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ON THE STORING OF HAILSTONES AND THE INVESTIGATION OF THEIR MICROSTRUCTURE.

By Boris Weinberg,
Professor of Physics at the Technicological Institute, Tomsk.

The investigation of the microstructure of hailstones being hitherto very difficult if not impossible in summer, I constructed an apparatus (Fig. 1) for storing them until winter. It consists of three coaxial cylinders; the inner space is intended for the hail, the middle space for a mixture of ice and copper sulphate (approximately in proportion corresponding to eutectics $t = -1^{\circ}{\cdot}6$), the outer space for ice, which forms a sort of protective mantle.

During the summers of 1908 and 1909 I had only once the chance of meeting a hailstorm, on the 2/15 August, 1909, when I was at sea near Helsingfors on my way from Aaland to St. Petersburg. This hail lasted from three to seven minutes; the hailstones were very small (2 to 3 mm. diameter), but still I gathered 200 to 300 grams of them, and immersed them in order to avoid their freezing together in glass boxes containing a mixture of nearly equal parts of benzol and tolnol, which I presumed to be of a density equal to the density of hailstones, but which proved to be lighter. These hailstones I brought later to Tomsk (Siberia), and in December sent them to the Twelfth Congress of Russian Naturalists and Physicians in session at Moscow. These facts demonstrate thoroughly the possibility of storing and transporting hailstones. My experiment has also shown that it would be preferable to preserve one or two hundred hailstones separate from each other than a greater number of them, but partly, and especially in the lower layers, frozen together. That can be attained by inserting the hailstones individually into some very viscous liquid of a density nearly equal to that of the hail, such as cylinder oil, vaseline, or castor oil.

For the investigation of the microstructure of a single hailstone, Mr. W. Dudecki and I made a thin section of it by first rubbing one side on emery paper or by melting it with the heat of the finger. This side was laid on a microscope slide and frozen to it by touching during some time the other side of the glass with the finger. The other side of the hailstone was then polished in the same way as the

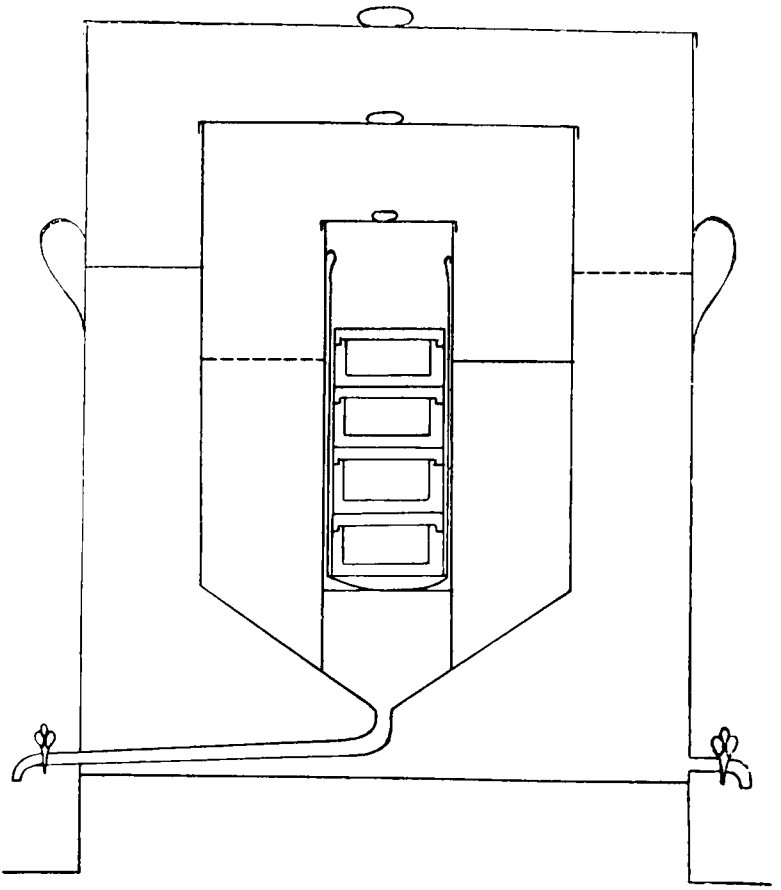


FIG. 1.—APPARATUS FOR STORING HAILSTONES.
ONE-SIXTH ACTUAL SIZE.

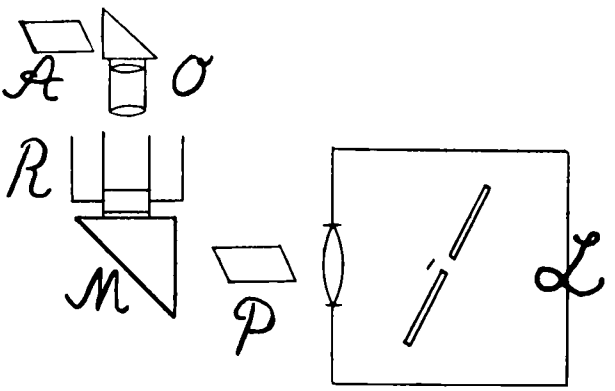


FIG. 2.—APPARATUS FOR OPTICAL INVESTIGATION OF HAILSTONES.
L = PROJECTING LANTERN. P = POLARISER. M = MIRROR.
R = REFRIGERATING VESSEL. O = OBJECTIVE. A = ANALYSER.

first till the requisite thickness was attained. These operations were made in the open air, and were so much the easier because the temperature of the air was below the freezing point. Still it was found possible to grind hailstones in the laboratory at the room temperature by means of cooling the slide, the emery paper, &c., in double-walled vessels with a mixture of ice and salt.

For the optical investigation of thin sections a polarising microscope was used in the open air, and in a lecture room a projecting lantern. In the latter case (Fig. 2) the section was laid in a refrigerating vessel with double walls and double bottom—to avoid the condensation of aqueous vapour from the surrounding air—of plane-parallel glass plates; the space between the walls contained a mixture of ice and salt. The real image of the section was thrown on a screen or on a photographic (autochrome) plate.

The greater number of hailstones were crystallic individuals, as also was the case with "artificial hailstones," drops of water frozen in a mixture of cinnamon and linseed oil of suitable density. In those hailstones, which consisted of several crystallic individuals, there was no regularity in the boundaries between crystals, nor in the angles between the boundaries, nor in the directions of the axes, which lay indifferently to each other, as well as to the milky nucleus which appeared in the section as a lot of air-bubbles of different size.

I would like to hope that my attempt will call forth similar researches, and would be glad if any other investigator had an opportunity to preserve and study some larger or more peculiar hailstones than I have been able to do, and in this way improve our deficient knowledge as to the origin of the hail and the details of its formation.

THE RAINFALL OF SEPTEMBER, 1910.

DRY Septembers are probably on the whole less uncommon than are dry months either in the middle of the summer or in the later autumn, and a dip in the average rainfall curve between August and October is a feature common to practically all the types of seasonal variation which are to be found in the British Isles. The past month has, no doubt, had a rainfall in excess of that of several of the dry spring months during the last half century, but it seems not impossible that it may prove, so far as England and Wales are concerned, to have been one of the driest Septembers of which we have any record.

These islands came under the influence of an anticyclone at the end of August, and until within a few days of the end of September remained more or less affected by it, with the result that with unimportant exceptions rainless weather persisted throughout. On the map, which we reproduce in a generalized form, the isohyets which limit the areas with less than ·25 in. and ·50 in. are shown as broken lines, those for the higher values being drawn solid, whilst

the limited areas, where as much as 2·00 in. fell, are indicated by a tint. It is at once seen that the rainfall reached 1·00 in. at only a few isolated places in England and Wales, the only patches of any considerable size being over the central hills of Wales, and over the greater part of East Anglia, extending to Kent on the south. It is interesting to observe that in the eastern districts nearly all the rainfall of the month was the result of one day's fall, and that but for the thunder rains of the 13th, which in some cases extended to the 14th, this part of the country would have been as dry as, or drier than, any other part. A curiously local storm occurred at Ulcombe, near Maidstone, on the 7th, producing ·74 in., but we can find no trace of this except in the immediate neighbourhood.

