

# Symons's Meteorological Magazine.

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## METEOROLOGY AT THE BRITISH ASSOCIATION.

WE have rarely had more difficulty in preparing an abstract than in endeavouring to present in restricted space the brilliant address delivered by Dr. W. N. Shaw, Director of the Meteorological Office, as President of Section A. The statements were so interwoven with poetic imagery that the omission of passages not in themselves essential breaks the thread which binds the whole together. The following consists of passages of the Address without alteration of wording, though half the text has been cut out in order to get the other half in. Dr. Shaw said :—

It is with much misgiving that I endeavour to discharge the traditional duty of the President of a Section of the British Association. So many other duties seem to find a natural resting-place with anyone who has to reckon at the same time with the immediate requirements of the public, the claims of scientific opinion, and the interests of posterity, that, unless you are content with such contribution towards the advancement of the sciences of mathematics and physics as my daily experience enables me to offer you, I shall find the task impossible.

[After a reference to the loss to science of Lord Kelvin.]

In this country there is a widespread idea that meteorology achieves its object if by its means the daily papers can give such trustworthy advice as will enable a cautious man to decide whether to take out his walking-stick or his umbrella. Some of us are accustomed to look upon India as a place of unusual scientific enlightenment, where governments have a worthy appreciation of the claims of science for recognition and support. But Eliot was never tired of telling me that it was the administration of India, and not the advancement of science, that the Indian administrators had in view ; and among his achievements the one of which he was most proud was that the conduct of his office upon scientific lines during his tenure had so commended itself to the administrators that his successor was to be allowed three assistants, with special scientific training, in order that the State might have the benefit of their knowledge.

It is, of course, easy to suggest in explanation of this success that the Department of Public Works in India cannot afford to be unmindful of the distribution of rainfall, and that there is an obvious connection between Indian finances and Indian droughts ; but it is a new fact in British history that the application of scientific considerations to the phenomena of rainfall are of such direct practical importance that meteorological information is a matter of consequence to all Government officials, and that meteorological

prospects are a factor of finance. Imagine His Majesty's Chancellor of the Exchequer calling at 63, Victoria Street, to make inquiries with a view to framing his next Budget, or taking his prospects of a realised surplus from the Daily Weather Report. Yet in India meteorology is to such an extent a public servant that such proceedings would not excite remark.

I speak for the Office with which I am connected when I say its temptations to waste are very numerous and very serious. It is wasteful to collect observations which will never be used; it is equally wasteful to decline to collect observations which in the future may prove to be of vital importance. It is wasteful to discuss observations that are made with inadequate appliances; it is equally wasteful to allow observations to accumulate in useless heaps because you are not sure that the instruments are good enough. It is wasteful to use antiquated methods of computation or discussion; it is equally wasteful to use all the time in making trial of new methods. It is wasteful to make use of researches if they are inaccurate; it is equally wasteful to neglect the results of researches because you have not made up your mind whether they are accurate or not. It is wasteful to work with an inadequate system in such matters as synoptic meteorology; it is equally wasteful to lose heart because you cannot get all the facilities which you feel the occasion demands.

It is the business of those responsible for the administration of such an office to keep a nice balance of adjustment between the different sides of activity, so that in the long run the waste is reduced to a minimum. There must in any case be a good deal of routine work which is drudgery; and if one is to look at all beyond the public requirements and public appreciation of the immediate present, there must be a certain amount of enterprise and consequently a certain amount of speculation.

Let me remark by the way that there is a tendency among some of my meteorological friends to consider that a meteorological establishment can be regarded as alive, and even in good health, if it keeps up its regular output of observations in proper order and up to date, and that initiative in discussing the observations is exclusively the duty of a central office. That is a view that I should like to see changed. I do not wish to sacrifice my own privilege of initiative in meteorological speculation, but I have no wish for a monopoly. To me, I confess, the speculation which may be dignified by the name of meteorological research is the part of the office work which makes the drudgery of routine tolerable. For my part I should like every worker in the Office, no matter how humble his position may be, somehow or other to have the opportunity of realising that he is taking part in the unravelling of the mysteries of the weather; and I do not think that any establishment, or section of an establishment, that depends upon science can be regarded as really alive unless it feels itself in active touch with that speculation which results in the advancement of knowledge. I do not hesitate to apply to other meteorological establishments, and indeed to all scientific institutions that claim an interest in meteorology, the same criterion of life that I apply to my own office. It is contained in the answer to the question, How do you show your interest in the advancement of our knowledge of the atmosphere? The reply that such and such volumes of data and mean values measure the contribution to the stock of knowledge leaves me rather cold and unimpressed.

But to return to the endeavour after the delicate adjustment between speculation and routine, which will reduce the waste of such an institution to a minimum ; experience very soon teaches certain rules.

I have said elsewhere that the peculiarity of meteorological work is that an investigator is always dependent upon other people's observations ; his own are only applicable in so far as they are compared with those of others. Up to the present time, I have never known anyone take up an investigation that involved a reference to accumulated data, without his being hampered and harassed by uncertainties that might have been resolved if they had been taken in time. I shall give you an example presently, but, in the meantime, experience of that kind is so universal that it has now become with us a primary rule that any data collected shall forthwith be critically examined and so far dealt with as to make sure that they are available for scientific purposes—that is, for the purposes of comparison. A second rule is that as public evidence of the completion of this most important task there shall be at least a line of summary in a published report, or a point on a published map, as a primary representation of the results. Such publication is not to be regarded as the ultimate application of the observations, but it is evidence that the observations are there, and are ready for use.

You will find, if you inquire, that at the Office we have been gradually lining up these troops of meteorological data into due order, with all their buttons on, until, from the commencement of this year, anyone who wishes to do so can hold a general review of the whole meteorological army, in printed order—first order stations, second order stations, rainfall stations, sunshine and wind stations, sea temperatures and other marine observations—on his own study table, within six months of the date of the observations, upon paying to His Majesty's Stationery Office the modest sum of four shillings and sixpence. For all the publications except one the interval between observation and publication is only six weeks, and as that one has overtaken four years of arrears within the last four years, I trust that by the end of this year six weeks will be the full measure of the interval between observation and publication in all departments. This satisfactory state of affairs you owe to the indefatigable care and skill of Captain Hepworth, Mr. Lempfert, and Mr. R. H. Curtis, and the members of the staff of the Office who work under their superintendence. I need say little about corresponding work in connection with the Daily Weather Report, in which Mr. Brodie is my chief assistant, although it has received and is receiving a great deal of attention. The promptitude with which the daily work is dealt with hardly needs remark from me, though I know the difficulties of it as well as anyone. If I spend only one long sentence in mentioning that on July 1st, 1908, the morning hour of observation at twenty-seven out of the full number of twenty-nine stations in the British Isles was changed from 8 a.m. to 7 a.m., and the corresponding post-offices, as well as the Meteorological Office, opened at 7.15 a.m. in order to deal with them, so that we may have a strictly synchronous international system for Western and Central Europe, and thus realise the aspiration of many years, you will not misunderstand me to mean that I estimate the task as an easy one.

The third general rule is that the effectiveness of the data of all kinds, thus collected and ordered, should be tested by the prosecution of some

inquiry which makes use of them in summary or in detail. It is here that the stimulating force of speculative inquiry comes in; and it is in the selection and prosecution of these inquiries, which test not only the adequacy and effectiveness of the data collected but also the efficiency of the Office as contributing to the advance of knowledge, that the most serious responsibility falls upon the administrators of Parliamentary funds.

Scientific Shylocks are not the least exacting of the tribe, and there have been times when I have thought I caught the rumination :—

“Three thousand ducats? 'tis a good round sum!”

When Shylock demands his pound of flesh in the form of an annual report, it is not at all uncommon to find that some argosy that started on its voyage long ago ‘hath richly come to harbour suddenly.’ There have been quite a number of such happy arrivals within the last few years.

(*To be continued.*)

### THE RAINFALL OF OCTOBER, 1908.

OCTOBER has generally the highest rainfall of any month in the year in the British Isles as a whole, and a dry October is a comparative rarity. In October, 1908, the rainfall exceeded 4·00 in. only in a few isolated spots in the Irish mountains, Wales, the Lake District and (somewhat doubtfully) in the south of Scotland; the largest area with more than 4 inches was in the south of Dorset, and to this very remarkable rain attention is called in our correspondence. Areas with less than 1·00 in. of rain occur in the north-east and south-west of Scotland, the east and centre of England and the extreme north of Ireland. On comparing the map of the month with those of the four dry Octobers (1879, 1888, 1897, 1904) in *British Rainfall*, 1904, p. 28, it is seen that although there have been instances of larger areas with less than 1·00 in., there has never before been so small an area with more than 4·00 in. The dryness was most conspicuous in the west of Scotland where not more than one-third of the normal rainfall was experienced, and there was only a narrow strip along the east coast of Scotland with so much as half the normal fall. Over the greater part of England and over half of Ireland less than half the average rainfall was experienced, and the average was only reached or exceeded in three patches, viz., the south-west of Ireland, Dorset and the east of Forfarshire and Kincardineshire. Compared with other dry Octobers the proportional amounts of rainfall over the different divisions of the country were (taking 100 as the average) :—

| October.....          | 1879 | 1888 | 1897 | 1904 | 1908 |
|-----------------------|------|------|------|------|------|
| England and Wales ... | 39   | 47   | 39   | 42   | 49   |
| Scotland .....        | 54   | 84   | 68   | 64   | 45   |
| Ireland .....         | 48   | 59   | 81   | 60   | 52   |
| British Isles.....    | 44   | 59   | 54   | 51   | 48   |

It thus appears that only in 1879 was October so dry as this year, and so far as our records go there was never before so dry an October in Scotland, and especially in the west.

