to March..	46·30	25·23	55·27	43·12	31·77	40·34
April to October.....	6·77	12·52	17·68	3·68	No obs.	10·16

It is probable in view of the extreme variability which this table shows that if the record were longer it might be necessary to alter the limits of the wet and dry seasons. We are not informed whether this record was taken from the great rain gauge, a photograph of which was given in this Magazine, Vol. **40**, p. 204, but presume that it was so.

Rainfall at Beira, Portuguese East Africa, lat. 19°50′ *S., long.* 34°50′ *E.* 50 *feet above the sea.*

	1902.	1903.	1904.	1905.
January	8·65	10·47	18·01	3·34
February	10·46	3·35	10·30	11·39
March	18·70	5·06	13·22	15·93
April	·59	2·76	8·74	·29
May	2·25	2·75	3·57	·61
June	·29	·29	·19	·20
July	·42	·10	1·31	·96
August	·41	5·11	·74	1·14
September.....	·51	1·00	·93	·48
October	2·30	·50	2·21	...
November	4·34	9·58	2·12	3·96
December	2·00	4·18	10·33	9·40
Total	50·92	45·15	71·67	47·70

METEOROLOGICAL NEWS.

LECTURES ON METEOROLOGICAL SUBJECTS, under the scheme of the Royal Meteorological Society, will be given by the Society's Lecturer, Mr. W. Marriott, on November 14th at the College, Eastbourne; on the 24th at St. Felix School, Southwold; on the 28th at Christ's College, Brecon, and on December 18th at the Literary and Scientific Institution, Highgate.

REVIEWS.

Studies on the Diurnal Periods in the Lower Strata of the Atmosphere. (*Reprints from the Monthly Weather Review*, 1905.) By FRANK HAGAR BIGELOW, M.A., L.H.D., Professor of Meteorology. Washington, 1905. Size $11\frac{1}{2} \times 9\frac{1}{2}$. Pp. 52.

PROFESSOR BIGELOW here embodies the results of a discussion of data derived from balloon and kite ascents made at Berlin, Trappes, Hald and Blue Hill, during the past ten years, regarding the periodic diurnal variations occurring in those strata of the atmosphere lying between sea-level and an altitude of two miles, in temperature, pressure, vapour tension, electric potential, co-efficient of dissipation of electric charges, and action of the magnetic force. The periodic daily temperature variations occurring in the free atmosphere, which are different from, and often inverted with regard to, those at the surface, the diurnal, semi-diurnal, and tri-diurnal temperature waves, are held to explain the periodic daily pressure changes, the temperature waves affecting the density, and therefore the pressure of the air in the different strata, rather than evoking dynamic pressure waves as suggested by Lord Kelvin. The fact that the atoms and molecules of the atmospheric gases undergo partial "ionization" when exposed to certain conditions is brought forward to elucidate the problems of the diurnal periods of the terrestrial magnetic force and electric potential gradients. The free electric charges or "ions," the products of temporarily ruptured molecules of aqueous vapour or atoms of the elementary gases oxygen and nitrogen, by moving from one level to another, occasion the hourly variations of the magnetic field; by shifting from one hemisphere to another produce the daily variations of the field, auroral displays, Earth-currents, and by acting in conjunction with the diurnal temperature variations in the free air, originate the changes in the electric potential gradient.

The sun is to be regarded as a variable star. The variability in the intensity of solar activity as registered by the sun's spots, but more actively by its atmospheric hydrogen prominences, is shown from curves obtained by comparing the variations in solar activity with those in the activity of the Earth's magnetic field, and by computing the mean annual pressures and temperatures for the years 1872—1900, at several hundred stations scattered over the globe, to have a counterpart in the variability of the Earth's magnetic field and in changes of temperature and pressure in the Earth's atmosphere, through the electro-magnetic radiation of the sun; it is further demonstrated that while increased solar activity manifests itself directly in the tropical regions where the sun's rays are most powerful, by increased temperature, in temperate latitudes it is associated, or apt to be associated, with lowered temperature due to the augmented flow equator-wards of cold polar winds. The variations in the amount of solar energy received by the Earth, moreover, impose a complex modification on the circulation of the Earth's atmosphere, *i.e.*, in the distribution of its pressure. L.C.W.B.

