

SYMONS'S MONTHLY METEOROLOGICAL MAGAZINE.

CCCLIII.]

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THE GREAT SNOWSTORM OF MARCH, 1891.

THE snowstorm of January, 1881, had more than one beneficial effect. It showed us that the stories handed down from remote ages of roads blocked for weeks, of thousands of sheep buried in a single county, of coaches and carts with their horses and drivers perishing on the highways, were probably not exaggerated, and therefore our ancestors were more truthful than had been imagined. That 1881 storm should have had another good effect—to arouse rainfall observers to a sense of their duties in the matter of observing snow, and the very difficulties they then had to encounter should have made them more careful, and have improved the character of subsequent records.

It is as yet too early to determine how much better prepared our staff has been to grapple with the storm of 1891 than it was with that of 1881; that we shall find out later on. Meanwhile, we will endeavour to deal with the March, 1891, snowstorm in two respects.

INCONVENIENCE AND DAMAGE CAUSED BY THE STORM.

(Based chiefly on Newspaper Reports.)

The following details for one parish—Kensington—will give some idea as to the total cost of the removal of the snow in London:—Total loads removed, 10,689; cost thereof, £3,741. Salt used, 40 tons. Extra men employed, 6,963, at a cost of £1,044.

A man was found dead in the snow near Dorking.

Drift at Dulwich, 11 ft. deep.

A L.B. & S.C.R. train was blocked as near London as Beddington, and had to be left for the night.

Train in Saltwood Tunnel (Hythe) all night; tree with a trunk 3 ft. in diameter blown across the line in front, rear blocked by S.

Folkestone, 9th, 8 p.m., S = 6 in. deep.

Near Shepherdswell snowdrift on line, 14 ft. deep.

Dover, terrific gale and S at midnight 9th–10th.

Dover and Deal line blocked for some hours.

At one village near Dover a cottage surrounded by 12 ft. of snow.

Elham Valley line, Dover to Canterbury, closed all the 10th.

Last train into Faversham blocked 2 miles outside the town ; and passengers had to stop in it nearly all night.

At Oakleigh, near East Grinstead, a 3-year old garden wall, 270 ft. long and 15 ft. high, with a $2\frac{1}{2}$ ft. glass coping, was all blown down.

Both up and down Parcel Post road vans London-Brighton were blocked within half a mile one of the other, near Handcross.

Newhaven train buried from 11 p.m. till 5.30 a.m.

A Coastguard man buried in snowdrift near Beachy Head.

An Isle of Wight train ran into a drift at Merstone, between Sandown and Newport, and passengers had to stop in it all night.

Mail train London to Portsmouth, due at midnight, went off line in the S, and only got in about 4 hours late.

On Tuesday night G.W.R. train blocked between Newbury and Didcot.

Marlboro' and Andover line blocked.

G.W.R. blocked between Heytesbury and Westbury on Salisbury-Bristol line.

Amesbury, S drifts = 12 ft. deep.

Somerset and Dorset line blocked ; no traffic between Bournemouth and Bath.

At Plymouth great damage was done both by snow and wind. One woman was frozen to death in a public square. Much trouble also arose through the water supply from Dartmoor, which runs in an open channel, being impeded by ice and snow so that the supply was cut off. A batch of workmen was sent to clear it, but no food was sent with them, and after about 12 hours' exposure to cold and hunger most of them deserted. The next day (Thursday) 500 soldiers and navvies, with the Mayor, and ample provisions, were sent to the nearest point a train could reach, but they did not clear the channel until Friday night.

Six G.W.R. trains blocked between Exeter and Plymouth. S 26 ft. deep at Bittaford, between Ivybridge and Brent.

The G.W.R. "Zulu" leaving Paddington 3 p.m. Monday, 10th, for Plymouth was blocked at Brent until Friday, 13th, when it was released and reached Plymouth at 8.30 p.m.

Two engine drivers and a fireman were dug out of a drift near Hemerdon, nearly dead ; one delirious.

In the Hemerdon drift, at 10 p.m. on the 12th there were six engines and several snow ploughs buried.

The G.W.R. company are stated to have had 1200 men on the block near Hemerdon. No up mail passed by this line between the 9th and the night of the 13th.

At Torquay the fall in sheltered spots was 15 to 30 inches, and in drifts several feet.

At Dartmouth the drifts were from 10 to 12 ft. deep.

The various parks near Plymouth suffered severely ; in one alone

upwards of 1000 trees were uprooted ; in another an avenue of sixty limes was entirely swept away.

On the Dartmoor line a train was snowed up for three days ; there were only six passengers, four men and two women, and they had to pass two nights and one day in the train, with only one slice of bread and butter and one piece of cake each. There was a farm house within 200 yards, but the passengers could not get out, and the farmer did not know that the train was there.

Even on the 12th fresh blocks occurred in Devon. A full (L. & S.W.R.) train (with 50 women) left Devonport at 2.30 p.m. on 12th for Okehampton ; it took $3\frac{1}{2}$ hours to do 30 miles and then stuck, it and the passengers being buried for 20 hours.

Two up G.W.R. trains blocked between Exeter and Taunton.

Another train was blocked at South Molton.

The Hemyock branch of the G.W.R. was not open on 12th.

S began at Penzance 4 p.m. 10th, and by night, roads all blocked, S 8 ft. deep. The 11 a.m. G.W.R. express, which got through Ivy-bridge 4 hours before the "Zulu," was blocked at Camborne, and several other trains were blocked in that neighbourhood.

Near St. Columb Minor one man was frozen to death.

Near Hayle a train was deserted and left in a drift ; the gang of men sent to dig it out could not find it, and gave up the search.

Near Bude, on the night of 12th, nearly all the roads were still blocked with drifts 10 ft. to 15 ft. deep.

Shepton Mallet, drifts so deep that no train was expected for three days ; several drifts were more than 20 ft. deep.

Somerset and Dorset line was blocked between Bristol and Wimborne.

On the West Somerset one train was blocked at Dunster and another at Watchet.

