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THE ORGANIZATION OF AERONAUTICAL RESEARCH.

There is one valuable compensation for retarded development in the case of scientific organization; it becomes possible when the subject is at last seriously undertaken to launch it carefully planned and completely equipped.

We have to announce two very important steps in the progress of aeronautical research in Great Britain, which we welcome as certain to lead to an advance in the study of meteorological conditions, with which the aeronautic art even more than navigation has vitally to do. The Government has decided that both the Navy and Army should be concerned in the designing and testing of air-ships and aeroplanes, and that ample provision should be made for the expense of the necessary experiments. Realizing that scientific principles and engineering skill must be brought to bear on the problems involved, the Government has decided to make use of the facilities afforded by the National Physical Laboratory at Teddington, where a special aeronautical department is to be organized. A permanent Treasury Committee is to superintend this department, and to be available for consultation by the Admiralty and War Office on the various problems that may arise. *The Times* states that of the Committee as nominated,

> Lord Rayleigh is President, and Dr. R. T. Glazebrook, the director of the laboratory, Chairman. The other members are:—Major-General Sir Charles Hadden, representing the Army; Captain R. H. S. Bacon, representing the Navy; Sir Alfred Greenhill, F.R.S., a distinguished authority on hydrodynamics and formerly Professor of Mathematics in the Ordnance College, Woolwich; Dr. W. N. Shaw, F.R.S., the Director of the Meteorological Office; Mr. Horace Darwin, F.R.S., of the Cambridge Scientific Instrument Company; Mr. H. R. A. Mallock, F.R.S., a consulting engineer and member of the Ordnance Committee; Mr. J. E. Petavel, F.R.S., Professor of Engineering in the University of Manchester; and Mr. F. W. Lanchester, an engineer who has given much attention to aeronautical matters and the author of a well-known text-book on the subject.

We miss the name of Mr. W. H. Dines, F.R.S., whose long experience in research on the upper air and remarkable inventive skill

should surely have led to his nomination as a member of such a Committee. Apart from this omission, the appointment of the Committee is a sign of enlightened action being taken in high quarters in connection with the striking developments now going on in aerial navigation, which concern the means of national defence as much as the advancement of science.

While a new body of an exceptionally representative character is being created to aid the Government in the perfection and application of new means of aerial defence, it is gratifying to find that the various private bodies, which have identified themselves with aeronautical matters, have come to a practical understanding to avoid needless rivalry, and to delimit the portions of the subject to which each is to direct attention. The Aeronautical Society of Great Britain has kept the spark of interest in the science of aeronautics alive through two generations of public apathy; and of its younger contemporaries, the Aero Club pursues aeronautics as a sport in the earnest English way, and the Aerial League was formed to keep before the public the necessity of being foremost in practical aeronautics as a means of national defence. These three bodies have formally pledged themselves to respect each other's provinces and to be mutually helpful. The scientific aspects of aerial navigation and the problem of flight will, as heretofore, be the special care of the Aeronautical Society, which will receive the support of the newer bodies, and be saved from the very real risk of being elbowed out by the stronger appeals of sport and patriotism.

The memorandum of agreement drawn up on May 3rd, 1909, provides as follows:—

With this object in view it is now proposed that the three bodies shall come to a definite written agreement to recognize the respective spheres of action of each separate body.

For the purposes of this agreement the Aeronautical Society shall be regarded as the paramount scientific authority on aeronautical matters, and shall be consulted on all questions dealing with the scientific side of the question.

The Aero Club shall be recognized as the paramount body in all matters of sport and the development of the art of aeronautics.

The Aerial League shall be recognized as the paramount body for patriotic movements and for education.

In order to assist the Parliamentary Committee which is in process of formation, each of these bodies will nominate three of its members to advise and assist when required.

The need for co-operation and definition of spheres of interest has long been felt amongst meteorologists, and we hope that so definite and practical a movement amongst other votaries of aerial science may help to overcome such difficulties as remain in the way of a complete federation of the meteorological activities of the country

THE WEATHER OF APRIL, 1909.

By FRED. J. BRODIE.

AT the commencement of April a large anticyclone extended over western Europe from the northward and produced a spell of remarkably fine weather, commencing on the 1st, and lasting over England until the 11th (Easter Day). In Ireland, Scotland and Wales the conditions between the 2nd and 4th were however affected more or less seriously by a cyclonic system whose borders spread in from the Atlantic, the rainfall in Ireland on the 2nd and 3rd being sufficiently heavy to occasion floods of considerable local severity. After the 4th the influence of the anticyclone became supreme, and for six or seven days brilliantly fine weather prevailed over the entire kingdom, the duration of sunshine being in some districts the highest ever observed in a calendar week since the general establishment of sunshine recorders in 1881. The generalised results for large districts given in the Weekly Weather Report show that in the week ending the 10th as much as 89 per cent of the possible amount of sunshine was registered in the east of England, and as much as 87 per cent. in the south-east. For individual stations the amount was even nearer the limit of possibility, the percentage in some parts of our eastern and southern counties varying between 92 and 94. With so clear a sky both in the daytime and at night, the amount of solar and terrestrial radiation was very large, the days being warm but the nights cold with occasional sharp frost in many districts. The highest shade temperatures were recorded very commonly on the 9th and 10th, when the thermometer rose to 70° and upwards in several parts of England and at some few places in the south of Ireland, to 73° at Hereford and to 74° at Cullompton. The lowest night readings occurred mostly between the 5th and 8th, when the thermometer in the screen fell to 25° or less in many inland parts of Great Britain, a reading as low as 18° being recorded at Balmoral, and a reading of 22° at Llangammarch Wells. On the grass the frost was naturally more severe, the exposed thermometer falling under 20° in many places (as far south even as Greenwich), and reaching a minimum of 9° at Llangammarch Wells.

After the 10th the anticyclone began to recede southwards, and for the remainder of the month the country was influenced by numerous areas of low barometrical pressure, which spread in from the Atlantic. Typical April weather now prevailed, frequent and in some cases heavy falls of rain being interspersed with substantial intervals of bright sunshine. With a current of air blowing usually from between south and west, the thermometer until very near the end of the month was above its average level. No great warmth was however experienced, the daily maxima being seldom as high as 65° even in the most highly favoured localities. The highest readings were observed on the 19th, when the thermometer in some parts of the London district (Greenwich and Tottenham) reached 69°. Night

frosts were reported at various times in inland parts of the country, but these were not sufficiently severe to occasion much injury to vegetation, scarcely any temperatures below 20° being registered even on the surface of the grass. Quite at the close of the month a cold wind from north to north-west sprang up in the rear of a cyclonic disturbance which moved rapidly eastwards across Ireland and England, and showers of hail, sleet or snow fell in nearly all parts of the kingdom. In spite of a large amount of bright sunshine the thermometer on the 30th scarcely rose above 50° in any part of England, while in the northern districts of Ireland and Scotland it did not reach 45°.

The mean temperature for the month was above the average over nearly the whole of the United Kingdom, but in the western and northern districts the excess was small, and in a few scattered places there was a trifling deficiency. The greatest excess, more than two and a half degrees, was reported in the east of England.

ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, April 21st, at the Institution of Civil Engineers, Great George Street, Westminster, Mr. H. Mellish, President, in the chair.

Mr. Baldwin Latham, M. Inst. C.E., read a paper on "Percolation, Evaporation, and Condensation," in which he gave the results of the observations which he had carried out at Croydon on these subjects during the last 30 years. Two percolation gauges were used, both of which were exactly a superficial yard in area, and contained a cubic yard of natural soil, one of chalk and the other of gravel. The average annual amount of percolation through the chalk gauge was 10·84 in., and through the gravel gauge 10·34 in. The average annual rainfall was 25·45 in. It appears that the rate of percolation is governed by the rate of rainfall, for when once the gauges have become sensitive, by being thoroughly wetted, the rate at which rain percolates depends entirely on the quantity of rain immediately falling. The evaporator used for determining the evaporation was a floating copper vessel 1 foot in diameter supported by a life-buoy ring, connected by four arms with the evaporating vessel, the whole being floated in a tank 4 feet internal diameter containing about 3 feet depth of water. The average annual amount of evaporation by this gauge was 18·14 in., and the average annual amount of condensation was ·36 in.

Mr. W. Marriott referred to the percolation observations which had been carried on at Nash Mills, Apsley Mills, Rothamsted, and Berkhamsted. At Apsley Mills, Sir John Evans had 3 gauges—one with chalk, one with sand, and one with natural soil. The percolation was greatest through the sand. Mr. Marriott also referred to the evaporation observations carried out at Camden Square by Dr. Mill,

and at Downholland, near Southport, by Mr. Baxendell. He considered that the chief factors influencing evaporation were the dryness of the air, the temperature of the water and the wind.

Mr. C. Salter said that during the last three years, Dr. Mill (who had asked him to express his regret at not being present) had been experimenting with the object of ascertaining the relation of evaporation measurements to other meteorological elements. The results seem to indicate that wind movement had but little effect upon the amount evaporated, except perhaps in winter, but a remarkable parallelism was shown between the curves, both of duration of sunshine and black bulb maxima and those of evaporation during the summer months. The evaporation was more closely related to shade temperature in winter.

Mr. W. H. Dines said that his father had made many observations on evaporation, and was of opinion that wind was important.

Mr. J. E. Clark, Mr. F. C. Bayard, Dr. W. N. Shaw, Mr. J. Hopkinson, and the President, also took part in the discussion, and Mr. Latham replied.

A paper on "The Meteorological Conditions in the Philippine Islands, 1908," by the Rev. José Algué, S.J., Director of the Philippine Weather Bureau, was read by the Secretary.

The year 1908 was one of extraordinary meteorological conditions. Heavy floods occurred, and frequent violent cyclonic storms passed over or affected the Archipelago. The author stated that out of fourteen typhoons of extraordinary intensity which have occurred during the past 29 years, 5 occurred in the year 1908, the most violent being those of September 23rd, October 13th, and December 5th. It seems that the part of the Archipelago that is visited the most frequently by these extraordinary typhoons is the northern part of Luzon, from parallel 15°·30′ to the Batanes Islands and from parallel 11° to 14° N.

The following gentlemen were elected Fellows of the Society :— Prof. H. T. Barnes, Dr. W. R. Blair, Prof. J. E. Church, Mr. H. B. Hersey, Capt. J. E. Leach, Mr. E. R. Miller, Mr. E. C. Shankland, and Capt. T. J. Uren.

SCOTTISH METEOROLOGICAL SOCIETY.

A MEETING of the Society was held in the Rooms of the Highland and Agricultural Society, Edinburgh, on 5th May, Sir Archibald Buchan-Hepburn, Bart., Vice-President, in the chair.

The Chairman explained that the meeting had a peculiar interest as the formation of the Society was the result of a meeting which was held in 1855 in the rooms of the Highland and Agricultural Society, composed of members of that Society interested in meteorology.

A discussion on the relation of Meteorology to Forestry was opened by Mr. A. W. Borthwick, D.Sc., who summarized the present state of our knowledge with regard to the influence of Forests no climate. Forest meteorology in this country is not so advanced as on the continent. In France, Germany and Sweden, and in America, Forest Meteorological Stations are abundant, and records of the greatest importance are kept. Within forests extremes of temperature are not so great and the average humidity of the air is increased. It is doubtful whether rainfall is actually increased, but the quantity and distribution of rain throughout the year is altered. With regard to the surrounding country, forests are of enormous importance in regulating the drainage and water supply, and in retarding and tempering the effect of violent, cold or dry winds.

Mr. R. Stewart Macdougall, D.Sc., discussed the importance of meteorological conditions from the point of view of plant life. Trees give off a large quantity of water by transpiration in the course of a year. In winter the temperature of the soil falls so much that inflow of water at the roots is made impossible. Provision is therefore made in various ways, *e.g.*—by the shedding of leaves to prevent evaporation and transpiration during winter. Just as with human beings, trees in an unhealthy or dying condition, frequently have a far higher temperature than a healthy tree. Late and early frosts, and, in general variable weather conditions are of great value because the death rate among insect pests is then very high.

Mr. Cadell, of Grange, suggested an enquiry into the effect of the needles of coniferous trees in collecting atmospheric electricity, and thought that this might have some influence on the growth of trees.

Mr. J. H. Milne Home drew attention to the fact, that in well wooded districts the ripening of grain crops is delayed on account of the decrease in warmth and sunshine, but thought that any loss to farmers on this account would be compensated for by the better growth of other crops in the rotation, and by the shelter afforded to stock.

Mr. E. M. Wedderburn suggested that in connection with the establishment of Demonstration Forests, or in the event of the afforestation of large areas by the State, Forest Meteorological Stations should be established, the records from which would be of great value.

Mr. A. Watt pointed out that the relation of meteorology to forestry was of especial interest in Scotland in view of the recommendations of the Royal Commission on Coast Erosion. He was of opinion that afforestation, even on a large scale would not materially alter the climate of Scotland.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

ROYALTY AND RAIN.

In *Notes and Queries*, first series, Volume V., pp. 242-3, is a copy of a letter (from Miscellaneous Collections by Dr. Richard Pococke, in British Museum, MS. Add., No. 15,801, folio 33) written by Philip Herbert, third Earl of Pembroke, to the Sheriff of Staffordshire in the time of Charles I., touching the belief that burning brought on rain by ascent of smoke.

"Sr.—His Majesty taking notice of an opinion entertained in Staffordshire that the burning of ferne doth draw downe rain and being desirous that the country and himself may enjoy fair weather as long as he remains in those parts His Majesty hath commanded me to write unto you to cause all burning of ferne to bee forborne untill His Majesty bee passed the country. Wherein not doubting but that the consideration of their own interest as well as of His Maties will invite the country to a ready observance of this, His Maties command, I rest

"Your very loving friend,

"PEMBROKE AND MONTGOMERY.

"Belvoir, 1st August, 1636.

"To my very loving friend the High Sheriff of the County of Stafford."

This extract is interesting at least, as carrying the royal interest in rainfall as far back as the time of Charles the First.