The Rains of the Nile Basin in 1905, by CAPTAIN H. G. LYONS, *Director-General Survey Department.* Cairo: 1906. Size 11 × 8. Pp. 40. Maps and diagrams.

CAPTAIN LYONS has greatly extended the rainfall observations in the Egyptian Sudan, and correlated them with observations in Abyssinia, Eritrea, and British East Africa. In this report he points out that the rainfall over the Nile area is regulated by the sun's annual motion north and south of the equator, the region of heaviest precipitation shifting its position according to the time of year so as always to be approximately beneath the vertical sun, within the central low pressure system. Thus at the equinoxes the rainfall is heaviest in the equatorial lake regions, where the White Nile has its source, whilst in June, July and August, it is heaviest in northern Sudan and the Abyssinian tableland, in December and January the rains are south of the equator. That part of the Nile basin situated between 18° and 30° N. is practically rainless, but the delta which lies north of 30° N. comes within the influence of the Mediterranean winter rains. In 1905 the number of stations to afford rainfall measurements was seventy-eight, against forty-six in 1904, and the number of stations which merely record rain days was forty-four. The rainfall during 1905 was generally deficient over the Nile Basin. Over the delta the winter rainfall was fairly large as compared with that of 1904, the total depth at Alexandria during the six months January—March, and October—December, amounting to 10·6 inches; the importance of this winter rain is in connection with the barley crop. Over the Blue Nile plains the summer rains were abundant, but on the Abyssinian tableland, where, during the months of July and August the total amount of precipitation normally amounts to 27·5 inches, they were greatly deficient. The basins of the White Nile, Sobat and Bahr-el-Jebel, also experienced a great deficiency of rainfall.

The Nile flood* was only ·65 of an average flood, the average being based upon 163 years of reliable records. During the past ten years the value of the "flood" has slightly exceeded the average in 1896 and 1898, but has been below it in the other eight years. From the few existing records of the water-level of the Bahr-el-Jebel and of the rainfall over the basin of that river it has been found that the amount of rain which falls over a certain part of the basin has a special effect upon the water-level, and this fact should therefore be taken into consideration in the formulation of any project for increasing the volume of water which enters the White Nile.

Captain Lyons finds confirmation in 1905 of the relation between the rainfall of Abyssinia and the atmospheric pressure over north-eastern Africa, which he previously pointed out, viz.: that in years of scanty flood pressure is nearly always excessive, and *vice-versâ*.

L. C. W. B.

* Reckoned upon the volume of water passing Aswan between July 1st and October 31st.

TEMPERATURE FOR OCTOBER, 1906.

STATION.	COUNTY.	Lat. N.	Long. W. [-E.]	Height above Sea. ft.	TEMPERATURE. Max. °	Max. Date.	Min. °	Min. Date.	No. of Nights at or below 32° Shade.	Grass.
		° ′	° ′							
Camden Square	*London*	51 32	0 8	111	71·0	1	35·4	26	0	0
Tenterden	*Kent*	51 4	*0 41	190	72·0	11	34·0	15	0	4
West Dean	*Hampshire*	51 3	1 38	137	69·0	1	30·0	26	2	6
Hartley Wintney	,,	51 18	0 53	222	69·0	1, 17	30·0	26	1	6
Hitchin	*Hertfordshire*	51 57	0 17	238	69·0	9	33·0	26	0	...
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	69·0	1	31·0	26	1	6
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	73·0	11	35·0	26	0	...
Brundall	*Norfolk*	52 37	*1 26	66	...	...	...	...	...	...
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	64·6	3	27·5	31	3	8
Torquay (Cary Green)	*Devon*	50 28	3 32	12	65·9	3	35·1	31	0	1
Polapit Tamar [Launceston]	,,	50 40	4 22	315	64·0	3	31·2	20	1	5
Bath	*Somerset*	51 23	2 21	67	68·0	1	33·5	20	0	0
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	69·0	1	37·0	13	0	...
Church Stretton (Woolstaston)	*Shropshire*	52 35	2 48	800	63·0	1	26·0	14	7	...
Bromsgrove (Stoke Reformatory)	*Worcestershire*	52 19	2 4	225	66·0	3	27·0	19	3	...
Boston	*Lincolnshire*	52 58	0 1	25	66·0	11	33·0	20	0	...
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	68·9	10	32·9	26	0	9
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	70·0	1	34·0	19	0	...
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	65·0	1, 5	32·2	14	0	4
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	71·0	10	35·0	29	0	6
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	...	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	63·7	11	28·5	14	2	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	...	...	...	...	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	62·6	1	28·8	20	1	5
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	68·0	5	27·0	9	4	...
Llandudno	*Carnarvon*	53 20	3 50	72	66·0	1	35·0	30	0	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	63·0	10	28·0	14	3	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	64·0	2	26·0	28	5	11
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	64·1	5	31·5	30	2	3
Colmonell (Clachanton)	*Ayr*	55 8	4 54	140	63·0	2, 3	25·0	29	2	...
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	63·0	7	26·0	14	2	15
Tighnabruaich	*Argyll*	55 55	5 14	50	58·0	7	30·0	30	2	3
Mull (Quinish)	,,	56 36	6 13	35	57·0	22	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	64·9	7	29·8	30	2	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	..	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	65·0	5, 6	25·0	29	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	64·0	7	28·0	30	3	...
Castletown	*Caithness*	58 35	3 23	100	63·0	7	23·0	30	5	5
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	69·5	2	32·5	19	0	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	65·0	8	28·0	20	4	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	64·0	7	30·0	18†	4	..
Carlow (Browne's Hill)	*Carlow*	52 50	6 53	291	...	...	...	...	...	...
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	65·1	6	32·9	20	0	3
Ballinasloe	*Galway*	53 20	8 15	160	69·0	21	23·0	19, 20	12	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	...	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	61·0	1, 10	29·0	27	2	8
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	...	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	63·0	10	27·0	19	6	8

