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METEOROLOGY AT DUNDEE.

THE number of meteorologists and the papers on meteorology at the Dundee meeting of the British Association were quite up to the average. We believe the only foreign meteorologist was Professor Chas. Martens, of Montpellier, for we cannot class the able observer at the Mauritius, Mr. C. Meldrum, as a foreigner. Among our own countrymen may be noted C. Brooke, F.R.S., Sec. Met. Soc.; W. R. Birt, F.R.A.S.; A. Buchan, Sec. Scot. Met. Soc.; Dr. Davy, F.R.S.; Dr. Everett; J. Glaisher, F.R.S., Pres. Met. Soc.; Prof. A. Herschel; D. Milne Home, Pres. Council Scot. Met. Soc.; Col. Sir H. James, F.R.S.; E. J. Lowe, F.R.S.; Dr. Moffat, F.R.A.S.; Prof. Phillips, F.R.S.; Col. Sykes, M.P., F.R.S.; D. Smith, F.R.A.S.; Dr. Balfour Stewart, F.R.S.; G. J. Symons, F.M.S.; F. Vivian.

We cannot find space to give all the Meteorological papers *in extenso*, much less the reports; we therefore propose to give simply condensed notices of the papers and discussions, and in these we shall, to a certain extent, avail ourselves of the reports of the *Dundee Advertiser*, the accuracy of which were the theme of general comment.

BEHAVIOUR OF THE ANEROID BAROMETER.

Dr. BALFOUR STEWART, Superintendent of Kew Observatory, read an interesting paper on the Behaviour of the Aneroid Barometer at different pressures. Experiments had lately been made with the view of ascertaining to what extent an Aneroid may be considered a reliable instrument when exposed to such considerable changes of pressure as occur in mountain districts. By means of an air pump, the Aneroids, when placed in a receiver, might be subjected to any pressure. A method of tapping the Aneroids had also been devised, and by this means the experiments as to the deviation of the results given by these instruments were conducted with comparative ease, and with the greatest accuracy. The experiments were still going on.

Sir W. THOMSON said the Aneroid had become so popular an instrument that many had satisfaction in learning that it was capable of giving results with scientific precision. Dr. Stewart had shown that in taking a barometer up a mountain of 12,000 feet, the error would only be about 300 feet, and had also shown how to correct this error. By carefully using these instruments, therefore, they had a probability of determining, with much less error, the height of a mountain of 12,000 feet.

Mr. BROOKE entered into some explanations regarding the action of the small Aneroid, one of which he had carried in his pocket for a considerable time.

Mr. GLAISHER corroborated the remarks of Dr. Stewart.

MAGNETIC DISTURBANCES.

A paper on the results of a comparison of the magnetic curves at the Observatories at Kew and Lisbon during the Disturbance of February 20—25, 1866, by Senor Capello, was also read by Dr. Stewart.

METEOROLOGICAL OBSERVATIONS AT SEA.

Dr. MOFFAT read a paper on some observations made at sea with regard to the ozoniferous currents of the ocean. The observations referred to had been made by W. F. Moffat, R.N., between lat. 53 deg. N., and 39 S., and long. 83 E., and 25 W. Mr. Moffat had observed that, as the wind veered with increasing readings of the barometer from south points of the compass through W. to N., ozone disappeared, and continued absent while the wind was in points between N. and E., and that it reappeared as the wind veered with decreasing readings of the barometer to S. points. The disappearance and reappearance of ozone with those conditions were so regular, that the changes appeared to be the result of an invariable atmospheric law, and Mr. Moffat was induced to examine the law of rotation of the wind, so clearly developed by Dore, and the results of the examination led him to believe that the Polar current is the non-ozoniferous or that of minimum of ozone, and that the equatorial is the ozoniferous, or that of the maximum of ozone. According to the rotation theory, the N. Polar current forms the N.E. "Trade," and the S. Polar the S.E. Trade, while the equatorials form in the Northern and Southern Hemispheres the upper or returning "Trades." These returning Trades come to the earth's surface in the Northern and Southern Hemispheres about the 53 deg. or 30 degrees of latitude—the latitude varies with the season—N. and S. of the Equator.

LUMINOSITY OF PHOSPHORUS.

Dr. MOFFAT then read an account of several interesting experiments which he had made on the luminosity of phosphorus. From these experiments it was shown that phosphorus in a luminous state produced phosphorus and phosphoric acids, and ozone also; that it was non-luminous at temperatures below 39° (F), and that it was luminous above 45° (F), but the temperature of luminosity and non-luminosity varied with the pressure of the atmosphere, and also with the direction of the wind. A series of experiments, extending over four years, had been made on the luminosity of phosphorus in connection with atmospheric conditions, and from the results it would appear that the equatorial or sea wind is that of phosphorescence and ozone, and that the polar or land wind is that of non-luminosity and no ozone. As the ocean is the reservoir of ozone, Dr. Moffat asks if it is not probable that its phosphorescence is the chief source of its development—a probability strengthened by the fact that the polar and land winds seem to modify its development, as the land current does. From observations made at sea, between lat. 53 N. and 39 S., Dr. Moffat was led to believe that, were it not for the modifying influence of the polar or trade winds, ozone at sea would be a constant quantity.

