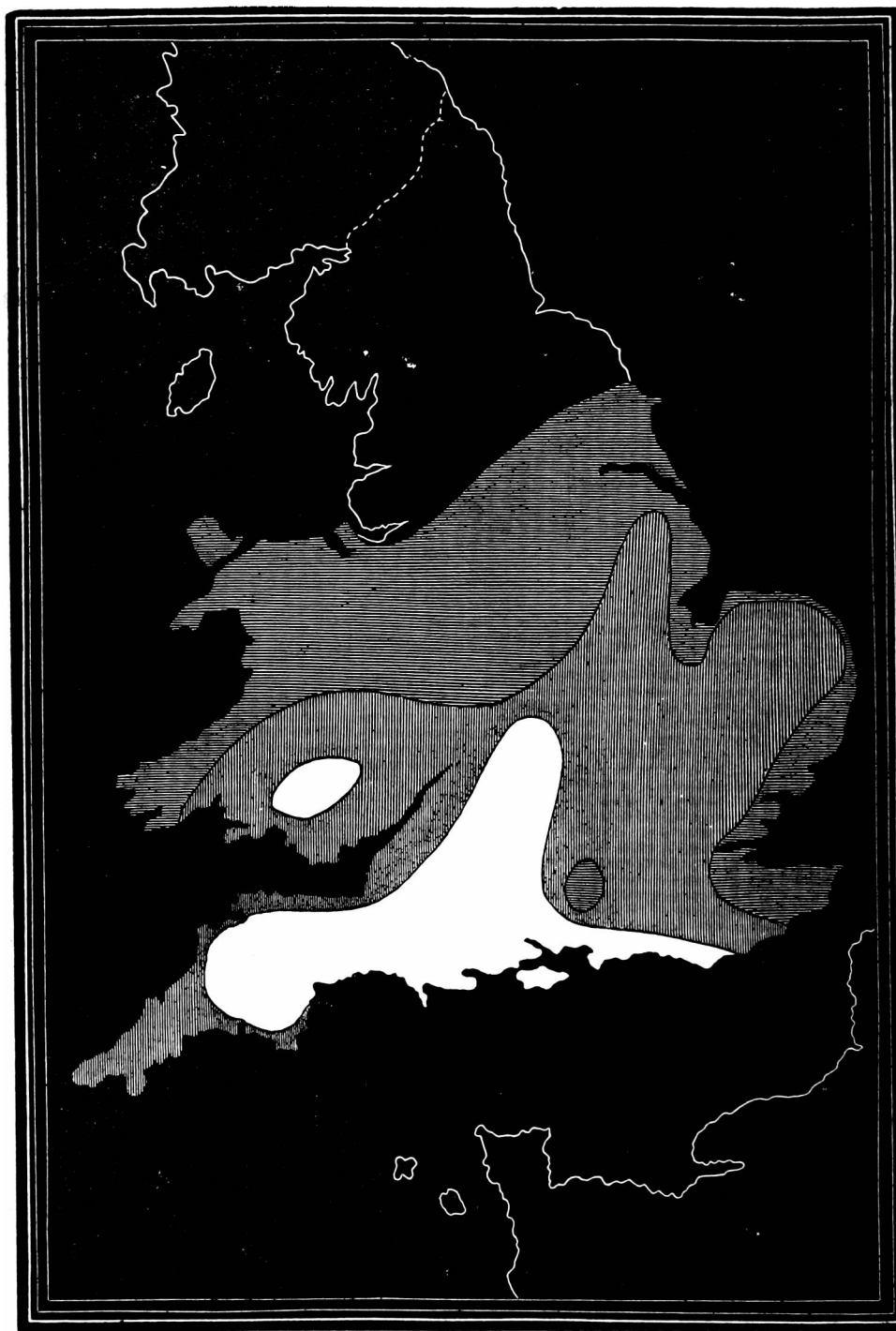


DISTRIBUTION OF SNOW,
JANUARY 17TH TO 21ST, 1881.



[For explanation see page 4.]

SYMONS'S MONTHLY METEOROLOGICAL MAGAZINE.

CLXXXI.]

FEBRUARY, 1881.

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EDITORIAL AND EXPLANATORY.

DURING the past fifteen years it has several times been our duty and our pleasure, by special enlargements, to present our readers with complete accounts of remarkable phenomena. But on no occasion has there been such a strain put upon us, as has resulted from the mass of details furnished respecting the frost and the snow of the past month, which have come in along with sadly too numerous enquiries, "How to measure the snow?" from observers who had neglected to read rule XV., which we reprint, in the hope that, with the recent snow-storm in their memory, all our correspondents will read it.

XV.—SNOW.—In snow three methods may be adopted—it is well to try them all. (1) Melt what is caught in the funnel by adding to the snow a previously ascertained quantity of warm water, and then deducting this quantity from the total measurement, enter the residue as rain. (2) Select a place where the snow has not drifted, invert the funnel, and turning it round, lift and melt what is inclosed. (3) Measure with a rule the average depth of snow, and take one-twelfth as the equivalent of water. This being a very rough method, is not to be adopted if it can be avoided. Some observers use in snowy weather a cylinder of the same diameter as the rain gauge, and of considerable depth. If the wind is at all rough, all the snow is blown out of a flat-funnelled rain gauge. Snowdon pattern gauges are much the best.

Very fortunately the Council Meeting of the Meteorological Society was held on the night after the snow, and it was then resolved that all the data respecting the frost which could be collected should be forwarded to the Assistant Secretary, Mr. Marriott, who should discuss them and report the results to the meeting of the Society on February 16th. An abstract of his report will be found on page 25, and of course the report in *extenso* will appear in the Society's *Quarterly Journal*. Hence it is that none of the many letters which we have received upon the subject will be found in our pages.

We undertook the investigation of the limits of the snow-storm; we applied specially to 150 of our observers and also to the managers or principal officers of the following railway companies, nearly all of whom have taken much trouble in the matter, and rendered most

valuable aid, as is sufficiently evident from the letters and tables printed at the end of Mr. Wallis's report.

List of Railways with the pages on which data respecting them will be found.

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Although it has been a matter of considerable difficulty to get all this mass of material discussed in time for the regular date of publication we are satisfied that accuracy has not been sacrificed to speed, and that such subsequent material as may arrive will in no way invalidate the conclusions arrived at in the following article.

Owing to the very exceptional character of the snow-storm many of the monthly returns on pages 30 and 32 are obviously incorrect. All the figures to which the ? is attached are not necessarily wrong; but the observers are requested to report what they believe to have been the average depth of the snow in their neighbourhood, and the nearest possible approach to the truth will be obtained before the publication of the annual totals. Few rain-gauges will hold 5 inches of snow, many will not hold 3 inches; where, therefore, the fall has exceeded those amounts, it is evidently fallacious to report merely what was "found in the gauge." Rule XV., Sections (2) and (3), should have been generally followed, but even then some difficulty existed. It is neither easy nor pleasant to obtain accurate measurements of such a storm; we rejoice to notice the care which many of our observers paid to the matter; that which they have done will not merely render their own records perfect, but will help to check those of their neighbours, and in spite of all difficulties and a terrible addition to our ordinary work, we have no doubt that eventually few records will prove entirely spoilt.—G. J. S.

ON THE SNOW STORM OF JANUARY, 1881.

By H. SOWERBY WALLIS, F.M.S.

AFTER the 9th of January snow fell daily on some portion of the British Isles, and on the 12th and 13th rather heavily over the greater part of them, so that by the 17th (on which day practically none fell), there was a considerable depth on the ground over the whole of the United Kingdom, the weather having been so cold that scarcely any had melted. This depth averaged three to four inches over the greater part of England, and rather more in Wales, the N. of England, and in Scotland. During the early morning of the 18th the wind, which was easterly, rapidly increased in force, and blew a strong easterly gale nearly all day, the wind falling again in the south at night, but in other parts of the country it lasted till about mid-day on the 19th. The gale was particularly severe on the

east coast, but the number of wrecks and casualties all round our shores was very great; reports from many seaports stating that it was the most severe gale that had been experienced for more than 30 years. Much damage was done to roofs, &c., and a very large number of trees were blown down in the eastern counties—*e.g.*, Lord Rendlesham reports over 1,500, most of them large ones, blown down on his estate, and there were many isolated cases of structural damage in other parts of the country. In London an extremely high tide, increased by the gale, overflowed the low-lying districts on the south of the Thames, causing great distress, augmented by the extreme severity of the weather, among the poorer classes.

The gale was accompanied by a heavy and steady fall of snow over all but the north of England, which lasted through the 18th and continued, though rather lighter, till about noon on the 19th. The amount of snow deposited over the whole of the southern portion of the country was very great, and was so drifted by the fierce wind, that communication both by rail and road was entirely disorganised, and it was more than a week before the railway and postal arrangements throughout the country recovered their usual regularity and punctuality; the interruption to business was further increased by the large number of telegraph wires which were broken by the gale or by contraction caused by the extreme cold.

Snow fell again on the 20th in the S. and S.W., very heavily in the Isle of Wight and neighbouring districts, blocking up many lines of railway that had with great difficulty been cleared from the fall of the 18th.

Among careful observers in all parts of the country where the snow fell with its full intensity, it appears to be the general opinion that to find anything like a parallel case we must go back to 1836 or to 1814; and it would appear that in most parts of the country the depth in those years was greater, but that the drifts were not so great. As regards the fall in the Isle of Wight and South Hampshire, it is believed to be altogether unprecedented in recent times.

One feature of the snow which appears to have been noticed nearly all over the country, was its extreme fineness and dryness, and the remarkable manner in which it penetrated in large quantities through roofs, the cracks of doors and windows, and even the most minute and almost imperceptible crevices.

The loss of life in England and Wales, entirely due to the snow, was very great, and probably an estimate of 100 persons would be very near the truth, and the amount of distress occasioned simply by the stoppage of the supplies of food and fuel to country districts from towns is almost incalculable.

Small birds died of starvation in vast numbers, their food being covered by the snow. At Littlehampton, in one shrubbery, more than 100 dead blackbirds and thrushes were found, and the following curious incident is reported in an Isle of Wight newspaper:—"A friend of ours looking from his window (in Shanklin) on Monday,

saw some larks hopping about on his lawn. Presently some rooks swooped down upon the birds, tore several to pieces, and ate them."

It is very difficult to realise the magnitude of the snowstorm and of the drifts; perhaps some of the men employed in clearing the railways had the best opportunity of doing so. Locomotive engines and trains, in spite of their size and power, were snowed up by the dozen; not merely stopped, but buried for days together, and in some cases so completely as to be quite hidden. From the Tring cutting on the L. & N. W. railway, 1,700 truck loads of snow were taken. A railway truck is about 15 ft. long, therefore 1,700 trucks would form a train nearly five miles long. A train five miles long to empty *one* cutting on *one* railway, what length of train would it require to remove the snow from all the cuttings on all the railways in England?

