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The Polar Flight of the Airship Norge I.

THE landing of the airship *Norge I.* at Teller, Alaska, following her flight over the Pole from King's Bay, Spitsbergen, terminated successfully the Amundsen-Ellsworth Arctic expedition. The flight was undertaken with two main objects in view. The first of these was a desire to make an aerial survey of the extensive unexplored area lying between the Pole and Alaska, and the second was to provide an opportunity of obtaining meteorological observations over the polar basin. Such observations would have a certain value from the purely scientific point of view, and also from the standpoint of assisting in the determination of the extent to which the north polar regions might be utilised at certain times of the year as an air route to the Far East. On the other hand the value, from either standpoint, of results obtained from a single flight is limited. It is at present difficult to say to what extent the objects of the flight were achieved, but as Colonel Nobile, the designer and pilot of the airship, has recently remarked, "a new demonstration of aeronautics in the progress of civilisation has been made."

The *Norge I.* is an Italian semi-rigid airship, 325 feet long, designed by Colonel Nobile, who is in charge of the Italian Government Airship Factory, Rome. She has a capacity of 650,000 cubic feet, and is therefore small compared with existing rigid airships such as H.M. Airship R. 33. Her fuel capacity is such as to enable her to fly about 3,500 miles in still air, at a speed of about 50 miles per hour.

The flight from Rome to Spitsbergen was undertaken in three stages : (1) Rome to Pulham, Norfolk ; (2) Pulham to Leningrad, via Oslo ; (3) Leningrad to King's Bay, Spitsbergen, via Vadsö in northern Norway (Fig. I.).

Rome was left at 9.30 on the morning of April 10th, after a delay due to unfavourable weather, for a strong mistral, which had been blowing during the two previous days, had rendered conditions unsuitable between Rome and southern France. There were two meteorologists on board, Professor F. Eredia, Director of the recently reorganised Italian " Forecasts Office," and Mr. F. Malmgren, of the Bergen Meteorological Institute, who was meteorologist to the expedition, and destined to accompany the airship across the Pole. Major G. H. Scott, the officer in charge of British airship flying, also accompanied the *Norge* on her journey from Rome to Pulham, giving Colonel Nobile the benefit of his wide and valuable experience of conditions in this region. During this stage, special meteorological information was passed to the airship, at first from the Air Ministry, London, and later from the Meteorological Office at Pulham, to assist in coming to a decision whether to land at one of several alternative aerodromes in France, or to make Pulham in one flight. From Rome to Toulouse a following wind was enjoyed, and by 10 p.m., about which time the airship reached Toulouse and headed for Rochefort, the wind in that region had become more definitely south-east, consequent on the eastward movement of an area of low pressure to the west of Spain. Very good progress was therefore made as far as Rochefort, a speed of 75 miles per hour with the wind being attained at times. At Rochefort a sharp turn north was made, and, as the wind had there become north of east and somewhat stronger, progress was for a time considerably impeded. However, as favourable wind conditions were forecast for housing the airship at Pulham, the flight was continued to that station. Pulham was eventually reached at about 3 p.m. on Sunday, April 11th. The landing, however, occupied over two hours owing to sudden changes in temperature resulting from alternations of sunshine and cloud, causing rapid variations in the lift of the airship, and thus rendering handling near the ground difficult. She was ultimately housed in one of the sheds at about 6 p.m. The distance of 1,400 miles from Rome to Pulham had been covered in approximately 30 hours at an average altitude of 1,000 feet.

At this stage the meteorological problem arising was that of forecasting a favourable opportunity for the airship to leave Pulham for Oslo and Leningrad, allowing suitable conditions for her to be moored to a mast at Oslo for at least 12 hours, and providing suitably light winds at Leningrad for landing and housing the airship. In order to provide the necessary

forecasts, charts were drawn at Pulham to cover a very extensive area: northern and western Europe (including Russia), the Atlantic Ocean and America. A very suitable opportunity for undertaking the second stage of the flight was soon found, and as unfavourable conditions were seen to be approaching from

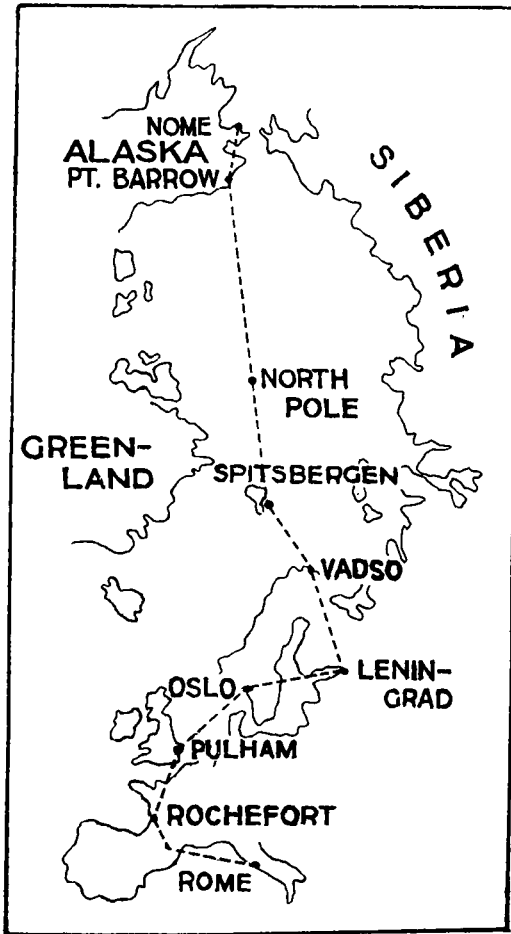


FIG. 1

The third and last stage of the flight from Rome to Spitsbergen could not be undertaken until all preparations for receiving the airship at Spitsbergen had been made. Leningrad was eventually left at 9.30 on the morning of May 5th, and with the assistance of a southerly wind current between an anticyclone centred over Spitsbergen, having an extension across the White Sea, and a shallow depression over southern Norway, Vadsö was reached at 4.30 a.m. on the following morning. The airship was moored there for refuelling, and left for King's Bay, Spitsbergen, at 2.30 p.m. in the afternoon of the same day.

the Atlantic, the occasion was utilised and the *Norge I.* left Pulham for Oslo at 11.40 p.m. on Tuesday, April 13th. Fog was encountered over the North Sea and over Denmark, proving some handicap to navigation, though not a serious one; Oslo was reached in the early afternoon of the 14th, and the airship was secured to the mooring mast for refuelling. The departure for Leningrad took place at 1.0 a.m. on the following morning, and apart from some further difficulties in navigation owing to fog, the flight was satisfactorily terminated at Gatchina Aerodrome, 35 miles south of Leningrad, at 7.30 p.m. in the evening of the same day.

Pressure was then high between the White Sea and Spitsbergen, and weather conditions appear to have been very favourable for this stage of the flight, which might quite well have proved the most difficult of all. King's Bay was reached on the morning of May 7th, and it was here that the expedition was joined by Amundsen and Ellsworth.

On the morning of May 11th, the *Norge I.* left King's Bay for her flight over the North Pole. Some fog was encountered near the Pole, which was reached at 1 a.m. on the morning of the 12th. Course was then set for Point Barrow, Alaska, which is approximately 1,300 miles from the Pole. From the Press accounts of the remainder of the journey, weather conditions then appear to have been somewhat adverse, considerable fog being met, which proved to be, indirectly, the most serious difficulty encountered. During the passage of the airship through a fog (or cloud), ice formed on the gondolas and rigging, causing an increase of weight. A further difficulty arose as this ice dropped off in pieces, and was caught by the propellers and shot up through the fabric of the ship. Loss of gas ensued, and although the holes made in the fabric were kept repaired, the airship became steadily heavier, and it seems to have been on this account that a landing had to be made at Teller, 60 miles north west of Nome, instead of at Nome itself. The flight from King's Bay to Teller occupied 71 hours, of which 25 hours were spent in reaching Teller from Point Barrow, owing to much fog and strong winds.

The voyage of the *Norge I.* has made flight by airship across the north polar basin an accomplished fact, and many valuable lessons have been learnt from it. From the meteorological standpoint, which is the main one in the problem of air navigation over Arctic regions, it would seem that the conditions obtaining over the Pole should, in many ways, be reasonably favourable, at any rate during certain seasons of the year. We may mention for example, that there is, firstly, practically a permanent inversion of temperature, which in calm weather is from the surface upwards to 1,500 to 3,000 feet, and during wind from something of the order of 500 feet up to 1,500 to 3,000 feet.* Secondly, there seems to be an almost complete absence of storms over the polar basin itself. "According to the *Fram* observations, the average maximum wind velocity in the polar basin proper was scarcely over 10 metres per second; only very seldom were velocities over 15-18 metres per second observed. In brief, the basin appears to be practically storm free. Cyclones appear to be phenomena of the rim of the basin rather than of its interior, penetrating the basin but infrequently."† The significance,

*SVERDRUP, H. U. The north polar cover of cold air. *M. W. Rev., Washington D.C.* 53 (1925), pp. 471-5.