The rainfall was smallest, both actually and in relation to the average, in two large areas occupying, respectively, the south-west of England and Wales, from Pembrokeshire to Dungeness, and the north of England as far as the borders of Northumberland, excluding the Lake District, which was slightly wetter. In both these dry areas the fall was everywhere less than ·50 in., and over a very large part less than ·25 in., the culminating points lying in the west of Yorkshire and on the south coast of England, where, in some places, the total rainfall was returned as little more than ·10 in. An unbroken band, with more than 1·00 in. of rain, lay across Ireland and Scotland, and the fall was less than 1·00 in. over a comparatively restricted area, nowhere falling to ·50 in. outside England and Wales. It, however, hardly anywhere reached half the average amount, and in the west of Scotland, where there is by far the largest stretch of normally great rainfall, only a few stations returned so much as 4·00 in.

The general rainfall over the three Kingdoms, as calculated from the tables on pages 172—173, was

England and Wales.....	26	per cent.	of average.
Scotland	41	,,	,,
Ireland	32	,,	,,
British Isles	32	,,	,,

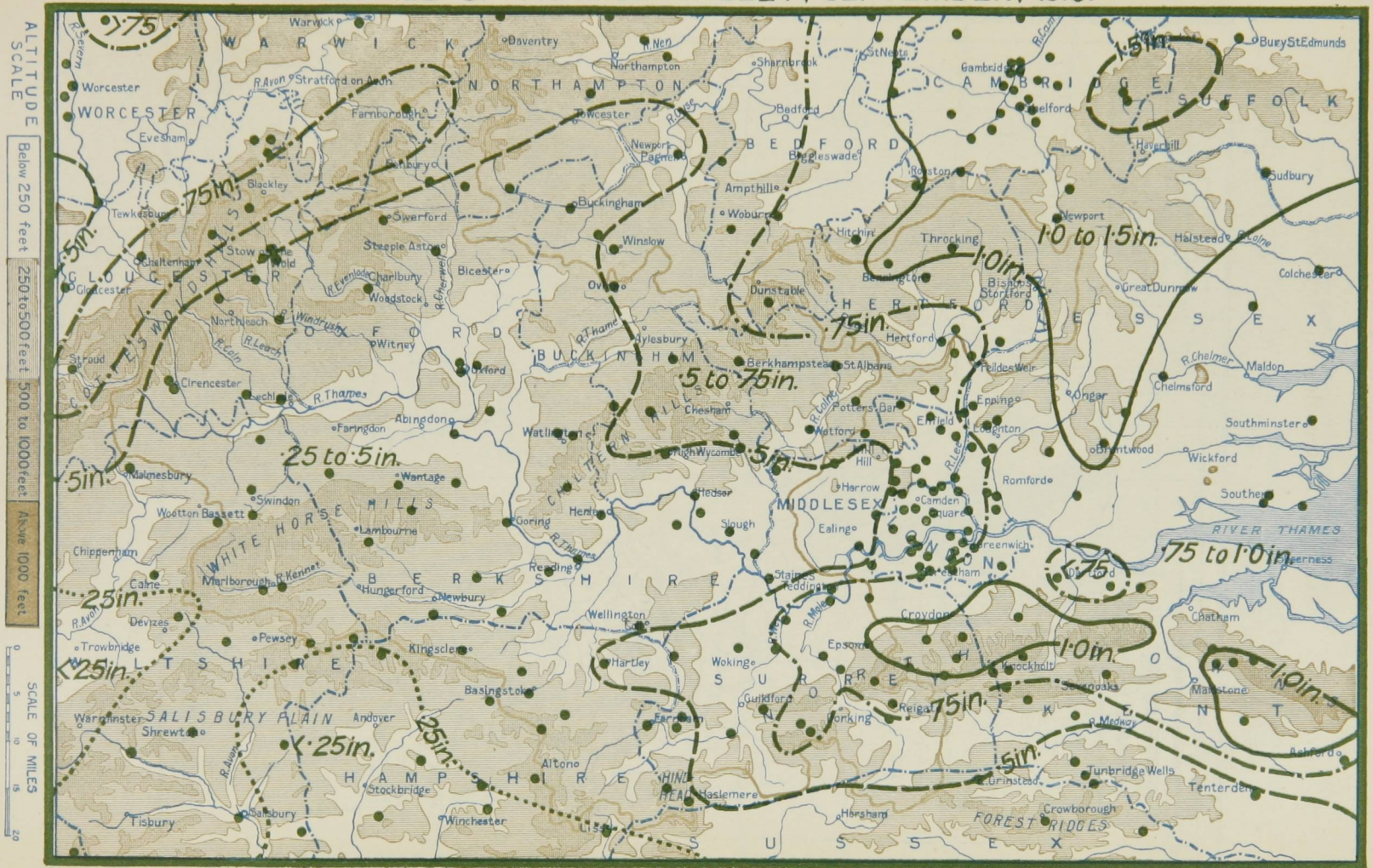
In spite of the widespread dryness of September the general rainfall, since January 1st, 1910, was still considerably above the average in most parts of the British Isles, the only exceptions being the English Midlands and the east coast of Great Britain as far south as the Humber.

THE WEATHER OF SEPTEMBER.

By Fred. J. Brodie.

Late amends for the misdeeds of the past summer were forthcoming in September, which proved for the most part fair and exceedingly dry. In striking contrast with the conditions which had hitherto prevailed, the type of weather was almost continuously anticyclonic; but owing to the position occupied by the area of maximum pressure (usually over our western and northern districts, or adjacent portions

RAINFALL OF THAMES VALLEY, SEPTEMBER, 1910.



Symons's Meteorological Magazine.

Watershed of River Thames above Teddington, and River Lee above Feildes Weir.

Isohyetals

Rainfall Stations reporting


SEPTEMBER, 1910.
RAINFALL IN INCHES.
SCALE OF ENGLISH MILES.
SCALE OF TINTS.
6·0 4·0 3·0 2·0 1·0 ·5 ·25in.
Symons's Meteorological Magazine.

of the Atlantic) the prevailing winds for the first three weeks were from some northerly point, and were accompanied by a considerable amount of cloud. Temperature, therefore, failed to rise to any high level, and was more often than not below the average. Between the 1st and the 3rd the thermometer rose to 70° or a little above it in many English districts, and also in the south of Ireland, and on the 4th similar values were recorded in some parts of central Scotland. Again, on the 11th and 12th, when the central portion of the anticyclone advanced more directly over the country, the thermometer rose well above 65° in several parts of England and Ireland, and touched 69° at Stonyhurst. The second spell of warmth was followed by a drift of cool air from the northward, and in many places the thermometer on the 13th and 14th failed to reach 60°. Owing to the cloudiness of the sky, and to the consequent absence of brisk terrestrial radiation, the nights were as a rule fairly mild; but on the 1st or 2nd the sheltered thermometer fell to 35° in some Scottish districts; while at various times between the 5th and 16th it sank to about the same level in many parts of Great Britain, a reading as low as 30° being recorded at Balmoral on the 8th, and at West Linton on the 16th. The low screen temperatures were accompanied in many instances by ground frosts, but in the southern districts these were too slight to cause any injury to vegetation. On the 14th the long run of anticyclonic weather was temporarily interrupted by the formation of a shallow barometrical depression over the Netherlands, and, as this moved south-westwards over France, a heavy fall of rain, accompanied by local thunderstorms, was experienced at many places situated in the south-eastern quarter of England.