† and 19, 31.

RAINFALL FOR OCTOBER, 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.	
2·85	3·15	+ ·30	111	·47	29	17	20·59	17·86	—2·73	87	25·16	Camden Square
3·60	4·52	+ ·92	126	1·16	30	18	22·40	19·55	—2·85	87	28·36	Tenterden
3·53	5·81	+2·28	165	·89	18	25	23·94	24·00	+ ·06	100	29·93	West Dean
3·08	5·11	+2·03	166	1·14	18	21	21·52	20·30	—1·22	94	27·10	HartleyWintney
2·72	4·19	+1·47	154	·83	18	21	20·05	19·21	— ·84	96	24·66	Hitchin
2·89	3·94	+1·05	136	·78	2	19	21·85	19·64	—2·21	90	26·75	Addington
2·66	4·52	+1·86	170	·94	29	17	20·78	20·82	+ ·04	100	25·39	Westley
2·98	3·17	+ ·19	106	1·01	2	18	20·56	21·98	+1·42	107	25·40	Brundall
4·33	6·86	+2·53	158	1·09	1	26	30·05	31·94	+1·89	106	39·00	Winterbourne Stpltn
4·09	4·52	+ ·43	111	·72	9	22	27·83	23·52	—4·31	84	35·00	Torquay
4·97	5·72	+ ·75	115	·92	1	26	30·17	31·38	+1·21	104	38·85	Polapit Tamar
3·22	4·91	+1·69	152	·83	2	25	24·93	22·37	—2·56	90	30·75	Bath
3·10	5·35	+2·25	173	1·09	2	27	24·38	21·58	—2·80	89	29·85	Stroud
3·99	5·46	+1·47	137	·71	17	27	26·94	23·37	—3·57	87	33·04	Woolstaston
2·55	4·34	+1·79	170	·72	18	22	20·28	19·16	—1·12	94	24·50	Bromsgrove
2·62	4·13	+1·51	158	1·15	2	21	19·37	18·56	— ·81	96	23·30	Boston
2·77	5·01	+2·24	181	·93	18	23	20·58	18·18	—2·40	88	24·70	Hodsock Priory
2·77	5·05	+2·28	182	·86	2	25	21·62	19·13	—2·49	88	26·18	Derby
4·72	7·36	+2·64	156	1·54	28	29	34·33	40·90	+6·57	119	42·43	Bolton
3·18	4·94	+1·76	155	·67	18	24	22·54	21·88	— ·66	97	26·96	Ribston Hall
6·55	10·63	+4·08	162	1·66	28	29	48·55	54·63	+6·08	113	60·96	Arncliffe Vic.
3·26	5·04	+1·78	155	1·36	18	20	22·21	19·87	—2·34	89	27·02	Hull
2·94	4·65	+1·71	158	1·64	18	23	22·70	23·03	+ ·33	101	27·99	Newcastle
13·35	15·87	+2·52	119	2·72	27	28	104·07	105·06	+ ·99	101	132·68	Seathwaite
4·81	7·67	+2·86	159	1·70	1	27	34·12	36·89	+2·77	108	42·81	Cardiff
5·63	8·79	+3·16	156	1·57	2	28	37·25	41·33	+4·08	111	47·88	Haverfordwest