Sir W. THOMSON commented on the wonderful character of the results referred to by Dr. Moffat. They were altogether new to him, and certainly he should take the very earliest opportunity of endeavouring to obtain them for himself. He remarked that the phenomenon of luminosity stored up in the ice and produced after the melting of the ice was certainly one of the most startling ever met with in physical science—the luminosity having been induced by the previous presence of non-luminous phosphorus at a low temperature. It was a most beautiful and wonderful result. He was sure the publication of Dr. Moffat's paper would induce persons in all parts of the world to repeat the experiments.

REPORT OF THE RAINFALL COMMITTEE.

After some remarks from the Chairman of the Committee, Mr. GLAISHER, who commented on the importance of knowledge regarding rainfall in connection with the water supply of large towns, Mr. G. J. SYMONS, read the report, which dealt principally with the following branches of rainfall investigations:—
1. Extraction and classification of published records, being a collection into one uniform set of tables of all reliable rainfall measurements. 2. Examination of the rain gauges actually in use, by the personal visit of Mr. Symons to each observer, and the careful measurement of each gauge. Upwards of 60 were tested during the past year, and the total now visited is nearly 250. 3. Inclined and tipping-funnelled gauges. These experimental instruments were reported to be acting satisfactorily, and it was stated that Professor Phillips was about to

undertake the reduction of the observations. 4. Experiments on the influence of river mists on the amount of rain collected were reported upon, and it was intimated that any person possessing a lake or large pond in the middle of a large level plain, and clear of trees, might very usefully employ himself in making observations. 5. Reference was made to the establishment of additional gauges in Derbyshire, and in the Lake district of England—the results whereof will be given next year. 6. A preliminary notice was given of some results, as to the relative fall of rain in the various months; and it was pointed out that the monthly per centage is very different at stations having a small fall from what it is at wetter ones—the former having the greatest per centage in the summer, and the latter in the winter. 7. The last subject noticed was the means adopted to determine the altitude of the rain gauges above the sea, explanation being given of the means of obtaining the information from the publications of the Ordnance Survey, and also of some recent arrangements carried out by Mr. Symons for obtaining approximate determinations by means of barometric observations.

Mr. GLAISHER remarked that if there were gentlemen in localities situated near large towns, and where there is a good opportunity for measuring rainfall, who had not yet taken observations, they would, by commencing to do so, and communicating the results to the Committee, aid and assist them in the very important work in which they were engaged.

STORM WARNINGS—THEIR IMPORTANCE & PRACTICABILITY.

Colonel SYKES, M.P., then read a very lengthy paper, giving in minute detail a review of the progress of Meteorological Science. He referred to the appointment of Admiral FitzRoy as head of the Meteorological Department of the Board of Trade, and to the long and most valuable and assiduous labours of that gentleman in advancing meteorology, and in applying it to the most practical and useful purposes. The storm signals made by Admiral FitzRoy were very numerous. In the course of three years he gave 405 storm warnings, and of this number 305 were correct, showing that the meteorological observations leading to these warnings were of great utility, for they might safely infer that these 305 correct predictions of storms had saved many a vessel from shipwreck, and many a human life. (Applause.) Again, as to the observations on the wind in the same period, the predictions made were correct to the extent of 38 per cent., and these results were surely sufficient justification of the continuance of the storm warnings. Upon the death of Admiral FitzRoy, however, a Committee of the Royal Society was requested to carry on the work, but this they declined to do, on the ground that Admiral FitzRoy had promulgated these signals on empirical data. This was a determination which was much regretted, not only by scientific men, but by the Mercantile Marine, and by all the fishermen on our coasts. The storm warnings originated in a recommendation by the Mathematical Section of the British Association, which met at Aberdeen in 1859, and when, in conformity with the application of the Association to the Board of Trade, telegraphic meteorology was commenced, and Admiral FitzRoy was appointed to carry it out, that appointment gave great satisfaction to the country; but now all was to be changed. The Committee of the Royal Society had refused to continue these signals, and a long correspondence had taken place on the subject; but the result as yet had only been, that while the Committee of the Royal Society still persevered in their refusal to continue these warnings, they agreed to take steps for procuring certain observations, extending over the next fifteen years, and when these were obtained they would then issue these warnings, if the nature of these observations warranted that course. In order to do this, however, a large number of new Observatories were to be established with self-recording instruments, and this at a very much larger cost to the country than the Meteorological Department of the Board of Trade had cost. He had no hesitation in saying that the argument employed in the refusal of the Committee of the Royal Society was a pedantic affectation of science—literally the coxcombry of science. (Laughter.) What was the position of other countries in regard to this matter? In France meteorological observations were made, and, in the last report on the state of the French Empire, it was stated that the storm warnings given by the Imperial Observatory at Paris were very highly appreciated. In St. Petersburg, the same thing was done, and also

