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THE AUTUMN CONGRESSES.

Of the various autumnal Congresses, the meetings of the British Association at Birmingham, and of the Sanitary Institute at York, alone demand some notice from us. In both cases the gatherings and discussions seem to have been highly successful generally, though meteorological papers were not so numerous as usual at either; and of these space forbids our giving more than a very brief report.

Among the papers read before the British Association were the following :—

Report of the Committee on the Ben Nevis Meteorological Observatory.

Report of the Committee on the Chepstow Meteorological Observatory.

Report of the Committee on Solar Radiation.

HON. R. ABERCROMBY.—*The Peculiar Sunrise-Shadow of Adam's Peak in Ceylon.*

J. T. MORRISON, M.A.—*On the Distribution of Temperature in Loch Lomond and Loch Katrine during the past Winter and Spring.*

J. T. MORRISON, M.A.—*On the Distribution of Temperature in the Firth of Clyde, in April and June, 1886.*

H. R. MILL, D.Sc.—*On the Temperature of the River Thurso.*

A. F. OSLER, F.R.S. (by Professor Balfour Stewart, F.R.S.).—*On the Forms of Clouds.*

W. E. WILSON (by Howard Grubb, F.R.S.).—*On a New Sunshine Recorder.*

METEOROLOGICAL OBSERVATIONS ON BEN NEVIS.

Report of the Committee appointed for the purpose of co-operating with the Scottish Meteorological Society in making Meteorological Observations on Ben Nevis. Submitted by LORD McLAREN.

The report stated that all observations, both at the Observatory itself and at the sea-level station at Fort William, had been made with the utmost regularity during the year. For the twelve months ending May, 1886, the mean temperatures and pressures at the Ben Nevis Observatory and Fort William were :—
Observatory : summer temperature, 39·3 ; pressure in inches, 25·502 ; autumn temperature, 29·9 ; pressure, 185 ; winter temperature, 22·5 ; pressure, 244 ; spring temperature, 26·4 ; pressure, 276 ; year temperature, 29·5 ; pressure,

25·302. Fort William : summer temperature, 55·2 ; pressure, 30·027 ; autumn temperature, 44·9 ; pressure, 29·736 ; winter temperature, 36·5 ; pressure, '880 ; spring temperature, 43·4 ; pressure, '873 ; year temperature, 45·0 ; pressure, 29·879. These twelve months were thus characterised by an unusually low mean temperature, the annual mean at the sea-level station, 45·0, being 2·2 below its normal mean temperature. The maximum temperature at the observatory for the period was 60·0 at three p.m. on July 31, which nearly approaches the maximum of previous years—viz. 60·1 at 2 p.m. on August 9, 1884. The lowest temperature was 8·0 on the evening of December 6, 1885, which is the lowest temperature yet recorded on Ben Nevis. The lowest temperature for the three winters had been respectively 9·9, 11·1, and 8·0. During the twelve months the sunshine recorder registered 752 hours of sunshine, which is about 18 per cent. of the possible sunshine. In the previous year the hours of sunshine only amounted to 464. But the most remarkable features in the climate of Ben Nevis during the year were the frequent occurrence of excessive droughts, comparatively large amount of sunshine, and occasional unusually heavy falls of rain and snow. The most remarkable drought yet recorded at the observatory occurred in March last, commencing at 1 a.m. of the 11th and ending at midnight of the 12th, thus extending over a period of 48 hours. The rainfall for the twelve months amounted to 128·33 inches, the largest monthly fall being 24·33 inches in December, 1885, and the smallest 2·85 inches in February following. The heaviest precipitation on any day was 5·34 inches on December 12, and 4·45 inches on January 1—these being heavier than any previously recorded daily falls. On the two days, December 12 and 13, the precipitation amounted to 8·86 inches. For five-day periods the following heavy falls are recorded :—For the five days ending December 15, 10·25 inches ; October 5, 10·02 inches ; January 3, 9·25 inches ; and September 16, 6·13 inches. On the other hand the year was marked by the large number of days on which either no rain fell, or on which the amount was less than 0·01 inch. The number of these days amounted to 126, being thus in the proportion of two rainy days for each fair day. The largest number of fair days in any month was twenty, in August ; and the least, two, in September. In the previous year there were only seventy-nine days without rain, being thus forty-seven fewer than last year.

THE CHEPSTOW METEOROLOGICAL OBSERVATORY.

Third Report of the Committee appointed for the purpose of co-operating with Mr. E. J. Lowe in his project of establishing on a permanent and scientific basis a Meteorological Observatory near Chepstow. Submitted by PROFESSOR BALFOUR STEWART.

The Committee expressed their sympathy with Mr. Lowe and his friends under the unfortunate circumstances that had tended to retard local action. The Committee saw such evidence of local interest in the undertaking, that they desired to have an early opportunity of co-operating with the local committee. They therefore asked for their re-appointment, and requested that the unexpended sum of £25, and an additional sum of the same amount, be placed at their disposal for the purpose.

THE PECULIAR SUNRISE SHADOW ON ADAM'S PEAK IN CEYLON.

BY THE HON. RALPH ABERCROMBY.

In this paper the author dealt with a great peculiarity which has been noticed by many travellers about the shadow of Adam's Peak at sunrise. The shadow, instead of lying flat on the ground, appears to rise up like a veil in front of the spectator, and then suddenly to fall down to its proper level. Various theories have been propounded to account for this, and it has usually been supposed to be due to a sort of mirage. The author, in the course of a meteorological tour round the world, spent a night on the top of the peak, 7,352ft. above the sea, and obtained unmistakeable evidence that the appearance is due to light wreaths of thin morning mist being driven past the western side of the mountain by the prevailing north-east monsoon up a neighbouring gorge. The shadow is caught by the mist at a higher level than the earth, and then falls to its own plane on the ground as the condensed vapour moves on. The appearance is peculiar to Adam's Peak, for the proper combination of a high isolated pyramid, a prevailing wind, and a valley to direct suitable mist at a proper height on the western side of a mountain is only rarely met with. Any idea that the appearance could be caused by mirage is completely disproved by the author's thermometric observations.

ON THE DISTRIBUTION OF TEMPERATURE IN LOCH LOMOND AND LOCH KATRINE DURING THE PAST WINTER AND SPRING.