Near Bristol, in one cutting a mile long, the average depth was 12 ft.

Bristol, S storm for 20 hours ; street traffic stopped.

DETAILS OF THE STORM.

(Notes from our own Correspondents.)

CAMDEN SQUARE, LONDON.—Average depth of snow 5 inches, yield .55 in., giving 1 inch of R for each 9 inches.—*G. J. Symons.*

ELLERAY, ETCHINGHAM PARK, FINCHLEY.—S on 9th and 10th, estimated depth, 6 in., but much drifted. S remained in the railway cutting between East Finchley and Finchley Station till the afternoon of the 24th.—*J. W. Scott.*

LEATHERHEAD.—Depth of S here, 7 in.—*A. T. Miller.*

PRESTONVILLE ROAD, BRIGHTON.—A great S storm and gale on the 9th. S on 10th 4 in. deep.—*H. Phillips.*

CROWBOROUGH OBSERVATORY.—Great S storm; roads blocked; average depth on morning of 10th, 6 inches. The snow was very dense, a 6-inch cylinder, when melted, yielding 1·30 in., or one inch of water for 4·6 inches of snow.—*C. L. Prince.*

REDLANDS, EMSWORTH.—S storm of the 9th and 10th caused drifts 4 to 5 ft. deep, and on 31st some of the S drifts remain unmelted.—*F. Jacomb Hood.*

ASHDELL, ALTON.—14 in. of S fell 9th and 10th.—*F. Crowley.*

ST. GILES'S, OXFORD.—9th and 10th, the blizzard was not so fierce as that in 1881, and there was not nearly so much snow.—*A. R. Tawney.*

BLOXHAM GROVE, BANBURY.—Gale on 9th from N.E., and on morning of 10th it blew hard, with driving S, and there were in places drifts from 2 to 3 ft. deep.—*G. Warriner.*

ALDERBURY, SALISBURY.—9th, storm and fall of S, and on 10th heavy storm and fall of S; roads blocked with drifts.—*R. S. Hutchings.*

BISHOPS CANNINGS, DEVIZES.—9th and 10th, S about 4 in. deep.—*C. W. Hony.*

BLOXWORTH HOUSE, WAREHAM.—Great S storm; average depth 12 in.—*J. P. Cambridge.*

HAZELBURY BRYAN, DORSET.—Heavy S began to fall on 9th, roads blocked on 10th, and all communication with the outside world suspended.—*R. F. Wheeler.*

IVYBRIDGE.—My calculations for this month are much thrown out by the great storm of the 9th and 10th inst. The rain gauge stood in a very few inches of snow; N.E. of it, about 30 yards off, was a drift 20 ft. deep; W. of it, the snow increased in depth up to and above the entrance gate, about 8 or 9 ft. A train was snowed up in a drift 15 ft. deep, and at least 100 yards long, about 200 yards from the house. The storm lasted here just 36 hours—from noon on Monday, 9th, to midnight of Tuesday. An old man, near by, tells me that he remembers as much snow in the lanes *once* in his life; when he was about 10 years old, and that was about 54 years ago; it was in *April*. Is this a storm which you can identify? I hear another old man in Ivybridge thinks that there was a great storm of snow in 1839 or 1840.—*M. A. Glanville.*

TORQUAY.—Slight snow fell from 0.35 to 0.45 p.m. on the 8th, snow and rain showers from 11.35 a.m. to 0.23 p.m. on the 9th, and snow from 0.26 p.m., 9th, to 10 p.m., 10th, and was very heavy at times from 3 p.m., 9th, to 4.40 p.m., 10th; soft hail fell from 10.55 to 11.30 a.m. on the 10th. The snow began to cover the ground at 5.30 p.m. on the 9th, and attained a depth (on the level) of 6 in. at 9 a.m., and 1 ft. at 9 p.m. on the 10th, which was by far the greatest

depth observed here since the observations were begun in August, 1876. A terrific E.N.E. gale, which accompanied this unprecedented snowstorm, caused immense snow-drifts, which attained a depth of 8 ft. on the Warberry Hill, completely blocking the lanes and roads. Fog prevailed from 5.30 to 6.5 p.m., 9th, and 1.25 to 1.45, and 2.45 to 4.30 p.m. on the 10th. The weight of the snow, and the tremendous gale on the 9th and 10th, threw down or broke great numbers of trees and shrubs; and the sea was very rough and tides high carrying away large quantities of the Babbacombe beach.—*E.E.Glyde*,

HOLNE VICARAGE, ASHBURTON.—9th and 10th, rain gauge, 18 in. high, completely embedded in the S.—*J. Gill*.

DRUID, ASHBURTON.—The quantity of S on 9th, 10th, and 12th could not be measured, owing to the great drifts; the depth on 10th estimated at average 2 ft. 6 in., and on 12th 6 in.; many roads remained blocked to the end of the month.—*F. Amery*.

TREWIRGIE, REDRUTH.—The storm commenced on Monday, March 9th, about 11 a.m., and soon became a regular blizzard, and by the evening the snow, which was exceedingly fine, had accumulated in enormous drifts, so much so that in this short space of time the G.W.R. main line was completely blocked on both sides of Redruth Station, and vehicles in the streets and roads were so completely snowed up that they had to be left there, and were not dug out until the following Friday. Out of five consecutive days in this week snow fell heavily for the greater part of four. The damage on land and sea was unprecedented, and the woods and shrubberies in the neighbourhood are completely wrecked, the damage being enormous. The following are the measurements of the gauge:—

			Snow.
Monday	1.28	=	15.36
Tuesday	.20	=	2.40
Wednesday	.00	=	.00
Thursday	.66	=	7.92
Friday	.11	=	1.32
	<hr/> 2.25		<hr/> 27.00

My gauge is placed so as to be free from drift, and the gauge was frequently verified by actual measurements of the snow on the ground. On the 17th, 18th, and 19th January, 1881, 1.31 in. of melted snow was registered, and this would make 15.72 in. of snow, so that the present storm fairly surpassed the memorable storm of 1881 in every particular. The drifts ranged in depth from 3 to 15 ft. in most districts. For a fortnight or more after the 9th the roads were in many places impassable, and even now (March 25th) in many places the drifts are very large. Indeed, probably no such storm, combining a very heavy snowfall with such a gale, has occurred in the West of England in the memory of the oldest inhabitant.—*Alfred H. Jenkin*.