The loss to the country was enormous; over more than half England business was practically stopped for one day at least, and the cost of clearing not only the railways but almost all the roads in the country, is incalculable, not to mention the more or less serious suffering and discomfort. Plymouth was deprived of water for nearly a week. Public and private meetings of all kinds had to be postponed; in short, that intercourse between man and man, on which the whole business and pleasure of life depend, was interrupted.

The accompanying map and following summaries for the different counties are founded on special returns from about 200 regular meteorological observers, and on the reports furnished by nearly all the great railway companies, which are especially valuable, as they are based on statistics furnished by the engineers and traffic superintendents of the various lines, who not only had special opportunities of ascertaining the various depths, but who are in the habit of dealing with accurate measurements, and are, therefore, less likely to be led into unconscious exaggeration than amateurs of all classes.

The depths of snow in the various cases must be understood to represent the greatest depth to which the ground was covered at any time between the 17th and 21st of January, as it was impossible to deal with it in any other way; but except in the extreme S. and S.W., by far the greater portion of it fell during the one continuous storm of the 18th-19th.

The map shows at a glance where the greatest amount fell. Over the white portion the depth exceeded 12 inches, and the part left black is where no appreciable amount fell on the 18th and 19th; the shaded portions represent respectively where the depth was less than 6 inches, and where it was between 6 and 12 inches.

There was also snow on the ground over almost the whole of Scotland and Ireland, which drifted considerably, and in some cases caused delay to traffic; but it has no interest in connection with the abnormally heavy fall of the 18th and 19th over the southern portion of England, and therefore needs no further notice. The special feature

being that the heaviest falls occurred in those parts of the United Kingdom where ordinarily such falls are most rare.

In the neighbourhood of *London* snow began to fall soon after 9 a.m. on Tuesday, January 18th, while a violent gale was blowing, gradually increasing in quantity till night, continuing all night, and ceasing about mid-day on Wednesday the 19th, about which time 9 inches had fallen over the whole of *Middlesex*. In the London streets traffic was almost entirely discontinued during Tuesday afternoon, and nearly, if not quite all the suburban lines of railway were blocked, and remained so till various times on Wednesday. Drifts 3 feet in depth were common in the streets, and in the country lanes 4 feet was occasionally reached.

In *Surrey* conditions were much the same as those prevailing in *Middlesex*, the depth of snow being if anything rather less. Communication by rail with London and other places was stopped from about mid-day on Tuesday till the same time on Wednesday, the mails of course being delayed to the same extent.

The fall in *Kent* was considerably less, being only 3 to 4 inches along the coast, 4 to 6 inches over the greater part of the county, increasing to about 7 inches in the N.W. near London. Drifts up to 5 feet in depth were frequent, others were 6 to 8, 9, and 10 feet, and in the Isle of Thanet, where they appear to have been remarkably deep, 12 to 14 feet is reported in a Margate newspaper, and confirmed by the observer at Acol. The roads in many parts were not rendered passable till the 22nd, and in some cases not till the 24th. Communication with all parts any distance from London stopped for periods varying from 4 to 29 hours. The Judges leaving London on the 18th to open the Maidstone Assizes found the line blocked at Shoreham, near Sevenoaks, and were obliged to return to London.

The fall commenced earlier in *Sussex* than in London, snow being first observed in the night of 17th-18th, and the depth all along the coast was very great, reports of the average depth being, Worthing, 18 in. to 24 inches; Brighton, 18 inches; St. Leonard's, 12 inches; Littlehampton, 12 to 9 inches. The fall appears to have diminished gradually from the coast northwards, the depth on the borders of Surrey being not more than 7 or 8 inches. The snow ceased about 4 or 5 p.m., when the drifts varied from 4 to 8 feet. Railway traffic was of course stopped, and two or three trains and several locomotives were so imbedded in the drifts that they had to remain till gangs of labourers were collected to dig them out. A considerable amount of inconvenience and distress was occasioned in the villages and country districts by the want of food and fuel, the snow-drifts rendering it impossible for them to receive their usual supplies from the towns.

In the *Isle of Wight* and the south of *Hampshire* matters were very serious, for the fall of the 18th—which was greater there than in any

other part of the country—was followed by another, equally heavy on the 20th. At Newport the first fall averaged 16 inches, and the second 18 inches; total 2 ft. 10 in. At St. Lawrence the two falls gave 22 inches; at Ventnor, 18 inches; at Osborne, 18 inches; and at Cowes it is stated that the depth was 5 feet, but this is certainly an exaggeration. At Ryde the fall was 18 inches to 2 feet, and many of the roads are said to have been filled nearly half-way up the lamp-posts, and the lamps were left alight the greater part of the day on account of the difficulty of getting to them. No shops were open, the drifts in some cases being above the tops of the doors and shutters. All the towns in the Island seem to have been in much the same state. At Cowes there were drifts in the streets 12 feet deep, and in the west of the Island there were blocks in the roads 12 feet deep extending for a quarter of a mile at a stretch. At Shorwell the school-house was buried, and to rescue the master and his family a tunnel was dug from the road to his door. The roads in the Undercliff were impassable from the 18th to the 26th. Here, also, the distress occasioned in the rural districts by the stoppage of supplies was very great; and it is stated that at Chale there was no bread from Tuesday, the 18th, to Tuesday, the 25th, when a waggon load of flour was dragged in with great difficulty. All the railway lines on the Island were of course blocked, and, though large gangs of men were kept at work, it was impossible to resume traffic on any of them till mid-day on Saturday, and the Ryde Direct was not re-opened till Wednesday, the 26th. All over the south of Hampshire the fall was almost, if not quite, as bad as in the Isle of Wight, the depth being reported at from 8 inches to 4 feet; but the latter amount is undoubtedly too great, the true fall probably ranging from 12 to 18 inches, or perhaps in special cases to 2 feet or 2ft. 6in. In the N.W. of the county the fall was considerably less, being about 8 in., while in the N.E. it was remarkably small, it being a well-authenticated fact that in a large district surrounding Basingstoke the depth did not exceed 4 inches, nevertheless there were drifts 8 feet deep in the neighbourhood. The greatest drifts appear to have been in the neighbourhood of Havant, where they were 10 to 14 feet, and Portsmouth, 3 to 8 feet. The rail to Portsmouth was blocked for 17 hours on 18th–19th, and 21 hours on 20th–21st. A hall at Portsmouth is reported to have fallen to the ground from the weight of snow on the roof.

In *Berkshire* the average depth ranged from 9 inches to about 15, the fall being greatest to the west of the county and smaller in the east. The roads in most parts were completely blocked and remained so for several days till the drifts were cut through, and in one road near Lambourn a tunnel several yards in length was cut for foot passengers. No mails were received at Lambourn from Tuesday, 18th, morning, till Saturday, 22nd, afternoon.* The drifts on the Great Western Railway were considerable.

* Near Hungerford a mail cart driver and two assistants were frozen to death.

The fall was rather smaller in *Hertfordshire*, the reports varying from 6 in. to 9 in., the fall being greatest in the west. The average for the whole county was about 7 or 8 inches.

In *Buckinghamshire* the fall averaged about 7 inches, which, though large, is small in comparison with other parts of the country, and the drifts were not so deep, the greatest reported being 6 ft. 6 in., but even with this fall the difficulty of establishing communication was very considerable, for the surveyor of the borough of Buckingham states that he had 14 miles of road to clear on which the average depth of snow was 3 ft.

The amount of snow in *Oxfordshire* was very great, reports from all parts giving the fall as 12 to 13 inches. In Oxford on Wednesday the drifts in the principal streets were knee-deep, and all traffic was suspended. No letters or newspapers from London or the north were received from Tuesday to Thursday, and Oxford was isolated from the rest of England; the local traffic by the Great Western Railway was suspended from Tuesday afternoon till Thursday afternoon. The 3.30 p.m., 3.50 p.m., and 4.45 p.m. trains from Paddington were snowed up between Reading, Didcot, and Radley; passengers by the 2.15 p.m. train from Reading on Tuesday were snowed up at Radley until 9 a.m. on Wednesday, when they were released and taken to the station, and finally reached Oxford (4 miles) about 7.15 p.m., after a captivity of 26 hours. The down line from Didcot was cleared about 6 or 7 o'clock on Wednesday evening. The block was not so complete on the L. & N. W. Railway; only two trains left Oxford for Bletchley on Wednesday and reached their destination very late, all communication south of Bletchley being cut off. On Tuesday night the only passenger train which left Oxford was snowed up about 1½ miles out, and brought back with much difficulty, after several hours delay. Careful measurement taken in several places show the fall in Oxford to have been from 12 to 13 inches, and the drifts were of all depths, from knee-deep to 13 feet. At Banbury snow began to fall soon after noon on the 18th, and by the next morning the depth averaged 9 inches, and during the 19th another 4 inches fell; the drifts in the streets at one side of the way were 3 ft. deep; about a mile from the town a drift nearly covering the road was 7 ft. deep, and in other roads it is said to have been as deep or deeper. Four men lost their lives near Banbury, and there were several narrow escapes. There was no communication with London or Birmingham for two days, and mails both going out and coming in were delayed for the same time.

Over almost the whole of *Northamptonshire* there was an evenly distributed fall of six inches, the exception being the S.W. where it gradually increased to 12 inches near Banbury. The lines all over the county were blocked with drifts of an average depth of 6 feet.

In *Huntingdon* the depth ranged from about 5 inches in the N.E. to 8 inches in the S., the average probably being between 6 and 7 inches; the drifts all along the Great Northern Railway, which runs

in almost a straight line from N. to S. through the county, were very considerable, and were some of the worst on that system, ranging from 3 to 10 feet.

The fall in *Bedfordshire* averaged about $7\frac{1}{2}$ inches, the amount being slightly larger in the S. than in the N. The drifts on the different railways ranged from 6 to 10 feet, and traffic was much interrupted, the Hertford, Luton and Dunstable line being blocked for two days, and the North Western line to Bedford for the same period.

The depth did not vary much in *Cambridgeshire*, and averaged about 7 inches, all reports stating it at from 6 to 8 inches. The Spalding and March Railway, and part of the Cambridge branch of the G. N. R., were blocked for two days, and the Cambridge branch of the L. and N. W. for twelve hours.

There was considerable variation in the amounts of snow which fell in different parts of *Essex* but the average was about 8 inches, the deposit was slightest in the S.E. and on the coast, where it was just below six inches, 8 inches fell over the central portion of the county, and 9 inches in the W. and S.W. The drifts were considerable and five or six persons are reported to have lost their lives in the snow.

The fall in *Suffolk* was curiously small, not averaging more than 6 inches and very diversified, not more than 2 or 3 inches falling on the southern portion of the coast, and four or five on the northern part, inland the fall was 6 inches, increasing to 7 in the extreme west. Drifts of 7 feet and upwards are reported, a luggage train was buried near Ingham station and the traffic was suspended for three days. The mail cart from Thetford was snowed up and the driver had some difficulty in removing the horse.