In the closing days of the month the area of highest pressure was transferred to central and southern Europe, and the weather over the United Kingdom was influenced by shallow cyclonic disturbances which came in from the Atlantic. The general conditions now became less settled, but the influx of a current of air from the southward resulted in a rise of temperature to a higher level than at any previous time in the month. On the 27th and 28th readings above 70° were recorded in many parts of England, the thermometer on the latter date reaching 75° in the London district (at Greenwich, Westminster and Tottenham), and 76° at Raunds, in Northamptonshire. In London the readings were higher than at any time since August 12th.

The touch of warmth failed, however, to compensate for the longer period of cool weather, and the mean temperature of the month was therefore below the average, the deficit being greatest (a degree to a degree and a half) over central and southern England. The total duration of bright sunshine was slightly in excess of the normal on many parts of our west and south coasts, but was deficient at most northern stations. At Westminster the record, 118 hours, agreed almost precisely with the average.

METEOROLOGY AT THE BRITISH ASSOCIATION, SHEFFIELD MEETING, 1910.

By E. GOLD, M.A.

IT had been hoped that time would permit of the whole of Tuesday morning (September 6th) being devoted by the full section to Cosmical Physics, but finally it proved necessary to divide immediately after the discussion on Atmospherical Electricity, opened by Dr. Chree, who gave an excellent resumé of the present state of our knowledge of this subject. The discussion was a success with the consequence that it took up a large portion of the available time and the meteorological papers which followed were nearly all closured without permitting any expression of opinion on the points raised.

The following is a brief account of Dr. Chree's opening statement. Excluding Aurora as a subject inviting separate discussion, we may include under the term Atmospheric Electricity, the potential gradient in the atmosphere, the influence of the potential gradient and electrical changes on the growth of vegetation, the phenomena of thunderstorms, the number and nature of the negative and positive ions in the air, the vertical current between the earth and the atmosphere, and the phenomena of radio-activity. The potential gradient and its diurnal and annual variation have been studied for a long time and we know that there is considerable variation with the season of the year at any given station and that different stations show large differences both in the mean values and in the variations. At the same time it ought to be pointed out that improvements in the instruments have resulted in increased mean values, both at Kew and Potsdam, so that the results for different places, depending on different instruments, may not be strictly inter-comparable. The gradient must be much greater than the normal over the tops of trees of even moderate height, and it is easily conceivable that growth may be affected by variations in this quantity. The influence of electricity on growth was first studied by Lemstrom, and it may prove to be of economic importance. In connection with thunderstorms, apart from theories as to their origin, there are several facts of a more human interest which deserve explanation, *e.g.*, only one out of every five persons killed by lightning is a woman; oak trees are struck by lightning more frequently than others, while beech trees are rarely struck. So far as protection from danger is concerned, the method described by a golfing acquaintance, *viz.*, to lie flat down in a bunker, has points in its favour.

The loss of change of insulated bodies and the ionic charges in the atmosphere have received attention, especially in Austria and Germany, Elster and Geitel being among the pioneers in this work. C. T. R. Wilson has investigated the change brought down by rain and snow, and has devised an instrument for measuring the earth-air current. Few, if any, of the theories advanced to explain the different phenomena have received anything like universal acceptance.

Sir Oliver Lodge spoke of the possibility of influencing the weather by varying the potential gradient, and thought that rain might be produced in this way and that here was a field of experiment for the enterprising capitalist. Referring to the effect of electricity on plant life, he explained that the experiments with which he was connected, showed that in dull weather the plants were stimulated by high tension wires overhead, and the effect was good, but in bright sunny weather they were over stimulated with consequent bad results. He mentioned humorously an experiment which he could not get the farmer to repeat, because in the single case in which it had been tried, the crop had proved a failure.

Dr. Shaw pointed out that in order to produce rain in considerable quantities, it would be necessary to find a source for an enormous amount of energy. He referred also to the question whether the clouds acted as tea-trays, *i.e.*, as flat conductors in the presence of the earth.

Sir J. J. Thomson thought the real difficulty about producing rain by electrical methods would be political. Making rain for oneself would be all very well if it could be confined to oneself; but when it came to deluging neighbouring countries with rain they did not want, or depriving them of their normal supply, difficulties would begin. As he understood Sir Oliver Lodge, it was not a question of supplying energy, but of transforming energy already existent in the atmosphere, in order to produce rain. He referred also to the difficulty of explaining the return to earth of the outward flowing negative electricity, and mentioned, in conclusion, the relation between the radio-active contents of the air and its previous history; air which had travelled over the sea was much less radio-active than that which had been for some time over the land.

After the section divided, Dr. W. Schmidt, of Vienna, communicated an interesting description of a new instrument, the Variograph, designed by him for measuring short waves in atmospheric pressure. He showed records obtained by it at Innsbrück and Vienna. Conditions at Innsbrück, especially in the winter months, are very favourable for the production of waves, the cold air in the valley lying beneath a warmer upper layer, so that it is sometimes possible to see the snow melting on the mountains before it begins to thaw at Innsbrück. By recording with two instruments, 2 km. apart, Dr. Schmidt deduced that both progressive and standing waves occurred, the period of the latter being considerably greater than that of the former; in a particular case the periods were 9 minutes and 3·5 minutes respectively, and the resultant curve showed the interference of the two sets of waves. Dr. Schmidt showed too that in Fôhn weather, when regular waves were recorded, the regularity ceased when the Fôhn wind actually broke through the cold layer and blew at Innsbrück, proving that the layer of discontinuity of temperature was essential to the formation of the waves. He found also in some cases that regular waves

preceded, by several hours, the occurrence of line-squalls, a result in agreement with Mr. Russell's interesting observations of cirrus clouds.

Mr. Dines communicated some observations on the Upper Atmosphere during the passage of the Earth through the tail of Halley's Comet. The traces obtained by Mr. Dines in ordinary cases are of two kinds; one in which the up and down curves coincide, the other in which loops are formed. The traces at the time of the Comet showed an abnormally large proportion of the second kind, but it was not possible to say if the peculiarity was due to the Comet, or to the type of weather prevailing.

After a paper by Dr. Nicholson on Cosmical Applications of Radiation Pressure, Miss Margaret White showed a series of slides giving the results of the hourly balloon ascents made from Manchester, in March, 1910. The results corroborated in their main features those obtained in June, 1909, and communicated at the Winnipeg meeting.

Mr. Stupart gave some results of an enquiry into the vertical temperature gradients in Canada in the winter months. The principal conclusions were (1) that in cold winters in Manitoba the temperature increased upwards, the mountains being warmer than the plains, and the inversion (in mean temperatures for the month) amounting to as much as 6° F.; (2) that in warm winters the mountains were colder than the plains, and the vertical gradient approached the adiabatic value.

Mr. Gold communicated the results of an investigation into the effects of radiation on H_C, the height, and T_C, the temperature, of the Advertive Region. So far as radiation is concerned, the variation, both in the temperature and in the absolute humidity of the atmosphere, tend to increase the value of H_C with approach towards tbe equator, but their effects on T_C are in opposite directions. A necessary condition for the existing state of affairs, is that the atmosphere should be very nearly transparent to low temperature radiation for considerable regions in the spectrum,

Professor Bailey described a sensitive bifilar seismograph for recording undulatory movements of the earth's surface of short period.

On Wednesday morning, the Report of the Seismological Committee was read. In it reference is made to the interesting results on the semi-diurnal change in level, caused by the tide, obtained by Plummer at Bidstone; and to the small thickenings of the trace ascribed to large surface waves set up by great earthquakes.

The Report of the Joint Committee for the Investigation of the Upper Atmosphere was also presented. During the International week, Dec. 6th—11th, 1909, 18 records were obtained from registering balloons sent up in this country. In the earlier part of the week, the results from different stations agreed in showing that the value of H_C was between 7·5 and 8·5 km., *i.e.*, very much below the

average. These islands were situated then in a region of low pressure with small gradients. As this became transformed into the ridge between a low and a high pressure system, the heights observed increased to 12 km. or more, falling again when a fresh cyclone advanced from the Atlantic.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

A WET FIRST HALF, AND AFTER.