[Mr. Jenkin seems to have assumed throughout that both in 1881 and on all the days in 1891 the density of the snow was such that

12 inches of snow equalled one inch of water. That is the average, but individual falls differ enormously, and we shall be glad if he will favour us with the details of the verifications he refers to, as they are most important, and at present we have only two observations of that character.—ED.]

STOWELL RECTORY, TEMPLECOMBE.—Gale and S storm on 9th and 10th; the S drifts were in places 8 or 10 ft. deep.—*H. J. Poole.*

HALSE HOUSE, NEAR TAUNTON.—The storm began on Monday the 9th, about noon, and continued till midnight of Tuesday—36 hours, without intermission. The road through this village of Halse, seven miles west of Taunton, was blocked up for two days, so that there was no communication with our post office at Bishop's Lydeard till Wednesday evening. But to the east of that place, the Taunton side of it, the fall was much greater than here; so that for several days the road was impassable. Mr. Hancock, of this village, taking the average of several places on his premises, and reckoning an inch of water to a foot of snow, registered on Tuesday the 10th, '90, and on Wednesday the 11th, '40. A good many birds have been killed. The gardener has found them in cutting back ivy bushes, sitting two together. But the mortality has not been as great as in Hampshire, and in some other counties. A self-registering thermometer on the north-side of an alcove, indicates 12° as the lowest temperature since the beginning of December, and I believe that the birds have perished from hunger, more than from cold. We have many thick hedges of holly, and in these they are likely to have found shelter. The plants have scarcely suffered at all. Two myrtles on a south wall are nipt, but not killed, and other half-hardy shrubs, as sweetbay, laurestinus, and Japanese spindle, are untouched.—*R. C. A. Prior.*

WELLS, SOMERSET.—The S storm of the 9th and 10th caused nearly all the bye-roads to have drifts level with the top of the hedges. One on the Wookey Hole was reported as 20 ft. deep; at the same time, a field close by was bare.

CLIFTON, BRISTOL.—9th and 10th, average depth of S, 9 in. The fall continued with little intermission from 4.30 p.m. on the 9th till 7 p.m. on the 10th.—*G. F. Burder.*

FURTHER BARTON, CIRENCESTER.—The S storm of the 9th and 10th was not so severe as at some places, but many country roads were blocked with drifts for a day or two. S was still to be seen in ditches as late as the 25th.—*Miss Brown.*

THE GRAIG, ROSS.—The blizzard of the 9th—7.30 to 8.30 p.m.—will long be remembered for violence of wind and amount of drifted S; though not so bad as Jan. 18th, 1881, it was 9½ in. deep on both sides of the house, and in exposed places, nearly 11 in.—*H. Southall.*

KETTON HALL, STAMFORD.—S on night of the 9th, which at 9 a.m. on 10th was 4 in. deep, and lay in some places until 16th.—*F. Coventry.*

LLANFRECHFA GRANGE.—9th, S began about 7 p.m., lasted all night, and on the 10th was $8\frac{1}{2}$ in. deep; as the wind blew hard, it drifted greatly, and the roads were much blocked.—*F. J. Mitchell.*

THE HENDRE, MONMOUTH.—On the evening and night of the 9th, there was a severe S storm, accompanied by a gale. Depth of S, where undrifted, slightly over 1 ft.—*J. M. Rolls.*

LLANVIHANGEL COURT, ABERGAVENNY.—N. to E. gales on nights of 9th and 10th. The S on 9th appeared to be a heavier fall than on the 8th of Jan., when the gauge registered more; this was due, I think, to the high wind. Inverting gauge gave .57 in.; measurement 10 in. gave .83 in.—*Col. Sturt.*

CLEGHORN HOUSE, HAVERFORDWEST.—I timed my return journey home from London, unfortunately, just to get into the terrific snow-storm of Tuesday. I left London on Monday afternoon, and stayed at Gloucester the night. Snow began falling there 8.15 p.m., accompanied by a piercing gale from the E., and by 8 a.m. Tuesday the snow on the level was about 9 in. in depth. I left Gloucester at 1 p.m., and fortunately got home safely without detention or casualty. The earlier trains had been detained up from S. Wales, between Neath and Newport (Mon.), but energetic measures had been taken to clear one line of rails. Before I reached Pembrokeshire the snow had ceased falling, although I could see enormous drifts and roads filled up as I came along.—*E. P. Phillips.*

GENERAL CONCLUSIONS.

Besides the information given in the previous sections, there is that given in the "Notes on the Month" by our regular correspondents.

We have considered the data already received, and proceed to state the conclusions to which we have been led; but obviously these may have to be modified when, instead of the reports from perhaps 50 observers, we have them from the whole of those (about 900) in the area over which the storm swept.

The area visited seems to have been a belt about 120 miles wide, extending from about Cheltenham on the N. to Jersey on the S., or say from Colchester on the N. to Dieppe on the S., and reaching from the South of Ireland eastwards to Holland.

We do not issue a map with this number, as we did with that referring to the storm of 1881, because we think it better to defer it until all the information has been received and tabulated for *British Rainfall*, 1891, and also because, as just stated, the area is apparently a very simple one, easily defined without a map.

The snow was much deeper in Cornwall and Devonshire than anywhere else. Although Mr. Glyde puts the Torquay fall at only 1 foot, we are inclined to think that the average for the whole country S.W. of the railway from Exeter to Barnstaple was nearly

or quite 2 ft. We think that there is no doubt that in Cornwall the storm of 1891 far surpassed that of 1881, and possibly in parts of Devonshire this was also the case. As regards wind force also, the storm was exceptionally bad in Cornwall, causing many wrecks. The stoppage of the Plymouth water supply occurred in both 1881 and 1891; in the former year it was stopped for 5 days, in 1891 for 4 days.