R. BENTLEY.

Upton, Slough, Bucks.

THE EVAPORATING AND RECEIVING AREAS OF DEW-PONDS.

In the remarks on dew-ponds in your Magazine for April (p. 57), rain is rightly stated to be the principal factor in filling them, and the *difference* between the rainfall and the evaporation—on the summit of the South Downs from 15 to 20 inches per annum—is given as the depth of accumulation of water from rain alone. This, however, leaves out of account the difference between the evaporating and the receiving area. Dew-ponds being made in the form of a shallow inverted cone, their gathering area is larger than the evaporating surface of the water, except when they are full. The consequence of this is, as I pointed out in a discussion on dew-ponds at a conference of delegates of Corresponding Societies of the British Association (*Rep. Brit. Assoc.*, for 1900, p. 584), that the depth of water accumulated is usually greater than the difference between the rainfall and the evaporation. With the one area double that of the other—about an average difference—every inch of rain would add two inches of

water to the pond. In wet weather there may be but little difference, but in a dry summer I have seen the water occupying about a tenth of the gathering area. Then rain would when commencing to fall add ten times its own depth to the depth of water in the pond, the excess in proportion gradually decreasing with continued rain. That the less water there is in a pond, the more effect has the rain in increasing its depth is the reason these ponds maintain a more equable level than do ponds with a flat bottom and steep sides, a fact which appears to have been hitherto overlooked.

JOHN HOPKINSON.

Weetwood, Watford, 7th May, 1909.

[Our note designedly stated the lowest possible value for rain replenishment on the assumption of a vertical-sided depression with a sharp rim. The points referred to above were fully appreciated in the discussion on Mr. Martin's paper, see p. 77.—ED., *S.M.M.*]

ROTHESAY AND GREENWICH WEATHER.

SOME time ago I remarked on a relation between Rothesay summers and Greenwich winters as possibly helpful in forecasting. Further enquiry seems to indicate an interesting relation between the year's rainfall at Rothesay and the character of the Greenwich year following. In such studies the climates of those two places are, of course, taken as largely representative.

Consider what happens at Greenwich in the year after a very wet year at Rothesay. Last year at the latter was decidedly wet, with close on 56 in. (the average is 48·6 in.). Suppose we take all Rothesay years with more than 55 in. (in 1841-1907); and note in each case, for Greenwich (1) the number of frost days, (2) the number of days with 70° or more in the year following. We find this—

	Very wet Years, Rothesay, (> 55 in.).		Frost Days Year following (Greenwich).	Relation to Average.		Days with 70° or more in Year following (Greenwich).	Relation to Average.
1.	1841.....	65·9	51	— 3	.....	82	+ 5
2.	1861.....	56·3	35	—19	.....	67	—10
3.	1862.....	59·5	34	—20	.....	66	—11
4.	1866.....	58·7	64	+10	.....	78	+ 1
5.	1868.....	57·2	50	— 4	.....	76	— 1
6.	1872.....	70·2	52	— 2	.....	79	+ 2
7.	1877.....	68·6	57	+ 3	.....	76	— 1
8.	1882.....	59·6	44	—10	.....	73	— 4
9.	1903.....	61·6	56	+ 2	.....	66	—11
10.	1906.....	56·3	45	— 9	.....	60	—17
11.	1907.....	58·5	49	— 5	.....	77	0
	Average	.....	48·8	— 5·2	.....	72·7	— 4·3

Here we have in both kinds of days a preponderance of minus values (8 and 7 out of 11); and where there is excess it is never great. (The annual frost days have ranged up to 95, and the warm

days up to 132.) The group here considered is not large, and the relation may perhaps be upset in time; but until that happens we might, it seems, be justified in expecting no great frost and no great warmth (in the above senses) in the Greenwich year following a very wet one at Rothesay.

Consider now the rainfall of summer at Greenwich in relation to a very wet preceding year at Rothesay. Taking the 20 wettest and the 20 driest years at Rothesay since 1841, I find this: after the former Greenwich had 16 dry summers, 4 wet; after the latter, 8 dry, 12 wet. This would point to a dry summer as probable this year; but there are other lines of evidence which, I think, may make one doubtful. Last summer was one of the 4 "exceptions" to the "rule" (as we might perhaps put it), and conformity to the "exceptions" has to be reckoned with.

Once more, the Greenwich year after a very wet Rothesay year (in the sense of those 20 wettest) rarely has more than 6 months wet (only one case, 1867, which had 8). Such years with over 6 wet months seem to occur about 1 in 4 in the period 1815-1907.

I do not here enter into the theory of the above relations. In some cases a reason may, I think, be perceived; while others are more obscure. Some discussion of the facts might be acceptable.

ALEX. B. MACDOWALL.

THE GREAT SNOWSTORM OF APRIL 25th, 1908—A SUGGESTED EXPLANATION.*

By CATHERINE O. STEVENS.

IN the case of this storm the track of precipitation of snow was restricted to a curiously limited area of Southern England, and the snowfall was actually most excessive along the coast-line of Dorset, Hampshire, and Sussex. Official Meteorological records for the inclusive dates, April 25th—26th, show that two cyclonic disturbances pursuing nearly parallel courses passed, during these three days, from west to east, the centre of one crossing the Midlands, and that of the other moving up the Channel. By means of a projected telescopic image of the sun evidence was secured at Oxford, at 3 p.m., on April 24th, of the fact that these two cyclones were, at this time, already actually overlapping one another. The drift of visible cloud was still from N.N.W., but the movements of distortion of the sun's telescopic image gave evidence of a lower stratum of movement from S.S.E. or S. Later in the day the south wind became more and more marked, and intensely cold; at 10.30 p.m. it was recorded that minute needles of ice were falling on a very light south wind, and

* Paper read to Section A of the British Association at Dublin, Sept., 1908.

when daylight returned the ground was already covered several inches deep in snow, with the wind now blowing strongly from south-south-east.

It is suggested that the moisture-laden air of the comparatively warm (water-borne) southern cyclone was impregnated with ice-crystals associated with the cold (land-borne) northern cyclone, and that, in consequence, what would otherwise have been precipitated as drops of rain became first converted into flakes of snow by the process of spontaneous crystallisation. It is desired to lay stress upon the fact that evidence of the relative positions of these two cyclones was obtained (by the employment of the telescopic method of scrutinizing the atmospheric distortions of the sun's limb) *hours* before other more tangible evidence was obtainable, of their coming into conflict with one another, making it appear that, by the employment of this means of research, granted the origin of that precipitation of snow has been rightly surmised, it would be within the reach of the meteorologist to forecast such blizzards with considerable certainty, and so avert, to some extent, the more disastrous of their results. This probability is strengthened by the fact that in every case yet examined into of sudden and phenomenal snowfall (such as that of December 24th and 25th, 1906, and January 18th, 1881), the same circumstances were attendant upon the same results—that is to say, there proves to have been the occurrence of a near approach together of two cyclones, the one from over the Atlantic, inevitably warm and vapour-laden, conflicting with the other of more northerly, or even of Arctic origin. But without the employment of the telescopic method, evidence of the preliminary overlapping of such systems is generally not obtainable, and is certainly not known to me to have been obtained, excepting only in the case of the recent storm that has been made the subject of this paper.