In the first half of this year, Greenwich had a rainfall of 12·5 in. The average is 10·37 in.

Consider all previous cases of 12 in. or more. There are 17; and it is a curious fact that in no fewer than 16 of these the August following was wet. The exceptional year is 1869.

We might make this universal statement: the thirteen wettest first halves (all over 12·3 in.) were each followed by a wet August. These are given, in descending order, in the following table, with the rainfall of August (which has an average of 2·33 in.).

	Year.	Rainfall, First Half. in.	Rainfall, August. in.	Rainfall, October—December. in.
1.	1866	17·4	2·42	5·42
2.	1879	17·3	5·19	2·32
3.	1878	16·2	5·38	6·27
4.	1903	15·6	4·82	7·64
5.	1860	15·5	3·68	6·85
6.	1848	14·2	4·25	7·25
7.	1877	13·7	2·90	7·07
8.	1862	13·4	3·01	6·66
9.	1865	13·1	3·97	9·16
10.	1851	12·8	2·60	3·38
11.	1867	12·6	2·64	4·53
12.	1905	12·6	2·54	4·63
13.	1853	12·5	2·75	6·98
		Average	3·55	6·01

The rainfall of August this year, 2·42 in. adds a fourteenth case.

An opposite tendency may be noted on the other side. Thus, where the first half has had a rainfall under 8 in., which has happened in 11 years, August has been dry in 9 cases.

It would further appear that there is a tendency to dryness in the last quarter of those years. A column of the rainfall added, shows that, with an average of 6·96 in. in the last quarter, those quarters are in excess only five times; and in four the excess is slight (+·68 in. at most). The average of the column is 6·01 in. We might say that in only two cases (1848 and 1865) was the last quarter wet in the twofold sense of a preponderance of wet months and an excess of rainfall.

Some discussion of these facts and relations might be interesting.

ALEX. B. MacDOWALL.

THE DRY SEPTEMBER.

OUR rainfall for September is only ·26 in., the driest September I have record of here. Rainfall on 6 days as follows:—

September 1st	·01 in.	September 25th.....	·01 in.
,, 10th.....	·01 ,,	,, 26th.....	·02 ,,
,, 14th.....	·17 ,,		·26 ,,
,, 15th.....	·04 ,,		

Chewton Priory, Bath, October 1st, 1910. WALDEGRAVE.

WE have only had five rain days, with a total of ·23 in. during this month; and to-day an open sky leads one to expect another perfect summer's day.

There have been two ten-day periods without any rain.

H. SATCHELL.

Chelwood Rectory, North Somerset, 30th September, 1910.

THE partial drought here has now extended from 31st August to 30th September, both inclusive. There has been an absolute drought from 16th September (inclusive) to date hereof.

The rainfall for the month has only been ·21 in. on 5 days, viz.:—

September 7th.....	·02 in.	September 14th.....	·07 in.
,, 9th.....	·02 ,,	,, 15th.....	·01 ,,
,, 13th	·09 ,,		

With amounts under ·005 on 30th and 31st from heavy dew. All the field ponds about here are dried up.

J. F. LEIGH CLARE.

The White Cottage, Heathfield, Sussex, 1st October, 1910.

AS the rainfall here for September constitutes a record—or something very near it—for that month, I enclose my figures; the total was ·22 in. falling on 5 days, on the wettest of which ·12 in. fell. In the past 50 years of my observations in the S.E. district I find no record of so low a figure for September. During the 22 years at Croydon, 1860 to 1881 (inclusive), the minimum fall was ·35 in. in 1865; during the 15 years at Tunbridge Wells, 1884 to 1899, the minimum was ·53 in. in 1898; during the past 10 years at Eastbourne, 1900 to 1909, the minimum was ·76 in. in 1902. Of course a more extreme minimum may have occurred at Eastbourne previously to 1900, but I see on reference to *British Rainfall* that there is no indication of such an extreme in the years for which I have no record at all, *viz.*, 1882, 1883 and 1899.

JAMES WESTON.

Staveley Cross, Eastbourne, 1st October, 1910.

HEAVY RAIN.

THE thunderstorms of June, 1910, have been supplemented by heavy rains in August. On the high ground at or near Durdham Down, Clifton, the figures were :—

August 28th Rain.

	Depth.		Heaviest Fall.
Stoke Bishop	6·65 in.	.....	1·84 in.
Durdham Down	6·44 ,,	.....	1·93 ,,
Westbury-on-Trym	6·20 ,,	.....	1·81 ,,

Average for August is about 3½ inches.

Dr. G. F. Burder, at Clifton, registered in August, 1865, 8·508 in., and in 1891, 7·439 in. In 1879 I recorded 7·464 in.; 1897 also furnished a very wet August in this locality, the Clifton fall being 7·77 in., and 2·49 in. of this fell on the 30th of that month.

W. F. DENNING, F.R.A.S.

Bristol, September 2nd, 1910.

REMARKABLE SOLAR HALO.

A MOST remarkable Solar Halo, with Parhelia, (mock suns) was seen here between noon and 1 p.m. on Saturday, September 10th. Is not this phenomenon a very exceptional one in these latitudes? The largest halo appeared on the north side of the sun, the southern edge apparently passing through the sun. A smaller one in the shape of an ellipse, was seen round the sun, and on the zenith were wonderfully brilliant segments of circles showing the spectral colours; the mock suns were, of course, due east and west of the sun. I called the attention of many to this wonderful spectacle. It would be interesting to know whether it was visible in other parts of the country.

GEO. J. KIMMINS.

Brooklands, Tonbridge, September 14th, 1910.

The phenomenon referred to by Mr. Kimmins forms the subject of a letter to *The Times* by Sir Thomas Fraser, dated from Eastbourne, on September 10th. The following extract is abbreviated somewhat.

A cold north-east wind had been blowing for many days, and the weather this morning was very fine. The north-east wind suddenly died out, and a light south-west wind came up, bringing some damp haze which kept increasing. There were some light cirrus clouds. At 12.48 p.m. the sun being west of south, I saw it apparently surrounded by two rainbow-like nimbi. The inner one was circular with true rainbow colours, red outside, then yellow, then blue inside. The second rainbow, of which the colours were reversed, was apparently elliptical, with the longer axis horizontal. This rainbow enveloped the circular one. The striking feature was that the ellipse and circle appeared to overlap for one or more degrees on each side of the vertex of the short axis, and the two spectra blended very

brilliantly here, while the divergence of the two figures was very marked as they separated further out. Combined with these two phenomena there was a third. This was a white circular or elliptical anulus, a narrow, colourless ribbon of more or less opaque mist or cloud lying in an horizontal plane above us. The plane of this ring intersected that of the nimbi at right angles, the ring cutting the elliptical nimbus, a little below the poles of the long axis and in an attenuated form, but quite definite; it appeared across the plane of the nimbi till it seemed to pass through or behind the apparent position of the sun on that plane, as it shone through it. The diameter of the anulus appeared so large that only some 60 degrees or less of its south-western circumference was involved in the nimbi. It did not affect the circular nimbus, but at each of the two points where it crossed the fading prismatic bands of the outer one, a short section of the prismatic colours became very vivid and quite blazed out in the broad daylight. This lasted till about 1.30 p.m.

These two short prismatic sections seemed each to have a colourless reflection opposite to it in the north-eastern circumference of the great anulus, where the ribbon was enlarged to about twice its width by a white elliptical blob. The connection was evident, for, when the more western bright patch was clouded over for a time its corresponding blob almost disappeared from the ring and reappeared as that bright patch cleared. At first I noticed a detached prismatic patch of colour at a distance from the sun of four or five times the diameter of the inner nimbus. It proved to be a section of the western haunch of an ordinary rainbow over the sea, the remainder of which was obscured by mist.

LOW SEPTEMBER TEMPERATURE.

THE minimum temperature to-day in the screen, by Kew certified thermometer, was 31°·7. This is the lowest temperature I have ever observed in September.