†VARNEY, B. M. Meteorological conditions in the Eurasian sector of the Arctic. *M. W. Rev., Washington D. C.* Vol. 53 (1925), pp. 475-9.

from the point of view of airship navigation, of this second consideration needs no comment. The importance of the first lies in the fact that an inversion of temperature makes for stability in flight. If an airship, flying just on the top of an inversion, becomes suddenly heavy, due, say, to a fall in temperature of the gas, she will tend to lose height, but on doing so will, on account of the inversion, immediately encounter colder air, which will increase her buoyancy and restore stability. The converse effect will result if the airship should become suddenly light. The violent vertical air currents associated with thundery conditions, too, would be absent in the polar basin. Fog should not be a great hindrance to airship navigation in polar regions with the development of position finding by radio-telegraphy: in any case, it is only prevalent in the summer months, from about May until the end of September. The most adverse weather conditions, however, are likely to be met on the "rim of the polar basin," that is to say, between northern Scandinavia and Spitsbergen and along the north of Alaska (on the route traversed by the *Norge I.*), and it is difficult to imagine aviation being employed in the polar regions for many years for anything but exploration, the primary object of the present expedition.

It is to be hoped that the achievement of the *Norge I.* is only the first of a series of such enterprises to be undertaken with a view to obtaining further meteorological information regarding the polar regions. The publication of the meteorological observations taken on the *Norge I.* between Spitsbergen and Alaska will be awaited with interest.

S. P. PETERS.

Royal Meteorological Society

THE monthly meeting of this Society was held on Wednesday, May 19th, at 49, Cromwell Road, South Kensington, Sir Gilbert T. Walker, C.S.I., F.R.S., President, in the Chair.

E. S. Player.—Meteorological Conditions and Sound Transmission.

This paper first describes a series of observations made by the author at Joss Gap, near the North Foreland, during the years 1921-22, when the sound from the siren of the North Goodwin light-vessel was observed. The audibility of the siren showed very marked fluctuations, the changes sometimes occurring with great rapidity. The fluctuations were recorded by means of a galvanometer connected to a Wheatstone bridge, one arm of which consisted of a doubly-resonated hot-wire microphone.

The experiments show that acoustical conditions depend on wind, temperature and humidity, as might be expected from general considerations. The effect of wind depends on its

direction: for example, if the wind increases with height, the wave front downwind is carried forward more rapidly at a height than it is at the ground, and, consequently, the sound keeps low; while upwind the effect is reversed, the sound being deflected upwards, and so lost. The effect of temperature may be deduced from the fact that sound travels faster in warm air than in cold air, so that temperature decreasing with height tends to deflect sound upwards, while temperature increasing with height deflects sound downward. The latter is thus more favourable for audibility along the ground. It was noted in the paper, and again brought up in the subsequent discussion, that as the effect of the changes of temperature with height is the same for all horizontal directions, if it reinforces the wind effect for sound travelling in one direction, it will oppose the wind effect for sound travelling in the opposite direction. The experiments showed that humidity is also a very important factor, and a diagram is given showing how, during the day, audibility would diminish as humidity diminished, and increase as humidity increased.

It is noted that the worst acoustical conditions occurred on days such as are usually described as "oppressive," during the warmer months of the year, when there is little or no wind, the sky is cloudless, but there is a considerable haze at an altitude.

During the summer of 1925 a series of flights by R.A.F. machines was organised for continuing the experiments, and observing the audibility from the ground of sources of sound in the air. Observations of the intensity of the sound from an aeroplane were made by ear and instrumentally, and it was found that the intensity varied very considerably, and, further, that good audibility from a height was not of necessity associated with good audibility along the surface. On occasions, as the aeroplane circled round, it appeared from time to time to pass into a well-marked silent zone. These 1925 experiments again showed the very marked effect of humidity. The measurements of audibility were compared with observations of temperature and humidity made by an observer in an aeroplane, and some remarkable observations of this nature are given in the paper.

In the course of the discussion which followed, the effects of variations of wind and temperature with height were elaborated, and emphasis was laid on the possible effect of sharp discontinuities in temperature and humidity.

J. Glasspoole, M.Sc., Ph.D.—The wet summer of 1924 and other wet seasons in the British Isles.

C. E. P. Brooks, M.Sc.—Pressure distributions associated with wet seasons in the British Isles.

In a paper read before this Society in February, 1922, some

features of the remarkable drought of 1921 were discussed and compared with those of previous droughts in these Islands. The abnormal rainfall of 1924 provides an opportunity for a similar study of pronounced wet seasons. Maps are given of the rainfall (as a percentage of the normal) of other wet seasons over the British Isles since 1870, of from three to seven months' duration, together with brief notes of the rainfall distributions of the individual months of these wet periods. A list of the periods discussed in the paper is given below :—

April-Oct., 1924.	Nov., 1911-Mar., 1912.	April-Sept., 1879.
Dec., 1919-May, 1920.	April-June, 1907.	Nov., 1876-Feb., 1877.
July-Sept., 1918.	Jan.-Mar., 1903.	Sept.-Nov., 1875.
Nov., 1914-Feb., 1915.	April-Oct., 1903.	Sept., 1872-Jan., 1873.
Mar.-May, 1913.	Aug.-Dec., 1891.	Jan.-July, 1872.
June-Aug., 1912.	Sept., 1882-Feb., 1883.	

A comparison of the maps with those for dry periods indicates that while large deficiencies are confined mainly to the south and east of these islands, large excesses do occur in the north and west. The results of the present investigation form a basis for the comparison of current weather, and are indicative of the excesses likely to be experienced in the future.

The second paper discusses the average pressure distribution over the northern hemisphere during each of the wet periods enumerated above, from 1876 to 1924. The pressure distributions were represented as deviations from normal, and it was found that they fall into two clearly defined types :—

- a. Greatest deficit of pressure over Iceland.
- b. Greatest deficit of pressure over the British Isles.

The classification of the different periods was as follows :—

Type a.	Type b.	Intermediate.
Aug.-Dec., 1891.	Nov., 1876-Feb., 1877.	
Jan.-Mar., 1903.	April-Sept., 1879.	
Mar.-May, 1913.	April-Oct., 1903.	
Dec., 1919-May, 1920.	April-June, 1907.	
	Nov., 1911-Mar., 1912.	Sept., 1882-Feb., 1883.
	June-Aug., 1912.	
	Nov., 1914-Feb., 1915.	
	July-Sept., 1918.	
	April-Oct., 1924.	

Out of fourteen charts only one could be regarded as intermediate between the two types. With a pressure distribution of type *a* the south-west winds over these islands would be stronger than normal, giving more orographic rain on the western highlands, and in all the four periods classed as of this type the rainfall distribution was found to be mainly orographic. With a pressure distribution of type *b* there would be a tendency for depressions to pass directly across these islands, giving an excess of rainfall over the whole country (cyclonic type), and with the exception of April-June, 1907, all the periods with a pressure distribution of type *b* had this type of rainfall distribution.

The conditions in the Atlantic Ocean during and preceding these wet periods were then investigated. The conclusions may be summarised as follows :—

Conditions favourable to a wet period of the mainly orographic type :—

North-east trade wind velocity below normal nine to twelve months before.

South-east trade wind velocity below normal twelve months before.

Pressure difference, Sydney (Nova Scotia) minus Ivigtut (Greenland), above normal three months before.

Amount of ice near Iceland below normal during the wet period.

Conditions favourable to a wet period of the mainly cyclonic type :—

Pressure difference, Sydney minus Ivigtut, above normal three months before.

Amount of ice near Iceland above normal in preceding spring, but below normal during the wet period.

The weak north-east and south-east trades and the large pressure difference between Sydney and Ivigtut all contribute to a lower temperature in the North Atlantic, which may thus be the chief cause of a wet season in the British Isles. The part played by the Iceland ice is probably to determine the location of the greatest deficit of pressure.

Correspondence

To the Editor, *The Meteorological Magazine*

The Sunny South-West

AN article on "Seasonal Sunshine in Great Britain," by Mr. Charles Harding, appeared in *Nature* of March 20th. The results are based on the 35 year mean 1881-1915. Comparing south-east England with south-west England and south Wales the writer says "The average sunshine for the year in south-east England is 4.49 hours a day, and in south-west England and south Wales, including the so called Cornish Riviera, it is 4.28 hours. In the winter south-east England has an average daily sunshine of 1.92 hours and in south-west England and south Wales the value is 1.91 hours a day; in spring the hours of sunshine for the two districts are respectively 5.50 and 5.36, in summer 6.88 and 6.41, and in autumn 3.46 and 3.31 hours."

An examination, however, of the Meteorological Office figures upon which these values are based, show that more sunshine is experienced in the south-west than in the south-east. This fact is hidden through the district being linked up with south Wales, which has different climatological characteristics. South-west

England and south Wales have now been made separate districts by the Air Ministry for forecasting purposes, but the original larger areas are still retained for climatological investigation. The counties included in south-west England have an area of 6,548 square miles, and those in south-east England 7,224 square miles. As these districts are situated in approximately similar latitudes there is but little difference between them for purposes of comparison of sunshine values. The addition of south Wales, however, with its additional 4,762 square miles of country brings the south-western district up to 11,310 square miles, and the lowering effect upon the sunshine values is apparent.

The results for south-east and south-west England are as follows :—

	South-east England.	South-west England.
Spring (Mar., Apr., May) ..	5.50 hours	5.66 hours
Summer (June, July, Aug.) ..	6.88 „	6.75 „
Autumn (Sept., Oct., Nov.) ..	3.67 „	3.68 „
Winter (Dec., Jan., Feb.) ..	1.92 „	2.01 „
Year	4.49 „	4.53 „

J. B. PHILLIPS.

The Observatory, Falmouth. April 28th, 1926.

