

Symons's Meteorological Magazine.

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THE REPORT OF THE METEOROLOGICAL COMMITTEE.

IN December, 1902, the Prime Minister appointed a Committee consisting of Sir Herbert Maxwell, M.P., F.R.S., Mr. J. A. Dewar, M.P., Sir W. de W. Abney, F.R.S., Sir F. Hopwood of the Board of Trade, Sir T. H. Elliott of the Board of Agriculture, Mr. T. L. Heath of the Treasury, Dr. R. T. Glazebrook, F.R.S., and Prof. J. Larmor, Sec.R.S., "to enquire and report as to the administration by the Meteorological Council of the existing Parliamentary grant, and as to whether any changes in its apportionment are desirable in the interest of Meteorological Science, and to make any further recommendations which may occur to them with a view to increasing the utility of that grant."

The Committee held twelve meetings for the examination of witnesses and received evidence from twenty-two representatives of various scientific bodies and government departments, whose names, in the order in which they were called, are given below:—General Sir R. Strachey, F.R.S., Chairman of the Meteorological Council; Dr. W. N. Shaw, F.R.S., Secretary of the Meteorological Council; Sir Michael Foster, M.P., F.R.S., Secretary of the Royal Society; Sir John Murray, F.R.S., Chairman of Directors of Ben Nevis Observatories; Dr. A. Buchan, F.R.S., Secretary of Scottish Meteorological Society; Admiral Sir W. Wharton, F.R.S., Hydrographer to the Admiralty; Commander D. Wilson Barker, R.N.R., President of the Royal Meteorological Society; Mr. W. H. Christie, F.R.S., Astronomer Royal; Mr. J. MacDonald, Secretary of Highland and Agricultural Society; Sir Norman Lockyer, F.R.S., Director of the Solar Physics Observatory; Lord Kelvin, F.R.S.; Professor George Darwin, F.R.S., Professor of Astronomy at Cambridge; Dr. R. T. Glazebrook, F.R.S., Director of the National Physical Laboratory; Mr. R. T. Omond, Hon. Sec. Scottish Meteorological Society; Mr. E. K. Spiegelhalter, Optician, Malton, Yorks; Dr. H. R. Mill; Professor A. Schuster, F.R.S., Professor of Physics in Manchester; Mr. R. N. Grenville, of

the Royal Agricultural Society; Sir E. Verney, Steeple Clayden, Bucks; Captain A. MacDonald, Commander of Scottish Fishery Board's cruiser; Rev. V. F. Willson, Rector of Fullbeck, Lincolnshire; Mr. R. A. Dawson, Superintendent of the Lancashire Sea Fisheries.

The Committee has now issued its report, dated 16th May, 1904, and the full evidence of all the witnesses is also published.* Both documents should be studied by all who have the science of meteorology at heart and who desire to see it promoted for the benefit of the public. The report is important, the evidence is interesting in a high degree, and we do not hesitate to devote a large part of our space to the subject this month. The logical order would be to begin with the evidence and then consider the report; but as we are entirely in agreement with the majority of the Committee and consider that a better or fairer report could hardly have been based on the evidence before them, we shall in this article consider the report in detail and leave the evidence in the meantime.

Sir Herbert Maxwell's Committee considered five special points, and after a preliminary remark on the first, we summarise the conclusions seriatim without further comment until the end. The constitution of the Meteorological Council does not appear to have been understood before by the general public, and we confess that, like the reverend gentleman on the golf course, although we might never have uttered such a word ourselves, we felt a sense of relief when *The Times* "said it for us" and referred to the Council "as bearing a considerable analogy to the arrangements of comic opera."

The substance of the Report is as follows:—

(a) *Constitution of the Meteorological Council.*—The Meteorological Council is constituted upon a system which bears no analogy to that of other departments, administering money voted by Parliament. In 1856 a Meteorological Department of the Board of Trade was formed in accordance with the advice of the Royal Society, and placed under the control of Admiral FitzRoy. On his death, in 1865, a committee consisting of one representative each of the Board of Trade, the Admiralty, and the Royal Society, inquired into the work accomplished, and in conformity with its report, the control of the Meteorological Department was handed over, in 1867, to the Royal Society, who, in consideration of an annual grant of £10,000, undertook to appoint a standing committee (unpaid) to carry on the work, and established the Meteorological Office.

The Royal Society had first tried, but failed, to induce the Board of Trade to separate the collection and discussion of scientific data from the issue of storm warnings, considering that the latter should remain under a Government Department.

Nine years later, in 1875, another committee was appointed by the Treasury to review the work of the Meteorological Office. As a result of its

*Meteorological Grant Committee. Vol. I., Report. Size 13 × 8½. Pp. 20. Price 2½d. Vol. II., Evidence and Appendices. Size 13 × 8½. Pp. 122. Price 1s. [Cd. 2123, 2124.] London, Eyre and Spottiswoode, 1904.

report, the committee charged with the administration and control of the Meteorological Office was reconstituted in 1877 as the Meteorological Council, receiving an annual grant of £14,500, which was increased in subsequent years to £15,300, where it now stands.

The Council consisted of a chairman and four other members, all nominated by the Royal Society, £1,000 being allotted out of the grant for their remuneration. In addition to these, the Hydrographer was appointed *ex officio* a member of the Council. This arrangement was regarded as provisional and the Committee recommended its revision at the end of five years. The Royal Society pressed upon the Treasury, at this time and again in 1881, their view that the Meteorological Office should be constituted as "a Government Department, with a man of science, responsible to a Minister of the Crown, at the head of it." This view was not shared by the Government.

In 1901,* having obtained the approval of the Royal Society, the Council was incorporated under the Companies' Acts with a license from the Board of Trade enabling them to dispense with the word "limited," in order to obtain such benefits as limited liability, perpetual succession, and the right to sue.

The members of the Council became the Directors of the Association. But, whereas the statute requires that an association to be registered must consist of not less than seven persons, it became necessary to add to their number, which was done by the election of five members, the executive functions remaining exclusively in the hands of the five directors receiving emolument.

Thus was constituted what must be pronounced a singular anomaly—viz., a limited liability company, managed by a Board of five Directors receiving pay out of a grant made by Parliament, appointed by and presenting its annual report to the Royal Society, submitting its accounts for audit to the Comptroller and Auditor-General, but held bound under its Memorandum and Articles of Association to "observe any lawful conditions or directions imposed or given by the Lords Commissioners of the Treasury to the administration of the said grant or the form of receipt to be given for payment of it."

(b) *Administration of the Annual Grant.*—Out of the sum of £1,000 a year originally assigned by the Treasury for the remuneration of the Directors, £875 is applied as follows, under the scheme approved by the Royal Society in 1900:—£300 to the chairman, £50 retaining fee to each of the Directors other than the Chairman and the Hydrographer. The balance remaining, £425, after deducting travelling expenses, is divided among the Directors, other than the Chairman, in proportion to their attendance at meetings, provided that no such Director shall receive more than £125 in any year in that way.

The staff in the Meteorological Office consists of a Secretary with a salary of £625 supplemented by his Director's fee of £125, a Marine Superintendent with £400, twenty-five classified clerks receiving various salaries from an initial £75 to a maximum of £275, fifteen other clerks, messengers, etc., and a special assistant to the Secretary for scientific investigations. The staff is distributed amongst five branches, viz.—The Secretary's Office, the Marine Branch, the Forecast and Storm-Warnings Branch, the Observatory Branch, and the Statistical and Library Branch. The grant is allocated amongst the branches as follows:—

* The Report gives the date as 1891, but that is a misprint.

