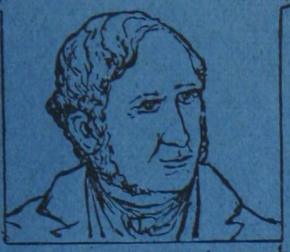

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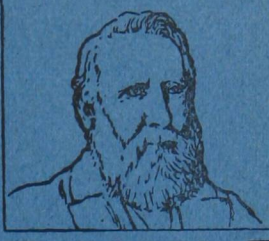

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No. 677
JUNE 1922
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JUNE 1922.

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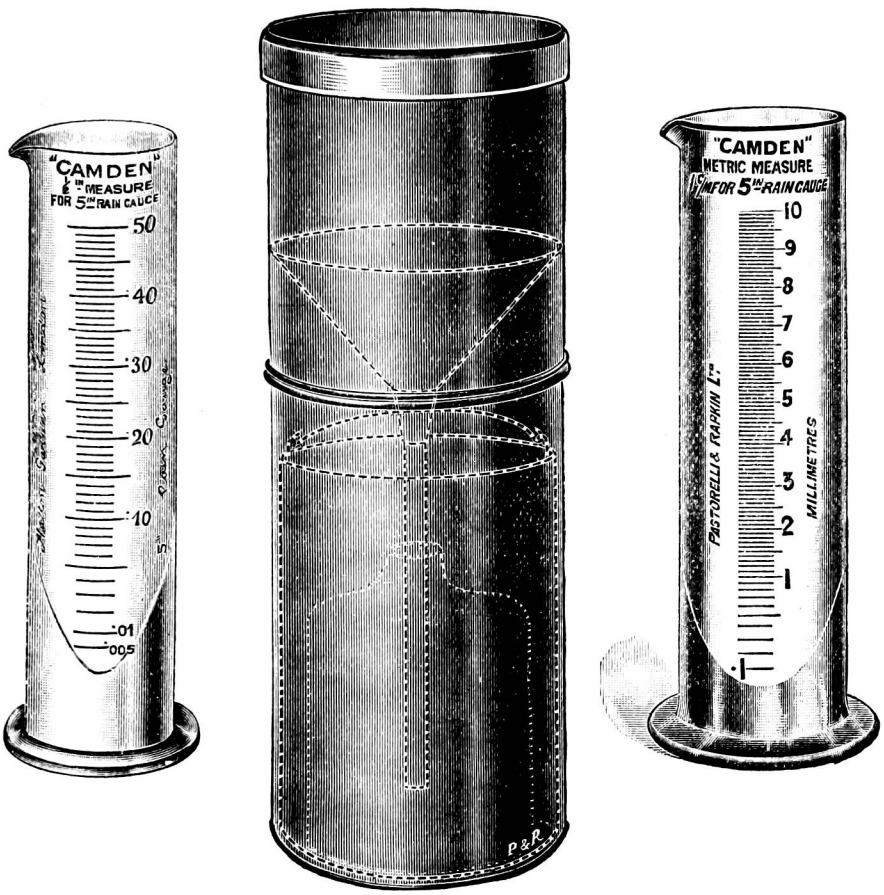

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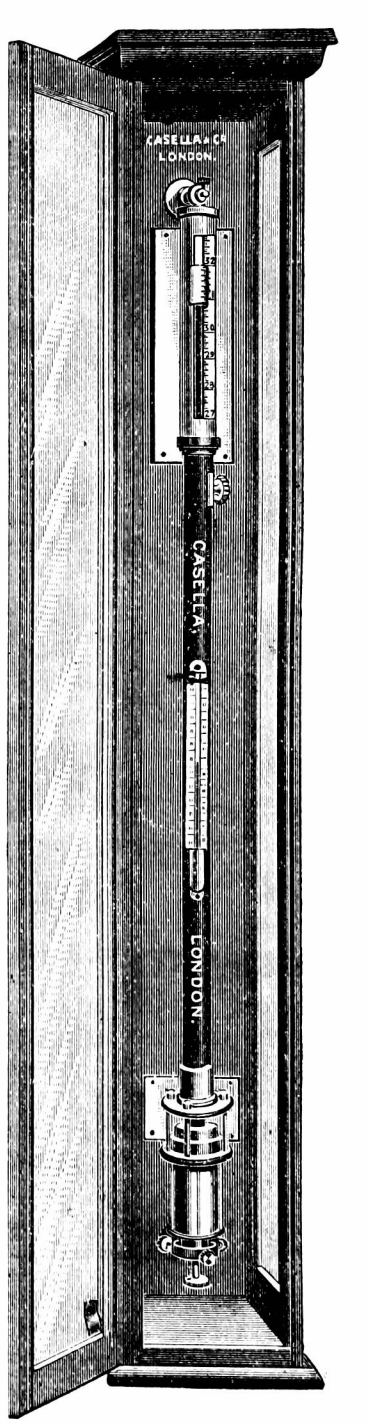

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The International Meteorological Committee.

THE Proceedings of the International Meteorological Committee which met in London last October are being published in a Report which is to be issued shortly. The Report is of necessity somewhat involved, as frequent reference has to be made to the deliberations of the Commissions on which the resolutions of the Committee were largely dependent and which are set out in the form of appendices.

The International Meteorological Committee is appointed from time to time at Conferences of the Directors of the Meteorological and Magnetic Institutes and Observatories of the World for the intervals between conferences which are irregularly periodic. The period used to be about ten years; it is now normally six years. The Committee consists of sixteen members;* ultimately there will be twenty, who must be directors of national meteorological institutes, selected by a vote of the general assembly for their services to meteorology and geophysics. It has no separate funds, but has all the executive power and influence of the individuals of whom it is composed.

* For the photograph in which the majority of the members of the Committee appear (reproduced as a frontispiece to this volume), taken in the Director's Room at South Kensington, we are indebted to Lady Shaw. The names, reading from left to right, are:—back row: Commandant J. Jaumotte, Belgium; Dr. Th. Hesselberg, Norway; Dr. L. Gorczynski, Poland; Mr. L. F. Richardson, Great Britain; Dr. G. Melander, Finland; Colonel L. Matteuzzi, Italy; Miss E. E. Austin, Great Britain. Front row: Dr. T. Okada, Japan; Dr. G. C. Simpson, Great Britain; Captain C. Ryder, Denmark; Professor V. Bjerknes, Norway; Sir Napier Shaw, Great Britain; Professor Dr. Maurer, Switzerland; Professor E. van Everdingen, Holland; Colonel F. A. Chaves, Azores.

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The Committee advises all the administrative authorities that have representation on the International Conferences and informs all the other meteorological organizations of the world. To the congresses and conferences of the past, within which the Committee originated, we owe the establishment of such uniformity as exists between various countries, in the manner of making observations, in the formulæ by which they are reduced, in the hours at which they are taken, and in the telegraphic codes whereby they are transmitted to neighbouring countries. The Conferences and the Committee have also in former years done much to organise co-operative researches by appointing commissions to discuss questions connected with Terrestrial Magnetism and Atmospheric Electricity, with Scientific Aeronautics, with Solar Phenomena and Radiation, with Maritime Meteorology and Storm Warnings, with Meteorology and Agriculture, also with the Réseau Mondial.

The efficacy of this organization depends on the fact that all the members of its central body, the Committee, are the directors of the meteorological establishments of their separate countries, and experience has shown that what the Committee recommends becomes the established practice. The function of the Committee is, in fact, to find out and set out in print the administrative points upon which the responsible meteorological authorities of different countries are agreed. The agreement so determined gradually covers all the activities of the meteorological services.

The organization of the Committee was of necessity interrupted by the war, but it had in part been resumed by a meeting of the members of the old Committee in London in July, 1919, and by a Conference of Meteorologists of Allied and Neutral Nations in Paris in the autumn of that year, at which the Committee and Commissions were re-appointed.

A meeting of the Commission for Weather Telegraphy was held in October, 1920, and the importance of the recommendations put forward made it desirable for an ordinary meeting of the Committee to be held at an early date. This was the more urgent on account of the retirement of Sir Napier Shaw from the directorship of the Meteorological Office, London, and the consequent resignation from his membership of the Committee. The Bureau arranged, therefore, to call a meeting of the Committee in London during the week September 12-17th, 1921, and arrangements were also made for meetings of the Commissions on Weather Telegraphy, Maritime Meteorology, the Application of Meteorology to Aerial Navigation, Polar Meteorology and the Réseau Mondial to be held during the previous week. Meetings of the Commission for the Investigation of Upper Air and of the Polar Commission had been held in Bergen in July.

The meeting sof the Committee were attended by the following

members:—Sir Napier Shaw (President), Great Britain; M. A. Angot (Vice-President), France; Professor E. van Everdingen (Secretary), Holland; Colonel F. A. Chaves, Portugal, Azores; Director Th. Hesselberg, Norway; Commandant Jaumotte, Belgium; Dr. J. Maurer, Switzerland; Captain C. Ryder, Denmark; by the following Presidents of Commissions: Professor V. Bjerknes, Commission for the Upper Air; Colonel E. Gold, Commission for Weather Telegraphy; and Colonel J. Th. Saconney, Commission for Aerial Navigation; and by the following distinguished meteorologists: Colonel E. Delcambre, Dr. L. Gorczynski, Colonel Matteuzzi, Dr. G. Melander, Professor T. Okada, Dr. G. C. Simpson, Dr. A. Wallèn, Dr. S. Fujiwhara, and Mr. L. F. Richardson.

At the first meeting of the Committee two new members were elected, Dr. T. Okada, Director-designate of the Meteorological Service of Japan, in place of Professor Nakamura, resigned, and Dr. A. Wallèn, Director of the Meteorological and Hydrographical Service of Sweden. At the close of the meeting Dr. G. C. Simpson (Great Britain) and Colonel Delcambre (France) were elected in place of Sir Napier Shaw and M. Angot, who resigned their membership as being no longer directors of meteorological services.

The Committee was mainly concerned in the consideration of the reports presented by the Presidents of the various Commissions; among the more important matters submitted the following may be mentioned:—

(1) By the Commission for Weather Telegraphy: a revised international code for the transmission of reports from land-stations, and a new code for ships, drawn up in conjunction with the Commissions for Maritime Meteorology and Aerial Navigation.

(2) By the Commission for the Upper Air: scheme for the publication of international data for the upper air.

(3) By the Commission for Maritime Meteorology: the collection of oceanographical data.

The Committee approved a resolution of the Commission for the Réseau Mondial thanking the Director of the Meteorological Office for the publication of the Réseau Mondial and expressing the hope that the publication might be continued.

Among the subjects raised by individual members of the Committee it is of interest to note the proposal by Professor Nakamura for the early publication of details of the weather month by month, and the suggestion that such data would be of economic as well as of scientific importance; and a proposal by Colonel Matteuzzi for the publication of upper-air winds with a view to the construction of charts of lines of flow for various levels over Europe.

A suggestion by Colonel Delcambre for the more detailed study of clouds led to the appointment of a new Commission for the study of clouds and their stratification, of which Sir Napier Shaw was elected President.

The Committee emphasised the importance of promoting the study of the application of meteorology to agriculture by appointing as members of the Commission for that study experts in the agricultural world; the names of nine new members were added, two of whom, Messrs. R. H. Hooker and R. A. Fisher, represent the United Kingdom.

Before the close of the meeting the Committee proceeded to the election of the new Bureau. Sir Napier Shaw, though no longer qualified for ordinary membership of the Committee, which is confined to directors of meteorological services, was found eligible for the position of President, and was re-elected by the unanimous wish of the members. Professor E. van Everdingen was elected Vice-President in place of M. A. Angot, and Director Th. Hesselberg, Secretary.

During the meeting Colonel Chaves announced that the Portuguese Government had expressed their appreciation of the work of the International Meteorological Committee by conferring upon Sir Napier Shaw (President), M. Angot (Vice-President), and Professor E. van Everdingen (Secretary) the Order of S. Tiago da Espada.

At the invitation of Professor E. van Everdingen, arrangements were made for a Conference of Directors, to be held at Utrecht in either the spring or autumn of 1923.