Winter in Spain

HAVING just returned from a 5 months' visit to Barcelona, and having kept a daily record of the temperatures in that city from November to April, I submit the following data :—

Month.	Mean Max.	Mean Min.	Mean Temp.	Diff. from Average.
December ..	56.2	47.5	51.9	+1.9
January ..	58.6	45.0	51.8	+3.8
February ..	62.3	49.3	55.8	+5.8
March ..	64.1	53.2	58.7	+6.0
April ..	67.3	56.4	61.9	+3.9
Averages ..	61.7	50.3	56.0	4.3

This shows a result much above the average, the latter being 51.73 only. There was no reliable record of rainfall, but it could not have exceeded $2\frac{1}{2}$ to 3 in. during the whole period. There was a great excess of sunshine, but this was not recorded officially. Barcelona is considerably warmer than Madrid during the winter months, the mean isotherms being on a level with the south of Italy. Madrid has higher day temperature, but the nights are much cooler, making the range far greater there than at Barcelona : at the latter the cool winds and rain invariably come with a

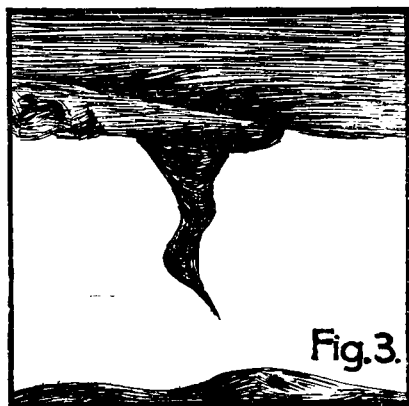
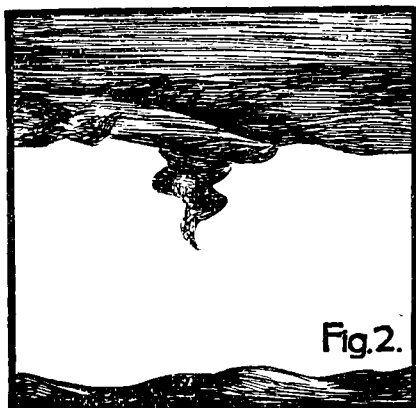
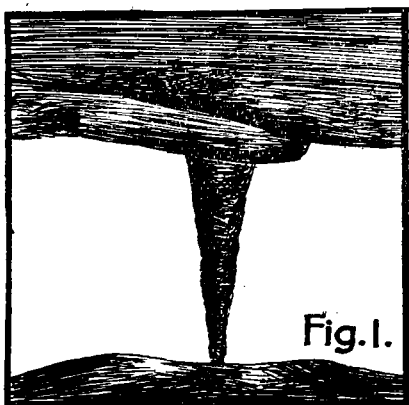
northerly current from the Pyrenees, and many mountains on this range were capped with snow at the end of April.

A. F. PARBURY.

Newbridge Road, Bath, Somerset. May 6th, 1926.

A Cloud Pendant at Eskdalemuir

On April 20th a cloud pendant was observed to the south of the Observatory and appeared to be just over a mile away. It was first seen at 9.39 G.M.T. in the form of a funnel with definite edges (Fig. 1) linking the cloud to the top of the hills. This cloud was strato cumulus with a well defined base. The sky was



9/10ths clouded with strato cumulus moving from the north-west. The anemometer record for this period shows light north westerly airs to calm. The lower part of the pendant then left the hill and became very thin. Soon after, this bottom part or tail curled up as in Fig. 2 and swayed about like an elephant's trunk (Fig. 3). Presently it swayed into the direction of the wind (Fig. 4) and as it moved over the Esk Valley it gradually dwindled away.

It was seen by several people in the district. One farm-hand stated that it came within 2 or 3 feet of the ground (according to this man the distance between the base of the cloud and the ground was roughly 100 ft.) No rain fell from the pendant.

R. V. M. GARDINER.

The Observatory Eskdalemuir. April 27th, 1926.

Rare Halos

I was fortunate enough to witness a somewhat unusual halo this afternoon. At 14 h. 30 m. (G.M.T.) the sky was apparently clear except for detached cumulus, but close inspection showed a very tenuous sheet of cirrus spreading up from the south-west. The normal halo of 22° was clearly visible and brightly coloured, but inside it was a second halo having a radius of about 15° . This halo was also coloured, the red being nearest the sun as in the 22° halo. The two halos persisted and at the time of writing (19 h. 40 m.) they can still be distinguished even though the sun has set. At about 16 h., a third halo became visible outside that of 22° . It was colourless and had a radius of roughly 35° . The writer was careful to measure the radius as it was obviously not the halo of 46° .

Pernter and Exner* mention these halos as rarities.

At no time were any parhelia or tangent arcs visible nor was there any sign of the horizontal ring.

CHARLES LEAF.

7, Grange Road, Cambridge. April 16th, 1926.

[The coloured halo of about 15° radius is of extremely rare occurrence. Just as the 22° and 46° halos are produced by refraction at 60° and 90° refracting angles respectively, oriented for minimum deviation, so the 15° halo would be produced by refraction at a refracting angle of 45° . The origin of white halos is somewhat obscure, but they are considered to be produced by refraction and total reflection at the sides of the ice crystals.—ED. M.M.]

NOTES AND QUERIES

A Dragon's Tail

Mr. Joseph Clark, of Street, Somerset, sends us word that on April 7th, from 1.30 to 1.45 p.m., a "waterspout" was seen on the Polden range of hills, about $2\frac{1}{2}$ miles from the observer, on the south side of the Wirral Hill, Glastonbury. The main heavy mass of cloud from which the pendant came was travelling quickly from west to east. When first seen, the funnel-shaped

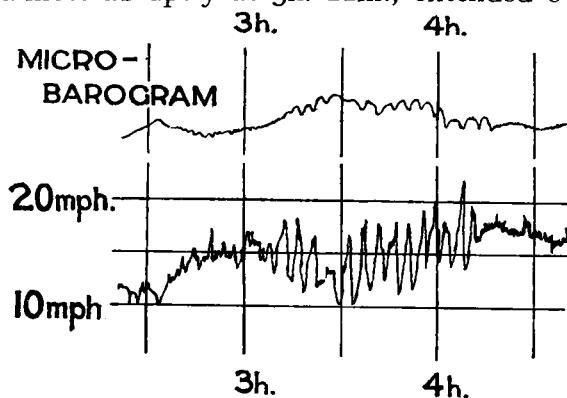
* PERNTER J.M., AND EXNER F.M. *Meteorologische Optik*, 2nd edition, Vienna and Leipzig, 1922, pp. 297-8.

pendant appeared to be touching the ground. Later this broke in two, but joined again. After about 8 to 10 minutes the pendant faded into the background. This type of cloud is known locally as a "Dragon's Tail," and Mr. Clark remarks that in a long life he has only seen four, the first one being pointed out to him as a boy about 74 years ago.

An example of stationary pressure waves at Holyhead

SOME interesting records of wave motion were obtained at Holyhead on the anemogram and the microbarogram of November 19th, 1925. Attention was directed to them by Mr. H. L. Pace, who is in charge of the meteorological station at Salt Island. The essential parts of the records are reproduced in the figure.

It will be seen that these outstanding oscillations, commencing almost abruptly at 3h. 11m., extended over exactly one hour,



at the end of which time the effect could no longer be traced. If allowance is made for the time errors on the two charts, it is evident that the pressure and wind changes occurred simultaneously. During this interval of time fourteen complete oscillations

can be traced, having a period of 4.3 minutes. Further, by taking the mean wind speed as 15 miles per hour, the wave length is found to be 1,900 yards. From the wind record it is also apparent that there is a secondary disturbance which has a period approximately four times that of the primary disturbance. At the time the disturbance commenced the surface wind was east, and backed slowly to east-north-east between 3h. 30m. and 3h. 50m., while just as these oscillations were dying out it commenced to veer again to east.

The general meteorological situation at the time was such that for a day or two an easterly wind current extended from western Germany across the northern Midlands, assuming a more southerly direction over northern Ireland. During November 18th, a separate centre of the anticyclone formed over southern Scotland, a light northerly wind current passing over the north of England, and showing also at Eskdalemuir at the 7h. and 18h. observations. A considerable number of pilot balloon ascents

in the late afternoon of the 18th made it possible to examine the tracks of the air arriving at Holyhead at various levels. These agree in indicating that at almost all levels up to 6,000 feet the air must have crossed the north Midlands, Cheshire, the eastern Irish Sea, and thence passed over the Isle of Anglesey. It appears improbable that a track crossing the mountains of north Wales could have been followed, and that the waves were set up as a result of passing over this high ground.