5·58	6·77	+1·19	121	·90	17	27	36·24	39·28	+3·04	108	45·41	Gogerddan
4·08	5·23	+1·15	128	·92	17	26	24·65	26·62	+1·97	108	30·98	Llandudno
4·39	5·54	+1·15	126	1·34	26	20	34·25	37·79	+3·54	110	43·43	Cargen
3·24	5·65	+2·41	174	·75	4	26	26·57	28·74	+2·17	108	33·04	Riddell House
...	6·11	...	...	1·44	19	23	...	26·46	...	...	...	Edinburgh
4·97	7·52	+2·55	151	1·62	11	23	35·16	33·64	—1·52	96	44·85	Colmonell
3·36	5·33	+1·97	159	·80	11, 26	26	28·79	32·27	+3·48	112	35·80	Glasgow
5·72	8·92	+3·20	156	1·74	26	25	45·36	54·43	+9·07	120	57·90	Tighnabruaich
6·09	7·47	+1·38	123	·75	29	28	44·62	42·74	—1·88	96	57·53	Quinish
2·71	3·75	+1·04	138	·85	11	23	23·46	21·20	—2·25	90	28·95	Dundee
4·05	5·34	+1·29	132	...	...	...	28·98	28·32	— ·66	98	36·07	Braemar
3·18	6·23	+3·05	196	1·48	19	22	26·15	27·13	+ ·98	104	33·01	Aberdeen
2·85	4·07	+1·22	143	1·95	19	20	24·19	24·74	+ ·55	102	29·37	Cawdor
5·54	8·04	+2·50	145	·97	26	17	43·35	46·81	+3·46	108	56·00	Invergarry
9·98	10·52	+ ·54	105	1·37	27	28	67·67	73·20	+5·53	108	86·50	Bendamph
3·32	2·44	— ·88	73	1·05	19	12	24·95	29·53	+4·58	118	31·60	Dunrobin Castle
...	2·84	...	...	·59	19	25	...	28·50	...	..	...	Castletown
6·05	7·61	+1·56	126	·74	26	30	45·62	38·30	—7·32	84	58·11	Killarney
4·00	6·10	+2·10	152	1·11	11	29	31·08	28·76	—2·32	93	39·30	Waterford
3·12	5·43	+2·31	174	·67	11	26	26·91	31·63	+4·72	118	33·47	Hurdlestown
3·48	4·63	+1·15	133	·81	26	21	27·84	23·80	—4·04	85	34·44	Carlow
3·08	3·32	+ ·24	108	·50	11	22	22·76	19·44	—3·32	85	27·75	Dublin
3·45	4·69	+1·24	136	·68	27	25	29·81	32·05	+2·24	108	37·04	Ballinasloe
7·93	9·46	+1·53	119	1·60	25	21	62·99	59·62	—3·37	95	80·23	Kylemore House
5·04	6·43	+1·39	128	1·46	27	25	39·06	41·96	+2·90	107	50·50	Enniscoe
3·82	5·13	+1·31	134	·94	11	25	31·03	27·85	—3·18	90	38·61	Seaforde
4·45	3·39?	...	...	·41?	27	26	32·70	33·85?	...	...	41·20	Londonderry
3·72	5·65	+1·93	152	1·15	27	30	30·55	35·26	+4·71	115	37·85	Omagh

SUPPLEMENTARY RAINFALL, OCTOBER, 1906.