LOCAL AUTHORITIES AND METEOROLOGICAL INSTRUMENTS.

In the opinion of many experienced engineers, as well as in that of most meteorologists, it is the duty of the State to encourage and even to subsidize scientific observations on the climate, and particularly the rainfall of the country which constitute at present natural resources of unknown value. We have been met in several recent efforts to induce local authorities to establish rain gauges or meteorological stations by the statement that the Local Government Board auditors will not allow any expenditure for such a purpose, and data of inestimable value are lost to the country, unless some public-spirited individual is found to provide the few shillings or pounds required at his own charges. We have no time to fight against stupidity in high quarters. Mr. Symons's long struggle with

an autocratic official of the Post Office shows how hopeless such a strife is; but we rejoice to cull the following from the *Sanitary Record* of April 15th:—

"The provision of meteorological instruments by District Councils for recording local rainfall, amount of sunshine, temperature, &c., is one which is almost a necessity in health resorts and residential towns now-a-days, for that town which can show the most hours of sunshine—and one or two of the south-coast towns, by the way, seem, judging from the "tall" records furnished to the daily papers, to get a special sun all to themselves—is deemed to beat all other competitors. The question has, however, arisen in a number of cases as to whether expenditure in the purchase of such instruments would be legal, and would be passed by the Auditors of the Local Government Board, for most towns which already possess such instruments have their own Auditors, and their expenditure is not supervised by the Local Government Board. It appears that the Board have given a decision in favour of the legality of such expenditure on an appeal against a surcharge made by one of their Auditors. 'The Board do not consider,' that communication runs, 'that the Auditor's decision in this case can be sustained. They are advised that instruments of this description are useful for the purpose of obtaining information as to influences likely to affect the public health, and they are consequently of opinion that the possession of these instruments enables the Medical Officer of Health to discharge with greater efficiency the duties pertaining to his office. This being so, the Board consider that it was competent to the District Council to provide the instruments for the use of the Medical Officer of Health at the cost of the funds under their control.'"

METEOROLOGICAL NEWS AND NOTES.

UNDER THE HEAD OF "ECCLESIASTICAL INTELLIGENCE," *The Times* of April 29th says, but without italicizing the last sentence:—

"During a heavy thunderstorm which passed over South Lincolnshire yesterday, the ancient parish church of Walcot, near Billingborough, was seriously damaged by lightning. The weather vane and about 8 feet of its beautiful crocketed spire were demolished. Masses of masonry fell through the roof of the church, and considerable damage was done to the belfry. It is feared that the steeple will have to be almost entirely rebuilt, as there is a bad crack extending towards the base. *The church was restored only a year ago, but owing to lack of funds a lightning conductor was not fixed.*"

METEOROLOGICAL HUMOUR has been frozen out of our pages for some months, but as a sign of returning spring we welcome "that blessed word" *until* in a letter written to a western paper by a resident of Torquay.

"Torquay has long suffered, and is still suffering, because of the lack of winter attractions, which a pavilion would supply. Until that comes we must continue to show up our climatic advantages."

WEATHER LORE VERSES by a worried meteorologist have reached us bearing the well-known initials "R.T.O.," and our readers may like this :—

To sit down on the spur of the moment
Presages an early Spring,
And the summation of columns of figures
We expect the Summer* to bring.

REVIEWS.

Pocket Book of Aeronautics by HERMANN W. L. MOEDEBECK, in collaboration with O. CHANUTE and others. Authorised English edition translated by W. MANSERGH VARLEY, B.A., D.Sc., Ph.D., London, Whittaker & Co., 1907. Size $6\frac{1}{2} \times 4\frac{1}{2}$. Pp. xiv. + 496. Price 10s. 6d. net.

THE rapid progress of aeronatics makes it important for those who wish to follow new developments, to have a convenient work of reference such as that before us, in which the foundations and history of the subject are clearly set forth. The author, in his preface, acknowledges the co-operation of the well-known English authority, Mr. P. Y. Alexander. Professor Kremser, of Berlin, contributes a chapter on the Physics of the Atmosphere, and another on Meteorological Observations in Balloon Ascents and the Computation of Results. These are excellent summaries; but the methods of using self-recording instruments on kites and ballons-sondes are not described.

Notes on Meteorology and Weather Forecasting for Junior Navigators. By COMMANDER A. C. SCOTT, R.N. Portsmouth and London: J. Griffin & Co., 1909. Size 10 × 6. Pp. (8) + 40, 24 plates. Price 5s. net.

THE theoretical meteorologist often gets new light on his own science from the practical man whose concern is only in the application of meteorology to some special purpose. In the sailorly little treatise before us we see how a navigating officer on a modern man-of-war utilizes the means of forecasting the weather at his disposal, and the form which his experience suggests as the best for conveying the necessary information to young officers. The summary seems to us rather too terse to satisfy an enquiring mind, and it should, we think, be supplemented by some references to meteorological literature; but we have no doubt that Commander Scott knows exactly what he is about, and that his notes and diagrams will be very useful to his brother-officers. It is interesting to note his remark on the use of the barograph: "The instrument is not at present supplied

* *i.e.*, he who sums.

to ships for the use of the navigating officer, but nearly every ship has one either in the ward-room or in some officer's cabin." The men on the spot, in fact, have discovered, perhaps a generation before the officials ashore, that the barograph is far and away the most useful meteorological instrument for sea service.

The first four sentences of the Introduction on the utility of meteorology in modern navigation are so telling that we gladly quote them in full:—

> The need for meteorological knowledge in these days of costly hulls, machinery and armaments, is all important.
>
> In time of war, if the scene of operations were in the North Sea, Baltic, or anywhere in these latitudes, it might mean everything to the Commander-in-Chief of a fleet to be able to tell, say 24 hours in advance, what the weather is likely to be; not only for his battle fleet, but also as regards the movements of smaller craft, destroyers, and submarines.
>
> With wireless telegraphy it is possible to obtain at any time from the Meteorological Office the positions of the existing areas of high and low pressure, and from this information the Commander-in-Chief can more or less forecast what winds and weather he will experience for the next 12 or 24 hours, and, perhaps, in some cases a longer period than that in advance.
>
> Even without information from the Meteorological Office it is still possible for a solitary observer by carefully watching the barometer, the direction of the wind, and the general appearance of the weather, to foretell with a fair degree of accuracy, what the weather is going to do some hours ahead.

Brief List of Meteorological Text-Books and Reference Books. A selection of works suitable for General, Scientific and University Libraries in the United States. Prepared under the direction of WILLIS L. MOORE, Chief U.S. Weather Bureau, by C. FITZHUGH TALMAN, Libraian. Washington, 1909. Size 9 × 6. Pp. 16.