The Meeting at Rome of the International Union for Geodesy and Geophysics.

BY invitation of the Italian authorities the scientific activities of the Unions for Astronomy and for Geodesy and Ge physics were inaugurated at meetings held in Rome between May 2nd and May 10th of this year.

The Unions are under the ægis of the International Research Council, a new international organization mooted at Paris by representatives of the Academies of Science of the allied countries, and duly constituted at an assembly at Brussels in 1919.

Under the constitution, research in any subject which involves international co-operation may become in each country the care of a National Committee which formulates questions for consideration at an international meeting of the Union, and nominates delegates to attend the meeting and discuss the questions which they and their colleagues of other countries have propounded. The National Committee in each country is organized by its Academy of Science. We have, as yet, no Academy of Science in this country. The Royal Society discharges the international function.

Under the scheme of the Research Council a Union is a self-governing international organization subject to certain statutes which are the care of the Council, and it enjoys the administration of certain revenues derived from the fixed annual subscription of the States which " adhere " to the Union.

A Union has various sections, that of Geodesy and Geophysics comprises Geodesy, Land-Hydrology, Meteorology, Physical Oceanography (with a subsection for Tides), Seismology, Terrestrial Magnetism, Vulcanology. The business of each section is managed by a Bureau consisting of a President, one or more Vice-Presidents and a Secretary, amplified to an Executive Committee by the appointment of additional delegates as members.

At Rome the mode of procedure was to hold a plenary sitting of the Union on the first day to open the proceedings and to discharge or provide for any business which concerned the sections in common, and another on the last day to approve the distribution of the funds, and to wind up the proceedings of the assembly for that term.

A day in April was originally agreed upon for the meeting in Rome, but obsession by a Railway Conference caused its postponement until May, and as in Italy May 1st is a *dies non*, May 2nd, the earliest available date, was duly celebrated by a general assembly in the Gallery of the Conservators of the Capitol, at which H.M. the King of Italy and H.R.H. the Crown Prince were present with the two or three hundred delegates of the National Committees of the two Unions, to listen to five speeches of inauguration. The place on the left of the King was occupied by Cardinal Maffi, noted for his interest in physical science. The next day the two Unions met, each separately, in general assembly in the two great halls of the apartments of the Accademia dei Lincei in the Palazzo Corsini, a magnificent building just outside the walls, over the Tiber from the busy part of Rome.

The general assembly concluded, the respective sections met morning and afternoon for five or six days, Sunday being omitted. On Wednesday, the 10th, the Unions met again in general assembly to wind up their business, and agreed upon time and place for the next meeting. The Astronomical Union is to meet in Cambridge in 1925; the Union for Geodesy and Geophysics in Madrid in 1924.

The section for Meteorology met to discuss a paper of agenda comprising some formal preliminary business and eleven questions submitted by the National Committees as questions upon which international co-operation was required. The French National Committee proposed :—

(1) the different sorts of thunderstorms and electrical phenomena of the atmosphere,

(2) transparency and optical phenomena,
(3) the different sorts of clouds, and
(4) forecasting, particularly the method of barometric tendencies.

The British Committee:

(5) provision for observations of the Upper Air in places of special meteorological interest where there is no organized meteorological service,
(6) trajectories of air in three dimensions,
(7) the special exploration of the winds of the stratosphere,
(8) radiation in relation to " time-scale " in meteorological phenomena,
(9) the use of observations of atmospheric pollution in relation to visibility,
(10) the composition of the atmosphere in the highest levels.

The Italian Committee added a proposal—

(11) on the necessity for presenting the summaries of meteorological phenomena in other statistical forms than the arithmetic mean.

Other questions were added by permission of the section: one led to a resolution in favour of the continuance of the observations of solar radiation at the Observatory at Naples, which have been made for some time past and are in some danger. Another resolution encouraged the continuance of the Smithsonian observations of solar radiation for a further period.

Of the officers of the section, only the President, Sir Napier Shaw, was present; Professor di Marchi of Padua temporarily filled the place of Monsieur Angot, Vice-President, and Dr. Kimball that of Professor Marvin, Secretary; Professors Eredia of the Ufficio Centrale and Platania of Naples also gave their assistance as secretaries.

When the report of the Finance Commission was approved by the general assembly, the section found itself in control of about 20,000 francs of accumulated funds and 20,000 francs for each of the next three years.

The proceedings differed from those of the customary international meetings in having to provide for the judicious spending of a certain amount of money. The meeting authorised the spending of a sum on " jet-instruments " for obtaining deposits of atmospheric dust. These instruments are for presentation to the countries who adhere to the Union and are willing to make observations and forward them to the Bureau. It also authorized the spending of certain sums for the supply of instruments and material for balloon-sondes to competent persons in special localities, and the Bureau was instructed to make an appeal to Yacht Clubs and Aero Clubs for aid as regards personnel. It

also authorised the provision of theodolites and material for the exploration of the stratosphere by pilot-balloons in the anticyclonic belt and other regions of clear atmosphere, and instructed the Bureau to appeal to the Directors of Astronomical Observatories erected in specially favourable situations.

The Bureau was further charged with other duties :—

(1) to report on the present position of our knowledge of radiation and its relation to the distribution of temperature in the atmosphere,

(2) to report on the requirements for dealing with the open question of the composition of the atmosphere at great heights,

(3) to invite the co-operation of *savants* of the various countries on the question of the details of convexion in the atmosphere, and

(4) to obtain from the meteorological services of the countries adhering to the Union a reasoned statement of the method of forecasting the weather in the respective countries.

The question of the statistical form for meteorological data was ordered to be referred to the International Meteorological Committee; and on the question of cloud forms persons interested were invited to communicate with the Commission on Clouds recently appointed by that body.

The Bureau has also to make enquiry of the International Meteorological Organization represented by the International Meteorological Committee as to the question of overlapping and of common action. The Bureau appointed to carry out these duties consists of Sir Napier Shaw, President; Colonel Delcambre and Professor Marvin, Vice-Presidents; Professor Eredia, Secretary. Professor Gamba, Dr. G. C. Simpson, and Director Wallèn were added to form an Executive Committee.

While the Meteorological Section was thus employed, the Sections for Geodesy, Physical Oceanography, Seismology, Terrestrial Magnetism and Vulcanology were equally occupied. The Section of Land-Hydrology was not constituted until the close of the meeting.

In Meteorology the line taken was to deal with administrative action in those questions which did not fall within the province of existing institutions or endowments. In Terrestrial Magnetism the paper of Agenda seemed to contemplate a review of the whole of the activity in the subject. In that Section Dr. Chree was president and Dr Bauer, secretary. The discussions were reported to occupy all the available time and to cover a wide range.

The proceedings of the meetings were enlivened by an evening party at the Campidolio given by the Municipality of Rome,

an afternoon party at the Palatine Hill given by the Minister of Public Instruction, and excursions on Sunday to some of the many places of interest in the neighbourhood of Rome.

After the meeting some of the delegates proceeded on an excursion organized for the Physical Oceanographical Section to Sicily and Etna, others accepted invitations of the municipality of Florence to visit that beautiful city. There remained for some also the duty of assisting at the 700th Anniversary of the Foundation of the University of Padua.

The general organization of the sections was in charge of the President of the Union, Professor C. H. Lallemand, and the Secretary, Colonel H. G. Lyons, and the duty of local organization, which was admirably carried out, fell upon a Committee of which Professor Magrini of Venice was chief.

OFFICIAL NOTICES.

Reorganization of the Civil Aviation Department.

THE Under-Secretary of State has become the Member of Council responsible to the Secretary of State for Civil Aviation business. The Under-Secretary of State will act as Chairman of the Meteorological Committee, and for administrative purposes the Director of the Meteorological Office will be responsible to the Secretary of the Air Ministry. The Controllerate of Communications has already been placed under the Chief of the Air Staff. Major-General Sir W. S. Brancker, K.C.B., A.F.C., has been appointed Director of Civil Aviation as from May 9th, 1922.

The Royal Meteorological Society.

A MEETING of the Society was held on May 17th; Dr. C. Chree, F.R.S., President, in the chair.

Dr. A. E. M. Geddes.—Weather and the Crop Yield in the north-east counties of Scotland.—The paper was on the lines of Mr. R. H. Hooker's Presidential Address to the Society on January 18th (see *Meteorological Magazine*, 1922, p. 5), and dealt with the principal crops of the three counties, Aberdeen, Banff and Kincardine. A preliminary investigation covered the whole of eastern Scotland from Nairn to Fife, but there was not sufficient

uniformity in all the conditions over this area to permit of useful deductions being drawn. Consequently the final investigation, which covered the years 1885 to 1919, was confined to three counties. The results indicate that in these north-east counties, cereals prefer a comparatively warm summer with rainfall somewhat in excess. Root crops show less connection with the weather than do cereals, but on the whole prefer a season with rainfall below the normal. The yield of hay was found to be influenced almost as much by the weather of the year previous to that of harvest as by the actual year of harvest. A comparison of these results with those obtained by Hooker for eastern England shows that the most important sections of the year, so far as the weather is concerned, vary from district to district, so that in any investigation of this nature care must be taken not to make the district too wide.

After the reading of the paper an important general discussion took place on Dr. Geddes' paper and on Mr. R. H. Hooker's Presidential Address, during which emphasis was laid on the value of the work and on the necessity for extending to it other districts. The President (Dr. C. Chree) pointed out that the stage which a crop had reached must have a great influence in determining whether rainfall or heat was beneficial at the time. Sir A. D. Hall (Agricultural Advisor to the Ministry of Agriculture) discussed the results from the agriculturalists' point of view, and called for co-operation between the meteorologist and plant physiologist. The effect of winter rains on wheat was, he thought, two-fold. Heavy rain washed the nitrates out of the soil, while a dry winter enabled the crop to establish a good root system. He thought it was unfortunate that we had not yet succeeded in making a good definition of growing weather, but had to consider rainfall and temperature separately.

Sir Thomas Middleton thought that Mr. Hooker had laid too much stress on the importance of the weather of the preceding year on the seed for the following year, and too little stress on the effect of weather in cleaning the ground. A dry autumn is unfavourable to weeds and so benefits the crop of the succeeding year. The unfortunate crop of 1916 was due, not to bad seed, but to war conditions causing bad farming. Dr. Geddes had found that north-east Scotland was too cold for oats and barley, while Mr. Hooker had found that eastern England was too hot; the optimum must therefore lie somewhere between. To elucidate this further, " dot diagrams " were necessary.

Mr. G. Udny Yule suggested that in place of dot diagrams solid models should be constructed showing the effect of rainfall and temperature on the crop in the same model. He thought that in the curves of correlation coefficients for barley and oats

the close resemblance of form strongly supported the values found, though from the probable errors the results were barely significant. Mr. Yule also pointed out that what had been correlated with the weather was not in fact the yield, but the estimated yield, which might explain some of the differences. Mr. R. A. Fisher criticised Dr. Geddes' choice of periods, pointing out that they varied in length and did not overlap, so that it was impossible to regard his results as continuous functions, while the difference in length affected the value of the correlation coefficients.

Sir Napier Shaw looked for a further extension of Mr. Hooker's work to districts in the south and west. We had already obtained two important results: one was the conclusion that the optimum for barley lay somewhere between north-east Scotland and eastern England, by an extension of the process we could draw across the country a line of optimum conditions for barley; the other point was that the rainfall of the spring and summer had no influence on the root crop in Scotland, this could only mean that the average rainfall there was already the optimum. Sir Napier Shaw also referred to the necessity of selecting overlapping periods of uniform length in order to make the correlation coefficients into continuous functions. Mr. Hooker had already justified eight weeks. He wondered if it was necessary to go behind the direct simple correlations and calculate partials, since to the logical extension of that process there was no end. What we wanted was a bird's-eye view over a large extent of country as rapidly as possible. Major A. H. R. Goldie and Mr. J. E. Clark also spoke.