Over the greater part of *Norfolk* the fall was large, the average for the whole county being about 9 inches, dividing the county by a straight line from Lynn to Harleston, the deposit on the N. of the line was 10 inches and S. 6 to 7 inches. Drifts were very considerable, the roads nearly all over the county being blocked. In the neighbourhood of Swaffham drifts were 12 feet deep and the mail cart from Swaffham to Brandon was stopped for more than a week, and the rail to Watton was closed for three days. At Hindringham the mails were stopped from Tuesday to Friday, and the Attleborough mail cart was abandoned and buried.

Wiltshire was one of the counties where the fall was greatest, and over the whole county it probably averaged 18 inches, reports varying from 6 inches at Calne to 36 inches at Warminster. These appear to err one on each side of the truth, though there was an exceptionally small deposit in the neighbourhood of Calne and Devizes, and an exceptionally large one about Warminster, near which place the drifts on the railway were 12 feet deep, and near Severnake 9 feet. The lines between Salisbury and Downton and between Salisbury and Warminster were blocked for three days, and the roads were blocked in some places for four days.

Dorset, like all counties on the southern coast, was severely visited, the average for the whole county being about 15 inches, 12 to 14 inches inland and 18 to 20 inches or perhaps more on the coast. The drifts on the S. W. Railway were 5 to 12 feet deep, and the line was partially blocked on the 18th, 19th, and 20th, and completely for a short time on the 21st. Roads in the neighbourhood were blocked from 18th to 22nd. On the Somerset and Dorset line, between Stalbridge and Sturminster Newton, there was 5 to 6 feet of snow on the rails for a considerable portion of the way, and similar but shorter drifts S. of Blandford. At Beaminster the streets were stopped by drifts 3 feet deep, and on the country roads there were drifts of 6 to 12 feet; no mail carts could run between Beaminster and Ilminster, or between Beaminster, Bridport, and Dorchester. Two public conveyances which started from Beaminster to Crewkerne on Tuesday morning (18th) remained buried in a drift till Saturday, 22nd.

Over *Devonshire* the fall was pretty evenly distributed about 12 to 14 inches, except round the greater part of the coast, where it was rather less, and on Dartmoor, where it may have averaged anything up to 3 feet. The drifts on the railways were in many places 15 feet deep, and parts of the lines were entirely blocked for 2 and 3 days, and the line to Holsworthy was blocked for 7 days. The roads in the same neighbourhood were stopped for 4 days, the drifts in many cases being 10, 12, and 15 ft. deep, and the observer at Holsworthy says that "at the age of over sixty years I do not remember such severe weather; birds may be seen dead in considerable numbers." Perhaps one of the most serious results of the snow in any part of the country was the entire stoppage of the water supply to Plymouth, the open channel from the reservoirs and gathering ground on Dartmoor becoming completely choked by the drifting snow. The channel is about 20 miles long, and the drifts were in places from 12 to 20 feet deep, so that although 1,000 men were employed in clearing it they did not succeed in getting it open till the evening of Sunday, the 23rd.

In *Cornwall* the fall was about 12 inches in the extreme E., and decreased considerably towards the W., the deposit over the greater part of the county being about 7 inches, though it appears to have been heavier again in the neighbourhood of Penzance; the drifts, though very considerable, were not so bad as might have been expected in such a hilly country.

Twelve to 13 inches of snow fell in the S. and E. of *Somersetshire*, and 8 to 10 inches in the W. and N. The Bristol and Exeter line was not much blocked, but all along the Cheddar Valley line, and indeed from Yatton to Witham, there was almost one continuous drift, the average depth being 10 feet. The Somerset and Dorset line was much blocked, and traffic stopped for two days.

In *Gloucester* the fall appears to have decreased gradually from S. to N., the average depth in the S. being about 9 or 10 inches, and in the N. 6 or 7 inches; drifts 7 to 10 feet deep.

The fall in *Hereford* was 10 or 11 inches in the S., diminishing to about 6 inches in the north. Drifts on the rail in the neighbourhood of Ross averaged 6 feet. The 10 p.m. mail on Tuesday from London did not arrive at Hereford till Thursday.

Shropshire escaped all serious inconvenience from the storm, the fall being very small, not exceeding 5 inches in the south and 3 in the N. The drifts were only sufficient to make locomotion slow and disagreeable, and horses, if not overweighted, would have drawn a carriage anywhere.

In *Stafford* also the fall was unimportant, the reports varying from 1 to 4 inches; the drifts did not exceed 3 feet.

The average fall in *Worcestershire* was apparently about 5 to 6 inches, the fall being greatest in the east and N.E., where it was about 8 inches, and the drifts were considerable.

The snow was very unevenly distributed over *Warwick*, the depth in the central portion being about 7 or 8 inches, decreasing to about 4 inches in the N. and increasing to 12 inches in the S.E.

The fall appears to have been very equable over the whole of *Leicestershire*, and to have averaged about 6 inches; drifts of 6 feet were common on the railways.

Over the whole of *Lincolnshire* the fall averaged about 6 or 7 inches, being rather smaller along the coast. All the Lincolnshire section of the M. S. & L. R. was very much blocked, the traffic in some cases being suspended for 20 hours, and one passenger train became so embedded in a drift that it was only extricated with considerable difficulty.

On the 18th the fall of snow in *Notts* was not very great, but with what had previously fallen there were 5 or 6 inches on the ground, which drifted considerably, but there was no stoppage of traffic.

In *Derby*, *Cheshire*, and the *Northern Counties* there was no snow on the 18th or 19th, or so little as not to call for remark, though there was previously fallen snow over almost the whole of the remainder of England and the greater part of Scotland, and in many cases considerable drifts, but these were altogether of a normal character and are therefore outside the scope of this article.

The quantity of snow which actually fell on the 18th and 19th in *South Wales* was not great, probably not being so much as 6 inches anywhere, unless in the neighbourhood of Abergavenny, but there was a depth of 5 or 6 inches on the ground from previous falls, which was so blown about by the gale that it was impossible to ascertain how much fell and how much only altered its position. In *Monmouthshire*, however, the fall was considerably greater, ranging from about 7 to 9 inches. It is reported that in Monmouth on the 18th there were 4 feet of snow in the streets, no trains arrived, and business was totally suspended. The drifts in the mountainous country were, of course, very great, particularly in the district N. and W. of Abergavenny.

In *North Wales* very little snow fell, but that on the ground drifted

very much and caused some delay to traffic, especially in Anglesea and between Conway and Bangor.

THE GREAT NORTHERN RAILWAY,
General Manager's Office, King's Cross Station,
London, N., Feb. 9th, 1881.

DEAR SIR,—Referring to your letter of the 3rd inst., I think I cannot do better than send you copy of communication which has been addressed to me by Mr. Johnson, our Engineer, giving his experience of the effects of the late snow storm upon the Great Northern line.—Yours faithfully,
H. OAKLEY.

G. J. Symons, Esq.

[Copy.]

Engineer's Office, King's Cross, N.,
February 7th, 1881.

DEAR SIR,—Herewith I return Mr. G. J. Symons's letter of the 3rd inst., referring to the late snow storm.

So far as this railway is concerned the following particulars may be useful to Mr. Symons :—

The storm commenced on Tuesday morning, 18th January, wind north-east, and the whole of our railway from Grimsby on the east, to Boston, Sleaford, Grantham and Nottingham was covered with about 6 inches of snow. This extended southwards to Stamford, Peterborough, Cambridge and Hitchin, at which point there were about 9 inches of snow on the level, and this continued southward as far as Hatfield, Luton, and Hertford.

From Hatfield to London there was rather less snow, averaging only about 6 inches in depth.

As regards the drift, it was very bad on the whole of the area from Grimsby to Boston, Sleaford, Grantham, Peterborough, Cambridge, and Luton. The average depth of the drift was about 3 feet; but in many of our shallow cuttings, from 8 ft. to 10 ft. in depth, one side of the railway was completely blocked with snow.

The East Lincolnshire Railway, the Spalding and March Railway, part of the main line between Grantham and Peterborough, the Ramsey branch; part of the Cambridge branch between Cambridge, and Hitchin; and the Hertford, Luton, and Dunstable branches were blocked with snow for two days.

The east side of the railway between Hatfield and Potters Bar was also blocked with the snow drifts.

We have not had so serious a block on this railway since February, 1854, and January, 1861.—Yours faithfully,

H. Oakley, Esq.

(Signed) RICH'D. JOHNSON.

LONDON, BRIGHTON, AND SOUTH COAST RAILWAY.

London Bridge Terminus, S.E.,

February 9th, 1881.

DEAR SIR,—I beg to acknowledge the receipt of your communication of the 3rd inst., asking for certain particulars respecting the

depth of snow on various parts of our system, its average depth, its depth in drifts, and the obstruction of traffic therefrom.

I need scarcely say that I should be happy to give you all the information in my power in respect to this, but, necessarily owing to the exceptionally erratic nature of the storm and of the winds prevailing at the time, I am afraid the information I can give can only be of a general character differing as the storm did upon various parts of our line.

I may say that in cuttings and places exposed to exceptional drifts we have had the snow, in some instances, from 15 to 20 feet deep, and our traffic was temporarily suspended in consequence. This applied particularly to the *western* part of our system, in the direction of Portsmouth and the Isle of Wight, and where such snowstorm appears to have been most felt; and you may take it that the average depth of snow alone in this locality was not less than 4 feet. We had also some heavy drifts upon our *eastern* line in the vicinity of Eastbourne and Lewes; and our traffic generally would have been suspended in consequence for a much longer period than it was, but we have made use of the snow ploughs fixed upon the front of our engines, constructed by our Locomotive Superintendent, Mr. Stroudley, and which were of great advantage to us in clearing the roads and resuming the ordinary working of the traffic much earlier than we otherwise could have done.

I am, dear Sir, yours faithfully,

J. P. KNIGHT,

G. J. Symons, Esq., F.R.S.

General Manager.

LONDON, CHATHAM AND DOVER RAILWAY,

Engineer's Office, Victoria Station, Pimlico, S.W.,
9th February, 1881.

DEAR SIR,—Mr. Forbes having handed to me your letter of the 3rd inst., I send, as requested, the best details I have been able to obtain of the result of the snow-storm, and its effect in obstructing the traffic on this railway.

I shall be most happy to forward to you, to the best of my ability, any further information you may require.—Yours faithfully,

WILLIAM MILLS.

G. J. Symons, Esq., F.R.S.

LONDON, CHATHAM, AND DOVER RAILWAY.

Snow Storm, 18th January, 1881.

Suburban Lines.—Estimated fall, $3\frac{1}{2}$ to 5 inches; greatest drift, 18 inches, Loughborough to Elephant and Castle. Very little hindrance to traffic.

London to Rochester.—Estimated fall, 5 inches; greatest drift, 15 inches, Bromley and Bickley. Very little hindrance to traffic.

Sevenoaks and Maidstone Branches.—Estimated fall, 3 to 4 inches;

greatest drift, 2 ft. 6 in. to 4 ft., Eynsford and Shoreham. Line completely blocked for 5 hours.

Rochester to Canterbury.—Estimated fall, 3 to 4 inches; average drift, 2 ft.; greatest drift, 5 to 6 ft., at Teynham, and 8 ft. near Selling. Down line blocked for 27 hours, up line for 4 hours.