On September 27th, 1885, the minimum temperature at Greenwich was 30°·6.

H. K. G. ROGERS.

Glenart, Weybridge, 21st September, 1910.

A SIGN OF EAST WIND.

I MUST apologize for a mistake in my letter *re* east wind (this Vol., p. 149). Instead of saying "Temperature shows no tendency to rise by day or fall by night," I should have said, "Temperature shows little tendency to rise by day, but much more to fall by night." The reliability of this sign would seem to depend on whether the anti-cyclone, once started in its northward drift, continues in the same.

C. H. E. RIDPATH.

157, Finchley Road, South Hampstead, September 30th, 1910.

INTERNATIONAL BALLOON ASCENTS, IN APRIL, 1908.

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

April 1st, 1908.

Starting Point.	Country.	A miles.	B ° F.	C miles.	D ° F.	E miles.	F
Manchester....	England	6·2	—73	8·2	—70	140	S.E.
Paris.....	France	7·2	—80	8·7	—62	175	S.E.
Hamburg.....	Germany....	5·6	—52	5·8	—52	22	E.S.E.
Lindenberg....	,, ...	10·6	—72	10·8	—72	28	S.E. by E.
April 2nd, 1908.							
Pyrton Hill....	England	8·0	—71	8·8	—65	58	E.N.E.
Ditcham Park	,, ...	7·4	—74	8·0	—74	57	E. by N.
Paris	France.....	6·5	—79	9·0	—80	146	S.E.
Uccle	Belgium	6·6	—82	10·1	—72	91	S.S.E.
Hamburg.....	Germany....	7·0	—70	7·3	—67	89	S. by E.
Strassburg	,, ...	7·1	—71	9·1	—67	80	S. by E.
April 3rd, 1908.							
Manchester....	England	6·8	—56	7·1	—54	66	S.E. by E.
Ditcham Park	,, ...	6·0	—39	7·0	—38	219	E.S.E.
Paris.....	France.....	6·6	—74	7·8	—65	145	E.
Hamburg.....	Germany....	6·4	—74	8·4	—65	34	E.N.E.
Lindenberg....	,, ...	?	?	9·2	—76	18	S.S.E.
Strassburg	,, ...	7·2	—77	8·9	—63	42	E.S.E.
Munich.....	,, ...	7·0	—72	?	?	58	S.S.E.
Zurich	Switzerland..	6·9	—72	?	?	41	S.E.
Vienna.....	Austria.....	6·9	—72	11·6	—65	75	S.S.E.
Pavia.....	Italy.....	7·5	—87	8·5	—83	36	S.E. by S.

A=Height in miles of commencement of isothermal column.
B=Temperature, F°., at bottom of column.
C=Greatest height of reliable record in miles.
D=Temperature, F°., at greatest height.
E=Distance in miles of point where balloon fell.
F=Bearing of falling point from starting point.

There are two noticeable points in the figures. The great height of the commencement of the isothermal column at Lindenberg on April 1st, 10·6 miles (17 kms.), constitutes, I think, the record for the temperate latitudes. Also the temperature of —38° only at Ditcham Park on April 3rd is unusually high.

On April 1st the lowest pressure lay over the south-west of Scandinavia. On the 2nd this depression seems to have filled up, and the lowest pressure lay between Scotland and Iceland. The charts for the 3rd and 4th show a small well-marked depression, with complete circulation round it, passing to the south-east across the North Sea.

METEOROLOGICAL NEWS AND NOTES.

THE KING has been pleased to intimate that he will continue the annual subscription to the General Fund of the British Rainfall Organization which was given by His late Majesty King Edward VII.

THE INTERNATIONAL METEOROLOGICAL COMMITTEE met at Berlin in the end of September under the presidency of Dr. W. N. Shaw, with Professor Hellmann as Secretary. The places of those members

who have died since the last meeting were filled by the appointment of Dr. G. T. Walker, F.R.S., Dr. W. Trabert, C. H. Ryder and Dr. E. van Everdingen.

MESSRS. AITCHISON & Co., of London, Leeds and Manchester, send us an attractive illustrated catalogue of Meteorological Instruments extending to 90 pages. We suppose it is inevitable that such catalogues must contain rain gauges of obsolete types; but this also shows the standard instruments to which alone we would direct attention.

REVIEW.

Descriptive Meteorology. By WILLIS L. MOORE, LL.D., Sc.D., Professor of Meteorology and Chief of United States Weather Bureau, &c. With forty-five charts, many in color, and eighty-one illustrations in text. New York and London: D. Appleton & Company, 1910. Size $9\frac{1}{2} \times 6\frac{1}{2}$, pp. xviii. + 344. Price 12s. 6d. net.

PROFESSOR WILLIS MOORE, at the head of the United States Weather Bureau, is in a unique position amongst the meteorologists of the world. The system he controls is the largest and the most generously supported, and it creates by the number of persons it employs a class of professional meteorologists to whose training the Chief must necessarily give much thought. It is mainly the young men entering the service of the Weather Bureau that Professor Moore had in mind when writing his book; and he has striven with success to make the volume interesting, up-to-date, and intelligible to anyone of alert intelligence, even if ignorant of mathematics. As he very truly remarks, a book which suits the class aimed at will "provide equally well for all others who are beginning seriously this important science." Except in so far as the superabundance of data at the author's disposal is mainly American, and the illustrations and maps relate mainly to the western hemisphere, the book should prove as interesting and attractive to readers in this country, and in "all the Britains," as to their American kindred.

The arrangement and treatment of the subject present several points of originality, which strike one pleasantly in reading what is physically the heaviest book of its size we have ever handled (it weighs 3 lbs.). For one thing, it is the first book on meteorology which has been planned and written since the complexity of the composition of the atmosphere, and the remarkable distribution of temperature vertically in the free air, have been known; and there is something refreshingly unfamiliar in the picture of an atmosphere above 100 kilometres consisting solely of hydrogen and helium, the oxygen and nitrogen being all left far below, while water vapour practically vanishes within 5 miles of the surface of the land. The part played by dust also falls into its place in the original plan; but

we do not think we are wrong in saying that the essential characteristic of the book is the vivid realization of the importance of the vertical range of atmospheric phenomena in all discussions. When meteorology is treated as merely the description of what occurs in the air at the surface of the Earth, the maps depicting the various distribution only show momentary sections of the heaving and throbbing mass of the atmosphere, from which it is impossible to picture the changes actually in progress. Professor Moore makes large use of maps, of course, but he always keeps in view that the map is merely the ground plan of the aerial structure which is ever before his mind. The correlation of the horizontal plan of cyclone and anticyclone with the vertical movements connecting the isobars at various levels, is very clearly brought out in the treatment of the movement of the winds, where Professor Bigelow's diagrams are expounded in a manner which should be understood by every reader. Approached from this point of view, a tornado or water-spout becomes a typical, and not an abnormal, feature of atmospheric activity.

There is no reason to suppose that the chapter on Precipitation is treated more summarily than those on other departments of meteorology; but in reading Professor Moore's treatment of the subject specially studied by the reviewer, the skill of the "leaving out," which must have been as great or greater in other chapters, appears specially striking.

The chapter on Forecasting the Weather and Storms will naturally be viewed as the kernel of the book, for it is in this department that the unrivalled experience of the author makes itself most plainly felt; and it is here also that his self-control is most apparent, for he resists the temptation to dwell on the magnitude and the routine of the U.S. Weather Bureau in order to give all the space available to the description of weather types and the way of interpreting the daily weather charts. An excellent chapter on climate completes the work, and after reading it we are amazed at the amount of well-digested, clearly-arranged material which has been set out in the 284 pages of text. The plates which occupy pp. 287 to 331 are well chosen. Those of a general character are of course familiar, like Buchan's isotherms and isobars; but others, such as the maps of the diurnal pressure wave on pp. 294-297, will be new to most English readers. We must congratulate Professor Willis Moore on the production of a book which is bound to have a great future in moulding the thoughts of the rising generation of meteorologists; and while there are, of course, points where future editions can improve upon the present, we have very rarely indeed met with a work on Meteorology which presented so few opportunities for correcting details or questioning conclusions.