## METEOROLOGY AT THE FRANCO-BRITISH EXHIBITION.

By L. C. W. BONACINA, F.R.Met.Soc.

### III.

(Concluded from p. 177.)

I WILL now, at the risk of being tedious, afford another illustration to show more especially the liability to error, attendant upon fixing attention only on the same individual plants, however "average" these may be, of any particular species. The British oak (*quercus robur*) is a tree that unites in a high degree the qualities of magnificence and beauty; and although it is a genuine native of the soil, eminently adapted to the climate, conspicuous almost everywhere for size and abundance, receives such little attention, except during the processes of barking and sawing, that comparatively few persons, other than botanists, are even acquainted with its flowers. In an average year, in an average district in the southern counties of England, about a quarter of the total number of oak trees have either already opened their leaf-and-flower-buds, or are just commencing to do so, as early as the 30th of April; by the 7th of May this fraction has increased to about half; by the 14th of May to threequarters; whilst on the 20th of May it has approached unity, that is to say almost all, even the very backward individuals, have at last yielded to the call of spring, and are no longer bare with closed leaf-and-flower buds. I accordingly make a generalization and conclude that in the south of England the oak commences to burst into leaf and flower *about* the 7th of May. In the midland counties this approximate date falls, generally speaking, a few days later; in the north of England about a week later, whilst in south and central Scotland the retardation probably approaches ten days. It is to be noted that we cannot get farther than an approximation to the required dates, but that the approximate dates reached by observing a large number of individuals, are of much greater value than the exact dates by observing a single individual only.

And now we come to the most cogent reason of all why phenological observers should not confine their attention to any individual, or any very limited number of individuals, of a species. To keep to the case of the oak, had I followed the ordinary instructions and based my records one year only upon some mature specimen selected as being a good average tree as regards leafing and flowering, I might have been uncomfortably surprised the following year to find this very individual among the exceptionally early ones, and one of the last year's early trees among the average, or even late ones. For although it is undoubtedly true that some individual trees have a constitutional tendency to be in advance of, or to lag behind the bulk of their fellows, I have actually come across instances of an early tree one year becoming an average or late one the next, and *vice-versa*. What has been said concerning plants applies also to birds and insects. Supposing that the observer hears the cuckoo's

note once or twice in the forenoon of April 15th, and not hearing it at all say on the 16th, he again hears it occasionally on the 17th, 18th and 19th; but that suddenly on the 20th, the sound of "cuckoo" issuing repeatedly from wood to wood, forces itself upon his attention all day long, his notes for the Royal Meteorological Society, or any scientific body for whom he is drawing them up, should take the following form: "I heard a cuckoo's note on April 15th and following days, but *the* cuckoo's note did not become a familiar sound of the country-side in this locality until the 20th. I therefore record the 20th as the date *about* which the call of the cuckoo was *first* generally heard."

It might be mentioned in this connection that authentic records exist (though whether they have come before the Royal Meteorological Society or not I cannot say) of isolated instances in various quarters of Britain of January cuckoos, December swallows, March nightingales, and similar anomalies. Naturalists are often most obstinate in their refusal to believe such records, when it is a personal case of "eye hath not seen, nor ear heard;" but the marvel is not so much that exceptions to the ordinary course of nature should occur from time to time, as it would be that they should never. Admitted that these islands are not a desirable sanctuary for migratory birds during the cold, dark, foodless season of winter, there is surely nothing impossible or particularly wonderful in the supposition that some ill-starred swallow deceived by unseasonable warmth in the autumn, or driven out of its course by contrary winds, or victim to one of the thousand-and-one accidents that might befall a migratory bird, should now and again be discovered nearly reduced to starvation by the climatic severities of the Cumberland dales, at a time when its more fortunate brethren were celebrating Yuletide upon a bounteous diet of such luscious insect morsels as are doubtless to be found in Algeria.

In summing up this somewhat lengthy discourse upon phenological observations, introduced by the map put before the public at the Franco-British Exhibition, I would point out that this very map, like any other founded on the present generally adopted scheme for observations, is useful and reliable (if it has been based upon a sufficient number of records in each large district) for comparing the dates in the different districts into which the kingdom is divided, but that the *absolute* dates are without doubt very much more uncertain and less valuable, for the reasons discussed above, than they would be if derived from the system I have proposed in this article. On the other hand it must be remembered that this system of observations is a difficult one, demanding on the part of the observer not only a considerable amount of time, but also as much accuracy of observation as, and a quicker judgment dependant upon a wider culture than, the one in more general use. In other words, the suggested method must be properly and assiduously carried out if its more interesting and comprehensive results are to be of certain scientific value.

## THE WEATHER OF OCTOBER, 1908.

By FRED. J. BRODIE.

THE extraordinary warmth experienced over England at the close of September extended later to Ireland and Scotland; and in the western and northern parts of the United Kingdom generally the temperatures observed on October 3rd were not only the highest, but in many places considerably the highest, recorded at so late a period in the season for at least 37 years past. In Ireland there were apparently no readings higher than  $75^{\circ}$ , but in many parts of Great Britain that value was exceeded, a shade temperature of  $78^{\circ}$  being observed as far north as Gordon Castle in Banffshire. The piecing together of meteorological records made at two different places is scarcely a commendable practice, but it may not be altogether unfair to remark that the maximum temperature of  $75^{\circ}$  registered at Leith on the 3rd was higher than any October reading quoted in Mr. R. Mossman's valuable Edinburgh statistics extending back to 1841.

After about the 5th the air, which had hitherto come up from the southward, backed temporarily to south-east and east, and the weather became somewhat cooler, a slight ground frost being experienced at many inland stations on the night of the 6th. Until well after the middle of the month, however, the thermometer remained almost persistently above its average level, a fresh burst of abnormal warmth occurring between the 12th and 14th, when shade maxima slightly above  $70^{\circ}$  were recorded in several parts of England, and above  $65^{\circ}$  even at some places in the north of Scotland.

After the 20th the wind shifted from the south-eastward to the north-eastward and brought with it a spell of colder weather, lasting for about a week. On the 24th the daily maxima were below  $50^{\circ}$  in many places, and between the nights of the 21st and 24th sharp frosts occurred over a large portion of the kingdom; the lowest temperatures were experienced, as a rule, on the latest date, when the thermometer at many of the northern and central stations fell at least  $5^{\circ}$  below the freezing point, a reading as low as  $18^{\circ}$  being recorded at Balmoral, and a reading of  $21^{\circ}$  at Llangammarch Wells. On the surface of the ground the frost was naturally more severe, the exposed thermometer falling to  $12^{\circ}$  at Llangammarch Wells, to  $15^{\circ}$  at Balmoral,  $17^{\circ}$  at West Linton, and  $18^{\circ}$  at Crathes.

Towards the close of the month the wind veered round to south, and the thermometer again rose to an unusually high level. On the 29th and 30th shade readings of  $65^{\circ}$  and upwards were recorded in many parts of Great Britain and as far north as Glencarron, while at a few scattered places in England and Wales the thermometer rose to within a degree of  $70^{\circ}$ . For the time of year these values were nearly as remarkable as those at the beginning of the month.

Over the United Kingdom generally the month was undoubtedly the warmest October the present generation has witnessed. Prior to 1870 reliable records of temperature were rare, but at Greenwich no such warmth had been experienced in October since the year 1861.

## Correspondence.

*To the Editor of Symons's Meteorological Magazine.*

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## HEAVY RAINFALL IN DORSET.

ON Wednesday, October 21st, a remarkable fall of rain occurred at Weymouth, 3·40 in. being measured in three hours, from 9 a.m. till noon; after this ·33 in. fell, the rain ceasing at 2 p.m. So far as I can gather information this rain appears to have been local. In the first half of the month only ·51 in. fell, after the 16th 5·94 in. were measured in 5 days, viz. :—

·04 on 17th.  
·96 „ 18th.  
·37 „ 19th.

·84 on 20th.  
3·73 „ 21st.

From 21st to 25th no rain; from 25th to 31st, ·80 in.; total for month, 7·25 in.

