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The International Union of Geodesy and Geophysics

MEETING IN MADRID, OCTOBER 1924

THE International Union of Geodesy and Geophysics held its second meeting in Madrid from October 1st to 8th, 25 out of the 27 countries which have adhered to the Union being represented. The arrangements made by the Spanish Committee for the comfort and entertainment of the delegates were on a most lavish scale, and all who attended carried away with them most grateful recollections of Spanish courtesy and hospitality. His Majesty the King of Spain presided in person at the opening meeting, and on the evening of Saturday, October 4th, the delegates had the honour of being received at the Palace, and of being individually presented to Their Majesties. Opportunities were provided for seeing not only the scientific institutions, but also the artistic treasures of Madrid under expert guidance. Excursions to places of interest, such as Toledo and Escorial, formed part of the official programme, while for those who could afford the time, there were organised excursions after the meeting to southern Spain. Limitations of space, however, make it impossible to give an account of all that was done to render the meeting the great success it was from the social point of view.

The sessions of the Union were held in the Parliament buildings, the plenary meetings taking place in the hall where the Cortes deliberate, while the sectional meetings were held in the adjoining

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committee rooms. The meteorological section had a very full programme and it needed all the organising ability and experience of the President, Sir Napier Shaw, to dispose of the necessary business in the time available. In arranging the work it was necessary to stress two principles. Firstly, that the Union exists for the furtherance of geophysical studies, and that consequently questions dealing with the applications of meteorology to economic problems are outside its scope, and are better left to the other international organisation, represented by the International Meteorological Committee which is now, under the new constitution adopted at Utrecht in 1923, confined to the Directors of Meteorological Services. Secondly, that, in order to avoid overlapping, the section should direct its attention more particularly to problems which lie outside the normal activities of the state services. Perhaps we might also add that the section should not be regarded as an appropriate place for reading and discussing papers of general meteorological interest. It should confine its attention to problems which require international co-operation for their further development.

Unlike the Meteorological Committee, the International Union has at its disposal certain funds derived from the subscriptions of the Governments which have adhered to the Union, and the business of the sections is thus to a large extent devoted to making arrangements for using this money to the best advantage. The meteorological section may look forward to having at its disposal during the next three years a sum of approximately £1,800, on which printing and secretarial expenses will form a first charge. An account of the work of the section thus becomes in the main an account of the arrangements approved for the allocation of this money.

One of the first subjects to be considered was that of solar radiation. Much of the recent work in this field has aimed at the measurement of the so-called solar constant, in other words at determining the amount of energy that reaches the outer limits of our atmosphere from the sun. With this object in view, the solar physicist has placed his observatories on mountain tops, preferably in regions where there is normally little cloud, in order to avoid as far as possible the absorption in the atmosphere. To the meteorologist, however, it is precisely this absorption that is a matter of special interest, and observations of the amount of energy received per unit area near sea level in different parts of the world are of primary importance. At the last meeting of the section, held in Rome in 1922, the officers were accordingly requested to prepare a report on such observations. By way of discharging this obligation, Sir Napier exhibited at Madrid a large map of the world showing the positions of the observatories for which such observations were available, with insets summarising the results. Needless to say the map shows many gaps which cry aloud to be filled. Professor Gorzinski, bringing to the notice of the section some recent work of his own, also urged the section to take steps to remedy the defect. It was therefore decided to follow a precedent set at Rome in connection with work on dust in the atmosphere, and to set aside a sum for the purchase of instruments for use in regions where observations appeared to be specially needed, provided that the responsible authorities are prepared to accept them and make arrangements for their use. A small commission was appointed to make the necessary arrangements.

The same commission was also authorised to endeavour to arrange for observations to be made in different countries with an instrument submitted to the section by Mr. L. F. Richardson, which enables a photometric comparison to be made in æroplanes between the radiation received from sun and sky and that reflected from the earth's surface. A sum of £400 was allocated under these heads.

In connection with the observation of dust in the atmosphere, satisfactory reports were received of observations made with the dust counters distributed by the section after the Rome meeting. A small commission was appointed to watch over the continuance of this work, but it was considered that, now that observations had been inaugurated in various parts of the world, the section need not allocate further funds to the matter.

The investigation of the upper air naturally occupied a prominent place on the agenda. Here, again, there is crying need for observations in regions for which none of the national services accept special responsibility, conspicuous among which are the oceans, the polar regions, and the desert areas of the globe. The programme inaugurated at Rome was therefore re-affirmed, and the balance (approximately £250) of the sum set aside for the provision of instruments, for use in such regions as opportunities may offer, was again placed at the disposal of the officers for this purpose. Another aspect of upper air work that calls for international co-operation, is that of the publication of the observations. Before the war the observations were published internationally, but the old organisation has ceased to work, and up to the present has not been replaced despite the fact that the question has been discussed. By way of getting a move on, a sum of £500 was allocated to the President in his capacity as President of the International Commission for the Study of the Upper Air in aid of the publication of a year's results of observations as a specimen. The total sum allocated to upper air work was £750.

There was, further, a number of subjects on the agenda which the President had grouped together, as they all appeared to imply the existence of an international meteorological bureau for their solution. The President suggested that the section might bring this difficult question a step nearer solution by selecting one of the subjects for investigation and inviting some individual to report on it, making him a grant to defray charges for clerical or technical assistance. If the work were successfully accomplished, the precedent once set might be followed in other directions, and so gradually the much desired bureau might come into existence. The principle found ready acceptance, but considerable differences of opinion arose over the subject to be selected for the experiment. Sir Napier suggested that the problem submitted by the British National Committee, the comparison of the weather on (magnetic) quiet and disturbed days, would form a very suitable subject, but the preparation of authoritative charts of the Northern Hemisphere on the lines of the charts of the North Atlantic formerly published jointly by the Danish Institute and the Deutsche Seewarte also found many supporters.

When the question finally came to be voted upon, the majority of votes were cast in favour of the latter proposal. A sum of £500 was accordingly allocated to the publication, by way of an experiment, of daily synoptic charts of the Northern Hemisphere for the three months, July, August, and September, 1923. The work was entrusted to M. La Cour, the Director of the Danish Meteorological Service, acting in consultation with a commission consisting of those members of the Commission for Charts of the North Atlantic, appointed by the International Meteorological Committee, who belong to states which have adhered to the Union. Thus, the newly created International Union has turned again to one of the oldest fields of international co-operation in its first attempt to give tentative effect to the idea of an international bureau.

It remains to mention the arrangements made for filling the office of President of the section. The rules of the Union contemplate that the presidents of sections shall hold office over two meetings and then retire. Sir Napier Shaw had presided at Rome in 1922, as well as at Madrid, and thus his term of office should have terminated. At the last meeting of the section, M. Lallemand, the President of the Union, asked to be heard, and in a few well chosen words, in which he dwelt on Sir Napier's services to meteorology and on his unrivalled experience of the conduct of international meteorological meetings, invited the section to depart from the accepted practice, and to endeavour to persuade Sir Napier to accept office for a further period. Sir Napier having expressed his willingness to serve again, the proposal was carried by acclamation.

R. G. K. LEMPFERT,

Discussions at the Meteorological Office

October 13th, 1924. *Light emitted from solid Nitrogen when bombarded with Cathode Rays and its bearing on the Auroral Spectrum.* By L. Vegard. (Amsterdam Proc. K. Akad. Wet. Vol. XXVI., p. 113), and *On the Luminescence of Nitrogen, Argon and other condensed Gases at very low Temperatures.* By J. C. McLennan and G. M. Shrum (London Proc. R. Soc., Vol. 106 A, 1924, p. 138). *Opener*—Dr. G. C. Simpson, F.R.S.

The first of the papers set down for discussion on this occasion has already been referred to in the *Meteorological Magazine.* It will be recalled that Professor Vegard having found that many of the lines of the auroral spectrum could be identified with those of nitrogen and that these lines as well as the characteristic green line persisted from the top to the bottom of the rays perhaps from 300 to 60 miles above the ground, put forward the theory that nitrogen must be the main constituent of the atmosphere at these great heights. He suggested that the nitrogen formed aggregates like minute solid crystals and that electric forces prevented it from sinking. To test his theory he experimented in the laboratory of Professor Onnes at Leyden, and was overjoyed to find that solid nitrogen when bombarded by an electric discharge gave a green glow and that, as nearly as he could tell with the spectroscopes he was using, the wave-length of the principal line in the spectrum of the glow was identical with that of the green line of the aurora.