Sittingbourne and Sheerness Branch.—Estimated fall, 5 to 6 inches; average drift on line, over 2 feet; greatest drift in cutting near Milton. Line completely blocked for 29 hours.

Canterbury to Dover.—Estimated fall, 3 to 4 inches; average drift, 3 ft. 6 in.; greatest drift, 9 to 10 ft., near Shepherd's Well. Down line blocked for 24 hours; up line traffic delayed.

Ramsgate and Margate Branch.—Estimated fall, 4 inches; average drift, 2 ft. 6 in.; greatest drift, 6 to 8 ft., Margate to Broadstairs. Up line blocked for 54 hours between Ramsgate and Margate; down line traffic delayed.

WILLIAM MILLS, Engineer.

LONDON AND SOUTH WESTERN RAILWAY,

General Manager's Office, Waterloo Bridge Station, S.E.,
London, 9th February, 1881.

SIR,—I beg now to send you, in answer to your letter of the 3rd instant, some particulars of the late snow-storm, and its effects upon the lines of this Company.

The whole of our lines were, more or less, seriously affected by the snow-storm; and on some portions the traffic was entirely suspended for some days, more especially in the vicinity of Dartmoor and on branches.

I trust the information is what you required.—I am, Sir, your most obedient servant,

ARCHIBALD SCOTT, General Manager.

G. J. Symons, Esq., F.R.S.

LONDON AND SOUTH-WESTERN RAILWAY.

Snow Storm, January, 1881.

District.	Depth in open Coun- try. in.	Depth in Drifts. ft.	Obstruction to Traffic and General Remarks.
Andover	12	5 to 15	Single line worked where drifts very deep; but no serious delays to trains. Highways blocked from 3 to 10 days before they were fit for traffic.
Basingstoke..	4	3 to 8	Lines pretty clear, trains delayed at Michel-dever about 8 hours through snowdrift. Roads in some cases entirely blocked. Villagers crossed the fields.
Barnstaple ...	36	10 to 16	Line to Ilfracombe blocked for several days, traffic greatly obstructed on North Devon line. Roads in all directions impassable.
Dorchester ...	36	5 to 12	Partial block on rail on 18th, 19th, and 20th. Complete block for about 10 hours on 21st. Roads all blocked round this neighbourhood from 18th to 22nd, inclusive.

District.	Depth in open Coun- try. in.	Depth in Drifts. ft.	Obstruction to Traffic and General Remarks.
Exeter.....	12	5 to 25	The whole of the railway and road traffic was very seriously interrupted (and at times quite stopped) from 18th to 24th, both inclusive.
Fareham	30	6	Roads in the neighbourhood blocked for days. Railway to Gosport blocked from 18th to 20th, for 48 hours, and from 21st to 22nd, about 40 hours entirely.
Guildford ...	8	5 to 10	Railway not obstructed, but some of the roads impassable for vehicles.
Havant	36	10 to 14	No train to Portsmouth on 18th inst. after 9.30 a.m., both lines blocked, worked single line on 19th inst. ; 20th both lines open again ; 21st, both lines blocked again by further fall of snow, but cleared in evening.
Lidford	15	about 15	Line blocked from 18th to 19th then cleared, again blocked from Friday 21st 9 a.m. till Saturday 11 a.m. Turnpikes blocked for 14 days.
Okehampton.	36	10 to 15	All traffic by road stopped for 4 days entirely, and by rail at intervals of 2 to 3 days. Hols-worthy line blocked for seven days.
Plymouth ...	18	3 to 5	Traffic by rail not suspended within 10 miles of Plymouth, and by road only partially.
Portsmouth..	30	3 to 8	Railway traffic delayed 18th and 19th about 17 hours and on 20th and 21st about 21 hours. Street traffic stopped practically for 6 days.
Ringwood ...	36	15	All trains delayed about 3 or 4 hours. Bourne-mouth East line blocked one day. Road traffic completely blocked for 3 days.
Salisbury ...	9	3 to 15	Line between Salisbury and Downton and between Salisbury and Warminster blocked for 3 days ; other lines for 10 miles east and west partially blocked. Roads blocked for 4 days.
Southampton	12	4 to 6	Trains running fairly well, no serious delays. Roads blocked for nearly a fortnight.
Templecombe	30	6 to 20	Somerset and Dorset line blocked for 2 days. Turnpike roads obstructed in every direction.

SOUTH-WESTERN AND MIDLAND RAILWAY COMPANIES'

SOMERSET AND DORSET JOINT LINE.

Office of Superintendent of the Line,

Bath, 9th February, 1881.

SIR,—In reply to your favor of the 3rd instant, I have pleasure in furnishing the information you ask for, so far as the "Somerset and Dorset" Line is concerned.

The snow storm commenced about 8.0 a.m. on Tuesday, the 18th ultimo. The snow was exceedingly fine, fell very fast, and was accompanied by a very strong wind from the south-west. It continued almost without ceasing throughout Tuesday, Tuesday night, and, at the Bath end, until about 5.0 p.m. on Wednesday (19th), at which time it ceased on the north side of the Mendips ; but at Shepton Mallet, on the south side of the Mendips, and south of that place, the

snow continued until about 1.30 a.m. on Thursday morning (20th), after which there was a very slight fall.

From Bath to the summit of the Mendips, I should consider the average depth was about 10 inches, this depth increasing on the south of the Mendips, being probably a foot or a little more at Shepton Mallet and as far as the foot of the hills at Evercreech Junction. From thence to Temple Combe there appeared to be a considerably less quantity, but southward of Temple Combe, and through to Wimborne, there was again a very considerable depth of snow, which, at Wimborne, is said to have reached 18 inches on the level. The drifts were, of course, to a very great extent controlled by the particular formation of the line at various points.

So far as the railway was concerned, the heaviest drifts on the north side of the Mendips were near Bath, again at Chilcompton, and on the actual summit, near Binegar; these drifts being from 3 ft. 6 in. to 4 ft. 6 in. in depth. The deepest drifts we had were on the southern slope of the Mendips, between the summit and Shepton Mallet, where in more than one place the drifts were 13 feet deep, and there were also other places where they ranged up to 6 feet for a distance of between 500 and 600 yards.

Between the foot of the hills at Evercreech Junction and Temple Combe the drifts were comparatively slight, but between Temple Combe and Wimborne we had several heavy interruptions, the principal ones being drifts of about 5 and 6 feet for a considerable portion of the way between Stalbridge and Sturminster Newton, and similar ones for shorter distances south of Blandford.

On the branch from Evercreech Junction to Highbridge the depth of snow was much the same as on the Bath end of the line, the principal drifts being near the terminal stations on the branch, which extended for nearly a mile, with a depth of at least 5 feet. There was also on the Wells branch a heavy drift, about half-way between Wells and Glastonbury.

The interruptions to traffic commenced about noon on Tuesday, after which time trains were very much delayed, and the later trains were not run at all. The line was wholly closed on Wednesday and Thursday, but the passenger train service was resumed on Friday morning (21st), though we were unable to re-commence goods working until Saturday night (22nd), owing to the station yards being thoroughly snowed up.—I am, Sir, your obedient servant,

ROBERT A. DYKES,
Traffic Superintendent.

G. J. Symons, Esq., F.R.S.,

GREAT WESTERN RAILWAY,

General Manager's Office, Paddington Station,
London, W., 10th Feb., 1881.

DEAR SIR,—In reference to your letter of the 3rd instant, I have the pleasure to enclose a copy of a statement which was prepared for

the information of the Directors, at their meeting last week, together with a plan shewing the position of each drift, and a memorandum giving the average depth.

If I can be of any further assistance to you, I shall, on hearing from you, be pleased to supply you with any other particulars in my possession.—Yours faithfully,

J. GRIERSON.

G. J. Symons, Esq., F.R.S.

Average Depth of Drifts on the GREAT WESTERN RAILWAY.

	Depth in feet.		Depth in feet.
Buckinghamshire—		Herefordshire—	
Wychcombe to Aylesbury	6½	Hereford to Mitcheldean Road.	4½
Bourne End to Great Marlow... ..	5	Ross to Kerne Bridge	6
Berkshire—		Hereford to Tram Inn.....	4
Maidenhead to Cookham.... ..	5	Lyons Hall to Almeley	6
Reading to Mortimer	4	Monmouthshire—	
Reading to Thatcham	4	Monmouth to Chepstow	5
Reading to Challow	6	Monmouth to Lydbrook	4
Moulsford to Wallingford	1½	Monmouth to Usk	4
Didcot to Kennington Junc. ...	8	Pontypool Road to Nantyderry.	4
Radley to Abingdon	5	Newport to Llantarnam	4
Uffington to Faringdon	5½	Pontypool Road to Crumlin ...	4
Brecknockshire—		Radnorshire—	
Hirwain Yard	4	Dolyhir to Radnor	7
Cornwall—		Oxfordshire—	
Victoria to New Quay.....	6	Twyford to Henley	3
Menheniot to Liskeard	6	Thame to Wheatley.....	5
Devonshire—		South Leigh to Alvescott	5
Venn Cross to South Molton... ..	9	Chipping Norton Junction to	
Wellington to Collumpton	3	Chipping Norton	3½
Tiverton Junction to Hemyock ..	5	Somersetshire—	
Tiverton Junction to Tiverton.	6	Langport to Martock	6
Torquay to Charston	5	Witham to Yatton	10
Totness to Plympton	13	Yatton to Clevedon	4
Bickleigh to Coryton	6	Weston Junc. to Weston-super-	
Dorsetshire—		Mare	4
Yetminster to Weymouth	10	Brent Knoll to Highbridge ...	5
Maiden Newton to Bridport ...	8	Norton Junction to Williton ...	5
Glamorganshire—		Warwickshire—	
Llwydcoed to Merthy Tydvil..	4	Fennycompton to Southam Rd.	6
Llancaiach to Aberdare	8	Stratford-on-Avon to Milcote... ..	6
Hendreforgan to Gilfach.....	15	Wiltshire—	
Brynmenin to Blackmill.....	3	Swindon to Purton	3
Llanharran to Tondur	4	Swindon to Dauntsey	4
Gloucestershire—		Dauntsey to Somerford	5
Lechlade to Fairford	6	Chippenham to Calne	5
Chipping Norton to Bourton.....	6	Thingley Junction to Melksham ..	5
Stapleton Road to Montpellier..	3	Holt Junction to Seend	4
Narraways Hill to New Passage ..	5	Savernake to Bedwyn	9
Kemble to Brimscombe	5	Savernake to Marlboro	3
Bullo Pill to Churchway.....	15	Westbury to Salisbury	12
Awre Junction to Howbeach... ..	6	Worcestershire—	
Hampshire—		Long Marston to Honeybourne ..	6
Mortimer to Basingstoke.....	4		

Interruptions to Traffic on the GREAT WESTERN RAILWAY.

