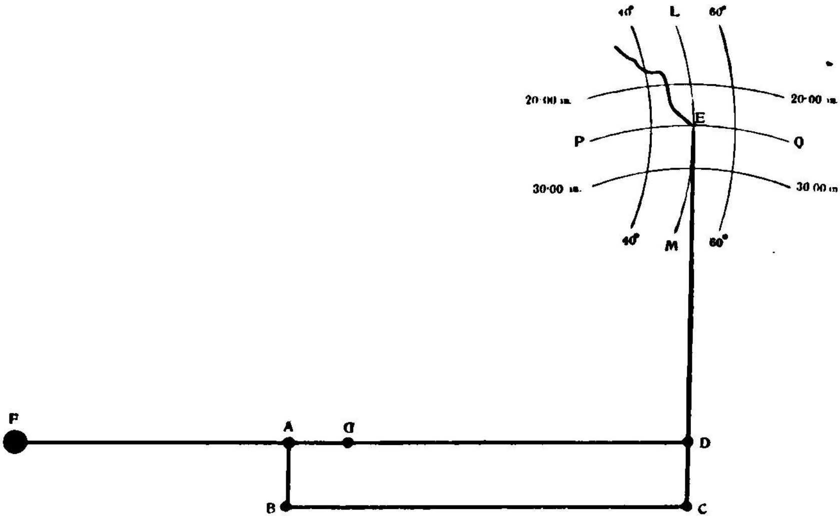


FIG. I.

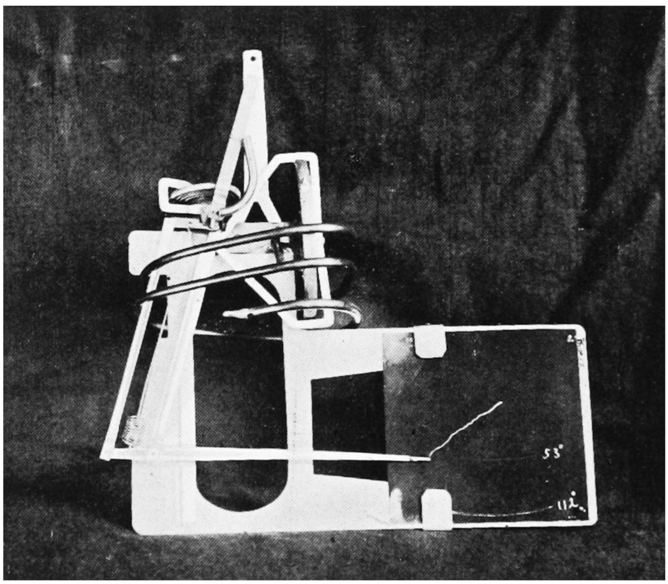


FIG. II.

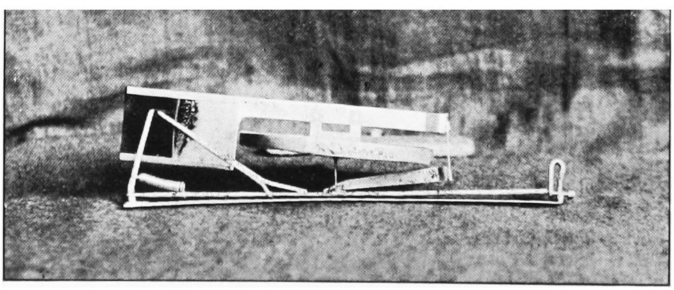


FIG. III

THE DINES' LIGHT METEOROGRAPHS.

Symons's

Meteorological Magazine.

No. 486. JULY, 1906. Vol. XLI.

TWO NEW LIGHT METEOROGRAPHS FOR USE WITH UNMANNED BALLOONS.

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

Perhaps next to accuracy, lightness is the most important characteristic of a meteorograph designed for work with small balloons, and since the clock supplies in general a fair proportion of the weight, an attempt has been made to dispense with the clock. In the heavier of these instruments, which weighs 3½ oz. (100 grammes), the following plan is adopted. Fig. I. shows the arrangement in diagrammatic form. A, B, C, D, is a parallelogram formed of strips of thin aluminium, freely jointed at the points A, B, C and D. This is pivoted to the frame at A. The rod D A is produced to F and carries a counterpoise at F. The rod C D is continued to E, and ends at E in a turned-down sharp point, which writes on a piece of smoked aluminium and forms the record. The point G is pivoted to the face of an aneroid box, so that G moves backwards and forwards as the atmospheric pressure varies. If B remains fixed the result is that the writing point E describes the arc L M of a circle, and its position on this arc determines the pressure and hence the height. The point B is pivoted to some thermometric arrangement, so that B moves round A as the temperature varies. This causes E to move in an arc P Q and its position on P Q determines the temperature. The motions are quite independent of each other, and consequently the position of the writing point fixes both height and temperature, and the trace it makes gives the relation between them.

In the second and lighter form of instrument, which weighs 1 oz. (28 grammes), the trace is very small, but is read under a low power microscope. This plan was suggested by Dr. W. Watson some time since. The trace is given by two sharp steel points, which scratch a piece of thin metal electro-plated with copper. This plated metal is moved laterally by the extension of an aneroid box and by this motion two scratches like the lines A———B / C———D are produced. The distance between the two points which make the scratches is regulated by the temperature, and it is quite easy under a microscope to determine the distance between the lines to 1/2000 in. ($1/80^{mm.}$). Thus the distance measured along the lines gives the height, and the distance between them at that point the corresponding temperature at that height. The thermometric arrangement consists of a round steel rod and a strip of very thin aluminium, both six inches long, and their difference in length, which is multiplied up about 20 times by a lever, produces the varying distance between the scratches. The arrangement permits of the temperature being read to within about half a degree Fahrenheit, since it is not the exact position of the scratch which has to be noted but merely the distance between two scratches which lie within one or two millimetres of each other. Nickel steel, which does not vary in length, might be used, but there is an advantage in using common steel for the following reason: the round steel bar, having a small surface, in proportion to its mass, does not follow any change of air temperature as rapidly as the thin strip of the more expansible aluminium, and consequently the difference in length of the two bars before the steel has time to expand is too great, and too large a change of temperature should be indicated. But the inevitable tendency of all thermometers is to have a sensible lag, and this is to some extent compensated, so that on the whole the arrangement is more sensitive than it would be with one non-expansible metal.