The next chapter in the story is to be found in the paper by McLennan and Shrum. These authors have been working in the low-temperature laboratory at Toronto equipped by Professor McLennan on the Leyden model, and have studied the spectrum of nitrogen at low temperatures with the aid of a spectroscope with high dispersion. They have been able to determine the wave-lengths with great accuracy. They find that if nitrogen vapour at low temperatures is irradiated by electrons it becomes luminescent and the spectrum of the emitted light includes three wave-lengths in the yellow-green region, the wave-lengths being 5556, 5617 and 5654 Ångstrom units respectively. Solid nitrogen phosphorescing at the temperature of liquid hydrogen gives light of a single wave-length, 5231 units.

The precision of these results is in sharp contrast to the figures given by Vegard, whose measurements had shown that when his solid nitrogen was being bombarded the principal band in the spectrum lay between 5522 and 5689 Ångstrom units. Vegard appears to have been too optimistic in averaging readings covering such a wide range and giving out that this average represented the true wave-length. Now the wave-length of the characteristic auroral line is known with extraordinary accuracy. H. D. Babcock* using an interferometer and exposing it to the night sky for many hours found this wave-length to be 5577·35 Ångstrom units. This wave-length is not one of those occurring in McLennan and Shrum's observations, and no evidence is left for the identification of solid nitrogen as the origin of the auroral light. Whilst meteorologists must feel some regret that the chain of Vegard's argument has been broken so soon, they are perhaps relieved to know that they have not to provide an explanation for temperatures below the freezing point of nitrogen in the upper atmosphere.†

In this connection Dr. Simpson pointed out that interferometer photographs give us a very limited choice of elements for generating the auroral light. Babcock found that the width of the individual rings in the photographs indicated that the range of wave-length in the green auroral light was about ·035 Ångstrom unit. Now, in laboratory experiments on a gas producing monochromatic light the range of wave-length is found to depend on the temperature of the gas and the mass of the atoms.‡ The explanation is based on the Doppler effect. If a number of locomotives had their whistles tuned to unison and if these whistles were blown together whilst the locomotives were travelling at various speeds a listener would find the noise discordant because some of the whistles would be raised in pitch and some lowered. Similarly if gas molecules are all giving out light with the same frequency there will be a certain range of wave-length in the light which reaches an observer. Accordingly the average speed of the molecules of the gas from which the auroral light comes, can be estimated. The light might come from hydrogen at 55° A, (—360° F.) helium at 220° A. (—95° F.) or from a heavier element at a higher temperature. Nitrogen would have to be at 800° A, oxygen at 900° A. This evidence as far as it goes suggests that helium is the wanted element in spite of the fact that the appropriate means of producing the light from it in the laboratory have not been evolved. However that may be, Vegard's part in the story of the aurora will not be forgotten.

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* *Astroph. J. Chicago, Ill. Vol.* 57, 1923, *p.* 209.

† The physical objections to the theory are set out in a recent paper by R. d'E. Atkinson, of Hertford College, Oxford. Atkinson favours oxygen as the most likely source of the green auroral light. *London, Proc. R. Soc. Vol.* 106 *A.* 1924, *p.* 249.

‡ The moving particles which are stimulated to emit light are atoms not molecules. *Buisson et Fabry, J. Phys., Paris. Ser.* 5. *Vol.* 2, 1912, *p.* 455.

October 27th, 1924. *Measurements of the Sun's Ultra-Violet Radiation and its absorption by the Earth's atmosphere.* By G. M. B. Dobson (London. Proc. R. Soc. Vol. 104 A. 1923, p. 252). *Opener*—Captain F. Entwistle, B.Sc.

In this paper Mr. Dobson has developed a method of recording photographically the part of the ultra-violet radiation emitted by the sun that will pass through a thin film of silver, and finds that the percentage variation of the radiation from day to day is large, having a standard deviation of 30 per cent. He suggests that the ordinary haziness of the atmosphere is due to large particles which scatter all wave-length alike, while the large variations in transparency which occur from day to day are chiefly due to scattering by particles which are small enough to scatter according to the inverse fourth power of the wave-length. A large increase in transparency occurred about June 1922, which may be connected with the marked change in the general weather which took place about that time. During the discussion Professor S. Chapman pointed out that the daily movements of the magnetic needle were attributed to electric currents in the upper atmosphere, and that the changes in the strength of these currents from time to time were probably due to variations in the conductivity of the atmosphere such as might be produced by fluctuations in the amount of ultra-violet light received from the sun. Thus we have a new reason for hoping that Major Dobson's pioneer work will be followed by systematic records of the intensity of the ultra-violet radiation.

Royal Meteorological Society

THE monthly meeting of the Society was held on Wednesday, October 15th, at 49, Cromwell Road, South Kensington, Capt. C. J. P. Cave, President, in the Chair.

L. F. Richardson, B.A., F.Inst.P.—The Brown Corona and the Diameters of Particles.

In this paper Mr. Richardson describes experiments made to determine the relation between the brown corona and the diameters of the particles by which it is produced. It is only on rare occasions that a corona with well defined coloured rings can be seen round sun or moon. Much more frequently there is only a brownish ring. Mr. Richardson compares the colour with that of the skin of a horse chestnut. It is desirable to estimate the size of the cloud particles from the dimensions of this ring. Other workers have concentrated attention on the brightly coloured rings, and information about the chestnut ring could only be found by experiment. With his usual versatility, Mr. Richardson devised half-a-dozen different experiments. He found that the mean radius of the brown ring depended in part on the radius of the source of light as well as on the size of the diffracting obstacles. For practical use, it will probably be best to suppose the diameter of the corona estimated as so many times, say n times, the diameter of the sun or moon. In that case, the formula given by Mr. Richardson can be written with sufficient accuracy in the form—

Diameter of cloud particles in microns $= 230 \div (2n-1)$.

For example, if the apparent diameter of a corona is 5 times that of the moon, the average diameter of the cloud particles is 26μ, almost exactly the thousandth of an inch.

L. F. Richardson, B.A., F.Inst.P.—Photometric Observations on Clouds and Clear Skies.

Mr. Richardson's second paper is concerned mostly with the problem of determining from observations of a cloud how much water it contains. The most definite of his results was that a great thunder-cloud contained the equivalent of 2 millimetres of rain, less than the tenth of an inch.

L. J. Sutton, M.A., A.Inst.P.—Notes on Haboobs.

Haboobs are severe sandstorms of a type apparently confined almost entirely to the Sudan, where they are most frequent in the central region. Nearly all of them occur during the rainy season, *i.e.*, May to October, and at Khartoum, for example, they are experienced more than once a week during this period, and last about three hours on the average. Haboobs probably owe their origin to the heating up of a large region for four or five days, but, owing to the wide distances between meteorological stations in the Sudan, it has not been possible to discover where any particular haboob originated or to follow its track.

Correspondence

To the Editor, *The Meteorological Magazine*

The Reform of the Calendar

LOOKING over some papers that have accumulated during my absences abroad, I note a letter of Mr. H. A. Boys in the *Meteorological Magazine* for August about the reform of the calendar, in which he deprecates the division of the year into thirteen months of four weeks each, because with such a system of reckoning there could be no half-year or quarter-year.

I think he misses the point of the issue raised by Dr. Marvin of the United States Weather Bureau, who invites us to decide whether to build our meteorological statistics upon the day, the week and the year, all of which can be fairly well related to the sun, or whether our guiding principal shall be some variable unit originally related to the moon, of which twelve heterogeneous specimens shall be put together to form a year. An important consideration is that the month is too long a unit for problems concerning the relation of weather to crops and other recurring phenomena, and the week or fortnight is for that purpose preferable ; but no amount of ingenuity can make out a relation between the week and the calendar month, and we have as alternatives for practical purposes the week, with all its possible combinations, or the month, the whole month, and nothing but the month.