in many continental nations ; and yet here were we, the most maritime nation in the world—having set the example to other countries in this matter of storm warnings—and yet we were now dropping them. (Applause.) We were too scientific for the work. (Laughter.) Colonel Sykes then went on to show, from the memorials that had been sent to the Board of Trade from all parts of the country, that there was a great desire for the restoration of the signals—quoting from those sent by the Edinburgh Chamber of Commerce, from the Dundee Local Marine Board and Harbour Trustees, and many others—and concluded by shewing the practicability of making these observations, if not with absolute accuracy, at least sufficiently so to be of very great practical benefit to the shipping interests of the country. It was compromising the character and affecting the safety of the life and property of the country to discontinue the signals, and he thought he had shown that the restoration of the storm signals was a most urgent necessity. (Applause.) They should not submit to be deprived of the advantage given by these storm signals by the mere crotchet of individuals. (Applause.)

Mr. J. P. GASSIOT, one of the members of the Scientific Committee of the Royal Society, in reply to what Colonel Sykes had said, remarked that there was no doubt Admiral FitzRoy was an able officer, but his own general knowledge as a seaman led him to conclusions without laying down any particular system, and while he had to a certain extent been successful, he had also to some extent been unsuccessful. It would be supposed from what Colonel Sykes had said that the idea of continuing storm warnings was to be suspended for fifteen years ; but the very fact of the Committee having engaged Captain Toynbee showed their desire to carry out these storm warnings in a proper and useful manner. They proposed to have observatories in certain ports, with self-recording instruments—no meteorological observations being worthy of recording, unless the instruments were self-recording. These observatories were in course of being established. They proposed to communicate to certain ports which had the sanction of the Board of Trade, all the facts which they got from the different stations, and that at these particular ports storm signals should be hoisted, and every sailor be able to get the precise information, from which he should make his own deductions to protect his own vessel.

Mr. JOHN DON, President of the Dundee Chamber of Commerce, on behalf of the commercial, manufacturing, and shipping interests of Dundee, thanked the honourable member for Aberdeen for the admirable manner in which he had brought this subject before the British Association. This question had for a considerable number of years constantly occupied the attention of the Chamber of Commerce, the Harbour Trustees, and other public bodies in Dundee. After the discontinuance of the storm warnings, they memorialised the Board of Trade and petitioned the House of Commons in April last, and the Section would therefore see that for some time past they had been urging the resumption of these storm warnings. The honourable member for Aberdeen informed them that these warnings had been discontinued in deference to the pedantic affectation of science. What might be the exact meaning of that term he could not say. All he could say was, that if these warnings had been discontinued in deference to the pedantic affectation of science, the British public would not think that a sufficient reason. (Applause.) If he was told that these warnings had been discontinued on the ground of economy, all he had to say was, that the trifling cost could not for a moment be put in comparison with the saving of valuable life and property. It occurred to him that this was a favourable time for the British Association to urge Her Majesty's Government to resume these signals. All who heard the inaugural address of the noble President—whom he was glad to see present at this discussion—must have been struck with his special and pointed allusion to the benefit of these storm signals ; and his Grace's party being now in power, and knowing his immense influence with the Government, he (Mr. Don) thought that the Association ought to take the opportunity of urging the necessity of at once resuming these storm signals at all the principal ports of the United Kingdom. (Applause.) While, therefore, they were greatly indebted to Colonel Sykes for his valuable paper, he hoped that some practical effect would be given to his suggestions, and that some influential members at this meeting would draw up a formal resolution on the subject.

MR. D. MILNE HOME, of Wedderburn, President of the Meteorological Society of Scotland, quoted the published opinions of various authorities with regard to the notification of storms, and pointed out that, following the example set by the Board of Trade, almost all other civilized countries had adopted these storm warnings as a system which had commended itself to them, after due consideration, as profitable and useful. It appeared to him that, for our country to drop these storm signals, after suggesting them to other countries, was a most disadvantageous position for our country to be placed in, especially as Great Britain, occupying the geographical outpost to Europe, should give the most valuable information. He thought some misapprehension existed with reference to the position taken up by the Royal Society, and he wished to exonerate that Society from a small portion of the blame which had been thrown upon them. Whilst that Society would not themselves undertake the duties, because they considered them incompatible with pure science, they recommended the Board of Trade themselves to appoint an officer as successor to Admiral FitzRoy, and pointed out the proper person for the position; but the Treasury said that, unless a strong case were made out, they were not disposed, with the information before them, to sanction any expense on that account. He thought that a strong case had been made out by Col. Sykes, and as the British Association on a former occasion had been successful with the Government in inducing them to commence these storm signals, he felt sure that the British Association would be equally successful on the present occasion, if they consented to go forward and ask that these storm signals should be resumed. (Applause.) He concluded by proposing the following motion for the adoption of the Section,—"Resolved, that this Section apply to the Council of the British Association, to make a communication to Her Majesty's Board of Trade, urging them to institute arrangements for causing the storm-signals of the late Admiral FitzRoy to be resumed." (Applause.)