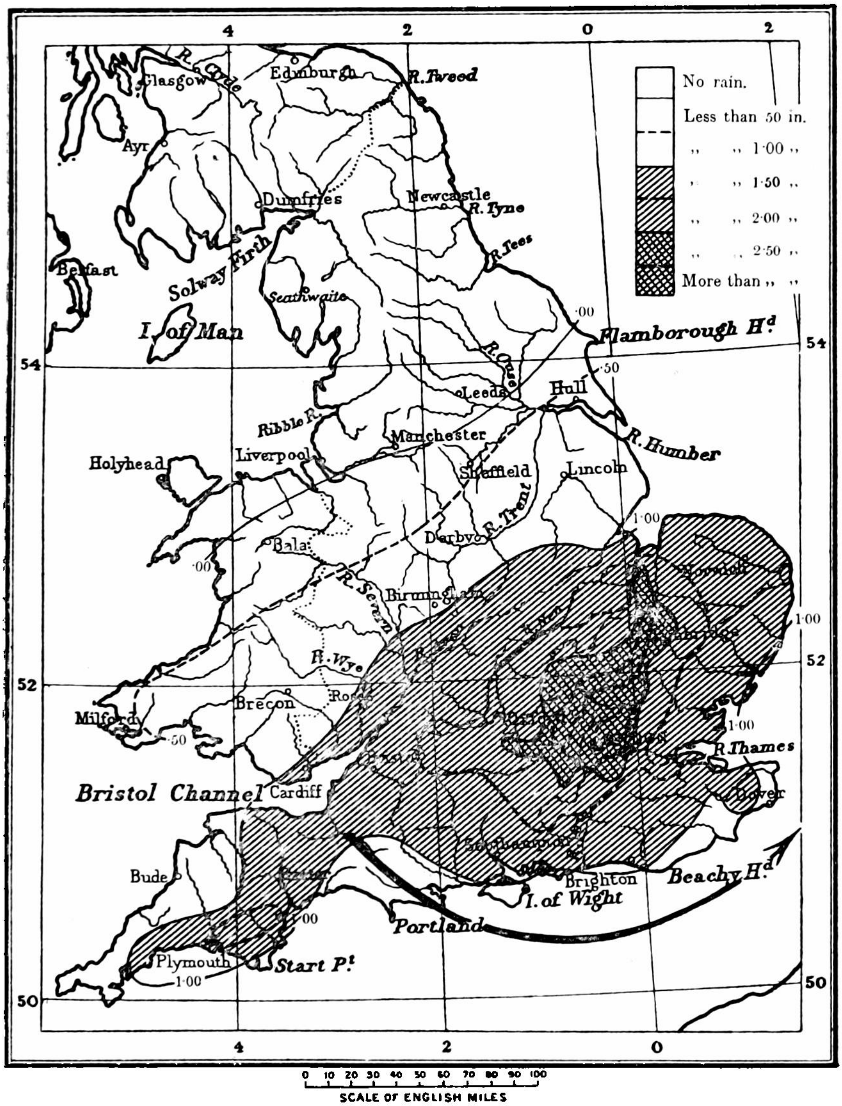
Figures II. and III. are from photographs. In Fig III. the electro-plated metal has been smoked, but only for photographic purposes.

Either instrument will stand a considerable amount of shaking without blurring the trace and may be used with a kite. A hygrometric arrangement to show the humidity is easily added to either.

THE RAIN OF JUNE 28—29, 1906.

THE month of June usually abounds in interest to the student of local weather, for while it is as a rule the finest month of the year, it seldom passes without severe thunderstorms in different parts of the country. We are embarrassed on this occasion with the richness of our letter-box and have had no little trouble in endeavouring to decide what must be omitted from this number of the Magazine. Heavy summer rain is almost always associated with thunderstorms, and last June was no exception in that respect, the series of storms in the south and west of England, on the 23rd in particular, having produced some remarkable instances, with regard to which we have received many letters. But during last month a comparatively rare phenomenon occurred in the form of a heavy summer cyclonic rain, and as, in our opinion, this was the most remarkable meteorological event which calls for notice, we have discussed it in as great detail as was possible in the limited time and with the necessarily imperfect data available. An occasion like this, when an incident of weather quite out of the common presents itself, makes us appreciate the trouble which so many observers take in forwarding their daily rainfall readings monthly, but it also makes us feel how much of that trouble is deprived of its chief value (immediate availability) by the delay of a day or two in sending it in. However, the regrets are not much in evidence on this occasion, for the returns, admirably supplemented by special reports from additional observers, were sufficiently numerous to enable us to construct a very satisfactory map, a reduction of which is here reproduced.

JUNE 28-29. 1906.



The rain commenced to fall heavily on the night of the 28th, and in London the hour was 0.27 a.m. on the 29th, while it fell steadily and continuous until 11.45 a.m. In most parts of the country affected by this rain the continuous fall stretched across the two rainfall days divided by 9 a.m. on the 29th, although in every case only a small fraction of the total fall came on the second day. In order to deal with the natural unit of the shower, or period of continuous rain, we have added together the rainfall recorded for the 28th and 29th, but though this represents a period of 48 hours practically all the rain fell in 12 consecutive hours.

When the figures are charted and the lines of equal rainfall drawn as in the accompanying map, it is seen that nearly the whole of the south of England up to a line drawn from the Bristol Channel to the Wash, an area of nearly 22,000 square miles, had received more than an inch of rain. The fall diminished rapidly from that line northwards, and stopped entirely at a line drawn from North Wales to the East Riding of Yorkshire. Within the wet area a roughly triangular patch, with its base near the lower Thames and its apex almost on the Wash, had a fall exceeding 2 inches, the base of the triangle measuring about 50 miles from Wallingford, in Berkshire, to Wallington, near Croydon, while the length of the triangle, from Woking to Wisbech, was more than 100 miles; the area with falls over 2 inches measured about 2600 square miles. The whole of this region, with over 2 inches, received in 12 hours an amount of rain equal to that which falls on the average throughout the whole month of June. Thanks to the numerous rain gauges maintained by the Metropolitan Water Board in the Lee Valley, it was possible to delineate the eastern edge of the very wet area with great exactness. It ran almost due north just to the east of the River Lee from near its mouth to Feilde's Weir, in no place entering the valley of the Roding. In the north of Middlesex and south-east of Hertfordshire there was a considerable area with more than 2·50 in. of rain, and at one point, Muswell Hill, the amount almost reached 3·00 in. A second area with more than 2·50 in. lay as a narrow strip along the Chiltern Hills from Maidenhead to Hitchin and extended thence to near Ely.

The similarity of this distribution to that of the unprecedented June cyclonic rainfall in 1903* is very striking. On that occasion the fall was continuous for nearly 60 hours and amounted to more than 4·00 in. in the wettest part, but though more prolonged it was of the same type as that now being considered. In both cases the first two days of the heavy fall were those in which a small depression passed through the English Channel, curving northwards on its eastward way with the area of heavy fall lying entirely to the left of the path. In June, 1906, the depression passed on its way over the Continent and the rain in the south of England was of short duration, whereas in 1903 the path of the depression doubled

* See this Magazine, vol. **38**, p. 97; also *British Rainfall*, 1903, p. 19.

back in a loop through England, keeping up the heavy rainfall on its left-hand side over the same area as had been deluged on its outward way.

The statement that the heavy rain was on the left-hand side of the path of a depression moving eastward, is equivalent to saying that it fell with a prevailing easterly or north-easterly wind, and this was the case on June 28th and 29th, the reduction of temperature being scarcely less remarkable than the heavy rainfall.

The following are some of the heaviest falls recorded :—

STATION.	June 28th.* in.	June 29th. in.	TOTAL. in.
Hedsor	2·66	·14	2·80
Muswell Hill	2·90	·08	2·98
Broxbourne	2·30	·40	2·70
Throcking	2·25	·25	2·50
Wendover (Halton Gardens)	2·63	·05	2·68
Ely (Stretham)	2·24	·56	2·80

THE RAINFALL OF JUNE AND OF THE FIRST HALF OF 1906.

A GREAT deal of time is spent both by Observers and Editor in preparing the elaborate table of monthly rainfall given on the last page but three of each number of this Magazine ; but, although all the facts which it is possible to put forward are set forth there in full without a superfluous letter or figure, the information is too concentrated for the taste of many readers, and it has to be diluted with a number of harmless but really unnecessary words before it can be assimilated with pleasure. June, 1906, would have been perhaps the driest month of the year but for the secondary depression referred to in the foregoing article, which deluged the country within 150 miles of the path of its centre on the left-hand side. It is only in the area of the heavy fall of June 28th--29th that the average monthly rainfall was reached, and in the heart of it, in the north of Buckinghamshire, in Bedfordshire and Cambridgeshire, the excess was more than 50 per cent. Outside a line drawn from Portland Bill through Bristol, Birmingham and Lincoln to the North Sea, the average was nowhere exceeded, and it appears that the whole of Scotland north of the Firths of Forth and Clyde and the whole north of Ireland had less than half the average rainfall, while in the north-east of Scotland only from one-third to one-quarter of the average amount was recorded. The result was that the eastern Midlands were the wettest part of the country, absolutely as well as relatively, and the Highlands and the north of Ireland were the driest.

* Most of the rain allocated to the rainfall day of June 28th really fell in the early hours of the 29th.

