

STEVENSON'S THERMOMETER STAND.
[See page 2.]

SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

XXXVII.]

FEBRUARY, 1869.

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INTRODUCTORY.

It has been our practice, in each preceding volume, to prefix a few words, by way of introduction, greeting, or prospectus. The plan may be unusual, may be open to some objections, but to us it seems more worthy of retention than abandonment. It calls upon us to review the volume completed, and to gird ourselves for new efforts in the forthcoming one. It calls upon our readers to remember that the progress of any branch of science depends in part upon the publications devoted to it—that if they are independent and progressive, the science is far more likely to advance, than if they are lethargic or dead. We rejoice to know that the *Meteorological Magazine* commences its fourth volume with an increased staff of correspondents, with a steadily increasing circulation, double its original size, and copiously illustrated. We never made promises of the grand things we would do, and we leave our past to indicate our future. In conclusion, we would remind our readers that the progress of a scientific periodical very much depends upon themselves; if they are prompt in supplying local information, and in pointing out any errors, editorial or otherwise, it will tend to keep the whole staff up to their work; and if they, by their recommendation, still further increase the circulation, they will soon find a corresponding increase in the quality and quantity of its contents.

THERMOMETER STANDS.

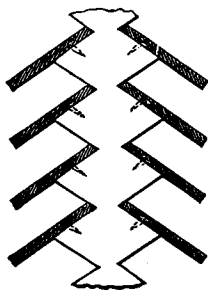
At last we are approaching the termination of our long series of descriptive articles. The entire set at Strathfield Turgiss includes varieties of mounting briefly designated by the following names, which may be grouped in three columns—

Already described.	Described in this Number.	To be described.
Lawson's Glaisher's Martin's James's Morris's	Stevenson's Stow's Griffith's	Welsh's = Kew. Pastorelli's 13 feet, <i>i.e.</i> elevated Aspirated.

We therefore hope to conclude the individual descriptions in our next, and to proceed to details of the very important experiments now in progress.

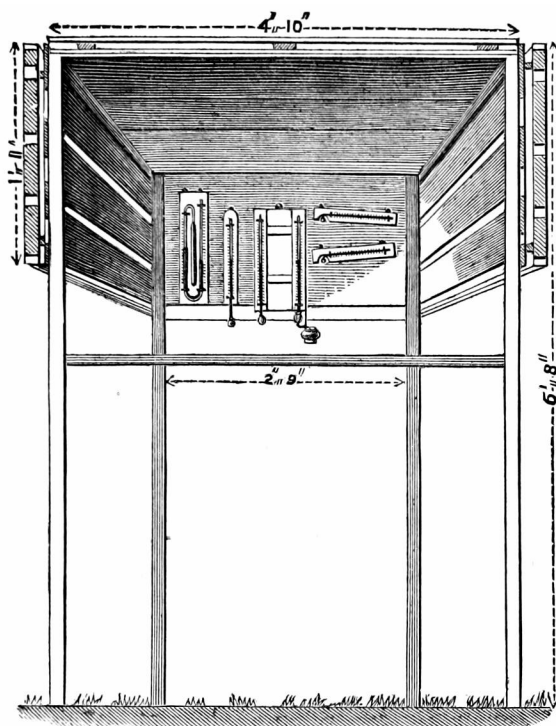
STEVENSON'S STAND

Is represented on the frontispiece, the northern side being shown as let down when observations have to be taken—ordinarily the north side is up like the other three, and the thermometers are thus protected most infallibly from any possible solar rays ; the top of the box is solid, to keep out the rain ; the small capped chimney prevents the accumulation of heated air, and the bottom is perfectly open ; the venetians are fitted by the ingenious plan shown in the annexed figure, and the thermometers hung as shown in the frontispiece. Refraining as we have hitherto done from forming any opinion on the merits of any of the stands, we cannot help most heartily approving the arrangements connected with this pattern, namely, that the manufacture is in the hands of one firm, that the dimensions are all settled, the materials, construction, and price, uniform in every respect, so that there is no room for doubt or uncertainty. It may be a good pattern, it may be a bad one, but this much is certain, that wherever a Stevenson's stand is used, we must always have the same corrections, if any, to apply.