H. W. GREEN.

*Massandra, Weymouth.*

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DURING the tremendous rainfall experienced during the forenoon of October 21st, Weymouth was not quite the centre of the storm, as the rainfall recorded by the Superintending Civil Engineer at H.M. Breakwater here was much greater. The figures which I have obtained from him are as follows :—

Rainfall recorded between 10 a.m. on the 20th October and 10 a.m. on the 21st was 3·98 in.; and the fall between 10 a.m. on 21st and 10 a.m. on 22nd, 2·91 in., of this latter amount 2·28 in. were recorded between 10 a.m. and 12 noon on the 21st. As there was very little rain before 8 a.m. on the 21st, and none after 1 p.m. on that date, almost the whole of this total of 6·89 in. fell in 5 hours, at any rate, after going carefully into the matter it is safe to assume that 6½ inches fell in 5 hours. At Weymouth I believe they had 4 inches in 5 hours. The distance of the rain gauge at the Breakwater from Weymouth is about 4 miles to the south. My rain gauge at Upwey is 5 miles to the north of Weymouth, and the record at our Waterworks there was ·56 in. at 9 a.m. on the 21st, and 2·67 in. at 9 a.m. on the 22nd. Of this latter amount 1·65 in. fell between 9 and 11, and ·92 in. between 11 and 1 o'clock, ·10 in. falling afterwards. The result of the storm was, of course, that all the low-lying streets were flooded.

R. STEVENSON HENSHAW,

*Portland, Dorset, Nov. 10th, 1908.*

*Engineer & Surveyor.*

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## SMALL DIURNAL RANGE OF TEMPERATURE.

ON looking over my register I find a rather unique occurrence, any-way within my records of meteorological observations, which are made with Kew verified thermometers in a Stevenson screen.

|                          | Min.  |       | Max.  |       | Range. |
|--------------------------|-------|-------|-------|-------|--------|
| October 20th, 1908 ..... | 50°·3 | ..... | 51°·3 | ..... | 1°·0   |
| October 21st, 1908 ..... | 44°·0 | ..... | 44°·3 | ..... | 0°·3   |

Is it not very rare to have such a small range? My station is 302 feet above sea level.

G. HAMLIN.

40, East Street, Brighton, Oct. 23rd, 1908.

## THE WARM AUTUMN AT YORK.

THE official York records of maximum temperature from September 28th were this year 68°, 75°, 80°, 77°·5 (October 1st), 74°, 73°, 76° and 62° (October 5th). Having access to the values from 1832 on, I find that the previous highest October value was 71° in 1834 (on 5th), and in 1898. On only four other occasions was 71° reached, namely, in 1848, 1861, 1895 and 1900. Judging by the records to hand it seems probable that the mean temperature for the month will exceed any record, the warmest October previously having been 52°·9 in 1861, whilst the average is practically 48°. The lowest, taking as in the other cases the mean of max. and min. records, were 43°·3 in 1842, and 44°·1 in 1896.

J. EDMUND CLARK.

Asgarth, Riddlesdown Road, Purley, Surrey, Oct. 31st, 1908.

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WEATHER PREDICTION.

THE art of forecasting seasons, more or less definitely, will, I believe, be acquired in time; after many attempts, no doubt, and many stumbles. I may confess to making such attempts—and stumbles—in the appropriate shade of privacy.

It seems a legitimate question, discussable at any time: Here is a piece of knowledge available before a given season; is it, or is it not, a sufficient reason for expecting the season to be so and so?

In the course of these studies one comes across many sequences or tendencies with apparently high probability. It might be a good thing to tabulate such for practical use. For example, when the first three months of the year (at Greenwich) are all dry, we have generally a dry summer (11 cases out of 13); when we have 20 or more days with 80° or more in the hot season the autumn is generally warm (16 cases out of 19).

Among other helpful facts, I consider, is a relation which I have before noted elsewhere between Rothesay summers and Greenwich winters following—both regarded as typical for a region. Whatever the explanation (perhaps sunspot influence manifest in both), it appears that after a very wet summer at Rothesay we may look pretty confidently for a mild winter season at Greenwich (one with less cold than the average), and after a very dry summer a severe

winter. Corresponding inferences may be drawn from very severe or very mild Greenwich winters to Rothesay summers. The inference is in each case from extreme values to values which may or may not be extreme. If the terms "very" and "extreme" be objected to as vague, it is easy to make more precise statements.

We have just had an illustration of one of these sequences—a very wet Rothesay summer last year (14·8 in.); frost days at Greenwich last September to May 47, which is 7 under average.

With regard to our summer rainfall (at Greenwich), which fails of consistent agreement with the sunspot curve, there is something to be said for a recurrence at about 13 years' interval. The following method may be found instructive. Make out a series of sums of summer rainfall in five-year groups, 1841-45, '42-'46, &c.; then represent these values by dots according to scale in 13 columns (beginning with the group about '43 in col. 1, '44 in col. 2, and so on). One finds a tendency to low values in the earlier columns and high values in the later; and by considering the distribution in the column which is about to receive a fresh dot, and the relation of each dot in it to that which preceded, some light may be had, I think, on at least one limit for the rainfall of an approaching summer.

I made a (private) forecast of the Greenwich summer just ending (31st August) as "cold and wet," which may seem to some an egregious misnomer of a season notable for many delightful days. Yet we have these facts: 60 days cold out of 92; only 8 days with 80° or more (aver. 15); mean temperature of summer slightly under average; in all three months excess of rain.

It seems to me quite possible on scientific grounds to predict "wetness" or "dryness" for a Greenwich summer (in relation to average). This is vague, but not, I should think, despicable. I have succeeded with the previous five summers also. The possibility of "fluke" is not, of course, excluded. Let me add that in some other items of summer weather I have been quite wrong.

There are many ways of attacking these important problems, and it may be well to invite the attention of your readers to what seems a highly attractive line of investigation.

ALEX. B. MACDOWALL.

## REVIEWS.

*Aspirations - Psychrometer - Tafeln. Herausgegeben vom Königlich Preussischen Meteorologischen Institut. Braunschweig, Vieweg und Sohn, 1908. Size 13 × 10. Pp. xiv. + 88.*

THESE Tables consist mainly of a detailed statement of the vapour tension and relative humidity for every tenth of a degree centigrade of the dry and wet bulb thermometers, from  $-30^{\circ}$  to  $+24^{\circ}\cdot9$  wet and  $39^{\circ}\cdot9$  dry ( $-22^{\circ}$  to  $+76^{\circ}\cdot8$  wet and  $103^{\circ}\cdot8$  F. dry bulb) at a pressure of 775 min. (29·76 in.), with supplementary tables for correcting the relative humidity to its value for other pressures.

*Climate considered especially in relation to Man.* By ROBERT DE COURCY WARD, Assistant Professor of Climatology in Harvard University. (Progressive Science Series.) London, John Murray, 1908. Size 9 x 6. Pp. xvi. + 372. Price 6s. net.

PROFESSOR WARD has laid the English-speaking world under a debt by his translation of Hann's *Climatology*, and that debt is greatly increased by the present volume which meets a want that has been felt acutely by the comparatively small public who study climate scientifically. The book is based upon lecture notes and the material has been gradually brought together, tested and improved. As now completed the book is the best on its subject in the language, which might be poor enough praise for it has no competitors; but in our opinion even if treatises on climatology were as common as novels it would still hold a high rank. It does not claim to be original in the sense of setting the facts in a new light, and the author necessarily follows Hann pretty closely; he states indeed that the introduction is essentially a synopsis of the first six chapters of Hann's *Climatology*. It is one of Professor Ward's characteristics that he acknowledges the source of his information in a generous spirit.

The classification of climates is dealt with in considerable detail in chapters i. to v. Professor Ward says that we should certainly abandon the word *temperate* altogether in speaking of zones and substitute some such word as *intermediate*, while the words *torrid* and *frigid* should likewise disappear and their place be taken by *tropical* or *equatorial* and *polar*. No doubt there is something to be said for this; but alas for human nature, our author himself speaks guardedly of "temperate" and "torrid" for a chapter or two, then drops the quotation marks and relapses fairly into the old familiar phrases. In our opinion if *Torrid* is to go *Intertropical* is the best substitute; but so long as the simple zones determined by the obliquity of the ecliptic stand, and being natural they must continue, the name by which we call them is of little importance. A more detailed classification is necessary and Professor Ward gives an interesting summary of the divisions proposed by Supan, Köppen, Ravenstein and Herbertson; his conclusion is that the broad classification of climates into the three general groups of marine, continental and mountain with the subordinate divisions of desert, littoral and monsoon is convenient but incomplete, and on the whole he seems inclined to recommend Supan's classification, while noting the greater convenience of Köppen's for the study of plant geography.

After dealing with the character of the different types of climate, the hygiene of the zones and the conditions of human life in the tropics, the temperate and polar zones are entered into at some length, and this is the part of the book which will prove of most general value. It summarises the relation of climate to health in the light of the most recent data.

The final chapter deals with changes of climate; but here as in

other parts of the work the author presents the views of others rather than his own. We should have been grateful for a bibliography, for the book focusses a vast amount of reading and the references are rather scanty from the point of view of a student anxious to pursue special lines of research.

The publisher has presented the book in an attractive form and at a remarkably low price which must greatly extend its usefulness.

*Bibliothèque Marsale. To Klima tes 'Ellados. Meros A. To Klima ton Athenon. Meros B. To Klima tes Attikes, upo DEMETRIOU AIGINETOU.* [The Climate of Greece. Part. I.—The Climate of Athens. Part II.—The Climate of Attica, by Demetrius Aiginetes. Athens, 1908. Size  $10 \times 6\frac{1}{2}$ . Pp. 540, 488.