We are very sorry that up to the present time we have *only three* records of the density of the snow. Mr. Jenkin seems to have made some, but has not quoted them, and of the others Colonel Sturt's gives exactly the 1-12th, Mr. Prince's 1-5th, and Mr. Symons's 1-9th.

COLDEST MONTH.

To the Editor of the Meteorological Magazine.

SIR,—I take the liberty of sending you a statement of the mean temperatures of all Januaries and Decembers from 1872 to 1890 inclusive, in corroboration of my remarks as to which is the coldest month in the year.

	JANUARY. Mean of each Year.	JANUARY. *Average Mean.	DECEMBER. Mean of each Year.	DECEMBER. *Average Mean.	Average Mean of January as compared to that of December.
1872	38·2	38·20	38·0	38·00	+ ·20
3	37·9	38·05	40·4	39·20	— 1·15
4	39·2	38·43	28·1	35·50	+ 2·93
5	39·5	38·70	36·1	35·65	+ 3·05
6	35·8	38·12	38·9	36·30	+ 1·82
7	37·8	38·07	38·9	36·73	+ 1·34
8	37·5	37·99	27·6	35·43	+ 2·56
9	27·5	36·68	30·1	34·76	+ 1·92
1880	33·6	36·33	39·1	35·25	+ 1·08
1	26·8	35·38	36·3	35·35	+ ·03
2	40·4	35·84	36·1	35·42	+ ·42
3	40·0	36·18	39·2	35·73	+ ·45
4	42·3	36·66	36·5	35·79	+ ·87
5	35·4	36·56	37·1	35·88	+ ·68
6	34·3	36·41	33·7	35·74	+ ·67
7	35·0	36·32	35·8	35·74	+ ·58
8	36·9	36·36	39·5	35·96	+ ·40
9	38·1	36·46	36·7	36·00	+ ·46
1890	41·1	36·70	31·0	35·74	+ ·96

* The average means are those of all years up to date inclusive.

You will see that at no period since the end of 1873 has the average temperature of all previous Decembers equalled those of the Januaries during 19 years.—Yours truly,

SAMUEL KING.

Elswick Lodge, March 5th, 1891.

EXCEPTIONAL WEATHER RECORDS, 12 YEARS, 1879-91, AT OLD PARK, RUSPER, SUSSEX,
34 MILES SOUTH OF LONDON, 372 Ft. ABOVE SEA LEVEL (THERMOMETER FACING N.)

Date of occurrence.	Heavy Rains. inches.	Heavy Snowfall. Depth.	Great Gales, &c.	Great Drought and Heat. In Shade.	No. of Frosts in Month, &c.
1879 May 28	1.50 12 hrs.				
1880 May 26				Max. 77°	
Sept. 4				Max. 80°	
Oct. 20		4 or 5 in.			
1881 Jan. 18		Over 2 ft.	Very strong E.		Min. 7°
July 15				Max. 93°	
1883 March					28 frosts
Sept. 2			S.W. heavy		
1884 Jan. 23-27					
April 20			S.W. very violent		Severe frosts
Aug. 8 & 9				Very hot. Max. 86°	
1885 March 22		5 in.			
July				Very dry. Rain only .24 in.	Severe frosts
Sept. 27					
1886 March 30			S.W. very heavy		
Oct. 4				Very hot. Max. 74°	
Dec. 9			Severe gale S.W.		
Dec. 26	2.75. 15 hrs.	With rain			
1887 Mar. 13, 14					Very cold. Min. 19°
July, Aug {				{ Very hot ; 33 days of absolute drought Severe drought	
October					
Oct. 12, 13					Very cold. Min. 24°
Nov. 17					Very cold. Min. 18°

Date of occurrence.	Heavy Rains. inches.	Heavy Snowfall Depth.	Great Gales, &c.	Great Drought and Heat. In Shade.	No. of Frosts in Month, &c. Great Cold.
1888 Feb. 22-25.			Piercing N.E.		Blizzard. Min. 17°
1888 March 11					
April 12		Deep on 8th	Great storm S.W.		Very severe. Min. 24°
July 12		Snow fell			Min. 38°
Oct. 3 to 8.					Very cold
November.	4.10		Gales S.W.—W.		
1889 May 22 to 25				Very hot. Max. 78° on 23rd	
May 26	1.70. 8 hrs.				
June 7	.88. 30 mins.*				
Sept. 2 to 19				Severe	
Sept. 10 to 13				Mean temp. 63°·2	
October.....	R. 6.01			Absolute drought 18 days	
November..					
1890 Jan. 26			Very violent		Very severe, min. 14° on 4th.
March 1 to 4					
HEADLEY, HANTS, MILES 47 S.W. OF LONDON, 252 Ft. ABOVE SEA LEVEL.					
1890 August 31					Frost
Sept 17				Absolute drought 21 days	Sudden. Min. 14°
Nov. 28					
Dec. 19		4 in.			Min. 11°
Dec. 22				{ Absolute drought 5th to 21st 15 calm days	Mean 26°·9
December {					
1891 Jan. 1 to 20				Absolute drought 15 days 10 calm days	Mean 26°·1
January				{ Absolute drought 21 days R. only .07 in. 11 calm days	Min. 14° twice
February {					

* At Ruspur Rectory, 1 m. N. 2.20 in. in 1½ hrs.

Summary, Old Park, Rusper and Headley, Hants, 12 Years.