THE DUKE OF BUCCLEUCH said he was quite ready to second that motion, and the more so in that he was one of the deputation that waited upon the President of the Board of Trade, urging this very subject upon him. (Applause.) He did not pretend to enter into the scientific aspects of the question, neither would he enter into the subject of whether the Royal Society was the proper body from which these storm warnings should emanate. What he went upon was the practical benefit that would ensue from some such signals being again resumed. As he remarked the other night, and as he had observed on other occasions, they did not ask the Board of Trade, or any body of men, to undertake the duty of being weather prophets. (Laughter.) All they wanted was to procure information for the public which would enable maritime men and others to judge as to the nature of the weather they were likely to encounter when they left port. He therefore cordially agreed with the resolution that had been proposed, and had great pleasure in seconding it. (Applause.)

SIR JOHN OGILVY remarked that he had listened with much attention to the interesting discussion which had taken place, and it had only confirmed the opinion formerly entertained by him of the value and importance of these storm signals to a large portion of his constituents in Dundee, and he should have the greatest pleasure in co-operating with His Grace in urging this matter upon the attention of the Government. (Applause.)

DR. BALFOUR STEWART said that the Meteorological Committee of the Royal Society had stated that they would have telegraphic stations scattered all over the country, and principally in the west and south-west of Ireland. They would have a telegraphic officer of great intelligence stationed at Valentia, who would be prepared to keep an outlook on the state of the weather, and whenever he found that there was a probability of a storm he would telegraph at once to the Central Office in London; and if he found the meteorological disturbance increasing, and as soon as the Central Office found that a storm was approaching, and that an actual fact had taken place, they would be ready to telegraph this fact to the out-ports without loss of time. So far as he could see, this procedure would not be very different from that of the late Admiral FitzRoy.

MR. GLAISHER, who rose as President of the Meteorological Society, and Meteorological Director of the Greenwich Observatory, said that the Council of the Meteorological Society were very much surprised by the decision of the Royal Society

Committee regarding the discontinuance of the storm signals. Admiral FitzRoy had trained Mr. Babington in the work in which he himself had been engaged, and the storm signals did not cease when the Admiral died, and there was no good reason why these observations should not be resumed. (Applause.) As to the self-recording instruments which it was proposed by the Committee of the Royal Society to establish, and as to what Dr. Balfour Stewart had said, that the mere fact that there was a storm in a certain quarter should be sent down to the different outposts, he would say that self-recording instruments, without eye observations to check and, if need be, correct them, were of no use; and as to sending down the mere results of the meteorological observations to the coasts, he would say, for God's sake, do not do it. They would be read in a dozen different ways, and would only lead to mischief. He concluded by earnestly stating his opinion that the signals should be restored. (Applause.)

ADMIRAL BELCHER said that Admiral FitzRoy had been tried by a civil court-martial, and by a set of men who were not qualified to judge him. They should hear the naval side of the question, for it was really after all a naval question. It had been said that we could not foretell events of the weather, but he could tell them facts to the contrary. (Applause.) As far back as 1812 he recollected that it was the constant habit of the Admiral on the Bordeaux station to give signals every hour when the barometer changed, and the ships struck masts and sent down yards accordingly. On one occasion, when they were chasing the enemy, and just as they were on the point of coming up with them, their captain looked at the barometer, and suddenly gave the order to reef topsails, but before that could be done many spars were lost. On another occasion, he himself had predicted a storm in a certain quarter, and his prediction was fulfilled to the very hour. He knew they could continue the storm signals if those in authority would only be stirred up to do their duty. It was all nonsense to say they could not do so. (Applause.) Why, the cattle, the birds, the fish, and the reptiles, and in fact everything gave indications of coming storms, and, with the assistance of meteorological observations, scientific men should be able to give very precise notice of atmospheric changes. (Applause.)

COL. SYKES regretted that Dr. Balfour Stewart seemed to misapprehend him in a point of some importance. He did not mean to say that the Committee of the Royal Society were pedants, but that the arguments against the data on which Admiral FitzRoy's warnings were based, was a pedantic argument, and of no practical value.

THE REV. C. PRITCHARD remarked that the impression on his mind was that, as usual, the truth in this matter lay between the two extremes. Perhaps too much had been attempted to be done by the late Admiral FitzRoy, but on the other hand he thought that the Committee of the Royal Society, with such a man as General Sabine at their head, might be trusted to do all that could be done in the matter. He thought that a slight alteration in the wording of the resolution might have a good effect. He would propose that, instead of saying that the signals of the late Admiral FitzRoy should be continued, that arrangements should be made for continuing the system of storm signals, and this would prevent them from tying the hands of Government as to the mode in which these should be made. (Applause.)

MR. D. MILNE HOME contended that the value of the signals given by Admiral FitzRoy consisted chiefly in their specific character and intelligibility. He did not merely intimate a meteorological fact, leaving anybody to interpret it, but what he signalled was something like this—"Look out at Dundee for a gale from the S.W." It would be of no use whatever to the people of Dundee or any other port to know that a gale was blowing at Copenhagen, Valentia, or elsewhere, unless they were also told that they might expect to be visited by the same storm. (Applause.)