WE hope that we have transliterated the title properly. The volumes, which include a long prologue and a geographical and geological chapter introductory to the climatological discussions, is beautifully illustrated by plates of views in the neighbourhood of Athens and in Attica. We are sorry that we cannot read it; but we shall be happy to forward the work to the first of our readers conversant with modern Greek who expresses willingness to write a fuller notice.

*The National Physical Laboratory. Report of the Observatory Department for the year 1907.* With appendices. Teddington, 1908. Size  $7 \times 10\frac{1}{2}$ . Pp. 46.

THE General Board of the National Physical Laboratory contains official representatives of the Board of Trade, the Institutions of Mechanical, Civil and Electrical Engineers, the Iron and Steel Institute, the Society of Chemical Industry, and the Institution of Naval Architects; but, although the Director publishes this report separately because it "appeals to a different class of workers to that interested in the Engineering and Physics departments," there is no representative of the Royal Meteorological Society on the Board, and probably no member of the Board, with one possible exception, looks upon this as in any way anomalous! Yet a substantial portion of the work of the department here described is purely meteorological.

*Das Klima von Berlin, eine meteorologisch-hygienische Untersuchung* [The Climate of Berlin, a meteorologico-hygienic investigation], von OTTO BEHRE. Berlin, Otto Salle, 1908. Size  $10 \times 6\frac{1}{2}$ . Pp. IV. + 158. Price 5 marks.

THIS remarkably readable little book deals with the climate of Berlin statistically, but the discussion of figures is lightened by a happy literary style, and a number of singularly appropriate

quotations and historic instances. Between a brief introduction and conclusion there are five chapters dealing respectively with Temperature, Humidity, Pressure and Wind, Cloud, Fog and Sunshine, and Precipitation. The monthly means of the various elements are given for the years available, and there are also tables of extremes and of various groupings of figures designed to elucidate special points. The hygienic bearings of the various elements are also discussed. The climate is compared in detail with that of St. Petersburg, concerning which a Russian poet is quoted as saying that "we require an iron constitution in order to live under our leaden skies," and Berlin comes out very favourably from the comparison. The hottest day on record in Berlin, since 1848, was July 20th, 1865, with a maximum of  $98^{\circ}6$  F.; and the coldest, January 22nd, 1850, with a minimum of  $-13^{\circ}0$  F. The comparison of death-rate with temperature gave no certain indication of a causal connection, but the author is inclined to believe that the spread of influenza is promoted by the absence of sunshine. The greatest hygienic value is, however, claimed for rain, and especially for snow, on account of the influence of precipitation in removing micro-organisms from the air, a point of view which it might be well for some of our health resorts who claim a small rainfall as an asset to consider.

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*Barometric Gradient and Wind Force. Report to the Director of the Meteorological Office on the Calculation of Wind Velocity from pressure-distribution, and on the variations of meteorological elements with altitude.* By ERNEST GOLD, M.A. Published by the Authority of the Meteorological Committee. London, Printed for H.M. Stationery Office, 1908. Size  $13 \times 10$ . Pp. 44 + 14 plates. Price 2s. 6d.

MR. GOLD gives the details of a mathematical investigation into the relation of the velocity of wind, the pressure gradient, and the curvature of the path along which the wind blows. There is no question of greater importance in meteorology, for it is common to the theory of the winds and to the practical art of forecasting from synoptic maps. While Mr. Gold's paper is one for the student, the preface contributed by Dr. Shaw, gives a very clear exposition of the object and the results of the work. Although the effects of surface friction are not yet known, and there are cases in which the observed winds are at variance with the gradients as deduced from isobaric maps, these are surprisingly few, and Dr. Shaw is satisfied that the conditions tend to adjust themselves automatically so that the wind corresponds with the gradient by altering the curvature of its path, and that the exceptional cases are likely to be profitable subjects of meteorological study.

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## METEOROLOGICAL NEWS AND NOTES.

THE FRANCO-BRITISH EXHIBITION'S list of awards in the Group of Education, in which the Science Section appears to be included, contains the names of the Meteorological Office, the Royal Meteorological Society, Dr. H. R. Mill, as Director of the British Rainfall Organization, Messrs. Negretti and Zambra, Mr. J. J. Hicks, and many others, as being awarded the "Diploma for Grand Prize," the highest distinction given by the Exhibition. The Diploma for gold medal was awarded to Mr. John Aitken, F.R.S., Mr. Eric Stuart Bruce, Commander D. Wilson Barker, Mr. A. W. Clayden, Mr. W. E. Plummer, and others.

THE ROYAL METEOROLOGICAL SOCIETY will hold its opening meeting for the session in the hall of the Institution of Civil Engineers, Great George Street, on the evening of Wednesday, 18th November, at 7.30 p.m. It may not be generally known that visitors are welcomed at these meetings, on the introduction of a Fellow of the Society.

THE SERIES OF CONFERENCES AT THE METEOROLOGICAL OFFICE for this session opened in a very happy manner by an account of the work of the Australian Federal Weather Service by its chief, Mr. Hunt, on October 19th, and a discussion of the rainfall of the Transvaal, by the Director of the Meteorological Service of that colony, Mr. R. T. A. Innes, on November 2nd. Discussions will take place at the Meteorological Office, 63, Victoria Street, Westminster, on Mondays, at 5 p.m., the dates provisionally fixed being November 16th and 30th, December 14th, January 11th and 25th, February and March 8th and 22nd. The Director will be glad if ladies or gentlemen interested in Meteorology would attend and take part in the discussions.

FLOODS OF AN UNPRECEDENTED SEVERITY devastated the city of Haidarabad in the Deccan, towards the end of September last. While we hope that one of our Indian readers will forward authentic particulars of the meteorological data, we may state on the responsibility of the daily newspapers, that very heavy rainfall accompanying a cyclone caused the Musi river to rise from a trickling stream to a vast river 60 feet deep, which in 48 hours subsided again to its normal insignificance. On September 27th and 28th, it is reported that 15 inches of rain, nearly half the annual fall, came down in 36 hours. One of the suburbs was overwhelmed, and it and a part of the city, together measuring two miles by half a mile, were laid in ruins. Enormous destruction was done to buildings, and between 5,000 and 7,000 inhabitants lost their lives, while 100,000 were rendered homeless, and the damage to property probably exceeded a million and a quarter pounds sterling.

MR. W. MARRIOTT WILL LECTURE ON meteorological subjects, on behalf of the Royal Meteorological Society, at Uppingham School, on November 17th; at Harrow School, on November 21st; and at the Tunbridge Wells Natural History and Philosophical Society, on December 4th.


PHOTOGRAPHS OF THE UPPER SURFACE OF FOG form an attractive feature in a very interesting article by Dr. W. J. S. Lockyer, in the October number of *Knowledge*. The pictures were obtained during a balloon ascent on October 27th, 1907, made from Battersea, during a fog, which was found to extend to a height of 2,500 feet, and its upper surface revealed the familiar outlines of a cumulus cloud. One very striking picture was taken showing this fog-cumulus below and an alto-cumulus above.

TORRENTIAL RAINS IN CALCUTTA on June 17th-18th, 1908, caused serious flooding in that city and its suburbs, and the loss of several lives. According to *The Statesman* of June 19th, three and a half inches of rain fell during the twelve hours ending at 8 p.m. on 17th, and 11.95 in. in the twenty-four hours ending at 8 a.m. on 18th, making the heaviest daily fall on record for June at Calcutta, and, with the exception of 14 inches on September 20th, 1900, the heaviest in any month. As a result of the downpour the Hugli river was in high flood, and some casualties to shipping occurred. Great inconvenience also resulted by the flooding of streets, and damage to flimsy native buildings, several of which collapsed under the stress of the raging waters, burying their inmates in the debris. The storm appears to have been quite local, and was the result of a seemingly unimportant depression.

THE RIO DE JANEIRO OBSERVATORY has lost its distinguished chief, Professor L. Cruls, who died at Paris on June 21st, and Dr. H. Morize has been promoted to the position of Director.

MESSRS. C. F. CASELLA & Co. have issued a new catalogue of meteorological instruments, which cannot fail to be of interest to many of our readers. It is, we presume, necessary to quote in such lists instruments like the Howard rain gauge, which have had their day and done good work in their time but which have long since been superseded by better forms. There are in this catalogue, however, several novelties of a useful kind, and in addition to the prices and drawings of instruments it contains a list of standard works on meteorology, and several tables for the conversion of British and metric units.

DR. H. R. MILL has been elected a Corresponding Member of the German Meteorological Society.