BY J. T. MORRISON, M.A.

The author made observations on the temperature of these lakes on or about the term day of each month from December, 1885, to June, 1886, in continuation of Mr. J. Y. Buchanan's researches. These included the whole length of Loch Katrine, and the head and middle part of Loch Lomond, the deepest sounding, 99 fathoms, being got near Inversnaid, in the latter lake. At Inversnaid from December till March the water was each month of uniform temperature from surface to bottom, the temperatures being—December 22, 1885, 42°·8; January 21, 1886, 41°·2; February 23, 1886, 40°·05; March 23, 1886, 39°·05. In the deepest sounding obtained on Loch Katrine, 79 fathoms, a similar distribution was met with up till February, the readings being—December 23, 1885, 42°·3; January 22, 1886, 40°·4; February 24, 1886, 39°·0. And, though the maximum density point was thus attained in February, uniformity still prevailed in March down to a depth of 70 fathoms, the readings on March 24 being—surface 38°·1, 70 fathoms 38°·1, 79 fathoms 38°·7. In April the temperature distribution usually found in spring had set in in both lakes, the surface being warmest, the bottom coldest, and the temperature falling more and more slowly with increase of depth. The circumstance of most interest, however, was that the warmth of the bottom layer increased monthly over the deepest parts of both lakes, as follows :—Loch Lomond (99 fathoms), March 39°·05, April 39°·4, May 40°·3, June 40°·6; Loch Katrine (79 fathoms), March 38°·7, April 39°·1, May 40°·1, June 40°·65. This rise was evidently due not to the conduction of heat nor to the penetration of solar radiation, but to some drainage or oozing causing mixture. This supposition seems necessary also to explain the behaviour of Loch Katrine in March. Drainage *en masse* appeared

to occur chiefly in winter and spring, not in summer when the river water and the lake surface water were much warmer than the deep water of the lake. The mean temperature of Loch Katrine probably had a greater range than that of Loch Lomond. The shallower parts of the lakes resembled the deep parts as to uniformity of temperature up till March, but their yearly range was greater. In both lakes the mean temperature became uniform along the whole length about April 4.

ON THE DISTRIBUTION OF TEMPERATURE IN THE FIRTH OF CLYDE IN APRIL AND JUNE, 1886.

By J. T. MORRISON, M.A.

Serial temperature soundings were made by Dr. Mill, Mr. John Murray, and the author throughout the Clyde district during the latter parts of April and June last. It was found that in matter of temperature the waters of the district were divisible into four groups : I. North Channel and the plateau south of Arran ; II. the Arran and Dunoon open basins ; III. the deep sea lochs ; IV. the shallow-sea lochs. The average temperature in each group at every depth was calculated for April and June. In April in all groups there was a deep layer of uniform temperature overlaid by a layer of temperature rising steadily to the surface. In groups II., III., and IV. the uniform deep temperatures are almost the same, about $41^{\circ}4$; in group I. it is $41^{\circ}8$. In June the superficial layer of varying temperature had thickened to about 20 fathoms. The deep temperatures in the groups were now very different :— Deep temperature in April, $41^{\circ}8$, $41^{\circ}3$, $41^{\circ}5$, $41^{\circ}5$; deep temperature in June, $46^{\circ}7$, $43^{\circ}9$, $43^{\circ}8$, $45^{\circ}3$; rise of temperature, $4^{\circ}9$, $2^{\circ}6$, $2^{\circ}3$, $3^{\circ}8$. To groups III. and IV. analogues were found in a deep and a shallow basin of Loch Lomond, in both of which the bottom temperature rose between April and June. From this it was inferred that land influences, especially drainage *en masse*, produced most of the effect noticed in III. and IV. The great rise in the North Channel and southern plateau was evidently due to a warm oceanic current. The rise in temperature in group II. was due to the incoming of warm water from without. As the water between 30 and 75 fathoms in this group was very uniform in temperature, and as the south plateau was 25 fathoms below the surface, it was supposed that the dense plateau water was carried into the open basins (group II.), and through convection mixed thoroughly the water below 30 fathoms there. Loch Goil was specially remarkable for its isolation and the small rise of bottom temperature— $0^{\circ}6$ in two months. In Upper Loch Fyne a lenticular mass of water below $43^{\circ}0$ was found in June to float between two warmer layers. Its greatest thickness, 30 fathoms, was opposite Inverary. The bottom layer of $44^{\circ}0$ was not found to be in connection with any equally warm layer either inside or outside of the loch.

(To be continued.)

THUNDERSTORMS AND HEAVY RAINS OF SEPTEMBER 3RD TO 5TH.

From Falmouth on the south to Glasgow on the north, and from Deal on the east to Swansea on the west, reports have reached us from all parts of the country relating to the series of severe storms which took place on the night of Friday, September the 3rd, throughout the whole of the day and night of Saturday the 4th, and on into the morning of Sunday the 5th.

In all quarters the downpour seems to have been great, and the darkness phenomenal, while the thunder and lightning were exceptionally severe.

Of the very heavy rainfall experienced at Falmouth, details are given by our correspondent, Mr. Fox, on another page. At Portsmouth, from half-past eleven on Saturday night (4th) to two a.m. on Sunday morning (5th), a similar downpour was experienced, thoroughfares being rendered impassable and basements flooded. At the Park Hotel, casks of wine, spirits and beer were floated about. At Deal extraordinary effects, it is said, were witnessed; and of the alarming nature of the catastrophe at Swansea we were able to give an idea last month.

In some cases much mischief was done by the lightning, as, for instance, at Wood Lee, near Egham, where a large hay rick was struck, and damage estimated at £300 was done; at Lavender Hill, near Tunbridge, where a house was struck and greatly damaged, a chimney shaft and an oak tree being also struck; and at Moor Park, near Rickmansworth, the seat of Lord Ebury, where a tree was struck, the bark being completely ripped off, and two heifers which were sheltering beneath it were killed.

At Glasgow streams ran down the steep streets bordering George Street, and dwellings in the eastern districts were flooded to a depth of three feet, torrents of rain falling for fully an hour and a half.