THE DUKE OF BUCCLEUCH thought, with all deference to Mr. Milne Home, that to insert the words originally proposed would perhaps lead persons to suppose that Admiral FitzRoy's system should be continued. He, however, was not quite sure but that great improvements might be made upon that system. He would be glad to see what had been begun by Admiral FitzRoy taken up and if possible improved, but he should not like to feel himself tied in any way to say that

Admiral FitzRoy's system should be resumed. Perhaps Mr. Milne Home would allow the resolution to stand in this way, "that arrangements regarding storm signals be continued." (Applause.)

MR. MILNE HOME was understood to consent to this proposal, and on the amended resolution being put to the meeting by Professor Kelland, it was carried unanimously.

OBSERVATIONS OF ATMOSPHERIC ELECTRICITY.

DR. EVERETT, formerly Professor of Natural Philosophy in the University of Windsor, Nova Scotia, and now official assistant to the Professor of Mathematics in the University of Glasgow, read a paper on the "Results of Observations of Atmospheric Electricity at Kew Observatory, and at Windsor, Nova Scotia." The Kew observations included in this paper extended from June, 1862, to May, 1864, inclusive, and were taken with Sir Wm. Thomson's self-recording apparatus, specimens of the photographic curves thus taken being exhibited at the meeting. The Windsor observations, taken by Dr. Everett with apparatus of a different kind, also invented by Sir. Wm. Thomson, but not self-recording, extended from October, 1862, to August, 1864. Monthly averages which had been taken showed that at Kew there had in every month been two maxima in the day—one of them between eight and ten a.m., and the other, which was more considerable, between eight and ten p.m. At Windsor, on the contrary, the electricity between eight and ten p.m. had in every month been weaker than either between eight and ten a.m. or between two and three p.m. The annual curve for Kew had its principal maximum in November, and another in February or March. At Windsor the principal maximum was in February or March, and the minima in June and November. The annual curves for the two places agreed pretty well from January to October, but were curved in opposite directions from October to January.

ACTION OF LIGHTNING IN FORFARSHIRE.

Professor KELLAND read the following paper of Sir David Brewster's: "In the summer of 1827 a hay stack in the parish of Dun, in Forfar, was struck by lightning. The stack was on fire, but before much of the hay was consumed the fire was extinguished by the farm servants. Upon examining the hay-stack, a circular passage was observed in the middle of it, as if it had been cut out with a sharp instrument. This circular passage extended to the bottom of the stack, and terminated in a hole in the ground. Captain Thomson, of Montrose, who had a farm in the neighbourhood, examined the stack, and found in the hole in the hay-stack, a substance which he described as resembling lava. A portion of this substance was sent by Captain Thomson to my brother, Dr. Brewster of Craig, who forwarded it to me with the preceding statement. The substance found was a mass of silix obviously formed by the fusion of the silix in the hay. It had a highly greenish tinge, and contained burnt portions of the hay. I presented the specimen to the museum of St. Andrews."

(To be continued.)

TEMPERATURE IN THE SHADE AND IN THE SUN.

To the Editor of the Meteorological Magazine.

SIR,—Perhaps if no abler correspondent answers W.E.H.'s letter, you will allow me a few lines.

In the first place, the temperature of the air in the shade is *not* what meteorologists want to know; they want to know the temperature of the air. It is only through necessity that we are obliged to place our instruments in the shade. The air receives increase of heat mainly in two ways:—(1) by absorbing the direct rays of the sun, (2) by contact with the ground still more heated by them. It loses heat (1) by radiating heat into space, (2) by contact with the ground still more cooled by the same process. Now meteorologists place their instruments where these forces act, and not where they do not act; they register the highest temperature to which the air at a certain height (commonly 4 feet) above the ground is heated, and the lowest to which it is cooled by the above causes.

If it were possible to make a thermometer transparent to the sun's heat-rays, such an instrument suspended freely in the air in an open space would show the real temperature of the air. But as this is impossible, meteorologists almost without exception, I believe, place the thermometers as far as possible in an open

space free from trees, and distant from walls upon a stand so arranged that the air has a free passage past and around the bulbs of the instruments, while the sun's rays are completely kept off. If so placed, there will be no substance that can reflect heat to them and no heated surface near, except the ground and the top of the stand, and the air which passes over the latter does not go near the instruments. Mr. Glaisher very properly insists that they shall not be hung against a board unless the bulbs project beneath, for if so placed they are affected by the temperature of the board which is slower than they to receive heat from the air.

Now in the shade, in which W.E.H. puts his thermometers, none of these causes act, and the air would hardly alter in temperature if it were not for the wind. But on calm days the circulation of the air is far from complete, and therefore, the air is cooler in such places by day and warmer by night than in an open space. Moreover, walls and trees do not readily change their temperature if not exposed to the sun, but tend further to cool by day and heat by night the air surrounding them. Trees especially are kept at a very uniform temperature by their vitality, and still further cool the air around by the evaporation from their leaves, so that the air in a wood, as everyone knows, is damp and cold by day, but close—i.e., damp and warm—by night.