THIS list is long and elaborately sub-divided. The works left unselected will no doubt stimulate British Meteorologists by showing the space their labours fill in the ampler horizons of the west. As Dr. H. N. Dickson's little volume on "Meteorology," which is to our mind by far the best introduction to the more detailed treatises on the science, Dr. Shaw's "Life History of Surface Air Currents," and all his other writings; Mr. W. F. Tyler's suggestive "Psycho-Physical Aspect of Climate"; the "Scottish Meteorological Journal," and the whole literature of Arctic and Antarctic Meteorology (including the records of the circum-polar observations of 1882) are excluded, we cannot feel that there is any special slur cast on this Magazine or on "British Rainfall" by their absence from what is in most respects an admirable list. Although works "addrest to the specialist" are not intended to be included, we note that Ferrel's "Popular Treatise on the Winds" finds a place, as well as Pernter's "Meteorologische Optik."

THE ROYAL GEOGRAPHICAL SOCIETY.

At recent meetings of the Research Department of the Royal Geographical Society, several papers bearing on the ground common to Geography and Meteorology have been brought forward for discussion, and we now offer short summaries of three discussions which are, or will be, given fully in the *Geographical Journal*.

At the January meeting Mr. George Bransby Williams, C.E., discussed the geographical distribution of the mean annual rainfall of Wales and Monmouthshire, and presented a map which he had prepared.* The map, of which the paper is a description, is compiled on the basis of a 35-years' average, the period being 1872—1906 in North Wales, and 1868—1902 in South Wales and Monmouthshire, the difference between the two periods being fixed by the author as only 0·15 per cent., a negligible quantity. Mr. Williams gives a table which we quote below showing the difference between the computed mean deduced by the usual method from a short record and the actual mean at the same stations, a number of long and apparently accurate records having been discussed in detail for this purpose. For our own part we doubt the admissibility of the fundamental assumption of accuracy in the records, and believe that the very large uncertainty of mean falls deduced from one or two years' observations is in part due to the existence of errors of observation which are neutralized in a longer period; though we fully recognize that the coincidence of several exceptionally wet days in a single year, due to local thunderstorms, must often make the computations very uncertain.

Table showing Average Percentage of Error obtained in calculating Mean Annual Rainfall from Short Periods.

Length of Record.	Average Error.	PERCENTAGE OF RESULTS WITH ERROR OF				
		more than 20 per cent.	between 15 & 20 p.c.	between 10 & 15 p.c.	between 5 & 10 p.c.	less than 5 per cent.
years.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.
1	8·03	5·4	9·1	11·4	36·1	38·0
2	6·59	3·0	5·1	13·1	27·3	51·5
3	5·29	nil	1·3	11·7	29·9	57·1
4	4·59	nil	1·5	10·1	23·2	65·2
5	4·32	nil	nil	7·9	22·3	69·8
10	2·96	nil	nil	nil	18·0	82·0

While we believe that the map as a whole is substantially correct, we do not agree with all the details, and, in particular, we feel that the area with rainfall above 100 inches in the Brecon Beacons is greatly exaggerated, while the rainfall on the Black Mountains on the borders of Brecon and Monmouthshire is under-estimated.

* Published in the *Geographical Journal* for March, 1909.

Another rainfall paper was read at the meeting in February, when Mr. Alexander Knox discussed the rainfall data available for the construction of a rainfall map of the region between the Sahara and the Sudan in northern Africa. He recapitulated the scanty data, and put forward a map which differed somewhat in detail from the map published by Dr. Herbertson in his "Mean Rainfall of the Land," and also differed in detail from the map published by Dr. Fraunberger in *Petermanns Mitteilungen* for 1906. The data are so few however, and our knowledge of the method of observation so uncertain that it seems to us that either of the three maps might equally well be accepted as within the wide limits of error which must be allowed in balancing so many uncertainties.

The third paper to which we have to refer was a report at the April meeting on an investigation of dew-ponds by Mr. E. A. Martin, who has been undertaking investigations on the subject on the South Downs in Sussex. It may be well to remind our readers that the name dew-pond is applied to small ponds artificially formed on the summits of the flat chalk downs in the south of England, which have no apparent source of supply, but nevertheless contain water even in dry weather when ponds at a lower level fed by the drainage of considerable areas of land become dry. The popular notion is that these ponds collect dew in some manner in which other ponds at lower levels fail to act, and Mr. Martin has been endeavouring to ascertain what this action may be. He points out that the traditional dew-pond is made by digging a hollow, placing a quantity of straw in it, and then covering the straw by clay or chalk puddle worked so as to be watertight. Some experiments which he made seemed to suggest that the water surface condensed moisture from the air even when the lower layer of the atmosphere remained above the dew-point; but he fully allowed that the influence of rainfall must be considerable, and by measuring the nearly flat edges of several of the Sussex dew-ponds, he showed that they constituted a drainage area which in some instances increased the gathering ground to twice or even four times the water-surface. It seems to us that this fact solves the whole problem, for with a rainfall of 35 inches, which is about the average for the summit of the Sussex Downs as measured in a rain gauge, and an evaporation of even 20 inches, the depth of water in a pond which has once been filled should increase (if the area of the rim is equal to that of the water-surface) by 30 inches per annum, an ample reserve for occasional droughts and sufficient to supply the demand of many sheep. The reason why the ponds at low levels run dry is probably largely the fact that they have not been so carefully puddled and rendered watertight, and perhaps partly because the supply is drawn upon to a much greater extent for farmyard purposes. No doubt on the top of the Downs a considerable amount of condensation which escapes the rain gauge is drawn from drifting mists by even the low vegetation which the thin chalk soil around the margin bears.

RAINFALL TABLE FOR APRIL, 1909.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	RAINFALL OF MONTH.	
					Aver. 1870-99.	1909.
		° ′	° ′		in.	in.
Camden Square	*London*	51 32	0 8	111	1·69	1·90
Tenterden	*Kent*	51 4	*0 41	190	1·77	1·67
West Dean	*Hampshire*	51 3	1 38	137	1·99	1·48
Hartley Wintney	,,	51 18	0 53	222	1·69	1·62
Hitchin	*Hertfordshire*	51 57	0 17	238	1·62	1·51
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	1·83	1·74
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	1·54	1·46
Brundall	*Norfolk*	52 37	*1 26	66	1·68	1·42
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	2·60	1·96
Torquay (Cary Green)	*Devon*	50 28	3 32	12	2·45	1·87
Polapit Tamar [Launceston]	,,	50 40	4 22	315	2·23	2·58
Bath	*Somerset*	51 23	2 21	67	2·05	2·13
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	2·05	2·12
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	2·14	3·00
Coventry (Kingswood)	*Warwickshire*	52 24	1 30	340	1·96	1·60
Boston	*Lincolnshire*	52 58	0 1	25	1·59	1·51
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	1·69	1·52
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	1·72	1·48
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	2·15	4·11
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	1·98	2·81
Arncliffe Vicarage	,, ,,	54 8	2 6	732	3·32	5·51
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	1·72	1·75
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	1·79	2·68
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	6·27	7·54
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	2·34	2·66
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	2·67	3·60
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	2·39	3·71
Llandudno	*Carnarvon*	53 20	3 50	72	1·82	2·58
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	2·30	4·15
Hawick (Branxholm)	*Roxburgh*	55 24	2 51	457	1·92	3·35
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	...	2·14
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	2·45	3·12
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	1·77	3·33
Inveraray (Newtown)	*Argyll*	56 14	5 4	17	3·40	5·23
Mull (Quinish)	,,	56 36	6 13	35	2·80	4·03
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	1·94	3·46
Braemar	*Aberdeen*	57 0	3 24	1114	2·18	3·14
Aberdeen (Cranford)	,,	57 8	2 7	120	2·22	3·29
Cawdor	*Nairn*	57 31	3 57	250	1·49	2·21
Fort Augustus (S. Benedict's)	*E. Inverness*	57 9	4 41	68	2·04	1·90
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	4·31	4·48
Dunrobin Castle	*Sutherland*	57 59	3 56	14	1·81	3·58
Castletown	*Caithness*	58 35	3 23	100	...	2·78
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	3·71	4·86
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	2·56	5·36
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	2·17	5·66
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	2·40	5·40
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	2·00	4·08
Mullingar (Belvedere)	*Westmeath*	53 29	7 22	367	2·34	5·68
Ballinasloe	*Galway*	53 20	8 15	160	2·32	5·08
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	2·90	4·95
Collooney (Markree Obsy.)	*Sligo*	54 11	8 27	127	2·30	3·70
Seaforde	*Down*	54 19	5 50	180	2·59	4·99
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	2·32	2·77
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	2·25	4·12

