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THE METEOROLOGICAL OUTLOOK IN SOUTH AFRICA.

BY A CONTRIBUTOR.

It is to be hoped that the new Union Parliament will take an early opportunity of considering the position of meteorology in South Africa. It cannot be said that any of the States of the Union, or Rhodesia has hitherto spent as much upon meteorology—or upon any other science for that matter, saving perhaps geology—as might reasonably have been expected. Besides, South Africa, like most other young countries, has not yet developed to any considerable extent the cultured class of people with leisure to take up the study of any pure science for its own sake. Consequently the pre-eminent vantage ground of South Africa for the study of world meteorology has not been utilized as it might have been.

Leaving out of account for the present the voluntary work of the thousand odd rainfall stations, and the fifty or sixty second and third order meteorological and climatological stations reporting regularly to Government Departments, the only stations of any importance in the country are the Royal Observatory at Cape Town, the Government Astronomical Observatory at Durban, the Government Observatory at Johannesburg, and the private Observatories at Kimberley and Bulawayo.

The Royal Observatory is kept up by the Admiralty, but some of the meteorological instruments there are the property of the Cape Government, and such meteorology as is done there is of course quite a side show. At Durban, while the Observatory is nominally an astronomical one, a large proportion of the work is meteorological, and is of excellent quality considering the limited equipment. The Observatory at Johannesburg possesses some fine meteorological instruments, and undertakes weather forecasts. For the Observatory at Kimberley meteorologists are under a great obligation to the De Beers Mining Company, whose example in this respect is probably altogether unique for a public company. This was the first station in South Africa to undertake systematic continuous records of all the principal recognised meteorological elements. Father Goetz, at Bulawayo, is assisted to a small extent, we believe, by the Rhodesian Government, but is largely dependent upon his own resources. In addition to these, Mr. Lyle has organised, under the auspices of the

Government of Orangia, a meteorological service with headquarters at Bloemfontein. His instrumental appliances are, however, not yet very elaborate.

None of these stations is wholly satisfactory. Our gratitude for what we have so far got from them is tempered by the feeling that we might have got more if only they could have made a better start. The site in nearly every case, considered from a meteorologist's ideal standpoint, was bad from the beginning—"born bad," as Professor Lowell would say. So far as Cape Town, Durban and, perhaps, Johannesburg are concerned, these places having been chosen with a view to astronomical observations were not likely to be the best for meteorological purposes. Whenever meteorology is associated with astronomy it must necessarily suffer to a large extent, not, perhaps, in the matter of routine observations (Greenwich is a standing example of how excellent these may be), but certainly on the experimental—the most important—side. Also at Kimberley Dr. Sutton has to do the best he can for the disposal of his instruments in his own garden, where he is crowded for room, and surrounded outside by the nuisance of growing trees. And all this in an ideal country of ideal sites for meteorological study. Another drawback is that none of these observatories can hope to undertake magnetic work of passable quality, which every good meteorological observatory ought to do to some extent.

What South Africa would appear to want is a series of first order independent meteorological observatories, one at least of which should be furnished with tools for the exploration of the upper air; and all for some amount of magnetic observation, suitably distributed in latitude and longitude, say in one line across the country from Durban to Port Nolloth, and in another line from Bulawayo to East London. With these in working order, a systematic discussion of the great mass of second-order observations already in existence could be made; and in particular, of the years of continuous wind records understood to be preserved at some of the ports. Of these, so far as we can gather, only the East London records have been examined at all, and only for a period of three years; so that scarcely more has been done in this direction than to show how extremely important and interesting the whole matter of the coastal winds of South Africa is.

A single service for the whole country could obviously be run more cheaply and more efficiently than separate services for each State as at present. The only, and not very serious, difficulty to be arranged would be that the standard times of observation for voluntary Observers have been selected at random by the different State services. Apparently these times have been chosen not with the idea of what is best for meteorology, but with the idea of what is the most convenient for local use. Preferably, the standard time used by the Cape Meteorological Commission should have been adopted throughout, even at the expense of some little sacrifice of convenience, the Cape having

been first in the field by many years. There is, however, one small matter in which the amalgamation of the different services can be anticipated: the barometric observations made at Johannesburg, the headquarters of the Transvaal service, are printed in millimetres, whereas those for the Transvaal out-stations are printed in inches. Now every meteorologist is capable of converting the one into the other, but it is hardly fair to expect him to do such a work of supererogation. Is it impossible to have the conversion into inches done at headquarters before publication? Or better still, cannot the blank forms for the barograph curves be graduated in English measures?

INTERNATIONAL BALLOON ASCENTS, MARCH 5th, 1908.

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

THE conditions were remarkable, inasmuch as the commencement of the isothermal column was lower than usual and the temperature also lower. In general the temperature and height show a connection with opposite signs, so that if the temperature is above, the height is below the average. The figures for Pyrton Hill are remarkable also, and suggestive of some error in the record, but the temperature is the easiest element to measure. It is more likely that this high temperature was associated with the small but deep depression, with the barometer below 29.00 in., that crossed the south of England the next day.

Barometric condition.—On March 4th pressure was highest over Russia, Spain and the south-east of Europe. The conditions were somewhat similar on the 5th, but the barometer was falling on the west coast of Ireland. During the night a small depression travelled rapidly across the south of Ireland, and slowly across the south of England during the next day.

March 5th, 1908.

Starting Point.	A	B	C	D	E	F	G
	in.	miles.	° F.	miles.	° F.	miles.	
Manchester, England..	30.0	6.4	—72	7.9	—62	59	E. by S.
Pyrton Hill, „ ..	29.9	6.4	—36	9.9	—36	82	E. by S.
Uccle, Belgium.....	29.9	7.1	—78	10.0	—71	131	E.S.E.
Lindenberg, Germany..	30.0	6.2	—78	6.6	—76	25	N.E. by N
Strassburg „ ..	30.1	5.0	—69	6.9	—69	48	E. by N.
Munich „ ..	30.1	5.3	—74	7.6	—62	59	E.N.E.
Vienna, Austria	30.1	5.8	—80	9.4	—62	75	E.N.E.
Pavia, Italy	30.2	6.0	—76	6.8	—74	60	E.

A=Approximate barometric pressure reduced to sea-level.

B=Height in miles of commencement of isothermal column.

C=Temperature, F°, at bottom of column.

D=Greatest height of reliable record in miles.

E=Temperature, F°, at greatest height.

F=Distance in miles of point where balloon fell.

G=Bearing of falling point from starting point.

BRITISH RAINFALL, 1909.

THE annual volume embodying the year's work of the British Rainfall Organization was first completed on February 15th, 1862, when it consisted of 18 pages; it was completed in February until the issue for 1867, which had 126 pp., and dealt with 1292 records. The last to be completed in March was for 1870, with 184 pp. and 1509 records. In the following year the preface was not signed until May, but the next three years saw it done in April, the last being for 1874, with 214 pp. and 1727 records. *British Rainfall*, 1878, was the latest to be finished in May, with 216 pp. and 2071 records. Except for two sporadic spurts the volume was not completed in June since 1884, with 290 pp. and 2463 records. Except for 1902, 1903 and 1904, which were completed in June or July, the last to be finished before August was that for 1898, with 320 pp. and 3404 records, and *British Rainfall*, 1909, was completed, so far as the editorial work is concerned, on August 22nd, 1910, with 428 pp. and 4681 records. The growth of the volume and the retardation of publication are dealt with in a historical article of 24 pp., which concludes with a recital of the essential clauses of the Trust Deed. Mr. Gethin Jones, the chief authority on the rainfall of the Snowdonian region, contributes an illustrated article describing the spot in North Wales where snow lies latest into the summer. One of the photographs shows a large patch of snow lying on June 29th, 1910.

All the usual features are present in the volume, and special care has been devoted to the sections on "The Staff of Observers," in which the special interest of the records which appear for the first time, or have ceased to appear, are touched upon in detail. The Obituary Notices are as numerous and as full as the information accessible to the Editor and the space at his disposal permit. It is only by means of these notices that the remarkably varied and interesting careers of their fellow Observers can be realized by the Observers of to-day, for the few who die each year are typical of the thousands who live.