Mr. R. H. Hooker, replying to the various speakers, showed how the positive and negative correlation coefficients obtained fitted into their places in the curves representing the relation of crops to weather. If the average conditions fall on the left of the curve, the correlation will be positive; if on the right, the correlation will be negative. A zero correlation has two obvious explanations, either the weather at that particular point has no effect on the crop or we are at the optimum. The meteorologist supplied the figures; it was for the plant physiologist to interpret them.

Dr. H. P. Waran.—A new Form of Direct Reading Barometer.—In this paper Dr. Waran describes a barometer in which the height of the upper surface of the mercury is determined by observation of the reflection of a fixed vertical scale. The reflection is seen in a telescope and the cross-wire in the focal plane of the object glass gives the reading on the scale. No "setting" of the barometer is necessary. The invention is at present only in the experimental stage.

Correspondence.

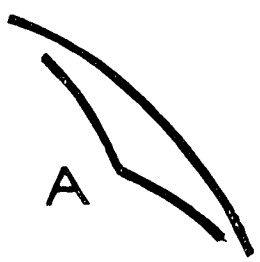
Optical Phenomena.

THE following observations ought perhaps to be put on record :—

1. On January 29th, 1922, off the north-west coast of Spain, a halo was observed. The radius was distinctly less than 22°. A rough measurement taken with a rule held at a known distance from the eye gave a radius of 16°, but the measurement was rough and may easily have been a degree or two out. Halos have been recorded at 14°, 16°, 17°, 17° 55′ and 19° 25′, and in the absence of exact measurement it is impossible to say which of these was the one observed on this occasion.

2. April 25th, 1922, at Stoner Hill, Petersfield, at 8h. G.M.T. and for about an hour afterwards, patches of cirrus coming from a northerly point showed optical phenomena. The halo of 22° was visible at times, and the two parhelia. The upper arc of contact of the 46° halo, or as it should perhaps be called the circumzenithal arc, was extremely brilliant. But the most remarkable phenomenon was a faint white paranthelion 99° east of the sun, the angle being measured with a sextant; this was seen twice in about a quarter of an hour, when patches of cirrus had drifted into the right position.*

3. On February 9th, 1922, about 90 miles north of Madeira, a little before sunset, a portion of a rainbow was observed on a slight shower from a rather degraded cumulus cloud; there was one supernumerary bow which was not symmetrical, but widened out as shown diagrammatically in the figure. The rain was evidently evaporating as it fell, and from the appearance only part of it could have reached the sea. Since the distance of the supernumerary bow from the primary is greater the smaller the drops, the latter must have been smallest at the point A. This is rather difficult to account for if the drops were evaporating as they fell; the only explanation that appears to be possible is that the drops in the shower were mainly of two different sizes, and that those of the smaller size were completely evaporated soon after passing the point A; at this point, on this theory, the proportion of small to large drops would have been a maximum.



C. J. P. CAVE.

Stoner Hill, Petersfield, May 31st, 1922.

* It follows from Capt. Cave's data that the difference in azimuth between sun and paranthelion was the normal 120°.

Ice Pinnacles.

I WAS much interested to read the account of "ice pinnacles" in the *Meteorological Magazine* for April, for precisely the same phenomenon was observed here on the same day (February 5th last). It was also seen once before, on March 7th, 1917. On both occasions the pinnacles were confined to a relatively small area of the carriage drive on the north-east side of the house, where they were very numerous. Only two or three were seen elsewhere on the drive. Invariably each pinnacle was based on a small stone of the gravel, and the shape of the pinnacle (triangular, rectangular, etc.) was determined by the shape of the stone base. They were striated and apparently solid, for they could be picked up adhering to their stone bases, and when taken indoors they wasted away gradually.

The weather conditions were very similar on both occasions, but I particularly noticed that on February 5th there was very little wind, whereas on March 7th, 1917, a strong, bitterly cold east wind was blowing.

I should add that the gravel on which the pinnacles were observed was brought from Bournemouth, and is the only sample of its kind here, which might account for the very limited occurrence of the phenomenon, but, of course, neither the Bournemouth gravel nor the local soil here is at all chalky.

IVAN D. MARGARY.

Chartham Park, East Grinstead, Sussex, April 27th, 1922.

Solar Halo observed at Eskdalemuir, March 15th, 1922.

L'arc énigmatique observé le 15 mars dernier par Mr. Jarrold à Eskdalemuir était probablement un halo "secondaire." La lumière très vive émanant des cristaux qui donnaient le point le plus bas du halo de 22° a pû, en se réfractant de nouveau dans des prismes de 60°, produire un halo secondaire de 22°, ayant pour centre le bas du halo ordinaire de 22°.

Le même halo secondaire a été vu par Pernter en 1888 sur le Sonnblick (*cf.* "Meteorologische Optik," p. 379).

LOUIS BESSON.

Service Météorologique de la Ville de Paris, Paris, le 26 mai, 1922.

[M. Besson's communication adds to the interest of Mr. Jarrold's observation. Reference to Pernter's account shows that the secondary halo observed on the Sonnblick was well-developed and was accompanied by secondary parhelia. The centre was a brilliant patch of light 9° below the horizon, and Pernter mentions that this patch was probably the lower arc of contact of the 22° halo, which in such a case has a sharp bend and may give the effect of a mock sun. In the Eskdalemuir observation the circumstances were not so favourable.—ED. M.M.]

The Thunderstorms of May.

ON May 21st a thunderstorm came up from the south-west and began at 5 p.m. The fall was at first heavy rain, but it soon turned to hail. The stones were of two sorts: (*a*) more or less spherical, from the size of peas to sparrow's eggs up to ¾in. in their longest diameter; and (*b*) irregular ovals of ice about ½ in. thick and up to 1¼ in. long with irregular finger-like projections. The storm was soon over, but after an interval of bright sunshine it came back from the north-east at 5.40 p.m., and this time the fall was chiefly of large hail-stones only, of both types.

Twenty of the larger stones collected after the second fall yielded 52 c.c. of water, an average weight of 2·6 grm., corresponding to ice spheres of ·74 in. in diameter.

The "Halliwell" gauge showed that ·25 in. fell in the first storm at the rate of 3·30 in. per hour, but shortly after the fall ceased and while the grass was still thick with stones, there were no unmelted stones in the funnel, suggesting that the larger stones jumped out, which seems quite likely, as they bounded up about a foot off the grass. It is therefore doubtful whether the rain gauges caught the full fall. The 8-in. ordinary gauge recorded ·35 in. for the two storms and the "Halliwell" ·38 in.

No damage of any consequence was done by the hail.

HENRY MELLISH.

Hodsock Priory, Worksop, May 26th, 1922.

A SEVERE thunderstorm, accompanied by rain and hail, approached to-day from the west and south-west, travelling in an easterly direction, and at 6 p.m. reached its maximum. At 6.30 p.m. a second heavy storm arrived from the north, east, and west, and was at its maximum at 7.45 p.m. with very heavy rain and hail, accompanied by continuous thunder and lightning for two hours. The fall of rain for these two storms was 1·93 in.

G. E. CLAYTON.

Buckden, Skipton-in-Craven, May 22nd, 1922.

A THUNDERSTORM passed over this house yesterday at about 7.30 a.m., and from the hail which fell for not more than 10 minutes I registered ·87 in. in my rain gauge.

AMBROSE BOYSON.

Synyards, Otham, Maidstone, May 26th, 1922.

DURING a sharp thunderstorm in the early morning of May 25th, three houses and a tree in different parts of Tunbridge Wells were struck by lightning within ten minutes and ·43 inch of rain fell between 6.10 and 6.15 a.m. (G.M.T.). This storm, however, was but a preliminary to what was to follow in the afternoon. At about 3 p.m., dark, copper-coloured clouds worked up from northward and from 3.2 to 3.17 p.m. thunder and lightning were continuous with rain and hail in torrents, the hail lying on the ground to a depth of a foot in places and being still in evidence the next morning. The rain measured immediately the storm ceased was 1·08 in., but practically all the hailstones, which varied from three-quarters of an inch to 2 inches in diameter, jumped out of the gauge, the actual fall being estimated at 1·37 in. during the 15 minutes. Considerable damage was done, holes being made through galvanised iron roofing. Where windows faced north or north-east scarcely a whole pane of glass was left and greenhouse roofs were completely demolished, the noise being like continuous machine-gun fire. The stones resembled in shape a small tangerine orange, and appeared to have a nucleus of water surrounded by coatings of clear and opaque ice.

Many freaks of the storms are reported. A house in Hawkenbury Road was considerably damaged by lightning during the morning. Fortunately no one was injured, but a lady in an adjoining house had her hands burnt. A girl, caught in the open in the afternoon storm was apparently struck, her arms being scorched by the lightning. She was further injured by the hail. Serious flooding occurred in the low-lying parts of the town, where the water level rose to the ceilings in some basement houses.

D. H. HORNER.

Sydenhurst, 47, Forest Road, Tunbridge Wells, June 1st, 1922.

THE following details of the hailstorm of May 25th may be of interest. Barometer was steady at 30·15 in., and the shade temperature was 81° F. The storm began at 5.50 p.m. (G.M.T.) with heavy rain and several flashes of lightning, the telephone wires near the church being struck. At 6.5 p.m. hail commenced, suddenly increasing in size but diminishing in the number of stones to about one per square yard. The size of the stones was about that of a golf ball. The storm ceased abruptly by 6.20 p.m., the precipitation having been ·18 in.

The storm clouds travelled over Mildenhall from south to north-north-east. By 6.45 p.m. there was bright sunshine, the temperature being 79° F. and the barometer 30·18 in., rising.

H. R. W. FORSTER.

Mildenhall, Suffolk, May 26th, 1922.

VIEW IN MONTPELIER AFTER THE HAILSTORM OF MAY 13TH, 1922.

An Exceptional Hail Shower.

ON May 13th, 1922, between 15 h. 30 m. and 16 h. the town of Montpellier and its surroundings experienced a severe thunderstorm, with a quite remarkable hail shower. The hail stones were about 10 or 15 millimetres in diameter with a weight of 3 to 5 grammes. On open ground after the storm the depth of the layer was about 10 centimetres. In many streets rain overflowed and hail stones were caked together in lumps, being in places some 50 or 60 centimetres deep.

The traffic was blocked, and clearing by military fatigue parties was necessary as after a blizzard.

Happily, this exceptional shower was restricted to a limited area of half a kilometre wide and 5 or 6 kilometres long. The damage was, of course, considerable, but without any personal casualty.

MARCEL MOYE.

University of Montpellier, France, May, 1922.

"Sea Breezes" on the Lincolnshire Coast.

VERY interesting examples of the afternoon "sea breeze" have been experienced at Skegness. On May 21st my shade thermometer rose steadily from 59° F. at 8 a.m. (G.M.T.) to 76° F. at 2 p.m., with a light wind varying slightly but about south. Shortly after 2 p.m. gusts of cool air came from east and north-east, the temperature falling to 71° F. at 2.30 p.m. and to 67° F. at 3 p.m., a drop of 9° in one hour, with clear sunshine. Later the wind veered to south-east and south, with a slight rise in temperature after 7 p.m.

On May 22nd, a similar event occurred. After a cloudless warm morning, with the thermometer rising from 67° at 8 a.m. to 79° at 1 p.m., cool air came in off the sea, the temperature falling to 72° at 2 p.m. and 69° at 3 p.m.

The formation of cumulus cloud to landward each afternoon seemed to indicate an upward current. On the second day these clouds rapidly developed into cumulo-nimbus, and a thunderstorm broke at 3.45 p.m.

May 23rd was even more noteworthy. A sea breeze prevailed till 1 p.m., when the thermometer showed 69°. The wind then veered to about south-west, and at 1.30 p.m. it reached 80°. At 3.30 it stood at 82°, a very high reading for this coast in May, I should imagine, when a sudden breeze from the sea lowered the thermometer to 69° at 4 p.m., a drop of 13° in half an hour.

To-day, with a continuous wind from about north, I have noticed nothing above 65°. The temperature at 3 p.m. was 21° lower than that of the same time yesterday.

ARNOLD B. TINN.