RAINFALL TABLE FOR APRIL, 1909—*continued.*

RAINFALL OF MONTH (*con.*)					RAINFALL FROM JAN. 1.					
Diff. from Av. in.	% of Av.	Max. in 24 hours. in.	Max. in 24 hours. Date.	No. of Days	Aver. 1870-99. in.	1909. in.	Diff. from Aver. in.	% of Av.	Mean Annual 1870-1899. in.	STATION.
+ ·21	112	·53	19	12	6·82	5·95	— ·87	87	25·16	Camden Square
— ·10	94	·63	19	10	7·87	7·54	— ·33	96	28·36	Tenterden
— ·51	74	·29	22	13	8·73	6·55	—2·18	75	29·93	West Dean
— ·07	96	·40	19	12	7·91	6·96	— ·95	88	27·10	HartleyWintney
— ·11	93	·50	29	11	6·50	5·97	— ·53	92	24·66	Hitchin
— ·09	95	·57	29	12	7·23	5·14	—2·09	71	26·75	Addington
— ·08	95	·53	19	11	6·43	5·49	— ·94	85	25·39	Westley
— ·26	85	·40	30	11	6·49	5·31	—1·18	82	25·40	Brundall
— ·64	75	·59	19	16	12·02	9·63	—2·39	80	39·00	Winterbourne Stpltn
— ·58	76	·69	22	11	10·96	9·41	—1·55	86	35·00	Torquay
+ ·35	116	·85	22	18	11·35	11·39	+ ·04	100	38·85	Polapit Tamar
+ ·08	104	·41	19	15	8·63	7·19	—1·44	83	30·75	Bath
+ ·07	103	·50	29	12	8·50	7·58	— ·92	89	29·85	Stroud
+ ·86	140	·45	19	15	9·23	8·57	— ·66	93	33·04	Wolstaston
— ·36	82	·29	23	13	8·04	6·59	—1·45	82	29·21	Coventry
— ·08	95	·74	19	12	6·09	6·08	— ·01	100	23·30	Boston
— ·17	90	·44	19	11	6·56	6·42	— ·14	98	24·70	Hodsock Priory
— ·24	86	·36	19	14	6·82	6·48	— ·34	95	26·18	Derby
+1·96	191	·55	19	17	11·08	11·84	+ ·76	107	42·43	Bolton
+ ·83	142	·53	19	14	7·35	8·47	+1·12	115	26·96	Ribston Hall
+2·19	166	·75	21	18	19·42	19·45	+ ·03	100	60·96	Arncliffe Vic.
+ ·03	102	·59	19	15	7·17	7·03	— ·14	98	27·02	Hull
+ ·89	150	·61	24	15	7·43	10·68	+3·25	144	27·99	Newcastle
+1·27	120	1·34	24	17	43·13	38·70	—4·43	90	132·68	Seathwaite
+ ·32	114	·54	23	13	12·11	9·65	—2·46	80	42·81	Cardiff
+ ·93	135	·48	3	18	14·53	12·75	—1·78	88	47·88	Haverfordwest
+1·32	155	·72	23	19	12·22	10·80	—1·42	88	45·41	Gogerddan
+ ·76	142	·40	13	18	8·33	8·34	+ ·01	100	30·98	Llandudno
+1·85	180	·86	24	13	13·47	17·47	+4·00	130	43·43	Cargen
+1·43	174	·66	24	16	10·28	12·49	+2·21	122	34·80	Branxholm
...	...	·62	27	17	...	10·18	...	...	...	Edinburgh
+ ·67	127	·36	16	20	14·84	15·38	+ ·54	104	48·87	Girvan
+1·56	188	·61	26	16	9·88	12·93	+3·05	131	35·80	Glasgow
+1·83	154	·82	3	21	19·89	19·83	— ·06	100	57·90	Inveraray
+1·23	144	1·17	3	22	17·38	15·77	—1·61	91	57·53	Quinish
+1·52	178	·52	19	18	8·06	9·00	+ ·94	112	28·95	Dundee
+ ·96	144	...	...	...	10·21	9·77	— ·44	96	36·07	Braemar
+1·07	148	·72	13	17	9·40	11·68	+2·28	124	33·01	Aberdeen
+ ·72	148	·50	3	11	7·65	8·76	+1·11	115	29·37	Cawdor
— ·14	93	·48	12	17	14·70	10·69	—4·01	73	43·71	Fort Augustus
+ ·17	104	·88	12	18	26·21	25·75	— ·46	98	86·50	Bendamph
+1·77	198	1·00	3	12	9·29	11·59	+2·30	125	31·60	Dunrobin Castle
...	...	1·33	3	19	...	9·82	...	...	...	Castletown
+1·15	131	·51	22	23	19·75	17·22	—2·53	87	58·11	Killarney
+2·80	209	1·38	2	18	12·47	12·15	— ·32	97	39·30	Waterford
+3·49	261	1·63	2	22	9·51	13·50	+3·99	142	33·47	Hurdlestown
+3·00	225	·90	3	22	10·50	11·60	+1·10	110	35·19	Abbey Leix
+2·08	204	1·58	3	22	7·99	8·62	+ ·63	108	27·75	Dublin
+3·34	242	1·20	3	18	10·37	12·64	+2·27	122	36·48	Mullingar.
+2·76	219	·96	2	23	10·74	11·61	+ ·87	108	37·04	Ballinasloe
+2·05	171	·74	2	24	15·86	17·06	+1·20	108	50·50	Enniscoe
+1·40	161	·48	2	23	11·74	13·47	+1·73	115	41·83	Markree Obsy.
+2·40	193	1·99	3	18	11·75	14·56	+2·81	124	38·61	Seaforde
+ ·45	119	·60	26	24	11·67	15·56	+3·89	133	41·20	Londonderry
+1·87	183	·65	3	21	10·55	13·90	+3·35	132	37·85	Omagh