In Part II. the long series of remarks by Observers on the days, the months and the year are still inserted, although it may perhaps be found more serviceable to use the 80 pp. so occupied for printing monthly values of the rainfall at all stations, and so doubling the size of the General Table. No consideration save expense keeps out monthly values. In the section on Heavy Falls on Rainfall Days, all cases where the wettest day in the year at any station had a rainfall exceeding either 2.50 in. or $7\frac{1}{2}$ per cent. of the total for the year are dealt with, and maps are given of the eight most wide-spread falls. These occurred on April 2nd and 3rd, when the area with more than 1 inch of rain (for the two days together) was 27,108 square miles in Ireland; on July 27th, when it was 17,502 square miles in England; on August 17th, when it was 12,378 square miles in England; on September 27th-28th, when (for the two days) it was 35,291 square

miles in Great Britain and Ireland ; on October 26th-28th, when (in the three days) more than 1 inch fell over 21,920 square miles in the south of England ; on December 2nd, when 23,659 square miles in Great Britain and Ireland had more than an inch of rain ; and on December 21st, with 13,072 square miles in the south of England. All these were ordinary cases of cyclonic or thunderstorm rains, in which the splash of the rain on the map showed no relation to the configuration of the ground, but was related solely to the meteorological condition of the atmosphere. But the heavy fall of December 9th, which is also mapped, is of another type. Here the isobars ran straight across the British Isles with practically no curvature to proclaim them part of a cyclone or of an anticyclone, and the area with rainfall over an inch on that day in Great Britain measured 14,783 square miles, and was concentrated on the high land against which the wind appeared to blow with apparently no ascensional movement due to meteorological as distinguished from geographical causes.

The rainfall for each month is mapped for the whole country, each map being constructed from about 2000 observations, and maps showing the percentage of the average for the month, compiled from a smaller number of stations, are also given for comparison.

The price of the volume to Observers remains the same as when it was one quarter of the size, and the cost of production was a much smaller fraction of what it is to-day.

A list of donors to the Endowment Fund, of which Mr. F. Druce is the Treasurer for the Trustees, shows that one donation of £500 was received, four of £100 each, one of £50 and 24 smaller sums make up £150 between them. This fund is invested and the interest will be devoted to the expenses of the British Rainfall Organization. It is right to mention that the Director of the Organization is unpaid, and that he has contributed £300 during the last two years to cover the deficit caused by increasing the staff and improving the publications. The number of permanent assistants is five, there is also a housekeeper, and a considerable amount of outside help has to be called in, the total outlay on salaries and wages in 1909 having been nearly £600, and the cost of printing and postage of the publications, £570. Establishment expenses, stationery, etc., amounted to £272, and the income from subscriptions was £1,080, and from sales of publications to the public, advertisements, supplying certificates for rain gauges and glasses, supplying copies of rainfall data, and from other sources, £210.



**THE METEOROLOGICAL LUNCHEON,
British Association, Sheffield, 1910.**

By E. GOLD, M.A.

THE experiment, initiated at Winnipeg last year, of substituting a luncheon for the time-honoured meteorological breakfast, was repeated at Sheffield on Tuesday, September 6th. The luncheon came appropriately after a morning's discussion of problems in cosmical physics, and the stimulus of the double event was apparent in the speeches. Dr. W. N. Shaw presided over a company which included the following ladies and gentlemen interested in meteorology :—

Sir Norman Lockyer, K.C.B.
Lady Lockyer
Mr. R. F. Stupart
Professor Bigelow
Dr. Aitken
Professor F. G. Bailey
Dr. W. Schmidt
Professor A. W. Porter
Mr. G. G. Chisholm
Dr. W. G. Duffield
Mrs. Duffield
Miss White
Mr. M. McCallum Fairgrieve
Mrs. Fairgrieve
Mr. J. Smith
Mr. J. Bisset

Mr. W. L. Fox
Dr. H. Borns
Dr. W. Makower
Mr. T. L. Bennett
Mr. A. A. Robb
Mr. H. Bateman
Dr. J. W. Nicholson
Mr. Edward Kitto
Mrs. Kitto
Mr. E. Gold
Mrs. Gold
Mr. J. S. Dines
Mr. E. Howarth
Mr. R. S. Whipple
Mr. Watts

In addressing the company after the luncheon, Dr. Shaw referred to some recent events in the meteorological world which, he believed, would hereafter be found to have had considerable influence on the direction and progress of meteorological research in this country, and on meteorology generally. First, by an evolutionary process, an arrangement had been made to terminate the isolation of seismological and magnetic work, and by the direct connection of Kew and Eskdalemuir Observatories with the Meteorological Office, the advantages of co-operation and co-ordination were secured for geophysical work in this country. Secondly, the transference of the Meteorological Office to its new abode at South Kensington marked an important step, because the institution would have in future, not only a building for clerks and scientific workers worthy of the subject in which they were engaged, but it would provide, in addition, a library which looked like a library and a museum for the exhibition of objects of scientific interest which might be contributed to it. Specimens of what such objects might be, the company had an opportunity of seeing in the Lumière photographs of the rainbow and the sun-pillar shown by Dr. Aitken, in the drawings of aurora by Mr. Clarke of Aberdeen, and in a work, humorously illustrative of the description of the Beaufort scale given in Dr. Simpson's memoir, designed by a young naval officer, and indicative at least of an interest in meteorology in that important service, and perhaps also.

instructive in other ways. In proposing a toast to the progress of meteorology, Dr. Shaw referred to the presence at the luncheon of Mr. Stupart, Director of the Canadian Meteorological Service, Professor Bigelow, late of the U.S. Weather Bureau, and widely known for his contributions to dynamical meteorology, Dr. Schmidt, of the Meteorological Institute at Vienna, and Mr. Bennett, who represented a younger member of the family, the meteorological service of Egypt. He coupled the names of those gentlemen with the toast.

Mr. Stupart said he had recently experienced the difficulties of moving an office, in fact, he had had a double removal, and he assured Dr. Shaw that it would be a considerable time before things settled down satisfactorily in the new quarters. He referred also to the inter-dependence of meteorologists of different countries, and instanced the general relationships between Canadian and European weather conditions.

Professor Bigelow expressed the interest he felt at seeing men face to face whom he knew well by name, and who were all co-operating in the advance of meteorological science. He acknowledged fully how closely the United States, Canada and England were bound together by meteorological ties. He referred humorously to the possibility of a forecaster in the U.S.A., who foretold fair weather every day, obtaining 75% of accurate forecasts, while the official forecaster, who tried to apply the principles of the science, might predict accurately in only 68% to 70% of the whole number of cases. He related also some experiences on a recent expedition to California for the study of evaporation; and mentioned a new way of catching fish by trolling from a moving train crossing a bridge over a certain inlet in that region.

Dr. Schmidt said that at Vienna the combination of the various branches of geophysics under a central authority, took place some time ago, and that now the tendency was rather to decentralization. He trusted that Dr. Shaw's expectations would not be disappointed by such a termination. He expressed also his gratification at the hospitable reception which England had accorded him.

Mr. Bennett regretted that Captain Lyons, who had practically created the meteorological service of Egypt was not present. His own claim to represent Egypt there rested on the rather slender foundation that for two months every summer he took Mr. Craig's place in meteorological affairs. It might be not uninteresting to note that for these two months 99% of the forecasts were accurate, always fair weather. The great problem for Egyptian meteorology was the origin and prediction of the Nile flood. Mr. Craig's expedition to Abyssinia had thrown much light on this question, and his recent conclusion that the rain-bearing winds came as a S.W. current from the Atlantic, might lead to further valuable results.

Mr. Gold proposed that the thanks of all present should be accorded to Mr. Howarth, the local observer. He felt that all

meteorologists ought to be grateful to men who looked after meteorology with interest and ability in what might be called the outlying districts of the meteorological world.

Mr. Howarth, in the course of an interesting speech, expressed the hope that the time would soon arrive when the collection of observations, which was now so lengthy and extensive, would be utilized for developing a scheme for the practical forecasting of the general character of the weather some distance ahead. In common with many others he felt profoundly dissatisfied that we were unable to obtain a forecast for a longer period than 24 hours. We had been in the present position for more than 30 years.

THE RAINFALL OF AUGUST, 1910.

THE month of August proved to be very near the average as regards rainfall in the south-east of England, although rain fell on many days. To the east and south of a line drawn from Weymouth to Skegness there was a total fall of less than 3 inches, except for a patch in East Anglia, and the detached areas shown on our map of the Thames Valley and its neighbourhood. The least rain fell in two areas, one round the Thames estuary, the other between Northampton and Cambridge, less than 2 inches having fallen in each of these. The portion of country covered by the Thames Valley map had rainfall of a normal type, the higher ground having the larger fall and the lower ground the less. It is only in the extreme west of the map that the appearance of the lines of 4, 5 and 6 inches shows the severe conditions which prevailed outside the favoured triangle of the south-east.

The greater part of Cornwall, Devon, Somerset and Gloucestershire, Worcestershire, Herefordshire, and practically the whole of Wales, had more than 5 inches, and a very large area more than 7 inches. A somewhat drier belt separated the Pennine Chain and Lake District, where the extent of the high rainfall was even greater, culminating in an area with more than 8 inches stretching for 70 miles from Skipton to Cockermouth, and for 30 miles from Cartmel to beyond Shap. In the heart of the Lake District several stations recorded more than 20 inches of rain in the month, and even at Seathwaite more than 20 inches has only been recorded for August on three previous occasions in the last 50 years, viz., in 1861, 1891 and 1903.