The readings at Holyhead at 16h., November 18th, are singular in that there is distinct evidence of a light wind slightly east of north at about 2,500 feet, while both below and above that height the wind was stronger and almost due east. This effect was not observed at any other station, and was not found at Holyhead in the next balloon ascent made at 9h. on November 19th. The speeds and directions shown by the ascent at 16 h. are given below :—

Height.			Wind Speed (miles per hours).	Direction (degrees from North).
500 feet	..	..	15	85
1,000 "	..	..	12	85
1,500 "	..	..	7	65
2,000 "	..	..	7	25
2,500 "	..	..	5	38
3,000 "	..	..	9	85
3,500 "	..	..	15	94

Aeroplane ascents were made at Duxford on the mornings of November 18th and 19th, temperature inversions produced by subsidence being registered on each occasion with very dry air above the inversion. On November 18th at 10h. 45m. there was an inversion of 3.5° F. between 365 and 800 feet, of 1° F. at 2,400 feet, and of 2° F. at 5,200 feet. On November 19th at 10h. an inversion of 13° F. was found at 2,150 feet, and one of 1° F. at 6,900 feet. It seems unlikely that so large an inversion as 13° F. could be produced at Holyhead by 3h. of November 19th, but it is significant that the level of this inversion is approximately the same as that at which the different wind direction and speed were found at Holyhead.

It appears probable that the waves observed were set up at this surface of discontinuity. From the readings obtained in the pilot balloon ascent at Holyhead at 16h., November 18th, the surface was probably at a height between 2,500 and 3,000 feet, where the north wind dies out and is replaced by the east wind above it. Another point worth noting is that at a level of about 7,500 feet the wind is again north-north-east, and this height is comparable with that found at Duxford (6,900 feet) on the following morning for the second inversion of temperature.

This second surface of discontinuity may help to account for the feebler wave of longer period super-imposed on the main wave.

The striking fact with regard to these waves is that the formation of inversions is by no means an infrequent occurrence, and one might thus be led to expect evidence of them on the autographic records much more often than appears to be the case.

R. S. READ.

Memòires Patxot

To encourage research in Physics and Mathematics principally in Catalonia, M. Raphaël Patxot i Jubert in 1922 and the following years has offered prizes for the best essays on certain subjects connected with Catalonia. The winning essays published by M. Patxot i Jubert are known as the *Memòires Patxot*. The subject chosen for the 1926 (the fifth) competition is a meteorological one, the title being "*Météorologie de la Méditerranée Occidentale et plus spécialement de la côte Catalane.*" This time the competition is international, and the essays may be written in Catalanian, any one of the Latin languages, or in English. The prize offered is 5,000 pesetas. The competition closes on December 31st, 1927. Further particulars can be obtained from M. R. Patxot i Jubert, Rue de la Cucurulla, 1 and 3, Barcelona.

Weather in the Argentine

THE remarkably hot weather which prevailed in the middle latitudes of Argentina since the third week of December, 1925, terminated on the 9th of April when the advent of a high pressure system in the south (1,030 mb. at Port Madryn at 8 a.m. on the 9th) caused a rapid fall of temperature with the first snows of the season in Patagonia on the 8th. The mean daily maximum temperature of the first eight days of the month in Buenos Aires was 70° F. above the average of the 20 years 1906-1925, while the nocturnal warmth was even more marked, the mean of the minima being as much as 10.6° F. above the normal. It is worthy of note that the summers of 1924-25 and 1925-26 have been exceptionally hot in Buenos Aires. Taking the four months December to March, there was in 1924-25 a record excess of 3.8° F. in the mean temperature (mean of 24 hours), and in 1925-26 of 3.2° F. January of this year with a mean temperature of 77.7° F. shared with January, 1858, the distinction of being the hottest month in Buenos Aires during the 70 years 1856-1925. The month following with a mean of 77.0° F. constituted another record, for although the Februaries of the years 1925 and 1913 were slightly hotter than that of 1926 there was

no previous instance of two consecutive months in Buenos Aires with a mean of 77.0° F. or above as has just happened. It is of interest to note that in both these hot summers the lines of temperature inversion on the Atlantic Coast were located a little south of Rio on the one hand and south of Santa Cruz on the other. The hot summer in Argentina has been associated with a remarkable fall in the River Uruguay which, at Paso De Los Libres (Lat. 30° S., Long. 57° W.) is lower than since the year 1877. On the other hand the river Parana at Rosario some 310 miles south west of Libres is in high flood, as are also some of the southern rivers.

R. C. MOSSMAN.

Climatic Fluctuations in China

Mr. Co Ching Chu has made a useful contribution to the subject of climatic fluctuations by a study of the weather records in the Chinese archives since the first century A.D. This study has been published in the *Geographical Review* for April, 1926. The most important results refer to variations of rainfall, for which his method is similar to that employed in discussing the long-period fluctuations of rainfall in the British Isles.* The numbers of records of floods and of droughts are tabulated for each century, and in order to eliminate the secular increase due to the greater frequency of records in more recent centuries, the ratio of droughts to floods is taken as the measure of dryness. Converted to the same measure of "raininess" as was employed for the British Isles, the figures give:—

Century	...	...	...	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"Raininess" per cent.	...	...	...	34	38	11	33	20	23	43	36	36	37	49	36	49	31	34

It will be noticed that the figures are all below 50 per cent., indicating that drought is a greater enemy than flood in China, whereas in Britain the reverse holds. The figures point to a marked minimum of rainfall in the fourth century and to lesser minima in the sixth to seventh and in the fifteenth centuries, while there were maxima in the eighth, twelfth and fourteenth. The droughts of the seventh and fifteenth centuries are confirmed by records of extensive emigration at those times, due to pressure of population caused by droughts and famines. The author might also have remarked that the dry period from the fourth to the seventh centuries coincides with a long period of anarchy and general disruption in China.

Fluctuations of temperature are more difficult to determine, since there is no ready way of eliminating the secular increase in the number of records. The author tabulates the frequency of severe winters in China, and finds a maximum in the twelfth to fourteenth centuries. He compares these Chinese figures with

* *Meteor. Mag.*, 60 (1925) p. 108.

Brückner's data of severe winters in Europe, which show a similar maximum in the twelfth to fourteenth centuries, and points out that the Chinese records of sunspots also reach a maximum at the same time.

These data from the east of Asia do in fact add appreciably to the evidence in favour of world-wide climatic fluctuations during the historical period, by the remarkable agreement which they show with similar data from Europe. The latter may be represented by a curve of "raininess" published in 1925,* and obtained by tabulating the records of floods and droughts for western and central Europe from the beginning of the Christian era, and combining these figures with the available evidence of lake and glacier fluctuations, Alpine settlement, etc. This curve shows a maximum of rainfall in the second century A.D., pronounced minima in the fourth, sixth and seventh centuries, and a prolonged maximum from the beginning of the eleventh to the middle of the fourteenth century. The agreement between the major swings of the two curves is very close, and seems to show that there were real changes in the direction of greater dryness in the north temperate belt after the third century A.D. and back to increased rainfall in the eleventh to fourteenth centuries.

Smoke Trail behind Aeroplane

ON December 23rd, 1925, at 12h. 45m., while watching an aeroplane in which electrical heating experiments were being carried out, at a height of about 25,000 ft., Flight-Lieutenant Shales noticed that the aeroplane had a long following almost straight trail of steam or smoke, which became trumpet-shaped towards the end. The trail lasted about the same time as the smoke used for sky writing. It was not continuous but the longest clear length was about 50 times the length of the aeroplane and stood out white and clear against the blue sky. The day was fine, very cold and clear, with occasional cumulus cloud at a height below the aeroplane. Temperatures recorded on the same day and about the same time by other aeroplanes were below -44° C. (-47° F.) at this height, and the cloud was due to the condensation of the water of combustion owing to the low temperature.

On January 4th, 1926, while flying the same aeroplane at a height of about 25,000 ft. at -42° C. (-44° F.) Squadron Leader Haig observed the formation of swirls of snowy mist from the exhaust. Alterations of the altitude control, to alter the mix-

* *Discovery*, VI., (1925) p. 473.

ture, did not apparently alter the volume of the snow formation. The trail was not observed from the ground in this case as the aeroplane was above cloud.

Fifty Years' Observations

Mr. H. Mellish has included with his summary of "The weather of 1925, at Hodsock Priory, Workson," tables of the mean and extreme values during a period of fifty years. Mr. Mellish started the station at Hodsock Priory in 1876, for the observation of rainfall, wind and cloud. When he joined the Royal Meteorological Society, in 1879, he extended the observations to include pressure and temperature, and in 1881 a sunshine recorder was added to the equipment. Now he has published tables giving means for all these elements for either 45 or 50 years, together with a brief description of the main features of the period. Throughout the whole of the time, Mr. Mellish has been personally responsible for the observations and we are sure that our readers will join with us in congratulating him on this long record.

Reviews

National Bureau of Standards, its functions and activities, Dept. of Commerce. Circular of the Bureau of Standards, No. I. Size 10 × 7, pp. v + 113 (*illus.*). Washington, 1925, 50 cents.

This publication is intended to interest the general public of the United States in the work of the National Bureau of Standards, Washington. It is an interesting and well illustrated popular account of the functions of the Institute, and as such deserves notice on this side of the Atlantic as well as in America. The treatment of each individual section of the work is necessarily brief but nevertheless the book runs to over a hundred pages and includes nearly that number of photographs. As in most American publications of the kind, the printing and paper are admirable.

The Bureau of Standards was established by Congress in 1901 for the purpose of fulfilling the Constitutional authority to "fix the standard of weights and measures." The act of establishment gave the Bureau legal authority to fix standards of every kind necessary for modern commerce as well as to carry out any research work associated with its main functions. These terms of reference have been interpreted very broadly and the Bureau appears to be prepared to investigate any problem associated with standardisation, even in cases where the physicist is less concerned than the industrial psychologist. The Bureau has, for instance, standardised the cardboard boxes used for packing hosiery.