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Council and Secretary.....	£1,475
Secretary's Office, including rent	2,000
Marine Branch.....	2,434
Forecast Branch	3,560
Statistical and Library Branch.....	912
Observatory Branch	2,633
Inspections	400
Special Researches	726
Superannuation	1,220
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Total.....	£15,360

The Marine Branch spends on the average £522 per annum in supplying meteorological instruments to ships of the Royal Navy, and £260 for a similar service to the mercantile marine. The Forecast Branch pays £2,060 to the Post Office, £260 for postage and £1810 for telegrams, which are charged at the ordinary rate and being subject to the usual conditions, frequently fail to be delivered in time. During the winter of 1902-03, storm-warnings were telegraphed to Tenby on 11 occasions at 7.30 p.m., and on 6 of these occasions they were not delivered until the following morning, 14 hours after the observations, on which they were founded, had been made. On another occasion the Post Office accepted 120 storm-warning telegrams one Sunday, charging 6d. each and an extra fee of 1s. each for Sunday delivery, and yet only 19 were delivered that evening, the £7 11s. 6d. paid for the others being absolutely wasted. The Library is inadequately housed, and as it contains 17,000 books and pamphlets to which 1,500 are added each year, the want of space is increasingly felt. The offices also are low-roofed and ill-ventilated, and the general routine of office work is estimated by the Council to demand an additional expenditure of £700 per annum.

With regard to the Observatory Branch the Council have been paying £1,910 per annum towards the maintenance of five observatories, viz. : Kew, Valencia, Falmouth, Aberdeen, and Fort William. They also receive observations from the observatories maintained by Stonyhurst College and Glasgow University.

Attention has been specially directed to the recent decision of the Council to discontinue the payment of £250 per annum to the Fort William Observatory, which was established as subsidiary to the observatory at Ben Nevis.

The important question whether the observatories should be retained or abandoned has been most carefully considered. The evidence on the subject is conflicting. Lord Kelvin still holds to the opinion expressed at the meeting of the British Association in 1887 that "the Ben Nevis observations are of the highest utility in the development of meteorology, and in framing forecasts of storms and weather," and he is of opinion that it is a matter for regret that these observations have not been used by the Meteorological Council in preparing their forecasts and warnings. On the other hand, Professor Schuster is of opinion that "the problems which could with convenience be carried out at Ben Nevis Observatory have been dealt with," and that further observations would be superfluous unless some definite problem were set for solution.

After weighing all the circumstances, it appears, that, on public and economic grounds, it would constitute a bad bargain to allow the observatories to disappear. Such a proceeding would involve the sacrifice of a large capital outlay which has been expended upon works, and the loss of the property and "good-

will" subsisting in the maintenance of the building and plant. It appears that only £350 per annum is required to insure the continued maintenance of the observatories, and every effort should be made to provide this small sum for the purpose.

Full accord has not always existed in the past between the Meteorological Council and the Directors of the Ben Nevis Observatory, and it seems that as a condition precedent to a continuance of the grant of £350, arrangements should be made for (1) a reorganisation of the management of these observatories, (2) a consideration of the general scientific purposes for which they might be used, (3) framing, with the assistance of meteorologists, a scheme defining the lines of investigation which should in future be undertaken at Fort William and Ben Nevis, and (4) securing to the Office the full right to publish telegraphic reports from Ben Nevis along with those from other stations.

With regard to meteorological research the Council has made a strong representation to the effect that the staff wants strengthening by the addition of assistants specially qualified by a knowledge of mathematics and physics, three such assistants would cost, with incidental expenses, £2,250 per annum. It also appears from the evidence that it would be desirable for the Council to have access to a meteorological laboratory properly equipped, which would serve as one of their first-order observing stations.

It appears that the present constitution of the Meteorological Office was never regarded by the Royal Society as a permanent one, but as "a temporary measure till some other organisation should be carried out." This seems to be a favourable opportunity for placing the Meteorological Office upon a permanent footing.

(c.) *Utility to the Public of the work of the Meteorological Council.*—The utility of the Maritime Branch is conceded; but some attention must be given to the work of the Forecast Branch in this particular, and the matter has been carefully enquired into.

Sea-faring men on all parts of the British coast where storm signals are displayed have become accustomed to regulate their movements in compliance with them. The fishing population also recognise their utility, although the increased use of steam trawlers has made fishing vessels less dependent on fair weather than formerly. It cannot be doubted that the system of storm-warnings has been effective in the protection of life and property at sea.

Farmers in those districts where timely information can be obtained are learning to take advantage of weather forecasts; but there is considerably more difficulty in distributing forecasts over wide agricultural districts than in communicating them to the centres of fishing population and coasting marine. Witnesses from different agricultural districts, remote from each other, estimate the proportion of accuracy in weather forecasts at from 70 to 90 per cent. It is to be regretted, therefore, that no effort seems to have been made on the part of agricultural societies to co-operate with the Council in the dissemination of this kind of information.

In the opinion of the Committee the economic value of weather forecasts and storm-warnings amply justifies the cost of maintaining them—a value which perhaps the public would never fully recognise until they should be discontinued.

After dealing with matters as they are at present, the Committee proceeds to recommend certain measures with a view to improvement,

and these are so important that we give them in the exact words of the Report :—

We are of opinion that the registration of the Meteorological Office as a company under the Joint Stock Companies' Act should be cancelled, that the company should be wound up, and the office reconstituted as a department under the control of the Board of Agriculture and Fisheries.

The necessity for a Council of seven having thus been got rid of, we recommend that the office be placed under the control of a man of science as Director of Meteorology, appointed after consultation with the Royal Society, but responsible to the Board of Agriculture and Fisheries, and making his annual report to that Department. We recommend also the appointment of an advisory board, consisting of the Hydrographer to the Admiralty, a representative of the Board of Trade and one of the Board of Agriculture and Fisheries, and two members nominated by the Royal Society. The functions of the advisory board should be consultative only, the Director being responsible to the Board of Agriculture and Fisheries for administration.

We recommend also that a second officer be appointed to act as scientific assistant to the Director, to assist him in the general management of the office and in the discussion of such scientific problems as may arise.

The mean annual cost of this arrangement, as compared with that for the present Council, we estimate thus :—

PRESENT ARRANGEMENT.				PROPOSED ARRANGEMENT.			
Council ... ..	..	...	£850	Director ...	£800 rising to	£1,000	
Secretary ... ..	...	...	£625	Scientific Assistant ... ..	...	£450	
			<u>£1,475</u>	Mean ... ..	...	<u>£1,350</u>	

The fixed Parliamentary Grant £15,300 should be transferred to the vote for the Board of Agriculture and Fisheries.

Under such an arrangement the anomaly would cease of what is practically a department of the public service, though nominally a joint stock company, paying for postal and telegraph services money out of its fixed income. The charge for these services would not appear in the estimate, though undoubtedly the revenue would be the loser by the amount now repaid out of the Parliamentary grant. The Director of Meteorology would not then feel, as the Council now do, that the more complete and rapid the distribution of forecasts and warnings is made, the less money remains for scientific research and for overtaking arrears in the statistical work of the department.

Further, we judge it important that the Post Office should make arrangements at the 27 reporting stations in the United Kingdom for the transmission of daily telegraphic reports one hour earlier than the present one of 8.15 to 8.30 a.m., and that storm warnings should, if practicable, have priority over all private messages at all hours.