RAINFALL TABLE FOR SEPTEMBER, 1910.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	RAINFALL OF MONTH. Aver. 1875—1909. in.	1910. in.
		° ′	° ′			
Camden Square	*London*	51 32	0 8	111	2·00	·58
Tenterden	*Kent*	51 4	*0 41	190	2·25	·48
Steyning	*Sussex*	50 53	0 20	80	2·77	·16
Southampton (Cadland)	*Hampshire*	50 50	1 22	52	2·60	·15
Hitchin	*Hertfordshire*	51 57	0 17	238	1·98	·91
Oxford (Magdalen College)	*Oxfordshire*	51 45	1 15	186	1·98	·45
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	2·18	1·27
Geldeston [Beccles]	*Norfolk*	52 27	*1 31	38	2·13	2·06
Polapit Tamar [Launceston]	*Devon*	50 40	4 22	315	3·11	·21
Rousdon [Lyme Regis]	,,	50 41	3 0	516	2·69	·29
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	2·39	·79
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	2·40	·98
Coventry (Kingswood)	*Warwickshire*	52 24	1 30	340	2·35	·72
Market Overton	*Rutland*	52 44	0 41	475	2·30	1·46
Boston	*Lincolnshire*	52 58	0 1	25	2·07	1·09
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	1·84	·16
Macclesfield	*Cheshire*	53 15	2 7	501	2·92	·36
Southport (Hesketh Park)	*Lancashire*	53 38	2 59	38	3·09	·54
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	2·11	·28
Arncliffe Vicarage	,, ,,	54 8	2 6	732	4·55	·46
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	2·05	·24
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	2·00	·74
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	11·28	1·38
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	3·61	·15
Haverfordwest	*Pembroke*	51 48	4 58	95	3·91	·23
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	3·89	·61
Llandudno	*Carnarvon*	53 20	3 50	72	2·50	·52
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	3·34	...
Marchmont House	*Berwick*	55 44	2 24	498	2·67	1·09
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	4·30	2·00
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	2·99	1·69
Inveraray (Newtown)	*Argyll*	56 14	5 4	17	6·15	2·71
Mull (Quinish)	,,	56 36	6 13	35	5·20	2·71
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	2·34	·99
Braemar	*Aberdeen*	57 0	3 24	1114	2·73	·54
Aberdeen (Cranford)	,,	57 8	2 7	120	2·69	1·03
Cawdor	*Nairn*	57 31	3 57	250	2·55	1·21
Fort Augustus (S. Benedict's)	*E. Inverness*	57 9	4 41	68	3·54	·82
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	7·28	2·19
Dunrobin Castle	*Sutherland*	57 59	3 56	14	2·51	1·18
Wick	*Caithness*	58 26	3 6	77	2·57	1·31
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	3·79	1·15
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	3·19	·74
Nenagh (Castle Lough)	*Tipperary*	52 54	8 24	120	3·16	·78
Miltown Malbay	*Clare*	52 52	9 26	400	4·18	1·45
Gorey (Courtown House)	*Wexford*	52 40	6 13	80	2·78	·98
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	2·93	1·30
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	2·06	·73
Mullingar (Belvedere)	*Westmeath*	53 29	7 22	367	3·01	1·01
Ballinasloe	*Galway*	53 20	8 15	160	2·99	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	4·42	·80
Collooney (Markree Obsy.)	*Sligo*	54 11	8 27	127	3·65	1·27
Seaforde	*Down*	54 19	5 50	180	3·25	1·23
Bushmills (Dundarave)	*Antrim*	55 12	6 30	162	3·49	·89
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	3·39	1·20

RAINFALL TABLE FOR SEPTEMBER, 1910—*continued.*

RAINFALL OF MONTH (*con.*)					RAINFALL FROM JAN. 1.					
Diff. from Av. in.	% of Av.	Max. in 24 hours. in.	Max. in 24 hours. Date.	No. of Days	Aver. 1875—1909. in.	1910. in.	Diff. from Aver. in.	% of Av.	Mean Annual 1875-1909. in.	STATION.
—1·42	29	·48	13	5	17·92	16·88	—1·04	94	25·11	Camden Square
—1·77	21	·22	13	10	18·32	18·69	+ ·37	102	27·64	Tenterden
—2·61	6	·06	14	4	22·07	26·72	+4·65	121	33·58	Steyning
—2·45	6	·13	14	2	21·18	19·40	—1·78	92	31·87	Cadland
—1·07	46	·40	14	8	17·82	16·55	—1·27	93	25·16	Hitchin
—1·53	23	·31	14	6	17·45	14·84	—2·61	85	24·58	Oxford
— ·91	58	·72	13	11	18·14	20·01	+1·87	110	25·40	Westley
— ·07	97	1·48	13	16	16·33	21·81	+5·48	133	23·73	Geldeston
—2·90	7	·13	14	6	24·90	28·92	+4·02	116	38·27	Polapit Tamar
—2·40	11	·09	25	4	22·54	21·75	— ·79	97	33·54	Rousdon
—1·60	33	·44	14	7	21·12	22·16	+1·04	105	29·81	Stroud
—1·42	41	·73	14	7	22·71	20·92	—1·79	92	32·41	Wolstaston
—1·63	31	·70	14	2	20·51	18·45	—2·06	90	28·98	Coventry
— ·84	63	1·21	14	11	19·12	19·73	+ ·61	103	27·10	Market Overton
— ·98	53	·89	14	9	16·67	17·29	+ ·62	104	23·35	Boston
—1·68	9	·05	19	7	17·54	16·17	—1·37	92	24·46	Hodsock Priory
—2·56	12	·19	1	7	24·85	27·30	+2·45	110	34·73	Macclesfield
—2·55	17	·14	29	9	22·70	24·18	+1·48	107	32·70	Southport
—1·83	13	·09	26	10	19·08	22·00	+2·92	115	26·87	Ribston Hall
—4·09	10	·31	26	8	42·14	48·54	+6·40	115	61·49	Arncliffe
—1·81	12	·11	10	7	18·57	17·84	— ·73	96	26·42	Hull
—1·26	37	·30	2	9	19·65	18·55	—1·10	94	27·94	Newcastle
—9·90	12	·43	2	9	88·04	96·14	+8·10	109	129·48	Seathwaite
—3·46	4	·13	14	2	28·63	32·78	+4·15	115	42·28	Cardiff
—3·68	6	·18	14	5	30·96	28·79	—2·17	93	46·82	Haverfordwest
—3·28	16	·18	2	8	30·92	37·31	+6·39	121	45·46	Gogerddan
—1·98	21	·20	10	8	20·55	23·60	+3·05	115	30·36	Llandudno
...	...	...	..	...	29·83	...	...	...	43·47	Cargen
—1·58	41	·42	10	8	23·89	19·86	—4·03	83	33·76	Marchmont
—2·30	47	·71	28	14	33·67	40·21	+6·54	119	49·77	Girvan
—1·30	57	·37	29	10	25·03	30·05	+5·02	120	35·97	Glasgow
—3·44	44	·50	10, 28	15	46·21	51·41	+5·20	111	68·67	Inveraray
—2·49	52	1·45	1	13	37·87	39·74	+1·87	105	56·57	Quinish
—1·35	42	·26	1	10	20·54	21·61	+1·07	105	28·64	Dundee
—2·19	20	...	...	...	24·16	28·17	+4·01	117	34·93	Braemar
—1·66	38	·43	1	9	22·78	19·95	—2·83	87	32·73	Aberdeen
—1·34	47	·40	1	7	21·25	23·48	+2·23	111	29·33	Cawdor
—2·72	23	·38	1	10	30·26	32·43	+2·17	107	44·53	Fort Augustus
—5·09	30	·62	10	15	56·63	63·18	+6·55	112	83·61	Bendamph
—1·33	47	·66	1	8	22·41	22·10	— ·31	99	31·90	Dunrobin Castle
—1·26	51	·40	2	19	20·68	20·52	— ·16	99	29·88	Wick
—2·64	30	·36	25	9	36·76	44·32	+7·56	121	54·81	Killarney
—2·45	23	·36	27	5	27·45	26·94	— ·51	98	39·57	Waterford
—2·38	25	·40	27	7	27·73	32·09	+4·36	116	39·43	Castle Lough
—2·73	35	·39	27	12	31·46	33·42	+1·96	106	45·11	Miltown Malbay
—1·80	35	·47	5	9	24·41	25·38	+ ·97	104	34·99	Courtown Ho.
—1·63	44	·63	27	8	25·70	32·49	+6·81	126	35·92	Abbey Leix
—1·33	35	·18	10	16	19·89	25·11	+5·22	126	27·68	Dublin
—2·00	33	·60	27	7	26·18	32·10	+5·92	123	36·14	Mullingar.
...	...	...	...	...	26·17	...	...	...	36·64	Ballinasloe
—3·62	18	·23	27	13	35·74	41·16	+5·50	115	52·87	Enniscoe
—2·38	35	·54	27	10	30·14	42·38	+12·24	140	42·71	Markree
—2·02	38	·53	28	9	27·63	27·73	+ ·10	100	38·91	Seaforde
—2·60	26	·32	10	9	26·32	30·25	+3·93	115	37·56	Dundarave
—2·19	35	·50	28	10	28·05	34·39	+6·34	122	39·38	Omagh