When the moon was the practical timekeeper for the human race, the month had a strong claim for consideration—salaries were paid thereby ; one can form a picture of the members of some civil service, now defunct, pointing to the new moon as an undeniable certificate for a month's pay. Perhaps that was why so much ingenuity was spent in endeavouring to accommodate the division of the year into twelve new moons, but the efforts were not at all successful and the margin of error is too large for meteorological work.

In 1878 when the Meteorological Council began the issue of a weather report to meet the requirements of agriculture and hygiene, they chose the week as unit, but allowed it to wobble about the beginning of the year with an oscillation of three days on either side of the first day of the year. Even so, the files of the *Weekly Weather Report* are the best compendium of meteorological data in existence. Now the question is raised again, and we are at the parting of the ways. Shall we go whole-heartedly for the week as an accepted unit next in magnitude to the day, group the weeks as best we can and face the consequences ? or shall we go on with an aggregation of heterogeneous months, dividing the year into twelve unequal parts and allowing no further sub-division except the day and its fractional parts ?

At its recent meeting at Madrid, the Meteorological Section of the International Union for Geodesy and Geophysics agreed to approve and recommend as units of time for meteorological measurements (*inter alia*) :—

1. The mean solar day.
2. A week of 7 mean solar days.
3. A year consisting usually of 51 week-spells of 7 days each and 1 week-spell of 8 days ; but in leap-year of 50 week-spells of 7 days each and 2 of 8 days each.

The possible grouping of the weeks was not considered, and the moon was tacitly allowed to disappear from the control of meteorological data.

I cordially agree with Mr. Boys that a "*dies non*," has no place in the organised study of weather. We have to take all the facts in their turn as they come. That makes it of little importance for us whether the ordinal of the names of the days shall be the same in successive years or not.

Another resolution invited meteorologists who were specially interested in the reform of the calendar to circulate a calendar for 1925 (as a sort of New Year's card), setting out exactly how they would deal with the 365 or 366 days of meteorological data. I intend to try. If some acceptable method of dealing systematically with our data were disclosed, a committee of the League of Nations which has the reform of the calendar on its lap would doubtless be thankful.

NAPIER SHAW.

10, *Moreton Gardens, S.W.5. October 24th,* 1924.

High Pilot Balloon Ascent at Shoeburyness

May 28th, 1924

A VERY high pilot ballon ascent was carried out at Shoeburyness on May 28th, 1924. The balloon was followed with two theodolites up to a height of 50,000 feet, when the home station lost it, and for a further 14 minutes with one theodolite. The ascent, therefore, reached well into the stratosphere.

Up to a height of 16,000 feet the wind was south-easterly, averaging a speed of about 10 miles per hour. It then veered to south, decreasing slightly at first, then increasing to about 16 mph. at 25,000 feet. Beyond this height it continued to veer and increase, becoming south-west, 20 mph. at 30,000 feet. Beyond 40,000 feet it backed slowly and decreased. From 40,000 to 45,000 feet the wind averaged 13 mph. from west-south-west to south-south-west. At 50,000 feet the wind was west or west by south and very light. Before the balloon was lost by the home station, it had begun to descend slowly, showing evidence of a slight leak, and so no use was made of the readings obtained in the subsequent 14 minutes by the outstation only.

The balloon was a 150 inch pilot balloon. Its mean rate of ascent during the first 70 minutes was slightly in excess of the computed value, 500 feet per minute, but for the next 30 minutes the rate of ascent was somewhat irregular, having a mean value of about 360 feet per minute. After the 112th minute the balloon was definitely descending. The balloon was about 24½ miles distant when finally lost in the distance.

This pilot balloon reached well into the stratosphere, though there were no temperature observations available up to a sufficient height to determine the height of the tropopause. It should be noted, however, that there was no rapid change of wind at any stage of the ascent. The synoptic chart for 7 h. on May 28th showed a depression far out in the Atlantic, and an anticyclone extending eastward from the southern Baltic. The pilot balloon showed the southerly circulation between the two.

The theodolites used were larger than those normally used at outstations. These instruments have been tried at Shoeburyness with 150 inch balloons with a view to obtaining ascents reaching into the stratosphere, but few really high ascents have been obtained, largely on account of unfavourable weather.

D. BRUNT.

Precision in Rainfall Measurement

IN reply to your comment on my letter in the October number of the *Meteorological Magazine*, p. 210, I should like to be allowed to say that the collecting bottle in the gauge, if its neck is a narrow one, as it should be, will not become dry in 24 hours. Experiment proves that so little evaporation takes place that its amount is quite negligible. The tendency is for the film of moisture to slowly drain to the bottom of the bottle, so that a few drops are always to be found there even when there has been no rain. If these few drops are spread over the inside of the bottle before inverting it over the measuring glass not a drop will fall into the measure unless the drainage is prolonged much beyond the period adopted when the bottle was deliberately wetted. But the drainage, both after deliberate wetting and when transferring rain to the measure, should always be for about the same length of time—say 2 minutes—so that a film of equal thickness is spread over the inside on both occasions.

Another and, for most observers, simpler way of obtaining the desired precision of measurement is the following. Let two bottles be used, but let them always be drained for 12 hours, both before placing in the gauge and when transferring their contents to the measure. The film of water on the interior will by this prolonged drainage, become so attenuated that its amount may be neglected without appreciable error.

M. J. SALTER.

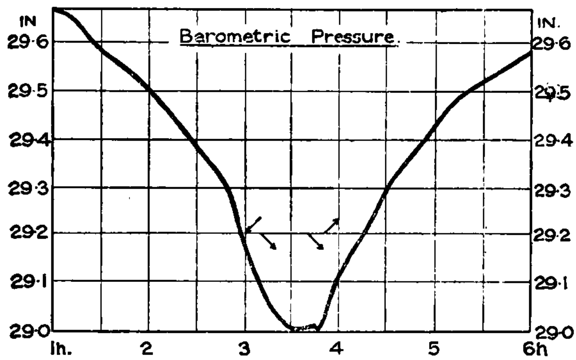
Bank House, Mickletson, Campden, Gloucester. October 31st, 1924.

Report on Hurricane Experienced in Montserrat (West Indies)

August 28th, 1924

A SEVERE hurricane passed over the island of Montserrat on the morning of Thursday, August 28th, causing great damage to life and property. The first signs of the approaching hurricane were shown by the heavy swells from the north breaking along the shore during the afternoon of Wednesday. At this time the barometer stood at 29·872 in. A heavy rain storm was experienced at 5 p.m., which seemed to clear the atmosphere, and there was no sign of the barometer falling until 9.30 p.m. on Wednesday night, when calm weather prevailed and the barometer registered 29·813. At midnight the wind blew a little stronger from the north-east. At 12.30 a.m. the barometer fell to 29·681, the wind increasing gradually in force. From this time the barometer was read every quarter of an hour and continued to fall. From 2 a.m. the intensity of the wind increased from north-east, and between 2 and 3.30 a.m. the barometer fell rapidly from 29·503 to 29·003. The wind then veered to north-west. At this time the velocity of the wind must have been somewhere in the region of 100 miles per hour, and around the Botanic station the largest trees fell at this time. The severest gust of wind was experienced between 3 and 4 a.m.

Botanic Station, Montserratt, 28th August 1924.



At 15 minutes to 4 the barometer gave the first sign of rising slightly (29·015), but a minute after it again fell a trifle (29·007). At 5 minutes to 4 a decided rise to 29·075 was noticed. The wind was still blowing at hurricane proportions. From 4 a.m., when the barometer rose to 29·113, the wind veered to the south-west and decreased in force. This apparently indicated that the storm was travelling to the north. From 4·15 a.m. the wind then veered in decreasing severity from south-west to south and the barometer rose gradually to 29·621 at 6.30 a.m. At 10 a.m. in the morning the barometer registered 29·785, and at 3 p.m. the reading was 29·799. During the whole of the storm period the total precipitation was 8·25 in. There was no centre calm and from the above indications the centre passed north of Montserrat. From reliable sources the barometer was said to have recorded the very low readings of 28·6 in. at Olveston (north) and 28·5 in. at Farm (east districts). The Botanic station suffered very badly. Many valuable specimens were uprooted and the nursery and glass house damaged. The experimental plots were destroyed and valuable experiments lost. The scene after the storm was one of confusion because of the fallen trees and debris.