The effect of the June rainfall was to bring the whole country well over the average for the half year. Part of the south of Ireland, a few stations in the south-east of Scotland and a very narrow strip in the English Midlands extending from the Humber to the Severn, had just less than the average fall for the six months, but the rest of the country continued to show a moderate excess. The exceptional dryness of Scotland and Ireland in June did something to mitigate the effects of the very wet May, while in England and Wales the wetness of the south was rather more than counterbalanced by the dryness of the north. Thus the result of the six months' rainfall is to show a general excess of 16 per cent. in England and Wales, 13 per cent. in Scotland, 8 per cent. in Ireland, and 14 per cent. for the British Isles as a whole. This means that there is considerably more than a month's rainfall in hand, if one can use an expression of the counting-house in dealing with the half-unknown economy of Nature.

DR. W. N. SHAW ON THE CIRCULATION OF THE ATMOSPHERE.

(CONCLUDED.)

The fourth of Dr. Shaw's recent lectures on Meteorology, delivered at the University of London, is summarised as follows:—

IV.—Variations from normal conditions of atmospheric circulation may be studied by two distinct methods. The first, or geographical method, is that of comparing the variations of any element simultaneously at different parts of the globe, and the second that of studying the sequence of conditions over a period of time at a single locality.

Of these, the former was illustrated by curves exhibiting an obvious relation between the winter rainfall at Thorshavn (Faroe Islands) with that of the preceding summer at St. John's, Newfoundland, and that of the following summer at Berlin. The curve of barometric pressure from year to year at Bombay was shown to be conspicuously similar to those at Cordoba and Santiago inverted, indicating a reciprocal or inverse relation. Again, the seasonal variation curve of Trade-Wind velocity at St. Helena runs parallel to that for rainfall in the south of England. The Trade-Wind may be looked upon as the main artery of atmospheric circulation, and the rainfall as the direct result of that circulation.

In this connection, Dr. Shaw stated that there begin to be signs of many associations on these lines, such, for example, as Captain Lyons's discovery of the connection between Nile floods and rainfall conditions in Abyssinia, but the laws governing these correlations are at present largely matters of speculation. They, however, serve as examples of the geographical association of meteorological phenomena.

Turning to the second method, that of attempting to discover the laws governing the sequence of events in any one part of the globe, it was remarked that the effect of combined meteorological influences may be excellently summed up by observation of the wheat-crops of the British Isles. The yield of wheat is more than accidentally connected with the amount of rain falling during the previous autumn, and Dr. Shaw has made a detailed study of the conditions which precede good and bad wheat crops, with striking results. Plotting the autumn rainfall alone, the inverted curve from 1886 to 1905 follows that of the yield of wheat per acre over the Eastern Counties in almost every year, but, although the autumn rainfall is undoubtedly the predominating factor, it is not the only one. If the five best wheat crops in 20 years, with an average yield of 34·4 bushels per acre, are considered, it is found that the requisite conditions are a warm and dry autumn, a moderate or mild winter with average rainfall, a cold and rather wet spring, and a dry summer with normal temperature. The five worst years, averaging 26·3 bushels per acre, required conditions almost exactly reversed: a wet autumn, colourless as regards temperature, a cold wet winter, warm dry spring and hot summer with average rainfall.

It is a fact, not without significance, that in 16 of the 21 years considered, the departure from the average of the rainfall of the spring and the autumn of the preceding year were in opposite directions.

With regard to the periodic recurrence of meteorological conditions, the state of motion of the atmosphere, regarded as the result of the combined movements of the Earth in relation to the sun, may be considered as stable rather than unstable, that is, with a tendency to revert to a previous state in preference to diverging more widely from that state as the result of temporary disturbing influences. For this reason variations in the circulation indicate variations in the factors causing that circulation, and periodic changes in these factors would have a corresponding influence on the circulation. To become conspicuous, however, these periods must be "in tune."

By combining the sine curves of four component oscillations of respectively 1, 2, 3 and 4 wave lengths over a period of eleven years, the third curve being inverted, a resultant curve is obtained which shows a remarkable analogy with the smoothed wheat-yield curves. It is probable that wheat has a variation with a period of eleven years and perhaps a few months. This period would probably be found to relate also to rainfall, temperature, etc., but with an individual element the resemblance is apt to be masked, whereas the wheat-yield combines the effects of all.

In conclusion, Dr. Shaw reverted to the need for considering the meteorology of the British Isles as an integral part of that of the whole globe, rather than regarding this country as a separate meteorological province and studying it as such.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

COLD WEATHER AND ATLANTIC ICE.

THE coldness of the past spring has been rather freely attributed to the prevalence of ice in the North Atlantic. From a rough estimate, based on ice reports, the amount of ice in the north-western portion of that ocean during May would have stood in about the same proportion to that expanse of water as would a cube of ice with sides of 640 ft., exposed and submerged, in the western half of the English Channel, to the water in that area.

What effect could such a relatively small amount of ice have upon the temperature of land even within a radius of a quarter of a mile?

It is the cold Labrador current which lowers the temperature of the western Atlantic, the current from the north which brings the ice rather than the ice itself; and this lowering of temperature has undoubtedly its effect upon the climate of north-western Europe. But it seems probable that the cold periods which occur in this country during the months of April and May are due to the increased activity of the Greenland current, consequent upon the failure of the warm Atlantic Stream to reach, in those months, its average north-eastern limits.

To the westward of our Islands in April and in May the current usually sets to the southward or south-westward, and in the latter month the Atlantic Stream cannot be traced to a more north-easterly position than 47° N., 27° W.

This annual failure of the Atlantic Stream may be related to the fact that during February and March the average northern limit of the South-East Trade Wind lies very little north of the equator. In consequence the mean velocity of the Gulf Stream should be lower during these months than at other periods of the year and, presumably, would pour a smaller volume of warm water into the North Atlantic Ocean for some weeks immediately following.

CAMPBELL HEPWORTH.

Ealing, 26th June, 1906.

COLOUR OF LIGHTNING.

SOMERSET has recently been visited by two widespread thunderstorms of exceptional severity. The first storm, on May 13th, lasted for 8 hours. It moved slowly from S.S.W. to N.N.E., beginning here at 3.30 p.m. The thunder and lightning were continuous over the whole area for the whole 8 hours, and the casualties from lightning ran into hundreds, very impartially distributed. The rain was very unequal, almost *nil* to S. and S.W. of Yeovil, but quite tremendous to E.N.E. of the Mendip Hills, and exceeding an inch over a large district.

The second storm, on June 23rd, moved even more slowly from W.S.W. to E.N.E. I heard thunder, continuously increasing, for three good hours before the storm broke here at 9.15 p.m. Its violence lasted till 11 p.m., and for two short spells the rain was quite exceptionally heavy. This storm, like the first, became more and more terrible as it proceeded, and it would be hard to say which was the worse of the two. But as regards the character of the lightning, the two storms were in very marked contrast.

On May 13th the lightning was *red* throughout, during the heaviest of the rain, before the rain and after it, both while it was high day and after dark. Though very terrible to see, it had little illuminating power; one could *look* at "the red-hot chains flung across the sky," and it seemed to impart its own colour to the objects lit up by it. But on June 23rd, though the lightning shewed red at 7.30, while it was yet at a distance, from the time that the storm broke here, it was of a dazzling steely *blue*. The whole sky was brilliantly lighted up by it, but there was no *looking* at this lightning. Yet all things were shewn up by its pale glare in their own colours. One had time to see and distinguish between flowers and leaves, and I noticed particularly the yellow green of my lawn.

The extreme redness of the lightning in the one case, and its blueness in the other, are noticed again and again in the many reports that I have seen of these storms. Can any explanation be given of this contrast? H. A. BOYS, F.R.Met.Soc.

North Cadbury Rectory, July 3rd, 1906.

APRIL, 1906, IN NEW SOUTH WALES.