9, *St. Andrews Drive, Skegness, May 24th,* 1922.

Simple Weather Forecasting.

MAY I point out that Mr. Robertson and I—writing to the *Kent and Sussex Courier* on May 5th, 1921, the forecast being published on May 13th—stated that " a very warm early summer, with considerable drought and water shortage, may be expected, the fine weather being broken only by severe local thunderstorms." A similar forecast appeared in the *English Mechanic and World of Science* for May 27th. If it was not " forecasting the drought " which subsequently eventuated, I do not know what it was! It certainly did prove of great benefit to those agriculturists who believed in the forecasts and therefore laid their plans accordingly, but the majority of the farming community are too conservative to avail themselves of new ideas.

D. W. HORNER, F.R.A.S., F.R.Met.Soc.

Tunbridge Wells, April 4th, 1922.

IN your note on *Simple Weather Forecasting* (April, 1922) you show the unreliability of general predictions, which to my mind is often caused by the vagueness of the language used. The word " Spring " is a case in point, as " Spring " arrives at such different dates according as the observer lives in a cold or hot country; our Celtic Spring begins on February 2nd (Candlemas Day).

We have another common saying here:

> " The wind blowing at Midnight of the Eve of March 21st will be the prevailing wind for the next three months,"

and old men go out on that eve to know what to expect.

THEREZA STORY MASKELYNE.

Basset Down, Swindon, Wilts. April 21st, 1922.

[In Hampshire the saying is:

> " Where the wind is on the 21st of March, there she'll bide for the next three months,"

and they also say in Hampshire that the wind blowing on Palm Sunday will be the prevailing wind for the greater part of the Summer. Both these sayings are quoted in *A Medley of Weather Lore* by M. E. S. Wright, the first one being ascribed to Surrey as well as to Hants. It is curious that March 21st itself should be mentioned in one locality, while in another it is the eve of that day that is significant.

Mr. Inwards in his *Weather Lore* quotes Dr. Kirwan:

> " When there has been no particular storm about the time of the Spring equinox, if a storm arise from the east on or before that day or if a storm from any point of the compass arise near a week after the equinox then, in either of these cases, the succeeding summer is generally *dry*, four times in five; but if a storm arise from the south-west, or west-south-west, on or just before the Spring equinox, then the Summer following is generally *wet*, five times in six."

—ED. M.M.]

NOTES AND QUERIES.

Sunspots and Summer Rainfall.

MR. A. B. MACDOWALL has called attention to a parallelism between the rainfall at Rothesay during July and August and the sunspot numbers. In the accompanying diagram,* the upper curve shows the rainfall for these two months smoothed by averaging over periods of five successive years; the mean being entered to the middle year of the series. The lowest curve shows the mean annual relative sunspot numbers. The agreement is very good between 1820 and 1870, during the period of strongly accentuated sunspot maxima, but tends to break down before and after those dates. The second curve which is referred to the same zero as the first shows the corresponding July and August rainfall for Greenwich, completed for early years by the readings at the Royal Society, given by Luke Howard in his *Climate of London*. This Greenwich curve by itself shows no particular relation to the sunspot curve, but when the differences between I. and II. are taken, as in curve III., the agreement is even more marked than in the case of the Rothesay figures alone. It is to be noted that the scale of curve III. is double that of the first two.

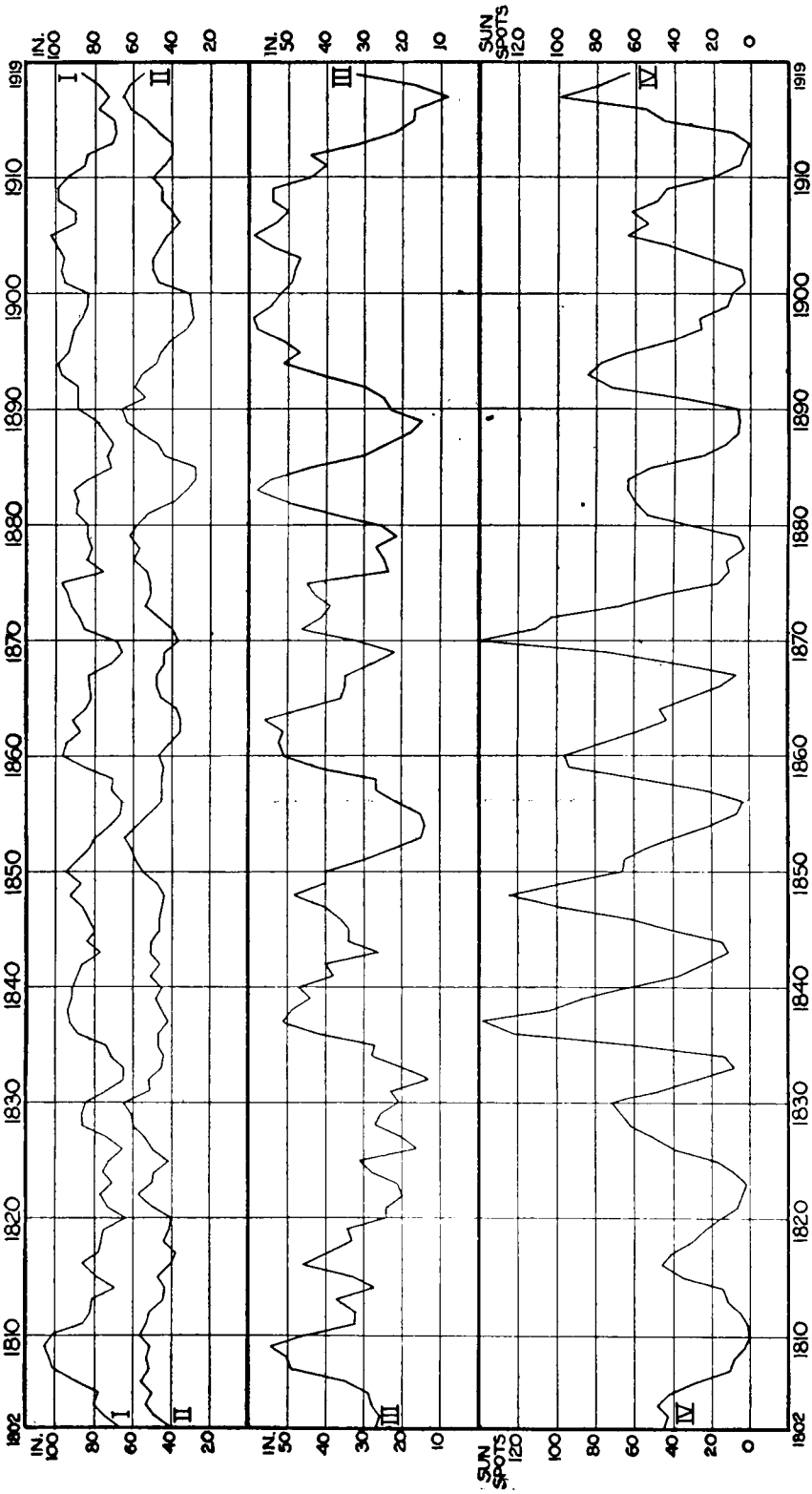
The dates of the successive maxima are set out in the following table:—

DATES OF MAXIMA.

Sunspots. S.	Rothesay Rain. R.	Greenwich Rain. G.	Difference. R-G.
1804	1809	1806	1809
1816	1816	1815, 22	1816
1830	1829	1830	1825
1837	1838	1841	1837
1848	1848, 50	1853	1848
1860	1860	1867	1861, 63
1870	1875	1877, 79	1871
1883–4	1883	1890	1883
1894	1894	1903	1894, 98
1905	1905	1910	1905
1917	? 1919	1917	—

* The rainfall data for Rothesay were supplied by Mr. Macdowall, the rainfall data for Greenwich were taken from the tables (1815–1903) by W. C. Nash in the *Q.J.R. Meteor. Soc.*, Vol. XXX., 1904, p. 291, and completed from manuscript records in the Meteorological Office; the sunspots numbers were taken from the *M.O. Calendar*.

The correspondence between Rothesay summer rainfall (July and August) and sunspot numbers was first brought out by Mr. Macdowall in a note to the *Meteorologische Zeitschrift*, Vol. XXIV., 1907, p. 514.



SUMMER RAINFALL AND SUNSPOTS.—I., Rainfall at Rothesay, July–August; II., Rainfall at Greenwich, July–August; III. = I.–II. (vertical scale doubled); IV., Annual Sunspot Numbers.

The chief disagreements occur about 1804 and 1870. At the sunspot maximum of 1804, Rothesay rainfall, Greenwich rainfall, and the difference between them, were all near a minimum, and all showed a maximum near the succeeding sunspot minimum of 1809–11. The pronounced sunspot maximum of 1870 is accompanied by minima at Rothesay and Greenwich, but the difference between them is rapidly increasing and rises from a minimum in 1869 to a maximum in 1871. It is interesting to notice that each of these dates, 1804 and 1870, corresponds to a change of the sunspot curve from steep to flattened maxima.

From 1874 to 1893 the difference curve shows a remarkable parallelism with sunspots, though the separate curves for the individual records diverge considerably from the sunspot curve. After 1893 the agreement is not particularly good.

It appears that the relationship is not nearly so marked when June is included, though it is difficult to suggest a reason why it should be limited to July and August.

Monthly Meteorological Charts for Western Europe.

TOWARDS the end of the war the Intelligence Division of the Naval Staff for the Hydrographic Department of the Admiralty undertook the preparation of monthly meteorological charts for Western Europe which would particularly meet the needs of seamen. The work was carried out under the direction of the late Prof. H. N. Dickson, C.B.E., M.A., D.Sc., and the charts are now available for the public.

Ten charts for each month show the average monthly values of certain meteorological elements at selected stations in Western Europe. So far as the information has been available averages have also been given for localities over the sea. This has been done by using information derived from the Danish Meteorological Annual and the United States of America North Atlantic Pilot Chart, in addition to the data supplied by the Meteorological Office. It is inevitable, however, in charts of this kind that large areas on the maps should have to be left blank.

Notable features of the charts are fog-roses, "showing fogs with winds in octants per 1,000 observations"; average monthly isotherms of sea temperature drawn for every 1° F.; charts showing the average number of days of snow per month; and charts showing the average number of days of thunder per month.

The charts are preceded by tables in which monthly average values of temperature, precipitation, vapour pressure, relative humidity and sunshine are given for selected stations in the British Isles. For foreign stations the average number of days per month with (*a*) maximum temperatures; (*b*) minimum

temperatures; and (*c*) rainfall, between certain limits is shown in the tables.

Most of the averages have been based on a comparatively long series of years (20 years or more), but in some cases (notably relative humidity averages) a period of eight or ten years has been used. In the case of the "Supplementary Meteorological Data," showing the average number of days of (1) hail; (2) clear sky; (3) overcast sky; (4) fog; (5) gale; the ten years 1906-1915 have been used.

The charts should be particularly useful and interesting to seamen. For example, it can be seen at a glance that a fog is hardly ever experienced in the Hebrides in January; that a south-west wind at Pembroke is much more likely to be accompanied by fog than a wind from any other direction, especially in the spring and early summer; that an east wind at Brest is seldom strong in August, but a west wind in the same month is as often fresh or strong as not; that a thunderstorm is rarely experienced at Lerwick in June, but that at Bordeaux the chances of a thunderstorm occurring on any day in that month are about one in six.

The Colour of Lightning.

A CORRESPONDENT calls attention to the statement in *The Times* commenting on the blue colour of the lightning during the thunderstorm of February 2nd, and points out that the flashes observed from Oxford, numbering four or five, between 15 h. 15 m. and 15 h. 35 m. on that day were distinctly reddish. The storm did not pass directly over Oxford, and the window from which the lightning was observed faces west. Another observer, facing east, commented independently on the redness of the forked lightning.

No doubt the explanation is that the blueness of the lightning seen in London was really a subjective effect due to the brilliancy of very near flashes. The brighter the light the more blue it appears. On the other hand the redness might be due to two causes. Real red flashes are not unknown, but rosy flashes are more common. These red flashes are supposed to be due to the discharge passing through hydrogen derived from the dissociation of water; hydrogen has many lines in the red.