Apart from the very sad loss of life in the island, the loss in property and crops will amount to very many thousands of pounds. Among the heavier losses sustained must be mentioned the serious damage to the cotton houses at Farm, Bethel, Trants, and Dagenham, approximately 160,000 lbs. of seed cotton were damaged. All the peasant sugar works were destroyed and the fruit trees, especially the breadfruit and avocado, sustained extensive damage and destruction. This will seriously affect the food supply of the peasantry for years to come.

The south of the island did not suffer as severely as the north-east and central districts. Reports from the far north are not yet to hand and the Assistant Curator is visiting this district to-day.

C. A. GOMEZ.

Botanic Station, Montserrat, West Indies. August 29th, 1924.

NOTES AND QUERIES

Daily Weather Charts for the South Atlantic

BY the general use of wireless telegraphy the preparation of daily weather charts covering a complete circuit of the northern hemisphere is now part of the routine of our meteorological services. The lacuna in high latitudes is being reduced in size as special meteorological stations are established in such regions as the coasts of Greenland and the far north of Canada. Meteorologists of the southern hemisphere have a more difficult task before them in gathering material for a daily chart of their part of the globe. In September 1923, the following resolution was adopted by the International Meteorological Conference at Utrecht. " It is highly desirable in the interest of synoptic meteorology in the southern hemisphere that meteorological observations should be transmitted by wireless stations from the islands of St. Helena, Ascension, Trinidad (Brazil), Tristan de Cunha and the South Orkneys to augment information from the surrounding coasts." We now learn that the Brazilian Government is equipping a station at Trinidad or rather Trindade (to give it the Portuguese name), a forlorn island, 700 miles east of the coast of Brazil, and 20° south of the equator. The station is to be occupied by navy men and there will be a 5 kilowatt radio equipment. There has been an important meteorological station at St. Helena since February 1892, and it may prove practicable before long to arrange for daily reports to be transmitted thence to South Africa and broadcasted with like information from Africa. A wireless station is being established at South Georgia, and it is expected that when this is finished, meteorological messages will be regularly transmitted, giving valuable information from this sub-Antarctic station.

If these new services prove of use to ships navigating the

South Atlantic as well as to the meteorological bureaux in South America and Africa, the development of similar services in other remote islands will not be long delayed.

Terrestrial Magnetism and Seismology at the Meteorological Office Observatories

It is announced that the work in Terrestrial Magnetism at Kew Observatory, Richmond, Surrey, is to be terminated at the end of the year 1924. The underground room which has been occupied since 1858 by the magnetographs will be occupied by the Galitzin Seismographs which are to be transferred from Eskdalemuir Observatory, Dumfriesshire. The changes are being made by the authority of the Meteorological Committee and with the approval of the Gassiott Committee of the Royal Society.

The association of magnetic observations with Kew Observatory may be traced back as far as 1842 when the Committee of the Royal Society, which was reporting on the uses to which the Observatory could be put if it should be taken over by that body, included in their list :—

> " 3. As a station for trial and comparison of magnetical apparatus, and affording to observers desirous of acquiring a knowledge of the nature and use of such apparatus, an opportunity for conveniently doing so, and of obtaining a practical knowledge of the system of magnetical observation recommended by the Society.
>
> " 4. As a station in which many occasional phenomena might be advantageously observed by Fellows of the Society, or others, on permission obtained from the President and Council, such as, for example, concerted observations of shooting stars, &c., or in which the phenomena of what has been called " magnetic storms " or unusual magnetic disturbances might be witnessed, and their particulars attended to by observers desirous of so doing, without interfering with observations regularly in progress at official stations, or with a view to other circumstances in their phenomena than what may be ordinarily observed at such stations: it being considered that such " storms " are sometimes of considerable duration, and may become known to exist by direct communication from Greenwich or other regular observing station."

It will be remembered that " it did not appear to the Council [of the Royal Society] to be expedient for the Society to occupy the Observatory at Kew." The supporters of the scheme for utilising the Observatory obtained the support of the British Association, and that body accepted the responsibility. For the first ten years Sir Francis Ronalds acted as Honorary Superintendent. It was in 1850 that regular magnetic observations were commenced with instruments provided by Lieut.-Col. Sabine. The first magnetic self-recording instruments were set up by Ronalds. The permanent ones were constructed after Walsh had become Superintendent, " very considerable improvement having been made in the art of photography." The instruments were completed at an expense not exceeding £250, derived from the Government Grant Fund. These same magnetographs have been in operation ever since, though the records were interrupted in 1874 and again when extensive alterations were being made in the Observatory in 1913. The records have been thoroughly discussed, and it is much to be regretted that the series could not be continued indefinitely. Since 1901 their use has been sadly impaired, however, by the electrification of the tramways and railways in the neighbourhood. This evil was anticipated. In 1908 the Observatory at Eskdalemuir, 17 miles from the nearest railway line, was opened by the National Physical Laboratory (then responsible for Kew Observatory), the cost of erection of the new observatory having been defrayed in part by the London United Tramways Company.

As another off-shoot from Kew, we have the observatory established at Lerwick in the Shetland Islands in 1921.

The magnetographs at the Royal Observatory, Greenwich, have recently been affected in the same way as those at Kew Observatory, and a new magnetic observatory has been built by the Greenwich authorities at Abinger in Surrey, close to Leith Hill. This observatory is now in operation and is free from disturbance, so that there are four magnetic observatories with continuous and "undisturbed" records in the British Isles: Lerwick, Eskdalemuir, Stonyhurst (the Jesuit College, near Blackburn), and Abinger. The study of terrestrial magnetism in Great Britain is therefore well provided for.

Publication of the magnetic results from Lerwick and Eskdalemuir will be carried out by the Meteorological Office, while the Astronomer Royal and the authorities at Stonyhurst College are respectively responsible for the publication of results from Abinger and Stonyhurst.

As to seismology, an undamped Milne Seismograph recording earth tilts in the East-West direction has been in operation at Kew since 1898. This instrument is now, however, regarded as obsolete because only the damped boom type of seismograph, best exemplified by the Galitzin instrument, enables a seismologist to identify the amplitudes and times of arrival of the various phases of an earthquake disturbance and so to determine with some accuracy the direction and distance of the epicentre. This determination can be made from the records of a single observatory provided three seismographs are installed to record earth tilts in three directions mutually at right angles. The installation at Eskdalemuir of three such instruments of the Galitzin type, which was rendered possible in 1910 by the generosity of Sir Arthur Schuster, F.R.S., is the finest in this country, and the transfer of the installation to Kew will, it is hoped, expedite the issue of bulletins notifying the occurrence of considerable earthquakes.

Exposure of Thermometer Screens

OFFICIAL books of instruction recommend that thermometer screens should be exposed in the open, and state that the distance of every object near the screen should be at least twice the height of the object. Questions have recently been raised as to the effect of a wood upon readings of a thermometer exposed inside it, the readings being compared with similar observations taken under normal conditions. Some information on this point is contained in the following tables showing a comparison of temperature in two Stevenson Screens at Belper, Derbyshire.

TABLE I.

MONTHLY MEAN MAXIMUM AND MEAN MINIMUM TEMPERATURES FOR THE PERIOD MAY, 1914 TO APRIL, 1916.