SUPPLEMENTARY RAINFALL, SEPTEMBER, 1910.

Div.	STATION.	Rain inches	Div.	STATION.	Rain inches
II.	Warlingham, Redvers Road	1·41	XI.	Llangyhanfal, Plâs Draw....	·49
,,	Ramsgate	1·45	,,	Dolgelly, Bryntirion	·56
,,	Hailsham	·29	,,	Bettws-y-Coed, Tyn-y-bryn	·36
,,	Totland Bay, Aston House.	·12	,,	Lligwy	·44
,,	Stockbridge, Ashley	·16	,,	Douglas, Woodville	...
,,	Grayshott.....	·45	XII.	Stoneykirk, Ardwell House	1·21
,,	Reading, Calcot Place.....	·27	,,	Dalry, The Old Garroch ...	2·15
III.	Harrow Weald, Hill House.	·52	,,	Langholm, Drove Road.....	·93
,,	Pitsford, Sedgebrook.....	·69	,,	Moniaive, Maxwelton House	1·45
,,	Huntingdon, Brampton.....	·99	XIII.	StMary'sLoch,CramiltLdge	·82
,,	Woburn, Milton Bryant.....	·71	,,	Edinburgh, Royal Observty.	·69
,,	Wisbech, Monica Road.....	·73	XIV.	Maybole, Knockdon Farm..	2·15
IV.	Southend Water Works.....	·89	XV.	Campbeltown, Witchburn...	1·13
,,	Colchester, Lexden.....	·90	,,	Glenreasdell Mains.....	1·64
,,	Newport	1·17	,,	Ballachulish House.....	2·11
,,	Rendlesham.....	1·20	,,	Islay, Eallabus	1·35
,,	Swaffham	·89	XVI.	Dollar Academy	1·02
,,	Blakeney	1·41	,,	Balquhidder, Stronvar	1·65
V.	Bishops Cannings	·24	,,	Coupar Angus	·81
,,	Winterbourne Steepleton ...	·33	,,	Blair Atholl.....	·92
,,	Ashburton, Druid House ..	·55	,,	Montrose,SunnysideAsylum	1·15
,,	Honiton, Combe Raleigh ...	·34	XVII.	Alford, Lynturk Manse ...	1·02
,,	Okehampton, Oaklands.....	·26	,,	Keith Station	1·55
,,	Hartland Abbey	·19	XVIII.	Glenquoich, Loan	7·20
,,	Lynmouth, Rock House ...	·29	,,	Skye, Dunvegan.....	2·53
,,	Probus, Lamellyn	·19	,,	N. Uist, Lochmaddy.....	2·05
,,	North Cadbury Rectory ..	·19	,,	Alvey Manse	·87
VI.	Clifton, Pembroke Road ...	·28	,,	Loch Ness, Drumnadrochit.	·82
,,	Ross, The Graig	·40	,,	Glencarron Lodge	3·38
,,	Shifnal, Hatton Grange.....	·80	,,	Fearn, Lower Pitkerrie.....	1·55
,,	Blockley, Upton Wold	·76	XIX.	Invershin	1·38
,,	Worcester, Boughton Park.	·71	,,	Altnaharra	...
VII.	Market Rasen	·40	,,	Bettyhill	·77
,,	Bawtry, Hesley Hall.....	·19	XX.	Dunmanway, The Rectory..	1·80
,,	Derby, Midland Railway ...	·54	,,	Cork	1·28
,,	Buxton.....	·44	,,	Mitchelstown Castle	1·40
VIII.	Nantwich, Dorfold Hall.....	.40	,,	Darrynane Abbey	1·23
,,	Liscard	·50	,,	Glenam [Clonmel]	·96
,,	Chatburn, Middlewood.....	·38	,,	Nenagh, Traverston	1·07
,,	Cartmel, Flookburgh	·62	,,	Newmarket-on-Fergus,Fenloe	...
IX.	Langsett Moor, Up. Midhope	·26	XXI.	Laragh, Glendalough	1·24
,,	Scarborough, Scalby	·91	,,	Moynalty, Westland	·82
,,	Ingleby Greenhow	1·01	,,	Athlone, Twyford	·86
,,	Mickleton.....	·37	XXII.	Woodlawn	1·05
X.	Bardon Mill, Beltingham ...	·31	,,	Westport, St. Helens	·83
,,	Ilderton, Lilburn Cottage...	·99	,,	Achill Island, Dugort	1·67
,,	Keswick, The Bank	·73	,,	Mohill	2·04
XI.	Llanfrechfa Grange.....	·36	XXIII.	Enniskillen, Portora	1·57
,,	Treherbert, Tyn-y-waun ...	·32	,,	Dartrey [Cootehill].....	·98
,,	Carmarthen, The Friary.....	·27	,,	Warrenpoint, Manor House	·86
,,	Castle Malgwyn [Llechryd].	·40	,,	Banbridge, Milltown	1·16
,,	Plynlimon.....	1·50	,,	Belfast, Springfield	1·35
,,	Crickhowell, Ffordlas.....	1·00	,,	Glenarm Castle....	1·27
,,	New Radnor, Ednol	·64	,,	Londonderry, Creggan. Res.	1·20
,,	Rhayader, Tyrmynydd	·52	,,	Killybegs	1·10
,,	Lake Vyrnwy	·45	,,	Horn Head	·89

METEOROLOGICAL NOTES ON SEPTEMBER, 1910.

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; F for number of days Frost in Screen; f on Grass.

LONDON, CAMDEN SQUARE.—The outstanding features of the month were the unusual dryness and brilliant sunshine records. The R was the lowest September amount in the 53 years' record, excepting only 1865 and 1898, when the amounts were ·55 in. and ·33 in. respectively. Of the total fall, ·48 in. or 83 per cent. fell in 4 hours on 13th. Duration of sunshine, 124·8* hours, and of R 6·7 hours. Mean temp. 57°·1, or 0°·7 below the average. Shade max. 76°·3 on 28th; min. 40°·0 on 21st. F 0, f 0.

TENTERDEN.—Nearly as dry as 1907 but not so warm, temp. only reaching 70° on 2 days. Duration of sunshine, 155·0† hours. Shade max. 72°·0 on 28th; min. 38°·5 on 21st. F 0, f 0.