Total number of places where blocks occurred	...	141			
Total length of drifts	...	Miles.	Chns.	Yds.	
		111	30	6	
Shortest length of drift (between Lidford and Coryton)		—	—	30	
Longest length of drift (between Tiverton Junction and Hemyock)	...	7	20	—	
Total time of stoppage of lines through drifts equal to		Days.	hrs.	mins.	
		190	2	56	
Shortest time any length was blocked (between Lidford and Coryton)	...	—	—	12	
Longest time any length was blocked (between Wallingford and Moultsford)	...	6	3	—	
Total number of Passenger trains snowed up over the system	...				51
Total time delayed equal to	...	Days.	hrs.	mins.	
		25	12	43	
Shortest time a train was delayed (between Savernake and Marlboro')	...	—	—	10	
Longest time a train was detained (between Wallingford and Moultsford)	...	4	22	—	
Number of Goods trains snowed up	...				13
Total time delayed equal to	...	Days.	hrs.	mins.	
		7	4	55	
Shortest time a Goods train was detained (between Paignton and Torquay)	...	—	—	45	
Longest time a Goods train was detained (between Highbridge and Brentknoll)	...	2	4	45	

GREAT WESTERN RAILWAY,

General Manager's Office, Paddington Station,
London, W., 12th February, 1881.

DEAR SIR,—In reply to your letter of the 10th instant, I have to state that I have obtained from the local officers statements giving, as far as they can, the average depth of the snow in undrifted localities in their respective divisions.

Of course there was not a district where the snow did not drift more or less, so that it has been rather a difficult task even to estimate what the depth would have been under ordinary circumstances; but the enclosed memorandum shows, as near as it is possible to judge, the depth of snow in the districts adjacent to the railway in the several counties through which the line passes.

Yours truly,

G. J. Symons, Esq.

J. GRIERSON.

Estimated depth of the snow in undrifted localities adjacent to the Great Western Railway in the several counties through which the line passes.

	ft. in.	ft. in.		ft. in.	ft. in.
Berks	0	6 to 2	0	Merioneth	0 6 to 0 9
Brecknock		0	6	Middlesex	0 10
Carmarthen		0	6	Monmouth	1 6
Cornwall	0	6 to 1	0	Pembroke	0 6
Denbigh		0	6	Radnor	1 3
Devon	1	0 to 1	6	Salop	0 6
Dorset		1	0	Somerset	1 0
Flint		0	8	Stafford	0 3
Gloucester	0	10 to 1	6	Warwick	0 6 to 0 8
Glamorgan		0	6	Wiltshire	1 0
Hampshire	0	10 to 1	0	Worcester	0 5 to 1 2
Hereford	0	10 to 1	6		

METROPOLITAN RAILWAY,

General Manager's Office, 32, Westbourne Terrace,
London, W., 10th February, 1881.

SIR,—In compliance with your application of the 3rd instant, I have pleasure in forwarding details of the extent to which this line was affected by the recent snow storm.

Owing to a considerable portion of our system being underground and protected from the downfall, we were able to continue the traffic on the line, and branch lines, without interruption, though the trains were prevented from maintaining their usual punctuality in consequence of the additional friction created by the snow on the wheels of the carriages and engines, which materially impeded their progress; and further detention was caused by the exceptional increase in the number of passengers who took advantage of our line during the complete interruption of vehicular traffic and train services in London and the suburbs.

On the exposed portions of our line the uniform depth of snow was estimated at from 8 to 9 inches, and in certain places the drifts were 2 feet deep. From three stations alone, we removed in one night 80 wagon loads of snow (equivalent to 560 cubic yards) from the space between the platforms.

We had no casualty of any kind, either to passengers or to our rolling stock, during this severe weather.

I am, Sir, your obedient servant,

JNO. BELL.

G. J. Symons, Esq., F.R.S.

GREAT EASTERN RAILWAY,

General Manager's Office, Liverpool-street Station,
London, E.C., 11th February, 1881.

SIR,—In answer to your letter of the 3rd inst., I beg to enclose you some papers which may perhaps give you the information you want.—I am, Sir, your obedient servant,

WM. BIRT.

G. J. Symons, Esq.

*Return shewing portions of GREAT EASTERN LINES blocked by Snow
Storms of January 18th and 19th, 1881.*

Between what Stations,	Average depth on the level. inches.	Average depth in drift. ft. in.	Obstructions and Remarks.
Tottenham and Park ...	8	3 0	From 12.30 p.m. 18th to 2.10 a.m. 19th; up line.
Broxbourne & Roydon...	8	3 6	From 8.30 p.m. 18th to 1.30 p.m. 19th; up line.
Angel Road and Edmon- ton	8	2 0	From 12.30 a.m. 18th to 12 p.m. 19th; single line.
St. James's Street	8	3 0	From 8.30 p.m. 18th to 7 a.m. 19th; up line.
Theydon and Epping ...	8	2 0	Jan. 18th and 19th, 3 hours each day; single line.
Stanstead and Great Chesterford	8	3 0	From 2 p.m. 18th to 2.3 p.m. 19th; up line. More or less, and trains delayed, snow having to be cut away. Engine working to keep line clear.
Hadham and 'Standon and Buntingford	8	3 0	From 9.50 p.m. 18th to 2 p.m. 20th.
Rye House and Brox- bourne	8	1 3	From 8 p.m. 18th to 1 p.m. 19th.
Oakington and Chester- ton Junction	...	4 to 5	From 6 a.m. 19th to 1.50 p.m. 20th, for about 2 miles in length.
Snailwell Junction and Fordham	...	3 to 4	From 8 a.m. 19th to 9 a.m. 19th, for about 300 yards (single line).
Stretham & Haddenham	...	2 to 4	From 6 a.m. 19th to 7 a.m. 19th, for about 1000 yards (single line).
Saxham and Kennett ...	...	4 to 5	From 9.30 a.m. 19th to 11 a.m. 19th, for about 300 yards.

The average depth on other parts of the Cambridge district, where no drifts, was from 6in. to 8in.

Harling Road & Norwich	12	2 0	Traffic delayed, but not stopped.
Wymondham & Dereham	12	5 0	Light engine and a passenger train blocked in snow 23 hours.
Dereham and Wells.....	12	5 0	Passr. train blocked in snow 46 hrs.
Heacham and Wells.....	12	5 0	Traffic stopped 26 hours.
Norwich and Yarmouth.	12	5 0	Passr. train blocked in snow 8 hours.
Reedham and Lowestoft	12	2 0	Traffic delayed, but not stopped.
Whitlingham and Wrox- ham	12	5 0	Passr. train blocked in snow 38 hrs.
Wroxham and Cromer...	12	5 0	2 do. trains blocked in snow 70 hrs.
Wroxham and Cawston..	12	4 0	Passr. train blocked in snow 3 hours. Traffic stopped 70 hours.
Bures and Sudbury	6	2 0	Goods train delayed ½-hour; blocked about ½-mile.
Cockfield and Lavenham	6	2 0	Passr. train delayed 25 minutes; blocked about 300 yards.
Hythe and Wyvenhoe...	6	2 to 4	Line blocked from 0.30 till 8.15 a.m. 20th.
Wyvenhoe and Bright- lingsea	6	5 0	Line blocked from 0 a.m. till 1.0 p.m. 20th.
Bentley	6	2 6	Train delayed ½-hour; blocked 500 yards.
Mistley	6	2 0	No delays; blocked 100 yards.
Dovercourt and Harwich	6	1 0	„ „ 50 „

Between what Stations.	Average depth on the level. inches.	Average depth in drift. ft. in.	Obstructions and Remarks.
Claydon and Needham..	6	3 0	No delays ; blocked 300 yards.
Haughley & Stowmarket	6	3 0	„ „ $\frac{1}{4}$ mile.
Thurston and Bury ...	6	4 0	„ „ 200 yards.
Walton	6	4 0	„ „ 100 „
Ipswich and Saxmund- ham	2	...	„ up line blocked 200 yds.
Saxmundham and Dars- ham	...	3 0	„ „ „ $\frac{1}{2}$ mile.
Darsham & Halesworth..	...	2 0	1 „
Halesworth & Brampton	...	3 0	Line „ blocked „ „ „ 1 „ blocked $\frac{1}{4}$ -mile.
Brampton and Beccles...	...	1 6	Line blocked 18th and 19th ; up line blocked $\frac{3}{4}$ -mile.
Beccles and Aldeby.....	...	5 0	Line blocked 18th and 19th ; up line blocked $\frac{1}{2}$ -mile up and $\frac{1}{2}$ -mile down.
Aldeby and St. Olave's..	...	3 6	Line blocked 18th and 19th : up line blocked $\frac{1}{4}$ -mile, and down $\frac{1}{2}$ -mile.
St. Olave's and Yarmouth	5	...	No delays.
Felixstowe line	3	2 6	„ single line.
Aldeburgh branch	3	2 6	„ „
Harleston and Tivetshall	5	5 0	Line blocked 18th, 19th, and 20th ; single line.
Harleston and Beccles...	4	3 0	No delays ; single line.
Lowestoft Branch.....	4	...	„ „
Haughley and Norwich..	5	2 0	„ up line.
Brandon	4	3 to 4	Blocked from 1 a.m. to 2.30 a.m. 18th
Harling Road	6	2 to 3	No delays.
Ingham	6	1 to 3	Line blocked from 1 p.m. 18th to 2 p.m. 20th for 1000 yards.
Seven Hills	9	6 9	Line blocked from 1 p.m. 18th to 5.30 p.m. 19th for 1000 yards.
ditto	15	Drifted sand.	
Barnham	9	1 to 3	Blocked 1600 yards from 1 p.m. 18th to 5.30 p.m. 19th.
Thetford Bridge	6	2 to 5	Blocked 440 yards from 12 noon 18th to 11 a.m. 19th.
Roundham Junction.....	6	1 to 2	Blocked 880 yards from 4 p.m. 18th to 10 p.m. 19th.
Wretham and Watton...	6	1 to 4	Blocked $2\frac{1}{2}$ miles from 4 p.m. 18th to 1 p.m. 19th.
Watton	6	3 to 4	Blocked 2 miles from 4 p.m. 18th to 5.30 p.m. 19th.
Watton and Swaffham..	6	1 6	Blocked $1\frac{1}{2}$ miles from 4 p.m. 18th to 10 a.m. 19th.
Dereham and Swaffham.	6 to 9	1 0	No delay.
Narboro and Lynn	6 to 9	2 to 6	Blocked $1\frac{3}{4}$ miles from 8.30 a.m. to 12 noon 19th.
Lynn and Snettisham ...	6 to 9	1 to 4	Blocked $4\frac{1}{2}$ miles from 2 a.m. to 9 a.m. 19th.
Snettisham and Hunstan- ton	9 to 12	2 to 6	Blocked $1\frac{3}{4}$ miles from 2 a.m. to 3.45 p.m. 18th.
Magdalen Road and Littleport	4 to 6	3 to 4	Blocked $\frac{1}{2}$ -mile from 7.30 a.m. to 9 a.m. 18th.
Ely and Littleport	4	...	
Chittisham and March...	4 to 6	...	
March and Peterboro'...	3 to 4	no drift.	