Month.	Maximum.		Minimum.		Month.	Maximum.		Minimum.	
	Field Head House.	Quarry Bank.	Field Head House.	Quarry Bank.		Field Head House.	Quarry Bank.	Field Head House.	Quarry Bank.
1914	°F	°F	°F	°F	1915	°F	°F	°F	°F
May	58·4	59·6	42·2	41·3	May	59·7	61·0	42·2	41·5
June	66·5	68·3	49·0	47·7	June	67·0	69·6	46·8	45·6
July	67·7	69·3	53·5	52·5	July	65·1	66·9	50·2	49·2
Aug.	68·4	70·1	51·9	50·5	Aug.	66·3	68·2	51·8	50·3
Sept.	63·6	64·8	46·6	45·4	Sept.	63·3	65·0	47·3	45·5
Oct.	55·4	55·8	44·4	43·7	Oct.	53·2	53·6	41·7	41·2
Nov.	48·5	49·1	38·4	36·8	Nov.	42·9	43·2	32·1	30·8
Dec.	43·7	43·7	34·4	33·9	Dec.	45·3	45·4	35·3	34·8
1915					1916				
Jan.	42·5	42·5	34·4	34·1	Jan.	49·5	49·4	39·5	38·9
Feb.	44·3	44·5	32·5	32·1	Feb.	41·7	41·8	32·3	32·4
Mar.	47·5	47·9	34·5	34·1	Mar.	41·1	41·5	32·5	32·5
April	53·4	53·9	37·6	37·3	April	55·2	55·4	38·0	37·1

The observations were made in 1914-1916 by Mr. John Hunter, who has contributed regular observations, first to the Royal Meteorological Society and later to the Meteorological Office, since 1877.

The screens are set up respectively at Field Head House and at Quarry Bank, at elevations above M.S.L. of about 340 feet and 280 feet. They are about ½ mile apart. The screen at Field Head House is sheltered by a large tree and is also close to a house; that at Quarry Bank is exposed normally.

TABLE II.

AVERAGE MONTHLY DIFFERENCE OF MEAN MAXIMUM AND MEAN MINIMUM TEMPERATURE FOR THE TWO STATIONS. (DEGREES FAHRENHEIT)

	Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					MAXIMUM.							
Quarry Bank above Field Head	0·0	0·1	0·4	0·3	1·2	2·2	1·7	1·8	1·4	0·4	0·4	0·0
					MINIMUM.							
Field Head above Quarry Bank	0·4	0·1	0·2	0·6	0·8	1·2	1·0	1·4	1·5	0·6	1·4	0·5

It will be seen that except during December and January the maximum temperature under the tree is less than that given by the normal exposure, and that the minimum temperature under the tree is invariably the higher of the two. The differences are in general most marked in summer, but the seasonal effect is less regular in the case of the minimum temperature. In the case of the maximum temperature the greatest difference in any single month was 2·6°F. in June, 1915; January, 1916, showed a reversal, the sheltered thermometer being 0·1°F. higher than the normally exposed one. In the case of the minimum temperature the greatest difference was 1·8°F. in September, 1915, and here again a reversal occurred in one month, the sheltered thermometer being 0·1°F. lower than the normally exposed one in February, 1916.

The variations tend to balance one another and the effect on the mean temperature is very small. The maximum differences of mean temperature are 0·5°F. in June and November, the normally exposed thermometers giving the highest value in June and the lowest in November. On the whole year the mean works out about 0·3°F. higher in the case of the normal exposure.

Dry Decks in Sea Fog

ON my voyage from Canada in the "Empress of Scotland" after the British Association Meeting, I made an observation which illustrates the extent to which heat rays from the sun penetrate fog. On September 1st, in mid-Atlantic we were in thick and uniform fog. On the sheltered decks everything was dripping, but the boat-deck, where it had no shelter over it, was quite dry. The most remarkable contrast was provided by the rail of a ladder leading to the boat-deck. The lower half of this rail was sheltered by the deck and wet, the upper half was dry. One would expect the contrast between the sheltered and unsheltered parts of the boat to disappear at sun-down, and I should have liked to have confirmed this, but on the night in question the circumstances were altered by drizzle setting in.

F. J. W. WHIPPLE.

Radiation from the Sky

RADIATION MEASURED AT BENSON, OXON, 1924.

Unit: one gramme calorie per square centimetre per day.

		July	Aug.	Sept.
ATMOSPHERIC RADIATION only (dark heat rays). Averages for Readings about time of Sunset.				
Cloudless days :—				
Number of readings	n	12	5	6
Radiation from sky in zenith ...	πI	585	542	521
Total radiation from sky ...	J	629	581	555
Total radiation from horizontal black surface on earth ...	X	799	737	722
Net radiation from earth ...	X—J	170	156	167
DIFFUSE SOLAR RADIATION (luminous rays). Averages for Readings between 9 h. and 15 h. G.M.T.				
Cloudless days :—				
Number of readings	n_0	3	0	2
Radiation from sky in zenith ...	πI_0	59	—	28
Total radiation from sky ...	J_0	57	—	38
Cloudy days :—				
Number of readings	n_1	3	5	3
Radiation from sky in zenith ...	πI_1	178	83	97
Total radiation from sky ...	J_1	154	75	81

Unit for I = gramme calorie per day per steradian per square centimetre.

Unit for J and X = gramme calorie per day per square centimetre.

For description of instrument and methods of observation, see *The Meteorological Magazine*, October, 1920, and May, 1921.

The Testing of Rain Gauges

A NEW edition of the pamphlet dealing with the conditions under which tests on volumetric glassware are made has been issued recently by the National Physical Laboratory. It is interesting to note that with regard to rain-gauges the rule is that the mark of the Laboratory is placed on funnels and measures which conform with the specifications adopted by the Air Ministry, Meteorological Office. Similarly in the case of self-recording gauges, only those types which are approved by the Meteorological Office are now accepted for test.

It is explained how the test of a vessel such as a rain-gauge measure is carried out. " The adjustment of a water meniscus to a mark on a vessel is made so that the lowest point of the meniscus is in the plane which contains the mark . . . . The meniscus is shaded by folding a strip of black paper round the vessel, the top edge of the paper being not more than 1 mm. below the mark on which the setting is to be made. The meniscus so shaded is viewed against a white background."

Our Sins of Omission

OUR contemporary *Ciel et Terre* in a light-hearted review of the note on "The Influence of Climatic Conditions on the Shape of the Nose," published in the July issue of this magazine, points out that we omitted to give any reference to the journal in which the original article was published. We hasten to say that it appeared in the Journal of the Royal Anthropological Institute, London, Vol. 53, 1923, p. 92.

It has also been brought to our notice that in the October number of the magazine in the note on the "Ballon Sonde Ascent over the Sea," we give the temperature readings only in degrees absolute. The temperatures in degrees Fahrenheit were, at sea level 68°, at 1 km. (3,300 ft.) 61°, at 3 km. (9,900 ft.) 43°, and at 5·4 km. (17,800 ft) 12°.

News in Brief

THE "Jevons Memorial" Lectures for 1924-5 are being given by Mr. R. H. Hooker, at Universtity College, London, on Fridays, November 7th, 14th, 21st and 28th, at 5.30 p.m. The subject is "The Weather and the Crops, Part II.—Economic Effects." The lectures are open to the public without fee or ticket.

The Weather of ~~June~~ October, 1924

UNSETTLED rainy conditions prevailed generally throughout the month except for a few periods of finer drier weather. During the first days most of the rainfall occurred in the west, and fine sunny weather with early morning mist or fog was experienced in the eastern counties. On the 4th, however, a depression over the Bay of Biscay began to move northwards and rain became general over the whole country, *e.g.*, on the 5th 58 mm. (2·26 in.) were reported from Ilderton (Northumberland), 53 mm. (2·09 in.) from Nairn, 16 mm. (0·63 in.) from Gorleston, and 9 mm. (0·35 in.) from Roches Point. On the 7th a secondary depression developed off the mouth of the English Channel and moving eastwards caused high winds and gales with much heavy rain in the south-western districts of England. More than 25 mm. (1 in.) fell over a broad belt extending from Land's End to Worcester and Warwick, and more than 50 mm. (2 in.) over the greater part of