Except for a broad strip along the east coast and a small area in the south-west, practically the whole of Scotland had more than 6 inches of rain, and two large areas—one in the Southern Uplands, the other in the Southern Highlands—had more than 8 inches, each enclosing a substantial stretch of country with more than 10 inches. The most remarkable wet area was in Stirling, Argyll and Perth, stretching for 80 miles from the Kyles of Bute to beyond Dunkeld,

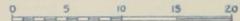
RAINFALL OF THAMES VALLEY — AUGUST, 1910.



ALTITUDE SCALE

Below 250 feet	250 to 500 feet	500 to 1000 feet	Above 1000 feet
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SCALE OF MILES



and for 40 miles from Bridge of Allan to near Rannoch, over the whole of which there was more than 10 inches of rain. Except at one isolated station, nothing above 8 inches occurred north-west of the Great Glen through which the Caledonian Canal runs. The very wet area in Perthshire was the scene of some remarkable floods, doing damage to property and crops.

All Ireland, except a narrow strip in the east round Dublin, and a much larger area in the west including Galway, had more than 5 inches, and a patch in the north round Londonderry, which was the wettest part of Ireland in August, had more than 8 inches.

THE WEATHER OF AUGUST.

By FRED. J. BRODIE.

THE concluding summer month of 1910 proved even more disappointing than its two immediate predecessors. Owing to a general deficiency in the amount of bright sunshine, the thermometer failed to rise to anything like a high seasonable level, and had it not been for a remarkable burst of warmth in the extreme north the month would have passed without any shade temperature as high as 80° in any part of the United Kingdom. At Balta Sound in Shetland the thermometer on the 6th rose to a maximum of 77°, while 60 miles or so farther south at Sumburgh Head, it succeeded in touching 82°. The latter reading was 12° higher than anything observed at the same station since the year 1871*.

In other parts of these islands the thermometer last month seldom rose as high as 75°, and was often much lower. During by far the larger portion of the time the country lay between a large anticyclone, which occupied a normal position over the central southern portions of the North Atlantic, and a similar system which hung quite abnormally over Iceland and the neighbouring oceanic regions. Between these two areas numerous low pressure systems formed over the eastern half of the Atlantic, and moved slowly across the United Kingdom, causing much cloud and frequent falls of rain, often of considerable weight. Irrespective of the sudden burst of warmth in the extreme north, the highest temperatures of the month occurred between the 10th and 16th, when the thermometer rose to 75° or a little above it in many parts of England, and touched 78° at Whitby on the 11th. In London the highest readings occurred on the 12th, when a maximum of 76° was recorded in St. James's Park, and a reading of 77° at Greenwich. Between the 27th and 29th of the month the thermometer at many northern stations failed to reach 60°, and in a few isolated places it scarcely exceeded 55°. Owing to the presence of much cloud, which served to hinder the progress of

* This remarkable phenomenon is fully described in Mr. Lempfert's letter on another page. ED. S.M.M.

terrestrial radiation, the nights were relatively speaking warmer than the days. In the south of England few temperatures below 50° were observed; but over the northern half of Great Britain the thermometer on the 4th and 23rd fell below 40° , a reading of 37° being recorded at Balmoral on the former date, and a reading of 32° at West Linton on the latter occasion.

The mean temperature of the month was below the average in all districts excepting the north of Scotland, the deficit varying from about half a degree on our north-east and north-west coasts, to about a degree and a half in the extreme south and south-west of England. The amount of bright sunshine was also below the normal, but the deficiency varied greatly in extent in different parts of the country, being upon the whole greatest in the extreme south and south-west. In London (at Westminster) the total duration, 156 hours, was only 12 hours short of the average, but was the smallest recorded in August since the year 1902.



Correspondence.

To the Editor of Symons's Meteorological Magazine.

HIGH TEMPERATURE IN SHETLAND ON AUGUST 6th, 1910.

THE present summer has been regarded very generally as one of particularly unsettled weather, and I am not prepared to defend it against its accusers. It may, however, be of interest to point out that even within the limits of the United Kingdom there are regions where the weather has been unusually fine, and one of these is the Shetland Islands. At Sumburgh Head the rainfall for June was just about equal to the average, while that for July was 1.59 inches below it. The two months combined had only 22 days with rain, or only about two-thirds of the average number. Simultaneously the sunshine recorder at Balta Sound, in the extreme north of the group, has been rivalling and even outdoing the performances of the instruments on our favoured south coast. We must, of course, bear in mind the great length of the days at midsummer in those northern latitudes, but the present is the first year since the establishment of a sunshine recorder at Balta Sound in which the total for June or July has approached those of our south coast stations. Dr. Saxby writes to me from Balta Sound, "It has really been a glorious summer, but farmers are all complaining of the want of rain, and I do not remember ever seeing the ground so dry."

It is, however, to some extraordinarily high temperatures which have been recorded recently in Shetland that I wish to draw special attention. On Saturday, August 6th, Sumburgh Head reported a maximum as high as 82° . Seeing that the records from 1871

onwards disclose no other reading above 70° a telegraphic error was at first suspected, but inquiry of the Observer confirmed the figure, and a reading as high as 77° at Balta Sound lends it additional support. What makes the occurrence all the more remarkable is that the temperatures in the Orkneys and on the Scottish mainland were low for the time of year. Both Deerness (Orkney) and Wick reported maxima no higher than 58° . The circumstances seemed to me so unusual that I was induced to write to Dr. Saxby for further particulars. Here is his reply: "On Saturday, August 6th, I awakened at 5 a.m., and was unable to go to sleep again on account of the 'closeness' of the air, so rose and went out at 5.30 a.m. The sun was shining brightly, and from the card had been shining since a few minutes past 3 a.m. Black, calm, cloudless sky, air oppressive, *sultry* not *scorching*; 9 a.m. temperatures, dry bulb $76^{\circ}\cdot5$, wet bulb $69^{\circ}\cdot0$, humidity 65%. The air was just perceptibly moving, I recorded it as E. 1. Sky still clear. At 11 a.m. the dry bulb showed $73^{\circ}\cdot0$, wet $67^{\circ}\cdot2$, humidity 71%. The maximum thermometer recorded 77° , so that the highest reading was apparently between 9 a.m. and 11 a.m. During the rest of the day there was a light wind veering to south, the sun felt scorching not sultry. Duration of sunshine 15.6 hours."

As to the causes of this very unusual state of things, Dr. Saxby's account indicates that insolation can have had little to do with the phenomenon. At 5 a.m. radiation cannot have been very intense, and the sun cannot be looked upon as more than a contributory cause. Convection of warm air from the neighbouring continent suggests itself as a possible cause. The Daily Weather Report for the day shows a low pressure system centred over the North Sea, and under such circumstances we can conceive of air following an east to west trajectory and passing from Scandinavia to Shetland. The temperatures recorded on the mainland on August 5th were high: Bodö, maximum 75° , Christiansund 77° , Skudesnaes 70° ; more detailed information might well reveal even higher values. We are, however, faced with the difficulty that this warm air would have had to pass over a cold ocean during its passage from Norway to Shetland. The temperature of the surface water recorded at Lerwick was only 55° , or 27° below the air temperature recorded at Sumburgh Head. One of the most striking facts brought out by a study of a set of daily temperature charts of the North Atlantic, is the rapidity with which the temperature of the air adjusts itself to within a few degrees of that of the water surface over which it is flowing. In the present case warm surface air from Norway could not have passed over nearly 200 miles of cool sea without having its temperature very considerably reduced, particularly as the wind was so light that the journey would have occupied at least twelve hours.

The hypothesis of the convection of warm air by surface currents thus breaks down, and we are driven back upon a dynamical explanation. We know that air, of which the motion has a downward

component, has its temperature raised by one degree Centigrade for each hundred metres of descent owing to the compression which it undergoes in the process. In the warm Föhn wind we have a familiar example of an air current which has had its temperature raised in this way. The high temperatures in Shetland must have been due to a similar cause. The cloudless sky supports such a hypothesis. It must be admitted that we should expect greater dryness than that recorded by Dr. Saxby. Still the surface layers of air in which our observations have perforce to be made may have been moistened by evaporation from the ground. The suggestion that the north-west quadrant of a depression is a region of descending air is no new one, but it is startling to find the process resulting in air at a temperature of 82° , remaining anchored at the Earth's surface in close proximity to air at a temperature below 60° . The densities of the masses of air respectively over Shetland and Orkney on the morning of August 6th were approximately in the ratio 29:30. Under normal circumstances we should expect that upward motion of the lighter air would remove it from the Earth's surface long before the difference of density reached anything like this magnitude.

R. G. K. LEMPERT.

Meteorological Office, London, S. W., September 2nd, 1910.

EVAPORATION CORRECTED FOR RAINFALL.