Between what Stations.	Average depth on the level. inches.	Average depth in drift. ft. in.	Obstructions and Remarks.
Wisbech and March.....	3	2 to 3	
Emneth & Middle Drove	3	no drift.	
Stratford Market and Canning Town	8	3 0	Blocked from 3 p.m. 18th to 8 a.m. 19th.
Canning Town and Woolwich	8	3 0	Blocked from 3 p.m. 18th to 2.35 p.m. 19th.
Blackwall line	8	3 0	No delays.
Stratford to Mark's Tey	8	2 6	"
Witham to Bishop's Stortford	10	4 0	Blocked from 8 p.m. 18th to 12 a.m. 19th.
Ditto to Maldon	12	6 0	Blocked from 3.37 p.m. 18th to 2.40 p.m. 19th.

ALFD. LANGLEY.

*Engineer's Office, Great Eastern Railway,
Liverpool-street, E.C., 11th February, 1881.*

MANCHESTER, SHEFFIELD, & LINCOLNSHIRE RAILWAY,

General Manager's Office,

Manchester, 11th February, 1881.

DEAR SIR,—With reference to your letter of the 3rd instant, in which you intimate that you are collecting all the information you can, in conjunction with the Meteorological Society, in regard to the depth of snow during the recent storm in various parts of the country; and asking for particulars so far as the neighbourhood of this Company's lines is concerned.

In reply I have to state that the average depth of snow in the several districts through which our lines of railway and canal pass, would be about six inches, but in some places where it had drifted the depth varied from one to nine feet, as you will see from the following instances:—

Usselby	9 feet.	Congleton	4 feet.
Thornton	9 "	Macclesfield	4 "
Oldham	6 "	Crowden	3 "
Chapel-en-le-frith ...	6 "	Dunford Bridge ...	3 "
Manchester	5 "	Attercliffe	3 "
Marple	5 "	Frodingham	1½ "

The working of the traffic was, of course, very seriously impeded, and in several instances we were compelled to suspend the train service, particularly on the Lincoln and Barnetby section of our line, and also on the main line between Ulceby and New Holland;—indeed in several places between the points named large drafts of men were employed in removing the obstruction caused by the drifted snow, and in some cases they were thus engaged for a period of about 20 hours.

I may mention that a very melancholy accident occurred on the branch line between Lincoln and Barnetby, near to Usselby, on the night of the 18th January, whereby four of our servants were run over and killed by a passing engine whilst endeavouring with the aid

of a snow-plough to clear the line, and to extricate a train of passengers which had become embedded in the snow.

From the 13th January to the 2nd February, the whole of our Macclesfield Canal, extending from Marple to Hall Green, and the greater portion of the Peak Forest and Ashton Canals, extending from Manchester to Whaley Bridge, were frozen over and traffic was entirely suspended.

If you wish for any further information on the subject, generally, and will let me know what it is, I shall have pleasure in furnishing it, so far as our records will enable me to do so.

Yours faithfully,

R. G. UNDERDOWN,

General Manager.

G. J. Symons, Esq.,

LONDON AND NORTH WESTERN RAILWAY,

Office of the Superintendent of the Line, Euston Station,
London, February 12th, 1881.

DEAR SIR,—I have the pleasure to enclose you herewith, as requested in your favour of 3rd inst., the particulars I have been able to gather respecting the general effect of the snow-storm on the 18th January—the average depth of the snow, and in drifts, and the obstruction caused to traffic thereby—as far as this company's system is concerned.—Yours faithfully,

G. P. NEELE.

G. J. Symons, Esq.

District Superintendent's Office, Euston Station,
February 12th, 1881.

DEAR SIR,—The effects of the snow-storm on Tuesday, 18th ult., began to be seriously felt on the traffic in the afternoon. The last train from Euston that got through to Stafford on that day was the 5.0 p.m. for Liverpool, which lost about 60 minutes travelling 133 miles.

The first train that got through to Rugby on the 19th left Euston at 9.15 a.m., about which time the local suburban service from Euston commenced to run with a fair degree of regularity. A train conveying the whole of the night and morning mails, was started from Euston at 10.35 a.m. The local service throughout Wednesday north of Watford was only partially resumed over the main line.

About 18 of the up express and long distance passenger trains starting on the 18th were seriously impeded and arrived at Euston from 2h. 30m. to 14h. 30m. behind their due time.

The first train into Euston on the 19th was a local passenger train from Willesden, which arrived at 9.12 a.m. The first express passenger train arrived at 10.3 a.m.

Before the main lines became obstructed on the 18th very serious difficulties were encountered in the making up and shunting of trains in consequence of the character of the snow and the high wind, which caused the points to be clogged and prevented them being used, even although men were constantly employed cleaning them

out ; the axle boxes of the vehicles also became clogged with snow, preventing the axles from revolving. This necessitated one of the local suburban services in connexion with Willesden Junction being suspended between 3 and 4 o'clock, and later on the whole of these services had to be stopped. These trains could not resume running until the 20th.

The undermentioned branch lines between London and Stafford were blocked on the 18th, and traffic on them was resumed on the dates named :—

St. Alban's Branch.....	19th
Rickmansworth	19th (partially)
Aylesbury	20th
Dunstable.....	21st
Oxford	20th (one train went through late on the 19th).
Banbury	20th
Cambridge	19th

Although practically two sets of rails on the main line were opened on the Wednesday, the storm raged with considerable violence throughout the day and especially towards evening, some distance down the line, causing frequent temporary blockages, but as a very large staff of men was employed at all points, the difficulties were got through with only occasional delays of about 60 minutes.

The coal and goods traffic of course had to be suspended until the accumulation of passenger trains had been worked off. The goods were released on the Wednesday night, and on Friday some of the coal traffic was allowed to come forward, We had to work throughout the whole of Sunday in order to get away some of the accumulation of the latter traffic ; and no fewer than 75 specials were started on Sunday in the direction of London from Rugby, Nottingham, South Wales, &c.

To give some idea of the quantity of snow that obstructed the line I may mention that at Tring cutting alone, at which place the drift principally affected the slow lines, no fewer than 1700 wagons had to be loaded and conveyed to a convenient place for unloading.

Yours truly, E. M. G. EDDY.

G. P. Neele, Esq.

Abstract of data furnished by the Engineers and Superintendents,
LONDON AND NORTH WESTERN RAILWAY.

District.	Average depth. inches.	Drifts. feet.	Obstruction.
London to Bletchley	7	6 to 8	Lines more or less blocked, and several trains had to be dug out.
Buckinghamshire	7	6 to 8	Blocked 8 p.m. 18th to 8 a.m. 20th.
Leighton to Dunstable ...	7	3 to 5	Blocked 8 p.m. 8 p.m. 18th to noon on 21st.
Cambridge line	6	3 to 4	Blocked for 12 hours on 19th, about 5 miles W. of Cambridge.
Bletchley to Rugby	5		
Northampton to Market } Harboro'	6 to 10	6 to 12	} Blocked in three places from 9 p.m. 18th to 7 p.m. 20th.

District.	Average depth. inches.	Drifts. feet.	Obstruction.
Northampton to Peterboro'	6	6	Blocked near both termini.
Rugby to Birmingham.....	5 to 10	2 to 6	None.
Rugby to Stamford	6	6	Blocked near Rugby.
Market Harboro' to Melton	6	6	Blocked in two places.
Rugby to Leamington and Coventry	12 to 13	3 to 6	{ Men out all night, and no actual stoppage.
Shrewsbury to Manchester	...	under 5	
Between Shrewsbury, Stafford, Buxton, Stock- port, Warrington, and Chester	4 to 6	under 3	Nothing serious.
Trent Valley—South end..	4	2 to 4	None.
„ „ North end..	2½	„	None.
Manchester to Huddersfield	6	2 to 3	None.
Manchester to Liverpool..	4 to 6	2 to 4	Slight block about 10 miles W. of Manchester.
Wigan to Preston.....	6	5	Considerable interruption ; several goods trains ran into drifts, some as early as 11 a.m. on 18th.
Preston to Carlisle	3	under 1	None.
Whitehaven to Keswick...	4	none	None.
Near Swansea	2	2	None.
Llandovery to Knighton...	7	5 to 10	None.
Abergavenny to Merthyr..	19	10 to 13	Earliest block 5 p.m. on 18th ; generally clear 9 a.m. 20th ; last block, that at Dowlais, cleared 9 a.m. 21st.
Chester to Conway	12	2 to 10	
Llandudno branch	12	4 to 6	More than a mile ; blocked 48 hours.
Conway to Bangor	12	5	One-and-a-half miles near Aber ; blocked about 12 hours.
Anglesey Central .....	...	6½ to 10	Blocked 24 hours.

THE FROST OF JANUARY, 1881.

FROM January 7th to 26th an intensely severe frost prevailed over the whole of the United Kingdom, which for severity has not been equalled since the winter of 1814; but that was more remarkable for its long continuance, than for its extreme severity. On every day from the 7th to the 12th the temperature fell below 10° at several places in the south of Scotland, and readings below 20° prevailed over the greater part of Scotland, the north-west of England, and the central part of Ireland, and frost occurred all over the United Kingdom except at a few of the extreme sea coast stations. On the 13th the lowest reading registered was -2° at Cardigan. Temperatures below 20° prevailed over almost the whole of Scotland, the western half of England, and the greater part of Ireland. On the 14th readings below zero occurred in several parts of the country, the lowest being -4° at Corwen, -3° at Cardigan, and -1° at Achonachie, Alston, Ketton, and Lauder, while temperatures below 20° prevailed at all places except at some of the extreme sea-coast stations and the west of Ireland. On the 15th the frost became more intense all over the country, readings below 10° prevailing over the south of Scotland, the whole of the inland districts of England and Wales, and several parts of Ireland. On the 16th the frost was more intense than on the preceding day, temperatures below zero being registered in the south of Scotland and the north and north-west of England. The lowest readings were -12° at Blackadder, -10° at Stobo, -8° at Kelso and Corwen, -7° at Scaleby and Alston, -1° at Blackpool, and 0° at Chester. Temperatures below 10° were registered over the greater part of Scotland, England, Wales and Ireland, while readings below 20° prevailed all over the United Kingdom, except at the extreme sea-coast stations. On the 17th the temperature fell below zero over the south of Scotland and north of England, the lowest readings being -22° at Blackadder, -16° at Kelso, -15° at Stobo, -11° at Lauder, and -10° at Melrose. Readings below 10° degrees prevailed over the greater part of Scotland, England, Wales, and Ireland, while the temperature fell below 20° at all stations, except at the extreme sea-coast stations. On the 18th the lowest readings registered were, -15° at Stobo, -12° at Blackadder and Kelso, -10° at Melrose and -4° at Wick. The temperature fell below 10° over the greater part of Scotland and the north, east and west of England, while readings below 20° prevailed all over the United Kingdom. On the 19th the frost was not so severe, but still temperatures below 20° prevailed over the whole of Scotland and the central part of Ireland, while readings below 32° were registered at all places in the British Isles. On the 20th the frost became more intense, the region of greatest cold having travelled further south. The lowest readings were -4° at Ketton, -3° at Cheltenham, and 0° at Haltwhistle and Stokesay. Readings below 10° were registered over the southern half of Scotland, the north-west