We would call attention to the expediency of testing the efficacy of wireless telegraphy in providing advance news of weather in the Atlantic. Such news would incalculably strengthen the forecast and warning service, and might, we believe, be obtained regularly over an experimental period by co-operation either with the Admiralty, the Ocean Steamship Companies, or both. We would urge that no unnecessary delay should take place in organising this experiment.

We recommend that in future the cost of instruments supplied to His Majesty's ships be borne upon the Navy Votes, except where such instruments are intended for use in research or observation specially called for by the Director of Meteorology.

We consider that the premises now rented by the Council are neither suitable in character nor adequate in space for the present requirements of the office, and that others should be provided wherein the staff might perform their duties under more favourable hygienic conditions, and necessary accommodation for the rapidly growing library might be secured.

We recommend that the staff employed in the library, the statistical branch, and observatory branch, should be augmented. The steps necessary to give effect to this and the preceding recommendation can best be determined when the future of the office has been decided upon.

In default of an increase to the grant the small increased expenditure which we have recommended would have either to be postponed, or to be met from economies on other branches of the work of the office.

Unfortunately, the Committee was not unanimous in its report, various portions of it being taken exception to by different members. Thus, Sir Herbert Maxwell and Sir Wm. Abney dissent with some emphasis from the recommendation to continue support to the Ben Nevis observatories on the ground that their utility has not been proved. After stating reasons for this view, they conclude—"We are thus led to the conclusion that there is no ground for interfering with the discretion of the Meteorological Council in withdrawing their subsidy to these observatories and applying the £350 thus released to what they may consider more profitable methods of research." But they allow that an increase of the Parliamentary grant would alter the case.

Mr. Dewar dissents from the approval implied in the Report of the superannuation scheme adopted by the Council, on the ground that a large annual charge for pensions ought not to be made on a fund voted annually for a specific purpose.

Finally, Sir Francis Hopwood and Mr. Heath, representing the Board of Trade and the Treasury, object to all the recommendations of the Committee which involve an addition to the annual grant, on the ground that such matters were outside the reference, and they also object to the transference of the meteorological grant from the Vote for Scientific Investigations, &c., to the Vote for the Board of Agriculture and Fisheries, because they consider that the time has come for an inquiry into the whole question of grants in aid of scientific work.

It is a misfortune that the Report is not unanimous, for it may give the Government an opportunity to delay the steps necessary to give effect to those recommendations on which all were agreed. The difficulties raised do not strike us as overwhelming. If the Meteorological Office is reconstituted, with a Director of recognised scientific position and administrative ability at its head (and no better man than the present secretary could be found), it would surely be safe

to leave to him the responsibility for continuing or discontinuing the grant to any of the present observatories. The economies suggested by the substitution of a Director and scientific assistant with an unpaid advisory body for the present Council and Secretary would have the effect of practically increasing the grant, and after all the cost of one torpedo a year would not be money thrown away if it improved our knowledge of the weather. It would, in any case, be unwise to hamper the prospective Director by any definite instructions as to what he must do in any special case, the urgency of which may vary as time goes on.

It surely does not matter on what vote the money is given, so long as it is expended in the right way for the proper purpose and is as free as possible from the trammels of red tape. The Royal Society it appears never liked the constitution of the Meteorological Council, were always anxious to change it, and would view its reorganization as a Government department without regret. The Board of Agriculture and Fisheries has shown itself to be energetic and reasonable in the control of the Ordnance Survey, an institution in many ways akin in its relation to the public to the Meteorological Office, and the practical applications of meteorology apply mainly to the two great national industries the oversight of which is now under the charge of the Board. The feeling is unanimous that the anomalous Meteorological Council should cease and that a Government department should accept responsibility for the national weather service. But we cannot too strongly emphasize our opinion that the Government department must give an absolutely free hand to the Director of Meteorology and not exhaust his strength in trivial details or in trying to carry out or to evade vexatious regulations.

With one point in the decisions of the Committee we are particularly pleased. That is the frank manner in which the Post Office has been condemned for the obstruction it has systematically thrown in the way of the work of the Meteorological Office. In a smaller degree but no less vexatiously we have ourselves suffered from the perversity of Post Office officials with regard to regulations as to the postage exacted on meteorological communications not of the nature of a letter; and although the late Mr. Symons failed to obtain redress, even in Parliament, we trust that when the Treasury takes the matter up, the Post Office may at last be convinced that their function is to facilitate and not to frustrate the transmission of important information.

The Directors of the Ben Nevis Observatory deserve to be congratulated on the result of their public-spirited appeal to Parliament; for not only is the continuance of high-level meteorology insisted on in the Report of the Committee, but a reform in the treatment of meteorology in this country has been brought within sight which promises to be of high utility to the science and its applications.

We would suggest one modification in the recommendation as to an advisory Committee, which is that it be increased by the addition of a member nominated by the Royal Meteorological Society. This would in no way detract from the recognised position of the Royal Society as the scientific advisors of the Government, for an exact precedent is to be found in the constitution of the Board of Visitors at Greenwich, and we claim the same privilege for the Royal Meteorological Society in connection with Government meteorology which is conceded to the Royal Astronomical Society in the case of Government astronomy.

A NEW METEOROGRAPH FOR KITES.

BY W. H. DINES.

THE want of a reliable meteorograph at a moderate cost is one that is often felt by those engaged in obtaining meteorological observations by means of unmanned balloons and kites, and it has been, to me at least, a serious difficulty in my work. The requirements are somewhat out of the common; the meteorograph must be light, it should offer little resistance to the wind, and the control over the pens should be sufficiently powerful to prevent the blurring of the trace by the violent shaking to which the instruments are at times exposed. It is also very desirable that no change of position, such as an alteration of level, should be able to alter the positions of the pens on the paper. It is hoped that these requirements are met in the instrument here described, and made by Mr. J. J. Hicks, of 10, Hatton Garden, London, E.C.

Simplicity of construction and small surface are secured by letting the pens write upon a circular paper disc of about 11 or 12 inches diameter instead of on a clock drum. This disc turns on a pin passing through a hole in its centre and lies on a flat piece of thin wood. It is turned at any rate that may be desired by an ordinary small clock, the paper near its circumference being pressed against the milled wheel that is used for setting the hands, by a small roller mounted on a spring.

The height, or more strictly the air pressure, is given by an aneroid box of $2\frac{3}{4}$ inches diameter. This box is formed of thin metal and is left full of air. There is in consequence a fairly large temperature correction to be applied, but, on the other hand, the elasticity of the enclosed air is perfect, and the elasticity of the metal plays a comparatively small part in determining the position of the pen. A stud on the box presses against a lever, and the other end of the lever is formed into a pen of special construction, which

will not easily blot. There is no difficulty in getting a sufficiently open scale by this means.

The thermograph consists of a coil of fine thin brass tube in communication with an aneroid box of about $1\frac{1}{4}$ in. diameter. The tube and aneroid box are completely filled with ether. Ether is chosen because its co-efficient of expansion is greater, and its specific heat less, than that of spirit, and in consequence the thermograph is more sensitive than it would be with alcohol. The expansion of the ether expands the aneroid box, and the motion of the face of the box is communicated to the pen by a single lever, just as in the case of the aneroidgraph. Any temperature scale can be arranged for, but 40° F. to one inch allows readings to be obtained with certainty within 1° F. in so far as deciphering the trace is concerned. Of course there is a certain lag, but it appears to be less than that of the ordinary mercurial thermometer.