THE month of April, 1906, possessed such abnormal temperature features in New South Wales, that a brief note may be of interest to your readers.

Unseasonably warm weather had been experienced throughout the month, and during the Easter holidays what might be termed a hot wave passed slowly over our State; its duration being most remarkable for the month of April. The following consecutive readings were recorded at the Sydney Observatory:—

April	13th.	14th.	15th.	16th.	17th.	18th.	19th.
Temp.	76°·8	79°·0	87°·2	85°·0	81°·2	88°·0	84°·6

Taking the mean temperature for the whole of this month at the Observatory, we find that all previous records, extending back to the year 1859, have been eclipsed. The mean for the month just ended was 67°·7, which is 3° in excess of the normal, and 0°·5 higher than the previous next highest mean, *i.e.*, 67°·2, which was the mean for April, 1897. Taking the average of all maximum readings, the abnormal character of the heat becomes still more apparent. The average max. for the month just ended was 75°·8, or 4°·9 above the normal, and 1°·2 higher than the previous next highest average maximum, *i.e.*, 74°·6 in April, 1897.

Following is a table showing the means for April, 1906, compared with the result for previous years, at Sydney Observatory :—

	Mean Temp.		Mean Max.		Mean Min.
	°		°		°
April, 1906........................	67·7	...	75·8	...	59·6
Average for previous 47 years	64·7	...	70·9	...	58·3
Excess of 1906 over average for previous 47 years	3·0	...	4·9	...	1·3

Unseasonably high temperatures for this month have also been experienced in the other Australian States.

We have noticed by the cablegrams published in the Sydney daily papers that a similar heat visitation was experienced in parts of Great Britain about the same time as our heat-wave here, above noted.

H. M. HUNT, Acting Meteorologist.

Meteorological Branch, Sydney Observatory, May 3rd, 1906.

REVIEWS.

Die Niederschläge in den Norddeutschen Stromgebieten. [*Precipitation in the North German River Basins.*] *In amtlichen Auftrage bearbeitet von* PROFESSOR DR. G. HELLMANN. *In drei Bänden.* Size 10½ × 7. Pp. Vol. **1**, vi. + 386 + (140). Vol. **2**, viii. + 722. Vol. **3**, viii. + 872. Plates. Berlin: Dietrich Reimer (Ernst Vohsen). 1906.

THIS is a remarkable and unique work, consisting of a collection of all the rainfall statistics for Germany printed in full as regards monthly totals, and accompanied by a complete discussion of the general bearing of the data. The period covered is from 1715 to 1891 and the stations are arranged according to the river basins. A map is given of the mean annual rainfall of the German Empire for the ten-year period 1893—1902, based on the records of 3000 stations. It is difficult for any one not conversant with the wearyful details of testing and discussing rainfall data of various origin, observed by different methods, to realize the amount of labour involved in the production of this monument of German Rainfall. It is easy enough to see the vast utility of the work and the extraordinary ability shown in it.

We cannot do more here than congratulate Professor Hellmann on the completion of his herculean task and refer our readers to a detailed article based on these volumes in the forthcoming issue of *British Rainfall.*

Dix Années d'Observations Météorologiques à Sèvres (Seine-et-Oise). 1892—1901. Par G. EIFFEL, avec la Collaboration de M. G. BARBÉ. Paris: 1904. Size $12\frac{1}{2} \times 9\frac{1}{2}$, pp. 96 + Atlas des Planches.

Etudes pratiques de Météorologie et Observations comparées des Stations de Beaulieu, Sèvres et Vacquey pour l'Année 1903. . . . Ibid pour l'Année 1904. . . . Par G. EIFFEL. Paris: 1905. Size $12\frac{1}{2} \times 9\frac{1}{2}$, pp. 378 and 158 + Atlas des Planches.

Types Généraux de Comparaisons Météorologiques appliqués à l'étude des Stations de Beaulieu-sur-Mer (Alpes Maritimes), Sèvres (près Paris) et Vacquey (Gironde), pour l'Année 1905 (premier Semestre). Par G. EIFFEL. Paris: 1905. Size $12\frac{1}{2} \times 9\frac{1}{2}$, pp. 72.

Les Observations Courantes en Météorologie et Comparaison des Stations de Beaulieu, Sèvres et Vacquey. Par G. EIFFEL. Paris: 1905. Size $7\frac{1}{2} \times 6\frac{1}{2}$, pp. 44.

THE eminent engineer whose name is associated with the great tower at Paris has given to his meteorological observations at three stations in France a lavish and magnificent embodiment in the series of superb volumes of text, tables and plates the titles of which are given above. Such works could only be produced by a wealthy amateur, and it is pleasant after the usual type of official publication to find so much fresh and spontaneous enthusiasm enshrined in quarto form. Our first thought is that the money expended in the preparation of these volumes might in other directions have produced a greater advancement of the science of meteorology, but probably the second thought is best, which leads us to accept gratefully the object-lesson of Weather Observations made attractive by the charm of liberal space and fine typography.

M. Eiffel strongly advocates the use of recording instruments, though in the case of rainfall he contents himself with the readings of an ordinary gauge twice daily. He groups monthly observations in three "decades," the two first of 10 days, the last of 8, 9, 10 or 11 days, according to the length of the month, preferring these 36 units to the 52 weeks in a year; he also uses the seasonal year from December to November in preference to the civil year for meteorological purposes, a reform which we would gladly see carried out if it were practicable.

ROYAL METEOROLOGICAL SOCIETY.

THE final meeting of the Session was held on Wednesday afternoon, June 20th, at the Society's Rooms, 70, Victoria Street, Westminster, Mr. Richard Bentley, President, in the chair.

Mr. F. J. Brodie read a paper on "The Mean Prevalence of Thunderstorms in various parts of the British Isles during the 25 years 1881—1905." The author employed the records from 53 stations, and extracted from them the number of days on which thunderstorms or thunder only were observed. The mean results for the whole year showed that thunderstorms are most common over inland portions of the northern and eastern counties of England, some places in those districts experiencing between 17 and 19, and one station, Cheadle, in Staffordshire, 22. In London the average annual number is 14. Thunderstorms are least common in the south-western counties, the mean annual number at Cullompton, in Devonshire, being 6, and at Falmouth 4. At some places in the eastern parts both of Ireland and Scotland the number is 8, and locally in the west of Scotland it is even larger. On the west and south coasts of Ireland there are on the average less than 5 thunderstorms per annum, while at most places in the north of Scotland the number is smaller still. Sumburgh Head, in the Shetlands, experiences on the average only one thunderstorm a year. The results for the four seasons of the year show that in all but the winter months the distribution of thunderstorms is very similar to that exhibited by the annual averages, the prevalence being in each case greatest over the northern, eastern, and some parts of the midland counties. In the winter time the distribution is quite different. On the average none of the stations experience 3 thunderstorms in that season, and between one and two are felt only along the extreme western coasts and in the Orkneys. The winter thunderstorms occur most commonly during the passage of large cyclonic disturbances over the Atlantic in proximity to our western coasts, and are experienced at night. The monthly means for the 25 years show that over the greater part of Great Britain thunderstorms are most frequent in July. In several parts of Ireland and the west of Scotland the maximum frequency occurs in June, while in the Scilly Islands and in some parts of the west and north of England it occurs in August.

A paper by Mr. W. H. Dines, F.R.S., on "A Typical Squall at Oxshott, May 25th, 1906," was, in the absence of the author, read by the Secretary. During the morning there was a steady wind from the south-west of over 10 miles per hour until 11.0 a.m., when there was some falling off for fifteen minutes, then a rise to over 20 miles per hour, accompanied by a sudden increase of barometric pressure, and a fall of a few hundredths of an inch of rain. After the squall the wind dropped suddenly and there was almost a dead calm for about twenty minutes. The author, who was flying a kite at the time, gave some account of the changes in the wind at a considerable altitude above the ground. At 11.26 the squall struck the kite, which was then at a height of 2400 feet. Two minutes later the velocity at the kite had risen to 58 miles per hour, and the wire broke under a strain of 180 lbs. Three minutes later the kite fell at a spot $2\frac{1}{4}$ miles distant from Oxshott.