and central parts of England and Wales and several parts of Ireland, while the temperature fell below 20° over almost the whole of the United Kingdom. On the 21st the lowest readings were, -10° at Haydon Bridge, -5° at Cardigan, -3° at King's Sutton, and -1° at Stokesay. Readings below 10° were registered in the south of Scotland, the greater part of England and Wales and the central part of Ireland, while the temperature fell below 20° at all places, except a few of the extreme sea-coast stations. On the 22nd readings below 10° were registered in the south of Scotland, the north-west, southern, and central parts of England, and the central part of Ireland, while the temperature fell below 20° at all places except in the eastern part of Scotland, the north-east of England, and at a few of the sea-coast stations. On the 23rd, the temperature at all places was much higher than on the previous day, and was not much below the freezing point except in the north-east of Scotland. On the 24th the temperature had fallen considerably, readings below zero being registered in the south-east of Scotland; the lowest reported were: -10° at Blackadder, -7° at Stobo, -4° at Lauder, and -1° at Melrose. The temperature fell below 10° over the southern part of Scotland, the greater part of England, and the north-west of Ireland; and frost occurred at all places except Sandwick, Falmouth, Penzance, and Scilly. On the 25th the lowest readings were: -7° at Bury St. Edmunds, -6° at Cardigan and Stobo, -4° at Corwen, and -2° at Arncliffe. Readings below 10° were registered in the south of Scotland, the greater part of England and Wales, and the north-west of Ireland. Frost occurred at all places except at Valentia, Scilly, and the extreme north of Scotland. On the 26th the cold was more intense in several parts than on the previous day. The lowest readings were: -16° at Blackadder, -9° at Sorrel Sykes, -8° at Melrose and Raby Castle, -3° at Aysgarth, and -1° at Churchstoke. Readings below 10° were registered in the central and south-eastern parts of Scotland; the north, north-west, east, and south-west of England; the central part of Wales; and the north of Ireland. Temperatures of 20° prevailed over the greater part of Scotland, nearly the whole of England and Wales, and the greater part of Ireland; while readings above 32° were registered only at Sumburgh Head, Sandwick, Scourie, and Roches Point.

During the day the temperature began to rise, and ultimately a thaw set in.

THE FUTURE OF WEATHER FORETELLING.

ATLANTIC MONTHLY.

IN no other part of her wide realm has Science done so little for the good of man or her own fame as in the department of meteorology. In the solid earth her prophecies have long had a high value, in the far-off heavens her empire is affirmed, but in the unstable air between these two well-possessed provinces there is a region that is not yet subjugated. Around the border of the domain of meteorology some

gains to the cause of law and order have indeed been made : we control the lightning, we are able to track a clearly-defined storm for days on its path, and can help the sailor to knowledge that often enables him to escape its clutches when it assails him on the deep sea ; but as for foretelling the weather in any proper sense, we have not yet attained to it. Is it attainable ? Can we hope to compass the conditions of our days so that we may sow and reap, travel, feast, or make war in weather of our choice ?

It is desirable that the work should be supplemented by a set of studies of the extra Gulf Stream—that little-known division of it that passes outside of the West Indian Archipelago. This could only be accomplished by an untried system of buoys, or by steamers cruising in those waters. This system of observations should occupy as many vessels as could be afforded for a few years : in a decade it should be possible to learn the laws of flow of the Gulf Stream in the Antillan and Floridian regions so well that thenceforth three cruising steamers would probably accomplish all the result sought for. It might be found useful to extend the observations by a system of studies on the course of the Gulf Stream north of the Straits of Florida ; but while these inquiries would have a general scientific interest, and would serve to supplement the excellent observations made by the United States Coast Survey, it is not likely that they would throw much additional light upon the problem we are now considering. It is probable that the rate of flow and volume of the Gulf Stream when it passes the Straits of Florida, with the observations on the varying force and direction of the winds of the North Atlantic,—which latter point could be determined by the logs of the transatlantic steamers,—would suffice for determining the volume and heat-carrying power of this current. The effects of the Gulf Stream are greatly intermingled with that of the Japan current, its twin stream in the Pacific Ocean. It is certain that the Japan current has much less influence on the temperature of the lands about the boreal pole than the Gulf Stream has, yet the effects it has cannot be neglected if we would get an adequate idea of the possibilities of predicting the seasons in the northern parts of Europe and America. The study of this stream would be far more perplexing than that of the Gulf Stream. We know as yet much less of its general structure than we do of its Atlantic equivalent, and the acquisition of this knowledge will be a more difficult task. At no point does the Japan stream pass through such a gate-like channel as the Gulf Stream when it traverses the Straits of Florida. Its history must be sought in the open regions of the western part of the Pacific Ocean, where it finds its devious way among the coral islands of the great archipelagoes with which that sea is studded. It would probably require at least four times as many observers to trace the movements of the Pacific stream as we should need for the Atlantic current, and it would be necessary to have a careful system of weather reports from Oregon and the coast to the northward as far as Behring's Straits.

We should also need current observations on Behring's Straits, to determine the amount of Pacific water that enters the Polar Sea through that gate-way, if any part whatever passes that gate.

It is likely that next after the action of these ocean currents, the most powerful agent of climatic change is to be found in the relative amount of solar heat received on the earth during different years. It now seems probable that the sun's heat does vary in its power from one series of years to another. The actual value of this element of solar radiation would have been much better known were it not for the fact that our meteorological stations have been very badly placed for observations on this matter. Almost all our stations where observations on the radiant power of the sun are made are accumulated in the regions where frequent clouds and a great variation in the heat transmitting power of the atmosphere have made it impossible to obtain very accurate results. We need a number of stations chosen solely for the measurement of the sun's radiant energy, and placed in those regions where the most perfectly cloudless skies could be found. There are several regions where the skies are practically without clouds for from three to six months each year, and by comparing the observations of several stations together we could probably get a close reckoning of the value of the sun's heat for each day in the year. With such a system of observation we could hope to have the basis for approximately predicting the heat and rainfall of the lands around the North Atlantic Ocean. It would doubtless require some years of careful study before the relations between the facts observed and the subsequent climatic conditions could be clearly discerned, but as soon as the matter was well in hand we could hope for forecasts of a very valuable nature concerning the economic weather that the growing season would be likely to bring to the several lands. Predictions of this sort, even if fulfilled only in general terms, would have a very great value. In all our husbandry there is more or less choice between several crops which suit different sorts of weather. A farmer may make sure of a crop of oats in just such weather as that in which he would lose his crop of maize, and forage plants do well in conditions that are much against wheat. There can be no doubt that as a whole, such predictions would be more generally profitable than any extension of the present system of brief forecasts of weather can be. To carry out such a scheme would require great continuity of labour, and probably a great degree of patience under failure that is hardly to be expected from any one government. It seems to me that the risk could be better taken and the work better done by a commission that should be appointed by several maritime States of the Atlantic. The United States, England, France and Germany, could divide the cost of such a work without feeling the burden, and a board of experts could be easily chosen from among their scientific men, who would direct the researches. Supposing that the half dozen or so of steamers could be loaned and maintained by the

several governments from their naval forces, the total cost of the inquiry, including a sufficiency of stations to observe the Gulf Stream, the Pacific currents, and the solar radiation, should not exceed £100,000, less, indeed, than is required to maintain a regiment in a field or a war ship on the seas. Even if the results of this inquiry should be to show that the unobserved and at present unobservable forces that enter into the making of our several climates so far perturb the action of these great factors which it is proposed to study that we could not use them for forecasts, still the inquiry would not be in vain. We should have gained in a few years, and with a completeness we could secure in no other way, a knowledge of the facts concerning some of the most momentous phenomena of climate, and should have a better chance for making effective our further inquiries into its problems. It is not reasonable to suppose, however, that the inquiry would meet with a complete check; there can be no tenable doubt of a certain measure of success; and, as in all great inquiries, the elements of failure will themselves be the germs of successes by pointing the way to supplementary inquiries which will narrow the limits of the unknown. In connection with this scheme an international commission could doubtless do very much to extend our general knowledge of thalassography, or the physical geography of the sea, by recommending to their several governments a system of observations at sea, to be made by their merchant marines. The United States have already won an enviable prominence for their surveys of the wild countries that fall to their lot. They are, moreover, peculiarly well placed for this inquiry, as they constitute the only State that lies upon the two great climate-making seas of the earth. There seems a certain fitness in their undertaking to lead in this inquiry. The work could best be done as a joint work, but if the other States which should feel a peculiar interest in this task should neglect it, it would be fit that our own Government should itself take up the burden. It is surely many times more promising of results to science and to the more immediate interests of humanity than all the schemes for attaining the north and south poles that now vex the spirit of adventurous peoples. Our Government made the first adequate beginnings in the work of forecasting the weather, and it did the first good work that was done in the study of the marine currents. It can well afford to follow up these lines of inquiry, which are clearly adapted to the genius of its people.

JANUARY, 1881.