## RAINFALL TABLE FOR OCTOBER, 1908.

| STATION.                            | COUNTY.                      | Lat.<br>N. | Long.<br>W.<br>[°E.] | Height<br>above<br>Sea.<br>ft. | RAINFALL<br>OF MONTH.    |              |
|-------------------------------------|------------------------------|------------|----------------------|--------------------------------|--------------------------|--------------|
|                                     |                              |            |                      |                                | Aver.<br>1870-99.<br>in. | 1908.<br>in. |
| Camden Square.....                  | <i>London</i> .....          | 51 32      | 0 8                  | 111                            | 2·85                     | 1·95         |
| Tenterden.....                      | <i>Kent</i> .....            | 51 4       | *0 41                | 190                            | 3·60                     | 1·31         |
| West Dean .....                     | <i>Hampshire</i> .....       | 51 3       | 1 38                 | 137                            | 3·53                     | 1·25         |
| Hartley Wintney .....               | " .....                      | 51 18      | 0 53                 | 222                            | 3·08                     | 2·32         |
| Hitchin .....                       | <i>Hertfordshire</i> .....   | 51 57      | 0 17                 | 238                            | 2·72                     | 1·82         |
| Winslow (Addington) .....           | <i>Buckinghamsh.</i> .....   | 51 58      | 0 53                 | 309                            | 2·89                     | 1·04         |
| Bury St. Edmunds (Westley) .....    | <i>Suffolk</i> .....         | 52 15      | *0 40                | 226                            | 2·66                     | 1·42         |
| Brundall .....                      | <i>Norfolk</i> .....         | 52 37      | *1 26                | 66                             | 2·98                     | 1·63         |
| Winterbourne Steepleton .....       | <i>Dorset</i> .....          | 50 42      | 2 31                 | 316                            | 4·33                     | 5·46         |
| Torquay (Cary Green) .....          | <i>Devon</i> .....           | 50 28      | 3 32                 | 12                             | 4·09                     | 2·22         |
| Polapit Tamar [Launceston] .....    | " .....                      | 50 40      | 4 22                 | 315                            | 4·97                     | 1·31         |
| Bath .....                          | <i>Somerset</i> .....        | 51 23      | 2 21                 | 67                             | 3·22                     | 1·72         |
| Stroud (Upfield) .....              | <i>Gloucestershire</i> ..... | 51 44      | 2 13                 | 226                            | 3·10                     | 1·51         |
| Church Stretton (Wolstaston) .....  | <i>Shropshire</i> .....      | 52 35      | 2 48                 | 800                            | 3·99                     | 1·87         |
| Coventry (Kingswood) .....          | <i>Warwickshire</i> .....    | 52 24      | 1 30                 | 340                            | 3·18                     | 1·11         |
| Boston .....                        | <i>Lincolnshire</i> .....    | 52 58      | 0 1                  | 25                             | 2·62                     | ·87          |
| Worksop (Hodsock Priory) .....      | <i>Nottinghamshire</i> ..... | 53 22      | 1 5                  | 56                             | 2·77                     | ·67          |
| Derby (Midland Railway) .....       | <i>Derbyshire</i> .....      | 52 55      | 1 28                 | 156                            | 2·77                     | 1·09         |
| Bolton (Queen's Park) .....         | <i>Lancashire</i> .....      | 53 35      | 2 28                 | 390                            | 4·72                     | 2·40         |
| Wetherby (Ribston Hall) .....       | <i>Yorkshire, W.R.</i> ..... | 53 59      | 1 24                 | 130                            | 3·18                     | 1·21         |
| Arneliffe Vicarage .....            | " .....                      | 54 8       | 2 6                  | 732                            | 6·55                     | 4·16         |
| Hull (Pearson Park) .....           | <i>E.R.</i> .....            | 53 45      | 0 20                 | 6                              | 3·26                     | ·82          |
| Newcastle (Town Moor) .....         | <i>Northumberland</i> .....  | 54 59      | 1 38                 | 201                            | 2·94                     | 1·50         |
| Borrowdale (Seathwaite) .....       | <i>Cumberland</i> .....      | 54 30      | 3 10                 | 423                            | 13·35                    | 4·88         |
| Cardiff (Ely) .....                 | <i>Glamorgan</i> .....       | 51 29      | 3 13                 | 53                             | 4·81                     | 3·42         |
| Haverfordwest (High Street) .....   | <i>Pembroke</i> .....        | 51 48      | 4 58                 | 95                             | 5·63                     | 3·57         |
| Aberystwyth (Gogerddan) .....       | <i>Cardigan</i> .....        | 52 26      | 4 1                  | 83                             | 5·58                     | 1·28         |
| Llandudno .....                     | <i>Carnarvon</i> .....       | 53 20      | 3 50                 | 72                             | 4·08                     | ·98          |
| Cargen [Dumfries] .....             | <i>Kirkcudbright</i> .....   | 55 2       | 3 37                 | 80                             | 4·39                     | 2·19         |
| Hawick (Braxholm) .....             | <i>Roxburgh</i> .....        | 55 24      | 2 51                 | 457                            | 3·42                     | 1·45         |
| Edinburgh (Royal Observatory) ..... | <i>Midlothian</i> .....      | 55 55      | 3 11                 | 442                            | ...                      | 1·10         |
| Girvan (Pinnmore) .....             | <i>Ayr</i> .....             | 55 10      | 4 49                 | 207                            | 5·42                     | 2·04         |
| Glasgow (Queen's Park) .....        | <i>Renfrew</i> .....         | 55 53      | 4 18                 | 144                            | 3·36                     | 1·60         |
| Tighnabruich .....                  | <i>Argyll</i> .....          | 55 55      | 5 14                 | 50                             | 5·72                     | 2·08         |
| Mull (Quinish) .....                | " .....                      | 56 36      | 6 13                 | 35                             | 6·09                     | 2·30         |
| Dundee (Eastern Necropolis) .....   | <i>Forfar</i> .....          | 56 28      | 2 57                 | 199                            | 2·71                     | 2·81         |
| Braemar .....                       | <i>Aberdeen</i> .....        | 57 0       | 3 24                 | 1114                           | 4·05                     | 1·44         |
| Aberdeen (Cranford) .....           | " .....                      | 57 8       | 2 7                  | 120                            | 3·18                     | 3·18         |
| Cawdor .....                        | <i>Nairn</i> .....           | 57 31      | 3 57                 | 250                            | 2·85                     | ·28          |
| Fort Augustus (S. Benedict's) ..... | <i>E. Inverness</i> .....    | 57 9       | 4 41                 | 68                             | 4·38                     | ·91          |
| Loch Torridon (Bendamph) .....      | <i>W. Ross</i> .....         | 57 32      | 5 32                 | 20                             | 9·98                     | 3·20         |
| Dunrobin Castle .....               | <i>Sutherland</i> .....      | 57 59      | 3 56                 | 14                             | 3·32                     | ·86          |
| Castletown .....                    | <i>Caithness</i> .....       | 58 35      | 3 23                 | 100                            | ...                      | 1·25         |
| Killarney (District Asylum) .....   | <i>Kerry</i> .....           | 52 4       | 9 31                 | 178                            | 6·05                     | 2·96         |
| Waterford (Brook Lodge) .....       | <i>Waterford</i> .....       | 52 15      | 7 7                  | 104                            | 4·00                     | 2·76         |
| Broadford (Hurdlestown) .....       | <i>Clare</i> .....           | 52 48      | 8 38                 | 167                            | 3·12                     | 1·95         |
| Abbey Leix (Blandsfort) .....       | <i>Queen's County</i> .....  | 52 56      | 7 17                 | 532                            | 3·45                     | 2·45         |
| Dublin (Fitz William Square) .....  | <i>Dublin</i> .....          | 53 21      | 6 14                 | 54                             | 3·08                     | 1·22         |
| Ballinasloe .....                   | <i>Galway</i> .....          | 53 20      | 8 15                 | 160                            | 3·45                     | 1·39         |
| Clifden (Kylmore House) .....       | " .....                      | 53 32      | 9 52                 | 105                            | 7·93                     | ...          |
| Crossmolina (Enniscoe) .....        | <i>Mayo</i> .....            | 54 4       | 9 18                 | 74                             | 5·04                     | 1·75         |
| Collooney (Markree Obsy.) .....     | <i>Sligo</i> .....           | 54 11      | 8 27                 | 127                            | 4·54                     | 1·30         |
| Seaforde .....                      | <i>Down</i> .....            | 54 19      | 5 50                 | 180                            | 3·82                     | 3·77         |
| Londonderry (Creggan Res.) .....    | <i>Londonderry</i> .....     | 54 59      | 7 19                 | 320                            | 4·45                     | 1·25         |
| Omagh (Edenfel) .....               | <i>Tyrone</i> .....          | 54 36      | 7 18                 | 280                            | 3·72                     | 1·70         |