A general discussion took place on the papers read at the meeting and also on that by Mr. R. G. K. Lempfert, on "The Development and Progress of the Thunder Squall of February 8th, 1906," which was read at the previous meeting.

Mr. A. Hands, Dr. H. R. Mill, Mr. W. Marriott, Mr. J. Hopkinson, Mr. R. G. K. Lempfert, Mr. F. J. Brodie, and the President took part in the discussion.

The following gentlemen were elected Fellows of the Society, viz.: Mr. E. G. Coutts, Mr. H. T. Jackman, Mr. T. S. Sama Row, and Mr. F. W. Simms.

THE METEOROLOGY OF THE FREE ATMOSPHERE.

M. L. Teisserenc de Bort, Director of the Observatory for Dynamical Meteorology at Trappes, near Paris, delivered a lecture on the Meteorology of the Free Atmosphere, before the Royal Society of Edinburgh, on the afternoon of May 21st.

The lecturer said that the methods for sounding the atmosphere employed at the present day have been in our possession but a few years. The kite, carrying self-registering apparatus, was introduced by the Americans about fifteen years ago; the sounding balloon dates but twelve years back. The use of balloons, furnished with registering apparatus, was proposed by Lemonnier, a French physicist, at the end of the eighteenth century; but they were actually employed for the first time by the Fathers Renard, and especially by MM. Hermite and Besançon, whose first observations go back to 1893. Observations of great interest had already been made on mountains. To these are now added observations made in air altogether free; and these have taught us much that is new.

The lecturer in the first place discussed the distribution of the barometric pressure at a distance of several thousand metres above the ground; and showed maps in which the isobars at 4000 metres (about 2½ miles) are calculated from the pressure and temperature on the surface of the Earth. He had carefully verified the fact that the pressure in free air falls in accordance with the barometric formula. For that purpose he determined the heights of a large number of balloons by observing them with two theodolites. On the average the heights thus observed agreed with those deduced from the barometers carried by the balloons to within 2 or 3 millimetres of barometric pressure for a height of 4000 metres.

The maps of the isobars at 4000 metres show that most of the areas of high and of low pressure observed near the ground become effaced as we rise in the air, and give place to a maximum of pressure all round the Earth in the tropical regions, and low pressures at the poles. The average direction of cirrus clouds is in harmony with these conditions.

The first fact which the sounding balloons enabled the lecturer to show with regard to temperature was that, even at a height of several thousand metres above the ground, there is, contrary to what had been thought, a very sensible variation of temperature from winter to summer; the range between the coldest and the hottest months is 16° F. at 10 kilometres (about 6 miles).

Sounding balloons despatched from the Trappes Observatory enabled the lecturer to prove that, after a certain height, varying from 9 to 14 kilometres (5 to 9 miles), the fall of temperature with height ceases altogether—another fact that was wholly unexpected. The zone where this occurs is called the "isothermal zone," and is situated, comparatively, near the ground (8 to 9 kilometres in certain places) with low pressures; but at a greater height (about 12 or 13 kilometres) above high pressure areas. As a general rule, the air is colder in the upper part of an anticyclone than it is at a corresponding height above low pressures; but the contrary holds at medium heights of about 5 kilometres. The absolutely lowest temperatures are observed near high pressures. A temperature of —99° F. has been observed several times at Trappes, and recently as low as —112° F. in Austria.

Balloon flights made daily for a week or more at a time, in different years and at different seasons, have shown that at intervals of a few days the atmosphere exhibits much greater variations of temperature high up than on the ground. At a height of 11 kilometres variations of 15° to 20° are often observed at a time when variations of only 2° to 3° are found near the ground. The lecturer believed that the arrest of the decrease of temperature is connected with the cessation at a certain height of movements of the air having a vertical component, the air then having movements which follow the isobaric surfaces. There is thus no longer any temperature variation due to expansion or compression of the air.

In conclusion, the lecturer showed how cyclones and anticyclones are transformed as we rise in the atmosphere. He demonstrated the interesting fact, proved alike by calculation of the isobars and by the flight of balloons, that most of the depressions which appear near the ground as complete atmospheric vortices suffer deformation as the height increases, and in their northern part lose themselves in the great polar vortex; so that, at a certain height (4 to 7 kilometres), east and north-east winds are no longer found to the north of a depression, and the isobars at this height form a handle attached to the low-pressure areas of northern latitudes. On the front of a depression its characters remain distinct to the top; a sheaf of ascending air reaches the height of cirrus cloud, and then spreads over the barometric maxima to east and south-east.

METEOROLOGICAL NEWS AND NOTES.

AN EARTHQUAKE SHOCK was experienced in South Wales and in various parts of the south and west of England on the morning of June 27th, and several of our correspondents have been kind enough to send particulars of their observations regarding it. On account of the pressure on our space we are unable to print these letters in the present number; and in order that the facts they contain should be put to the best use, we have forwarded them to Dr. C. Davison, of Birmingham, who is dealing fully with the matter.

MR. H. H. CLAYTON, whose work at the Blue Hill Observatory is well known to our readers, has, we learn from *Science,* accepted the position of Professor in the United States Weather Bureau at Washington.

A METEOROLOGICAL EXHIBIT FOR NEW ZEALAND, prepared by the Meteorological Office, was shown at a reception by Dr. W. N. Shaw on July 6th. An account of the exhibit will be given next month.

A METEOROLOGICAL EXHIBITION was arranged by the Royal Meteorological Society, at the request of the Council of the Royal Horticultural Society, which, realizing the great importance of the study of meteorology by those engaged in horticulture, desired to have the subject brought forward at their Great Summer Show, which was held at Holland House, Kensington, on July 11th and 12th. Mr. W. Marriott gave a short address on Meteorology in relation to Gardening, each afternoon during the Show.

RAIN-MAKING IN CANADA.—It is almost incredible that the Legislature of Yukon Territory have voted public money to supplement a popular subscription to induce a notorious "rain-maker" from California to produce rain in the Klondike region this summer. The matter has been brought up in the Dominion Parliament at Ottawa, where the facts were stated and very proper sentiments expressed. When it is so difficult to obtain a few hundred pounds for serious research in meteorology, it is exasperating to find a government within the British Empire throwing away thousands in futile experiments.

"RAIN-MAKING AND SUNSHINE" is the title of a little book which showed unconsciously how enthusiasm for a subject, apart from scientific training, may lead an intelligent mind deplorably astray. The following note is from the *Standard* of May 28th:—

The funeral took place at Shanklin, on Saturday, of Mr. John Collinson, of Delphi Cliff House, who, some time ago, gained considerable local notoriety as the "rainmaker," through his alleged power to regulate the elements, which at times caused him to be subjected to a good deal of chaff. He was the author of a book entitled "Rainmaking and Sunshine," exhaustively discoursing on odyllic force, closing with the hope that this remarkable power might, in course of time, be thoroughly understood and properly valued, and that it might be used and developed for the benefit of the British nation and British Empire.