Div.	STATION.	Rain. inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	5·06	XI.	Rhayader, Tyrmynydd	8·85
,,	Ramsgate, West Cliff Villas	1·57	,,	Lake Vyrnwy	7·76
,,	Hailsham	4·97	,,	Llangyhanfal, Plâs Draw	5·97
,,	Crowborough, Uckfield Lodge	5·86	,,	Criccieth, Talarvor	5·97
,,	Osborne, Newbarn Cottage.	5·30	,,	Llanberis, Pen-y-pass	13·04
,,	Emsworth, Redlands	5·05	,,	Lligwy	6·44
,,	Alton, Ashdell	5·73	,,	Douglas, Woodville	4·80
,,	Newbury, Welford Park	5·48	XII.	Stoneykirk, Ardwell House	5·90
III.	Harrow Weald, Hill House.	3·82	,,	Dalry, The Old Garroch	8·80
,,	Oxford, Magdalen College..	3·92	,,	Langholm, Drove Road	7·19
,,	Bloxham Grove	4·89	,,	Moniaive, Maxwelton House	8·22
,,	Pitsford, Sedgebrook	4·13	XIII.	N. Esk Reservoir [Penicuick]	8·30
,,	Huntingdon, Brampton	3·41	XIV.	Maybole, Knockdon Farm..	5·80
,,	Wisbech, Bank House	2·94	XV.	Campbeltown, Witchburn	7·04
IV.	Southend Water Works	3·82	,,	Inveraray, Newtown	10·18
,,	Colchester, Lexden	3·46	,,	Ballachulish House	10·39
,,	Newport, The Vicarage	3·76	,,	Islay, Eallabus	5·74
,,	Rendlesham	3·06	XVI.	Dollar Academy	6·73
,,	Swaffham	4·58	,,	Loch Leven Sluice	5·33
,,	Blakeney	1·90	,,	Balquhidder, Stronvar	...
V.	Bishops Cannings	5·47	,,	Perth, Pitcullen House	3·39
,,	Ashburton, Druid House	8·20	,,	Coupar Angus Station	3·46
,,	Okehampton, Oaklands	6·19	,,	Blair Atholl	5·52
,,	Hartland Abbey	5·12	,,	Montrose, Sunnyside Asylum	4·03
,,	Lynmouth, Rock House	6·66	XVII.	Alford, Lynturk Manse	5·21
,,	Probus, Lamellyn	5·11	,,	Keith Station	4·76
,,	Wellington, The Avenue	4·32	XVIII.	N. Uist, Lochmaddy	4·49
,,	North Cadbury Rectory	4·47	,,	Alvey Manse	4·98
VI.	Clifton, Pembroke Road	5·88	,,	Loch Ness, Drumnadrochit.	6·27
,,	Moreton-in-Marsh, Longboro'	5·20	,,	Glencarron Lodge	8·78
,,	Ross, The Graig	4·19	,,	Fearn, Lower Pitkerrie	2·55
,,	Shifnal, Hatton Grange	4·74	XIX.	Invershin	2·72
,,	Cheadle, The Heath House.	5·57	,,	Altnaharra	3·27
,,	Coventry, Kingswood	5·00	,,	Bettyhill	2·88
VII.	Market Overton	4·44	,,	Watten Station	2·48
,,	Market Rasen	4·36	XX.	Dunmanway, The Rectory..	7·25
,,	Bawtry, Hesley Hall	4·37	,,	Cork	4·14
VIII.	Neston, Hinderton	4·35	,,	Darrynane Abbey	6·25
,,	Southport, Hesketh Park	5·62	,,	Glenam [Clonmel]	6·22
,,	Chatburn, Middlewood	6·85	,,	Ballingarry, Gurteen	4·88
,,	Cartmel, Flookburgh	6·42	,,	Miltown Malbay	7·55
IX.	Langsett Moor, Up. Midhope	7·68	XXI.	Gorey, Courtown House	4·78
,,	Scarborough, Scalby	4·85	,,	Moynalty, Westland	5·02
,,	Ingleby Greenhow	6·34	,,	Athlone, Twyford	5·84
,,	Mickleton	4·38	,,	Mullingar, Belvedere	5·89
X.	Bardon Mill, Beltingham	4·87	XXII.	Woodlawn	6·80
,,	Ewesley, Fallowlees	7·10	,,	Westport, Murrisk Abbey..	5·86
,,	Ilderton, Lilburn Cottage..	6·44	,,	Collooney, Markree Obsy..	4·78
,,	Keswick, York Bank	8·07	XXIII.	Enniskillen, Portora	4·91
XI.	Llanfrechfa Grange	7·73	,,	Warrenpoint, Summer Hill.	4·00
,,	Treherbert, Tyn-y-waun	13·35	,,	Banbridge, Milltown	5·22
,,	Carmarthen, The Friary	8·93	,,	Belfast, Springfield	4·79
,,	Castle Malgwyn [Llechryd].	8·84	,,	Bushmills, Dundarave	3·70
,,	Plynlimon	11·05	,,	Stewartstown, The Square..	4·64
,,	Tall-y-llyn	4·80	,,	Killybegs	6·51
,,	New Radnor, Ednol	6·12	,,	Horn Head	4·64