It will be realised that the functions of the Bureau extend

beyond those of our own National Physical Laboratory, an institution which, in other respects, it closely resembles. In particular, the Director of the National Physical Laboratory is not the custodian of the British standard weights and measures.

To the meteorologist there is little of direct interest in this pamphlet, no description being given of the methods of test applied to meteorological instruments. The meteorologist is, however, interested as much as anyone else in the general question of precision and the methods of obtaining it. He will therefore peruse the book with considerable interest, wishing at the same time, perhaps, that something similar was available in connexion with the British counterpart of the Bureau.

E.G.B.

Graphic studies in Climatology. 1. Graphic representation of a classification of climates, by J. B. Leighly, Univ. California Publications in Geography, Vol. 2, No. 3, pp. 55-71. Berkeley, California, 1926.

The comparison of climatological data in an easily understandable way is a problem which frequently confronts teachers and lecturers. Köppen's climatic formulæ would be admirable for the purpose, were it not that they are based entirely on numerical definitions; for English readers they have the additional disadvantage that the original numbers when converted to English measures lose their simple character. The author has therefore devised graphical methods of representing Köppen's divisions; he neatly describes his figures as the converse of climatological maps, representing the distribution of geographical areas within the frame of possible climatic variation.

Books Received.

India Weather Review. Annual Summary for 1923, pp. 263; Calcutta, Government of India Press, 1915, 12 rupees 8 annas. 20s.

News in Brief

Mr. G. B. Hamlin reports that during a thunderstorm at Burlow, Hellingly, Sussex, on May 22nd, the temperature fell 12° in less than 30 minutes.

The *Irish Times* states that a remarkable display of solar halos was discernible at Dublin on May 2nd. Most of the day the sky was covered with cirriform cloud, and between 5 and 6 p.m. a number of coloured intersecting circles developed, though, curiously enough, the 22 degrees primary halo was not produced.

Erratum

March, 1926, p. 39, line 17, for "altitude," read "latitude."

The Weather of May, 1926

THE weather of May was generally unsettled and cool during the first part, with a change to warm sunny conditions after the 20th. Easterly winds and fair to cloudy skies were prevalent during the first two or three days, but on the 4th the winds backed to north. Secondaries moving southwards in this northerly current caused showers of rain, hail, sleet and snow, and occasional thunder; 28 mm. were measured at Brighton on the 5th, and, during a thunderstorm at Hampstead on the 7th, 11 mm. fell in 11 minutes. Screen minimum temperatures about 30° F. occurred at several places, and at a few northern stations the maximum temperature did not reach 50° F. during this period. Between the 9th and 14th a depression developing south of Iceland moved slowly south-east across the British Isles, causing a slight rise in temperature with the change in wind direction. Showers occurred at most places, but the amounts measured were small. Northerly winds were renewed in the west on the 12th in the rear of the depression, and later over the whole country. During the cold spell which followed, ground temperatures were slightly lower than during the first week, 15° F. being recorded at Rhayader on the 16th. Snow occurred in parts of Scotland and the south Midlands on the 14th. On the same day 46 mm. (1.81 in.) of rain were measured at Winchmore (Gloucester), 38 mm. (1.50 in.) at Tenterden (Kent), and, during a thunderstorm in and around London, 45 mm. (1.77 in.) fell at Hampstead, the largest amount recorded there in May since records began in 1910. Between the 16th and 20th the weather continued cloudy and cool, but on the 21st there was a considerable rise in temperature as a high pressure area became established over the country. Light variable winds with warm sunny weather and some local thunderstorms prevailed for the next four or five days, and maximum temperatures above 70° F. were recorded at many stations, 79° F. being reached at Camden Square, London, on the 26th. Meanwhile a fresh depression approached from the Atlantic, causing rain generally in the west on the 24th, which extended to the eastern districts on the 27th. Changeable weather with cooler westerly winds continued until the end of the month.

Pressure was above normal over Spitsbergen, Iceland, northern Scandinavia and the Iberian Peninsula, the excess being as much as 6.4 mb. at Spitsbergen, and below normal elsewhere in Europe and over the northern Atlantic. Temperature was generally below normal except in Spitsbergen and rainfall was above normal except in the extreme north and west. Much damage was done by storms and floods in central and western Europe during the first part of the month. Three people were

Continued on p. 124.

Rainfall: May, 1926: England and Wales

CO.	STATION.	In.	mm.	Per- cent of Av.	CO.	STATION.	In.	mm.	Per- cent of Av.
<i>Lond.</i>	Camden Square	2.30	58	131	<i>War.</i>	Birmingham, Edgbaston	3.87	98	181
<i>Sur.</i>	Reigate, Hartswood ...	1.49	38	88	<i>Leics</i>	Thornton Reservoir ..	3.80	97	189
<i>Kent.</i>	Tenterden, Ashenden ...	3.49	89	222	"	Belvoir Castle	3.07	78	145
"	Folkestone, Boro. San.	1.62	41	...	<i>Rut.</i>	Ridlington	2.47	63	...
"	Margate, Cliftonville ...	0.76	19	48	<i>Linc.</i>	Boston, Skirbeck	2.47	63	140
"	Sevenoaks, Speldhurst.	1.28	33	...	"	Lincoln, Sessions House	1.61	41	86
<i>Sus.</i>	Patching Farm	3.45	88	187	"	Skegness, Marine Gdns.	1.41	36	83
"	Brighton, Old Steyne ...	3.02	77	187	"	Louth, Westgate	2.73	69	135
"	Tottingworth Park	3.00	76	167	"	Brigg	2.00	51	107
<i>Hants</i>	Ventnor, Roy. Nat. Hos.	1.95	50	115	<i>Notts.</i>	Worksop, Hodsok ...	1.66	42	83
"	Fordingbridge, Oaklands	1.98	50	95	<i>Derby</i>	Mickleover, Clyde Ho.	3.20	81	162
"	Ovington Rectory	2.14	54	99	"	Buxton, Devon. Hos.	4.13	105	133
"	Sherborne St. John Rec.				<i>Ches.</i>	Runcorn, Weston Pt. ...	3.71	94	161
<i>Berks</i>	Wellington College ...	1.45	37	78	"	Nantwich, Dorfold Hall	4.03	102	...
"	Newbury, Greenham ...	1.90	48	101	<i>Lancs</i>	Manchester, Whit. Pk.	3.37	85	159
<i>Heris.</i>	Benington House				"	Stonyhurst College	3.57	91	125
<i>Bucks</i>	High Wycombe	2.69	68	153	"	Southport, Hesketh ...	3.09	79	148
<i>Oxf.</i>	Oxford, Mag. College ...	2.99	76	167	"	Lancaster, Strathspey.	2.95	75	...
<i>Nor.</i>	Pitsford, Sedgebrook ...	3.29	84	172	<i>Yorks</i>	Sedbergh, Akay	2.87	73	90
"	Eye, Northolm	2.52	64	...	"	Wath-upon-Deane ...	1.63	41	80
<i>Beds.</i>	Woburn, Crawley Mill.	2.38	61	123	"	Bradford, Lister Pk. ...	2.81	71	134
<i>Cam.</i>	Cambridge, Bot. Gdns.	2.05	52	116	"	Wetherby, Ribston H.	2.73	69	132
<i>Essex</i>	Chelmsford, County Lab	1.05	27	73	"	Hull, Pearson Park ...	1.99	51	103
"	Lexden, Hill House ...	0.89	23	...	"	Holme-on-Spalding ...	1.70	43	...
<i>Suff.</i>	Haokedon Rectory ...	1.67	42	90	"	West Witton, Ivy Ho.	3.32	84	...
"	Haughley House	1.00	25	...	"	Felixkirk, Mt. St. John	2.53	64	135
<i>Norfol.</i>	Beccles, Geldeston ...	2.01	51	114	"	Pickering, Hungate ...	1.99	51	...
"	Norwich, Eaton	1.52	39	79	"	Scarborough	1.55	39	81
"	Blakeney	2.19	53	133	"	Middlesbrough	1.64	42	85
"	Swaffham	2.55	65	146	"	Baldersdale, Hury Res.	2.28	58	86
<i>Wilts.</i>	Devizes, Highclere ...	3.16	80	175	<i>Durh.</i>	Ushaw College	1.98	50	92
"	Bishops Cannings ...	3.51	89	180	<i>Nor.</i>	Newcastle, Town Moor.	3.29	84	162
<i>Dor.</i>	Evershot, Melbury Ho.	3.03	77	149	"	Bellingham, Highgreen	2.92	74	...
"	Creech Grange	2.51	64	...	"	Lilburn Tower Gdns. ...	2.43	62	...
"	Shaftesbury, Abbey Ho.	2.47	63	117	<i>Cumb.</i>	Geltsdale	2.97	75	...
<i>Devon</i>	Plymouth, The Hoe ...	1.34	34	65	"	Carlisle, Scaleby Hall	2.81	71	118
"	Polapit Tamar	1.11	28	55	"	Seathwaite M.	7.44	189	101
"	Ashburton, Druid Ho.	1.81	46	68	<i>Glam.</i>	Cardiff, Ely P. Stn.	2.47	63	99
"	Cullompton	1.91	49	88	"	Treherbert, Tynywaun	5.44	138	...
"	Sidmouth, Sidmount ...	1.00	25	51	<i>Carm.</i>	Carmarthen Friary ...	2.64	67	96
"	Filleigh, Castle Hill ...	2.37	60	...	"	Llanwrda, Dolaucothy.	3.87	98	115
"	Barnstaple, N. Dev. Ath.	1.22	31	59	<i>Pemb.</i>	Haverfordwest, School	2.30	58	92
<i>Corn.</i>	Redruth, Trewirgie ...	2.41	61	104	<i>Card.</i>	Gogerddan	2.64	67	100
"	Penzance, Morrab Gdn.	2.19	55	99	"	Cardigan, County Sch.	1.94	49	...
"	St. Austell, Trevarna ...	2.31	59	95	<i>Brec.</i>	Crickhowell, Talymaes	3.00	76	...
<i>Soms</i>	Chewton Mendip	3.27	83	118	<i>Rad.</i>	Birm. W. W. Tyrmynydd	3.54	90	103
"	Street, Hind Hayes ...	2.07	53	...	<i>Mont.</i>	Lake Vyrnwy	4.29	109	136
<i>Glos.</i>	Clifton College	2.59	66	124	<i>Denb.</i>	Llangynhafal	3.13	80	...
"	Cirencester, Gwynfa ...	3.87	98	183	<i>Mer.</i>	Dolgelly, Bryntirion ..	3.47	88	105
<i>Here.</i>	Ross, Birchlea	2.43	62	114	<i>Carn.</i>	Llandudno	1.99	51	105
"	Ledbury, Underdown ...	2.99	76	147	"	Snowdon, L. Llydaw 9	12.35	314	...
<i>Salop</i>	Church Stretton	3.60	91	140	<i>Ang.</i>	Holyhead, Salt Island.	2.18	55	111
"	Shifnal, Hatton Grange	3.00	76	146	"	Lligwy	2.83	72	...
<i>Staff.</i>	Tea, The Heath Ho. ...				<i>Isle of Man</i>				
<i>Worc.</i>	Ombersley, Holt Lock.	3.02	77	147		Douglas, Boro' Cem. ...	2.72	69	109
"	Blockley, Upton Wold.	4.35	110	202	<i>Guernsey</i>				
<i>War.</i>	Farnborough	2.71	69	121		St. Peter P't, Grange Rd	2.81	71	165