TEMPERATURE FOR JUNE, 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	80·9	20	39·8	5	0	0
Tenterden	*Kent*	51 4	*0 41	190	79·0	21	38·0	5	0	0
West Dean	*Hampshire*	51 3	1 38	137	77·0	23	34·0	5	0	6
Hartley Wintney	,,	51 18	0 53	222	80·0	23	36·0	5, 6	0	...
Hitchin	*Hertfordshire*	51 57	0 17	238	...	..	...	...	...	...
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	79·0	20	33·0	5	0	...
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	80·0	22	35·0	5	0	...
Brundall	*Norfolk*	52 37	*1 26	66	...	...	...	...	...	...
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	73·5	9	36·3	6	0	1
Torquay (Cary Green)	*Devon*	50 28	3 32	12	71·2	9	44·5	30	0	0
Polapit Tamar [Launceston]	,,	50 40	4 22	315	74·9	13	37·4	30	0	0
Bath	*Somerset*	51 23	2 21	67	76·5	23	39·5	6	0	0
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	80·0	23	46·0	30	0	...
Church Stretton (Woolstaston)	*Shropshire*	52 35	2 48	800	75·0	23	36·0	30	0	...
Bromsgrove (Stoke Reformatory)	*Worcestershire*	52 19	2 4	225	77·0	23	36·0	30	0	...
Boston	*Lincolnshire*	52 58	0 1	25	77·0	20	36·0	5	0	...
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	78·9	12	33·2	6	0	2
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	81·0	12	38·0	5	0	..
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	71·7	23	42·4	2	0	0
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	78·0	20	35·0	6	0	2
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	...	...	...	...	...	...
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	78·7	10	43·5	3	0	...
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	...	...	...	...	...	...
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	74·4	9	42·0	30	0	0
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	80·0	23	37·0	3, 18	0	...
Llandudno	*Carnarvon*	53 20	3 50	72	75·0	23	46·2	1	0	...
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	80·0	12	40·0	30	0	...
Lilliesleaf (Riddell House)	*Roxburgh*	55 31	2 46	550	75·0	9	37·0	4	0	...
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	75·1	12	41·8	5	0	0
Colmonell (Clachanton)	*Ayr*	55 8	4 54	140	76·0	11	38·0	3	0	...
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	76·0	11	41·0	3	0	1
Tighnabruaich	*Argyll*	55 55	5 14	50	72·0	11	36·0	3	0	0
Mull (Quinish)	,,	56 36	6 13	35	63·0	23	...	...	...	...
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	83·1	12	36·7	29	0	...
Braemar	*Aberdeen*	57 0	3 24	1114	...	...	...	...	...	...
Aberdeen (Cranford)	,,	57 8	2 7	120	77·0	19	43·0	4	0	...
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	70·0	21	34·0	29	0	0
Castletown	*Caithness*	58 35	3 23	100	73·0	19, 21	41·0	2, 18	0	...
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	78·5	11	40·0	4	0	...
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	76·0	9	40·0	4	0	...
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	74·0	10, 11	38·0	29	0	...
Carlow (Browne's Hill)	*Carlow*	52 50	6 53	291	...	...	...	...	...	...
Dublin (FitzWilliam Square)	*Dublin*	53 21	6 14	54	76·2	21	42·7	30	0	0
Ballinasloe	*Galway*	53 20	8 15	160	76·3	9	33·0	30	0	...
Clifden (Kylemore House)	,,	53 32	9 52	105	...	...	...	...	...	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	...	...	...	...	...	...
Seaforde	*Down*	54 19	5 50	180	81·0	8, 10	41·0	4, 29	0	0
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	...	..	...	...	...	...
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	78·0	11	36·0	29	0	1

RAINFALL FOR JUNE, 1906.

RAINFALL OF MONTH.							RAINFALL FROM JAN. 1.				Mean Annual 1870-1899.	STATION.
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.		
in.	in.	in.		in.	Date.		in.	in.	in.		in.	
2·09	2·89	+ ·80	138	2·21	28	8	10·63	11·48	+ ·85	108	25·16	Camden Square
1·96	1·19	— ·77	61	·33	28	8	11·55	12·29	+ ·74	106	28·36	Tenterden
2·02	22·1	+ ·19	109	·89	28	6	12·61	16·23	+3·62	129	29·93	West Dean
1·89	2·07	+ ·18	110	1·38	28	7	11·59	12·69	+1·10	109	27·10	Hartley Wintney
1·89	...	...	...	...	...	...	10·26	..	...	...	24·66	Hitchin
1·99	3·68	+1·69	185	2·02	28	9	11·28	13·00	+1·72	115	26·75	Addington
2·04	3·37	+1·33	165	1·46	28	9	10·32	13·85	+3·53	134	25·39	Westley
1·89	2·00	+ ·11	106	·75	28	15	10·12	15·78	+5·66	156	25·40	Brundall
2·32	1·71	— ·61	74	·94	28	7	16·36	21·18	+4·82	129	39·00	Winterbourne Stpltn
2·13	1·96	— ·17	92	1·28	28	7	15·05	15·36	+ ·31	102	35·00	Torquay
2·12	1·49	— ·63	70	·94	28	8	15·45	20·07	+4·62	130	38·85	Polapit Tamar
2·31	2·64	+ ·33	114	1·10	28	7	13·03	13·73	+ ·70	105	30·75	Bath
2·23	2·59	+ ·36	116	1·15	28	11	12·83	13·48	+ ·65	105	29·85	Stroud
2·46	2·14	— ·32	87	·56	16†	10	14·31	13·70	— ·61	96	33·04	Woolstaston
2·07	3·07	+1·00	148	·77	28	8	10·57	12·11	+1·54	115	24·50	Bromsgrove
1·94	2·33	+ ·39	120	·75	28	12	9·76	10·81	+1·05	111	23·30	Boston
2·24	2·15	— ·09	96	·72	28	10	10·81	10·30	— ·51	95	24·70	Hodsock Priory
2·70	2·04	— ·66	76	·54	28	11	11·48	11·65	+ ·17	101	26·18	Derby
3·21	1·86	—1·35	58	·33	1	13	16·75	22·77	+6·02	136	42·43	Bolton
2·38	·95	—1·43	40	·50	23	7	11·63	11·94	+ ·31	103	26·96	Ribston Hall
3·69	2·88	— ·81	78	·89	12	12	26·47	34·15	+7·68	129	60·96	Arncliffe Vic.
2·12	1·78	— ·34	84	·75	21	12	11·24	10·31	— ·93	92	27·02	Hull
2·03	1·86	— ·17	92	·55	16	12	11·35	12·92	+1·57	114	27·99	Newcastle
6·97	4·61	—2·36	66	2·61	26	10	57·36	63·45	+6·09	111	132·68	Seathwaite
2·53	2·33	— ·20	92	·90	28	11	17·19	23·58	+6·39	137	42·81	Cardiff
2·61	2·42	— ·19	93	·78	27	10	19·67	22·83	+3·16	116	47·88	Haverfordwest
2·93	2·89	— ·04	99	·70	23	14	17·59	24·04	+6·45	137	45·41	Gogerddan
2·00	1·41	— ·59	70	·62	26	9	12·18	15·72	+3·54	129	30·98	Llandudno
2·68	2·08	— ·60	78	·62	23	8	18·75	19·98	+1·23	107	43·43	Cargen
2·44	1·71	— ·73	70	·33	16	11	13·88	14·45	+ ·57	104	33·04	Riddell House
...	1·50	...	...	·86	21	8	...	12·93	...	...	...	Edinburgh
2·71	1·70	—1·01	63	·57	21	8	18·83	18·75	— ·08	100	44·85	Colmonell
2·70	1·61	—1·09	60	·32	17	13	14·94	17·90	+2·96	120	35·80	Glasgow
3·76	2·20	—1·56	59	·83	20	10	24·65	31·43	+6·78	128	57·90	Tighnabruaich
3·55	1·30	—2·25	37	·38	24	13	23·84	22·79	—1·05	96	57·53	Quinish
2·15	1·10	—1·05	51	·20	21	13	12·09	10·85	—1·24	90	28·95	Dundee
2·44	·77	—1·67	32	...	...	...	14·94	17·41	+2·47	117	36·07	Braemar
2·09	·74	—1·35	35	·17	30	13	13·69	13·95	+ ·26	102	33·01	Aberdeen
2·24	·80	—1·44	36	·28	30	13	11·92	14·13	+2·21	119	29·37	Cawdor
2·85	1·17	—1·68	41	·45	30	4	24·72	26·45	+1·73	107	56·00	Invergarry
4·78	2·22	—2·56	46	·37	26	13	36·04	45·48	+9·44	126	86·50	Bendamph
2·14	·53	—1·61	25	·11	21‡	7	13·45	18·30	+4·85	136	31·60	Dunrobin Castle
...	·99	...	...	·20	27	11	...	18·19	...	...	...	Castletown
3·29	3·36	+ ·07	102	1·31	17	11	25·99	22·79	+3·20	88	58·11	Killarney
2·61	1·46	—1·15	56	·44	23	14	17·19	16·86	— ·33	98	39·30	Waterford
2·52	2·51	— ·01	100	·74	17	15	14·12	17·96	+3·84	127	33·47	Hurdlestown
2·32	1·40	— ·92	60	·39	23	12	15·03	14·73	— ·30	98	34·44	Carlow
1·95	1·05	— ·90	54	·17	21	12	11·88	12·64	+ ·76	106	27·75	Dublin
2·69	2·05	— ·64	76	·40	30	14	15·92	18·65	+2·73	117	37·04	Ballinasloe
5·33	4·29	—1·04	80	1·04	17	7	34·29	34·78	+ ·49	101	80·23	Kylemore House
2·95	2·44	— ·51	83	·45	17	13	21·74	25·69	+3·95	118	50·50	Enniscoe
2·72	1·23	—1·49	45	·21	16	14	16·92	15·43	—1·49	91	38·61	Seaforde
2·92	1·08	—1·84	37	·24	19	14	17·07	21·02	+3·95	123	41·20	Londonderry
2·88	·91	—1·97	32	·30	24	9	15·86	20·49	+4·63	129	37·85	Omagh