The humidity-graph is obtained by the alteration in length of a few human hairs six inches long, the pen lever multiplying this eight times. Thus the pen exhibits on the paper the contraction and expansion of 4 ft. of human hair. The scale is about $\frac{1}{2}$ in. long.

It is hoped at some future time to add an anemograph.

The outside dimensions of the whole arrangement are 15 in. by 12 in. by 3 in. The paper disc, pens, clock, etc., enclosed and are protected from rain by a varnished linen cover, and the weight of the instrument, including the means of attachment to the kite, is about $1\frac{3}{4}$ lbs. The meteorograph is sent up in the kite, and is secured by four pieces of strong string running from its four corners to the top and bottom of the side sticks. It thus lies in the air slightly inclined to the wind, and advantage is taken of this position to protect the thermometer tube and hygrometer hairs from the sun. They are placed underneath where the wind blows freely over them and they must be in shadow unless the sun be low down on the horizon in the direction from which the wind is blowing. They are also thus protected from rain, but it is not possible to protect them from the driving fog particles of a cloud, and these are as wetting as rain.

Printed paper can be used, but it is simpler to cut circular discs of the required size out of ordinary drawing paper, and to decipher the traces by placing them under an engraved thin celluloid disc.

I have now used these instruments for a period of three months in all kinds of weather, and although on one occasion they were inadvertently placed in the kite upside down, they have on every occasion given a perfectly distinct trace free from blurring and easily decipherable.



Correspondence.

To the Editor of Symons's Meteorological Magazine.

BALL LIGHTNING.

AT the recent meeting of the Royal Meteorological Society considerable doubt was expressed as to the objective reality of the above phenomenon, and I have made some enquiries into the matter with the following result.

Some years since (it is unfortunately impossible to fix the exact date) Miss Norton, while watching a very heavy thunderstorm one afternoon, witnessed a phenomenon which was certainly like "ball lightning."

She says:—"I was seated near the window working, when there came a sudden crash, and a *ball of fire* fell into the garden disappearing immediately into the earth. It did *not* explode or break into pieces.

"The following day I was invited to go in to the next house to see the damage done by the lightning, which was very great, the fireplace and chimney-piece being wrenched from their position, and the furniture in the room demolished.

"It would therefore seem that the electric ball descended the chimney of my neighbour's house, and, having wrecked the room, proceeded into the back garden, then, bounding over the wall, it disappeared in my own garden, much to my alarm. I regret to say that as that time my fear exceeded my interest in the matter, I did not go into the garden to look for traces of where the lightning entered the ground, and the subsequent very heavy rains erased all marks."

This, then, is the authentic statement of an eye-witness of the phenomenon of ball lightning, and I venture to think that instead of definitely stating that such lightning never occurs, it would be better to assume that although it is possible it is at the same time *very* rare.

D. W. HORNER.

Clapham Park, S. W., June 24th, 1904.

[We think that Mr. Horner scarcely grasps the difficulty with regard to "ball lightning." No one denies that it has frequently been seen; the problem is whether the appearance of a ball of fire is the image of a real fireball, or is merely a subjective impression of some luminous phenomenon which may not be produced by a globular body at all.—ED. S.M.M.]

A THREE YEARS' PERIOD IN RAINFALL.

I HAVE just read Mr. Jenkin's communication in your June number, and I send you the result of an examination of my 30 years' observations at Montfaucon d'Argonne, near Verdun. The site is an

isolated hill of 1,150 feet altitude. The results show no agreement with those obtained at Trewirgie, nor do those at Paris for the same period which I add for comparison:—

MONTFAUCON D'ARGONNE.				PARIS (TERRASSE).			
Date of Col. I.	I.	II.	III.	Date of Col. I.	I.	II.	III.
1873.....	—	22·05	30·21	1873.....	—	16·62	20·06
1876.....	31·59	40·29	39·44	1876.....	20·44	23·71	24·82
1879.....	34·81	38·52	36·50	1879.....	17·66	19·05	19·06
1882.....	46·46	41·38	30·27	1882.....	21·81	18·78	14·61
1885.....	30·86	45·22	32·43	1885.....	19·80	22·95	16·89
1888.....	47·27	39·57	30·72	1888.....	16·73	18·23	17·68
1891.....	34·47	33·76	34·76	1891.....	20·42	19·49	17·42
1894.....	30·45	32·93	35·29	1894.....	17·85	16·42	24·85
1897.....	33·08	24·37	26·80	1897.....	21·40	20·17	16·97
1900.....	25·24	28·91	26·52	1900.....	15·93	—	—
1903.....	27·03	—	—	1903.....	—	—	—
Mean	34·13	34·70	32·29	Mean	19·12	19·49	19·15
General Mean.....	33·17			General Mean.....	19·25		

V. RAULIN.

Montfaucon d'Argonne, 18th June, 1903.

LAKE MOVEMENTS AND THUNDERSTORMS.

SEVERAL New Zealand newspapers recorded that the inland lake Taupo, on February 14th, rose one foot before a thunderstorm and fell again to its normal height after the storm was over. The lake, which has an area of 241 square miles, is the basin of an old volcanic crater. It is a pity that other observations are not available, for the rising and falling may have only been at one end of the lake, and not due in any way to electrical or subterranean causes. Still the matter seems to be worthy of investigation.

D.C.B.

[The relation of the lake levels to meteorological conditions is, we understand, being carried out at present on Loch Ness, in Scotland, by Sir John Murray and his assistants, and we hope to be able, before very long, to publish some description of the methods used and the results which have been obtained.—ED. *S.M.M.*]

THE KEW OBSERVATORY.

THE members of the Council of the Royal Meteorological Society on Wednesday, June 8th, paid a visit to the Kew Observatory, on the invitation of Dr. R. T. Glazebrook, F.R.S. and Dr. C. Chree, F.R.S. Several ladies accompanied the party, and the afternoon being fine a very pleasant time was spent in inspecting the various departments, and in listening to the descriptions of the instruments courteously given by the members of the staff.

Kew Observatory is in the Old Deer Park, about 1,200 yards from Richmond Railway Station. The building, which stands on the site originally occupied by an old monastery, was erected by King George III., in 1769, for observing the transit of Venus. The late Mr. J. P. Gassiot, about 1871, put in trust with the Royal Society an endowment of £10,000 for the purposes of the Observatory, which had been for some time carried on by the British Association; and the management since that time has been in the hands of the Kew Committee appointed by the Royal Society. From 1900 the Observatory has formed part of the National Physical Laboratory, the headquarters of which, however, in 1902 were transferred to Bushy House, Teddington. Dr. C. Chree, F.R.S., is the Superintendent, and the staff includes Mr. T. W. Baker, the first assistant, and 15 others.

The Observatory since 1867 has been the central observing station of the Meteorological Office.

The self-recording magnetic instruments for showing the variations in the declination, the horizontal force component, and the vertical force component, as well as the barograph and the seismograph, are in a room in the basement. These all record photographically. The thermograph is placed on the north wall of the first floor, and the electrograph is close by on the west wall. The Beckley anemograph, for showing the direction and the velocity of the wind, is mounted above the dome, the recording apparatus being in a room underneath. A Dine's pressure tube anemometer is also placed close by. Two Campbell-Stoke's sunshine recorders are on the parapet of the roof.

In the garden to the south of the Observatory are placed the various out-door instruments, including the Beckley self-recording rain gauge, and a Nipher rain gauge.