RAINFALL TABLE FOR OCTOBER, 1908—*continued.*

| RAINFALL OF MONTH ( <i>con.</i> ) |          |                   |             |     | RAINFALL FROM JAN. 1. |        |                      |          | Mean Annual 1870-1899. | STATION.            |
|-----------------------------------|----------|-------------------|-------------|-----|-----------------------|--------|----------------------|----------|------------------------|---------------------|
| Diff. from Av. in.                | % of Av. | Max. in 24 hours. | No. of Days |     | Aver. 1870-99.        | 1908.  | Diff. from Aver. in. | % of Av. |                        |                     |
|                                   |          | in.               | Date.       |     | in.                   | in.    |                      |          | in.                    |                     |
| — .90                             | 68       | .50               | 16          | 10  | 20.59                 | 21.09  | + .50                | 102      | 25.16                  | Camden Square       |
| — 2.29                            | 36       | .40               | 27          | 17  | 22.40                 | 19.10  | — 3.30               | 85       | 28.36                  | Tenterden           |
| — 2.28                            | 36       | .36               | 20          | 12  | 23.94                 | 19.73  | — 4.21               | 82       | 29.93                  | West Dean           |
| — .76                             | 75       | .83               | 18          | 11  | 21.52                 | 21.47  | — .05                | 100      | 27.10                  | Hartley Wintney     |
| — .90                             | 67       | .65               | 16          | 14  | 20.05                 | 19.61  | — .44                | 98       | 24.66                  | Hitchin             |
| — 1.85                            | 36       | .19               | 16†         | 12  | 21.85                 | 20.56  | — 1.29               | 94       | 26.75                  | Addington           |
| — 1.24                            | 53       | .37               | 16          | 10  | 20.78                 | 19.74  | — 1.04               | 95       | 25.39                  | Westley             |
| — 1.35                            | 55       | .57               | 9           | 10  | 20.56                 | 20.33  | — .23                | 99       | 25.40                  | Brundall            |
| + 1.13                            | 126      | 2.20              | 21          | 21  | 30.05                 | 28.76  | — 1.29               | 96       | 39.00                  | Winterbourne Stptn. |
| — 1.87                            | 54       | .44               | 17          | 15  | 27.83                 | 20.67  | — 7.16               | 74       | 35.00                  | Torquay             |
| — 3.66                            | 26       | .61               | 17          | 12  | 30.17                 | 27.03  | — 3.14               | 90       | 38.85                  | Polapit Tamar       |
| — 1.50                            | 53       | .62               | 18          | 10  | 24.93                 | 20.44  | — 4.49               | 82       | 30.75                  | Bath                |
| — 1.59                            | 49       | .56               | 18          | 14  | 24.38                 | 20.20  | — 4.18               | 83       | 29.85                  | Stroud              |
| — 2.12                            | 47       | .62               | 18          | 14  | 26.94                 | 26.48  | — .46                | 98       | 33.04                  | Wolstaston          |
| — 2.07                            | 35       | .41               | 27          | 13  | 23.97                 | 20.76  | — 3.21               | 87       | 29.21                  | Coventry            |
| — 1.75                            | 33       | .24               | 16          | 12  | 19.37                 | 18.52  | — .85                | 96       | 23.30                  | Boston              |
| — 2.10                            | 24       | .15               | 27          | 16  | 20.58                 | 17.82  | — 2.76               | 87       | 24.70                  | Hodsock Priory      |
| — 1.68                            | 39       | .40               | 27          | 13  | 21.62                 | 20.56  | — 1.06               | 95       | 26.18                  | Derby               |
| — 2.32                            | 51       | .53               | 20          | 10  | 34.33                 | 37.42  | + 3.09               | 109      | 42.43                  | Bolton              |
| — 1.97                            | 38       | .23               | 26          | 13  | 22.54                 | 21.75  | — .79                | 96       | 26.96                  | Ribston Hall        |
| — 2.39                            | 64       | 1.69              | 19          | 17  | 48.55                 | 54.60  | + 6.05               | 112      | 60.96                  | Arnelcliffe Vic.    |
| — 2.44                            | 25       | .27               | 27          | 12  | 22.21                 | 17.49  | — 4.72               | 79       | 27.02                  | Hull                |
| — 1.44                            | 51       | .36               | 19          | 14  | 22.70                 | 19.63  | — 3.07               | 86       | 27.99                  | Newcastle           |
| — 8.47                            | 37       | 1.25              | 19          | 12  | 104.07                | 102.97 | — 1.10               | 99       | 132.68                 | Seathwaite          |
| — 1.39                            | 71       | 1.62              | 19          | 14  | 34.12                 | 30.17  | — 3.95               | 88       | 42.81                  | Cardiff             |
| — 2.06                            | 63       | 1.03              | 17          | 12  | 37.25                 | 34.65  | — 2.60               | 93       | 47.88                  | Haverfordwest.      |
| — 4.30                            | 23       | .38               | 19          | 13  | 36.24                 | 36.26  | + .02                | 100      | 45.41                  | Gogerddan           |
| — 3.10                            | 24       | .32               | 28          | 13  | 24.65                 | 25.02  | + .37                | 102      | 30.98                  | Llandudno           |
| — 2.20                            | 50       | .72               | 19          | 11  | 34.25                 | 39.50  | + 5.25               | 115      | 43.43                  | Cargen              |
| — 1.97                            | 42       | .43               | 19          | 14  | 27.55                 | 25.68  | — 1.87               | 93       | 34.80                  | Branhholm           |
| ...                               | ...      | .18               | 30          | 11  | ...                   | 19.65  | ...                  | ...      | ...                    | Edinburgh           |
| — 3.38                            | 38       | .60               | 18          | 20  | 38.32                 | 40.22  | + 1.90               | 105      | 48.87                  | Girvan              |
| — 1.76                            | 48       | .41               | 18          | 14  | 28.79                 | 27.41  | — 1.38               | 95       | 35.80                  | Glasgow             |
| — 3.64                            | 36       | .68               | 18          | 11  | 45.36                 | 53.14  | + 7.78               | 117      | 57.90                  | Tighnabruaich       |
| — 3.79                            | 38       | .51               | 18          | 15  | 44.62                 | 42.91  | — 1.71               | 96       | 57.53                  | Quinish             |
| + .10                             | 104      | .82               | 19          | 17  | 23.46                 | 22.10  | — 1.36               | 94       | 28.95                  | Dundee              |
| — 2.61                            | 36       | ...               | ...         | ... | 28.98                 | 27.35  | — 1.63               | 94       | 36.07                  | Braemar             |
| ...                               | 100      | 2.06              | 19          | 8   | 26.15                 | 23.98  | — 2.17               | 92       | 33.01                  | Aberdeen            |
| — 2.57                            | 10       | .19               | 16          | 3   | 24.19                 | 20.27  | — 3.92               | 84       | 29.37                  | Cawdor              |
| — 3.47                            | 21       | .41               | 10          | 6   | 34.06                 | 35.02  | + .96                | 103      | 43.71                  | Fort Augustus       |
| — 6.78                            | 32       | 1.82              | 10          | 15  | 67.67                 | 72.28  | + 4.61               | 107      | 86.50                  | Bendampf            |
| — 2.46                            | 26       | .35               | 18          | 9   | 24.95                 | 27.71  | + 2.76               | 111      | 31.60                  | Dunrobin Castle.    |
| ...                               | ...      | .23               | 18, 30      | 16  | ...                   | 27.42  | ...                  | ...      | ...                    | Castletown          |
| — 3.09                            | 49       | .56               | 20          | 22  | 45.62                 | 37.81  | — 7.81               | 83       | 58.11                  | Killarney           |
| — 1.24                            | 69       | .58               | 15          | 16  | 31.08                 | 31.47  | + .39                | 101      | 39.30                  | Waterford           |
| — 1.17                            | 63       | .30               | 29          | 19  | 26.91                 | 33.06  | + 6.15               | 123      | 33.47                  | Hurdlestown         |
| — 1.00                            | 71       | .67               | 15          | 14  | 28.50                 | 29.93  | + 1.43               | 105      | 35.19                  | Abbey Leix          |
| — 1.86                            | 40       | .22               | 20          | 13  | 22.76                 | 20.78  | — 1.98               | 91       | 27.75                  | Dublin              |
| — 2.06                            | 40       | .26               | 9           | 15  | 29.81                 | 27.07  | — 2.74               | 91       | 37.04                  | Ballinasloe         |
| ...                               | ...      | ...               | ...         | ... | 62.99                 | ...    | ...                  | ...      | 80.23                  | Kylemore House.     |
| — 3.29                            | 35       | .36               | 9           | 16  | 39.06                 | 43.27  | + 4.21               | 111      | 50.50                  | Ennisceoe           |
| — 3.24                            | 29       | .22               | 15          | 17  | 33.71                 | 39.29  | + 5.58               | 117      | 41.83                  | Markree Obsy.       |
| — .05                             | 99       | 1.04              | 20          | 18  | 31.03                 | 35.06  | + 4.03               | 113      | 38.61                  | Seaforde            |
| — 3.20                            | 28       | .42               | 16          | 17  | 32.70                 | 36.64  | + 3.94               | 112      | 41.20                  | Londonderry         |
| — 2.02                            | 46       | .48               | 16          | 16  | 30.55                 | ...    | ...                  | ...      | 37.85                  | Omagh               |