But the full force of the storm, or, indeed, of the whole series of storms seems to have been concentrated over a limited area, chiefly in the West Midland Counties of England and in South Wales. Reports from this district, for which we are indebted to the *Hereford Times*, the *Birmingham Daily Post*, and other local newspapers, as well as to the observers who report to us in regular course, are given below, arranged in the order usually adopted, that of the tables in *British Rainfall*. Where possible we have distinguished between the several storms, and we have merely selected the most noteworthy details from a considerable number of stations at which the storms were, perhaps, equally severe, especially as regards the rainfall and its effects.

HEREFORD.

HEREFORD.—One of the elms in the Cathedral Close was damaged, a portion of the bark being ripped off. A fisherman, named

Richard Wigley, was walking up Victoria Street during the full fury of the storm when, immediately after a very vivid flash, he felt a shock in his hand and then in the upper part of his body. He fell to the ground, and was taken into a neighbouring house, but sustained no serious injury. At Messrs. W. Pulling & Co.'s distillery in East Street, at about a quarter to six o'clock (4th), a clerk named Hedger approached the telephone for the purpose of communicating with the offices in Broad Street. He received a violent electric shock, and was hurled from the instrument. He was stunned for the space of two or three minutes, and one side of his face was slightly scorched. *A working man was struck and rendered unconscious in one of the principal streets.

SHROPSHIRE.

LUDLOW.—A severe thunderstorm raged over this district on Saturday evening (4th) and Sunday morning (5th). On a farm at Tagford four beasts were struck, and on another at Snitton seven animals were killed.

CHURCH STRETTON.—A thunderstorm of almost unprecedented severity raged at intervals from noon until late at night (4th). Several trees in the neighbourhood were struck and shivered.

SHREWSBURY.—About seven p.m. (4th) a storm of appalling violence occurred, lasting about an hour and a half. The streets were covered from kerbing to kerbing by the rain, which fell in torrents, and cellars were flooded. Eight sheep, belonging to Mr. Corns, of Lyth Wood, were killed by the lightning, and crops were much damaged.

WHITCHURCH.—A thunderstorm of exceptional severity (4th), lasting an hour and a half, causing floods, and much damage to crops.

STAFFORD.

WEST SMETHWICK.—The most severe storm experienced for many years (4th). David Cox, an engine fitter in the employ of the Birmingham and Midland Steam Tramway Company, was struck whilst engaged in a shed at the terminus, Oldbury Road. It appears that he was using a spanner, when the electric fluid struck the tool, and passing through his arms and legs paralysed him.

ALBION.—The railway station was damaged.

SEDGLEY.—Three sheep belonging to Mr. Whitehouse, of Sedgley, were killed by lightning in a field at Trysull.

WEST BROMWICH.—A pig was killed by the lightning in Lodge Road, and a man residing in Trinity Street was struck, but not seriously injured.

BRADLEY.—A Mrs. Till was struck and injured.

BILSTON.—The lightning passed down a chimney in a house in

* Possibly another account of the accident in Victoria Street.

Oxford Street, occupied by Mrs. Brazier, and set fire to some clothing in an oak chest.

WALSALL.—The tall spire of the Bath Street Board School was struck, and stripped of the greater part of the covering of slates, the roof of the school itself being much damaged. Two men who were sheltering in the doorway immediately under the turret escaped unhurt.

WOLVERHAMPTON.—A terrific thunderstorm occurred on Saturday evening (4th) and was renewed on Sunday morning (5th). On each occasion the rain came down in torrents, flooding the streets and roads.

BARLASTON.—The Rev. Richard Lockyer, vicar of Barlaston, was walking out with some relatives when a brilliant flash of lightning caused him to recoil and fall senseless to the ground. He never recovered consciousness. Death was attributed to heart disease.

FENTON.—Two boys named Harrison, residing at Fenton, were struck and rendered senseless, the elder being so injured that doubts were entertained as to his recovery.

HANLEY.—The embankment of the Trent and Mersey canal gave way, the water carrying with it to the Trent immense stones and trees.

WORCESTER.

BERROW.—About 5 p.m. (4th) the beautiful tower of the church, which dates from the 14th century, was struck, the upper courses of the stone being rendered loose and unsafe, and cracks and holes being caused in the lower part of the masonry. A cottage some five or six hundred yards from the church was burnt to the ground.

WORCESTER.—Two cows belonging to Mr. H. Thrupp, of Bredicott Farm, were killed.

WARWICK.

BIRMINGHAM.—*Shireland Hall, an unoccupied mansion, was com-

*G. J. Symons, Esq.

SIR,—Two hours after receipt of your enquiry I took steam tram and went to Shireland Hall. It is situated near the main road to Dudley, three miles from Birmingham, and stands in a very isolated position, Shireland Hall Farm being the nearest inhabited building to it. Eleven years ago it was a school conducted by the Rev.—Munns, a celebrated Nonconformist minister; since then it has been empty. It is a square brick building, quite 80ft. square, three storey, and at some time had sleeping apartments added in the rear. These extra rooms were supported by two iron columns, and it was these being stolen on the night of September 3rd caused the back to entirely fall out (about 4.30 p.m.) on Saturday, September 4th. Building materials have been purloined from there for years, the present owner not being known in the neighbourhood. *It was not injured by lightning or rain.* These particulars are given me by an eye witness of the collapse, who added that the newspaper account caused a great many people to visit the place on Sunday, September 5th.

Yours faithfully, JOHN J. GILBERT.

Birmingham, October 8th, 1886.

pletely demolished, though the walls were of immense thickness, the greater portion of one side of the house being razed to the ground. The lower district of Birmingham was flooded. On Sunday morning (4th) a third thunderstorm occurred, in which one flash of lightning killed four out of a group of five cows sheltering under trees in a field near the residence of Mr. Chamberlain at Highbury.

MONMOUTH.

MONMOUTH.—In the first storm on Saturday morning (4th) drains and gutters overflowed, and roads were flooded, growing and cut corn was much damaged, and a large oak was shattered at the Buckholt. In the second storm, which occurred at about half-past four on Saturday afternoon (4th), “after one dreadful crash, a ball of concentrated electricity approached the town from the west, struck a hole in the roof of a house in Chippenham Gate Street, traversed the iron shooting of two or three houses, descended the down-pipe (which did not reach the ground by about two-and-a-half feet), from which it glanced on to the pavement, breaking a stone two and a half inches thick to atoms. A young man named Edward Jones, son of Mr. Edward Jones, coal merchant, was walking in the direction of the pipe at the time, and was but about a yard or so off the electric fluid when it struck the stone. He nearly fell from the shock, and must have had a very narrow escape of his life. The street was filled with a phosphorescent smell for some time afterwards.”