It follows, then, that without believing every "extraordinary account in the papers," we must decline to put our thermometers in a thick shade where they will register (as I have found by experiment) from 6° to 12° too low in summer heat, and as much too high in hard frosts.

About the mode of determining the heat of the sun's rays, there is, I am sorry to say, less agreement; W.E.H.'s criticisms upon the popular notions are very just, and the results of his experiments doubtless correct; still there is much more agreement that he supposes. A thermometer with blackened bulb enclosed in a glass cylinder enlarged at one end and exhausted of air—commonly called the "black bulb in vacuo"—is pretty generally employed, but it is not always similarly placed. I think the Greenwich plan of placing it upon a level piece of short grass, the simplest and the best; once raise it above the ground and there are an infinite number of different heights at which to place it, each giving a different result. Even a few inches elevation lowers the temperature 5° or 6° in summer, or even more on a bright but windy day. There could surely be no difficulty in all agreeing to adopt the very simple plan of putting it on the grass. Care, however, should be taken to select one in which the bulb is completely covered with lamp-black up to the point at which the tube first begins to widen towards the bulb, and which has also a shield of clear glass without flaws, bubbles, or inequalities, at least on the side exposed to the sun. I have found by experience, that if these points are not attended to, the instrument may read as much as 6° or 8° too low, but if they are, I believe the results are strictly comparable.—I am, Sir, yours truly,

September 19th, 1867.

F. W. S.

To the Editor of the Meteorological Magazine.

SIR,—Your correspondent "W. E. H." has come to the conclusion, from his experiments, that the true heat of the atmosphere in the shade is only to be obtained in the complete shade of trees. But I would ask whether such a conclusion can be looked upon as correct, when we call to mind the very great evaporation that takes place from the leaves, and the vast amount of caloric that will so be absorbed, reducing the temperature. I have been lately astonished at the effect produced upon a thermometer by allowing a major convolvulus to clamber over a part of the instrument, in reducing the extent of the daily range. I quite agree in the absurdity of giving temperatures from thermometers suspended just outside windows, as any criterion of the shade temperature of any spot, and was quite startled at the wide discrepancy between my own records and those sent to the *Times*, to surprise the public. Doubtless soil has much influence, and such influences are highly interesting to trace, but we certainly ought to try to get rid of the disturbing effect of reflecting surfaces, and of walls and roofs heated, at some period of the day, by the sun's rays.—Yours very faithfully,

T. L. L.

YELLOW HAZE AND S.E. WIND.

To the Editor of the Meteorological Magazine.

SIR,—There are two subjects which I would lay before your readers for discussion. The first is, the peculiar yellow haze which accompanies an east wind at all seasons of the year, but especially in spring, and which country folk call London smoke, but which I have noticed in Wales and in Germany. The second is the frequency of S.E. winds in this country, in the middle of the months of March and October, especially in October. The S.E. wind being, according to the present theory, a S.W. wind, deflected in its lower portions by a N.E. current, should be colder than the S.W., and so it often is, and we have a pretty positive proof of the truth of this theory, since we often observe with this wind the high clouds moving from the S.W., the low drift from the S., while a thin stream beneath flows languidly from the S.E., and further by the abundant rain (the most copious of all our rains) that falls under these circumstances.

But sometimes this wind is wonderfully warm, not so much from the sun's rays shining without screen, as because the air itself is highly heated, as evidenced by the night and shade temperatures. In Bavaria, men of science hold that the air from the deserts of Africa traverses, sometimes, the Alps, producing the violent breaks which occasionally occur in their somewhat severe winter there. May we not also be justified in assuming that the class of S.E. winds under discussion, come to us from the deserts of Africa giving a mitigated siricco? When they blow, the air is singularly transparent, and the only clouds are largish quantities of cirrus with little motion. This is the class of S.E. winds that we have in October, and I would further suggest that such a bed of heated air from Africa, wandered over Europe at the beginning of May in this year.

I think the S.E. is the most curious and interesting wind that blows in this country, not only because of its somewhat obscure origin, but also because, with it, we have the least atmospheric pressure, which fact has never been satisfactorily explained. I wish we had records, with their heavy rainfalls, in the United States, of the direction of their winds. I am reminded of this by observing that you quote one of these records.—Yours faithfully,

T. L. L.

LUNAR RAINBOW.

To the Editor of the Meteorological Magazine.

SIR,—At 7.30 p.m. September 10th, a beautiful lunar rainbow appeared here in the N.W. quarter, and continued visible for about seven minutes. We had no positive cloud overhead, but a very light vapour, with a scarcely perceptible drizzle for a minute or two. The gibbous moon was rather wan among some moving vapours. The arc itself was about 30° high, and shown upon grey cumulus, below which at the horizon was a long stripe of silver light.

This is the third lunar rainbow I have seen, and it differs from the other two, in possessing colour. The others were merely faint, pale arcs, but in this a fusion of rich colours, as in a fading solar bow, was seen. Moreover, a marginal repetition, just within the main broad stripe, could be descried by careful eyes. The arc was about half the apparent width of a near solar bow. The southernmost spring of the arch was at first the brightest part; then the crown, and then the northern column; and so it died away.