Rainfall: May, 1926: Scotland and Ireland

CO.	STATION	In.	mm.	Per- cent. of Av.	CO.	STATION.	In.	mm.	Per- cent. of Av.
<i>Wigt.</i>	Stoneykirk, Ardwell Ho	2.14	54	...	<i>Suth.</i>	Loch More, Achfary ...	3.33	85	76
<i>"</i>	Pt. William, Monreith.	4.52	115	...	<i>Caith</i>	Wick	1.89	48	91
<i>Kirk.</i>	Carsphairn, Shiel.	2.46	62	109	<i>Ork</i>	Pomona, Deerness	1.63	41	82
<i>"</i>	Dumfries, Cargen	2.46	62	109	<i>Shet.</i>	Lerwick	2.19	55	105
<i>Roxb</i>	Bransholme	4.28	109	...					
<i>Selk.</i>	Ettrick Manse	1.95	50	79	<i>Cork.</i>	Caheragh Rectory	4.11	104	...
<i>Berk.</i>	Marchmont House	2.25	57	113	<i>"</i>	Dunmanway Rectory.	4.30	109	126
<i>Hadd</i>	North Berwick Res.	3.33	85	178	<i>"</i>	Ballinacurra	2.27	58	96
<i>Midl</i>	Edinburgh, Roy. Obs. ...	3.17	81	158	<i>"</i>	Glanmire, Lota Lo. ...	2.49	63	102
<i>Lan.</i>	Biggar	6.59	167	...	<i>Kerry</i>	Valencia Obsy.	4.33	110	137
<i>"</i>	Leadhills	2.79	71	121	<i>"</i>	Gearshameen	3.20	81	...
<i>Ayr.</i>	Kilmarnock, Agric. C. ...	3.10	79	104	<i>"</i>	Killarney Asylum	3.59	91	117
<i>"</i>	Girvan, Pinmore	2.69	68	110	<i>"</i>	Darrynane Abbey	4.34	110	146
<i>Renf.</i>	Glasgow, Queen's Pk. ...	3.18	81	92	<i>Wat.</i>	Waterford, Brook Lo. ...	2.50	64	108
<i>Bute.</i>	Greenock, Prospect H. ...	3.01	76	99	<i>Tip.</i>	Nenagh, Cas. Lough ...	2.44	62	99
<i>"</i>	Rothsay, Ardenraig	3.59	91	...	<i>"</i>	Tipperary	2.66	68	...
<i>"</i>	Dougarie Lodge	4.91	125	...	<i>"</i>	Cashel, Ballinamona ..	1.95	50	81
<i>Arg.</i>	Ardgour House	4.12	105	...	<i>Lim.</i>	Foynes, Coolnanas	3.59	91	154
<i>"</i>	Manse of Glenorchy. ...	2.79	71	...	<i>"</i>	Castleconnell Rec.	2.53	64	...
<i>"</i>	Oban	2.59	66	90	<i>Clare</i>	Inagh, Mount Callan ...	4.40	112	...
<i>"</i>	Poltalloch	4.37	111	111	<i>"</i>	Broadford, Hurdlest'n.	3.41	87	...
<i>"</i>	Inveraray Castle	3.48	88	131	<i>Wexf</i>	Newtownbarry	2.11	54	...
<i>"</i>	Islay, Eallabus	6.10	155	...	<i>"</i>	Gorey, Courtown Ho. ...	2.91	74	131
<i>"</i>	Mull, Benmore	2.63	67	118	<i>Kilk.</i>	Kilkenny Castle	2.33	59	106
<i>Kinr.</i>	Loch Leven Sluice	5.45	138	121	<i>Wic.</i>	Rathnew, Clonmannon ...	2.03	52	...
<i>Perth</i>	Loch Dhu	4.26	108	105	<i>Carl.</i>	Hacketstown Rectory .	2.18	55	84
<i>"</i>	Balquhiddy, Stronvar. ...	3.41	87	137	<i>QCo.</i>	Blandsfort House	2.99	76	123
<i>"</i>	Crieff, Strathearn Hyd. ...	2.86	73	141	<i>"</i>	Mountmellick			
<i>"</i>	Blair Castle Gardens ..	2.19	56	90	<i>KCo.</i>	Birr Castle	2.57	65	115
<i>"</i>	Coupar Angus School. ...	2.31	59	111	<i>Dubl.</i>	Dublin, FitzWm. Sq. ...	2.28	58	111
<i>Forf.</i>	Dundee, E. Necropolis. ...	3.18	81	...	<i>"</i>	Balbriggan, Ardgillan .	1.79	45	86
<i>"</i>	Pearsie House	1.92	49	94	<i>Me'th</i>	Drogheda, Mornington ..			...
<i>"</i>	Montrose, Sunnyside ..	2.12	54	89	<i>"</i>	Kells, Headfort.	2.28	58	84
<i>Aber.</i>	Braemar, Bank	3.03	77	122	<i>W.M</i>	Mullingar, Belvedere .	2.29	58	94
<i>"</i>	Logie Coldstone Sch. ...	1.53	39	66	<i>Long</i>	Castle Forbes Gdns. ...	2.61	66	101
<i>"</i>	Aberdeen, King's Coll. ...	2.50	64	...	<i>Gal.</i>	Ballynahinch Castle ..	5.12	130	142
<i>"</i>	Fyvie Castle	2.54	65	120	<i>"</i>	Galway, Grammar Sch. ...	4.16	106	...
<i>Mor.</i>	Gordon Castle	2.24	57	96	<i>Mayo</i>	Mallaranny	4.47	113	...
<i>"</i>	Grantown-on-Spey	2.02	51	112	<i>"</i>	Westport House	4.18	106	147
<i>Na.</i>	Nairn, Delnies	3.81	97	...	<i>"</i>	Delphi Lodge	6.56	167	...
<i>Inv.</i>	Ben Alder Lodge	2.21	56	...	<i>Sligo</i>	Markree Obsy.	4.20	107	150
<i>"</i>	Kingussie, The Birches ...	5.10	130	...	<i>Cav'n</i>	Belturbet, Cloverhill. .	3.15	80	127
<i>"</i>	Loch Quoich, Loan	2.04	52	...	<i>Ferm</i>	Enniskillen, Portora ..	3.45	88	...
<i>"</i>	Glenquoich	3.08	78	77	<i>Arm.</i>	Armagh Obsy.	2.79	71	117
<i>"</i>	Inverness, Culduthel R. ...	3.56	90	...	<i>Down</i>	Warrenpoint	1.91	49	...
<i>"</i>	Arisaig, Faire-na-Squir ...	1.83	47	...	<i>"</i>	Seaforde	2.50	64	95
<i>"</i>	Fort William	2.96	75	114	<i>"</i>	Donaghadee, C. Stn. ...	2.13	54	94
<i>"</i>	Skye, Dunvegan	1.89	48	...	<i>"</i>	Banbridge, Milltown ..	2.23	57	99
<i>"</i>	Barra, Castlebay	2.87	73	...	<i>Antr.</i>	Belfast, Cavehill Rd. .	2.81	71	...
<i>R&C</i>	Alness, Ardross Cas. ...	2.08	53	...	<i>"</i>	Glenarm Castle	2.39	61	...
<i>"</i>	Ullapool	5.04	128	111	<i>"</i>	Ballymena, Harryville ...	3.48	88	122
<i>"</i>	Torridon, Bendamph. ...	3.10	79	...	<i>Lon.</i>	Londonderry, Creggan ...	5.36	136	147
<i>"</i>	Achnashellach	3.45	88	135	<i>Tyr.</i>	Donaghmore	3.21	82	...
<i>"</i>	Stornoway	2.87	73	...	<i>"</i>	Omagh, Edenfel	4.03	102	156
<i>Suth.</i>	Lairg	2.08	53	87	<i>Don.</i>	Malin Head	2.50	63	126
<i>"</i>	Tongue Manse	2.62	67	128	<i>"</i>	Dunfanaghy			
<i>"</i>	Melvich School				<i>"</i>	Killybegs, Rockmount. .	5.19	132	144