Apart from the ordinary observatory work, the Kew Observatory is specially devoted to the examination and verification of meteorological and other instruments; and the visitors were much interested in seeing the methods employed and the apparatus used for this purpose. The great extent and variety of this important work will be gathered from the following list of instruments examined last year:—

Air-meters	24	Rain-measuring Glasses	131
Anemometers	14	Sextants	901
Aneroids... ..	86	Sunshine Recorders	6
Artificial Horizons	21	Telescopes	3180
Barometers	298	Theodolites	23
Binoculars	1048	Thermometers, Clinical	19393
Compasses	9	" Meteorological	2851
Hydrometers	353	" Special	389
Inclinometers	8	Unifilars	5
Levels	16	Watches and Chronometers	458
Magnets	15	Miscellaneous	35
Milk Test Apparatus	89		
Rain Gauges	67	Total	29,420

ROYAL METEOROLOGICAL SOCIETY.

THE final Meeting of the present session was held on the afternoon of Wednesday, June 15th, at the Society's Rooms, 70, Victoria-street, Westminster, Captain D. Wilson-Barker, President, in the chair. Mr. F. W. FitzSimons, F.Z.S., and Mr. G. W. Bernini Palmer were elected Fellows.

The Rev. C. F. Box gave an account of some curious "Effects of a Lightning Stroke at Earl's Fee, Bowers Gifford, Essex, April 13th, 1904." A thunderstorm occurred during the early morning hours, and at about 3 a.m. there was a blinding flash, lighting up the whole neighbourhood for miles around, followed immediately by a crashing explosion. One person stated that he saw what appeared to be a cylinder, and another person, a ball of fire, descend and then explode, 'casting darts' in all directions. On careful examination in daylight it was found that in an oat field, which had recently been dredged, there were three distinct sets of holes ranging from nine inches down to about one inch in diameter. The holes, which were circular, diminished in size as they went downwards, and remained so on to the perfectly rounded ends at the bottom. Upon digging sectionally into the soil, which is stiff, yellow clay, it was found that the holes were "as clean cut as though bored with an auger."

Mr. W. Marriott said that the thunderstorm at Earl's Fee formed part of a series of thunderstorms which occurred over the south-eastern and eastern districts on the early morning of April 13th. The storm burst over the south coast at 2 a.m., and reached Lowestoft about 5 a.m., the rate of travel being about 50 miles an hour. Mr. Marriott showed some lantern slides illustrating various types of lightning flashes, and said that with moving cameras it was often found that there were several flashes on the plate following precisely similar courses. He pointed out that the flickering or repeating character of the lightning so frequently observed was really due to a succession of flashes following the same path. It might be that the three sets of holes mentioned by Mr. Box were caused by repeating lightning of three flashes with a slight distance between them. He was also of opinion that if the soil had been of a sandy nature instead of clay, the sand would have been fused and "fulgarites" formed.

Mr. R. Inwards said that it would have been interesting if a plaster cast of the holes had been taken.

Mr. A. Hands remarked that this was a type of case not often investigated, as attention was more frequently paid to buildings damaged by lightning. He believed that instances of damage by lightning were more numerous in Essex than in any other county except Yorkshire.

Mr. R. G. K. Lempfert, on behalf of Dr. W. N. Shaw, exhibited the records from the Dines sensitive barographs in London and at Oxshott during the thunderstorm on April 13th.

The President stated that he had recently seen a house which had

been struck by lightning in the neighbourhood of Greenhithe. The lightning had cut a clean hole through the tiles of the roof, and passing to the ground had gone out at the open door.

A paper by Mr. A. Lawrence Rotch, of the Blue Hill Observatory, U.S.A., describing "an Instrument for determining the true Direction and Velocity of the Wind at Sea," was, in the absence of the Author, read by the Secretary.

THE SIX MONTHS' RAINFALL OF 1904.

Aggregate Rainfall for January—June, 1904.

Stations.	Total Rain.	Per cent. of Aver.	Stations.	Total Rain.	Per cent. of Aver.	Stations.	Total Rain.	Per cent. of Aver.
	in.			in.			in.	
London	10·44	109	Arncliffe	31·86	119	Braemar	12·85	90
Tenterden	13·02	117	Hull	9·48	91	Aberdeen	14·93	112
Hartley Wintney	13·01	123	Newcastle.....	12·28	117	Cawdor	11·02	89
Hitchin	9·62	100	Seathwaite ...	65·01	112	Glencarron ...	43·06	107
Winslow	11·19	114	Cardiff	21·08	133	Dunrobin	14·52	110
Westley	9·90	96	Haverfordwest	22·08	124	Killarney	26·38	112
Brundall.....	9·95	98	Gogerddan ...	20·22	113	Waterford ...	21·06	125
Alderbury	15·19	130	Llandudno ...	13·06	109	Broadford.....	18·40	129
Ashburton	28·86	133	Dumfries	19·61	103	Carlow	15·99	109
Polapit Tamar ...	22·19	148	Lilliesleaf	16·29	128	Dublin	12·83	110
Stroud	14·01	121	Colmonell	18·11	96	Mullingar.....	18·11	114
Woolstaston	13·86	110	Glasgow	16·99	110	Ballinasloe ...	18·61	119
Boston	8·96	106	Inveraray	33·85	108	Clifden	41·04	119
Hesley Hall	9·39	107	Islay	22·87	120	Crossmolina ...	29·98	132
Derby.....	10·43	105	Mull	30·40	126	Seaforde	17·55	110
Bolton	16·75	100	Loch Leven ...	17·01	111	Londonderry..	17·09	99
Wetherby	14·43	141	Dundee	12·55	107	Omagh	20·34	123

June proved to be a dry month in almost all parts of the British Isles, the average deficiency of rainfall over England and Ireland being about one inch, and over Scotland about half-an-inch. A few stations on the west coast showed small excesses, but on the whole it was the driest June for several years; in the south-east of England certainly the driest since 1895. The rainfall for the year in the extreme east of England is no longer above the ten years' average employed for this Table, and excesses above 25 per cent. are confined to the south-west of England, the south of Ireland, and one or two scattered patches which are probably very small. The contrast with June, 1903, is marked, both as regards the rainfall for the month itself in the south of England, and the aggregate rainfall in most places. In Devonshire, however, the first half of 1904 has proved wetter than the first half of 1903. The number of rainy days appears to have been greater in June, 1904, than in the corresponding month of 1903, but this year there has been an unusual absence of thunderstorms.