In the present case the redness as seen from Oxford was probably simply due to atmospheric absorption. Distant lightning appears red for the same reason as the sun and moon appear red when near the horizon. This would be very likely with the turbid atmosphere of a winter afternoon.

The Horse Latitudes.

SEVERAL correspondents are to be thanked for references to explanations of the term "Horse Latitudes." The earliest of the references in the Oxford Dictionary is as follows:—

> 1777. G. Forster. *Voyage round the World*, II., 581. "The latitudes where these calms chiefly reign are named the horse latitudes by mariners because they are fatal to horses and other cattle which are transported to the last mentioned continent [America]."

The tradition of English seamen is in accordance with this quotation. On the other hand, Maury (*Physical Geography of the Sea*, 1866, p. 276) places the fatal region farther west.

> The horse latitudes are the belts of calms and light airs which border the polar edge of the north-east trades. They were so called from the circumstance that vessels formerly bound from New England to the West Indies with a deck-load of horses were often so delayed in this calm belt of Cancer, that for the want of water for their animals, they were compelled to throw a portion of them overboard.

An alternative interpretation of the term, which Commander L. G. Garbett tells us is "more familiar still" to most sailors, is as follows:—

> In sailing-ship days, crews always received a month's advance (pay) before leaving a home port; this had to be worked off during the first month at sea, and to celebrate the expiration of this period an empty tar-barrel known to sailors as the "dead horse," was hoisted to the end of the fore-yard arm, set on fire and dipped in the sea. The latitudes in which this occurred were known as "The Horse Latitudes."

Laughton, in his *Physical Geography*, 1870, p. 24, says:—

> Between the westerly winds and the north-east winds there is a part of the ocean where the winds are of the most changeable character . . . it lies for the most part between the meridians of 30° and 55° W. . . . Winds from all quarters and dead calms occur in very nearly equal proportions. Severe gales are common and the same uncertainty exists with regard to them that exists with regard to the general direction of the wind; they blow from all quarters, but perhaps most frequently from the south-west. Speaking roughly, this part of the ocean lies between the Azores and Bermuda, and at a very early period in Atlantic navigation received from the Spaniards the name of *el golfo de las yeguas*, the mares' sea, in allusion to its boisterous nature and in contradistinction to *el golfo de las damas*, the ladies' sea, as the trade-wind region was called from its being so smooth and pleasant to sail over. It is this name, *el golfo de las yeguas*, which our sailors translated into 'the Horse Latitudes,'* and the story of ships laden with horses being becalmed there so long that they had to throw their cargo overboard was probably invented at a comparatively recent date to account for the name which the region had so long borne.

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* There are, however, many instances in English in which the word "horse" is used as a prefix denoting boisterous; as, for instance, *horse-laugh, horse-play.*

Remarkable Temperatures in the Argentine and South Georgia.

WE learn from Mr. R. C. Mossman that on the morning of April 26th at Buenos Aires, the shade minimum fell to 27·9° F., and the grass minimum to 20·5° F. The previous April shade minimum (1861–1921) was 33·4° F., and the frost caused much damage to fruit trees and garden plants. The occasion of this low temperature was a high-pressure area which passed across South America from west to east, causing strong southerly winds in its front.

Mr. Mossman also reports that at Grytviken (South Georgia) the shade maximum on March 10th last rose to 83·8° F., which is 13° above the previous record. This is attributed to an intense Föhn effect. About the same time, probably on the same day, the shade maximum in the South Orkneys rose to 51·4° F., which is only one degree below the absolute maximum.

The Highest Aeroplane Ascent.

WITH reference to Major Schroeder's ascent at Dayton, Ohio, referred to in this magazine for March 1920 (p. 25) and April 1922 (p. 75), we are informed by the Royal Aero Club, which is the official British representative on the Fédération Aeronautique International, and thus the body responsible for deciding on records, that the official figures for Major Schroeder's flight are 33,114 feet (10,093 metres), not 36,000 feet as previosuly stated. A new record of 10,518 metres (34,500 feet) has since been set up by J. A. McCready in a flight at Dayton on a Lepère machine with a 400-h.p. Liberty engine, during September, 1921.

The Writing on the Sky.

THE recent successful attempts at smoke-writing by aeroplane carried out by the *Daily Mail* open up fascinating possibilities in regard to the study of atmospheric movements which may well have great meteorological significance. Taylor's work on atmospheric turbulence has brought this subject into prominence and demonstrated its importance in regard to weather, but the actual movements of the air in detail are extremely difficult to observe, and there appears every reason to hope that the movements of smoke emitted from aeroplanes, or possibly even better from stationary balloons, may throw much light on the subject.

The Value of Wireless.

THE Calcutta correspondent of the *Daily Mail* states that the broadcasting by wireless of information as to an approaching cyclone was recently picked up by no fewer than 450 wireless stations in Bengal. As many as eight large ships were enabled to alter their courses in order to avoid the storm, which was one of the worst known in the Bay of Bengal for many years, the wind velocity reaching 100 miles per hour.

Review.

Ceylon Rainfall: Monthly Averages. Memoirs of the Colombo Observatory, No. 3. By A. J. Bamford, B.Sc., B.A., M.C., Colombo, 1921. Size 13 × 8¼, pp. 3, 13 plates.

THE rainfall of islands is usually interesting on account of its relative simplicity. That of Ceylon is particularly instructive as it presents some peculiar features. These, Mr. Bamford's long experience enables him to bring out with great clearness.

The maps embodied in the memoir show the distribution of the average fall during each month of the year. It is unfortunate that no attempt appears to have been made to synchronize the records, which vary in length from 50 to 5 years, but the comparatively small number of stations in the north and part of the east probably makes this impossible. The author emphasises the value of voluntary co-operation in observing.

The main control of the rainfall of the island is definitely monsoonal. In the months of the northern summer, May to September, the south-west monsoon brings a large fall in the south-western hill slopes; but on the lee side of the high land pronounced rain-shadows exist. During the northern winter months, November to February, the north-east monsoon brings a similar, but less marked, maximum in the north-east, but the rain-shadow effect is not so definite. In the intermediate months, when the monsoon winds are not blowing, the land and sea breezes are able to become established and convectional thunder rains develop. In November some cyclonic rain falls.

Monsoonal rains fall nearly uniformly throughout the day and cyclonic rains have no definite diurnal variation, but convectional rains, especially in the tropics, tend to a marked afternoon maximum. An excellently devised diagram, comparing the diurnal range in each month in the east and west of the island, takes advantage of these facts to analyse the prevailing types at each season.

The Weather of May, 1922.

IN the first week of May the British Isles were under the influence of a series of depressions passing to the southward of Iceland, and, as a result, unsettled, changeable weather was experienced. Moderate rainfall was reported from many stations. On the 3rd of May several places in the south-west of England recorded about 10 mm. During this period pressure was relatively high to the north of Scandinavia and over the Azores.

The formation of an anticyclone over France about the 6th began immediately to affect conditions in the south-east of England, and by the 9th the whole of the British Isles lay under high pressure extending from Iceland to the south of France and very fine warm weather was experienced generally in Great Britain and France. Temperature rose above 80° F. in parts of London and exceeded 85° F. locally in France. During this period a deep depression existed over Scandinavia with a very steep gradient for northerly winds, giving gales accompanied by snow, sleet and hail in many places. The centre of the high pressure area moved slowly north-westward, and on the 12th it was situated between Iceland and the Azores, causing a northerly wind current over the British Isles generally with a marked fall in temperature. The presence of a low-pressure system on this date over central and south-west Europe gave rise to heavy local rains, 37 mm. being reported from Zurich, 33 mm. from Berne, and 18 mm from Munich.

A depression which made its appearance to the west of Iceland on the 12th moved in an easterly direction causing heavy northerly gales in Iceland with considerable falls of snow and also affected the north-west districts of the British Isles. On the 14th a high-pressure system extended from the Azores across south-west and central Europe, and fine weather with light winds prevailed generally in these districts. At the same time, in northern Europe a depression centred between Iceland and the Färöe Islands moved eastward and strong winds prevailed during its passage, gale force being reached at Blacksod Point. On the 15th the Atlantic depression moved slowly eastwards, causing much rain in Ireland and Scotland; 33 mm. being reported from Glasgow, 21 mm. from Nairn, and 17 mm. from Valencia and Castlebay. An anticyclone extended from the Azores to Austria, and pressure was relatively high over southern England. Fair weather prevailed over the whole of this area. Pressure was low in the western Mediterranean and 26 mm. of rain fell at Perpignan.

Conditions remained almost unchanged until the 20th, when the continental anticyclone moved slowly eastward and a ridge of high pressure extended northward from France to Scandinavia. A V-shaped depression over the Atlantic to the west of the British Isles moved slowly north-eastward and brought rain to the north and west of the kingdom. Snow occurred in Iceland, while rainfall amounted to 18 mm. at Valencia, 14 mm. at Birr Castle, and 12 mm. at Lerwick. In the anticyclonic area some high temperatures were reached—88° F. at Bordeaux and 79° F. at Paris. On the 22nd thunderstorms occurred locally in England, 11 mm. of rain being recorded at Nottingham and 7 mm. at Cranwell.

Around the period 22nd-24th very exceptional heat developed inland over south-east England, reaching a maximum of 88° F. at South Farnborough on the 22nd, 89° F. at Grain on 23rd, 86° F. and 88° F. respectively at Kew and South Farnborough on the 24th. High night minima also prevailed, varying between 58° F. and 62° F. On the 24th 101° F. was reached at Neufahrwasser, 96° F. at Paris and 95° F. at Frankfurt.

During the 25th a depression to the south-west of Iceland moved in a north-easterly direction to the Faröe Islands, and the cyclonic circulation of winds round it increased considerably in force. Slight rain was experienced generally in Iceland, on the west coasts of Scandinavia, and in the north-west districts of the British Isles. Sleet and snow occurred locally in Iceland, at Jan Mayen, and in the extreme north of Scandinavia.

On the same afternoon heavy thunderstorms occurred locally in London and south-east England. During the 26th the northern depression moved slowly north-eastwards to Scandinavia and caused strong winds rising to gale force in exposed places. Heavy rain occurred along the coasts of central Norway, 19 mm. falling at Florö and 11 mm. at Bronnö. In this period, temperature was lower generally than on the preceding few days, though 95° F. was registered at Perpignan, 86° F. at Lyons, 84° F. at Frankfurt and several other places. By the morning of the 28th the continental anticyclone had extended northwards over Scotland and the North Sea as the depression over the Scandinavian coasts receded north-east, but a fresh depression was indicated off the south-west of Iceland. Cloudy or overcast weather prevailed in the eastern Mediterranean and along the north African coasts owing to shallow areas of low pressure. At Athens 8 mm. of rain fell. In the anticyclonic regions the weather was generally fine and warm, temperatures of 91° F. being recorded at Lisbon and Neufahrwasser, 90° F. at Aachen, over 80° F. in parts of France and Germany, and over 70° F. inland in England.

On the 29th, apart from the extreme north of Scotland, which was under the influence of a small secondary, the weather over the Continent and the British Isles generally was fine and accompanied by high temperatures. At Bordeaux 91° F. was reached, at Rome 88° F., at Nice 86° F., while in some parts of England 75° F. was registered. The temperature at Spitzbergen at 13h. G.M.T. was, however, only 21° F. The anticyclone was maintained till the end of the month, and temperature again exceeded 80° F. in many parts of Europe, notably 92° F. at Limoges, while 80° F. was exceeded locally in the south-east of England. G. H.

At the beginning of the month the Garonne was nearly 10 ft. above normal level and parts of Toulouse were under water. In consequence of persistent rain the Seine rose so high that the Paris steamboat service had to be stopped for a few days. The river has not been so high since the great floods of 1910. Towards the end of the month very hot weather was experienced in northern France, especially in Paris, where a temperature of 92° F. was recorded on the 24th. This is the highest May temperature experienced for at least 50 years, and in spite of the great rise of the Seine earlier in the month the water supply has to be restricted in places.