GRIFFITH'S STAND.

Mr. Griffith desires to explain that his stand was not intended for competition ; it was like scores of others, an original design, because at the time of its erection no other pattern was known to him. It is brought into the competition by the fact of the other stands being all congregated in the rectory grounds, and because the extreme simplicity of its shape renders it one of the cheapest forms of stand, and one which any village carpenter could readily construct. It consists, as will be seen, of double boards with intervening spaces, and at the back



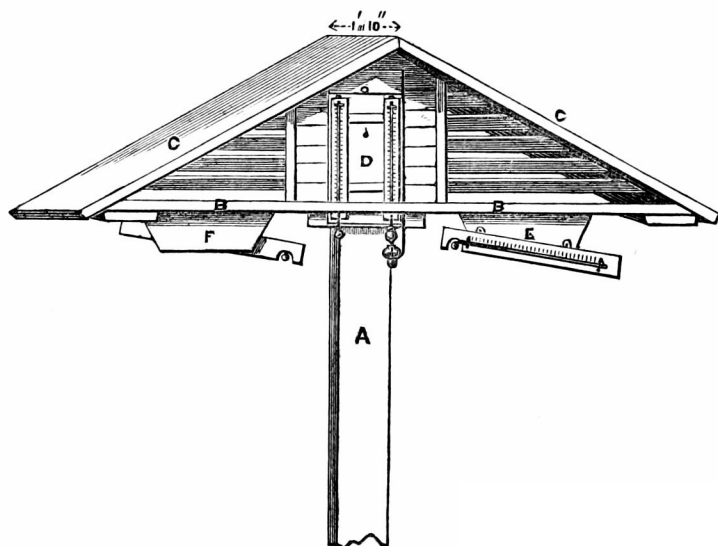
AVLOR.

of triple boards, also separated by air spaces ; the sides are brought so far forward as to prevent either morning or evening sun ever reaching the thermometers.

The stand also has a flat board, one inch thick, painted white below, fixed a few inches below the bulbs of the thermometers, indicated in the sketch by a shaded line drawn across from the one outer post to the other, to prevent heat being radiated or reflected from the ground to the bulbs of the instruments ; this board covers the whole space enclosed by the four outer posts. The two thermometers on the right of the stand are not in immediate contact with the wood, large holes being bored in their rear to admit freely the air after it has passed the two outer sheltering screens. The board to which the thermometers are affixed is set back about two feet from the outer front and wings.

STOW'S STAND.

This stand may be considered a modification of that invented by Mr. Glaisher, the thermometers being placed in the same positions relatively to each other, and exposed, as in the Glaisher stand, to a perfectly free circulation of air. It was contrived about two years ago by the Rev. F. W. Stow, M.A., F.M.S., and has been in constant use since. It is generally expedient that the designers of new things should themselves describe them ; we have therefore prevailed on Mr. Stow to favour us with the following :—



Referring to the engraving, A is a stout post, firmly fixed in the ground, and steadied by lateral supports. It is narrowed to a circular rod of $2\frac{1}{2}$ inches diameter from the point where it passes through the horizontal board (B), and its upper end, on which the weight of the stand principally rests, is inserted in a block of wood placed in the angle of the boards (c c). The whole frame turns upon the post (A), but though a convenient arrangement, it is not absolutely necessary that it should turn at all. (B) is a board of full half-inch deal, 4 ft. long and 1 ft. 10 in. or 2 ft. wide, through the centre of which the post (A) passes. It is 4 ft. 3 in. above the grass. Upon (B) are fastened the boards (c, c) of ordinary half-inch deal and of the same width as B, at an angle of 30° , so as to meet at a point 1 ft. above B. At the back, which is the sunny side, wide laths are placed across from one of the boards (c) to the other, sloped at an angle just sufficient to throw the rain outwards, and to prevent the sun's rays from falling on the board (B), while the breeze is allowed to pass freely through. At the front similar venetians are placed, but space is left open in the centre, to allow the scales of the dry and wet bulb thermometers (D) to be seen. These instruments are either screwed at the top to the block in the angle of the boards (c, c), or fastened on a frame which is suspended from the block. Their scales are above the horizontal board, but the lower part of their stems passes through it, and the bulbs are 3 inches or nearly so, below it. They are arranged on either side of the post (A) and at least 2 inches in front of it. (E) is a piece of wood screwed to the bottom of the board (B), and carrying the maximum thermometer; (F) is a similar piece of wood carrying the minimum thermometer. These thermometers are hung upon brass screws, and their bulbs project, as will be seen, considerably beyond the pieces of wood. (E) and