RAINFALL AND TEMPERATURE, JUNE, 1904.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables in <i>British Rainfall</i> to which each station belongs.]	RAINFALL.					Days on which .01 or more fell.	TEMPERATURE.				No. of Nights below 32°.	
		Total Fall.	Diff. from average, 1890-9.	Greatest in 24 hours.		Max.		Min.		Shade	Grass		
				Depth	Date.			Deg.	Date.			Deg.	Date.
		inches	inches.	in.									
I.	London (Camden Square) ...	.84	— 1.06	.26	14	6	76.7	30	43.1	4	0	0	0
II.	Tenterden.....	1.64	— .55	.66	9	10	75.0	30	44.0	26	0	0	0
III.	Hartley Wintney .....	.79	— 1.16	.25	1	7	79.0	30	42.0	27, 28	0	0	0
..	Hitchin ..	.86	— .92	...	...	...	...	...	...	...	...	...	...
..	Winslow (Addington) .....	.60	— 1.25	.23	14	8	79.0	30	39.0	28	0	0	0
IV.	Bury St. Edmunds (Westley) ..	.81	— 1.23	.26	14	6	75.0	14	40.0	26	0	...	...
..	Brundall .....	.68	— 1.34	.25	14	9	75.6	14	39.8	13	0	0	0
V.	Alderbury .....	.87	— 1.10	.25	1	8	71.0	23, 30	41.0	27	0	...	...
..	Winterborne Steepleton ...	1.31	...	.30	14	9	70.0	4	36.9	10	0	0	0
..	Torquay (Cary Green)	1.11	...	.40	14	8	70.1	30	44.5	10	0	0	0
..	Polapit Tamar [Launceston]	1.31	— 1.08	.42	14	12	69.2	4, 5	35.5	10	0	...	...
..	Bath	1.46	...	.53	1	8	74.2	30	41.2	27	0	...	...
VI.	Stroud (Upfield)	1.18	— .82	.48	14	9	78.0	30	47.0	3	0	...	...
..	Church Stretton (Woolstaston)	1.17	— .97	.40	1	11	72.0	29, 30	41.5	6	0	...	...
..	Bromsgrove (Stoke Reformatory)	.61	— .89	.33	1	6	75.0	30	35.0	26	0	...	...
VII.	Boston	1.55	— .13	.45	2	7	77.0	30	41.0	27	0	...	...
..	Bawtry (Hesley Hall) .....	.34	— 1.33	.12	9	5	77.0	29	34.0	28	0	...	...
..	Derby (Midland Railway)...	.53	— 1.52	.27	24	7	80.0	29, 30	40.0	27	0	...	...
VIII.	Bolton (The Park)	1.42	— 2.18	.35	13	12	73.1	30	42.0	2	0	0	0
IX.	Wetherby (Ribston Hall) ...	1.57	— .52	.40	26	10	...	...	...	...	...	...	...
..	Arncliffe Vicarage	2.20	— 1.53	.40	16	11	...	...	...	...	...	...	...
..	Hull (Pearson Park) .....	.75	— 1.22	.23	9	10	72.0	29	41.0	4	0	0	0
X.	Newcastle (Town Moor) ...	2.11	+ .23	1.35	24	12	...	...	...	...	...	...	...
..	Borrowdale (Seathwaite) ...	4.39	— 2.71	1.10	14	13	78.5	5	40.4	8	0	...	...
XI.	Cardiff (Ely)	1.45	— .88	.67	14	8	...	...	...	...	...	...	...
..	Haverfordwest (High St.)...	2.93	+ .60	.90	12	10	72.6	6	40.5	22	0	0	0
..	Aberystwith (Gogerddan)...	2.19	— .45	.70	1	7	84.0	5	35.0	27	0	...	...
..	Llandudno	1.93	— .04	1.00	1	8	76.0	29	45.8	3, 28	0	...	...
XII.	Cargen [Dumfries]	2.36	— .36	.72	24	9	77.2	5	40.0	27	0	...	...
XIII.	Edinburgh (Royal Observy.)	2.12	...	.73	1	12	72.8	30	41.3	28	0	0	0
XIV.	Colmonell	1.92	— .75	.74	14	11	76.0	6	38.0	26, 27	0	0	0
XV.	Tighnabruach	2.85	...	.78	14	12	71.0	5	40.0	26, 27	0	0	0
..	Mull (Quinish).....	3.84	+ .41	.62	13	15	...	...	...	...	...	...	...
XVI.	Loch Leven Sluices	1.77	— .61	.31	14, 25	9	...	...	...	...	...	...	...
..	Dundee (Eastern Necropolis)	.50	— 1.33	.10	13, 14	11	72.6	3	39.5	11	0	...	...
XVII.	Braemar	1.51	— .82	.31	16	11	75.0	3	37.5	28	0	3	0
..	Aberdeen (Cranford) .....	.91	— 1.23	.25	23	13	69.0	3	37.0	6	0	...	...
..	Cawdor (Budgate)	1.50	— .82	.78	1	12	...	...	...	...	...	...	...
XVIII.	Glencarron Lodge	5.97	+ .23	2.31	16	16	73.0	30	39.6	28	0	...	...
..	Bendamph.....	5.83	+ 1.93	1.86	16	15	...	...	...	...	...	...	...
XIX.	Dunrobin Castle	1.28	— .76	.30	1	12	65.0	15	38.5	28	0	...	...
..	Castletown	1.22	...	.26	23	15	73.0	4, 15	33.0	27, 28	0	...	...
XX.	Killarney	2.23	— 1.41	.50	15	10	77.0	6, 7	43.0	10	0	...	...
..	Waterford (Brook Lodge)...	2.52	— .09	.84	12	8	69.0	5, 6	43.0	3	0	...	...
..	Broadford (Hurdlestown) ...	2.01	— .40	.28	30	14	74.0	6	45.0	16	0	...	...
XXI.	Carlow (Browne's Hill)	1.40	— .87	.30	14	10	...	...	...	...	...	...	...
..	Dublin (Fitz William Square)	1.08	— .84	.25	9	10	72.0	30	45.1	27	0	0	0
XXII.	Ballinasloe	1.65	— 1.00	.61	14	14	77.0	5	42.0	23	0	...	...
..	Clifden (Kylemore House)...	5.48	+ .05	1.55	14	13	...	...	...	...	...	...	...
XXIII.	Seaforde	2.18	— .38	.66	9	12	86.0	4, 5	43.0	1, 2	0	0	0
..	Londonderry (Creggan Res.)	1.10	— 2.04	.34	14	9	...	...	...	...	...	...	...
..	Omagh (Edenfel).....	1.85	— 1.16	.56	14	11	78.0	5	35.0	26	0	1	0

+ Shows that the fall was above the average ; — that it was below it.

SUPPLEMENTARY RAINFALL, JUNE, 1904.