Climatological Table for the British Empire, December, 1925

STATIONS	PRESSURE			TEMPERATURE						RELATIVE HUMIDITY		Mean Cloud Am't	PRECIPITATION		BRIGHT SUNSHINE	
	Mean of Day M.S.L.	Diff. from Normal	mb.	Absolute		Mean Values			Mean	%	mm.	mm.	Diff. from Normal	Days	Hours per day	Per-cent age of possible
				Max.	Min.	Max.	Min.	1 max. and 2 min.								
	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.
London, Kew Obsy.	1008.5	- 5.2	56	23	44.4	34.5	39.5	- 0.8	36.0	91	6.3	68	+ 10	16	1.7	21
Gibraltar	1020.3	+ 0.2	69	44	64.0	54.7	59.3	+ 3.3	54.7	86	7.5	176	+ 34	15	...	...
Malta	1019.8	+ 3.2	72	44	60.8	52.8	56.8	- 1.1	52.7	83	6.1	16	+ 78	3	5.5	56
Sierra Leone	1012.8	+ 1.6	89	72	86.6	75.2	80.9	- 0.6	76.6	83	4.5	4	- 33	1	...	...
Lagos, Nigeria	1009.4	- 1.1	92	69	90.0	74.7	82.3	+ 1.0	76.8	84	7.4	0	- 21	0	...	...
Kaduna, Nigeria	1014.8	+ 2.0	91	...	87.9	...	...	...	...	...	3.9	0	0	0	...	...
Zomba, Nyasaland	1009.6	+ 0.4	93	61	83.5	65.5	74.5	+ 1.6	...	83	8.7	306	+ 34	19	...	...
Salisbury, Rhodesia	1008.8	+ 0.1	93	56	82.3	60.5	71.4	+ 1.5	64.4	64	4.5	72	- 74	11	8.2	62
Cape Town	1016.2	+ 1.8	101	50	76.5	57.7	67.1	- 0.5	59.7	70	4.6	6	- 16	4	...	...
Johannesburg	1011.1	+ 1.1	94	52	80.4	58.6	69.5	+ 4.4	57.7	58	4.7	84	- 39	11	9.2	67
Mauritius	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Elmfontein	1017.2	+ 1.5	81	47	91.6	57.9	74.7	+ 2.9	61.6	45	2.7	55	- 7	...	...	...
Calcutta, Alipore Obsy.	1013.3	- 0.2	92	68	87.2	72.8	80.0	+ 2.5	67.7	81	3.6	0	- 5	0*	...	...
Bombay	1014.4	+ 0.9	85	65	81.0	70.6	75.8	- 0.9	72.3	67	2.8	0	- 1	0*	...	...
Madras, Ceylon	1011.0	+ 0.3	90	71	86.9	73.4	80.1	+ 1.1	75.5	87	5.6	350	+ 202	13*	...	65
Hong Kong	1021.5	+ 1.8	77	47	68.3	58.3	63.3	+ 0.3	54.7	55	6.1	6	- 23	4	7.6	55
Sandakan	...	...	86	72	84.5	74.9	79.7	- 0.4	76.7	83	...	628	+ 179	24	5.9	...
Sydney	1013.0	+ 1.0	104	56	77.5	63.3	70.4	+ 0.2	64.5	60	6.9	29	- 43	9	7.4	51
Melbourne	1014.5	+ 2.0	101	47	73.7	55.4	64.5	+ 0.2	56.6	57	6.6	9	- 50	7	7.1	48
Adelaide	1015.2	+ 2.0	110	47	83.3	58.5	70.9	- 0.3	58.5	43	4.1	5	- 19	4	10.2	71
Perth, W. Australia	1013.5	+ 0.3	98	53	80.4	62.3	71.3	+ 0.6	63.8	53	5.8	17	+ 2	7	8.0	56
Ootgardie	1011.3	+ 0.1	108	54	92.4	63.6	78.0	+ 2.2	62.1	40	2.3	51	+ 33	3	...	...
Brisbane	1012.8	+ 0.9	90	62	84.6	68.8	76.7	+ 0.2	70.8	65	5.4	157	+ 31	14	8.4	61
Hobart, Tasmania	1009.0	- 0.7	92	41	68.7	50.7	59.7	- 0.7	52.4	61	6.6	40	- 10	14	8.8	58
Wellington, N.Z.	1011.5	- 0.6	71	48	66.6	54.4	60.5	+ 0.2	56.1	66	6.2	54	- 27	11	7.3	49
Suva, Fiji	1011.4	+ 2.8	87	64	84.5	73.2	78.9	+ 0.6	75.6	76	6.9	146	- 162	13	...	...
Apia, Samoa	1007.3	- 1.1	88	72	84.6	75.2	79.9	+ 0.1	77.6	74	2.8	21	- 20	5	...	...
Kingston, Jamaica	1014.0	+ 0.0	89	65	86.4	68.8	77.6	- 0.1	64.7	79	4.8	144	- 44	25	...	...
Grenada, W.I.	1013.8	+ 1.9	86	70	82.9	73.8	78.3	+ 0.2	74.1	64	8.7	33	- 39	17	1.7	19
Toronto	1013.1	- 4.3	48	- 14	31.6	21.3	26.5	+ 0.3	23.4	...	...	...	...	...	3.3	40
Winnipeg	1020.5	+ 2.6	43	- 20	15.5	3.7	9.6	+ 1.7	20.3	67	6.2	16	- 23	10	3.6	41
St. John, N.B.	1007.2	- 7.0	48	- 7	30.1	15.3	22.7	- 1.7	20.3	...	...	...	...	...	...	...
Victoria, B.C.	1018.1	+ 1.3	53	- 37	47.3	36.5	41.9	+ 0.4	43.5	94	8.0	122	- 28	22	1.7	20