(F) are not placed at the front of the stand, but at half the width of the board (B) from it. Thus the maximum and minimum thermometers have their bulbs as nearly as may be under the centre of the board (B), and 3 inches below it. It is not necessary, as in the Glaisher stand, that one of them should be made with the bulb at the reverse end. In the engraving the minimum thermometer is represented as placed on the other side of (F), and is read with facility from the back of the stand. It may be desirable, in a very open situation, to extend the venetians a little below (B), or to fasten a strip of deal to it, as in the Glaisher stand, projecting downwards a couple of inches (but so as not to interfere with the easy reading of the instruments), in order to shut off the rays of the sun at sunrise and sunset. But it will generally be sufficient to turn one end of the stand towards the sun.

Thus placed under the centre of a horizontal board, which is itself screened from the direct rays of the sun, the thermometers are supposed to be well protected from solar heat, while at the same time they are exposed to a free circulation of air.

The peculiar advantages claimed for this kind of stand, besides those mentioned, are :—

1. Complete protection from rain, as well as from radiation at night.
2. It is not necessary to turn the stand, which is a boon at least to those who have other occupations.
3. Ozone papers may be hung from the under surface of the horizontal board, without the use of a cage.
4. It is perhaps less unsightly than some stands, looking in a garden no worse, at all events, than a huge mushroom !

To the Editor of the Meteorological Magazine.

SIR,—Your correspondents, Mr. Smith of Hampstead, and Mr. Freeman, have done good service in directing attention to what one may call the weak point of nearly all the thermometer stands now in general use—viz., the tendency, when solar radiation is very powerful, to show a temperature much above that of any ordinary shade.

Mr. Smith, in the magazine for December, tells us that “on comparing his weekly maxima with those of Greenwich during the hot dry weather of last summer, he found that if the maximum fell on a bright sunny day, the Greenwich temperature was several degrees above his, while if the sun was less powerful, they were much more nearly together,” and, in further corroboration of this view, points out similar discrepancies between the maxima recorded at Greenwich and those at Kew.

I may perhaps be allowed to state that I observed precisely the same thing last summer on comparing my own observations with those of my neighbour, Mr. Lowe, of Beeston. You will of course understand that I am not for one moment putting my observations into competition with those of Mr. Lowe as regards accuracy, but merely

pointing out discrepancies arising from differences in the position of the instruments. Nor am I one of those who allow myself to be prejudiced against the existing forms of thermometer stands from a preference for a so-called natural standard of shade, as distinguished from an artificial and arbitrary one. I am aware that natural shade may admit of almost any amount of variety, and that any standard that may be adopted, if it is to be a uniform one, must be more or less arbitrary. And if the Glaisher or any other stand should eventually receive the deliberate sanction of those most competent to pronounce an authoritative decision, I for one would bow to that decision, as an alternative at any rate preferable to the present state of anarchy, as some one has well termed it.

At the same time, I think it is only right, while the matter is still *sub judice*, to point out what seems to me an obvious defect in nearly all the stands now in general use. I see that your correspondent Mr. Smith is disposed to attribute the extreme temperatures registered in these stands to reflection from the ground, but I believe they will be found to be due to that accumulation of heat which must necessarily take place in and around any small structure of wood exposed to the full blaze of a powerful sun, even though the instruments themselves may be carefully shielded from its rays. Might not this be remedied by some combination of the Glaisher with the Martin stand, described in your December number?

I only throw out this as a suggestion, and am quite willing to wait for Mr. Griffith's report, from which I look for much interesting and valuable information on this point.—Yours truly,

G. T. RYVES.

Nuthall, Nottingham, February 3rd, 1869.