METEOROLOGICAL NOTES ON OCTOBER, 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.—A cloudy, damp and extremely mild month, with few very fine but few very wet days. The mean temp. 54°·2 was 4°·4 above the average, and the highest in October during 49 years, except 55°·3 in 1861. Duration of sunshine 56·2* hours, and of R 49·6 hours.

Crowborough.—A pleasant, genial and unusually warm month. The mean temp. was 52°·9, or 8°·5 above that of October, 1905. R 1·62 in. above the average of 35 years. Prevailing winds S. and W.

Hartley Wintney.—Storms of wind and much R, chiefly at night. The days were warm and beautiful, and absence of frost enabled oaks in the neighbourhood to retain their leaf. Ozone on 13 days; mean 3·2.

Wellington.—Almost persistently rainy, R being recorded on 26 days, with a total an inch above the average. It was generally very mild, with the exception of the last three days.

Ross.—A month with frequent R, but sunny intervals. Mean temp. 3°·1 above the average of 40 years, the mean max., 58°·3, having been exceeded twice only since 1859. No sharp frost, and only slight damage done to tender plants.

Worksop, Hodsock Priory.—Very mild; the wettest October since 1885, and the wettest month since December, 1901.

Bolton.—The warmest October on record since 1886, the mean temp. being 49°·4, or 2°·5 above the average of 20 years. The duration of sunshine was only 31·7* hours, or 25·7 hours below the average; 12 sunless days.

Southport.—Exceptionally mild, wet and sunless, with a preponderance of S.E. and S. winds, and low bar. pressure. Mean temp. 51°·7, or 2°·8 above the average. Duration of sunshine 74·5* hours, being 20·0 hours below the average, and duration of R 92·1 hours. Underground water was at a low level until the middle of the month, but subsequently rose considerably.

Haverfordwest.—Wet and stormy, most of the R falling at night. Generally mild. Agricultural operations were well advanced. Duration of sunshine 97·7* hours.

Lilliesleaf.—Remarkable for the great quantity of R, more than making up for the shortage of September. The weather was mild and good for the garden and for turnips.

Mull.—A very wet month. Violent gales from S.W. on 17th and 26th, which subsided as suddenly as they rose, but otherwise calm.

Coupar Angus.—The R was ·89 in. above the average of 26 years, and the number of rain days was the greatest in that period. The mean temp., 47°·6, had not been so high since 1886. Pasture was never more abundant so late in the season.

Altnaharra.—Exceptionally favourable weather throughout, with keen frost at night towards the end. No S below the 1000 foot line, except a shower or two, and above 2000 feet it did not remain long at any time.

Castletown—Generally fine and settled, One of the finest harvest times for many years, corn crops being practically all stacked by 25th. Strong gale from 3 to 7 p.m. on 19th, beginning and ending suddenly.

Cork. The mean temp. was normal, that of the first half being 52°·6 and of the latter half 45°·4. R ·84 in. above the average. Prevailing winds S. and N.W.

Dublin.—Mild but rainy. Mean temp. 51°·2, or 1°·8 above the average, but from 17th to 20th and from 27th to the close, sharp cold snaps occurred.

Belfast.—A really disappointing month, and of no value to the land. The R was almost an inch above the average.

Omagh.—A saturating month, with R on every day but one, and occasionally very heavy. Temp. was most irregular, day and night being abnormally high and low in rapid succession.

* Campbell-Stokes.