IN determining the quantity of evaporation from the various types of evaporation gauge exposed in the open air, it seems to be generally the custom to allow for the rainfall by first of all deducting the depth of rain as shown by the rain gauge from the final height of the water in the evaporation gauge. The difference between the original height and the final height thus reduced is called the evaporation in the given interval. Thus, if the water level in the open evaporation gauge sinks $\cdot 20$ inch in any time and $\cdot 20$ inch of rain has fallen in the same time, the evaporation is called $\cdot 40$ inch. My own experience at Kimberley with large and small evaporimeters, however, agrees with that of Dr. Scott, that such an allowance is rarely to be trusted. A moderate South African shower will splash some water out of the evaporimeter; a heavy rain will sometimes, and a hail storm nearly always, splash more out than falls in, even when the evaporimeter is immersed to about its own level in a large cistern of water which serves as a guard ring. An interesting instance of this occurred here on January 10th, 1908, when $\cdot 220$ inch of rain fell as hail in about a quarter of an hour; and instead of the water level in the evaporation tank (surrounded by an outer cistern) rising $\cdot 220$ inch, it actually fell $\cdot 894$ inch. According to the usual rule this would give an "evaporation" of $\cdot 894 + \cdot 220 = 1\cdot 114$ inch in fifteen minutes!

J. R. SUTTON.

Kimberley, July 11th, 1910.

A SIGN OF EAST WIND.

I SHOULD be interested to learn if any of your readers have observed the following warning of east winds to come. It only applies to winter months, and is as follows:—

The wind is in the south with damp and mild air. Gradually the percentage of humidity goes down, and temperature shows no tendency to rise during the day or to fall during the night; all this time the sky is entirely overcast. In the meanwhile the wind backs to the east. These signs are, of course, associated with an anticyclone over central Europe, moving north to Scandinavia. So far I have tested this three times—twice successfully, before the cold easterly spell of Christmas, 1908, and the short spell in the beginning of December, 1909. It would be interesting to hear your readers' opinions as to the reliability of this sign. C. H. E. RIDPATH.

Great Malvern, September 4th, 1910.

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REVIEWS.

*Fifth Annual Report of the Meteorological Committee to the Lords Commissioners of His Majesty's Treasury, for the Year ended 31st March, 1910.* London. Printed for H.M. Stationery Office, and to be purchased from Wyman & Sons, Ltd., Fetter Lane, E.C., &c. Size 9½ × 6. Pp. 148. Price 1s. 10d.

THE Report now before us shows a condition of high efficiency and great activity in the Meteorological Office. The use of wireless telegraphy as an aid to weather forecasting has been tested and found to be capable of becoming a valuable aid if only more rapid transmission could be secured from ship to shore. The upper-air research carried on by the Office does not yet seem to have led to any practical results in forecasting, but there are indications of useful information being forthcoming in connection with aerial navigation. The accounts of the Meteorological Office show a total income of just over £20,000; but the very large item of printing is also met by Government and has not to be provided for from income. The *personnel* consists of a Director at £1000 per annum, and 52 other workers whose salaries and wages amount to £7000.

A great deal of time during the year was absorbed in preparations for moving the Meteorological Office to the new building prepared for it in Kensington, and we hope to be able to describe the new quarters in an early number. A great deal of time was also given to the important rearrangement of scientific institutions by its new relations with which the Meteorological Office is removed far beyond the status of a Weather Bureau, and appears to have entered upon a course of expansion as a result of which marine meteorology and weather forecasting will bulk relatively less in the work of the Office than they did when it was first established. Not only is Kew

Observatory taken over as the central observatory for the Meteorological Office, which is little more than reverting to an earlier arrangement from which the bodies concerned had drifted apart, but the new Eskdalemuir Magnetic Observatory brings in the subject of Terrestrial Magnetism and apparently of Seismology also. It is pointed out that "the variations of terrestrial magnetic force which it is the object of a magnetic observatory to record, seem to be due to movements in the upper regions of the atmosphere, and may therefore reasonably be included in the subject of meteorology." But we feel that a question may arise as to what could reasonably be excluded from meteorology if every influence which affects the upper atmosphere—where the air is of the rarefaction of a vacuum tube—were to be included.

We see signs of promise in the bringing together of cognate subjects, hitherto poorly provided for out of the national exchequer, under one head, and we could even dare to hope that the movement will not cease until all the activities of the scientific departments, including those concentrated under the Meteorological Office, those concentrated under the Board of Education, those concentrated under the Board of Agriculture and Fisheries, and many which are still scattered, are all brought together in a great Scientific Department, with a scientific man at its head, to represent the scientific services of the country as a Minister responsible to Parliament.

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*The Conquest of the Air or the Advent of Aerial Navigation* by A. LAWRENCE ROTCH, S.B., A.M. Illustrated. New York, Moffat, Yard and Company, 1909. Size  $7\frac{1}{2} \times 5$ . Pp. x. + 192. Price 1 dollar.

THIS exceedingly interesting historical account of the use of the air as a highway deserves to be known on both sides of the Atlantic. Professor Rotch has done so much for the scientific study of the Upper Air, beginning at a time when such observations were looked on as a harmless form of recreation, that now, when they have developed practical interests of an absorbing kind, his opinions become extremely valuable. In sketching the origin of ballooning, Mr. Rotch reprints a series of letters from Benjamin Franklin, then United States Minister in France, to Sir Joseph Banks, describing the ascents of 1783 by Montgolfier and his rivals. The development of the dirigible balloon and of the aeroplane is traced, and Mr. Rotch in his final chapters has some very wise words on the tendency to exaggerate the importance of new developments. He points out how the first balloons were hailed as precursors of a veritable revolution in means of locomotion and of war; and though the balloon failed to fulfil the expectations of its admirers, the airmen of to-day are quite as bold in their surmises as to the far-reaching changes which the aeroplane will bring.

## METEOROLOGICAL NEWS AND NOTES.

METEOROLOGICAL OFFICE APPOINTMENTS.—In view of the removal of the work of the Meteorological Office to the new building in Exhibition Road, South Kensington, which is being arranged to take place in the autumn, Mr. R. G. K. Lempfert, M.A., Superintendent of Statistics, has been appointed by the Meteorological Committee to be Superintendent of the Forecast Division; Mr. E. Gold, M.A., Fellow of St. John's College, Cambridge, Schuster Reader in Dynamical Meteorology, has been appointed Superintendent of the Statistics and Library Division; Mr. R. Corless, M.A., has been re-appointed Special Assistant to the Director, with additional duties as Secretary and Clerk of Publications. The appointments date from October 1st, 1910.

THE BRITISH ASSOCIATION met at Sheffield from August 31st to September 7th, and we hope to give an account of the papers of meteorological interest in an early number. An important circumstance of the meeting was the rejection by the General Committee, which, although it is sometimes forgotten, is the governing body of the Association, of a proposal made by the Council to rearrange the Sections in a manner which was not considered to be for general advantage by those best entitled to judge.

A PICTORIAL BAROGRAPH CHART, which may appeal to those who like to have a barograph as an ornament of the entrance hall, has been introduced by Mr. John Browning, 146, Strand. It is designed by Mr. Ackroyd, and shows a cloud panorama very black along the line of 28 inches, a little lighter at 29 inches, and fleecy white or pale blue, with birds in flight, above 30 inches. It is of course of no scientific value, and we fear may prove disappointing if taken as an indication of the weather to expect at various pressures.

“YSTORMYDD A GWLAWOYDD Mynyddoedd Eryri, yn nghyda'u dylanwad ar hinsawdd cylch Llandudno Junction” is the title of a lecture delivered by Mr. J. R. Gethin-Jones in the language quoted, a translation of which runs, “The storms and rains of the Snowdonian Range, with their influence on the climate of the district around Llandudno Junction.” Mr. Gethin-Jones, whose name is familiar to our readers, has done much to convey scientific conceptions of the weather to his less-instructed compatriots; and we should be glad if the Welsh School Committees were to avail themselves of his services in teaching elementary meteorology in the mother tongue of the children.

DAMAGE BY SNOW TO TELEPHONE WIRES in January, 1910, cost the National Telephone Company £20,331 to repair, “a large figure as the result of the visitation of Providence,” as the Report of the Company quaintly observes.