Max. Shade Temp., 93°, July 15, 1881	Driest Months, July, 1885, R. .24 in.
Min. 5 ft. from ground, 7°, Jan., 18, 1881.	(2 days); Feb., 1891, .07 in. (2 days).
Max. Rain in Month, 6.96 in., Oct., 1880.	Wettest Season, Summer of 1879, viz., June (5.50), July (4.48), Aug. (5.50); total R., 15.48 in.
Max. Rain in Shower, 2.20 in., 1½ hrs.; and .88 in., 30 mins., June 7, 1889.	Hottest Month, Aug., 1884, mean 62°·9.
Longest Absolute Drought, 33 days, June 3 to July 5, 1887.	Coldest Month, Dec., 1890, mean 27°·0.
Longest period of Dry Weather, .62 in. R. in 72 days, June 3 to Aug. 16, 1887.	Heaviest Gales, Jan. 24 & 27, 1884, March 11, 1888, Jan. 26, 1890.

THE SIGNAL SERVICE, U.S.A.

THE law transferring the U.S. National Weather Service from the War Department to the Agricultural Department, will take effect on July 1st. The New York Tribune, commenting on this change, says that Congress, in directing it, was probably "governed by the obvious fact that meteorological work is essentially civilian, and not military in character." The Tribune urges that great care should be taken in the selection of a new chief. "Congress," it says, "has properly provided that the daring and skilful commander of the Fort Conger Arctic Expedition of 1881-84 shall, after the Signal Corps is relieved of its meteorological duties, retain his present military rank and emolument. No element of personal reproach or hostility has entered into the movement for the transfer, so far as we know. The change thus involves no indignity to that gallant and accomplished officer and popular hero. This is a fortunate phase of the matter, and since several of General Greely's most valued assistants either gain promotion in the re-organized branch of military service in which they intend to remain, or else go with the observers and clerks into the new civil bureau, the President will experience less embarrassment than would otherwise be the case in selecting the new Superintendent."

[We reprint the above from *Nature*, and heartily endorse the opinion of the *Tribune*.—ED.]

THE METEOR OF DECEMBER 14TH.

IN addition to the notes in our February and March numbers, we may mention that the *Essex Naturalist* for October to December, 1890, contains nearly two pages of accounts of it as seen from twelve different places in Essex, and that Colonel Tupman, one of the vice-presidents of the Royal Astronomical Society, is collecting the accounts with a view to computing its path.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, SEPT., 1890.

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.									Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	75·9	10	37·8	1	70·1	51·3	53·0	80	119·9	37·1	·65	5	4·7
Malta.....	84·2	14	58·7	25	78·4	65·1	60·7	71	138·6	50·0	1·31	6	2·2
<i>Cape of Good Hope</i> ...	86·5	4	41·9	11	66·1	48·8	...	...	...	...	2·11	...	5·0
<i>Mauritius</i>	77·6	4	59·2	1, 2	74·6	64·1	58·7	71	131·0	47·6	·45	10	6·4
Calcutta	92·7	5	71·8	27	87·5	76·8	78·2	87	161·4	71·2	12·53	18	6·4
Bombay.....	86·3	28	72·8	16	84·3	76·2	73·7	81	149·0	69·0	6·45	17	6·6
Ceylon, Colombo	87·0	3	73·3	4	84·9	77·0	80·3	77	152·0	70·0	1·50	19	6·5
<i>Melbourne</i>	74·9	23	35·0	9	62·7	46·6	45·6	73	125·0	28·7	2·36	16	6·9
<i>Adelaide</i>	83·4	26	41·4	8	66·0	50·7	47·6	68	136·7	31·4	1·75	13	5·5
<i>Wellington</i>	67·5	13	36·5	7	59·2	45·6	43·9	74	121·0	29·0	3·95	15	4·4
<i>Auckland</i>	69·0	30	41·5	6	62·2	49·5	46·8	72	123·0	31·0	3·55	17	5·9
Jamaica, Kingston.....	91·3	27 ^a	70·6	13	89·0	72·4	70·9	75	...	...	3·04	...	...
Trinidad	96·0	10	64·0	30	89·0	70·4	71·4	80	160·0	62·0	3·37	16	...
Toronto	79·0	4	35·1	29	66·6	48·6	51·9	78	...	29·0	1·85	10	4·9
New Brunswick, Fredericton	72·8	13	30·0	25	64·8	46·8	51·9	81	...	...	3·72	15	5·5
Manitoba, Winnipeg ...	82·5	29	27·8	14	61·6	39·1	43·6	77	...	...	3·06	14	4·6
British Columbia, Victoria .....	...	...	...	...	...	...	...	...	...	...	...	...	...

^a And 30th.

REMARKS.

MALTA.—Mean temp. 70°·5; mean hourly velocity of wind, 8·9 miles; sea temp. fell from 82°·6 to 75°·0; Thunderstorms on 4th and 14th; L on 6 days. Temp. much below the average, but fevers very prevalent. J. SCOLES.

Mauritius.—Mean temp of air, 0°·9; mean dew point 1°·0, and rainfall ·96 in. below their respective averages; mean hourly velocity of wind, 10·8 miles, or 1·2 below average; extremes 27·4 on 30th and 1·7 on 10th; prevailing direction, S.E. by E. C. MELDRUM, F.R.S.

Melbourne.—Mean temp. of air 1°·3; of dew point 2°·0; humidity 2; cloud 0·9 and rainfall ·11 in. above their respective averages. Prevailing winds N. and N.W., strong on 6 days; fogs on 3 days; hail on 2 days; hoarfrost on 9th. Thunderstorms on 3 days and L on 3 other days; lunar halo on the 21st. R. L. J. ELLERY, F.R.S.

Adelaide.—The month was warm, the mean temp. being 1°·3 above the average. This result was chiefly due to the warm nights experienced; the mean of the min. readings of the month being 3° above the average. The rainfall of the month was slightly under average amount. C. TODD, F.R.S.

Wellington.—Fine for the first two days, then showery till 6th, with strong Southerly winds with hail on 4th and 5th. Fine from 6th to 15th, then showery until 18th; and again fine until 21st; showers on next three days and fine for the remainder of the month. Prevailing wind, N.W. Mean temp. 1°·5 above the average. R. B. GORE.

Auckland.—Strong N.E. gale from 11th to 14th; light variable winds during the rest of the month; rainfall slightly above the average; mean temp. rather more than a degree over the average. T. F. CHEESEMAN.