LLANGROVE.—The turret of the parish church was struck by lightning, and very seriously damaged, the larger portion of one side being hurled to the ground, the roof and floor of the belfry were pierced, and the bell was broken into a shapeless mass. After striking the turret, the lightning seems to have crossed the roof of the church, in which a large hole was made by a falling block of stone from the turret, to one of the stove chimney pipes. Its path was marked on the outside by the scattering and breaking up of several hundreds of tiles, and on the inside by the curious splintering of rafters and destruction of plastered roof. On reaching the ground, the electric fluid burst up several paving tiles. It is estimated that damage was done to the extent of some £50.

BLAENAVON.—Several houses in Broad Street and in High Street were flooded to a depth of from six to twelve inches by the rain which fell on Saturday afternoon, and part of the Cwmavon new road near Cold Farm, and the wall supporting it, were displaced by the rush of water from the adjoining heights. A tree in St. Peter's Churchyard was struck by lightning.

GLAMORGAN.

CARDIFF.—The new arcade in the High Street was flooded to a depth of several inches, and much damage was done to some of the shops,

BRIDGEND.—A valuable young mare, the property of Mr. Morgan John, of Old Castle-upon-Alum Farm, near St. Bride's Major, was killed, as was also a cow belonging to Mr. Evan Jenkins of Park Street, in his field at Newcastle. It was reported that a horse was killed at Pencoed. Two ricks, the one belonging to Mr. Jenkin Rees, of Ogmore Farm, and the other to Mr. Morris, Danygraig, Newton Nottage, were destroyed.

CAERPHILLY.—A lad named Hughes was playing with some companions in a bakehouse adjoining the Wernddu cottages, when a flash of lightning passing down the chimney severely injured him.

MERTHYR.—Six sheep, which were huddled together in a hollow on the mountain between Merthyr and Cwmpennar, were killed by lightning.

In the RHYMNEY and MERTHYR VALLEY large tracts of pasture land and crops were inundated and dwelling houses were swamped.

BRECKNOCK.

BRECON.—Part of the Watton was flooded, and many cellars were filled with water.

RADNOR.

LLANDRINDOD WELLS.—About 10.30 a.m. on the 4th, one of the chimneys of the Temperance Hotel was struck, and the electric current passing down into a sitting room, struck Mrs. Davies of Llanbister, on the arm, causing a severe burn.

WHIRLWIND AND WATERSPOUT IN SOUTH WALES.

To the Editor of the Meteorological Magazine.

SIR,—In your issue for September is quoted the following from the *Western Mail* :—"During the progress of the storm of September 4th, a waterspout was observed to travel from the bay in the direction of Kilvey Hill. It burst, and immediately ensued a scene the like of which has probably never been seen in England," &c.

I cannot agree with this explanation, viz., that a waterspout existed and burst on Kilvey Hill.

The Swansea valley is similar to those usually found in Wales, and runs N. and S. ; Kilvey Hill being on the S.E. extremity. Morriston is located three miles from Swansea on a slope of hill on the western side.

Now you will notice that the rainfall is given at the Swansea Dock, which is within one mile from Kilvey, as 1.13 in. only ; at Penllergare, which is about three miles from here in a W. direction, 1.73 in. ; while at Morriston I registered the largest fall, viz., 1.93 in. I gather from Mr. R. Capper (Swansea), that the wind on that day was due E., with a force of 0.5 lbs. per sq. foot, velocity 10 miles per hour ; hence I am inclined to think we had quite as much, if not more, fall on this western side than on the eastern side.

It would appear to me that within a comparatively small radius,

say of three miles from Swansea, we had on that afternoon, between three and five o'clock, a very heavy rainfall, and that Kilvey Hill suffered more than other places from the peculiar physical character of the ground, as explained by the writer in the *Western Mail*.

Yours faithfully,

E. RICE MORGAN, F.R.Met.Soc.

Morrison, September 30th, 1886.

To the Editor of the Meteorological Magazine.

SIR,—It may be interesting to your readers to know that a few hours after the above occurred, viz., during the early morning of Sunday, the 5th inst., Falmouth was visited with such a downpour of rain that in all probability it fell from a waterspout. There was, however, no whirlwind, as the wind, which had been South, gradually backed to the S.E. by E., and blew with a velocity of only 12 miles per hour, veering subsequently to the S.

The rainfall was wholly unprecedented and partial, as it extended almost exclusively over the town and a portion of the harbour, whilst the surrounding country escaped without any unusual rain. The Beckley gauge at the Observatory registered one inch in 20 minutes, viz., from 1.40 to 2 a.m. So far as I can judge, it was not in the centre of the fall, and has therefore only given approximately the rain which fell. The only sudden fall of rain approaching the above, since the Beckley gauge was fixed at Falmouth, took place on the 4th of October, 1880, when an inch of water fell between 8.30 and 9.30 p.m. There is proof that in one place the rain fell in sheets of water, as the gravel path had patches of the underlying stones laid bare; the surface gravel and the hard sandy earth beneath it being entirely removed. The effect produced was as though several large buckets of water had been suddenly spilt on the different spots. I refer especially to a garden path at Lamorna, in Woodlane, where there were three of these patches of bare stones about 12 to 15 inches apart, which I measured on the next day, in inches, as follows:—8" by 11", 6" by 8", and 10" by 26".

As may be supposed, the gulleys, conduits, and drains became choked with debris or proved wholly inadequate to carry off the water, and hence it overflowed over the roads, washing them bare, and cutting them up as though large mountain torrents had been let loose. The overflow quickly found its way into cellars, and in many cases into the halls, passages and rooms of houses, causing considerable damage. One end of the Moor, it is said, was submerged for a time, and presented the appearance of a lake. Enormous quantities of stones, gravel and sand were washed down into the lower parts of the town, and a channel was cut near the Custom House Quay, where the water must have run fully two feet deep.—Yours truly,

W. L. FOX, F.R.Met.Soc.

Falmouth, 23rd Sept., 1886.