## SUPPLEMENTARY RAINFALL, OCTOBER, 1908.

| Div.  | STATION.                    | Rain<br>inches | Div.   | STATION.                    | Rain.<br>inches |
|-------|-----------------------------|----------------|--------|-----------------------------|-----------------|
| II.   | Warlingham, Redvers Road    | 2.05           | XI.    | Rhayader, Tyrmynydd .....   | 3.43            |
| „     | Ramsgate .....              | 1.29           | „      | Lake Vyrnwy .....           | 2.73            |
| „     | Steyning.....               | 1.41           | „      | Llangyhanfal, Plâs Draw.... | 2.01            |
| „     | Hailsham .....              | 2.04           | „      | Criccieth, Talarvor.....    | 2.08            |
| „     | Totland Bay, Aston House.   | 1.71           | „      | Llanberis, Pen-y-pass ..... | ...             |
| „     | Emsworth, Redlands.....     | 3.19           | „      | Lligwy .....                | 1.57            |
| „     | Stockbridge, Ashley .....   | 1.15           | „      | Douglas, Woodville .....    | 1.91            |
| „     | Reading, Calcot Place.....  | 1.87           | XII.   | Stoneykirk, Ardwell House   | 2.02            |
| III.  | Harrow Weald, Hill House.   | 2.45           | „      | Dalry, The Old Garroch ...  | 2.53            |
| „     | Oxford, Magdalen College..  | 1.05           | „      | Langholm, Drove Road.....   | 4.24            |
| „     | Pitsford, Sedgebrook.....   | 1.18           | „      | Moniaive, Maxwelton House   | 2.22            |
| „     | Huntingdon, Brampton.....   | 1.42           | XIII.  | N. Esk Reservoir[Penicuik]  | ...             |
| „     | Woburn, Milton Bryant....   | 2.48           | XIV.   | Maybole, Knockdon Farm..    | .89             |
| „     | Wisbech, Bank House .....   | 1.01           | XV.    | Campbeltown, Witchburn...   | 2.12            |
| IV.   | Southend Water Works....    | 1.57           | „      | Inveraray, Newtown .....    | 1.47            |
| „     | Colchester, Lexden.....     | 1.14           | „      | Ballachulish House.....     | 2.24            |
| „     | Newport, The Vicarage.....  | 1.31           | „      | Islay, Eallabus .....       | 2.19            |
| „     | Rendlesham .....            | 1.39           | XVI.   | Dollar Academy .....        | 1.96            |
| „     | Swaffham .....              | 1.14           | „      | Loch Leven Sluice .....     | 2.61            |
| „     | Blakeney .....              | 1.08           | „      | Balquhidder, Stronvar ..... | 2.74            |
| V.    | Bishops Cannings .....      | 1.38           | „      | Perth, The Museum .....     | 2.33            |
| „     | Ashburton, Druid House ..   | 2.88           | „      | Coupar Angus Station .....  | 2.86            |
| „     | Honiton, Combe Raleigh ..   | 4.51           | „      | Blair Atholl.....           | 1.91            |
| „     | Okehampton, Oaklands.....   | 1.21           | „      | Montrose, Sunnyside Asylum  | 4.04            |
| „     | Hartland Abbey .....        | 2.09           | XVII.  | Alford, Lynturk Manse ..... | 2.13            |
| „     | Lynmouth, Rock House ..     | 1.77           | „      | Keith Station .....         | .74             |
| „     | Probus, Lamellyn .....      | 2.57           | XVIII. | N. Uist, Lochmaddy .....    | 3.25            |
| „     | North Cadbury Rectory ..    | 2.22           | „      | Alvey Manse .....           | .30             |
| VI.   | Clifton, Pembroke Road ...  | 1.91           | „      | Loch Ness, Drumnadrochit.   | .67             |
| „     | Ross, The Graig .....       | 2.00           | „      | Glencarron Lodge .....      | 1.96            |
| „     | Shifnal, Hatton Grange..... | 2.08           | „      | Fearn, Lower Pitkerrie..... | .82             |
| „     | Blockley, Upton Wold .....  | 1.97           | XIX.   | Invershin .....             | .44             |
| „     | Worcester, Boughton Park.   | 1.95           | „      | Altnaharra .....            | 1.56            |
| VII.  | Market Overton .....        | 1.96           | „      | Bettyhill .....             | .88             |
| „     | Market Rasen .....          | .93            | XX.    | Dunmanway, The Rectory..    | 3.94            |
| „     | Bawtry, Hesley Hall.....    | .65            | „      | Cork .....                  | 3.21            |
| „     | Buxton.....                 | 1.12           | „      | Darrynane Abbey .....       | 1.95            |
| VIII. | Neston, Hinderton Lodge...  | 1.71           | „      | Glenam [Clonmel] .....      | 3.09            |
| „     | Southport, Hesketh Park...  | 2.62           | „      | Ballingarry, Gurteen .....  | 1.47            |
| „     | Chatburn, Middlewood .....  | 1.99           | „      | Miltown Malbay.....         | 1.73            |
| „     | Cartmel, Flookburgh .....   | ...            | XXI.   | Gorey, Courtown House ..... | 3.33            |
| IX.   | Langsett Moor, Up. Midhope  | 1.56           | „      | Moynalty, Westland .....    | 2.17            |
| „     | Scarborough, Scalby .....   | 1.42           | „      | Athlone, Twyford .....      | 1.80            |
| „     | Ingleby Greenhow .....      | .94            | „      | Mullingar, Belvedere.....   | 1.25            |
| „     | Mickleton.....              | 2.72           | XXII.  | Woodlawn .....              | 1.57            |
| X.    | Bardon Mill, Beltingham ..  | 2.75           | „      | Westport, St. Helens .....  | 1.19            |
| „     | Ewesley, Fallowlees .....   | 2.81           | „      | Mohill .....                | 1.68            |
| „     | Ilderton, Lilburn Cottage.. | 3.17           | XXIII. | Enniskillen, Portora .....  | 1.34            |
| „     | Keswick, York Bank.....     | 2.39           | „      | Dartrey [Cootehill].....    | 1.46            |
| XI.   | Llanfrechfa Grange.....     | 2.58           | „      | Warrenpoint, Manor House    | 3.10            |
| „     | Treherbert, Tyn-y-waun ...  | 3.87           | „      | Banbridge, Milltown .....   | 2.70            |
| „     | Carmarthen, The Friary....  | 2.22           | „      | Belfast, Springfield .....  | 2.38            |
| „     | Castle Malgwyn [Llechryd].  | 3.00           | „      | Bushmills, Dundarave .....  | 1.12            |
| „     | Plynlimon.....              | 4.50           | „      | Sion Mills.....             | 1.29            |
| „     | Crickhowell, Ffordlas.....  | 2.80           | „      | Killybegs .....             | 1.80            |
| „     | New Radnor, Ednol .....     | 3.64           | „      | Horn Head .....             | .83             |

## METEOROLOGICAL NOTES ON OCTOBER, 1908.

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 first four days were remarkable for the prevalence of fog during the mornings, followed by unusually high temp. in the day. Generally fair and mild weather followed to 20th, after which the conditions were dull and cool. Duration of sunshine 84·8\* hours, and of R 43·1 hours. Mean temp. 53°·9, or 4°·1 above the average, and the highest in 51 years excepting in 1861, 1898 and 1906. Shade max., 79°·0 on 2nd, was the highest in any October since 1859; min. 32°·9 on 25th. F 0, f 1.

TENTERDEN.—Duration of sunshine 151·0† hours. Shade max. 78°·0 on 4th; min. 31°·0 on 25th. F 1, f 2.

TOTLAND BAY.—Duration of sunshine 143·1\* hours. Shade max. 72°·5 on 2nd; min. 33°·9 on 25th. F 0, f 1.

PITSFORD.—Mean temp. 52°·3. Shade max. 77°·3 on 2nd; min. 28°·4 on 25th. F 2. R 1·90 in. below the average.

TORQUAY.—Duration of sunshine 114·1\* hours, or 0·1 hour above the average. Mean temp. 56°·5, or 4°·5 above the average. Shade max. 69°·4 on 2nd; min. 34°·1 on 25th. F 0.

NORTH CADBURY.—Mild to 17th and then cooler, from 24th to 27th being quite cold, and the last four days again very warm. Shade max. 81°·5 on 2nd; min. 28°·5 on 25th. F 2, f 5.

BATH.—Shade max. 76°·8 on 1st and 2nd; min. 31°·0 on 25th. F 1.

ROSS.—The warmest October since 1861, the mean temp. being 53°·6, or 4°·5 above the average. Shade max. 77°·6 on 1st; min. 27°·8 on 25th. F 4, f 5.

HODSOCK PRIORY.—Shade max. 77°·0 on 1st; min. 29°·7 on 22nd. F 2, f 4.

SOUTHPORT.—R 1·25 in. below the average. Duration of sunshine 119·0\* hours, or 30·0 hours above the average. Duration of R 46·9 hours. Mean temp. 54°·4, or 5°·8 above the average. Shade max. 78°·0 on 1st; min. 30°·7 on 25th. F 1, f 5.

HULL.—Remarkably fine in the early part, and very mild with moderate R throughout. Duration of sunshine 72·2\* hours. Shade max. 77°·0 on 1st and 3rd; min. 32°·0 on 25th. F 1, f 1.

CARMARTHEN.—Unusually fine and mild, with but little R. Water supplies were getting low. Fodder was abundant, and the country had the appearance of spring.

HAVERFORDWEST.—The warmest October in 63 years, but with a cold period from 21st to 28th. Duration of sunshine 111·1\* hours. Shade max. 71°·4 on 2nd; min. 27°·3 on 25th. F 3, f 6.