SUPPLEMENTARY RAINFALL, APRIL, 1909.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Warlingham, Redvers Road	2·08	XI.	Rhayader, Tyrmynydd	5·42
,,	Ramsgate	1·26	,,	Lake Vyrnwy	4·67
,,	Steyning	1·61	,,	Llangyhanfal, Plâs Draw	2·79
,,	Hailsham	2·13	,,	Llwdiarth Esgob	3·13
,,	Totland Bay, Aston House	1·36	,,	Snowdon, Cwm Dyli	7·51
,,	Stockbridge, Ashley	1·68	,,	Lligwy	...
,,	Grayshott	1·92	,,	Douglas, Woodville	3·35
,,	Reading, Calcot Place	2·27	XII.	Stoneykirk, Ardwell House	2·64
III.	Harrow Weald, Hill House.	1·67	,,	Dalry, The Old Garroch	4·34
,,	Oxford, Magdalen College	1·55	,,	Langholm, Drove Road	...
,,	Pitsford, Sedgebrook	1·55	,,	Moniaive, Maxwelton House	3·95
,,	Huntingdon, Brampton	1·52	XIII.	N. Esk Reservoir [Penicuick]	2·00
,,	Woburn, Milton Bryant	1·40	XIV.	Maybole, Knockdon Farm	2·80
,,	Wisbech, Monica Road	1·49	XV.	Campbeltown, Witchburn	3·50
IV.	Southend Water Works	1·49	,,	Glenreasdell Mains	3·67
,,	Colchester, Lexden	1·56	,,	Ballachulish House	6·52
,,	Newport, The Vicarage	1·79	,,	Islay, Eallabus	3·69
,,	Rendlesham	1·63	XVI.	Dollar Academy	3·69
,,	Swaffham	1·20	,,	Loch Leven Sluice	3·78
,,	Blakeney	·75	,,	Balquhidder, Stronvar	7·24
V.	Bishops Cannings	1·59	,,	Perth, The Museum	3·16
,,	Ashburton, Druid House	3·39	,,	Coupar Angus	3·26
,,	Honiton, Combe Raleigh	3·40	,,	Blair Atholl	3·69
,,	Okehampton, Oaklands	3·50	,,	Montrose, Sunnyside Asylum	3·43
,,	Hartland Abbey	2·18	XVII.	Alford, Lynturk Manse	3·30
,,	Lynmouth, Rock House	3·76	,,	Keith Station	4·08
,,	Probus, Lamellyn	2·12	XVIII.	N. Uist, Lochmaddy	3·89
,,	North Cadbury Rectory	2·01	,,	Alvey Manse	1·95
VI.	Clifton, Pembroke Road	3·37	,,	Loch Ness, Drumnadrochit.	1·97
,,	Ross, The Graig	2·02	,,	Glencarron Lodge	4·84
,,	Shifnal, Hatton Grange	2·22	,,	Fearn, Lower Pitkerrie	1·64
,,	Blockley, Upton Wold	2·58	XIX.	Invershin	2·84
,,	Worcester, Boughton Park.	2·10	,,	Altnaharra	2·72
VII.	Market Overton	1·25	,,	Bettyhill	2·28
,,	Market Rasen	1·78	XX.	Dunmanway, The Rectory	8·06
,,	Bawtry, Hesley Hall	1·33	,,	Cork	5·67
,,	Buxton	3·01	,,	Mitchelstown Castle	6·90
VIII.	Neston, Hinderton Lodge	2·21	,,	Darrynane Abbey	6·44
,,	Southport, Hesketh Park	2·98	,,	Glenam [Clonmel]	4·94
,,	Chatburn, Middlewood	4·25	,,	Ballingarry, Gurteen	4·29
,,	Cartmel, Flookburgh	3·87	,,	Miltown Malbay	4·35
IX.	Langsett Moor, Up. Midhope	2·56	XXI.	Gorey, Courtown House	4·14
,,	Scarborough, Scalby	2·99	,,	Moynalty, Westland	4·98
,,	Ingleby Greenhow	3·03	,,	Athlone, Twyford	4·94
,,	Mickleton	2·13	XXII.	Woodlawn	5·25
X.	Bardon Mill, Beltingham	...	,,	Westport, St. Helens	4·45
,,	Ewesley, Font Reservoir	3·87	,,	Mohill	4·53
,,	Ilderton, Lilburn Cottage	3·52	XXIII.	Enniskillen, Portora	4·27
,,	Keswick, The Bank	3·34	,,	Dartrey [Cootehill]	4·85
XI.	Llanfrechfa Grange	3·06	,,	Warrenpoint, Manor House	4·37
,,	Treherbert, Tyn-y-waun	6·71	,,	Banbridge, Milltown	2·78
,,	Carmarthen, The Friary	3·74	,,	Belfast, Springfield	4·49
,,	Castle Malgwyn [Llechryd].	4·21	,,	Bushmills, Dundarave	2·91
,,	Plynlimon	7·20	,,	Sion House	3·37
,,	Crickhowell, Ffordlas	3·80	,,	Killybegs	5·96
,,	New Radnor, Ednol	3·61	,,	Horn Head	2·85

METEOROLOGICAL NOTES ON APRIL, 1909.

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.—April showers were less frequent than usual there being no R until the 12th, and half the subsequent total falling in less than nine hours, on two days. The duration of sunshine, 218·5* hours, was unusually great and there was only one sunless day. Records of 10 hours or more occurred in 7 days, and on 25th the duration was 11·8 hours. Duration of R 32·7 hours. Mean temp. 49°·8, or 1°·7 above the average. Shade max. 70°·6 on 11th; min. 28°·5 on 2nd. F 2, f 12.

TENTERDEN.—Duration of sunshine 238·0† hours. Shade max. 69°·6 on 11th; min. 30°·0 on 2nd and 4th. F 4, f 13.

TOTLAND BAY.—Duration of sunshine 227·3* hours, or 57·5 hours above the average. Shade max. 68°·3 on 10th; min. 30°·7 on 2nd. F 1, f 11.

MILL HILL.—Bright sunshine 233·5* hours. Shade max. 70°·0 on 9th; min. 28°·2 on 2nd. F 1, f 19.

PITSFORD.—R ·29 in. below the average. Mean temp. 48°·3. Shade max. 71°·0 on 10th; min. 27°·0 on 2nd and 8th. F 10.

TORQUAY.—Duration of sunshine 194·3* hours, or 14·2 hours above the average. Mean temp. 50°·1, or 1°·9 above the average. Shade max. 67°·9 on 9th; min. 35°·0 on 5th. F 0, f 2.

NORTH CADBURY.—Dry and sunny to 11th with light winds from between N. and S.E. The remainder of the month was showery, cool, and very boisterous. Shade max. 74°·4 on 9th; min. 29°·5 on 2nd. F 1, f 12.

ROSS.—Shade max. 73°·0 on 10th; min. 25°·6 on 2nd. F 6, f 9.

HODSOCK PRIORY.—Duration of sunshine, 208·0* hours, and the greatest amount since 1893. Shade max. 71°·0 on 10th; min. 23°·4 on 5th. F 9, f 19.