At Flushing a temperature of 94° F. was registered on the 24th. This is the record for any month.

The annual avalanche known as the "red avalanche," which falls every spring near Goppenstein, at the southern end of the great Lötschberg tunnel in the canton of Valais, Switzerland, fell on April 22nd, temporarily blocking the line. During April 244 mm. of rain fell at Geneva, the highest figure previously recorded in that month being 162 mm. in 1799; more rain has already fallen this year than during the whole of 1921. A great avalanche fell early in May in the Casque de Borée, above St. Gingolph (Valais), in a spot where no similar occurrence has been recorded for a century. An avalanche also swept away the new Fergenhogel hut, above the Klosters, at an altitude of 7,200 feet. At the end of the month Switzerland was experiencing the high temperature of western Europe.

The P. and O. steamship "Egypt" was sunk at 19h. on the evening of Saturday, May 20th, by collision with the French steamer "Seine," with the loss of 96 lives. The accident took place 28 miles off the Armen lighthouse on the coast of Finistère. Anticyclonic conditions prevailed over western Europe with the result that warm air was passing in a north-westerly direction from northern Africa and the western Mediterranean, giving rise to dense sea fog at the mouth of the English Channel.

Early in the month there was more snow lying on the mountains north

(*Continued on p.* 148.)

Rainfall Table for May 1922.

STATION.	COUNTY.	Aver. 1881–1915.	1922.		Per cent. of Av.	Max. in 24 hrs.		No. of Rain Days
		in.	in.	mm.		in.	Date.	
Camden Square	*London*	1·76	·83	21	47	·24	3	7
Tenterden (View Tower)	*Kent*	1·57	·67	17	43	·36	1	7
Arundel (Patching Farm)	*Sussex*	1·85	·93	24	50	·27	16	9
Fordingbridge (Oaklands)	*Hampshire*	2·08	·85	22	41	·34	16	10
Oxford (Magdalen College)	*Oxfordshire*	1·79	1·60	41	89	1·08	24	8
Wellingborough (Swanspool)	*Northampton*	1·94	1·20	31	62	·55	24	11
Hawkedon Rectory	*Suffolk*	1·85	1·12	28	61	·19	25	11
Norwich (Eaton)	*Norfolk*	1·93	·58	15	30	·09	12,17	12
Launceston (Polapit Tamar)	*Devon*	2·02	1·39	35	69	·43	16	9
Sidmouth (Sidmount)	„	1·96	·64	16	84	·19	16	8
Ross (County Observatory)	*Herefordshire*	2·13	·44	11	21	·09	4	9
Church Stretton (Wolstaston)	*Shropshire*	2·58	1·25	32	48	·39	4	9
Boston (Black Sluice)	*Lincoln*	1·76	1·36	35	77	·54	1	11
Worksop (Hodsock Priory)	*Nottingham*	1·99	1·17	30	58	·35	21	8
Mickleover (Clyd House)	*Derbyshire*	1·97	1·00	25	51	·33	22	8
Southport (Hesketh Park)	*Lancashire*	2·09	1·66	42	80	·56	16	14
Wetherby (Ribston Hall)	*York, W. R.*	2·07	·82	21	40	·27	16	5
Hull (Pearson Park)	„ *E. R.*	1·93	1·18	30	61	·68	22	11
Newcastle (Town Moor)	*North'land*	2·03	1·12	28	55	·56	16	11
Borrowdale (Seathwaite)	*Cumberland*	7·37	6·00	152	81	..	..	..
Cardiff (Ely Pumping Stn.)	*Glamorgan*	2·50	1·45	37	58	·58	16	12
Haverfordwest (Gram. Sch.)	*Pembroke*	2·50	..	..	..	..	..	..
Aberystwyth (Gogerddan)	*Cardigan*	2·64	1·98	50	75	·63	4	5
Llandudno	*Carnarvon*	1·90	·28	7	15	·06	1	10
Dumfries (Cargen)	*Kirkcudbrt.*	3·01	2·68	68	89	·48	6	15
Marchmont House	*Berwick*	2·47	·67	17	27	·14	15	9
Girvan (Pinmore)	*Ayr*	2·98	3·24	82	109	·95	15	15
Glasgow (Queen's Park)	*Renfrew*	2·44	2·62	67	107	1·08	15	14
Islay (Eallabus)	*Argyll*	2·65	4·22	107	159	1·18	15	15
Mull (Quinish)	„	3·06	6·59	167	215	2·02	15	23
Loch Dhu	*Perth*	4·49	6·80	173	151	1·70	4	17
Dundee (Eastern Necropolis)	*Forfar*	2·09	·94	24	45	·18	21	14
Braemar (Bank)	*Aberdeen*	2·38	1·42	36	60	·30	21	10
Aberdeen (Cranford)	„	2·48	1·00	25	40	·38	15	12
Gordon Castle	*Moray*	2·12	1·96	50	92	·97	15	12
Fort William (Atholl Bank)	*Inverness*	3·99	11·86	301	297	2·63	15	20
Alness (Ardross Castle)	*Ross*	2·60	3·30	84	127	1·29	15	23
Loch Torridon (Bendamph)	„	4·56	10·25	260	225	1·65	15	20
Stornoway	„	2·56	4·85	123	190	·55	7	23
Loch More (Achfary)	*Sutherland*	4·40	7·97	202	181	·96	14	30
Wick	*Caithness*	2·07	1·83	47	88	·39	15	19
Glanmire (Lota Lodge)	*Cork*	2·45	1·69	43	69	·57	15	14
Killarney (District Asylum)	*Kerry*	3·06	2·38	61	78	·41	21	17
Waterford (Brook Lodge)	*Waterford*	2·32	1·44	37	62	·43	16	11
Nenagh (Castle Lough)	*Tipperary*	2·47	2·00	51	81	·48	20	15
Foynes	*Limerick*	2·33	1·64	42	70	·42	21	17
Gorey (Courtown House)	*Wexford*	2·22	1·24	31	56	·53	16	7
Abbey Leix (Blandsfort)	*Queen's Co.*	2·43	1·60	41	66	·40	15	11
Dublin (FitzWilliam Square)	*Dublin*	2·05	·61	15	30	·20	17	13
Mullingar (Belvedere)	*Westmeath*	2·45	2·08	53	85	·65	20	11
Crossmolina (Enniscoe)	*Mayo*	3·25	..	..	..	..	..	..
Collooney (Markree Obsy.)	*Sligo*	2·80	1·49	38	53	·32	21	18
Seaforde	*Down*	2·63	1·77	45	67	·58	17	11
Ballymena (Harryville)	*Antrim*	2·86	1·86	47	65	·32	17	13
Omagh (Edenfel)	*Tyrone*	2·59	3·07	78	119	1·00	21	16
Letterkenny Asylum	*Donegal*	2·80	1·80	46	64	·45	21	18

Supplementary Rainfall, May 1922.

Div.	STATION.	RAIN.		Div.	STATION.	RAIN.	
		in.	mm.			in.	mm.
II.	Ramsgate	·50	13	XII.	Langholm, Drove Rd.	3·35	85
,,	Sevenoaks, Speldhurst	2·45	62	XIII.	Ettrick Manse	3·17	80
,,	Hailsham Vicarage	·79	20	,,	North Berwick Res.	·70	18
,,	Totland Bay, Aston Ho.	·70	18	,,	Edinburgh, Royal Ob.	·67	17
,,	Ashley, Old Manor Ho.	·85	22	XIV.	Biggar	2·63	67
,,	Grayshott	·99	25	,,	Leadhills	4·87	124
,,	Ufton Nervet	·82	21	,,	Kilmarnock, Agric. Coll.	3·67	93
III.	Harrow Weald, Hill Ho.	1·04	26	XV.	Dougarie Lodge	3·09	79
,,	Pitsford, Sedgebrook	1·02	26	,,	Oban	7·05	179
,,	Chatteris, The Priory.	1·18	30	,,	Holy Loch, Ardnadam	7·15	182
IV.	Elsenham, Gaunts End	1·01	26	,,	Tiree Cornaigmore	..	..
,,	Lexden, Hill House	1·07	27	XVI.	Loch Venachar	5·45	138
,,	Aylsham, Rippon Hall	·88	22	,,	Glenquey Reservoir	5·80	147
,,	Swaffham	·77	20	,,	Loch Rannoch, Dall	3·44	87
V.	Devizes, Highclere	·79	20	,,	Blair Atholl	..	..
,,	Weymouth	1·03	26	,,	Coupar Angus	1·38	35
,,	Ashburton, Druid Ho.	·95	24	,,	Montrose Asylum	·56	14
,,	Cullompton	·97	25	XVII.	Logie Coldstone, School	1·42	36
,,	Hartland Abbey	1·65	42	,,	Fyvie Castle	1·80	46
,,	Penzance, Morrab Gden.	1·49	38	,,	Grantown-on-Spey	1·54	39
,,	St. Austell, Trevarna.	1·65	42	XVIII.	Kingussie, Fasnakyle	2·93	74
,,	Crewkerne Merefield Ho	·54	14	,,	Fort Augustus	4·72	120
VI.	Clifton College	1·18	30	,,	Loch Quoich, Loan	..	..
,,	Ledbury, Underdown.	·95	24	,,	Fortrose	2·18	55
,,	Shifnal, Hatton Grange	1·08	27	,,	Faire-na-Squir	7·18	182
,,	Ashbourne, Mayfield.	·97	25	,,	Skye, Dunvegan	7·32	186
,,	Barnt Green, Upwood	·95	24	XIX.	Loch Carron, Plockton.	6·34	161
,,	Blockley, Upton Wold	·67	17	,,	Dornoch, St. Gilbert's	2·41	61
VII.	Leicester, Town Hall Sq.	·61	15	,,	Tongue Manse	2·92	74
,,	Grantham, Saltersford	1·27	32	,,	Melvich Schoolhouse	2·16	55
,,	Louth, Westgate	·61	15	XX.	Dunmanway Rectory	3·26	83
,,	Mansfield, West Bank	·93	24	,,	Mitchelstown Castle	1·75	44
VIII.	Nantwich, Dorfold Hall	·72	18	,,	Gearahameen	5·40	137
,,	Bolton, Queen's Park.	2·28	58	,,	Darrynane Abbey	3·22	82
,,	Lancaster, Strathspey.	2·42	61	,,	Cashel, Ballinamona	1·31	33
IX.	Wath-upon-Dearne	·86	22	,,	Roscrea, Timoney Park	1·69	43
,,	Bradford, Lister Park.	1·10	28	,,	Ballybunion	2·09	53
,,	West Witton	3·16	80	,,	Broadford, Hurdlestown	2·65	67
,,	Scarborough, Scalby	·92	23	XXI.	Kilkenny Castle	1·06	27
,,	Middlesbro', Albert Pk.	1·55	39	,,	Rathnew, Clonmannon	1·44	37
,,	Mickleton	·90	23	,,	Hacketstown Rectory	1·58	40
X.	Bellingham	1·39	35	,,	Balbriggan, Ardgillan	·82	21
,,	Ilderton, Lilburn	·82	21	,,	Drogheda	1·21	31
,,	Orton	3·03	77	,,	Athlone, Twyford	2·21	56
XI.	Llanfrechfa Grange	1·13	29	XXII.	Castle Forbes Gdns.	2·43	62
,,	Treherbert, Tyn-y-waun	2·33	59	,,	Ballynahinch Castle	3·61	92
,,	Carmarthen Friary	1·96	50	,,	Galway, Grammar Sch.	3·03	77
,,	Lampeter, Falcondale	1·67	42	XXIII.	Westport House	1·79	45
,,	Cray Station	2·00	51	,,	Enniskillen, Portora	1·67	42
,,	B'ham W.W., Tyrmyndd	1·19	30	,,	Armagh Observatory	1·77	45
,,	Lake Vyrnwy	..	..	,,	Warrenpoint	1·71	43
,,	Llangynhafal, P. Drâw	·67	17	,,	Belfast, Cave Hill Rd.	1·92	49
,,	Oakley Quarries	4·49	114	,,	Glenarm Castle	2·08	53
,,	Dolgelly, Bryntirion	1·84	47	,,	Londonderry, Creggan.	2·02	51
,,	Snowdon, L. Llydaw.	6·65	69	,,	Sion Mills	1·72	44
,,	Lligwy	1·16	29	,,	Milford, The Manse	1·32	33
XII.	Stoneykirk, Ardwell Ho.	2·52	64	,,	Narin, Kiltoorish	1·60	41
,,	Carsphairn, Shiel	3·98	101	,,	Killybegs, Rockmount	2·89	73