SUPPLEMENTARY TABLE OF RAINFALL,
MARCH, 1891.

[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 Hall.	2·47	XI.	Rhayader, Nantgwillt..	4·39
"	Margate, Birchington...	2·69	"	Corwen, Rhug	2·81
"	Brighton, Prestonville Rd	2·30	"	Carnarvon, Cocksidia ...	1·40
"	Hailsham	2·49	"	I. of Man, Douglas	1·51
"	Ryde, Thornbrough	2·15	XII.	Stoneykirk, Ardwell Ho.	2·64
"	Alton, Ashdell	2·92	"	New Galloway, Glenlee	4·45
III.	Oxford, Magdalen Col...	1·55	"	Melrose, Abbey Gate ...	3·83
"	Banbury, Bloxham	1·35	XIII.	N. Esk Res. [Penicuick]	5·65
"	Northampton	·84	XIV.	Ballantrae, Glendrisaig	2·29
"	Cambridge, Fulbourne..	1·86	"	Glasgow, Queen's Park.	2·63
"	Wisbech, Bank House..	·73	XV.	Islay, Gruinart School..	3·77
IV.	Southend	1·84	XVI.	Dollar	3·13
"	Harlow, Sheering ...	1·86	"	Balquhiddel, Stronvar..	5·86
"	Rendlesham Hall	1·82	"	Coupar Angus Station..	2·50
"	Diss	2·06	"	Dunkeld, Inver Braan..	2·65
"	Swaffham	1·39	"	Dalnaspidal H.R.S. ...	5·18
V.	Salisbury, Alderbury...	1·82	XVII.	Keith H.R.S.	2·13
"	Warminster	2·28	"	Forres H.R.S.	1·59
"	Bishop's Cannings	1·83	XVIII.	Fearn, Lower Pitkerrie.	1·19
"	Ashburton, Holne Vic....	4·89	"	Loch Shiel, Glenaladale	8·03
"	Okehampton, Oaklands.	2·42	"	N. Uist, Loch Maddy ...	2·46
"	Lynmouth, Glenthorne.	2·19	"	Invergarry	2·23
"	Probus, Lamellyn	2·88	"	Aviemore H.R.S.	3·29
"	Wincanton, Stowell Rec.	3·60	"	Loch Ness, Drumnadrochit	2·87
"	Wells, Westbury	2·68	XIX.	Lairg H.R.S.	5·57
VI.	Bristol, Clifton	2·80	"	Scourie	3·43
"	Ross, the Graig	1·79	"	Watten H.R.S.	2·87
"	Wem, Clive Vicarage ...	1·19	XX.	Dunmanway, Coolkelure	2·59
"	Cheadle, The Heath Ho.	1·74	"	Fermoy, Gas Works ...	1·91
"	Worcester, Diglis Lock	1·37	"	Darrynane Abbey	2·51
"	Coventry, Coundon	1·28	"	Tipperary, Henry Street	2·28
VII.	Ketton Hall [Stamford]	1·21	"	Limerick, Kilcornan ...	1·67
"	Grantham, Stainby	1·27	"	Ennis	1·99
"	Horncastle, Bucknall ...	1·45	"	Miltown Malbay	1·72
"	Worksop, Hodsock Priory	1·31	XXI.	Gorey, Courtown House	1·05
VIII.	Neston, Hinderton	1·13	"	Mullingar, Belvedere ...	1·02
"	Knutsford, Heathside ...	1·80	"	Athlone, Twyford	1·57
"	Lancaster, Southfield ...	1·56	"	Longford, Currygrane ...	1·11
"	Broughton-in-Furness ..	2·81	XXII.	Galway, Queen's Coll...	1·86
IX.	Ripon, Mickley	1·56	"	Crossmolina, Enniscoe..	3·26
"	Scarborough, West Bank	2·76	"	Collooney, Markree Obs.	2·53
"	East Layton [Darlington]	1·68	"	Ballinamore, Lawderdale	1·88
"	Middleton, Mickleton ..	2·30	"	Lough Sheelin, Arley ..	1·41
X.	Haltwhistle, Unthank..	2·66	XXIII.	Warrenpoint	1·00
"	Bamburgh	2·73	"	Seaforde	1·32
"	Shap, Copy Hill .....	...	"	Belfast, New Barnsley..	2·32
XI.	Llanfrechfa Grange	2·17	"	Bushmills, Dundarave...	3·50
"	Llandovery	2·49	"	Stewartstown	1·83
"	Castle Malgwyn	·93	"	Buncrana	4·31
"	Builth, Llanwrtyd Wells	3·70			