## RAINFALL TABLE FOR AUGUST, 1910.

| STATION.                       | COUNTY.            | Lat.<br>N. | Long.<br>W.<br>[*E.] | Height<br>above<br>Sea.<br>ft. | RAINFALL<br>OF MONTH.          |              |
|--------------------------------|--------------------|------------|----------------------|--------------------------------|--------------------------------|--------------|
|                                |                    |            |                      |                                | Aver.<br>1875—<br>1909.<br>in. | 1910.<br>in. |
| Camden Square.....             | London.....        | 51 32      | 0 8                  | 111                            | 2'39                           | 1'64         |
| Tenterden.....                 | Kent.....          | 51 4       | *0 41                | 190                            | 2'42                           | 1'98         |
| Steyning.....                  | Sussex.....        | 50 53      | 0 20                 | 80                             | 2'91                           | 3'29         |
| Southampton (Cadland) ..       | Hampshire.....     | 50 50      | 1 22                 | 52                             | 2'85                           | 2'18         |
| Hitchin.....                   | Hertfordshire..... | 51 57      | 0 17                 | 238                            | 2'48                           | 1'95         |
| Oxford (Magdalen College).     | Oxfordshire.....   | 51 45      | 1 15                 | 186                            | 2'44                           | 1'50         |
| Bury St. Edmunds (Westley)     | Suffolk.....       | 52 15      | *0 40                | 226                            | 2'52                           | 2'50         |
| Geldeston [Beccles].....       | Norfolk.....       | 52 27      | *1 31                | 38                             | 2'22                           | 2'23         |
| Polapit Tamar [Launceston]     | Devon.....         | 50 40      | 4 22                 | 315                            | 3'17                           | 4'83         |
| Rousdon [Lyme Regis].....      | ".....             | 50 41      | 3 0                  | 516                            | 2'84                           | 3'72         |
| Stroud (Upfield).....          | Gloucestershire..  | 51 44      | 2 13                 | 226                            | 2'90                           | 4'87         |
| Church Stretton (Wolstaston).. | Shropshire.....    | 52 35      | 2 48                 | 800                            | 3'43                           | 4'01         |
| Coventry (Kingswood).....      | Warwickshire.....  | 52 24      | 1 30                 | 340                            | 2'81                           | 4'09         |
| Market Overton.....            | Rutland.....       | 52 44      | 0 41                 | 475                            | 2'69                           | 3'78         |
| Boston.....                    | Lincolnshire.....  | 52 58      | 0 1                  | 25                             | 2'39                           | 3'25         |
| Worksop (Hodsock Priory).      | Nottinghamshire    | 53 22      | 1 5                  | 56                             | 2'55                           | 3'59         |
| Macclesfield.....              | Cheshire.....      | 53 15      | 2 7                  | 501                            | 3'76                           | 5'46         |
| Southport (Hesketh Park)..     | Lancashire.....    | 53 38      | 2 59                 | 38                             | 3'73                           | 4'70         |
| Wetherby (Ribston Hall) ...    | Yorkshire, W.R.    | 53 59      | 1 24                 | 130                            | 2'78                           | 3'40         |
| Arneliffe Vicarage.....        | ".....             | 54 8       | 2 6                  | 732                            | 5'62                           | 8'39         |
| Hull (Pearson Park).....       | "..... E.R.        | 53 45      | 0 20                 | 6                              | 3'05                           | 3'61         |
| Newcastle (Town Moor) ...      | Northumberland     | 54 59      | 1 38                 | 201                            | 3'20                           | 2'73         |
| Borrowdale (Seathwaite) ...    | Cumberland.....    | 54 30      | 3 10                 | 423                            | 11'47                          | 18'02        |
| Cardiff (Ely).....             | Glamorgan.....     | 51 29      | 3 13                 | 53                             | 4'54                           | 5'99         |
| Haverfordwest.....             | Pembrokeshire..... | 51 48      | 4 58                 | 95                             | 4'21                           | 6'98         |
| Aberystwyth (Gogerddan)..      | Cardigan.....      | 52 26      | 4 1                  | 83                             | 4'88                           | 6'41         |
| Llandudno.....                 | Carnarvon.....     | 53 20      | 3 50                 | 72                             | 3'16                           | 3'74         |
| Cargen [Dumries].....          | Kirkcudbright..    | 55 2       | 3 37                 | 80                             | 4'23                           | 8'71         |
| Marchmont House.....           | Berwick.....       | 55 44      | 2 24                 | 498                            | 3'54                           | 3'89         |
| Girvan (Pinmore).....          | Ayr.....           | 55 10      | 4 49                 | 207                            | 4'54                           | ...          |
| Glasgow (Queen's Park) ...     | Renfrew.....       | 55 53      | 4 18                 | 144                            | 3'62                           | 5'29         |
| Inveraray (Newtown).....       | Argyll.....        | 56 14      | 5 4                  | 17                             | 6'02                           | 8'28         |
| Mull (Quinish).....            | ".....             | 56 36      | 6 13                 | 35                             | 5'00                           | 7'11         |
| Dundee (Eastern Necropolis)    | Forfar.....        | 56 28      | 2 57                 | 199                            | 3'34                           | 7'51         |
| Braemar.....                   | Aberdeen.....      | 57 0       | 3 24                 | 1114                           | 3'63                           | 5'39         |
| Aberdeen (Cranford).....       | ".....             | 57 8       | 2 7                  | 120                            | 3'07                           | 4'07         |
| Cawdor.....                    | Nairn.....         | 57 31      | 3 57                 | 250                            | 3'05                           | 2'57         |
| Fort Augustus (S. Benedict's)  | E. Inverness.....  | 57 9       | 4 41                 | 68                             | 3'52                           | 3'23         |
| Loch Torridon (Bendamph)       | W. Ross.....       | 57 32      | 5 32                 | 20                             | 6'61                           | 7'89         |
| Dunrobin Castle.....           | Sutherland.....    | 57 59      | 3 56                 | 14                             | 2'71                           | 4'70         |
| Wick.....                      | Caitness.....      | 58 26      | 3 6                  | 77                             | 2'73                           | 3'97         |
| Killarney (District Asylum)    | Kerry.....         | 52 4       | 9 31                 | 178                            | 4'57                           | 6'95         |
| Waterford (Brook Lodge)...     | Waterford.....     | 52 15      | 7 7                  | 104                            | 3'73                           | 7'56         |
| Nenagh (Castle Lough).....     | Tipperary.....     | 52 54      | 8 24                 | 120                            | 4'04                           | 4'64         |
| Miltown Malbay.....            | Clare.....         | 52 52      | 9 26                 | 400                            | 4'98                           | 4'09         |
| Gorey (Courtown House).....    | Wexford.....       | 52 40      | 6 13                 | 80                             | 3'31                           | 6'39         |
| Abbey Leix (Blandsfort)....    | Queen's County..   | 52 56      | 7 17                 | 532                            | 3'94                           | 6'14         |
| Dublin (Fitz William Square)   | Dublin.....        | 53 21      | 6 14                 | 54                             | 3'08                           | 3'35         |
| Mullingar (Belvedere).....     | Westmeath.....     | 53 29      | 7 22                 | 367                            | 4'00                           | 6'94         |
| Ballinasloe.....               | Galway.....        | 53 20      | 8 15                 | 160                            | 3'96                           | 4'64         |
| Crossmolina (Enniscoie).....   | Mayo.....          | 54 4       | 9 18                 | 74                             | 4'68                           | 6'38         |
| Collooney (Markree Obsy.).     | Sligo.....         | 54 11      | 8 27                 | 127                            | 4'30                           | 6'94         |
| Seaforde.....                  | Down.....          | 54 19      | 5 50                 | 180                            | 3'64                           | 5'91         |
| Bushmills (Dundarave).....     | Antrim.....        | 55 12      | 6 30                 | 162                            | 4'06                           | 6'42         |
| Omagh (Edenfel).....           | Tyrone.....        | 54 36      | 7 18                 | 280                            | 4'22                           | 6'87         |

RAINFALL TABLE FOR AUGUST, 1910—continued.