Climatological Table for the British Empire for the Year 1925

STATIONS	PRESSURE			TEMPERATURE							Relative Humidity	Mean Cloud Am't	PRECIPITATION		BRIGHT SUNSHINE		
	Mean of Day M.S.L.	Diff. from Normal	mb.	Absolute		Mean Values			Mean	Diff. from Normal			Days	Hours per day	Per-centage of possible.		
				Max.	Min.	Max	Min.	1 and 2 min.								Wet Bulb.	
																	° F.
London, Kew Obsy.	1014.5	-	0.9	87	23	56.8	43.4	50.1	0.4	45.0	+	0.4	649	+ 43	164	4.0	31
Gibraltar.....	1018.1	+	0.3	89	41	69.5	57.1	63.3	+	1.0	56.1	-	0.4	997	+ 88	75	...
Malta.....	1016.2	+	0.3	102	43	70.3	61.1	65.7	-	0.4	60.7	-	0.4	543	+ 39	77	7.5
Sierra Leone.....	1012.7	+	0.9	97	65	86.7	72.7	79.7	-	1.2	74.8	-	0.7	3561	-356	165	...
Lagos, Nigeria.....	1009.9	-	1.4	93	63	87.0	74.7	80.9	+	0.7	75.5	+	0.7	1942	+122	116	...
Kaduna, Nigeria.....	1013.6	+	1.2	99	...	87.2	...	...	...	...	...	...	...	1689	+439	123	...
Zomba, Nyasaland.....	1012.3	-	0.4	93	46	79.7	60.5	70.1	+	0.8	...	+	0.8	1719	+322	153	...
Salisbury, Rhodesia	1012.6	-	1.0	93	34	76.5	53.6	65.1	-	0.2	58.1	-	0.2	3.7	+281	117	8.0
Cape Town.....	1017.2	+	0.4	102	37	72.0	54.7	63.4	+	1.1	56.4	+	1.1	1089	- 16	96	...
Johannesburg.....	1016.6	+	0.1	94	28	69.5	49.3	59.4	-	0.1	50.7	-	0.1	621	+ 26	107	8.1
Mauritius .....	...	...	...	...	...	...	...	...	...	...	...	...	...	826	...	...	68
Bloemfontein.....	...	...	...	101	19	74.8	46.3	60.5	-	0.9	51.9	-	0.9	588	- 7	77	...
Calcutta, Alipore Obsy.	1007.6	-	0.0	103	47	87.2	71.1	79.2	+	0.5	71.7	+	0.5	1508	- 81	88*	...
Bombay	1008.8	-	0.4	95	56	87.4	75.7	81.5	+	1.0	73.1	+	1.0	1291	-542	65*	...
Madras.....	1008.8	-	0.0	104	60	90.6	74.6	82.6	-	0.4	75.0	-	0.4	1697	+408	66*	...
Colombo, Ceylon	1009.7	-	0.3	92	63	86.6	74.7	80.6	-	0.1	76.9	-	0.1	3148	+1042	205	6.7
Hong Kong.....	1012.6	-	0.0	93	40	76.2	67.7	71.9	-	0.3	66.3	-	0.3	2225	+ 93	128	6.0
Sandakan.....	...	...	...	92	71	86.8	75.1	80.9	-	0.4	76.3	-	0.4	3981	+933	176	...
Sydney	1016.2	+	0.2	104	40	70.6	55.7	63.1	-	0.0	58.1	-	0.0	1279	+ 64	145	6.6
Melbourne.....	1017.0	+	0.7	101	31	66.8	49.7	58.2	-	0.1	52.4	-	0.1	447	-200	144	5.6
Adelaide.....	1017.8	+	0.7	110	36	72.2	52.8	62.5	-	0.4	54.1	-	0.4	555	+ 23	118	7.0
Perth, W. Australia.....	1017.1	+	0.7	102	37	73.2	54.8	64.0	-	0.2	57.2	-	0.2	798	- 63	126	7.6
Coalgardie	1016.6	+	0.6	108	32	76.3	51.9	64.1	-	0.4	53.3	-	0.4	401	+143	56	...
Brisbane.....	1015.8	-	0.1	106	37	76.5	59.6	68.1	-	0.8	61.7	-	0.8	1350	+195	138	7.3
Hobart, Tasmania.....	1014.1	+	1.6	92	31	61.2	46.3	53.7	-	0.6	48.0	-	0.6	577	- 25	170	6.0
Wellington, N.Z.	1014.1	-	0.0	78	30	61.4	49.3	55.3	-	0.0	51.6	-	0.0	1327	+ 91	175	5.6
Suva, Fiji.....	1011.4	-	0.0	91	60	82.7	70.6	76.6	-	0.4	72.8	-	0.4	2710	-144	217	...
Apia, Samoa.....	1010.5	+	0.2	90	67	85.0	74.1	79.5	+	1.0	76.2	+	1.0	2631	- 83	181	6.6
Kingston, Jamaica	1013.7	-	0.0	94	62	87.4	70.2	78.8	-	0.5	68.9	-	0.5	474	-387	74	...
Grenada, W.I.	1013.7	+	1.3	89	67	83.9	73.5	78.7	-	0.0	74.4	-	0.0	1618	-309	229	...
Toronto.....	1016.1	-	0.2	95	-14	53.8	37.8	45.8	+	1.4	40.4	+	1.4	776	- 74	151	5.6
Winnipeg.....	1016.5	+	0.2	93	-31	45.8	27.3	36.6	+	2.3	...	+	2.3	407	-110	129	5.2
St. John, N.B.	1014.0	-	0.7	89	-19	48.3	33.7	41.0	-	0.2	37.0	-	0.2	1258	+ 38	166	...
Victoria, B.C.	1016.6	+	0.2	95	31	56.6	44.3	50.5	+	1.0	...	+	1.0	525	-302	142	6.1

* For Indian stations a rain day is a day on which 0.1 in. (2.5 mm.) or more rain has fallen.

Continued from p. 119.

killed in the storms which raged in the neighbourhood of Warsaw between the 1st and 3rd, and gales and torrential rains in northern Italy about the 15th caused several rivers, including the Po, to overflow. Milan and other towns were partly flooded. The worst floods since 1895 were reported from Nijni Novgorod and towns watered by the Volga, which burst its banks near Kostrema, say the reports, and spread for twenty miles across country. Serious floods have also occurred in France and western Germany, and there has been an abundant fall of snow in the higher districts of France and Switzerland. It is said to be 31 years since snow was seen in the region of the Côte d'Or at this time of year. Owing to the heavy rains, Lake Lugano rose 5 ft. in two days. After the 18th there was a general improvement in the weather over the whole of western Europe, but severe storms followed by floods were encountered in Yugo-Slavia and the Caucasus, between Tiflis and Mengliz, towards the end of the month.

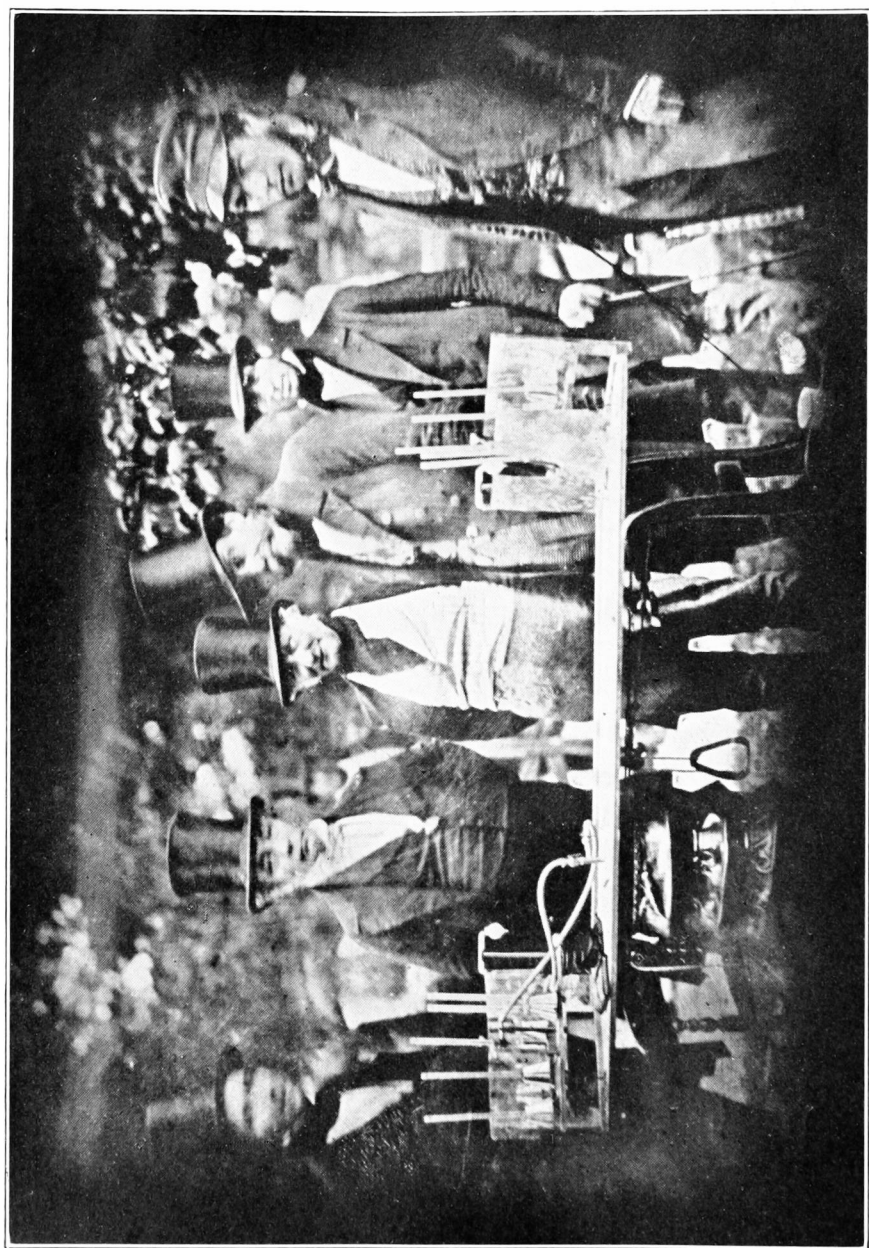
Heavy rain did considerable damage to houses in Aden on the 23rd, but the season is prosperous as there has been plenty of rain over the Yemen and the Hadramaut as well as in Somaliland. The heat wave under which Calcutta had suffered for some days was abruptly broken on the 24th by a severe cyclone which though it lasted only a few minutes caused the loss of several lives at Kidderpore docks and on the Hooghly. The same cyclone passed over Burma on the 25th and caused some loss of life and much damage in the Akyab district. A tidal wave swept up the Naaf river on the same day and it is feared that about 1,200 people were killed.

A large number of forest fires were raging in Minnesota, Wisconsin and Michigan on the 18th. Owing to a severe drought in the interior of Colombia, navigation in the Magdalena river is almost suspended.

The special message from Brazil states that the rainfall in the northern regions was scanty, being 33 mm. below normal, in the central regions abundant with 53 mm. above normal, and in the southern regions irregular in distribution with a total 44 mm. below normal. The atmospheric circulation was abnormal, the tracks of the anticyclones being limited to the interior of the country while depressions were active. The cotton, cane, tobacco and coffee crops were generally in good condition. At Rio de Janeiro pressure was 0.6 mb. above normal and temperature 0.4° F. below normal.

Rainfall, May, 1926—General Distribution

England and Wales	..	121	} per cent. of the average 1881-1915.
Scotland	.. .. .	109
Ireland	.. .. .	117
British Isles	.. .. .	<u>117</u>



APPARATUS FOR MR. WELSH'S BALLOON ASCENTS, VAUXHALL GARDENS, JULY, 1852

(See page 125)