† and 28. ‡ and 30.

SUPPLEMENTARY RAINFALL, JUNE, 1906.

Div.	STATION.	Rain. inches	Div.	STATION.	Rain. inches
II.	Abinger Hall	2·26	XI.	Rhayader, Tyrmynydd	3·03
,,	Ramsgate, West Cliff Villas	1·61	,,	Lake Vyrnwy	1·91
,,	Hailsham	1·35	,,	Llangyhanfal, Plâs Draw	1·14
,,	Crowborough, Uckfield Lodge	2·73	,,	Criccieth, Talarvor	2·22
,,	Osborne, Newbarn Cottage	1·37	,,	Llanberis, Pen-y-pass	4·85
,,	Emsworth, Redlands	1·60	,,	Lligwy	1·44
,,	Alton, Ashdell	2·18	,,	Douglas, Woodville	1·14
,,	Newbury, Welford Park	3·03	XII.	Stoneykirk, Ardwell House	1·68
III.	Harrow Weald, Hill House	2·98	,,	Dalry, The Old Garroch	1·64
,,	Oxford, Magdalen College	2·84	,,	Langholm, Drove Road	2·10
,,	Bloxham Grove	3·25	,,	Moniaive, Maxwelton House	1·80
,,	Pitsford, Sedgebrook	3·81	XIII.	N. Esk Reservoir [Penicuick]	1·65
,,	Huntingdon, Brampton	3·49	XIV.	Maybole, Knockdon Farm	1·39
,,	Wisbech, Bank House	3·23	XV.	Campbeltown, Witchburn	1·73
IV.	Southend Water Works	2·12	,,	Inveraray, Newtown	1·55
,,	Colchester, Lexden	1·73	,,	Ballachulish House	1·68
,,	Newport, The Vicarage	2·96	,,	Islay, Eallabus	1·30
,,	Rendlesham	1·93	XVI.	Dollar Academy	1·80
,,	Swaffham	2·82	,,	Loch Leven Sluice	1·67
,,	Blakeney	1·89	,,	Balquhidder, Stronvar	1·09
V.	Bishops Cannings	3·06	,,	Perth, Pitcullen House	1·30
,,	Ashburton, Druid House	2·61	,,	Coupar Angus Station	1·27
,,	Okehampton, Oaklands	1·54	,,	Blair Atholl	·58
,,	Hartland Abbey	1·32	,,	Montrose, Sunnyside Asylum	·77
,,	Lynmouth, Rock House	2·31	XVII.	Alford, Lynturk Manse	·60
,,	Probus, Lamellyn	1·55	,,	Keith Station	1·61
,,	Wellington, The Avenue	2·32	XVIII.	N. Uist, Lochmaddy	1·21
,,	North Cadbury Rectory	2·15	,,	Alvey Manse	·88
VI.	Clifton, Pembroke Road	2·74	,,	Loch Ness, Drumnadrochit	1·09
,,	Moreton-in-Marsh, Longboro'	3·46	,,	Glencarron Lodge	2·71
,,	Ross, The Graig	3·09	,,	Fearn, Lower Pitkerrie	·32
,,	Shifnal, Hatton Grange	2·36	XIX.	Invershin	·63
,,	Cheadle, The Heath House	1·97	,,	Altnaharra	·93
,,	Coventry, Kingswood	3·28	,,	Bettyhill	1·04
VII.	Market Overton	2·98	,,	Watten Station	·33
,,	Market Rasen	1·55	XX.	Dunmanway, The Rectory	3·17
,,	Bawtry, Hesley Hall	1·82	,,	Cork	1·62
VIII.	Neston, Hinderton	1·21	,,	Darrynane Abbey	4·28
,,	Southport, Hesketh Park	1·67	,,	Glenam [Clonmel]	1·45
,,	Chatburn, Middlewood	1·75	,,	Ballingarry, Gurteen	2·12
,,	Cartmel, Flookburgh	3·02	,,	Miltown Malbay	2·71
IX.	Langsett Moor, Up. Midhope	1·63	XXI.	Gorey, Courtown House	1·65
,,	Scarborough, Scalby	·58	,,	Moynalty, Westland	2·13
,,	Ingleby Greenhow	1·05	,,	Athlone, Twyford	1·95
,,	Mickleton	·67	,,	Mullingar, Belvedere	2·22
X.	Bardon Mill, Beltingham	1·93	XXII.	Woodlawn	3·57
,,	Ewesley, Fallowlees	2·20	,,	Westport, Murrisk Abbey	3·09
,,	Ilderton, Lilburn Cottage	1·66	,,	Collooney, Markree Obsy.	2·38
,,	Keswick, York Bank	1·77	XXIII.	Enniskillen, Portora	·84
XI.	Llanfrechfa Grange	3·37	,,	Warrenpoint, Summer Hill	...
,,	Treherbert, Tyn-y-waun	3·27	,,	Banbridge, Milltown	1·02
,,	Carmarthen, The Friary	2·75	,,	Belfast, Springfield	1·31
,,	Castle Malgwyn [Llechryd]	1·76	,,	Bushmills, Dundarave	1·28
,,	Plynlimon	4·00	,,	Stewartstown, The Square	1·30
,,	Tall-y-llyn	1·00	,,	Killybegs	1·77
,,	New Radnor, Ednol	2·00	,,	Horn Head	1·78

METEOROLOGICAL NOTES ON JUNE, 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.—Fine, with equable temp., except for short cold periods on 1st and 2nd, and 13th to 15th. Mean temp. 60°·1, or 0°·3 below the average; the mean temp. exceeded 70° on 22nd only. Of the R 76 per cent. took place on the night of 28th and morning of 29th. Moderate T showers on 16th and 23rd. Duration of sunshine 216·1,* and of R 16·8, hours.

CROWBOROUGH.—Fine and warm with considerable sunshine. TSS on 1st, 24th and 29th. R ·26 in. above the average of 35 years. Mean temp. 56°·8.

HARTLEY WINTNEY. — Uninterrupted summerlike weather prevailed throughout, but the heavy R of 28th was followed by cold wind and fall of temp. TSS on 16th and 23rd. Ozone on 9 days; mean 3·1.