| RAINFALL OF MONTH (con.) |          |                   |       |             | RAINFALL FROM JAN. 1. |           |                      |          | Mean Annual 1875-1909. | STATION.        |
|--------------------------|----------|-------------------|-------|-------------|-----------------------|-----------|----------------------|----------|------------------------|-----------------|
| Diff. from Av. in.       | % of Av. | Max. in 24 hours. |       | No. of Days | Aver. 1875-1909. in.  | 1910. in. | Diff. from Aver. in. | % of Av. |                        |                 |
|                          |          | in.               | Date. |             |                       |           |                      |          |                        |                 |
| - .75                    | 69       | .35               | 25    | 21          | 15.92                 | 16.30     | + .38                | 102      | 25.11                  | Camden Square   |
| - .44                    | 82       | .55               | 29    | 15          | 16.07                 | 18.21     | +2.14                | 113      | 27.64                  | Tenterden       |
| + .38                    | 113      | .70               | 5     | 20          | 19.30                 | 26.56     | +7.26                | 138      | 33.58                  | Steyning        |
| - .67                    | 76       | .58               | 29    | 17          | 18.58                 | 19.25     | + .67                | 104      | 31.87                  | Cadland         |
| - .53                    | 79       | .29               | 28    | 18          | 15.84                 | 15.64     | - .20                | 99       | 25.16                  | Hitchin         |
| - .94                    | 62       | .33               | 28    | 16          | 15.47                 | 14.39     | -1.08                | 93       | 24.58                  | Oxford          |
| - .02                    | 99       | .52               | 4     | 18          | 15.96                 | 18.74     | +2.78                | 117      | 25.40                  | Westley         |
| + .01                    | 100      | .32               | 25    | 22          | 14.20                 | 19.75     | +5.55                | 139      | 23.73                  | Geldeston       |
| +1.66                    | 152      | .79               | 14    | 25          | 21.79                 | 28.71     | +6.92                | 132      | 38.27                  | Rolapit Tamar   |
| + .88                    | 131      | 1.65              | 28    | 16          | 19.85                 | 21.46     | +1.61                | 108      | 33.54                  | Rousdon         |
| +1.97                    | 168      | 1.63              | 28    | 27          | 18.73                 | 21.37     | +2.64                | 114      | 29.81                  | Stroud          |
| + .58                    | 117      | .75               | 3     | 23          | 20.31                 | 19.94     | - .37                | 98       | 32.41                  | Wolstaston      |
| +1.28                    | 128      | ...               | ...   | ...         | 18.16                 | 17.73     | - .43                | 98       | 28.98                  | Coventry        |
| +1.09                    | 140      | .84               | 18    | 25          | 16.82                 | 18.27     | +1.45                | 109      | 27.10                  | Market Overton  |
| + .86                    | 136      | .55               | 18    | 22          | 14.60                 | 16.20     | +1.60                | 111      | 23.35                  | Boston          |
| +1.04                    | 141      | .74               | 14    | 18          | 15.70                 | 16.01     | + .31                | 102      | 24.46                  | Hodsock Priory  |
| +1.70                    | 145      | 1.60              | 28    | 24          | 21.93                 | 26.94     | +5.01                | 123      | 34.73                  | Macclesfield    |
| + .97                    | 126      | .62               | 18    | 24          | 19.61                 | 23.64     | +4.03                | 121      | 32.70                  | Southport       |
| + .62                    | 122      | .57               | 14    | 24          | 16.97                 | 21.72     | +4.75                | 128      | 26.87                  | Ribston Hall    |
| +2.77                    | 149      | 1.58              | 28    | 26          | 37.59                 | 48.08     | +10.49               | 128      | 61.49                  | Arneliffe       |
| + .56                    | 118      | .57               | 25    | 24          | 16.52                 | 17.60     | +1.08                | 107      | 26.42                  | Hull            |
| - .47                    | 85       | .44               | 25    | 20          | 17.65                 | 17.81     | + .16                | 101      | 27.94                  | Newcastle       |
| +6.55                    | 157      | 4.51              | 26    | 25          | 76.76                 | 94.76     | +18.00               | 123      | 129.48                 | Seathwaite      |
| +1.45                    | 132      | 1.04              | 28    | 24          | 25.02                 | 32.63     | +7.61                | 130      | 42.28                  | Cardiff         |
| +2.77                    | 166      | 1.14              | 23    | 23          | 27.05                 | 28.56     | +1.51                | 106      | 46.82                  | Haverfordwest   |
| +1.53                    | 131      | 1.38              | 29    | 22          | 27.03                 | 36.70     | +9.67                | 136      | 45.46                  | Goggerddan      |
| + .58                    | 118      | .64               | 26    | 24          | 18.05                 | 23.08     | +5.03                | 128      | 30.36                  | Llandudno       |
| +4.48                    | 206      | 1.94              | 28    | 21          | 26.49                 | 39.09     | +12.60               | 148      | 43.47                  | Cargen          |
| + .35                    | 110      | .65               | 28    | 21          | 21.22                 | 18.77     | -2.45                | 88       | 33.76                  | Marchmont       |
| ...                      | ...      | ...               | ...   | ...         | 29.37                 | ...       | ...                  | ...      | 49.77                  | Glirvan         |
| +1.67                    | 146      | 1.09              | 28    | 21          | 22.04                 | 28.36     | +6.32                | 129      | 35.97                  | Glasgow         |
| +2.26                    | 138      | 1.80              | 28    | 25          | 40.06                 | 48.70     | +8.64                | 122      | 68.67                  | Inveraray       |
| +2.11                    | 142      | 1.46              | 28    | 22          | 32.67                 | 37.03     | +4.36                | 113      | 56.57                  | Quinish         |
| +4.17                    | 225      | 1.36              | 28    | 22          | 18.20                 | 20.62     | +2.42                | 113      | 28.64                  | Bundee          |
| +1.76                    | 149      | ...               | ...   | ...         | 21.43                 | 27.63     | +6.20                | 129      | 34.93                  | Braemar         |
| +1.00                    | 133      | .81               | 25    | 21          | 20.09                 | 18.92     | -1.17                | 94       | 32.73                  | Aberdeen        |
| - .48                    | 84       | .48               | 18    | 15          | 18.70                 | 22.27     | +3.57                | 119      | 29.33                  | Cawdor          |
| - .29                    | 92       | .43               | 18    | 20          | 26.72                 | 31.61     | +4.89                | 118      | 44.53                  | Fort Augustus   |
| +1.28                    | 119      | 1.08              | 31    | 25          | 49.35                 | 60.99     | +11.64               | 124      | 83.61                  | Bendamph        |
| +1.99                    | 174      | .65               | 26    | 21          | 19.90                 | 20.92     | +1.02                | 105      | 31.90                  | Dunrobin Castle |
| +1.24                    | 145      | .85               | 5     | 23          | 18.11                 | 19.21     | +1.10                | 106      | 29.88                  | Wick            |
| +2.38                    | 152      | 1.17              | 4     | 30          | 32.97                 | 43.17     | +10.20               | 131      | 54.81                  | Killarney       |
| +3.83                    | 203      | 2.10              | 1     | 22          | 24.26                 | 26.20     | +1.94                | 108      | 39.57                  | Waterford       |
| + .60                    | 115      | .79               | 14    | 27          | 24.57                 | 31.31     | +6.74                | 127      | 39.43                  | Castle Lough    |
| - .89                    | 82       | 1.36              | 25    | 30          | 27.28                 | 31.97     | +4.69                | 117      | 45.11                  | Miltown Malbay  |
| +3.08                    | 193      | 1.84              | 1     | 21          | 21.63                 | 24.40     | +2.77                | 113      | 34.99                  | Courtown Ho.    |
| +2.20                    | 156      | 1.29              | 14    | 27          | 22.77                 | 31.19     | +8.44                | 137      | 35.92                  | Abbey Leix      |
| + .27                    | 109      | 1.10              | 1     | 22          | 17.83                 | 24.38     | +6.55                | 137      | 27.68                  | Dublin          |
| +2.94                    | 173      | 1.08              | 14    | 28          | 23.17                 | 31.09     | +7.92                | 134      | 36.14                  | Mullingar.      |
| + .68                    | 117      | .83               | 25    | 27          | 23.18                 | 26.44     | +3.26                | 114      | 36.64                  | Ballinasloe     |
| +1.70                    | 136      | 1.80              | 24    | 24          | 31.32                 | 40.36     | +9.12                | 129      | 52.87                  | Enniscoe        |
| +2.64                    | 161      | 2.30              | 25    | 25          | 26.49                 | 41.11     | +14.62               | 155      | 42.71                  | Markree         |
| +2.27                    | 162      | 1.18              | 1     | 24          | 24.38                 | 26.50     | +2.12                | 109      | 38.91                  | Seaforde        |
| +2.36                    | 158      | 1.73              | 20    | 20          | 22.83                 | 29.36     | +6.53                | 129      | 37.56                  | Dundarave       |
| +2.65                    | 163      | 1.45              | 14    | 23          | 24.66                 | 33.19     | +8.53                | 135      | 39.38                  | Omagh           |