MEAN TEMPERATURE.

To the Editor of the Meteorological Magazine.

SIR,—The following results are deduced from "Meteorological Observations made at the Private Observatory of J. Tebbutt, jun., for the Peninsula, Windsor, New South Wales, for 1863, 4, 5, and 6," recently published at Sydney:—

Mean of Maxima and Minima	63°
Mean of daily observations at 9 a.m. (62°·5), 3 p.m. (72°·5), and 9 p.m. (58°·4)	64°·5
Mean ditto 9 a.m., and 9 p.m.	60°·5

Will any of your contributors oblige me by saying what he considers the most approved and correct method of deducing the mean temperature of Windsor from those data?

If the formula applicable to three daily observations, given in Mr. Glaisher's "Diurnal Tables," be adopted—viz., $\frac{64^{\circ} \cdot 5 \times 3 + 63 \times 2}{5}$ the result would be 64°, or the mean at 9 a.m. and 9 p.m. + 3°·5.

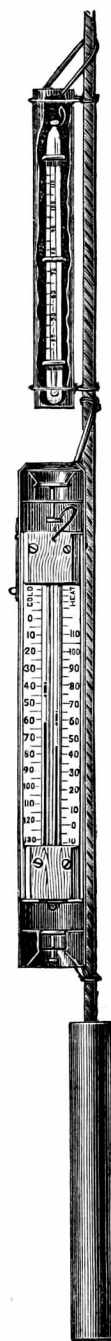
Your obedient servant,

D. A. FREEMAN.

Upper Tooting, S.W., Jan. 13th, 1869.

TEMPERATURE OF THE EARTH AT GREAT DEPTHS.

THE thermometers employed at Kentish Town are shown in the annexed engraving. They are all (as indeed was the whole of the apparatus) constructed by Mr. Casella, and their performance is perfectly satisfactory. Inasmuch as the temperature rises gradually downwards, it had been rightly decided that the most suitable thermometer would be one registering the maximum reading, and accordingly the committee of the British Association recommend the form of instrument shewn at the top of the engraving. It is a small and very delicate maximum mercurial thermometer, on Professor Phillips' principle, hermetically enclosed in a glass tube, containing a small quantity of alcohol, and protected from jarring against the tube by collars of cork. The tube itself is enclosed in a tin or copper case, and protected from fracture by india rubber collars. The lower thermometer is of the pattern invented in 1780 by Six, of Canterbury, and registers both maximum and minimum, as well as showing present temperature; it is provided with a copper case, having valves opening upwards top and bottom, so that on being lowered into water a stream passes upwards through it, and directly the thermometer is arrested in its descent the valves close, and the water then in it is raised to the surface. This is the pattern of instrument used for deep sea observations in the Royal Navy, and Mr. Symons added it to that recommended by the British Association committee, to compare their relative merits. He finds, as might have been foreseen, that the Six's is much more sluggish in its action, but that if time is given they agree perfectly. The great difficulty with registering instruments which have to be raised and lowered any considerable depth is in the slipping of the indices. In the Six's thermometer we have two tubes side by side, each containing an index, both of which, as tested by a magnet, are held by the springs with equal firmness; if then the indices be set, say the minimum at $46^{\circ}2$, and the maximum at $46^{\circ}3$, (there is generally a difference of 0.1 or 0.2 of index error between the columns), and the instrument be sent down into a temperature of $58^{\circ}0$, the indices after lowering and raising



should show, minimum $46^{\circ}2$, and maximum $58^{\circ}0$; if one has not slipped, *probably* the other has not. And if we further find that the Phillips', attached within four inches of the Six's, comes up also showing $58^{\circ}0$, the probability becomes a certainty, and within a range of $0^{\circ}2$ this agreement has always been found at Kentish Town, whence we conclude that the values thus obtained in duplicate must be correct. An iron sash weight is attached below the thermometers to ensure the tautness of the lowering line.