Climatological Table for the

STATIONS	PRESSURE		TEMPERATURE							
			Absolute				Mean Values			
	Mean M.S.L.	Diff. from Normal	Max.	Date	Min.	Date	Max.	Min.	½ max. and min.	Diff. from Normal
	mb.	mb.	° F.		° F.		° F.	° F.	° F.	° F.
London, Kew Observatory	1018·5	+4·6	57	28	30	5	49·5	39·7	44·6	+4·3
Gibraltar	1022·9	+3·3	67	5, 12, 31	44	21	62·3	49·2	55·8	−0·9
Malta	1015·4	−0·5	69	3	47	14	59·8	53·2	56·5	−0·7
Sierra Leone	1011·6	+0·5	92	20	70	30, 31	87·4	74·5	80·9	−0·6
Lagos, Nigeria	1012·5	+2·0	89	5	71	7	86·8	75·5	81·1	−0·2
Kaduna, Nigeria	..	..	..	..	..	..	..	..	..	..
Zomba, Nyasaland	1007·8	−0·8	87	3	62	4. 19	80·3	64·9	72·6	−0·1
Salisbury, Rhodesia	1006·7	−3·2	91	20	50	20	83·5	55·2	69·4	−0·5
Cape Town	1013·6	−0·7	87	25	55	12	76·8	59·5	68·1	+0·5
Johannesburg	1010·1	−0·6	84	18	45	14	75·0	53·9	64·5	−0·6
Mauritius	..	..	..	..	..	..	..	..	..	..
Bloemfontein	..	..	90	4	48	29	80·2	56·4	68·3	−3·5
Calcutta, Alipore Obsy.	1015·5	−0·2	83	31	53	13, 29	79·3	57·1	68·2	+1·7
Bombay	1013·2	−0·1	89	10	67	30	85·2	70·7	77·9	+0·6
Madras	1014·1	+0·5	86	2	64	22	84·2	69·4	76·8	+0·3
Colombo, Ceylon	1010·5	+0·7	92	13	71	17	88·2	72·8	80·5	+0·8
Hong Kong	1019·4	−0·5	76	17	54	23	69·3	61·3	65·3	+2·4
Sandakan	..	..	89	3, 5, 15	73	17	86·1	74·7	80·4	+0·3
Sydney	1011·8	−0·1	90	13	58	8	75·3	63·4	69·3	−0·7
Melbourne	1013·6	+1·3	87	12	46	7	71·6	56·0	63·8	−0·9
Adelaide	..	..	..	..	..	..	..	..	..	..
Perth, Western Australia	1011·7	−1·6	102	17	50	1	84·6	63·6	74·1	+3·4
Coolgardie	1012·0	+0·8	104	19	43	1	88·1	60·9	74·5	−1·3
Brisbane	1010·9	−0·9	96	6	61	11	83·6	67·5	75·5	−0·8
Hobart, Tasmania	1013·0	+3·3	76	25	43	28	65·4	50·9	58·1	−2·3
Wellington, N.Z.	1014·7	+2·6	80	10	42	14	66·2	53·2	59·7	−0·8
Suva, Fiji	1009·4	+0·8	88	24	69	9, 11	84·8	70·8	77·8	−1·1
Kingston, Jamaica	1014·3	+0·1	90	9	66	31	86·6	69·2	77·9	+0·2
Grenada, W.I.	1012·1	+0·2	86	2, 4, 8	70	25, 26	83·1	73·4	78·3	+0·2
Toronto	1015·8	−1·6	52	2	0	22	35·4	21·3	28·3	+2·1
Winnipeg	1018·2	+0·3	37	10	−26	23	20·0	2·9	11·5	+5·8
St. John, N.B.	1011·3	−2·9	52	18	− 5	22	32·1	16·3	24·2	−0·2
Victoria, B.C.	1020·1	+3·3	56	10	16	19	41·7	33·9	37·8	−3·7

LONDON, KEW OBSERVATORY.—Mean speed of wind 9·8 mi/hr; 5 days with fog. June corrected values for rainfall 0·20, 5, −50.

GIBRALTAR.—1 day with thunder heard, 1 day with gale.

MALTA.—Prevailing wind direction N.W. 2 days with hail, 2 days with thunder heard, 1 day with snow.

SIERRA LEONE.—Calms predominate. 3 days with thunder heard, 10 days with harmattan.

COLOMBO, CEYLON.—Prevailing wind direction N, mean speed 6·9 mi/hr.

LONDON, KEW OBSERVATORY:—										
Corrected values	Oct. 1921	..	..	82	5	35	25	66·2	46·9	56·6	+6·7
	Nov. 1921	..	..	58	1, 4	24	10	45·7	35·8	40·8	−3·2
GRENADA, W.I., Jan. 1921		1014·0	+1·2	87	1, 23	69	17	82·8	72·7	77·7	+0·7
,, Feb. 1921		1013·8	+0·4	86	16, 21	70	2, 4	82·5	72·4	77·5	+0·5

GRENADA.—Prevailing wind direction, Jan. E, Feb. E.

British Empire, December 1921.

TEMPERATURE		Relative Humidity	Mean Cloud Am'nt	PRECIPITATION				BRIGHT SUNSHINE		STATIONS
Mean	Absolute			Amount		Diff. from Normal	Days	Hours per day	Percentage of possible	
Wet Bulb. °F.	Min. on Grass °F.	%	0–10	in.	mm.	mm.				
43·0	23	83	7·5	1·30	33	− 25	13	1·2	15	London, Kew Observatory
51·7	35	78	2·8	3·33	85	− 55	8	..	..	Gibraltar.
51·6	42	75	5·9	3·45	88	+ 2	13	4·7	48	Malta.
75·1	..	73	3·7	2·16	55	+ 17	3	..	..	Sierra Leone.
76·1	67	87	8·7	2·35	60	+ 39	6	..	..	Lagos, Nigeria.
..	..	..	..	..	..	..	..	..	..	Kaduna, Nigeria.
..	..	87	8·3	11·00	279	− 12	23	..	..	Zomba, Nyasaland.
66·0	..	69	..	5·24	133	− 13	14	..	..	Salisbury, Rhodesia.
62·4	..	59	3·8	0·76	19	− 3	7	..	..	Cape Town.
56·7	44	69	4·9	6·67	169	+ 46	15	8·5	62	Johannesburg.
..	..	..	..	..	..	..	..	..	..	Mauritius.
58·0	..	54	4·1	2·96	75	+ 13	9	..	..	Bloemfontein.
63·6	43	51	2·3	0·00	0	− 5	0*	..	..	Calcutta, Alipore Obsy.
69·3	57	62	0·9	0·00	0	− 2	0*	..	..	Bombay.
70·5	59	75	5·4	2·04	52	−106	7*	4·8	..	Madras.
75·0	67	67	6·2	3·96	101	− 39	10	..	..	Colombo, Ceylon.
58·8	..	70	6·4	0·22	6	− 25	5	5·3	49	Hong Kong.
77·3	..	88	..	31·12	790	+341	21	..	..	Sandakan.
64·7	45	70	7·5	5·28	134	+ 67	14	5·2	36	Sydney.
58·9	38	67	6·6	2·49	63	+ 4	14	..	..	Melbourne.
..	..	..	..	..	..	..	..	..	..	Adelaide.
65·2	45	54	3·7	0·78	20	+ 5	5	9·5	..	Perth, Western Australia.
61·9	..	37	5·1	1·16	29	+ 11	8	..	..	Coolgardie.
69·8	56	66	6·0	11·33	288	+160	14	..	..	Brisbane.
52·0	36	64	7·7	0·58	15	− 35	11	5·9	39	Hobart, Tasmania.
54·8	31	72	6·4	6·67	169	+ 87	15	6·6	44	Wellington, N.Z.
76·6	..	79	6·6	29·40	747	+439	23	..	..	Suva, Fiji.
..	..	74	5·2	1·17	30	− 11	5	..	..	Kingston, Jamaica.
73·7	..	77	4·1	10·18	259	+ 71	25	..	..	Grenada, W.I.
24·9	0	63	8·1	2·40	61	− 11	17	..	..	Toronto.
10·4	..	90	5·1	0·50	13	− 11	8	..	..	Winnipeg.
20·8	5	61	5·0	3·02	77	− 29	14	..	..	St. John, N.B.
35·3	15	83	6·8	5·57	141	− 9	14	..	..	Victoria, B.C.

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

HONG KONG.—Prevailing wind direction E, mean speed 11·6 mi/hr.

SANDAKAN.—Nov., mean wet bulb 77·6°, relative humidity 84 per cent.

MELBOURNE.—Coldest December for 6 years. Feb. rel. humidity for 85 per cent. read 47 per cent.

SUVA, FIJI.—4 days with thunder heard.

GRENADA, W.I.—Prevailing wind direction E., 2 days with thunder heard.

										LONDON, KEW OBSERVATORY:—
53·4	..	78	..	..	..	..	..	..	..	Corrected values Oct. 1921
38·9	..	84	..	..	..	..	..	..	..	Corrected values Nov 1921
71·9	..	73	3·7	2·86	73	− 40	13	..	..	GRENADA, W.I., Jan. 1921
71·7	..	73	3·7	2·37	60	− 12	19	..	..	,, Feb. 1921