I hope other correspondents will tell you how far it was seen, and what it was like.—Yours very obediently,

R. D. BLACKMORE.

BOOKS, &c., RECEIVED.

FOURNET, M. J., "Commission Hydrométrique et des Orages de Lyon," 1866, 23^e Année.

HARRISON, J. P., M. A., "On Radiation and Vapour." [*Phil. Mag.* April, 1867. "On the Relation of Insolation to Atmospheric Humidity." "*Proc. Roy. Soc.* No. 90, 1867.]

HOSKINS, S. E., M. D., F.R.S., "A tabular form of analysis to aid in tracing the possible influence of past and present upon future states of weather." [*Proc. Roy. Soc.*, No. 93, 1867.]

SEPTEMBER, 1867.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.						Days on which 1/10 or more fell.	TEMPERATURE.				No. of nights below 32°.
		Total Fall.	Difference from average 1860-5	Greatest Fall in 24 hours.		Dpth.	Date.		Max.		Min.		
				in.	Date.				Deg.	Date.	Deg.	Date.	
I.	Camden Town	2.23	— .03	.55	11	11	79.0	1	36.0	25	0		
II.	Staplehurst (Linton Park) ...	1.43	— .79	.56	10	12	79.0	2	32.0	25	0		
III.	Selborne (The Wakes)	2.65	+ .21	.90	9	12	75.0	3	31.6	25	1		
III.	Hitchin	1.86	0.00	.72	10	10	74.0	1	35.0	24	0		
IV.	Banbury	1.79	— .58	.69	2	13	74.3	1	33.5	26	0		
IV.	Wisbech	2.26	...	1.00	3	6?	77.2	1	35.1	25	0		
V.	Bury St. Edmunds (Culford) ..	2.63	+ 1.02	.92	9	9	80.0	1	33.0	24	0		
V.	Calne .....	...	...	...	...	...	...	...	...	...	...
VI.	Plymouth (Goodamoor)	2.88	— 1.77	...	...	...	...	...	...	...	...
VI.	Barnstaple	2.09	— 1.68	.32	15	16	...	...	...	...	...
VII.	Taunton (Fulland's School) ..	1.31	— .35	.64	2	8	87.0?	2	38.0	24	0		
VII.	Shrewsbury (Highfield)	1.52	— .68	.39	13	14	...	...	...	...	...
VIII.	Tenbury (Orleton)	1.79	— .90	.39	3	13	74.8	2	35.0	26	0		
VIII.	Leicester (Wigston)	1.94	— .27	.93	3	6	81.0	2	34.0	24*	0		
IX.	West Retford .....	...	...	...	...	...	...	...	...	...	...
IX.	Derby	2.86	+ .52	1.39	3	15	75.0	2	38.0	26	0		
X.	Manchester	2.99	— .71	.62	1	19	76.6	2	38.0	17	0		
X.	York	1.75	— .59	.41	14	10	69.5	5	42.0	25+	...		
XI.	Skipton (Arncliffe)	5.27	+ .31	.84	15	19	68.0	5	43.0	17	0		
XI.	North Shields	1.85	+ .15	.56	11	13	68.2	5	41.5	26	0		
XII.	Borrowdale (Seathwaite)	12.47	— .74	1.73	6	21	...	...	...	...	...
XII.	Abercarn	3.31	...	.90	7	14	75.0	1	40.0	25	0
XIII.	Haverfordwest	3.54	— .17	.80	10	11	71.7	2	38.5	17	0		
XIII.	Rhayader (Cefnfaes)	2.96	— .88	.50	5	20	70.0	...	35.0	...	0		
XIV.	Llanberis (R. Victoria Hotel) ..	6.75	...	1.18	4	12	...	...	...	...	...
XIV.	Dumfries	3.87	+ 1.14	.76	5	21	68.5	2	38.0	17	0		
XV.	Hawick (Silverbut Hall)	2.12	...	.44	1	15	...	...	...	...	...
XV.	Ayr (Auchendrane House) ...	4.26	+ .53	.62	23	23	74.0	4	34.0	17	0		
XVI.	Otter House	5.67	+ .85	.85	5	19	67.0	2, 4	42.0	18+	0		
XVI.	Leven (Nookton)	2.20	— .28	.59	12	14	66.0	4	38.0	17	0		
XVII.	Stirling (Deanston)	4.72	+ 1.57	1.03	3	19	67.3	4	30.8	17	1		
XVII.	Logierait	2.00	...	.46	6	13	...	...	...	...	...
XVIII.	Ballater	1.94	...	.52	12	16	66.0	4	30.5	18	1
XVIII.	Aberdeen	1.97	...	.76	3	19	64.8	29	41.7	18	0
XVIII.	Inverness (Culloden)	1.31	...	.38	30	8	65.0	4	42.4	18	0
XIX.	Fort William	5.79	...	.92	23	25	...	...	...	...	...
XIX.	Portree	7.77	— 3.00	1.82	28	22	66.2	10	36.0	20	0		
XX.	Loch Broom	5.40	...	2.05	28	22	...	...	...	...	...
XX.	Helmsdale	3.01	...	.59	12	22	...	...	...	...	...
XXI.	Sandwick	5.38	+ 1.72	1.60	10	21	61.8	3	41.8	24	...		
XXI.	Cork	3.58	...	1.32	11	16	...	...	...	...	...
XXII.	Waterford	2.53	— .60	.63	11	17	71.0	15	44.0	22	0		
XXII.	Killaloe	3.14	— 1.02	.69	9	16	74.0	3	36.0	18	0		
XXIII.	Portarlinton	1.69	— 1.59	.23	5	22	63.5	1	36.0	17	0		
XXIII.	Monkstown	1.31	— .68	.29	2	14	70.0	3, 21	40.5	21	0		
XXIII.	Galway	3.52	...	.49	6	20	68.0	2, 17	43.0	30	0
XXIII.	Bunninadden (Doo Castle) ...	3.07	...	.51	4	18	67.0	3	31.0	18	1
XXIII.	Bawnboy (Owendoon)	4.06	...	.65	6	22	78.5	2	39.0	17	0
XXIII.	Waringstown	1.45	...	.19	6	16	71.0	2, 3	34.0	16	0
XXIII.	Strabane (Leckpatrick)	2.27	...	.43	4	20	74.0	3	36.0	18	0