Cornwall. Among the largest measurements were 88 mm. (3·46 in.) at St. Austell, Cornwall (where the observer reports that it was "the wettest day recorded since 1865"), 83 mm. (3·27 in.) at Falmouth (which constituted a record value for 24 hours for that station), and 82 mm. (3·22 in.) at Penzance. In some parts, especially Cornwall, serious floods resulted. Conditions remained unsettled for a few days after this, but by the 12th the anticyclone over Central Europe spread across Great Britain and fairer, drier weather set in in most districts for about a week. Sunshine reports of over 9 hours duration were registered on several days, notably on the 13th and 14th when the temperature rose above 70° F. at many places, Colwyn Bay reporting 73° F., Cambridge, Manchester, Aberystwyth and Croydon, 72° F. on the 13th, and Kilmarnock 72° F. on the 14th. During this period mist and fog occurred locally at night and in the early morning, and thunderstorms were experienced at a few stations in the south and east of Ireland on the 12th and 13th. On the 18th the approach of another depression from the Atlantic caused a renewal of unsettled weather over the whole country and heavy rain in the west. This spread also to the east of the country on the 21st, when more than 25 mm. (1 in.) were recorded over an area extending from Derbyshire to Norfolk and Suffolk; 43 mm. (1·69 in.) were measured at Geldeston (near Beccles) and 36 mm. (1·42 in.) at Cambridge. Near Saxmundham considerable floods occurred. On the morning of the 22nd high winds and gales were experienced along the south-eastern coasts. After this, anticyclonic conditions prevailed for a few days, during which time the lowest temperatures for the month were registered, many of the temperatures on the ground being unusually low for the time of year, *e.g.* 17° F. at Achnashellach, and 19° F. at Inverness and Wisley. During the last few days there was a renewal of mild, unsettled weather with further heavy rain at times. Thunderstorms accompanied by hail occurred in the south-eastern parts of England on the 30th.

Mean pressure during October was below normal over the British Isles, the North Atlantic, Iceland and Spitzbergen, the maximum deficit (6·9 mb.) being recorded at Reykjavik (Iceland). Elsewhere, the pressure was above normal, the excess reaching 6·1 mb. at Vardo, 5·7 mb. at Bornholm, and 3·0 mb. at Nice. Winds were mainly from S or SW over western Europe, and from S E over eastern Europe, resulting in an excess of rainfall in the west and a deficit in the east. Temperature was above normal over the whole of Europe, the excess being greatest in the north (Haparanda + 7·7° F.) After a fortnight of generally unsettled weather, a few fine days with local mist or fog occurred. The opportunity was seized for the flight of the Zeppelin ZR3 from Germany to the United States. She started under ideal weather conditions on the European side, but met with adverse winds after passing the Azores.] A period of alternating fine and stormy days followed, with gales and some heavy falls of rain. On the nights of the 21st and 22nd, a gale raged in the eastern Atlantic and North Sea. A Swedish steamer was wrecked, and, owing to the heavy seas, rescue work was impossible. Snow was reported from Russia, Iceland and Switzerland, where about two feet of snow fell at Santis on the 30th. In France, floods were caused both by the rising of the rivers and also by inundation from the sea on the Channel coast. At the end of the month, the Rhine and Meuse were in flood, and river traffic was mostly stopped. The Mediterranean region experienced mainly fair weather, many temperatures of about 80° F. being recorded, but there were some heavy falls of rain and a gale off Sicily on the 7th.

The floods in India reported last month, began to subside early in October. The rains for the week ending on the 15th, were heavy in the United Provinces and in the Central Provinces, and continued scanty in the north-west, in Central India (East), Mysore and Madras. For the week ending on the 22nd, the rain was for the most part normal. In eastern Siberia, the river Amur has been in flood, a rise of twelve feet in the level causing a loss of 400 lives. Typhoons causing damage and loss of life visited the Philippines on the 8th, and the coast of Annam on the 23rd and 24th.

The report on the crops of Canada is not very favourable. Damage has been caused through the rainy weather which delayed the threshing of the wheat, and in some parts by frost.

At Mantua (Cuba), on the 20th, and in Nicaragua, torrential rains and floods destroyed many buildings, with loss of life. In Cuba, the tobacco crop suffered severely.

The special message from Brazil states that the rainfall was scanty over the whole country, and was 24 mm. and 86 mm. below normal in the central and southern districts respectively. Fewer anticyclones passed across the country than in the last two or three months, but the continental depression was more active. There was a general improvement in the crops owing to the small amount of precipitation. At Rio de Janeiro pressure was 1 mb. above normal, and temperature ·7° F. below normal, the maximum temperatures during the month being unusually below.

Rainfall October, 1924: General Distribution

England and Wales	132	per cent. of the average 1881-1915.
Scotland	97	
Ireland	97	
British Isles	115	

Rainfall: October, 1924: England and Wales.

CO.	STATION.	In.	mm.	Per-cent. of Av	CO.	STATION.	In.	mm.	Per-cent. of Av.
Lond.	Camden Square.......	3·52	89	134	*War.*	Birminghm, Edgbaston	4·35	110	156
Sur .	Reigate, Hartswood...	3·41	87	108	*Leics*	Leicester Town Hall...	4·13	105	...
Kent.	Tenterden, View Tower	4·57	116	131	,, .	Belvoir Castle........	4·40	112	163
,, .	Folkestone, Boro. San.	4·59	116	...	*Rut* .	Ridlington...........	4·85	123	...
,, .	Broadstairs	3·52	89	114	*Linc*.	Boston, Skirbeck	4·06	103	148
,, .	Sevenoaks, Speldhurst.	3·81	97	...	,, .	Lincoln, Sessions House	4·08	104	160
Sus .	Patching Farm........	5·30	135	134	,, .	Skegness, Estate Office.	4·07	103	149
,, .	Eastbourne, Wilm. Sq.	4·11	104	99	,, .	Louth, Westgate	3·91	99	121
,, .	Tottingworth Park....	6·39	162	154	,, .	Brigg	3·98	101	133
Hants	Totland Bay, Aston...	5·43	138	133	*Notts*.	Worksop, Hodsock....	4·04	103	154
,, .	Fordingbridge, Oaklnds	4·96	126	120	*Derby*	Mickleover, Clyde Ho..	4·02	102	149
,, .	Portsmouth, Vic. Park.	5·35	136	145	,, .	Buxton, Devon. Hos...	7·18	182	146
,, .	Ovington Rectory	4·75	121	117	*Ches*.	Runcorn, Weston Pt...	4·19	106	122
,, .	Grayshott	4·59	117	110	,, ..	Nantwich, Dorfold Hall	4·13	105	...
Berks	Wellington College...	3·67	93	112	*Lancs*	Bolton, Queen's Park .	5·39	137	...
,, .	Newbury, Greenham..	4·07	103	116	,, ..	Stonyhurst College....	4·74	120	106
Herts.	Bennington House....	4·11	104	151	,, ..	Southport, Hesketh...	4·02	102	114
Bucks	High Wycombe	3·62	92	116	,, ..	Lancaster, Strathspey.	5·35	136	...
Oxf..	Oxford, Mag. College..	3·63	92	130	*Yorks*	Sedbergh, Akay	6·29	160	126
Nor .	Pitsford, Sedgebrook..	3·75	95	140	,, .	Wath-upon-Dearne ...	3·26	83	118
,, .	Eye, Northolm........	4·34	110	...	,, .	Bradford, Lister Pk...	3·01	76	86
Beds.	Woburn, Crawley Mill.	4·03	102	149	,, .	Oughtershaw Hall	7·37	187	...
Cam.	Cambridge, Bot. Gdns.	3·60	91	153	,, .	Wetherby, Ribston H..	2·90	74	97
Essex	Chelmsford, CountyLab	3·59	91	...	,, .	Hull, Pearson Park ...	3·63	92	122
,, .	Lexden, Hill House...	3·97	101	...	,, .	Holme-on-Spalding ...	3·51	89	...
Suff .	Hawkedon Rectory ...	4·10	104	152	,, .	Lowthorpe, The Elms.	3·78	96	116
,, .	Haughley House......	3·37	86	...	,, .	West Witton, Ivy Ho..	3·47	88	...
Norf.	Beccles, Geldeston....	4·52	115	160	,, .	Pickering, Hungate ...	3·99	101	...
,, .	Norwich, Eaton	4·20	107	135	,, .	Middlesbrough	3·05	77	102
,, .	Blakeney	3·75	95	143	,, .	Baldersdale, Hury Res.	...	..	...
,, .	Swaffham	3·94	100	137	*Durh*.	Ushaw College	3·13	79	91
Wilts.	Devizes, Highclere....	5·21	132	168	*Nor* .	Newcastle, Town Moor.	3·99	101	125
Dor .	Evershot, Melbury Ho.	5·45	138	118	,, .	Bellingham Manor....	3·49	89	...
,, .	Weymouth, Westham..	5·34	135	146	,, .	Lilburn Tower Gdns...	4·27	109	...
,, .	Shaftesbury, Abbey Ho.	5·59	142	143	*Cumb*	Penrith, Newton Rigg..	3·46	88	91
Devon	Plymouth, The Hoe...	7·09	180	180	,, .	Carlisle, Scaleby Hall .	3·34	85	100
,, .	Polapit Tamar	6·49	165	135	,, .	Seathwaite	10·00	254	83
,, .	Ashburton, Druid Ho..	9·02	229	149	*Glam*.	Cardiff, Ely P. Stn.....	6·36	161	133
,, .	Cullompton	5·33	135	129	,, .	Treherbert, Tynywaun	12·05	306	...
,, .	Sidmouth, Sidmount ..	6·19	157	166	*Carm*	Carmarthen Friary....	5·85	149	103
,, .	Filleigh, Castle Hill ...	6·67	169	...	,, .	Llanwrda, Dolaucothy.	7·52	191	119
,, .	Hartland Abbey......	5·96	151	...	*Pemb*	Haverfordwest, Portf'd	...	..	...
Corn.	Redruth, Trewirgie ...	9·52	242	181	*Card*.	Gogerddan..........	5·81	148	110
,, .	Penzance, Morrab Gdn.	8·45	215	181	,, .	Cardigan, County Sch. .	4·35	111	...
,, .	St. Austell, Trevarna..	10·44	265	198	*Brec*.	Crickhowell, Talymaes	9·00	229	...
Soms	Chewton Mendip	7·44	189	154	*Rad* .	Birm. W. W. Tyrmynydd	6·99	177	106
,, .	Street, Hind Hayes ...	5·36	136	...	*Mont*.	Lake Vyrnwy	8·76	223	154
Glos..	Clifton College	6·44	163	171	*Denb*.	Llangynhafal	3·58	91	...
,, .	Cirencester	5·04	128	148	*Mer* .	Dolgelly, Bryntirion..	5·58	142	92
Here.	Ross, County Obsy. ...	...	..	...	*Carn*.	Llandudno	3·19	81	89
,, .	Ledbury, Underdown.	3·81	97	124	,, .	Snowdon, L. Llydaw 9	12·97	329	...
Salop	Church Stretton......	5·14	131	142	*Ang* .	Holyhead, Salt Island.	3·28	83	82
,, .	Shifnal, Hatton Grange	3·42	87	121	,, .	Lligwy	3·38	86	...
Staff.	Tean, The Heath Ho...	4·82	122	149	*Isle of Man*				
Worc.	Ombersley, Holt Lock.	3·98	101	149		Douglas, Boro' Cem...	3·28	83	71
,, .	Blockley, Upton Wold.	5·37	136	164	*Guernsey*				
War.	Farnborough.........	4·21	107	133		St. Peter Port, Grange.	5·27	134	117