Climatological Table for the British Empire, May, 1906.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	78·9	8	32·1	1	63·8	45·9	47·3	78	123·9	27·8	1·09	14	7·5
Malta	86·8	31	49·6	4	72·8	57·6	54·5	73	...	42·9	·36	4	3·1
Lagos	...	...	...	...	...	...	...	...	...	...	..	...	...
Cape Town	75·1	9	44·8	27	65·1	52·9	50·9	72	...	...	3·65	10	5·2
Durban, Natal	83·7	5	50·8	31	76·1	59·0	...	...	136·3	...	1·76	9	2·7
Johannesburg	72·8	14	34·2	19	66·2	47·3	42·5	66	139·0	31·6	·11	2	1·1
Mauritius	84·0	5	57·4	13	79·2	66·8	64·2	76	149·4	47·6	3·92	20	7·1
Calcutta	105·8	2	70·6	10	97·3	78·9	76·1	72	162·1	68·2	3·98	6	3·1
Bombay	93·0	30	76·9	1	91·5	80·9	76·4	73	139·2	71·8	·00	0	3·0
Madras	111·5	27	77·2	6	100·8	83·0	76·5	71	149·6	74·6	·00	0	2·9
Kodaikanal	76·1	25	52·7	21	71·1	56·4	51·8	67	142·2	39·3	4·10	16	4·4
Colombo, Ceylon	89·2	sev.	72·0	20	87·9	78·4	76·4	84	153·6	70·4	6·96	25	7·0
Hongkong	89·4	21	66·7	2	80·6	73·2	71·8	86	147·8	...	11·58	16	7·9
Melbourne	69·1	9	37·5	22	60·7	48·3	47·8	80	125·5	30·5	1·77	11	7·3
Adelaide	82·3	10	46·0	25	68·0	52·0	50·8	74	138·0	38·7	2·12	12	5·9
Coolgardie	84·4	16	38·1	11	71·9	48·7	44·0	56	142·0	33·2	1·49	4	3·6
Sydney	79·9	6	48·0	31	67·1	54·0	50·6	78	110·6	37·0	7·32	26	5·2
Wellington	64·5	3	39·8	6	56·7	47·6	46·8	80	105·0	35·0	6·18	17	7·2
Auckland	66·0	3, 4	41·0	5	60·0	50·8	49·6	81	118·0	35·0	4·60	17	6·0
Jamaica, Negril Point	88·5	8	69·3	2	85·6	73·6	73·6	79	...	...	7·85	12	...
Trinidad	...	...	...	...	...	...	...	...	...	...	...	...	...
Grenada	88·0	5, 11	72·2	23	85·6	75·0	70·9	72	148·2	...	5·48	20	4·4
Toronto	86·0	18	30·5	11	...	...	41·9	67	...	...	2·51	11	6·0
Fredericton	77·3	19	27·5	12	...	...	35·3	54	...	...	3·46	12	6·0
Winnipeg	84·3	11	17·8	6	...	...	...	...	...	...	2·97	9	...
Victoria, B.C.	72·4	8	38·2	5	...	...	...	...	...	...	1·81	9	7·0
Dawson	...	...	...	...	...	...	...	...	...	...	...	...	...

MALTA.—Mean temp. of air 63°·6, or 0°·4 above the average. Mean hourly velocity of wind 9·4 miles, or 0·5 below average. Mean temp. of sea 64°·2.

Mauritius.—Mean temp. of air equal to, dew point 1°·1 below, and R ·23 in. above, averages. Mean hourly velocity of wind 10·3 miles, or 0·7 above average.

MADRAS.—Bright sunshine 214·1 hours.

KODAIKANAL.—Bright sunshine 238 hours.

COLOMBO.—Mean temp. of air 82°·7, or 0°·3 above, of dew point 1°·1 above, and R 4·98 in. below, averages. Mean hourly velocity of wind 9·3 miles.

HONGKONG.—Mean temp. of air 76°·5. Bright sunshine 137·6 hours. Mean hourly velocity of wind 13·3 miles.

Adelaide.—Mean temp. 2°·4 above, R ·64 in. below, averages.

Sydney.—Mean temp. of air 2°·1 above, and R 2·06 in. above, averages.

Wellington.—Mean temp. of air 0°·7 below average.

Auckland.—Mean temp. of air 1°·0 above, R rather over half an inch above average of previous 38 years.