MARCH, 1891.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.						Days on which ·01 or more fell.	TEMPERATURE.				No. of Nights below 32°
		Total Fall.	Differ- ence from average. 1880-9.	Greatest Fall in 24 hours.		Max.	Min.		In shade.	On grass.			
				Dpth	Date		Deg.				Date		
												inches.		inches.	in.
I.	London (Camden Square) ...	2·01	+	·40	·55	9	15	57·7	2	23·7	12	9 22	
II.	Maidstone (Hunton Court)...	2·14	+	·64	·60	10	14	...	...	...	...	...
III.	Strathfield Turgiss	2·07	+	·48	·37	7b	14	58·0	5	9·8	12	11 25	
IV.	Hitchin	1·48	+	·14	·44	7	18	62·0	1	20·0	12	13 22	
V.	Winslow (Addington)	1·20	—	·52	·34	7	16	62·0	1	15·0	12	14 22	
VI.	Bury St. Edmunds (Westley)	1·69	+	·14	·28	7, 9	17	...	...	...	...	...
VII.	Norwich (Cossey)	1·45	+	·03	·26	27	19	...	...	...	...	...
VIII.	Weymouth (Langton Herring)	3·58	+	1·68	·92	10	15	54·0	5	25·0	12	12 ...	
IX.	Barnstaple	1·11	—	1·38	·22	7, 15	11	58·0	1	25·0	31	...	
X.	Bodmin (Fore Street)	3·52	—	·26	1·00	9	18	...	...	...	...	...
XI.	Stroud (Upfield)	1·50	—	·69	·46	15	16	60·0	1	18·0	11	14 ...	
XII.	Church Stretton (Woolstaston)	1·34	—	·79	·27	15	21	60·0	1	23·0	12	19 23	
XIII.	Tenbury (Orleton)	1·47	—	·61	·30	15	20	63·1	1	18·2	12	14 19	
XIV.	Leicester (Barkby)	1·10	—	·61	·20	25	20	65·0	1	15·0	11	17 27	
XV.	Boston	1·54	—	·00	·45	8	13	65·0	1	24·0	15	20 ...	
XVI.	Hesley Hall (Tickhill)	1·40	—	·50	·40	7	19	58·0	1	20·0	9	14 ...	
XVII.	Manchester (Plymouth Grove)	1·59	—	·63	·37	6	13	55·0	1	23·0	11	12 25	
XVIII.	Wetherby (Ribston Hall) ...	1·23	—	·83	·26	26	12	...	...	...	...	...
XIX.	Skipton (Arncliffe)	3·51	—	1·59	·56	23	20	44·0	1	26·0	8	14 ...	
XX.	Hull (Pearson Park)	1·29	—	·76	·20	15	20	...	...	...	...	...
XXI.	Newcastle (Town Moor)	3·51	+	·88	1·11	7	21	...	...	...	...	...
XXII.	Borrowdale (Seathwaite)	8·35	—	2·15	1·43	6	16	...	...	...	...	...
XXIII.	Cardiff (Ely)	1·90	—	1·08	·40	15	17	...	...	...	...	...
XXIV.	Haverfordwest	1·34	—	1·90	·41	15	15	52·9	26	19·9	11	12 ...	
XXV.	Carno (Tybrith)	3·30	—	·24	·67	25	21	48·0	1	13·0	11	24 ...	
XXVI.	Llandudno	1·55	—	·53	·40	15	15	55·0	1, 2	26·4	12	4 ...	
XXVII.	Cargen [Dumfries]	2·52	—	·78	·69	7	13	54·2	1	11·0	9	15 ...	
XXVIII.	Jedburgh (Sunnyside)	3·17	+	1·21	·92	16	10	55·0	1	10·0	9	17 ...	
XXIX.	Old Cumnock	4·91	+	1·78	·75	15	17	...	...	...	...	...
XXX.	Lochgilhead (Kilmory)	4·94	+	·48	·91	5	18	...	...	13·0	8	23 ...
XXXI.	Oban (Craigvarren)	3·46	—	...	·57	5	17	51·6	4	19·0	9	11 ...	
XXXII.	Mull (Quinish)	4·19	+	·35	·62	5	16	...	...	...	...	...
XXXIII.	Loch Leven Sluices	3·40	+	·43	1·30	17	6	...	...	...	...	...
XXXIV.	Dundee (Eastern Necropolis)	2·00	—	·46	·95	16	7	56·8	1	19·1	9	15 ...	
XXXV.	Braemar	2·53	—	·11	·53	14	18	55·2	1	13·5	13	26 29	
XXXVI.	Aberdeen (Cranford)	2·12	—	...	·55	29	22	48·0	2, 25	21·0	8	18 ...	
XXXVII.	Strome Ferry	3·74	—	·89	·67	3	16	...	...	...	...	...
XXXVIII.	Inverness (Culloden)	1·05	—	·49	...	...	...	59·0	1	19·0	9	14 30
XXXIX.	Dunrobin	4·02	+	1·77	·52	25	18	62·0	1	19·0	9	19 ...	
XL.	S. Ronaldsay (Roeberry)	2·61	+	·07	·30	25	24	53·0	1	20·0	27	13 ...	
XLI.	Dromore Castle	2·90	—	1·52	·52	15	14	58·0	29	25·0	11	...	
XLII.	Waterford (Brook Lodge) ...	1·42	—	1·48	·44	14	12	61·0	1	22·5	14	9 ...	
XLIII.	O'Briensbridge (Ross)	2·39	—	...	·44	14	13	50·0	5	20·0	11	17 ...	
XLIV.	Carlow (Browne's Hill)	1·11	—	1·26	·31	14	15	...	...	...	...	...
XLV.	Dublin (Fitz William Square)	·94	—	1·07	·22	14	16	57·9	1	27·1	12	10 20	
XLVI.	Ballinasloe	1·51	—	1·12	·39	14	17	52·0	1	18·0	11a	20 ...	
XLVII.	Clifden (Kylemore)	4·79	—	...	1·09	31	18	...	...	...	...	...
XLVIII.	Waringstown	1·33	—	1·02	·40	14	20	59·0	1	16·0	13	15 21	
XLIX.	Londonderry (Creggan Res.) ..	3·75	+	1·02	·52	26	21	...	...	...	...	...
L.	Omagh (Edenfel)	2·35	—	·16	·35	14	22	55·0	1	20·0	9	12 20	

a And 13. b And 10.

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

METEOROLOGICAL NOTES ON MARCH, 1891.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

HUNTON COURT.—S on 9th and 10th, yielding .92 in.

STRATHFIELD TURGISS.—The weather of March was stormy and disturbed throughout the entire month, with a low temperature and occasional snow-storms. The min. on the grass on the 12th was 8°·9, and many years have elapsed since we have had so wintry an Easter. All vegetation is extremely backward. First wild primrose on 17th; first wasp seen on 21st. At this station two radiation thermometers are used; one is *always* on grass, the other is placed on the surface of snow whenever it is possible so to do.

HITCHIN.—Heavy S on the 9th.

ADDINGTON.—Many changes of weather occurred during the month. On the first a max. shade temp. of 62°, and on the 10th a max. of 31° only, a heavy S storm raging all day. On the morning of the 12th, intense frost. On the 26th H storms, and one loud peal of T at 3 p.m. During the snow storm of the 10th, there was a great deal of drifting, but it did not cause much inconvenience in this district.