Climatological Table for the

STATIONS	PRESSURE		TEMPERATURE							
			Absolute				Mean Values			
	Mean of Day M.S.L.	Diff. from Normal	Max.	Date	Min.	Date	Max.	Min.	½ max. and min.	Diff. from Normal
	mb.	mb.	°F.		°F.		°F.	°F.	°F.	°F.
London, Kew Obsy.	1019·0	+3·0	89	July 10	24	Nov. 10	60·2	44·8	52·5	+2·8
Gibraltar	1018·0	+1·5	91	Aug. 3	42	Jan. 15, 16 Feb. 8	70·2	57·6	63·9	−0.2
Malta	1016·0	+1·2	99	July 20	44	Feb. 2	69·9	60·8	65·3	+0·1
Sierra Leone,	1011·8	0·0	97	Feb. 17	64	July 8	87·4	72·1	79·7	−1·2
Lagos, Nigeria	1012·5	+1·1	99	Apr. 16 May 4	60	Mar. 16	86·1	75·2	80·7	+0·5
Kaduna, Nigeria	..	..	..	..	..	..	..	..	..	..
Zomba, Nyasaland	1012·4	+0·3	97	Nov. 12	45	Aug. 5	78·6	60·4	69·5	+0·4
Salisbury, Rhodesia	1012·5	−1·6	99	Nov. 10	35	Aug. 1	78·8	52·6	65·7	+0·4
Cape Town	1016·9	−0·1	100	Feb. 24	35	July 20	71·2	54·0	62·6	+0·5
Johannesburg	1016·6	0·0	89	Jan. 21	26	Aug. 10	68·9	48·9	58·9	−0·6
Mauritius	..	..	..	..	..	..	..	..	..	..
Bloemfontein	..	..	95	Jan. 26	16	July 2	73·3	46·8	60·1	−1·3
Calcutta, Alipore Obsy.	1007·0	−0·5	102	Mar. 23 May 24	49	Jan. 4	87·5	71·6	79·6	+0·9
Bombay	1008·5	−0·6	96	Feb. 16 Apr. 29	61	Jan. 22	86·9	75·3	81·1	+0·6
Madras	1008.5	−0·3	111	May 25	64	Nov. 10	91·1	75·1	83·1	+0·2
Colombo, Ceylon	1009·9	+0·5	93	Feb. 11	65	Mar. 2	87·3	75·3	81·3	+0·1
Hong Kong	1012·8	+0·2	92	Aug. 22	44	Feb. 4	77·1	68·5	72·8	+0·5
Sandakan	..	..	92	May 14 Aug. 16, 18	71	Sept. 13	87·0	75·0	81·0	−0·3
Sydney	1017·2	+1·3	99	Mar. 25	40	Aug. 6	72·0	56·7	64·4	+1·4
Melbourne	1017·1	+1·0	107	Jan. 24	33	June 27. July 23	68·2	51·1	59·7	+1·3
Adelaide	..	..	..	..	..	..	..	..	..	..
Perth, W. Australia.	1015·6	−0·8	108	Jan. 28	40	June 29	75·1	57·0	66·1	+2·1
Coolgardie	1015·5	−0·5	112	Jan. 21	30	July 29	78·7	53·1	65·9	+1·4
Brisbane	1016·9	+1·2	96	Dec. 6	42	Aug. 6	77·2	60·8	69·0	+0·1
Hobart, Tasmania	1013·9	+1·4	96	Jan. 1, Nov. 17	32	July 31 Aug. 1,19	63·2	47·7	55·5	+1.2
Wellington, N.Z.	1016·0	+1·9	82	Jan. 2	30	July 11	61·4	48·9	55·2	−0·2
Suva, Fiji	1011·9	+0·5	91	Mar. 19	58	July 14	84.9	69·0	76·9	−0·1
Kingston, Jamaica.	1014·1	+0·2	93	sev. months.	66	Jan. Mar. Dec.	87·7	71·1	79·4	+0·1
Grenada, W.I.	1012·2	−0·2	93	Sept. 7	68	Mar. 11	84·1	73·7	78·9	+0·2
Toronto	1016·7	+0·3	98	July 5	−5	Jan. 18	59·0	41·3	50·1	+5·7
Winnipeg	1015·4	−0·8	94	June, July, Aug.	−33	Jan. 17	48·3	28·5	38·4	+4·1
St. John, N.B.	1015·3	+0·6	87	Sept. 3	−5	Jan. Feb. Dec.	50·3	34·7	42·5	+1·3
Victoria, B.C.	1016·9	+0·5	77	July 22	16	Dec. 19	54·3	42·9	48·6	−0·9

LONDON, KEW OBSERVATORY.—Mean speed of wind 7·5 mi/hr.; 4 days with snow, 5 days with hail, 15 days with thunder heard, 65 days with fog.

GIBRALTAR.—4 days with hail, 16 days with thunder heard, 6 days with fog, 11 days with gale. Mean max. and min. temps. refer to 24-hr. period.

MALTA.—Prevailing wind direction north-westerly. Mean max. and min. temps. refer to 24-hr. period.

SIERRA LEONE.—Prevailing wind direction SW.; 50 days with thunder heard, 3 days with gale.

SALISBURY.—1 day with thunder heard.

Mauritius :—										
May 1921	1014·4	−2·0	80	4, 22	55	26	77·0	64·4	70·7	−1·9
June	1017·9	−1·1	77	1	54	26	75·0	60·4	67·7	−1·7
July	1019·3	−1·1	77	27, 31	55	22	74·7	61·7	68·2	−0·1

Mauritius :—May. Prevailing wind direction ESE., mean speed 6·5 mi/hr.
June. Prevailing with direction ESE., mean speed 6·9 mi/hr.
July. Prevailing wind direction ESE., mean speed 9·4 mi/hr.

British Empire, Year 1921.

TEMPERATURE		Relative Humidity	Mean Cloud Am'nt	PRECIPITATION				BRIGHT SUNSHINE		STATIONS
Mean	Absolute			Amount		Diff. from Normal	Days	Hours per day	Percentage of possible	
Wet Bulb. °F.	Min. on Grass °F.	%	0–10	in.	mm.	mm.				
49·1	16	73	6·3	12·14	309	− 297	104	4·6	37	London, Kew Obsy.
59·9	33	79	4·0	38·89	988	+ 78	74	..	..	Gibraltar.
..	..	..	(4·4)	18·81	478	+ 16	87	7·7	62	Malta.
74·9	..	73	5·3	134·17	3408	− 533	156	..	..	Sierra Leone.
76·9	52	84	8·0	83·22	2114	+ 294	149	..	..	Lagos, Nigeria.
..	..	..	..	..	..	..	..	..	..	Kaduna, Nigeria.
..	..	84	5·3	59·38	1508	+ 97	135	..	..	Zomba, Nyasaland.
58·3	?28	60	4·4	37·29	947	+ 139	91	..	..	Salisbury, Rhodesia.
57·7	..	66	4·5	25·83	656	+ 7	101	..	..	Cape Town.
49·5	25	64	3·8	31·75	806	+ 6	96	8·4	71	Johannesburg.
..	..	..	..	..	..	..	..	..	..	Mauritius.
50·2	..	63	3·3	21·85	555	− 40	73	..	..	Bloemfontein.
74·2	39	61	4·5	56·56	1437	− 131	*78	..	..	Calcutta, Alipore Obsy.
74·1	49	69	3·4	86·02	2185	+ 359	*101	..	..	Bombay.
75·0	59	72	4·7	54·43	1383	+ 128	*96	6·0	..	Madras.
77·1	55	70	7·1	53·56	1360	− 796	179	..	..	Colombo, Ceylon.
67·1	..	75	6·5	97·35	2473	+ 360	128	6·1	50	Hong Kong.
76·6	..	83	..	165·07	4193	+1145	186	..	..	Sandakan.
59·9	30	69	4·9	43·34	1101	− 118	140	6·4	54	Sydney.
54·8	30	66	5·7	29·76	756	+ 108	144	..	..	Melbourne.
..	..	..	..	..	..	..	..	..	..	Adelaide.
59·8	30	62	4·5	41·09	1044	+ 191	135	..	..	Perth, W. Australia.
57·3	25	44	3·9	11·84	301	+ 43	58	..	..	Coolgardie.
64·2	31	69	5·1	54·26	1378	+ 199	160	..	..	Brisbane.
49·7	23	65	6·2	18·04	458	− 144	159	..	..	Hobart, Tasmania.
51·8	21	75	6·5	42·86	1089	− 143	157	5·7	46	Wellington, N.Z.
74·7	..	88	..	170·66	4335	+1481	231	..	..	Suva Fiji.
..	..	74	6·0	25·91	658	− 203	103	..	..	Kingston, Jamaica.
74·2	..	75	4·3	78·62	1997	+ 70	241	..	..	Grenada, W.I.
44·4	− 9	73	5·0	27·35	695	− 155	148	..	..	Toronto.
35·4	..	81	4·9	22·03	560	+ 43	118	..	..	Winnipeg.
38·8	− 6	75	5·8	38·69	983	− 237	145	..	..	St. John, N.B.
44·9	15	81	6·0	35·10	892	+ 65	164	..	..	Victoria, B.C.

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

COLOMBO, CEYLON.—Prevailing wind direction WSW.; mean speed 5·6 mi/hr.; 30 days with thunder heard.

HONG KONG.—Prevailing wind direction easterly; mean speed 10·6 mi/hr.; 46 days with thunder heard, 5 days with fog.

WELLINGTON.—5 days with hail, 2 days with thunder heard, 1 day with fog.

SUVA, FIJI.—32 days with thunder heard.

GRENADA.—10 days with thunder heard, 1 day with gale.

66·6	47	81	6·0	3·91	99	+ 22	21	5·5	49	Mauritius :— May 1921.
62·6	47	74	4·7	0·58	15	− 56	9	7·9	72	June.
62·8	49	74	4·9	0·85	22	− 41	16	7·1	64	July.

(*Continued from p.* 141.)

and north-west of Madrid than there was in December, and ski-ing was still being enjoyed. The winter sports season has lasted for five months.

A message from Cairo dated May 3rd stated that the low level of the Nile was causing much anxiety, notably with regard to the cotton crop. The supply from the White Nile, which provides the bulk of the summer water, has disappointed expectations, being much lower than in any year hitherto recorded. The Blue Nile was also very low.

On the 10th an area of 50 square miles to the west of Winnipeg was in a flooded state owing to the rise of the Assiniboine River. The average depth of water was four feet and a large acreage of the finest wheatlands was threatened. The floods were aggravated by further heavy rains, but were stationary on the 15th, since when no information has been received.

A bridge over the Brazos River, Texas, U.S.A., collapsed on the 16th owing to floods. Of thirty persons on the bridge, only six were rescued.

Further heavy rains, which were much needed, fell in South Australia early in the month.

The special message from Brazil states that the general rainfall during the month was 180 mm. In the north the fall was above normal, the excess at many stations being more than 150 mm. In the centre of the country the rainfall was 20 mm. below normal, and in the south it was irregular or scarce, the general deficit being 22 mm. Sunshine was slightly below normal; the other elements present nothing unusual. The excessive rains in the north were harmful to the sugar cane plantations, but the weather was favourable to the coffee crop. There were slight frosts only in the extreme south, Five anticyclones swept over the southern part of the country, but there was no abnormal cold. At Rio de Janeiro the average pressure was ·08 mb. above normal, and the average temperature 0·9° F. above normal.

The rainfall of the month varied over the British Isles to a greater extent than is usually the case. At Marchmont in Berwickshire only about one-quarter of the average rainfall was recorded, while at Fort William as much as three times the average occurred. Rainfall above the average occurred mainly in the western half of Scotland, where a considerable area in the Western Highlands received more than twice the average, and in isolated areas in the west of Ireland. Along the south coast and in the centre of England, along the east coast of Scotland, and in the neighbourhood of Dublin, less than half the average for the month was recorded. The actual rainfall in these areas amounted for the most part to less than 25 mm. (1 in.). In the West of Scotland falls of 250 mm. (10 in.) were widespread. The thunderstorms towards the end of the month were accompanied in places by hailstones of a remarkable size. (*See* pp. 129 to 131.)

The general rainfall for May, expressed as a percentage of the average, was: England and Wales, 57; Scotland, 129; Ireland, 69; British Isles, 84.

In London, Camden Square, the mean temperature was 59·2° F., or 4·7° F. above the average; the duration of rainfall, 12·9 hours; and the evaporation, 2·93 inch.

THAMES VALLEY RAINFALL —— MAY, 1922.

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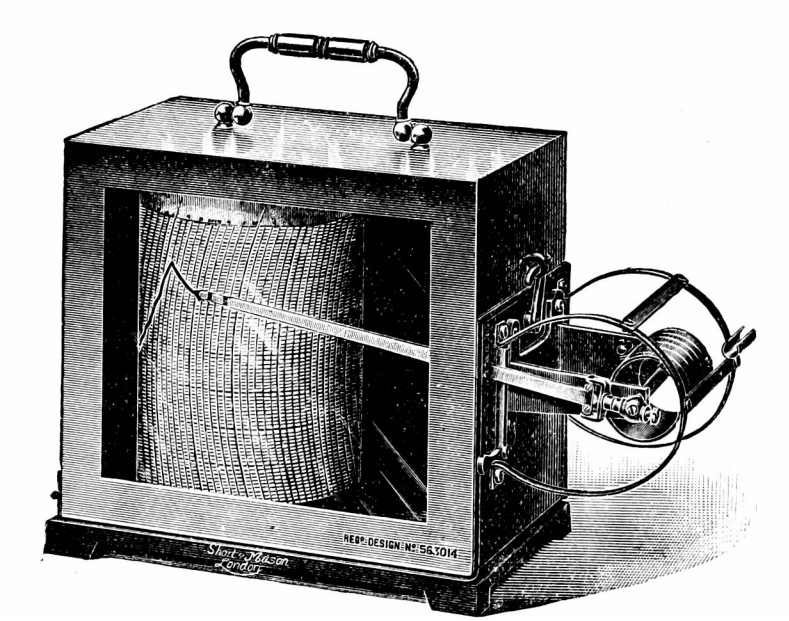

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