* And 30th. † And 26th. ‡ And 20th. § And 30th.

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

METEOROLOGICAL NOTES ON THE MONTH.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; 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.

LINTON PARK.—Fog on 14th and 21st; T on 10th, and frost on 25th.

SELBORNE.—TS at 11 p.m. with heavy R on 2nd. Violent TS at 6 a.m. on 3rd, which struck the chimney of a lodge about a mile from here. Another TS on 9th at 9 p.m., during which .90 in. of R fell in two hours. First frost on 25th. Harvest generally completed by the 14th. On the whole a good harvest month, and the hops generally very fine, and in large quantities in this parish.

BANBURY.—TS with heavy R at midnight on the 2nd, and again between seven and eight the following morning. Mean temp. of month slightly above the average.

WISBECH.—Fog on 2nd and 21st. Frost on grass on 25th. TS, with 1 in. of R, on the 3rd. Three sheep killed under a tree near here during this storm.

CULFORD.—T on 3rd. Latter part of the month very fine.

TATNTON.—The R on the 13th, though only .32 in., was noticeable from its literally coming down in sheets of water. Weather warm and genial. Harvest operations carried on uninterruptedly.

ORLETON.—A fine pleasant month, with moderate rainfall. Temp. nearly 2° above the average. Bar. high and steady. L in S. on evening of 2nd. Frequent TSS all day on 3rd, with L all night. Violent wind on 30th.

DERBY.—An unusually fine month; the mean temp. 2°·3 above the average of 21 years, but still 5°·3 below the magnificent September of 1865.

MANCHESTER.—TS on 3rd.

NORTH SHIELDS.—Solar halo on 9th.

SEATHWAITE.—Potatoes much diseased.

W A L E S.

ABERCARN.—TS to the S. on 1st. A heavy TS at 5 a.m. on the 3rd, with very vivid L to the N. and S.; this was repeated on the 4th, when the atmosphere was very oppressive and unusually warm; thus there were three TSS from the 1st to the 4th. Rather wet to the 15th, afterwards fine and calm.

HAVERFORDWEST.—First fortnight showery, wet, and very trying for harvest operations. Heavy TS, with vivid L, on morning of 3rd, rainfall .45 in. in one hour. T and L again, but less violent, on 6th. After the 15th the weather became settled, fine and clear; nights relatively warmer than the days; harvest well got in. Some three or four nights at the end were cold and foggy.

CEFNFAES.—A heavy TS, or rather three TSS, during the day of the 3rd. Temp. low. Grain crops in this district generally good, and well got in. A small flight of fieldfares seen on 20th.

S C O T L A N D.

DUMFRIES.—More or less R every day during the first fortnight; the second fine, with occasional showers. TS on 3rd. Harvest very protracted; all the grain cut on many farms before a sheaf was in the barn yard. After the 15th the fields rapidly cleared, the grain, owing to the brisk wind during the rainy period, being in better condition than had been expected. Harvest in the lower districts completed by the end of the month. Potatoes slightly diseased, but the crop good. Pasture fields fresh and green.

HAWICK.—L for two hours on the night of the 2nd. Aurora on the 23rd. Much wind during the last 10 days. Hurricane from the S. on 29th and 30th. Cereal crops in fine order. Potatoe disease very prevalent.

AUCHENDRANE.—September is the principal harvest month in this locality, and with the exception of January and December, it is our wettest month; and this year the weather has been worse than usual. Fortunately, there was a period of nearly dry weather between the 14th and 21st, favourable for harvest operations.

OTTER HOUSE.—Hoar frost on 17th and other days; R mixed with H on 23rd. Harvest nearly completed, under severe and almost continued equinoctial gales. The steam plough is a great boon to the West Highlands.

OSLER'S PRESSURE ANEMOMETER.