Erratum Broadstairs for September, 2·85 in. 72 mm., 145 %

Rainfall: October, 1924: Scotland and Ireland

CO.	STATION	In.	mm.	Per-cent. of Av.	CO.	STATION.	In.	mm.	Per-cent. of Av.
Wigt.	Stoneykirk, Ardwell Ho	...	..	...	*Suth.*	Loch More, Achfary...	7·02	178	90
,,	Pt. William, Monreith.	2·89	73	...	*Caith*	Wick	2·35	60	79
Kirk.	Carsphairn, Shiel.	4·55	116	...	*Ork.*	Pomona, Deerness	3·35	85	88
,,	Dumfries, Cargen.....	3·89	99	89	*Shet.*	Lerwick	3·05	77	77
Dum	Drumlanrig	4·74	120	110					
Roxb	Branxholme	3·11	79	96	*Cork.*	Caheragh Rectory	5·60	142	...
Selk.	Ettrick Manse........	4·19	106	...	,,	Dunmanway Rectory.	5·99	152	100
Berk.	Marchmont House	3·38	86	88	,,	Ballinacurra	4·32	110	106
Hadd	North Berwick Res....	3·78	96	128	,,	Glanmire, Lota Lo. ...	4·34	110	105
Midl	Edinburgh, Roy. Obs..	3·39	86	131	*Kerry*	Valencia Obsy.	5·30	135	95
Lan.	Biggar	2·89	73	96	,,	Gearahameen	7·10	180	...
Ayr.	Kilmarnock, Agric. C..	3·24	82	92	,,	Killarney Asylum.....	4·40	112	82
,,	Girvan, Pinmore......	3·24	82	65	,,	Darrynane Abbey	5·68	144	113
Renf.	Glasgow, Queen's Pk..	2·97	75	91	*Wat.*	Waterford, Brook Lo..	4·00	102	102
,,	Greenock, Prospect H..	4·07	103	76	*Tip.*	Nenagh, Cas. Lough...	4·32	110	127
Bute.	Rothesay, Ardencraig.	3·91	99	89	,,	Tipperary	4·22	107	...
,,	Dougarie Lodge	3·31	84	...	,,	Cashel, Ballinamona ..	3·67	93	102
Arg.	Glen Etive...........	7·21	183	...	*Lim.*	Foynes, Coolnanes	4·47	113	121
,,	Oban	4·44	113	...	,,	Castleconnell Rec.	4·66	118	...
,,	Poltalloch	4·79	122	97	*Clare*	Inagh, Mount Callan ..	7·30	185	...
,,	Inveraray Castle......	6·71	170	95	,,	Broadford, Hurdlest'n.	5·14	131	...
,,	Islay, Eallabus.......	4·79	122	100	*Wexf*	Newtownbarry	3·44	87	...
,,	Mull, Benmore	13·60	345	...	,,	Gorey, Courtown Ho...	2·97	75	84
Kinr.	Loch Leven Sluice	3·34	85	97	*Kilk.*	Kilkenny Castle	2·89	73	92
Perth	Loch Dhu	6·30	160	88	*Wic.*	Rathnew, Clonmannon	2·06	52	...
,,	Balquhidder, Stronvar.	5·33	135	78	*Carl.*	Hacketstown Rectory.	3·18	81	84
,,	Crieff, Strathearn Hyd.	3·87	98	98	*QCo.*	Blandsfort House.....	3·32	84	94
,,	Blair Castle Gardens ..	4·25	108	...	,,	Mountmellick	3·42	87	...
,,	Coupar Angus School..	3·82	97	134	*KCo.*	Birr Castle..........	3·30	84	113
Forf.	Dundee, E. Necropolis.	4·72	120	177	*Dubl.*	Dublin, FitzWm. Sq...	1·56	40	58
,,	Pearsie House........	5·53	141	...	,,	Balbriggan, Ardgillan.	2·20	56	81
,,	Montrose, Sunnyside..	4·52	115	164	*Me'th*	Drogheda, Mornington	2·59	66	...
Aber.	Braemar Bank	3·00	76	80	*W.M*	Mullingar, Belvedere.	4·09	104	131
,,	Logie Coldstone Sch. ..	3·80	97	117	*Long*	Castle Forbes Gdns....	3·09	79	95
,,	Aberdeen, Cranford Ho	3·43	87	106	*Gal.*	Galway, Waterdale ...	...	..	...
,,	Fyvie Castle	2·91	74	...	,,	Ballynahinch Castle ..	8·56	217	...
Mor.	Gordon Castle........	3·43	87	109	*Mayo*	Mallaranny..........	6·94	176	...
,,	Grantown-on-Spey....	3·16	80	106	,,	Westport House......	4·66	118	104
Na.	Nairn, Delnies.......	3·48	88	148	,,	Delphi Lodge	9·70	246	...
Inv.	Ben Alder Lodge	4·34	110	...	*Sligo*	Markree Obsy.	4·70	119	116
,,	Kingussie, The Birches	1·96	50	...	*Ferm*	Enniskillen, Portora ..	3·44	87	...
,,	Fort Augustus	...	..	...	*Arm.*	Armagh Obsy.	2·77	70	102
,,	Loch Quoich, Loan....	9·00	229	...	*Down*	Warrenpoint	3·49	89	...
,,	Glenquoich	7·46	189	75	,,	Seaforde	3·57	91	100
,,	Inverness, Culduthel R.	2·30	59	...	,,	Donaghadee	2·21	56	77
,,	Arisaig, Faire-na-Squir	5·42	138	...	,,	Banbridge, Milltown.	2·70	69	98
,,	Fort William.........	5·42	138	77	*Antr.*	Belfast, Cavehill Rd. ..	2·71	69	...
,,	Skye, Dunvegan......	6·56	167	...	,,	Glenarm Castle.......	1·96	50	...
,,	Barra, Castlebay	3·22	82	...	,,	Ballymena, Harryville	2·99	76	81
R&C	Alness, Ardross Cas. ..	2·28	58	59	*Lon.*	Londonderry, Creggan	3·45	88	94
,,	Ullapool.............	4·05	103	...	*Tyr.*	Donaghmore	2·20	56	...
,,	Torridon, Bendamph..	6·49	165	81	,,	Omagh, Edenfel	3·03	77	83
,,	L. Carron, Plockton...	...	..	...	*Don.*	Malin Head	2·90	73	98
,,	Stornoway	4·97	126	96	,,	Rathmullen.........	...	..	...
Suth.	Lairg	3·36	85	...	,,	Dunfanaghy	2·56	65	58
,,	Tongue Manse........	2·78	71	66	,,	Killybegs, Rockmount.	5·87	149	105
,,	Melvich School.......	1·99	51	54					