## SUPPLEMENTARY RAINFALL, AUGUST, 1910.

| Div.  | STATION.                     | Rain inches | Div.   | STATION.                     | Rain inches |
|-------|------------------------------|-------------|--------|------------------------------|-------------|
| II.   | Warlingham, Redvers Road     | 3.22        | XI.    | Llangyhanfal, Plás Draw....  | 2.71        |
| "     | Ramsgate .....               | 2.84        | "      | Dolgelly, Bryntrion .....    | 6.48        |
| "     | Hailsham .....               | 2.56        | "      | Bettws-y-Coed, Tyn-y-bryn    | 6.39        |
| "     | Totland Bay, Aston House.    | 1.98        | "      | Lligwy .....                 | 5.47        |
| "     | Stockbridge, Ashley .....    | 1.89        | "      | Douglas, Woodville .....     | ...         |
| "     | Grayshott.....               | 3.20        | XII.   | Stoneykirk, Ardwell House    | 6.82        |
| "     | Reading, Calcot Place.....   | 2.56        | "      | Dalry, The Old Garroch ...   | 10.67       |
| III.  | Harrow Weald, Hill House.    | 3.00        | "      | Langholm, Grove Road.....    | 8.69        |
| "     | Pitsford, Sedgebrook .....   | 2.79        | "      | Montaive, Maxwelton House    | 9.28        |
| "     | Huntingdon, Brampton.....    | 1.71        | XIII.  | St Mary's Loch, Cramilt Ldge | 8.00        |
| "     | Woburn, Milton Bryant.....   | 1.92        | "      | Edinburgh, Royal Observry..  | 5.18        |
| "     | Wisbech, Monica Road.....    | 2.63        | XIV.   | Maybole, Knockdon Farm..     | 4.81        |
| IV.   | Southend Water Works.....    | 1.90        | XV.    | Campbeltown, Witchburn...    | 6.26        |
| "     | Colchester, Lexden.....      | 2.45        | "      | Glenreadell Mains.....       | 6.94        |
| "     | Newport .....                | 2.02        | "      | Ballachulish House.....      | 5.98        |
| "     | Rendlesham.....              | 2.74        | "      | Islay, Eallabus .....        | 5.71        |
| "     | Swaffham .....               | 1.98        | XVI.   | Dollar Academy .....         | 9.61        |
| "     | Blakeney .....               | 2.02        | "      | Balquhiddy, Stronvar .....   | 10.72       |
| V.    | Bishops Cannings .....       | 3.89        | "      | Coupar Angus .....           | 7.19        |
| "     | Winterbourne Steepleton      | 3.35        | "      | Blair Atholl.....            | 6.79        |
| "     | Ashburton, Druid House ..... | 6.11        | "      | Montrose, Sunnyside Asylum   | 4.56        |
| "     | Honiton, Combe Raleigh ...   | 4.85        | XVII.  | Alford, Lynturk Manse ...    | 4.44        |
| "     | Okehampton, Oaklands.....    | 7.02        | "      | Keith Station .....          | 4.87        |
| "     | Hartland Abbey .....         | 4.47        | XVIII. | Glenquoich, Laon .....       | 13.20       |
| "     | Lynmouth, Rock House .....   | 5.22        | "      | Skye, Dunvegan.....          | 7.53        |
| "     | Probus, Lamellyn .....       | 4.37        | "      | N. Uist, Lochmaddy.....      | 6.26        |
| "     | North Cadbury Rectory ..     | 4.39        | "      | Alvey Manse .....            | 3.54        |
| VI.   | Clifton, Pembroke Road ...   | 6.36        | "      | Loch Ness, Drumnadrochit.    | 3.86        |
| "     | Ross, The Graig .....        | 5.46        | "      | Glen carron Lodge .....      | 5.43        |
| "     | Shifnal, Hatton Grange.....  | 4.26        | "      | Fearn, Lower Pitkerrie.....  | 2.79        |
| "     | Blockley, Upton Wold .....   | 4.33        | XIX.   | Invershin .....              | 4.91        |
| "     | Worcester, Boughton Park.    | 5.35        | "      | Altnaharra .....             | 4.96        |
| VII.  | Market Rasen .....           | 4.28        | "      | Bettyhill .....              | 5.87        |
| "     | Bawtry, Hesley Hall.....     | 2.87        | XX.    | Dunmanway, The Rectory..     | 6.22        |
| "     | Derby, Midland Railway ...   | 3.56        | "      | Cork .....                   | 5.24        |
| "     | Buxton.....                  | 5.44        | "      | Mitchelstown Castle .....    | 5.98        |
| VIII. | Nantwich, Dorfold Hall.....  | 4.39        | "      | Darrynane Abbey .....        | 6.21        |
| "     | Liscard .....                | 3.96        | "      | Glenam [Clonmel] .....       | 6.25        |
| "     | Chatburn, Middlewood .....   | 6.16        | "      | Nenagh, Traverston .....     | 6.14        |
| "     | Cartmel, Flookburgh .....    | 6.46        | "      | Newmarket-on-Fergus, Fenloe  | 4.84        |
| IX.   | Langsett Moor, Up. Midhope   | 4.06        | XXI.   | Laragh, Glendalough .....    | 7.77        |
| "     | Scarborough, Scalby .....    | 4.75        | "      | Moynalty, Westland .....     | 6.53        |
| "     | Ingleby Greenhow .....       | ...         | "      | Athlone, Twyford .....       | 5.59        |
| "     | Mickleton.....               | 4.42        | XXII.  | Woodlawn .....               | 5.03        |
| X.    | Bardon Mill, Beltingham ...  | 4.16        | "      | Westport, St. Helens .....   | 4.97        |
| "     | Ilderton, Lilburn Cottage... | 3.85        | "      | Achill Island, Dugort .....  | 7.43        |
| "     | Keswick, The Bank .....      | 8.35        | "      | Mohill .....                 | 6.95        |
| XI.   | Llanfrecfa Grange.....       | 6.43        | XXIII. | Enniskillen, Portora .....   | ...         |
| "     | Treherbert, Tyn-y-waun       | 12.36       | "      | Dartrey [Cootehill].....     | 6.06        |
| "     | Carmarthen, The Friary....   | 8.05        | "      | Warrenpoint, Manor House     | 5.23        |
| "     | Castle Malgwyn [Llechryd].   | 7.08        | "      | Banbridge, Milltown .....    | 3.81        |
| "     | Plynlimon.....               | 7.00        | "      | Belfast, Springfield .....   | 6.18        |
| "     | Crickhowell, Ffordlas.....   | 5.00        | "      | Glenam Castle.....           | 5.52        |
| "     | New Radnor, Ednol .....      | 5.80        | "      | Londonderry, Creggan. Res.   | 9.28        |
| "     | Rhayader, Tyrmynydd .....    | 6.67        | "      | Killybegs .....              | 8.61        |
| "     | Lake Vyrnwy .....            | 6.96        | "      | Horn Head ... ..             | 6.87        |

## METEOROLOGICAL NOTES ON AUGUST, 1910.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow; F for number of days Frost in Screen; f on Grass.

LONDON, CAMDEN SQUARE.—Evaporation, 2.12 in. Duration of sunshine, 139.6\* hours, and of R 31.7 hours. Mean temp. 62°·5, or 0°·4 above the average. Shade max. 77°·7 on 12th; min. 48°·9 on 7th. F 0, f 0.

TENTERDEN.—Windy and unsettled, but rain in small quantities, except on 28th and 29th. Duration of sunshine, 183.0† hours. Shade max. 74°·0 on 14th; min. 46°·0 on 7th. F 0, f 0.

WEST DEAN.—Very cool and unsummerlike month. Max. temp. never reached average. Shade max. 74°·0 on 12th; min. 40°·0 on 23rd. F 0, f 2.

PITSFORD.—R .92 in. above the average. Mean temp. 60°·2. Shade max. 75°·3 on 11th; min. 54°·4 on 23rd and 25th. F 0.

ROUSDON.—Very dull and wet, with remarkably dense fog at times. Shade max. 71°·9 on 10th.

NORTH CADBURY.—Extremely windy and cloudy; never hot and never cold. Dry up to 23rd, then very wet. Shade max. 79°·0 on 14th; min. 48°·0 on 23rd. F 0, f 0.

ROSS.—The wettest August since 1879, and with two exceptions since 1859. Shade max. 75°·0 on 14th; min. 43°·2 on 3rd. F 0, f 0.

HODSOCK PRIORY.—TS on 24th, with black rain and unusual darkness. Shade max. 75°·1 on 11th; min. 44°·3 on 1st. F 0, f 0.

SOUTHPORT.—Excessive cloud amount and humidity. Duration of sunshine 143.5\* hours, and of R 86.3 hours. Mean temp. 59°·2, or 0°·3 below the average. Shade max. 73°·2 on 11th; min. 47°·7 on 5th. F 0, f 0.

HULL.—Very cloudy, with frequent rains, low temp., and little sunshine throughout the month. Shade max. 75°·0 on 14th; min. 47°·0 on 23rd. F 0, f 0.

HAVERFORDWEST.—Cold, wet and stormy; crops greatly damaged. Duration of sunshine, 154.4\* hours. Shade max. 71°·5 on 14th; min. 47°·9 on 1st. F 0, f 0.

LLANDUDNO.—Shade max. 75°·0 on 14th; min. 49°·8 on 1st. F 0, f 0.

MARCHMONT HOUSE.—Duration of sunshine, 140.8\* hours. Shade max. 72°·0 on 11th; min. 45°·0 on 3rd and 10th. F 0, f 0.

EDINBURGH.—Shade max. 71°·2 on 12th; min. 45°·1 on 23rd. F 0, f 0.

COUPAR ANGUS.—The wettest August for 30 years. Mean temp. 58°·3, or 2° above the average owing to high night temp. Shade max. 75°·0 on 12th; min. 44°·0 on 10th. F 0, f 0.

FORT AUGUSTUS.—Shade max. 70°·0 on 12th; min. 43°·0 on 4th.

WATERFORD.—The wettest August since 1850. Shade max. 71°·5 on 8th and 10th; min. 48°·0 on 4th, 6th and 22nd. F 0.

DUBLIN.—A cloudy, rainy, windy month; gales on 19th and 26th; fogs on 8th and 9th. Mean temp. 59°·1, or 0°·6 below the average. Shade max. 69°·5 on 12th; min. 49°·1 on 22nd. F 0, f 0.