Div.	STATION.	Rain. inches	Div.	STATION.	Rain. inches
II.	Dorking, Abinger Hall	·64	XI.	New Radnor, Ednol	1·07
„	Sheppey, Leysdown	1·31	„	Rhayader, Nantgwilt	2·06
„	Hailsham	·98	„	Lake Vyrnwy	1·80
„	Crowborough	1·27	„	Ruthin, Plás Drâw.....	1·29
„	Ryde, Beldornie Tower.....	·88	„	Criccieth, Talarvor.....	1·32
„	Emsworth, Redlands.....	1·25	„	Anglesey, Lligwy	1·07
„	Alton, Ashdell	·98	„	Douglas, Woodville	1·65
„	Newbury, Welford Park ...	·93	XII.	Stoneykirk, Ardwell House	2·19
III.	Harrow Weald	·90	„	Dalry, Old Garroch	2·71
„	Oxford, Magdalen College..	·75	„	Langholm, Drove Road.....	3·84
„	Banbury, Bloxham... ..	·56	„	Moniaive, Maxwellton House	2·39
„	Pitsford, Sedgebrook	·52	„	Lilliesleaf, Riddell	2·73
„	Huntingdon, Brampton.....	·61	XIII.	N. Esk Reservoir [Penicuik]	2·80
„	Wisbech, Bank House	·52	XIV.	Maybole, Knockdon Farm..	1·80
IV.	Southend	1·12	„	Glasgow, Queen's Park	1·35
„	Colchester, Lexden.....	·87	XV.	Inveraray, Newtown	3·35
„	Saffron Waldon, Newport..	1·05	„	Ballachulish, Ardsheal	4·80
„	Rendlesham Hall	·52	„	Campbeltown, Redknowe...	1·34
„	Swaffham	·67	„	Islay, Eallabus	1·64
„	Blakeney	·70	XVI.	Dollar	1·06
V.	Bishop's Cannings	1·00	„	Balquhider, Stronvar	4·57
„	Ashburton, Druid House ...	1·75	„	Coupar Angus Station	·86
„	Okehampton, Oaklands.....	1·29	„	Blair Atholl.....	1·97
„	Hartland Abbey	1·12	„	Montrose, Sunnyside.....	·53
„	Lynmouth, Rock House	1·17	XVII.	Alford, Lynturk Manse	·95
„	Probus, Lamellyn	1·93	„	Keith, H.R.S.....	1·64
„	Wellington, The Avenue ...	·88	XVIII.	Fearn, Lower Pitkerrie.....	·83
„	North Cadbury Rectory ..	·70	„	S. Uist, Askernish	2·58
VI.	Clifton, Pembroke Road	1·92	„	Invergarry	3·61
„	Moreton-in-Marsh, Longboro'	1·11	„	Aviemore, Alvie Manse.....	1·42
„	Ross, The Graig	·97	„	Loch Ness, Drumnadrochit.	1·95
„	Shifnal, Hatton Grange.....	·69	XIX.	Invershin	1·17
„	Wem Rectory	1·02	„	Altnaharra .....	...
„	Cheadle, The Heath House.	·96	„	Bettyhill	·95
„	Coventry, Kingswood	·41	„	Watten, H.R.S.	1·30
VII.	Market Overton	·58	XX.	Cork, Wellesley Terrace ...	2·17
„	Market Rasen	·30	„	Darrynane Abbey	5·28
„	Worksop, Hodsock Priory..	·37	„	Glenam [Clonmel]	3·02
VIII.	Neston, Hinderton.....	2·09	„	Ballingarry, Hazelfort	1·49
„	Southport, Hesketh Park...	1·12	„	Miltown Malbay.....	1·68
„	Chatburn, Middlewood	1·29	XXI.	Gorey, Courtown House ...	2·01
„	Duddon Valley, Seathwaite Vic.	3·12	„	Moynalty, Westland .....	...
IX.	Langsett Moor, Up. Midhope	·89	„	Athlone, Twyford	1·72
„	Baldersby	1·35	„	Mullingar, Belvedere.....	1·34
„	Scalby, Silverdale	1·00	XXII.	Woodlawn	1·50
„	Ingleby Greenhow Vicarage	1·50	„	Westport, Murrisk Abbey..	2·82
„	Middleton, Mickleton	1·53	„	Crossmolina, Enniscoo	3·02
X.	Beltingham	1·12	„	Collooney, Markree Obsy...	1·85
„	Bamburgh.....	2·12	XXIII.	Enniskillen, Portora	1·66
„	Keswick, The Bank	2·10	„	Warrenpoint	1·49
„	Melmerby Rectory	1·74	„	Banbridge, Milltown	1·41
XI.	Llanfrechfa Grange	1·50	„	Belfast, Springfield	1·35
„	Treherbert, Tyn-y-waun ...	2·86	„	Bushmills, Dundarave	1·01
„	Llandoverly, Tonn	1·77	„	Stewartstown	1·40
„	Castle Malgwyn	2·33	„	Killybegs	1·39
„	Llandefaelog-fach	1·26	„	Horn Head	1·04

METEOROLOGICAL NOTES ON JUNE, 1904.

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.

ENGLAND AND WALES.

LONDON, CAMDEN SQUARE.—The weather was somewhat cloudy and lacking in sunshine, but dry and generally fine. It was the driest June for nine years. The temp. kept at an uncomfortably low point at times, especially during the first week, and on only three days during the month did the max. exceed 75° . The duration of sunshine was $158^{\circ}7^{*}$ hours, and of R $16\cdot7$ hours. Mean temp. $58^{\circ}9$, or $1^{\circ}5$ below the average. No TSS.

ABINGER HALL.—Very dry, with a good deal of cold N. and N.W. wind, and several slight frosts towards the end. Splendid hay-time and good crops.

TENTERDEN.—East wind in the first part damaged the fruit. There was a fair amount of sunshine, $230\cdot5^{\dagger}$ hours, but only 8 days with max. temp. above 70° . TS on 6th.

CROWBOROUGH.—A beautiful summer month, with considerable sunshine and deficient R. Mean temp., $55^{\circ}6$.

HARTLEY WINTNEY.—Persistent cold N. and N.E. wind and fitful sunshine marked the first fortnight. The second fortnight was exceedingly dry, and the last week summerlike. Ozone on 14 days with a mean of $2\cdot1$. Hay crops good.

PITSFORD.—A beautifully fine warm month. R $1\cdot42$ in. below the average. Mean temp., $56^{\circ}8$.

COLCHESTER.—Cool and very dry, with many bright days, and excellent weather for hay harvest.

BLAKENEY.—R $1\cdot17$ in. below the average of 10 years. Heavy storms occurred some few miles away, but none reached here, although T was often heard.

TORQUAY, CARY GREEN.—R $1\cdot09$ in. below the average. Duration of sunshine, $240\cdot1$ hours, or $9\cdot5^{*}$ hours above the average. Mean temp. $57^{\circ}7$, or $1\cdot0$ below the average. Mean amount of ozone, $5^{\circ}1$.

WELLINGTON.—Pleasant weather, with very little R and much bright sunshine, though the temp. was rather low, only 5 days having a max. of 70° or above. R an inch below the normal.

NORTH CADBURY RECTORY.—Very dry but not hot, with many rather low maxima and some cold nights. Hardly a day without very perceptible wind.

CLIFTON.—After a very wet and cold day on the 1st, it was fine on the whole till the 12th. Thereafter alternate rainy and fine spells of a few days continued until the end. Fine and warm from 27th to 30th.

ROSS.—The R was less than half the average, and there were no days with heavy falls, and only three with more than $\cdot07$ in. The mean temp. was rather more than a degree below the average. The nights were frequently very cold. and on no day did the max. reach 80° .

WORKSOP.—The driest June for at least 30 years, except 1887.

BOLTON.—The driest June since 1889. The duration of sunshine was $179\cdot8$ hours, or $19\cdot0$ hours above the average. Mean temp. $53^{\circ}8$, or $2^{\circ}2$ below the average, and the lowest since 1892. T and L on 24th. Much of the hay had already been secured in fine condition by the end of the month, and cereals promise to yield good crops.

SOUTHPORT.—Exceptionally windy; dry, but rather cool. Mean temp. $1^{\circ}2$ below the average. Duration of sunshine 9^{*} hours above the average. R $1\cdot10$ in. below the average.

HULL.—Generally mild, with some bright warm days. Cold nights until 12th, but afterwards warm. T and L on 26th.

* Campbell-Stokes.

† Jordan

LLANDOVERY.—A fine month, but cool, and very similar to June, 1903, the mean temp., $56^{\circ}\cdot4$, being the same. Grass crops were remarkably good and well harvested.

HAVERFORDWEST.—Fine and warm, but without any high temp. From 12th to 17th was wet and stormy, with a strong gale beginning on the 14th, and doing some damage. Duration of sunshine, $230\cdot6^*$ hours. No TSS. Crops of all kinds looking well, but backward.

DOUGLAS.—The fourth successive month of persistently low temp., but sunshine was not deficient as in the three previous months. Spring flowers were in bloom at the month's end. Mean temp. $0^{\circ}\cdot8$ below the average.

SCOTLAND.