Climatological Table for the British Empire, May, 1924

STATIONS	PRESSURE: Mean of Day M.S.L.	PRESSURE: Diff. from Normal	TEMPERATURE: Absolute Max.	TEMPERATURE: Absolute Min.	TEMPERATURE: Mean Values Max.	TEMPERATURE: Mean Values Min.	TEMPERATURE: Mean Values ½ max. and min.	TEMPERATURE: Mean Values Diff. from Normal	TEMPERATURE: Mean Wet Bulb.	Relative Humidity	Mean Cloud Am'nt	PRECIPITATION: Am'nt	PRECIPITATION: Diff. from Normal	PRECIPITATION: Days	BRIGHT SUNSHINE: Hours per day	BRIGHT SUNSHINE: Percentage of possible.
	mb.	mb.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	%	0—10	mm.	mm.			
London, Kew Obsy.	1012·3	− 3·6	75	38	64·0	47·7	55·9	+ 2·5	53·6	74	6·5	61	+ 17	19	5·9	38
Gibraltar	1015·8	− 0·3	88	52	76·1	59·5	67·8	+ 2·3	60·9	69	3·3	10	− 34	4	...	...
Malta	1017·2	+ 3·5	84	57	74·7	63·2	68·9	+ 3·8	62·7	70	2·9	0	− 10	0	10·8	77
Sierra Leone	1011·8	+ 0·1	94	70	89·6	73·8	81·7	− 0·3	77·5	73	5·3	191	− 92	18	...	...
Lagos, Nigeria	1009·3	− 1·7	99	72	90·3	77·1	83·7	+ 2·5	78·5	71	5·1	88	−175	9	...	...
Kaduna, Nigeria	1013·0	− 0·1	100	65	92·5	70·0	81·3	+ 1·9	73·0	66	0·9	108	− 78	15	...	...
Zomba, Nyasaland	1013·6	− 0·7	83	49	78·3	56·0	67·1	+ 1·4	...	92	3·1	4	− 21	2	...	...
Salisbury, Rhodesia	1015·2	− 2·9	83	38	76·4	48·1	62·3	+ 1·8	54·0	53	1·0	0	− 12	0	...	...
Cape Town	1019·4	+ 1·5	77	40	65·1	48·6	56·9	− 1·7	53·8	80	5·1	49	− 52	10	...	...
Johannesburg	1019·7	− 0·2	71	32	63·5	45·1	54·3	− 0·1	45·2	63	2·8	29	+ 11	4	8·6	80
Mauritius	1016·2	− 0·2	81	61	78·1	68·4	73·2	+ 0·6	69·1	81	6·2	94	+ 17	13	5·7	51
Bloemfontein	...	...	75	28	66·4	37·4	51·9	− 0·8	43·1	71	2·0	4	− 26	2	...	...
Calcutta, Alipore Obsy.	1003·6	+ 0·1	102	72	98·6	79·7	89·1	+ 3·1	79·7	73	5·3	26	−120	*4	...	...
Bombay	1006·5	− 1·2	94	79	92·9	81·6	87·3	+ 1·6	78·1	68	4·0	0	− 18	*0	...	...
Madras	1005·0	− 0·4	107	78	98·0	82·0	90·0	+ 0·1	78·3	57	4·5	0	− 27	*0	...	...
Colombo, Ceylon	1007·7	− 0·5	91	73	87·6	76·9	82·3	− 0·5	79·4	77	8·8	552	+241	29	5·6	45
Hong Kong	1008·3	− 1·1	88	73	84·4	76·7	80·5	+ 3·1	75·4	82	7·8	429	+132	13	6·0	46
Sandakan	...	...	90	74	87·9	75·8	81·9	− 0·7	77·3	81	...	425	+273	17	...	...
Sydney	1021·1	+ 2·5	80	43	67·7	51·2	59·5	+ 0·9	54·0	68	4·4	73	− 59	10	6·0	58
Melbourne	1021·0	+ 1·5	69	36	60·4	45·7	53·1	− 1·0	49·8	72	6·2	21	− 34	12	4·0	39
Adelaide	1021·0	+ 0·9	81	41	66·3	49·3	57·8	0·0	50·9	61	4·8	62	− 7	14	5·3	52
Perth, W. Australia	1016·9	− 1·9	85	43	70·1	53·0	61·5	+ 1·1	55·5	67	5·9	126	+ 7	17	5·3	51
Coolgardie	1017·9	− 1·9	87	37	71·2	47·9	59·5	+ 1·9	52·5	47	3·4	14	− 21	7	...	...
Brisbane	1020·6	+ 1·8	81	43	73·7	54·5	64·1	− 0·3	60·0	67	4·2	33	− 42	7	6·9	65
Hobart, Tasmania	1016·8	+ 1·2	69	36	57·9	43·9	50·9	+ 0·5	46·8	74	5·8	20	− 27	12	5·1	53
Wellington, N.Z.	1015·8	+ 0·6	66	36	59·0	47·3	53·1	+ 0·3	49·5	77	6·5	93	− 27	15	3·6	37
Suva, Fiji	1015·7	+ 2·9	88	70	80·9	72·6	76·7	+ 0·2	74·0	84	7·8	451	+193	25	...	...
Kingston, Jamaica	1013·0	− 0·1	93	70	89·8	73·2	81·5	+ 1·8	74·9	64	6·0	0	−110	0	...	...
Grenada, W.I.	1013·8	+ 1·2	89	72	85·8	74·7	80·3	+ 0·8	75·3	75	3·7	136	+ 18	20	...	...
Toronto	1009·5	− 5·3	69	30	58·6	41·5	50·1	− 2·6	44·5	71	6·0	112	+ 36	16	6·5	44
Winnipeg	1015·3	+ 1·0	74	22	56·9	32·7	44·8	− 6·8	45·3	76	4·9	10	− 47	5	7·8	51
St. John, N.B.	1010·5	− 3·5	65	32	55·6	39·9	47·7	0·0	43·8	74	7·0	107	+ 13	10	6·2	42
Victoria, B.C.	1018·8	+ 2·4	83	37	62·4	46·9	54·7	+ 1·6	48·5	72	4·4	2	− 31	2	10·1	66

* For Indian stations a rain day is a day on which 0·1 in. (2·5 mm.) or more rain has fallen.