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 .01 or more fell.					
				Dpth	Date.						
									Max.	Min.	
		inches.	inches.	in.		Deg.	Date.	Deg.	Date.	In shade.	On grass.
I.	Camden Square.....	1.85	— .50	1.08	18	8	48.4	30	11.8	17	20 27
II.	Maidstone (Hunton Court)...	1.03	— 1.54	.23	26	15	...	...	...	...	...
III.	Strathfield Turgiss	1.02	— 1.53	.29	18	10	49.1	31	3.9	22	21 26
III.	Hitchin	1.05	— 1.17	.24	29	12	42.0	2+	5.0	20	25 ...
IV.	Banbury	1.34	— 1.04	.49	19	11	44.0	30+	6.0	15	26 ...
IV.	Bury St. Edmunds (Culford)...	1.93	— .91	.20	26	12	47.0	30	1.0	21	23 ...
V.	Norwich (Cossey).....	1.15	— .55	.17	27	16	47.0	30+	1.0	26	23 24
V.	Bridport	3.20	...	...	...	...	48.0	30	6.0	22	21 ...
"	Barnstaple.....	1.74	— 2.52	.33	30	11	52.0	31	8.0	26	...
"	Bodmin	2.24	— 4.27	.42	28	17	48.0	31	12.0	6	20 25
VI.	Cirencester	1.50	— 1.88	.42	18	8	...	...	...	...	...
"	Church Stretton (Woolstaston)	...	...	...	...	...	...	...	...	...	...
"	Tenbury (Orleton) .....	.65	— 2.34	.20	18	11	47.5	31	4.3	22	22 25
VII.	Leicester (Town Museum) ...	.59	...	.18	18	10	47.0	31	5.2	15	12 19
"	Boston .....	.77	— .95	.21	27	8	45.0	31	2.0	15	22 ...
"	Grimsby (Killingholme) .....	.92	— .84	.32	12	15	42.0	5§	9.0	15	19 ...
"	Mansfield .....	.69	— 1.74	.32	12	9	45.2	1	6.0	15	23 27
VIII.	Manchester (Ardwick).....	1.71	— 2.53	.17	17	9	52.0	31	10.0	17**	23 ...
IX.	Skipton (Arncliffe) .....	.92	— 6.00	.22	30	11	46.0	2	—2.0	25	21 ...
X.	Malton .....	...	...	...	...	...	...	...	...	...	...
X.	North Shields	1.65	— .19	.42	13	15	46.0	2	6.0	26	23 25
XI.	Borrowdale (Seathwaite).....	1.26	— 17.49	.56	30	10	...	...	...	...	...
XI.	Cardiff (Ely)	2.91	— 3.36	.64	20	12	48.5	30	1.0	20	23 26
"	Haverfordwest .....	...	...	...	...	...	...	...	...	...	...
"	Aberystwith Goginan .....	...	...	...	...	...	...	...	...	...	...
XII.	Llandudno.....	1.79	— 1.17	.62	15	10	48.2	29	14.5	26	20 ...
XII.	Cargen .....	.61	— 5.50	.18	27*	8	47.6	2	7.0	17	21 ...
XIV.	Hawick (Silverbut Hall).....	1.61	— 2.63	.20	12	6	...	...	...	...	...
XIV.	Douglas Castle (Newmains)..	1.72	— 3.72	.65	18	12	...	...	...	...	...
XV.	Loch Long (Arddaroch) .....	...	...	...	...	...	...	...	...	...	...
"	Kilmory .....	.80	— 7.17	...	...	...	...	...	10.0	16	24 ...
"	Mull (Quinish)	1.02	...	.24	25	14	...	...	...	...	...
XVI.	Loch Leven .....	.70	— 3.12	.20	21	6	...	...	...	...	...
"	Arbroath .....	.93	— 1.52	.18	18	8	45.0	3	8.0	17	25 ...
XVII.	Braemar .....	.63	— 2.15	.29	19	9	49.5	29	—4.0	17	25 30
XVII.	Aberdeen	1.90	...	.41	19	16	46.0	2	4.0	17	25 ...
XVIII.	Portree	2.21	— 6.94	.67	14	15	...	...	...	...	...
"	Inverness (Culloden) .....	.64	— 1.11	...	...	...	48.0	2	4.0	14	24 29
XIX.	Dunrobin	1.29	...	.35	14	10	49.0	4	13.0	17	25 ...
"	Sandwick	2.57	— .77	.39	18	21	48.6	2	7.8	18	15 21
XX.	Cork (Blackrock).....	1.52	— 4.50	.74	26	9	51.0	29	8.0	15	21 ...
"	Darrynane Abbey.....	1.56	— 5.10	.80	25	9	...	...	...	...	...
"	Waterford	1.99	...	.67	17	14	50.0	29	10.0	17	22 ...
"	Killaloe .....	.64	...	.27	26	6	52.0	28	7.0	16++	25 ...
XXI.	Portllington	1.21	— 1.85	.67	17	14	47.0	30	11.0	21	22 ...
"	Monkstown .....	.79	...	.33	17	11	49.3	28	11.0	17	14 ...
XXII.	Galway .....	.27	...	.13	4	5	50.0	1, 2	13.0	17++	21 ...
XXIII.	Waringstown .....	.78	— 2.63	.26	17	14	49.0	30	—1.0	21	23 26
"	Londonderry.....	.72	...	.20	11	14	53.0	2	14.0	22	20 27
"	Edenfel (Omagh)	1.43	— 3.34	.16	19	9	46.0	1, 2	—3.0	23	25 ...

* And 30. + And 29, 30 & 31. ‡ And 31. § And 6, 30 & 31. || And 25.

¶ And 21. ** And 26. †† And 17. ‡‡ And 20 & 22.

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

METEOROLOGICAL NOTES ON JANUARY.

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.

BANBURY.—Mean temp. $28^{\circ}5$, min. temp. 6° ; the lowest registered since Christmas Eve, 1860. Magnificent aurora on 31st.

CULFORD.—The weather throughout the month was very severe.

BODMIN.—The severest January recorded; mean temp., $33^{\circ}4$.

CIRENCESTER.—The coldest month for many years.

ORLETON.—The temp. of the first six days was not lower than the average, but on the 7th frost set in and continued with unexampled severity till the 27th, when a gentle thaw commenced with fog and a cloudy sky. The mean temp. of the month was about $10^{\circ}5$ below the average, and was the lowest recorded for a period of more than 50 years. On the 25th the ther. never rose above 19° , and on 7 nights it registered a minimum varying from $4^{\circ}3$ to $9^{\circ}5$. The rivers were all frozen over about the 15th. Bright aurora on 31st.

BOSTON.—Mean temp. of month 10° below the average; for 15 days the mean day temp. averaged 21° . The ice on the river was $6\frac{1}{2}$ in. thick, and the drift ice in the haven accumulated in blocks from 10 to 12 feet in thickness.

KILLINGHOLME.—Quite an arctic month; temp. never reached 40° from 5th to 30th. Navigation of the Humber from 24th to 29th more difficult and dangerous from ice and fog than was ever remembered.

MANCHESTER.—A comparatively dry month; frost set in on the 7th, and continued with varying intensity until the 27th, when a thaw set in. Mean temp. unusually low.

WALES.

HAVERFORDWEST.—The severe frost of this January far exceeds anything I have recorded during 36 years. Minima in shade as low as 1° , 2° , 5° , 6° , and 7° were registered, and on the 20th, the coldest day, the max. was 18° . River Cleddan so frozen as to quite obstruct navigation. Fine aurora on 31st.

LLANDUDNO.—The month is memorable for the intensity and persistency of frost and amount of S, in both respects far exceeding anything within my experience of this place, which dates from 1858. The mean temp. ($34^{\circ}6$) was about 10° below the average of 20 years. Fine aurora on 31st.

SCOTLAND.

CARGEN.—The month was an unusually calm one; sunshine and pressure above the average. Mean temp. $9^{\circ}1$ below it.

HAWICK.—The first six days were mild; frost set in on the 6th and was very severe; garden produce nearly all reduced to pulp, and many shrubs killed; the severest winter remembered; fine aurora on 31st.

BRAEMAR.—A very cold month but calm; quantity of S not at all unusual. Very brilliant aurora on 31st.

ABERDEEN.—An intensely cold month throughout; brilliant aurora on 31st.

PORTREE.—A very cold month with extremely hard frost and S; a grand display of northern lights on 31st.

CULLODEN.—The month will be long remembered for the continued intensity of the frost and the exceedingly low temps., which are without parallel in the last 40 years.

SANDWICK.—One of the coldest Januaries we have ever had, the temp. being $5^{\circ}6$ below the mean of 54 years. On the 1st there was a thaw, which cleared the S off the ground, but on the 10th another set in, one of the most severe we have ever had. On the 18th, the exposed ther. registered $-1^{\circ}3$, the lowest during 20 years. Aurora on 31st.

IRELAND.

DARRYNANE.—A remarkably dry, but cold month; continuous frost from 2nd to 25th, very severe for the last ten days.

KILLALOE.—Frost very severe, a large portion of Lough Derg frozen over, and all traffic suspended for a fortnight. Aurora on 31st.

MONKSTOWN.—The month commenced somewhat mild; frost set in on 8th

and continued with varying intensity till 26th, excepting a slight thaw on 23rd. Brilliant aurora on 31st.

WARINGSTOWN.—Very severe frost set in on 10th and continued till 26th. Min. temp. on 21st the lowest recorded since observations commenced in 1860.

LONDONDERRY.—Frost the most severe for 15 or 16 years ; ice in some places 12 to 18 inches thick.

SUPPLEMENTARY TABLE OF RAINFALL IN JAN., 1881.

[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 .....	...	XI.	Corwen, Rhug	·63
„	Margate, Acol	1·24	„	Port Madoc	1·46
„	Littlehampton	1·98	„	Douglas .....	...
„	St. Leonards	1·17?	XII.	Carsphairn	1·09
„	Hailsham	·56?	„	Melrose, Abbey Gate ..	2·43
„	I. of W., St. Lawrence.	2·78	XIV.	Glasgow, Queen's Park.	·40
„	Alton, Ashdell .....	...	XV.	Islay, Gruinart School..	1·07
III.	Great Missenden	1·17	XVI.	Cupar, Kembach	·80
„	Winslow, Addington ...	1·54	„	Aberfeldy H.R.S.	·27?
„	Oxford, Magdalen Col..	1·19?	„	Dalnaspidal .....	...
„	Northampton	·73?	XVII.	Tomintoul	1·77
„	Cambridge, Merton Vil.	1·11	„	Keith H.R.S.	1·40
IV.	Harlow, Sheering	1·37	XVIII.	Forres H.R.S. ....	...
„	Diss	1·26	„	Strome Ferry H.R.S....	1·28
„	Swaffham	1·02?	„	Lochbroom	·50
„	Hindringham	1·22	„	Tain, Springfield	·47
V.	Salisbury, Alderbury ...	·95?	„	Loch Shiel, Glenfinnan.	1·76?
„	Calne, Compton Bassett	1·84	XIX.	Lairg H.R.S.	4·38
„	Beaminster Vicarage ...	3·30	„	Altnabreac H.R.S. ....	...
„	Ashburton, Holme Vic.	3·50?	„	Watten H.R.S.	1·31
„	Langtree Wick	1·82?	XX.	Fermoy, Glenville	1·48
„	Lynmouth, Glenthorne.	1·31	„	Tralee, Castlemorris ...	1·30
„	St. Austell, Cosgarne...	2·54?	„	Cahir, Tubrid	1·11
„	Taunton .....	...	„	Tipperary, Henry St....	·65
VI.	Bristol, Ashleydown ...	1·89	„	Newcastle West .....	...
„	Ross	1·65	„	Kilrush	·84
„	Wem, Sansaw Hall	·50	„	Corofin	1·07
„	Cheadle, The Heath Ho.	·39	XXI.	Kilkenny, Butler House	...
„	Bickenhill Vicarage ...	1·14	„	Carlow, Browne's Hill..	2·00
VII.	Melton Mowbray	1·19	„	Kilsallaghan .....	...
„	Horncastle, Bucknall ...	·71	„	Navan, Balrath	1·00
VIII.	Walton-on-the-Hill .....	...	„	Athlone, Twyford	1·13
„	Broughton-in-Furness ..	1·04	„	Mullingar, Belvedere ...	...
IX.	Wakefield, Stanley Vic.	·31	XXII.	Ballinasloe	·82
„	Ripon, Mickley	·50	„	Clifden, Kylemore	2·73
„	Scarborough	1·38	„	Crossmolina, Enniscroe..	2·07
X.	Mickleton	·54	„	Carrick-on-Shannon ...	·88
„	Haltwhistle, Unthank..	·54	XXIII.	Dowra	·58
„	Shap, Copy Hill	·51	„	Rockcorry	·45
XI.	Llanfrehfa Grange	2·32	„	Warrenpoint	1·19
„	Llandovery	1·65	„	Newtownards	·66
„	Solva	2·27	„	Carnlough	·75
„	Castle Malgwyn	1·28	„	Bushmills	1·36
„	Rhayader, Nantgwilt..	1·46	„	Buncrana	·95
„	Carno, Tybrite	·68			