CARGEN [DUMFRIES].—Fine genial weather during the first half, but the latter part was wet, cold and squally. T and L on 24th. Great promise of fruit and farm crops.

LANGHOLM.—The R was $\cdot48$ in. above the average of 28 years, and $1\cdot57$ in. above that for June, 1903. TS on 24th.

MAXWELTON HOUSE.—Fine as a whole. R $\cdot46$ in. below the average. Mean temp. 57° , being equal to the average.

LILLIESLEAF, RIDDELL.—R $\cdot76$ in. above the average. The weather was quite satisfactory for agricultural purposes, and there was grass in abundance.

INVERARAY.—Both the beginning and end were fine and warm, but the season was somewhat late.

MULL, QUINISH.—Abundant sunshine and an excellent prospect for fruit and crops. The week beginning on 13th was exceptionally stormy.

COUPAR ANGUS.—The month opened bright and warm, but cold and stormy N.W. winds, more like March than June, predominated till 27th, and the month closed bright and warm.

LYNTERK MANSE.—The first instance in 4 years of a month with less than an inch of R.

DRUMNADROCHIT.—R $\cdot18$ in., and rainy days 1, below the average of 18 years.

BETTYHILL.—Bright dry weather with scarcely any R.

WATTEN.—Dry and fine, though often cloudy and windy.

CASTLETOWN.—The first twelve days were very dry, with light wind and high bar. Strong westerly winds to 22nd with R and overcast skies. The latter part was changeable, but cold N. and S.E. winds. Slight frost on 28th.

IRELAND.

CORK.—Mean temp. $4^{\circ}\cdot3$, and R $\cdot62$ in., below the average. Prevailing winds E. and W.

DARRYNANE ABBEY.—R 55 per cent. above the average, the excess being due entirely to an exceptional fall of $2\cdot79$ in. on 28th, most of which fell after 8 p.m. A gale on 15th and 16th damaged the potato crops in exposed places. On the whole it was a fairly fine month, with some very fine and hot days, especially in the first half.

BROADFORD, HURDLESTOWN.—A favourable June. Crops of all kinds doing well.

MILTOWN MALBAY.—An ungenial June. Rather cold with dry winds. Little R, though 15 rainy days. Only two real summer days.

DUBLIN.—A favourable month, with average temp. by day and night. Bright sunshine $242\cdot3$ hours, being 45 hours above the Phoenix Park average.

BANBRIDGE.—R $\cdot89$ in. below the average of 40 years.

BELFAST.—A most encouraging June, the finest since 1893, and the finest month since March, 1900. Crops promising excellently.

OMAGH.—It is long since there has been so summerlike and agreeable a June, or one in which the resulting softness of foliage and profusion of flowers have lent more beauty to the landscape. Early fruits were most abundant, and later ones promise equally well.

Climatological Table for the British Empire, January, 1904.

STATIONS. <i>(Those in italics are South of the Equator.)</i>	Absolute.				Average.				Absolute.		Total Rain.		Aver. Cloud.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
London, Camden Square	55·3	13	25·1	1	44·1	34·8	37·8	93	65·1	19·8	2·33	22	7·8
Malta.....	69·1	23	42·1	21	59·7	48·8	47·5	81	107·4	39·0	3·63	18	5·9
Lagos, W. Africa	89·0	sev.	66·0	10	87·0	74·1	74·2	77	136·0	63·0	1·85	3	3·7
Cape Town	100·5	23	50·6	27	78·5	60·0	56·8	65	...	...	·34	4	1·6
Durban, Natal	94·5	15	62·8	31	85·4	68·8	...	...	148·3	...	4·11	14	6·1
Mauritius.....	89·3	8	67·6	19	85·4	71·7	68·8	75	153·0	64·0	3·36	23	6·8
Calcutta.....	83·4	18	48·6	8	78·3	54·3	53·4	64	136·2	41·1	·00	0	0·7
Bombay.....	87·9	7	62·3	19	83·7	69·1	64·7	69	136·4	56·9	·00	0	1·0
Madras	84·8	27	61·8	31	83·0	69·2	67·5	78	138·1	56·5	1·00	3	4·0
Kodaikanal	72·1	31	39·9	7	62·1	46·2	38·4	61	135·4	28·0	3·39	4	4·8
Colombo, Ceylon.....	91·0	7	68·3	31	83·5	72·0	68·9	78	157·7	67·0	5·74	16	6·4
Hongkong.....	74·9	14	44·9	20	64·9	55·4	50·9	72	126·1	...	·12	2	4·9
Melbourne.....	94·2	9	48·1	27	74·9	57·0	54·8	72	151·2	41·0	5·68	14	5·6
Adelaide	100·3	8	46·9	21	81·3	58·8	50·9	51	154·5	37·9	2·53	8	3·2
Coolgardie	107·2	16	48·6	4	92·3	60·4	50·0	39	174·6	46·5	·01	1	0·8
Sydney	96·8	26	58·5	28	77·4	64·6	59·8	67	134·9	45·0	1·93	17	4·8
Wellington	82·3	21	46·1	9	71·1	54·0	51·9	50	135·0	41·0	1·50	10	5·1
Auckland	78·0	12	49·5	9	73·2	59·7	59·3	78	148·0	46·0	·82	8	5·0
Jamaica, Negril Point..	87·8	22	63·8	7	84·9	69·1	67·5	74	...	...	1·42	5	...
Trinidad	89·0	16	62·0	22	85·2	67·9	70·1	60	160·0	61·0	3·00	17	...
Grenada.....	84·8	1	69·6	24	81·3	71·9	70·0	74	150·0	...	5·62	22	3·2
Toronto	40·2	22	-15·1	4	24·3	7·6	15·5	85	59·8	-18·2	2·39	18	7·0
Fredericton	41·9	14	-27·5	4	19·1	-3·6	-4·5	59	...	...	3·40	9	6·4
Winnipeg	36·1	7	42·0	24	7·4	-13·4	...	...	...	...	·17	4	3·7
Victoria, B.C.	55·1	12	27·7	19	45·0	37·6	...	...	...	...	4·32	23	8·8
Dawson	20·0	6	-57·8	14	-16·1	-26·4	...	...	...	...	·82	8	5·8

MALTA.—Mean temp. of air 54°·1 or 0°·9 above, mean hourly velocity of wind 10·5 or 0·7 below, averages. Mean temp. of sea 60°·0. TSS on 26th.

Mauritius.—Mean temp. of air 1°·3, dew point 1°·3, and R 3·74 in., below averages. Mean hourly velocity of wind 10·4 miles, or 0·7 below average; mean direction E.

MADRAS.—Bright sunshine 209·2 hours.

KODAIKANAL.—Mean temp. of air 52°·4. Mean velocity of wind 317 miles per day. Bright sunshine 185·8 hours.

COLOMBO, CEYLON.—Mean temp. of air 77°·6 or 1°·5 below, of dew point 1°·1 below, and R 5·74 in. or 2·17 in. above, averages. Mean hourly velocity of wind 11·3 miles, prevailing direction N. TSS on 8 days.

HONGKONG.—Mean temp. of air 59°·5. Bright sunshine 185·2 hours. Mean hourly velocity of wind 13·8 miles; mean direction E. by N.

Adelaide.—Mean temp. of air 4°·1 below, and R 1·39 in. above, average.

Sydney.—Mean temp. of air 0°·5, humidity 4 %, and R 1·63 in. below, averages.

Wellington.—Mean temp. 3°·0 above, and R ·91 in. below, averages; prevailing winds, N.W. and S.