LAND AND SEA BREEZES.

To the Editor of the Meteorological Magazine.

SIR,—The variations in the direction of the wind, due to the diurnal heating and nocturnal cooling of the land, as compared with the more equable temperature of the sea, are frequently to be observed here, although of course very liable to be masked by the more powerful influences usually in operation. Naturally it is in calm, clear and settled weather that the effect is most distinctly seen, and in such conditions it may sometimes admit of numerical demonstration. A good example occurred in June, 1865, a month which was without rain except for a few days at the beginning and end. In that month observations were taken at 8 a.m. and 6 p.m., and the winds (for this purpose) were classed in two groups, easterly and westerly. An analysis of the 60 observations gave the following result:—

	Morning.	Evening.
Easterly winds	18	9
Westerly winds	12	21

A similar analysis of the observations at 8 a.m. and 6 p.m. in September, 1865, which was an almost rainless month, gave a similar, though less striking result. Thus:—

	Morning.	Evening.
Easterly winds	16½	13½
Westerly winds	13½	16½

The tendency of the wind even in settled weather to veer rather than to back, seems to me scarcely to demand the special explanation which Mr. Backhouse suggests. We know that in these latitudes cyclonic disturbances usually produce this effect, and in the finest weather the influence of a centre of barometric depression passing in the far north may be sufficient to give a bias to the wind, determining the route by which it shall change from an easterly to a westerly point.

GEORGE F. BURDER.

Clifton, Oct. 1st, 1886.

ANOTHER SEVERE STORM.

A severe storm broke over the central part of the Isle of Wight last evening. The lightning was very vivid, and rain fell in torrents.—A terrific thunderstorm burst over Portsmouth last night, and in less than half an hour the sewers were overcharged and the streets so flooded as to be impassable. In nearly every part of the town the water covered the pavement and poured into the shops, while cellars were quickly filled. In some of the hotels the fires in the underground kitchens were extinguished, and considerable damage was done to the contents of the cellars. The lightning was very vivid. The storm broke over Aldershot between 7 and 8. The thunder was very loud, and the heavens were lit up by sheet and forked lightning. The storm continued for nearly an hour.—*Daily News*, Oct. 3, 1886.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, MARCH, 1886.

STATIONS. (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain.		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
	°		°		°	°	°	0-100	°	°	inches		0-10
England, London	62·2	24	22·1	7	46·8	34·1	35·7	86	103·3	17·3	1·38	14	6·8
Malta.....	66·2	15	40·2	12	61·1	49·0	47·5	79	128·9	35·5	·83	6	5·0
Cape of Good Hope ...	97·7	7	48·8	30	79·9	57·4	57·5	80	...	...	3·33	5	3·5
Mauritius.....	88·0	13	70·0	4	84·6	74·1	70·0	76	140·4	61·3	3·81	16	5·5
Calcutta.....	96·3	23	60·1	14	89·4	69·0	67·4	72	153·5	48·7	2·35	8	2·8
Bombay.....	95·7	14	68·7	10	86·4	73·5	69·0	70	149·4	57·9	·00	0	1·0
Ceylon, Colombo	94·8	14	72·8	22	90·7	75·3	72·1	70	149·2	60·0	3·88	8	2·6
Melbourne.....	98·1	4	43·3	1	70·5	51·8	50·0	68	147·9	33·9	1·72	11	6·2
Adelaide	99·3	2	48·0	11	80·9	56·7	46·7	46	152·7	39·4	*·01	5	3·1
Wellington	77·0	21	44·0	2	68·5	54·7	52·9	73	150·0	40·0	1·37	10	3·6
Auckland	77·0	5	53·0	2, 3	72·0	58·6	54·1	68	144·0	41·0	1·15	11	6·5
Jamaica, Kingston.....	88·9	27	66·6	25	86·2	70·3	68·9	75	...	...	·31	...	2·1
Barbados	82·0	19	66·0	31	80·0	71·0	71·5	80	145·0	...	2·01	9	6·0
Toronto	53·9	31	— 7·3	1	35·7	24·1	25·0	80	...	— 9·0	3·07	14	7·2
New Brunswick, Fredericton	48·8	26	—19·0	10	34·0	14·4	20·4	77	...	...		16	6·3
Manitoba, Winnipeg ...	41·3	23	—15·1	9	27·1	2·4	13·7	83	...	...		6	4·5
British Columbia, Victoria	60·0	29	26·0	1, 3	50·6	34·9	...	...	...	...	2·94	12	...

* [We think this entry must be erroneous.—ED. *Met. Mag.*]

REMARKS, MARCH, 1886.

MALTA.—Mean temp 54°·2; mean hourly velocity of wind 10·3 miles; velocity averaged 33 miles per hour from 8 a.m. to noon on 7th. The sea temp. was unusually low at the close, with pressure very high. Vegetation suffered severely from cold parching wind on 7th and 8th. A waterspout was seen on 21st; halos and parhelia on 27th. J. SCOLES.

Mauritius.—Rainfall 3·05 in. below, and mean temp. 0°·9 above the average; mean hourly velocity of wind 9·4 miles; extremes 23·9 miles on 15th, and 1·9 mile on 26th; prevailing direction S.E. by E. to E. T and L on four days, L on five, T on one. C. MELDRUM, F.R.S.

COLOMBO.—TSS occurred on five days, and L was seen on three other days. F. H. CLARKE, LT.-COL. R.A.

Melbourne.—Mean temp. of air 2°·5, of dew point 2°·2, and rainfall ·45 in. below their respective averages; mean amount of cloud 0·6, and mean pressure ·055 in. above their averages; mean humidity the same as the average. Prevailing wind S. strong on 6 days, max. hourly velocity 24 miles from 3 to 4 p.m. on 6th. T and L on 6th; dense fog on 16th; heavy dew on four days. R. L. J. ELLERY, F.R.S.

Wellington.—Fine almost throughout. Rainfall very small, 1·45 in. below the average. Prevailing wind N.W., moderate on the whole; Mean temp. 0·5, and pressure ·057 in. below their averages. R. B. GORE.

Auckland.—A warm, dry, month, with unusually small rainfall. T. F. CHEESEMAN.