ADDINGTON MANOR.—Heavy TSS on 16th and 24th, when seven sheep and two bullocks were killed by L. The R of 28th was the largest in 24 hours since July 17th, 1890, when 2·20 in. fell. Low temp. on 5th, 6th and 30th.

BURY ST. EDMUNDS.—Dry till 25th, with cold nights till 22nd. Heavy cold R on 28th and 29th, measuring 1·94 in. in 12 hours.

TORQUAY.—Duration of sunshine 261·9* hours, or 34·5 hours above the average. Mean temp. 58°·0, or 0°·7 below the average. Mean amount of ozone 4·6.

NORTH CADBURY RECTORY.—Delightful from 2nd to 23rd, but the last week was cool, cloudy and damp. TS on 23rd and long slow R on 28th.

CLIFTON.—After a cold day with TS on 1st, it was fine and warm till 13th with easterly winds; then rainy and cold till 17th, with TS on 16th. The rest was warmer but unsettled; TS on 23rd and about 30 hours continuous R on 27th and 28th. R ·30 in. above the average.

BOLTON.—Bright and sunny, but duration only 140·4* hours, or 17·8 hours below the average. Mean bar. the highest since 1887. Heavy hay crop.

SOUTHPORT.—Remarkably high and steady bar., but singularly normal in nearly all other respects. Mean temp. 57°·3, equal to the average. R ·49 in. below the average. Duration of sunshine 225·1* hours, or 4·9 hours above the average. Duration of R 29·5 hours. TSS on 12th, 22nd and 23rd.

CARMARTHEN.—Delightful summer weather till 13th, but afterwards cold, wet and dull to the end. TS on 23rd. Earthquake at 9.48 a.m. on 27th.

HAVERFORDWEST.—Fine and warm with low night temp. and considerable R. Duration of sunshine 222·1* hours. Agricultural operations were backward, but crops good. TS on 23rd. Earthquake on 27th.

MULL.—The lack of R did less harm than the dry weather of June, 1905. This month the temp. was much lower and heavy dews and sea fogs were frequent. Never have crops and foliage looked better.

COUPAR ANGUS.—R a little short of the average, but well distributed. Mean temp. 57°·8, the highest in 26 years. Remarkably steady bar.

DUNMANWAY.—The first 16 days were very fine and bright, and warmer than usual. After 16th there was heavy R at night and showers during the day, but it was still warm, except on the last three days.

DARRYNANE ABBEY.—Fine and hot to 16th, but thence almost constant R and fog to 27th. Total R 23 per cent. over the average.

WATERFORD.—The first half was dry, but in the latter part R fell nearly every day. The total was, however, the least since 1889. Mean temp. 58°·0.

MILTOWN MALBAY.—The first half was warm and sunny with great growth of vegetation. The second half, opening with a TS, had R to the end.

DUBLIN.—Fine with high bar. and marked prevalence of polar winds. The second half was showery. Mean temp. 59°·1, or 1°·6 above the average.

OMAGH.—As a rule the month was dry with a considerable preponderance of polar winds, producing on 29th a mean temp. of 46°, a point never before reached so late in June during 40 years. Crops, however, suffered but little.

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* Campbell-Stokes.

Climatological Table for the British Empire, January, 1906.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Average. Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	53·0	26	25·3	23	47·3	36·4	39·2	90	79·0	22·1	4·02	18	6·3
Malta	67·2	5	42·8	24	59·6	49·6	48·6	82	111·0	37·7	4·48	18	5·8
Lagos	91·0	6*a*	66·0	11*b*	88·0	73·4	71·3	71	135·0	54·5	1·04	2	0·7
Cape Town	85·8	21	51·7	18	76·7	59·1	57·2	70	...	...	·39	7	3·4
Durban, Natal	97·2	11	62·8	25	86·1	70·4	...	...	154·8	...	2·35	16	6·1
Johannesburg	87·2	21	51·7	26	78·9	58·2	59·0	76	162·1	51·8	3·80	12	3·6
Mauritius	89·6	21	65·7	6	86·1	72·6	70·2	76	152·1	58·9	3·42	13	6·5
Calcutta	81·9	28	46·3	17	75·9	55·8	55·2	68	144·0	40·2	1·78	1	3·5
Bombay	89·0	18	60·1	2	82·1	66·6	61·9	67	136·6	49·0	·00	0	1·3
Madras	86·8	10	65·1	1	83·9	69·5	69·0	80	138·2	60·9	4·05	5	4·8
Kodaikanal	73·3	1	41·9	13	64·8	48·3	45·0	70	137·3	22·6	4·10	5	3·4
Colombo, Ceylon	89·6	20	69·2	3	87·4	73·4	71·0	77	156·0	63·0	6·29	9	3·9
Hongkong	72·8	10	46·8	2	62·5	54·8	52·5	80	123·0	...	1·99	10	8·0
Melbourne	109·6	23	45·2	2	81·6	56·7	53·0	59	165·8	37·2	·37	4	4·6
Adelaide	113·1	5	51·9	27	92·4	64·4	52·7	41	165·3	45·0	·00	0	2·4
Coolgardie	113·0	18	54·4	11	96·2	66·6	52·4	37	176·0	51·2	·41	2	3·1
Sydney	91·0	24	58·0	16	77·9	64·3	61·2	69	135·4	52·5	2·21	16	5·8
Wellington	75·0	20	45·0	17	66·5	53·8	51·3	72	138·0	40·0	4·93	9	5·9
Auckland	76·0	14	52·0	3, 24	69·1	56·3	53·5	72	140·0	45·0	1·17	7	4·5
Jamaica, Negril Point	89·0	6	64·0	25	84·2	68·2	68·4	79	...	...	4·22	8	...
Trinidad	89·0	16	63·0	16*c*	82·5	64·4	67·7	77	155·0	59·0	·43	6	...
Grenada	87·0	29	69·0	26	82·0	72·0	68·6	72	149·0	...	2·02	13	2·6
Toronto	56·1	22	4·4	8	36·9	24·4	26·0	82	67·5	0·0	1·75	15	7·0
Fredericton	49·8	23	—10·7	11	31·0	10·2	8·7	63	...	...	4·04	9	5·6
Winnipeg	38·5	27	—35·5	23	17·0	—3·3	...	...	...	...	1·33	10	4·2
Victoria, B.C.	53·1	25	26·2	20	45·1	38·0	...	...	...	...	2·56	21	8·9
Dawson	18·0	31	—65·5	24	-27·1	—40·7	...	...	...	...	1·26	10	4·9

a and 21, 26. *b* and 12. *c* and 21.

MALTA.—Mean temp. of air 54°·4, or 1°·3 above average. Mean hourly velocity of wind 10·3 miles, or 1·0 below average. Mean temp. of sea 60°·0.

Durban, Natal.—R 2·39 in. below average.

Mauritius.—Mean temp. of air 0°·3 below, dew point equal, and R 4·36 in. below, averages. Mean hourly velocity of wind 9·9 miles, or 1·2 below average.

MADRAS.—R 4·05 in. the heaviest rainfall in January since 1870; TS on 17th, and distant T on 16th and 18th.

KODAIKANAL.—Bright sunshine 217 hours.

COLOMBO.—Mean temp. of air 79°·9, or 0°·8 above, of dew point 1°·0 above, and R 2·66 in. above, averages. Mean hourly velocity of wind 8·4 miles.

HONGKONG.—Mean temp. of air 58°·4. Mean direction of wind E. by N., and mean hourly velocity 12·7 miles. Bright sunshine 86·8 hours.

Adelaide.—Mean temp. of air 4°·4 above average. Dry and very hot month.

Sydney.—R 1·29 in. below, mean temp. 0°·4 below, and humidity 2·1 below, averages.

Wellington.—Mean temp. 2°·7 below, and R 1·50 in. above, averages.

TRINIDAD.—R 2·49 in. below 43 years' average.