MARKREE.—Heavy floods with strong gales on 25th and 26th. Shade max. 75°·3 on 7th; min. 41°·5 on 6th. F 0, f 0.

WARRENPOINT.—Wet, but comparatively mild, with light winds constantly varying; barometer very unsteady. Shade max. 69°·0 on 9th, 12th and 21st; min. 52°·0 on 21st. F 0, f 0.

HORN HEAD.—A great deal of thunder. Shade max. 78°·0 on 28th; min. 44°·0 on 24th.

\* Campbell-Stokes.

† Jordan.

## Climatological Table for the British Empire, March, 1910.

| STATIONS.<br><br><i>(Those in italics are<br/>South of the Equator.)</i> | Absolute. |       |          |       | Average. |       |               |           | Absolute.       |                   | Total Rain |       | Aver.<br>Cloud. |
|--------------------------------------------------------------------------|-----------|-------|----------|-------|----------|-------|---------------|-----------|-----------------|-------------------|------------|-------|-----------------|
|                                                                          | Maximum.  |       | Minimum. |       | Max.     | Min.  | Dew<br>Point. | Humidity. | Max. in<br>Sun. | Min. on<br>Grass. | Depth.     | Days. |                 |
|                                                                          | Temp.     | Date. | Temp.    | Date. |          |       |               |           |                 |                   |            |       |                 |
| London, Camden Square                                                    | 58°·2     | 30    | 27°·3    | 20    | 51°·5    | 35°·4 | 33°·2         | 84        | 96°·8           | 22°·7             | ·97        | 9     | 6·1             |
| Malta ... ..                                                             | 67°·1     | 16    | 46°·5    | 1     | 59°·9    | 50°·4 | 46°·8         | 78        | 133°·1          | ...               | 1·28       | 5     | 4·7             |
| Lagos ... ..                                                             | 93°·0     | 9     | 70°·0    | 10*   | 90°·6    | 76°·0 | 74°·2         | 68        | 156°·0          | 67°·0             | ·94        | 2     | 7·6             |
| Cape Town ... ..                                                         | 86°·8     | 24    | 43°·5    | 21    | 77°·1    | 59°·1 | 56°·4         | 68        | ...             | ...               | 1·27       | 3     | 2·5             |
| <i>Durban, Natal</i>                                                     | ...       | ...   | ...      | ...   | ...      | ...   | ...           | ...       | ...             | ...               | ...        | ...   | ...             |
| <i>Johannesburg</i> ... ..                                               | 80°·0     | 16    | 45°·7    | 31    | 72°·9    | 54°·2 | 52°·7         | 73        | 143°·9          | 43°·8             | 6°·50      | 8     | 4°·6            |
| <i>Mauritius</i> ... ..                                                  | 84°·5     | 3, 12 | 68°·0    | 28    | 82°·9    | 72°·5 | 71°·3         | 83        | 156°·5          | 62°·6             | 9°·70      | 23    | 6·9             |
| Calcutta... ..                                                           | 98°·0     | 24    | 57°·3    | 7     | 91°·5    | 69°·7 | 66°·6         | 65        | ...             | 51°·3             | ·66        | 1     | 1°·6            |
| Bombay ... ..                                                            | 93°·8     | 12    | 67°·5    | 6     | 87°·8    | 73°·1 | 68°·0         | 69        | 139°·8          | 59°·9             | ·00        | 0     | 0°·6            |
| Madras ... ..                                                            | 97°·2     | 20    | 65°·6    | 18    | 89°·8    | 71°·0 | 70°·7         | 76        | 140°·2          | 61°·7             | ·00        | 0     | 1°·4            |
| Kodaikanal ... ..                                                        | 74°·1     | 20    | 46°·9    | 15    | 68°·6    | 50°·8 | 39°·4         | 48        | 136°·7          | 33°·1             | ·01        | 1     | 1°·5            |
| Colombo, Ceylon ... ..                                                   | 92°·1     | 15    | 72°·0    | 30    | 90°·6    | 74°·1 | 71°·7         | 73        | 156°·2          | 68°·8             | ·84        | 2     | 3°·8            |
| Hongkong ... ..                                                          | 80°·3     | 16    | 50°·9    | 3     | 67°·0    | 60°·1 | 59°·0         | 84        | 131°·6          | ...               | ·58        | 9     | 8°·7            |
| <i>Melbourne</i> ... ..                                                  | 94°·9     | 23    | 44°·4    | 11    | 75°·6    | 55°·9 | 51°·2         | 59        | 145°·3          | 40°·1             | 2°·19      | 7     | 4°·5            |
| <i>Adelaide</i> ... ..                                                   | 97°·6     | 24    | 48°·8    | 16    | 78°·8    | 58°·1 | 52°·6         | 56        | 154°·0          | 39°·3             | 4°·10      | 5     | 2°·5            |
| <i>Coolgardie</i> ... ..                                                 | 102°·0    | 19    | 45°·0    | 29    | 85°·5    | 58°·6 | 49°·0         | 44        | 168°·0          | 40°·2             | ·05        | 2     | 2°·4            |
| <i>Perth</i> ... ..                                                      | 97°·4     | 2     | 50°·9    | 29    | 84°·2    | 62°·6 | 55°·0         | 52        | 153°·6          | 43°·6             | ·05        | 2     | 2°·1            |
| <i>Sydney</i> ... ..                                                     | 84°·8     | 8     | 57°·8    | 26    | 73°·8    | 62°·5 | 59°·1         | 74        | 145°·8          | 48°·8             | 7°·54      | 29    | 5°·7            |
| <i>Wellington</i> ... ..                                                 | 77°·4     | 2     | 45°·2    | 24    | 67°·9    | 56°·5 | 53°·9         | 75        | 125°·0          | 37°·0             | 2°·39      | 16    | 7°·5            |
| <i>Auckland</i> ... ..                                                   | 78°·5     | 12    | 51°·0    | 23    | 73°·1    | 61°·1 | 62°·4         | 85        | 156°·0          | 48°·0             | 7°·61      | 13    | 6°·3            |
| Jamaica, Kingston ... ..                                                 | 88°·1     | 1     | 62°·1    | 9     | 84°·7    | 66°·2 | 63°·7         | 69        | ...             | ...               | 1°·45      | 7     | ...             |
| Grenada ... ..                                                           | 85°·0     | 8     | 69°·0    | 1, 3  | 78°·8    | 71°·8 | 68°·5         | 75        | 141°·0          | ...               | 6°·65      | 19    | 5°·0            |
| Toronto ... ..                                                           | 75°·2     | 28    | 11°·5    | 15    | 47°·6    | 30°·1 | ...           | ...       | 91°·3           | 7°·2              | ·66        | 8     | 4°·3            |
| Frederickton ... ..                                                      | 54°·0     | 30    | 0°·0     | 11†   | 39°·2    | 20°·3 | ...           | 77        | ...             | ...               | 1°·86      | 9     | 5°·5            |
| St. John's, N.B. ... ..                                                  | 52°·7     | 29    | 10°·0    | 19    | 39°·6    | 27°·8 | ...           | 74        | ...             | ...               | 1°·72      | 11    | 5°·9            |
| Victoria, B.C. ... ..                                                    | 64°·1     | 13    | 31°·4    | 25    | 52°·4    | 39°·8 | ...           | ...       | ...             | ...               | 2°·37      | 16    | 7°·0            |
| Dawson ... ..                                                            | 45°·5     | 15    | -44°·0   | 3     | 17°·3    | -5°·9 | ...           | ...       | ...             | ...               | ·68        | 9     | 5°·5            |

\* and 28. † and 19.

MALTA.—Mean temp. of air 54°·6. Bright sunshine 7·7 hours per day.

*Johannesburg*.—Bright sunshine 239·3 hours.*Mauritius*.—Mean temp. of air 0°·4 below, of dew point 0°·7, and R ·49 in., above averages. Mean hourly velocity of wind 8·9 miles, or 1·5 below average. L, T on 5 days.

KODAIKANAL.—Bright sunshine 280 hours. Hoar frost on 10 days.

COLOMBO.—Mean temp. of air 81°·0, or 1°·0 below, of dew point 1°·2 below, and R 3°·54 in. below, averages. Mean hourly velocity of wind 4·5 miles. TS on 29th.

HONGKONG.—Mean temp. of air 63°·3. Bright sunshine 91·1 hours. Mean hourly velocity of wind 14°·0 miles. R 2°·28 in. below average.

*Melbourne*.—Mean temp. of air 1°·0 above, and R ·8 in. above, average.*Adelaide*.—Rainfall 3°·01 in. above average.*Perth*.—Mean temp. of air 2°·4 above average.*Sydney*.—Mean temp. of air 1°·0 below, and R 2°·40 in. above, averages.*Wellington*.—Mean temp. of air 1°·7 above, and R 1°·24 in. below, averages. Bright sunshine 166°·5 hours.*Auckland*.—Heavy R on the 29th, 3°·85 in., and total three times the average for the month.