JAMAICA.—Rainfall a little below the average. MAXWELL HALL.

BARBADOS.—Pressure steady and slightly below the average; mean temp. (74°·9) 1°·4 above the average; rainfall 6 per cent. above the average. Prevailing wind N.E., mean hourly velocity (11 miles) about the average; extremes 17 miles and 5·3 miles, L on two days. R. BOWIE WALCOTT.

SUPPLEMENTARY TABLE OF RAINFALL,
SEPTEMBER, 1886.

[For the Counties, Latitudes, and Longitudes of most of these Stations,
see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger	1·86	XI.	Castle Malgwyn	6·38
„	Margate, Birchington... 1·01	1·01	„	Rhayader, Nantgwillt.. 5·82	5·82
„	Littlehampton	1·66	„	Carno, Tybrith	4·70
„	Hailsham	1·87	„	Corwen, Rhug	3·05
„	I. of W., St. Lawrence. ...	...	„	Port Madoc	7·83
„	Alton, Ashdell..... 1·89	1·89	„	I. of Man, Douglas .....	...
III.	Winslow, Addington ... 1·57	1·57	XII.	Stoneykirk, Ardwell Ho. 3·10	3·10
„	Oxford, Magdalen Col... 2·27	2·27	„	Melrose, Abbey Gate ... 2·84	2·84
„	Northampton	1·29	XIII.	N. Esk Res. [Penicuik] 4·60	4·60
„	Cambridge, Beech Ho... 95	95	XIV.	Ballantrae, Glendrisaig 4·42	4·42
„	Wisbech, Bank House.. 97	97	„	Glasgow, Queen's Park. 4·45	4·45
IV.	Southend	1·15	XV.	Islay, Gruinart School.. 5·57	5·57
„	Harlow, Sheering ... 1·08	1·08	XVI.	St. Andrews, Pilmour Cot 2·43	2·43
„	Rendlesham Hall	1·02	„	Balquhider, Stronvar.. 10·59	10·59
„	Diss	1·28	„	Dunkeld, Inver Braan.. 4·09	4·09
„	Swaffham	1·57	„	Dalnaspidal H.R.S. ... 7·18	7·18
V.	Salisbury, Alderbury ... 2·17	2·17	XVII.	Keith H.R.S. 1·87	1·87
„	Warminster	2·29	„	Forres H.R.S. 2·29	2·29
„	Calne, Compton Bassett 2·66	2·66	XVIII.	Strome Ferry H.R.S.... 6·15	6·15
„	Ashburton, Holne Vic.. 3·17	3·17	„	Tain, Springfield..... 2·14	2·14
„	Holsworthy, Clawton... 2·89	2·89	„	Loch Shiel, Glenaladale 10·22	10·22
„	Hatherleigh, Winsford. 2·19	2·19	„	S. Uist, Ardkenneth ... 4·33	4·33
„	Lynmouth, Glenthorne. 3·58	3·58	„	Invergarry	7·18
„	Probus, Lamellyn	4·06	XIX.	Lairg H.R.S. ....	...
„	Wincanton, Stowell Rec. 3·00	3·00	„	Forsinard H.R.S. 1·71	1·71
„	Taunton, Lydeard Ho ... 2·84	2·84	„	Watten H.R.S. 1·47	1·47
„	Wells, Westbury..... 2·41	2·41	XX.	Dunmanway, Coolkelure 8·94	8·94
VI.	Bristol, Clifton	2·68	„	Fermoy, Gas Works ... 4·18	4·18
„	Ross	2·66	„	Tralee, Castlemorris ... 4·28	4·28
„	Wem, Sansaw Hall.....	...	„	Tipperary, Henry Street 3·74	3·74
„	Cheadle, The Heath Ho. 2·94	2·94	„	Newcastle West	2·71
„	Worcester, Diglis Lock 3·18	3·18	„	Miltown Malbay	4·77
„	Coventry, Coundon	1·85	XXI.	Gorey, Courtown House 3·97	3·97
VII.	Melton, Coston	1·54	„	Navan, Balrath	2·92
„	Ketton Hall [Stamford] 1·35	1·35	„	Mullingar, Belvedere ... 3·82	3·82
„	Horncastle, Bucknall ... 1·18	1·18	„	Athlone, Twyford	3·67
„	Mansfield, St. John's St. 1·30	1·30	XXII.	Galway, Queen's Coll... 3·88	3·88
VIII.	Macclesfield, The Park. 2·58	2·58	„	Clifden, Kylesmore ... 8·13	8·13
„	Walton-on-the-Hill..... 3·67	3·67	„	Crossmolina, Enniscoe.. 6·66	6·66
„	Lancaster, South Road. 7·54	7·54	„	Collooney, Markree Obs. 4·47	4·47
„	Broughton-in-Furness .. 7·74	7·74	„	Carrick-on-Shannon ...	...
IX.	Wakefield, Stanley Vic. 1·27	1·27	XXIII.	Rockcorry..... 4·22	4·22
„	Ripon, Mickley	1·55	„	Warrenpoint	2·72
„	Scarborough..... 1·26	1·26	„	Newtownards	1·70
„	East Layton [Darlington] 2·55	2·55	„	Belfast, New Barnsley.. 3·65	3·65
„	Middleton, Mickleton.. 2·70	2·70	„	Cushendun	2·27
X.	Haltwhistle, Unthank.. 4·57	4·57	„	Bushmills	3·16
„	Shap, Copy Hill	7·81	„	Stewartstown	3·19
XI.	Llanfrehfa Grange	3·00	„	Buncrana	3·94
„	Llandovery	6·42			