TOTLAND BAY.—The driest September since 1895, when only ·11 in. fell. Duration of sunshine 182·0* hours, or 29·0 hours above the average. Shade max. 69°·0 on 2nd; min. 40°·9 on 21st. F 0, f 3.

PITSFORD.—R 1·91 in. below the average. Mean temp. 54°·7. Shade max. 73°·6 on 28th; min. 34°·6 on 22nd. F 0.

NORTH CADBURY.—The lowest R in any month since observations began in 1896. Severe ground frost on 21st, killing dahlias on low ground. Flowers bloomed well, especially at end. Shade max. 76°·5 on 28th; min. 34°·5 on 21st. F 0, f 2.

ROSS.—After one of the wettest Augusts in 50 years, September was just the reverse, being much the same as in 1898 and 1900, when only ·46 in. and ·40 in. of R fell, respectively. Shade max. 71°·8 on 2nd. F 0, f 1.

HODSOCK PRIORY.—The R was less than one-third of the fall of any of the previous 35 Septembers. Shade max. 72°·1 on 28th; min. 35°·3 on 22nd. F 0, f 1.

SOUTHPORT.—The driest September in the 40 years' record, and bar. pressure the highest in the same period. Duration of sunshine 134·0* hours, and of R 15·5 hours. Mean temp. 54°·6. Shade max. 66°·2 on 28th; min. 38°·7 on 17th. F 0, f 2.

HULL.—Fine throughout, with moderate amount of cloud, light winds and very little R. Shade max. 71°·0 on 28th; min. 39°·0 on 13th. F 0, f 0.

HAVERFORDWEST.—Fine, dry and warm; no gales and no sunless days. Crops, except potatoes, were good. Duration of sunshine, 150·5* hours. Shade max. 66°·8 on 1st.

LLANDUDNO.—Shade max. 69°·5 on 28th; min. 43°·5 on 21st. F 0, f 0.

MARCHMONT HOUSE.—Duration of sunshine, 122·6* hours on 25 days. Shade max. 66°·0 on 24th; min. 37°·0 on 16th and 20th. F 0, f 1.

EDINBURGH.—Shade max. 64°·1 on 24th and 27th; min. 37°·8 on 20th. F 0, f 0.

COUPAR ANGUS.—An ideal month, with no frosts and no storms. Shade max. 69°·5 on 9th; min. 35°·0 on 20th. F 0, f 0.

FORT AUGUSTUS.—Shade max. 68°·0 on 17th; min. 34°·1 on 20th. F 0.

WATERFORD.—The driest September since 1865. Shade max. 70°·0 on 1st; min. 39°·0 on 24th and 30th. F 0.

DUBLIN.—The outstanding features were the high atmospheric pressure, the prevalence of N. winds to 25th, infrequent and moderate R, and an undue amount of cloud Mean temp. 55°·8. Shade max. 68°·1 on 27th; min. 41°·8 on 20th. F 0, f 0.

MARKREE.—Shade max. 67°·3 on 9th; min. 33°·9 on 30th. F 0, f 6.

WARRENPOINT.—Shade max. 70°·0 on 5th; min. 45°·0 on 19th and 21st. F 0, f 0.

Erratum.—In notes on August, 1910, at London, Camden Square, *read*, Mean temp. 61°·8 or 0°·5 below the average.

* Campbell-Stokes. † Jordan.

Climatological Table for the British Empire, April, 1910.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Total Rain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	65·7	21	25·9	3	56·1	39·8	40·7	79	107·5	20·2	2·24	18	7·2
Malta	73·4	25	47·3	19	64·1	54·5	53·8	85	141·5	...	·84	5	4·9
Lagos	92·0	5	70·0	25	88·9	75·1	82·3	73	156·0	68·0	4·48	8	8·2
Cape Town	98·8	12	42·8	22	75·1	54·1	54·2	71	...	...	1·15	7	3·6
Durban, Natal ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Johannesburg	78·2	9	34·0	26	70·8	48·6	47·3	70	132·8	30·4	·42	5	1·4
Mauritius	85·3	11	65·1	8	81·6	70·0	68·6	80	154·9	57·9	3·70	23	6·1
Calcutta...	104·8	10	69·2	16	96·6	75·7	72·2	68	...	65·5	1·22	3	2·4
Bombay...	92·6	22	74·9	12	90·2	77·2	72·9	73	135·0	69·2	·00	0	1·2
Madras	101·7	24	71·1	7	94·8	78·2	75·0	76	143·4	68·0	·04	1	2·6
Kodaikanal	75·4	1	52·2	6	69·5	54·6	45·6	57	135·6	40·9	4·10	10	3·8
Colombo, Ceylon ...	90·4	14	69·4	2	88·5	76·3	74·6	79	156·8	69·0	4·71	13	5·5
Hongkong	84·4	18	59·0	12	73·9	66·1	64·4	82	132·9	...	3·73	8	8·0
Melbourne	84·8	25	43·2	17	69·8	51·5	47·7	63	137·0	39·1	·93	14	4·9
Adelaide	88·0	6	44·0	27	75·3	53·2	48·9	57	152·6	34·3	·06	3	2·8
Coolgardie	95·0	7	40·9	29	80·8	54·3	46·4	47	154·0	33·4	·07	1	2·1
Perth	99·7	9	46·9	29	78·9	59·7	53·3	57	146·1	38·5	·90	8	4·4
Sydney	79·7	26	50·9	28	71·9	58·0	56·7	78	133·8	41·2	2·91	24	4·7
Wellington ...	66·9	9	44·8	18	61·3	50·8	46·4	70	118·0	35·0	1·88	11	4·5
Auckland	72·5	18	43·5	28	65·7	53·3	55·2	88	142·0	38·0	2·02	17	5·1
Jamaica, Kingston ..	91·0	28	64·0	1	87·0	68·8	66·0	70	...	...	1·53	2	3·5
Grenada	86·6	24*	69·0	1, 9	83·3	72·8	68·9	73	140·0	...	2·90	15	5·0
Toronto	74·0	14	27·0	12	55·3	38·4	...	...	89·8	19·6	5·01	15	...
Fredericton	44·0	28	-25·0	25	27·2	6·3	...	87	...	...	3·50	8	6·0
St. John's, N.B. ...	66·5	25	25·7	29	49·9	37·7	...	78	...	...	7·36	17	6·6
Victoria, B.C.	68·7	23	32·2	14†	55·0	40·2	...	72	...	...	1·69	12	7·0
Dawson	52·0	30	-12·0	10	38·9	12·5	...	...	...	...	1·68	9	5·9

* and 25, 26, 27. † and 17.

MALTA.—Mean temp. of air 58°·9. Average bright sunshine 8·4 hours per day.

Johannesburg.—Bright sunshine 277 hours.

Mauritius.—Mean temp. of air 0°·1, of dew point 0°·2, and R 2·44 in., below averages. Mean hourly velocity of wind 9·4 miles, or 1·1 below average.

KODAIKANAL.—Bright sunshine 233 hours. TSS on 14 days.

COLOMBO.—Mean temp. of air 80°·5, or 2°·1 below, of dew point 0°·1 above, and R 5·42 in. below, averages. Mean hourly velocity of wind 5·5 miles. TS on the 1st.

HONGKONG.—Mean temp. of air 69°·6. Bright sunshine 135·2 hours, or 31 hours above, and R 2·10 in. below, averages. Mean hourly velocity of wind 14·1 miles.

Melbourne.—Mean temp. of air 1°·1 above, and R 1·44 in. below, averages.

Adelaide.—Mean temp. normal. The driest April on record.

Coolgardie.—Rainfall ·61 in. below average.

Perth.—Rainfall ·46 in. below average. The max. temp. on 9th was a record one.

Sydney.—Mean temp. of air 0°·4 above, and R 2·36 in. below, averages.

Wellington.—Mean temp. of air 4°·2 below, and R 2·23 in. below, averages. Bright sunshine 200 hours.