BURY ST. EDMUNDS, WESTLEY.—A cold winterly month, S or H falling in small quantities on ten days; distant T on 26th; vegetation backward.

LANGTON HERRING.—A cold, wet month, the rainfall being the greatest in March for at least 17 years. The great snow storm of the 9th and 10th was very similar to the storm of January, 1881, and though not so much S fell now, as then, the drifts in the roads were higher—in some places here, as much as 14ft. The damage done to evergreen trees and to the hedges was much more serious than in 1881. The ground in general was covered by from 13 to 15 inches of snow, but from the high wind it was not possible to ascertain exactly the amount of fall. The Feb. drought lasted to March 7th—35 days without R.

BODMIN.—A very cold and stormy month. A hurricane from E. on 9th and 10th, with S about 8 inches on 9th and 4 inches on 10th. I could not get to the rain gauge, as there was a drift more than 5 ft. deep in the garden, and the door could not be opened.

STROUD, UPFIELD.—Gale and S at night on the 9th and all day on the 10th, drifting very much. Frost in the morning of the 15th, then heavy R and S in the afternoon. Hail showers and high wind on 26th.

WOOLSTASTON.—After two mild spring days cold weather returned, and the remainder of the month was stormy and very cold; S fell on several days, but never to any depth. There was a wild gale on the night of the 9th and 10th, but the fall of S was quite insignificant; mean temp. 38°·3.

ORLETON.—The first week was very warm and pleasant, the thermometer on the 1st rising to 63°·1. The remainder of the month was bitterly cold, with very hard frosts and much S. A great gale occurred on the night of the 9th inst., with fine drifting S. Most of the R fell in very small quantities, and there was generally a rough wind which dried it up as it fell, so that there was much complaint about the scarcity of water at the end of the month. Temp. 1°·2 below the 30 years average.

LEICESTER, BARKBY.—Excepting the first few days, the month was very cold and bleak, with occasional strong winds and frequent snow storms. Mean max. 47°·8; mean min. 30°·8; mean temp. 39°·3.

HULL, PEARSON PARK.—The weather throughout the month was cold, with frequent, though slight falls of H, sleet or S, squally and often very cloudy.

WALES.

HAVERFORDWEST.—The fine weather of February continued up to the 9th, when the weather assumed a threatening appearance, the wind rising to a furious gale towards evening, with blinding snow, continuing all night; depth 8 to 10 inches, drifts in some localities as many feet, particularly in the southern districts. The S continued falling until 5 p.m. on the 10th, after which the sky cleared and an intense frost set in, the temp. in shade on the morning of the 11th being 19°·9, and on the snow 10°·5. The rest of the month was

cold, mostly fine and frosty. The snow could not be accurately measured, as the fine salt-like character of it caused it to be blown over and out of the funnel. Prevailing winds, E., N., and N.W. This has been the driest three months ending March 31st in the last 42 years, with the exception of January to March, 1858, when 4·38 in. fell.

SCOTLAND.

CARGEN.—Generally speaking, a bright month, 30 hours sunshine above the average. Easterly winds prevailed for 15 days. Mean temp. 2°·5 below the average. S 6½ inches deep on 8th. Lunar halo on 18th. H shower on 25th. S showers on 3rd and 26th.

JEDBURGH.—The weather during the month was most cold and ungenial, virulent cold winds generally prevailing, with comparatively little sunshine; 2 inches of S fell at night on 8th, and 8 inches on 11th. The land is in a dry state, but little corn is yet sown. Vegetation may be said to be stationary. Grass land is as brown as brown paper.

OLD CUMNOCK.—On 6th 1 inch of S fell, on 7th and 8th 4½ inches, on 15th 4 inches, and on 25th 2½ inches.

OBAN.—The month was most stormy, with exceptional frosts from the 7th to 14th, and mean temp. much below the average. In the early part there was a fine cold period, with prolonged calm and sunshine during the blizzard in the South of England. All growth was much checked.

ABERDEEN.—A very cold, stormy month all through.

INVERNESS, CULLODEN.—The month was cold, with continued frost, and a very small rainfall. Vegetation backward.

DUNROBIN.—A cold and stormy month.

S. RONALDSAY, ROEBERRY.—The most severe March for a number of years. Gales on 1st and 15th. Snowstorms on six days.

IRELAND.

DROMORE.—Cold, and showery occasionally. Vegetation at a standstill.

WATERFORD, BROOK LODGE.—Much easterly wind during the early part of the month. Mean temp. 41°·4. S on the Comeragh Mountains on 15th.

O'BRIENSBRIDGE, ROSS.—A very cold but fine agricultural month. N. and N.E. winds were prevalent, with frequent and some very severe frosts.

DUBLIN.—Opening with a long-continued westerly gale, March, 1891, proved very severe, cold and showery. Mean temp. no less than 3° below that of February. Fogs on 4 days. High winds on 13 days. Snow or sleet on 7 days. H on 9 days. Temp. in screen exceeded 50° on 9 days.

BALLINASLOE.—A harsh, cold, and blustering month.

EDENFEL.—The month began fresh and mild, and during the second week was bright, clear, and frosty, but from the 14th to the end there followed a period of polar and easterly winds, not of the usually dry character, but mostly raw, wet, and inclement, with no vegetation whatever.

GREAT TERRESTRIAL RADIATION.

To the Editor of the Meteorological Magazine.

SIR,—I wonder whether you noticed the extraordinary terrestrial radiation on the evenings of 27th and 28th ult. At 5.30 p.m. on 27th I read 50° Fahr. in Stevenson screen and 31° on grass, a difference of 19°, the greatest I ever recorded. At 5.40 p.m. on 28th the readings were 51° and 33°. The shade max. temp. on each of the above-mentioned days was higher than any previous February reading in my 17 years' record. I need hardly add that my thermometers are in perfect order.—Yours faithfully,

WM. B. BUTLER.

Highland House, 235, Camden Road, N. 5th March, 1891.