SEPTEMBER, 1886.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.						TEMPERATURE.				No. of Nights below 32°.
		Total Fall.	Difference from average 1870-9	Greatest Fall in 24 hours.		Days on which not or more fell.	Max.		Min.			
				Dpth	Date.		Deg	Date	D g	Date.		
I.	London (Camden Square)	inches 1.73	inches — .78	in. .42	10	11	84.2	1	42.2	17	0 0	
II.	Maidstone (Hunton Court)...	1.24	— 1.07	.59	21	7	...	...	...	...	...
III.	Strathfield Turgiss	1.76	— .54	.62	2	9	85.4	1	34.2	19	0 0	
IV.	Hitchin	1.25	— 1.23	.47	2	8	74.0	1	38.0	17	0 ...	
V.	Banbury	1.99	— .82	.49	2	12	75.0	1	38.0	11	0 ...	
VI.	Bury St. Edmunds (Culford)	1.15	— 1.63	.37	10	9	80.0	1	35.0	22	0 ...	
VII.	Norwich (Cossey)	1.25	— 1.83	.37	10	8	...	...	...	...	...
VIII.	Weymouth (Langton Herring)	1.98	...	.57	3	13	75.0	1	41.0	24	0 ...
IX.	Barnstaple	2.63	— 1.65	.60	30	10	77.0	1	48.0	18	0 ...	
X.	Bodmin	4.13	— 1.11	.82	30	15	73.0	14	45.0	23	0 0	
XI.	Stroud (Upfield)	2.89	— .36	.63	4	12	78.0	1	42.0	17	0 ...	
XII.	Church Stretton (Woolstaston)	2.79	— .68	1.05	9	14	68.5	1	38.0	23	0 3	
XIII.	Tenbury (Orleton)	2.88	— .47	1.01	4	13	72.6	14	36.2	16	0 0	
XIV.	Leicester	1.60	...	.41	1	14	78.8	4	41.0	16	0 11
XV.	Boston	1.04	— 1.57	.25	27	11	81.0	4	40.0	20a	0 0	
XVI.	Grimsby (Killingholme) .....	...	...	...	...	...	...	...	...	...	...
XVII.	Hesley Hall [Tickhill]	1.07	...	.38	9	15	74.0	4	38.0	16	0 0
XVIII.	Manchester (Ardwick)	3.58	— .19	1.10	10	13	70.0	4, 5	40.0	23	0 ...	
XIX.	Wetherby (Ribston Hall) ...	1.19	— 1.89	.37	10	10	...	...	...	...	...
XX.	Skipton (Arncliffe)	5.84	+ .26	.94	27	19	77.0	6	38.0	15	0 ...	
XXI.	North Shields	1.82	— .50	.61	9	16	75.0	14	42.8	23	0 0	
XXII.	Borrowdale (Seathwaite)	20.70	+ 7.48	3.04	29	16	76.2	5	34.5	16	0 ...	
XXIII.	Cardiff (Ely)	3.49	— 1.31	.59	25	13	...	...	...	...	...
XXIV.	Haverfordwest	5.83	+ .78	1.34	9	16	67.0	6	38.0	22	0 1	
XXV.	Plinlimmon (Cwmsymlog) ...	6.10	...	1.86	8	15	...	...	...	...	...
XXVI.	Llandudno	3.56	— .19	.95	9	14	68.3	9	43.0	16	0 ...	
XXVII.	Cargen [Dumfries]	5.65	+ 1.24	1.26	5	15	76.0	4	32.0	16	1 ...	
XXVIII.	Jedburgh (Sunnyside)	2.32	— .27	.34	9	18	69.0	4	30.0	16	2 ...	
XXIX.	Douglas Castle (Newmains) ...	...	...	...	...	...	...	...	...	...	...
XXX.	Lochgilphead (Kilmory)	6.76	+ 1.00	1.60	29	16	...	...	33.0	15b	0 ...
XXXI.	Oban (Craigvarren)	6.87	...	.95	29	18	72.2	4	40.3	16	0 ...
XXXII.	Mull (Quinish)	5.90	...	.97	7	17	...	...	...	...	...
XXXIII.	Loch Leven Sluices	4.30	+ 1.07	1.00	30	12	...	...	...	...	...
XXXIV.	Arbroath	2.24	— .83	.45	5	11	68.0	12	37.0	16c	0 ...	
XXXV.	Braemar	3.77	— .17	.91	13	18	71.0	4	27.7	17	2 10	
XXXVI.	Aberdeen	1.66	...	.61	13	13	70.0	1	33.0	16	0 ...
XXXVII.	Lochbroom	3.74	...	.63	27	19	...	...	...	...	...
XXXVIII.	Culloden	2.49	— .41	...	...	...	68.0	3, 4	35.0	16c	0 7
XXXIX.	Dunrobin	2.01	...	.66	13	10	68.0	3	37.0	17	0 ...
XL.	Kirkwall (Swanbister)	1.82	...	.29	27	19	61.1	1	39.8	17	0 ...
XLI.	Cork (Blackrock)	4.03	— .12	.94	9	18	68.0	1	44.0	9	0 ...	
XLII.	Dromore Castle	4.39	...	1.40	27	17	69.0	2	35.0	22	0 ...	
XLIII.	Waterford (Brook Lodge) ...	4.44	...	1.10	9	17	66.0	2	38.0	23	0 1	
XLIV.	Killaloe	3.39	...	.98	26	19	71.0	1	39.0	23	0 ...
XLV.	Carlow (Browne's Hill)	3.93	+ .67	.90	9	17	...	...	...	...	...
XLVI.	Dublin (Fitz William Square)	2.47	+ .06	.65	9	15	69.5	13	39.0	23	0 0	
XLVII.	Ballinasloe	3.34	— .62	1.07	26	18	64.0	4	33.0	23	0 0	
XLVIII.	Waringstown	3.26	— .09	.55	11	16	71.0	3	33.0	22	0 4	
XLIX.	Londonderry (Creggan Res.) ..	4.60	...	1.01	7	19	...	...	...	...	...
L.	Omagh (Edenfel)	3.76	— .28	1.06	13	16	67.0	4, 5d	36.0	22	0 ...	

a And 23, 24. b And 22. c And 17. d And 6.

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

METEOROLOGICAL NOTES ON SEPTEMBER, 1886.

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.

STRATHFIELD TURGISS.—The harvest was secured in brilliantly fine weather and housed in excellent order. The sun had great power in the middle of the day all through the month, but the nights were cold, though without any actual frost. The temperature was 20° colder at the end of the month than at the beginning.

HITCHIN.—Almost the hottest September in our record. The mean temp. of July, August, and September was over 60 degrees, and only five inches of R fell in the four months June to September.

CULFORD.—The continued drought has been severely felt here, and will undoubtedly affect the root crops and late vegetables. T and L on 4th; distant T on 7th.