LLANDUDNO.—Shade max. 76°·2 on 1st; min. 34°·4 on 25th. F 0, f 0.

DOUGLAS.—A truly blessed change from the bad weather of the previous six months. With the exception of 1879, the R was the least recorded in October in 35 years.

DUMFRIES.—Mean temp. 52°·8, or 5°·1 above the average of 49 years. Shade max. 75°·0 on 1st and 3rd; min. 26°·0 on 25th. F 3.

EDINBURGH.—Shade max. 76°·2 on 1st; min. 32°·8 on 25th. F 0, f 5.

DUNDEE.—Shade max. 72°·2 on 1st; min. 31°·0 on 25th. F 2.

FORT AUGUSTUS.—Shade max. 74°·0 on 3rd; min. 25°·6 on 26th. F 4.

CORK.—The warmest October since 1890. Shade max. 64°·0 on 3rd and 14th; min. 35°·0 on 26th. F 0, f 0.

DUBLIN.—Wonderfully mild, the mean temp. being 55°·4, or 5°·9 above the average. Shade max. 68°·7 on 2nd; min. 38°·0 on 26th. F 0, f 0.

MARKREE.—Shade max. 72°·5 on 3rd; min. 27°·2 on 26th. F 1, f 6.

WARRENPOINT.—Shade max. 68°·0 on 4th; min. 36°·0 on 26th. F 0, f 1.

\* Campbell-Stokes.

† Jordan.

## Climatological Table for the British Empire, May, 1908.

| STATIONS.<br><br>(Those in italics are<br>South of the Equator.) | Absolute. |       |          |       | Average. |      |               |           | Absolute.       |                   | Total Rain |       | Aver.<br>Cloud. |
|------------------------------------------------------------------|-----------|-------|----------|-------|----------|------|---------------|-----------|-----------------|-------------------|------------|-------|-----------------|
|                                                                  | Maximum.  |       | Minimum. |       | Max.     | Min. | Dew<br>Point. | Humidity. | Max. in<br>Sun. | Min. on<br>Grass. | Depth.     | Days. |                 |
|                                                                  | Temp.     | Date. | Temp.    | Date. |          |      |               |           |                 |                   |            |       |                 |
|                                                                  |           |       |          |       |          |      |               |           |                 |                   |            |       |                 |
| London, Camden Square                                            | 77·9      | 27    | 42·2     | 23    | 67·2     | 48·7 | 51·6          | 83        | 124·5           | 35·0              | 1·95       | 11    | 6·1             |
| Malta ... ..                                                     | 86·0      | 6     | 54·6     | 3     | 74·5     | 62·5 | 58·9          | 71        | 144·8           | ...               | ·00        | 0     | 2·2             |
| Lagos ... ..                                                     | 90·0      | 12*   | 72·0     | 31    | 87·2     | 75·5 | 75·1          | 75        | 162·2           | ·68               | 6·34       | 14    | 8·2             |
| Cape Town ... ..                                                 | 89·0      | 21    | 43·3     | 8     | 70·0     | 51·9 | 51·2          | 71        | ...             | ...               | 1·23       | 9     | 4·9             |
| Durban, Natal ... ..                                             | 83·7      | 14    | 53·8     | 25    | 76·0     | 57·6 | ...           | ...       | 137·2           | ...               | ·37        | 8     | 2·1             |
| Johannesburg ... ..                                              | 70·3      | 16    | 36·5     | 24    | 65·2     | 46·5 | 41·2          | 66        | 132·8           | 34·8              | ·00        | 0     | 0·8             |
| Mauritius ... ..                                                 | 82·6      | 2     | 62·6     | 14    | 79·7     | 67·3 | 65·3          | 77        | 145·3           | 51·7              | 1·35       | 13    | 5·0             |
| Calcutta .. ...                                                  | 101·1     | 15    | 69·3     | 8     | 95·6     | 77·5 | 73·5          | 69        | 164·5           | 66·1              | 4·64       | 8     | 4·2             |
| Bombay .. ...                                                    | 92·0      | 29    | 78·6     | 1     | 90·5     | 80·3 | 74·8          | 72        | 137·8           | 73·8              | ·00        | 0     | 2·8             |
| Madras ... ..                                                    | 109·6     | 30    | 78·0     | 2     | 100·6    | 81·7 | 74·5          | 69        | 154·0           | 75·9              | ·09        | 2     | 3·5             |
| Kodaikanal ... ..                                                | 73·4      | 27    | 51·1     | 17    | 68·7     | 55·0 | 51·6          | 72        | 135·9           | 38·2              | 5·06       | 16    | 5·0             |
| Colombo, Ceylon ... ..                                           | 90·0      | 20    | 70·0     | 10    | 87·7     | 77·7 | 76·2          | 81        | 150·6           | 69·2              | 9·00       | 18    | 6·0             |
| Hongkong ... ..                                                  | 90·3      | 29    | 65·2     | 2     | 80·8     | 72·1 | 69·3          | 79        | 144·4           | ...               | 1·33       | 10    | 6·2             |
| Melbourne ... ..                                                 | 77·1      | 1     | 37·2     | 24    | 60·1     | 45·8 | 43·8          | 71        | 118·6           | 30·2              | ·88        | 13    | 6·9             |
| Adelaide ... ..                                                  | 75·3      | 1     | 39·9     | 27    | 64·4     | 49·6 | 48·5          | 75        | 128·5           | 30·0              | 3·87       | 16    | 6·7             |
| Coolgardie ... ..                                                | 78·0      | 2     | 36·9     | 21    | 63·9     | 45·9 | 7·9           | 53        | 144·9           | 33·2              | 1·74       | 11    | 4·9             |
| Perth ... ..                                                     | 75·5      | 18    | 41·9     | 13    | 68·2     | 51·5 | 5·2           | 66        | 134·6           | 40·4              | 6·29       | 14    | 6·2             |
| Sydney ... ..                                                    | 76·4      | 6     | 46·6     | 16    | 66·7     | 53·1 | 50·7          | 79        | 110·0           | 36·1              | 2·58       | 25    | 5·0             |
| Wellington ... ..                                                | 64·0      | 5     | 42·0     | 11†   | 58·6     | 48·5 | 46·3          | 77        | 102·0           | 29·0              | 1·77       | 12    | 6·0             |
| Auckland ... ..                                                  | 66·0      | 8     | 46·0     | 11    | 62·6     | 53·7 | 49·5          | 74        | 128·0           | 39·0              | 5·88       | 15    | 5·4             |
| Jamaica, Kingston ... ..                                         | 92·1      | 19    | 70·0     | 24    | 88·7     | 73·0 | 68·8          | 69        | ...             | ...               | 1·61       | 4     | 4·2             |
| Trinidad ... ..                                                  | 91·0      | 3     | 57·0     | 26    | 87·7     | 70·1 | 71·6          | 80        | 161·0           | 58·0              | 5·82       | 18    | ...             |
| Grenada ... ..                                                   | 88·6      | 16    | 72·6     | 23    | 84·6     | 74·6 | 70·4          | 74        | 141·2           | ...               | 4·71       | 22    | 4·0             |
| Toronto ... ..                                                   | 84·0      | 29    | 29·4     | 4     | ...      | ...  | ...           | ...       | ...             | ...               | 4·64       | 20    | ...             |
| Fredericton ... ..                                               | 79·0      | 20    | 29·0     | 4     | ...      | ...  | ...           | 68        | ...             | ...               | 4·87       | 12    | 7·0             |
| St. John's, N.B. ... ..                                          | 74·2      | 24    | 34·2     | 4     | ...      | ...  | ...           | ...       | ...             | ...               | 4·08       | 13    | ...             |
| Victoria, B.C. ... ..                                            | 66·2      | 23    | 39·7     | 26    | ...      | ...  | ...           | 74        | ...             | ...               | 1·27       | 9     | 7·0             |

\* and 17. † and 30.

MALTA.—Mean temp. of air 68°·4 or 4°·5 above average. Average hours of bright sunshine 12·1.

Johannesburg.—Bright sunshine, 311·3 hours.

Mauritius.—Mean temp. of air 0°·8 above, and R 2·53 in. below, averages. Mean hourly velocity of wind 9·5 miles, or 0·8 miles below average.

KODAIKANAL.—Bright sunshine 222 hours.

COLOMBO.—Mean temp. of air 81°·2 or 1°·1 below, of dew point 0°·9 above, and R 2·70 in. below, averages. Mean hourly velocity of wind, 7·5 miles.

HONGKONG.—Mean temp. of air 76°·1. R 10·97 in. below, bright sunshine 219·3 or 65·5 hours above, averages. Mean hourly velocity of wind 12·3 miles.

Melbourne.—Mean temp. of air 1°·0 below, and R 1·26 in. below, averages.

Sydney.—Mean temp. of air 1°·4 below, and R 2·55 in. below, averages.

Wellington.—Mean temp. of air 0°·8 above, and R 2·75 in. below, averages. Bright sunshine 144·4 hours.

Auckland.—Mean temp. of air 1°·0 above average, R 1·50 in. above average.

TRINIDAD.—R 2·03 in. above 43 years' average.



# RAINFALL OF THAMES VALLEY, NOVEMBER, 1908.