SOUTHPORT.—R 1·26 in. above the average of 35 years. Duration of sunshine 221·4* hours, or 44·3 hours above the average. Duration of R 54·5 hours. Mean temp. 47°·5, or 1°·6 above the average. Shade max. 62°·6 on 10th; min. 28°·8 on 2nd. F 2, f 10.

HULL.—Shade max. 68°·0 on 8th, 10th, and 11th; min. 28°·0 on 8th. F 5, f 19. Duration of sunshine 138* hours. TS on 27th.

HAVERFORDWEST.—Duration of sunshine 182·5* hours. Shade max. 69°·4 on 9th; min. 32°·1 on 8th. F 0, f 7.

LLANDUDNO.—Shade max. 65°·5 on 10th; min. 32°·4 on 2nd. F 0.

DOUGLAS.—Fine and springlike from 5th to 10th but otherwise the month was generally wet with strong cold winds. The last three days were a veritable return of winter and H fell daily. Vegetation seemed almost unprecedentedly backward.

CARGEN.—A fairly good seed time during the first half was succeeded by cold, wet weather, during which vegetation was at a complete standstill. Trees and hedgerows showed little signs of spring. Shade max. 67°0 on 9th; min. 27°·0 on 2nd; F 9.

EDINBURGH.—Shade max. 64°·6 on 10th; min. 29°·6 on 6th. F 2, f 12.

DUNDEE.—Shade max. 65°·0 on 8th; min. 26°·0 on 2nd. F 3.

FORT AUGUSTUS.—Shade max. 63°·2 on 9th; min. 20°·0 on 2nd. F 9.

WATERFORD.—Shade max. 64°·0 on 9th and 10th; min. 30°·0'on 9th. F 4.

DUBLIN.—Mild, and characteristically showery with a marked preponderance of S winds ULtil the last four days when a cold N. current prevailed with H showers. On 2nd and 3rd 1·98 in. of R fell in 37 hours. Mean temp. 48°·6, or 1°·0 above the average. Shade max. 68°·0 on 10th; min. 34°·4 on 8th. F 0, f 2.

MARKREE.—Shade max. 67°·0 on 9th; min. 28°·5 on 7th. F 8, f 15.

WARRENPOINT.—Shade max. 70°·0 on 10th; min. 31°·0 on 7th. F 2, f 8.

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* Campbell-Stokes. † Jordan.

Climatological Table for the British Empire, November, 1908.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Total Rain Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	58·5	12	23·1	10	52·6	41·1	43·8	90	86·0	19·3	·69	10	7·7
Malta	77·0	5	51·0	23	67·9	57·6	54·1	74	138·9	...	1·33	12	6·1
Lagos	89·0	11*	71·0	5	86·4	74·5	74·4	78	155·0	60·0	2·07	11	7·6
Cape Town	90·3	18	42·7	5	70·8	55·5	52·6	67	...	...	1·04	11	3·9
Durban, Natal ...	86·4	25	57·8	1,7,8	78·5	64·6	...	...	141·8	...	4·24	22	6·6
Johannesburg	76·9	12†	44·6	1	72·6	53·8	52·7	73	155·1	42·5	3·45	14	5·1
Mauritius	87·5	30	63·4	3	82·6	68·8	65·5	72	166·2	55·1	2·08	16	5·7
Calcutta...	86·8	1	57·7	25	83·4	61·9	59·2	65	144·1	51·5	·04	0	2·2
Bombay...	89·2	5	68·3	21	86·1	72·3	67·6	70	132·5	57·9	·00	0	0·6
Madras	87·4	10	65·0	10	83·9	69·0	67·9	79	137·2	60·1	12·01	8	4·0
Kodaikanal	64·7	23	40·6	15	59·3	46·6	46·8	82	122·6	32·6	1·73	5	4·8
Colombo, Ceylon ...	90·0	17	68·4	13	87·3	72·7	71·2	76	158·6	61·0	3·53	9	4·9
Hongkong	84·1	6	53·0	28	75·8	65·6	57·9	63	136·3	...	·15	5	6·0
Melbourne	95·0	15	43·1	9	75·5	53·6	49·6	56	149·1	35·9	·93	9	4·4
Adelaide	102·8	25	45·0	17	82·4	56·3	50·6	52	164·4	39·0	·35	6	3·5
Coolgardie	99·2	13	43·0	7	85·5	56·5	45·9	40	166·0	41·0	·39	4	2·1
Perth	94·7	20	47·5	25	76·1	56·2	54·2	65	160·5	39·1	1·07	11	4·0
Sydney	101·9	7	52·9	10	75·7	60·4	56·5	66	139·1	44·0	·81	18	6·3
Wellington ...	70·0	28	43·2	7	61·8	50·2	47·8	74	124·0	36·0	1·67	6	5·8
Auckland	73·0	30	51·0	10	65·2	54·5	50·2	70	142·0	44·0	1·95	6	5·4
Jamaica, Kingston ..	91·7	27	66·7	30	88·4	71·0	68·4	77	...	...	1·54	9	4·6
Trinidad	91·0	14	66·0	21	86·8	70·4	66·9	70	160·0	56·0	2·65	13	...
Grenada	87·4	27	71·0	8	84·4	74·4	70·7	74	145·0	...	4·59	17	3·2
Toronto	62·7	26	23·0	17	46·2	33·0	...	...	73·2	20·6	1·61	11	...
Fredericton	55·0	27	13·0	19	39·5	26·3	...	82	...	...	2·20	7	5·7
St. John's, N.B. ...	54·5	4	21·5	18	42·9	32·9	...	...	...	...	1·84	13	6·6
Victoria, B.C.	62·9	3	31·9	26	51·3	42·8	...	88	...	...	4·02	16	7·5
Dawson	28·0	17	-25·0	7	6·5	—5·7	...	...	...	...	1·48	11	...

* 27 and 29. † and 22.

MALTA.—Mean temp. of air 62°·6. Average sunshine 5·9 hours per day. Mean hourly velocity of wind 8·6 miles.

Johannesburg.—Bright sunshine 261·3 hours.

Mauritius.—Mean temp. of air 0°·1 below, dew point 1°·2, and R ·20 in., above, averages. Mean hourly velocity of wind 10·6 miles, or 0·1 below average.

KODAIKANAL.—Bright sunshine 194 hours.

COLOMBO.—Mean temp. of air 79°·0, or 0°·8 below, of dew point 1°·1 below, and R 8·42 in. below, averages. Mean hourly velocity of wind 6·6 miles. TS on 26th.

HONGKONG.—Mean temp. of air 70°·2. R 1·30 in. below average. Bright sunshine 189·8 hours. Mean hourly velocity of wind 11·7 miles.

Melbourne.—Mean temp. of air 3°·5 above, and R 1·33 in. below, averages.

Adelaide.—Mean temp. of air 2°·3 above, and R ·68 in. below, averages.

Sydney.—Mean temp. of air 1°·2 above, and R 2·19 in. below, averages.

Wellington.—Mean temp. of air 1°·0 below, and R 1·94 in. below, averages. Bright sunshine 229·4 hours.

TRINIDAD.—R 4·33 in. below the 43 years' average.