LANGTON HERRING.—Very favourable weather for ingathering the harvest. Rainfall just one inch below the average; mean temp. slightly above the average. The mean min. temp. was more than a degree above the average, and the max. (75° on 1st) had only once been exceeded in 14 years, 76° having been registered on September 4th, 1880. The persistent N.E. wind from 14th to 24th was noticeable. A very violent TS occurred on the evening of the 3rd. Fog on 12th.

BODMIN.—A very fine month. Mean temp. 58°·8.

WOOLSTASTON.—A perfect harvest month. Mean temp. 54°·9. A terrific TS occurred on the 4th, commencing about 6·40 p.m. and lasting nearly two hours, during which time the L was almost absolutely continuous; comparatively little damage, however, was done.

ORLETON.—Cloudy, damp, and gloomy till the 4th, when great darkness occurred at 10.30 a.m. with R and distant T, followed by a severe TS from 6 p.m. to 7 p.m. with heavy R, passing from S. to N. Much R fell again in the night of the 9th, after which there was no measurable R till the 25th, and the weather was generally warm and pleasant, but without much sun, and the nights were frequently cold. Mean temp. 0°·6 above the average of 25 years; pressure generally high and steady. About the 20th the air was full of aphides, although there had been none on the hops all through the season.

LEICESTER.—A very fine, dry month, quite suitable for the harvest, which was nearly over at the close. No R fell between 12th and 25th.

MANCHESTER.—The first twelve days were unsettled and wet, then the weather cleared, and for the next twelve days it was fine, though rather cold; the concluding six days were again unsettled and wet.

SEATHWAITE.—Several severe storms occurred during the month, and in addition to the fall of 3·04 in. of R on the 29th 1·99 in. fell on the 6th and considerably more than two inches on each of four other days.

WALES.

HAVERFORDWEST.—The first twelve days were very wet and most unfavourable for the harvest which was unfortunately late this year, owing to the absence of high temperature and sunshine. 28 in. of R fell in 4 min. at 2.40 p.m. on the 8th. From 13th to 24th cold, fine, and often bright weather prevailed, with fresh easterly winds, which dried up everything in a remarkable manner. High night temperatures prevailed all through the month, except from 12th to 24th. The R with high mean temp. of the first twelve days, damaged a great deal of corn, and was more disastrous than the wet September of 1885.

LLANDUDNO.—The weather of the month was somewhat unsettled, and the usual and inevitable equinoctial gales were experienced; one from the S.W. occurred on the 9th and continued for 24 hours; another of like duration from the E. on the 21st. Nevertheless there were some very fine days, and particularly a spell of dry, bright weather occurred from the 13th to the 20th inclusive.

From the 13th to the 24th there was no R. The mean temp. was but slightly (0·7) below the average. The total range of temp. (25°·3) was 4° below the average, and the diurnal range (10°·6) was also below the average by 1°·9, showing a striking equality of temp. for this period of the year. Sunshine, however, was decidedly deficient, particularly during the last week. T on 4th.

SCOTLAND.

CARGEN.—The first twelve days and the last six were very stormy and wet. Mean temp. (53°·5) 1°·3 below the average. Sunshine 40 hours below the average. 1·10 in. of R fell in 20 minutes during a TS on 5th.

JEDBURGH.—The corn-cutting in the lower part of this district was completed and mostly housed in good condition before the close, but in the higher districts there was still much to cut. The crop was decidedly far above what was expected, and over the average. Root crops were good and potato disease was not mentioned. The plum crop was good, but apples and pears were very short. Foliage was changing colour rapidly, and the leaves were falling fast at the close. L on 28th.

OBAN.—After heavy R at the commencement of the month there was excellent harvest weather, but it came too late for the whole crop. Some, however, was well saved and of excellent quality. T on 26th, with heavy gales and R to the close, and high spring tides. Gales occurred also from 6th to 9th.

QUINISH.—Tremendous gales with much R prevailed from 5th to 13th. The rest of the month was fine, and harvest was mostly secured in good order by the close.

ABERDEEN.—The weather throughout the month was fine and dry. Rainfall greatly below the average. Faint aurora on 10th and 26th. Vivid L on 27th.

LOCHBROOM.—The month was a curious mixture of beautiful and of boisterous weather; first fine, then wild, then a period of most beautiful weather, succeeded by a very severe storm, intense cold, several H showers, and S covering the tops of the hills.

CULLODEN.—The month generally was fine; the periods from 8th to 13th and from 15th to 27th were very fine, warm, and sunny. Harvest good and well advanced. There was very heavy R for 12 hours on 14th.

SWANBISTER.—Moderate S.W. winds kept the weather mild during the first half of the month. N. winds set in on 19th, followed by heavier R and low temperature. Strong gales on 9th and 28th damaged the crops. Fog on 6th; L on 27th.

IRELAND.

BLACKROCK.—With the exception of a few bright days, the weather was dull and humid, with misty R. Mean temp. 56°·5.

WATERFORD.—The weather was very broken for harvest work. Rainfall ·72 in. above the average of 25 years. During a TS on 9th a tree near this station was split by L. S.W. gale on 27th.

KILLALOE.—Ten days of very fine weather, from 13th to 23rd, enabled farmers to save and gather much corn and hay, which, up to the 14th, was in peril of being seriously damaged. The month closed with high winds and much R.

DUBLIN.—Two distinct types of weather presented themselves during this month—cyclonic, rainy, and even stormy from the 4th to the 13th, and again after the 24th; but anti-cyclonic, quiet and dry, with easterly winds from the 14th to the 24th inclusive. Temperature ranged about the average. TS on 4th, and distant T on 5th. Lunar rainbow on 11th. L on 26th and 27th. Fog on 5 days. High winds on as many as 12 days. Mean humidity 84; amount of cloud 5·6; prevailing winds S.W., W.S.W., and N.E.

EDENFEL.—The wet, unsettled, equinoctial period, which commenced on the 4th, terminated on the 13th in the heaviest rainfall yet recorded this year (1·06 in.), during which pressure, which was already 29·90 in., continued to rise, whereupon there followed eleven days of fresh, dry, and clear weather, enabling the greater part of an abundant harvest to be not only cut, but carried without a shower, an experience unprecedented here in 25 years.