The mode of observing adopted at present is weekly; for instance, on January 22nd, the thermometers were set at the following temperatures:—

Phillips' max.	$39^{\circ}8$
Six's max.	$41^{\circ}9$
,, min.	$41^{\circ}9$

And they were lowered to a depth of 200 ft.; on the 29th they were raised and read—

Phillips' max.	$53^{\circ}6$
Six's max.	$53^{\circ}3$
,, min.	$42^{\circ}0$

There is a constant difference of 0.3 between the temperature registered by the two thermometers, due to index error, which being allowed for, they never differ more than 0.1 . After reading on the 29th, they were cooled down to about 48° , and then lowered to 250 ft.—a week being allowed to take up the true temperature at each successive lowering, which is increased weekly by 50 ft. Subsequently observations will be taken on one or two days at various depths and short intervals of time.

In the observing room there are also a pair of standard thermometers, to afford some guide as to the probable influence of cold air descending the tube and well—a source of error not readily overcome and hitherto, so far as we know, neglected, though clearly pointed out in the note on terrestrial temperature, given by Professor Bravais in that marvellous treasury of information, "*Patria*."* Supposing the tube hermetically closed and free from water throughout, there would still be continuous currents, for a cubic foot of air near the top—say at 51° —would weigh 525 grains and one near the bottom—say at 61° —would weigh only 514 grains, a difference of 11 grains; this is assuming the air saturated with moisture; the difference would be the same whatever its hygrometric condition. Therefore the upper air, by reason of its greater specific gravity, must fall to the bottom, be warmed, and so being rendered lighter, must in its turn ascend, to be again cooled, and so on *ad infinitum*. The same holds good of such part of the tube as is filled with water—stagnant water we may term it, as distinguished from a running stream, but decidedly not stagnant

* *Patria*—*La France Ancienne et Moderne, Moral et Matérielle, ou Collection Encyclopédique et Statistique de tous les faits relatifs à l'Histoire Physique et Intellectuelle de la France et ses Colonies*. 2 vols. Paris, 1847.

in the ordinary acceptation of the term, because liable to exactly the same influences as the air. In that part of the tube occupied by air the influence of varying temperature will be partially reversed by the pressure of the superincumbent column of air.

These effects must complicate the results obtained, but it is quite probable their elimination is possible ; if the known laws of fluid motion are not adequate to their solution, there are several means by which the velocity of these currents might be examined, some of them very inexpensive.

The following letter so well describes the arrangement Mr. Symons had adopted for noting the varying depth of water, that it may stand in lieu thereof, with the exception that inasmuch as the diameter (8ft.) and depth (600 ft.) of the Kentish Town Well are so large, it is crossed at various depths by beams, which support the tube, and these are very much in the way of the line from the float, which cannot have an unimpeded path in any part of the well, hence of course friction is entailed.

To the Editor of the Meteorological Magazine.

SIR,—In reading your interesting article on the operations you are carrying on at Kentish Town, it struck me that you might perhaps like to have a description of a very simple plan I have had in operation for the last two years and a half, for ascertaining the daily rise or fall of water in wells. Observations on this subject being required during the last visitation of the cholera, it occurred to me that the simple application of an organ tell-tale would be the readiest mode. Accordingly, having ascertained the depth of the well, and the height of the water in it, I let down an empty bottle, well corked, as a float, (a champagne bottle is best, because it is heavy and large at the bottom), by means of some copper bell-wire. This wire was brought to the surface through three feet of common lead gas-piping, and joined to a small brass chain, which was made to pass over a pulley fastened to a wall, pump, or post, over the well, the other end of the chain having attached to it a leaden weight, nearly equivalent to the bottle. This weight playing on a scale of measurement, tells at a glance the exact depth of water in the well. We have three wells which are thus daily gauged ; their several depths (all in new red sandstone), are $22\frac{1}{2}$, 21, 18 feet. On November 7th, 1866, they severally contained 6 ft., 7 ft. 3 in., and 3 ft. of water. On the 5th of last November the third well was quite dry, the second contained only a few inches of water, and the first 18 inches. On the following day there were symptoms of a change, and since then the water has steadily increased at an average rate of two inches daily. I shall take care to note down the highest point reached between this and the next dry season.

I am, Sir, yours faithfully,

FREDERICK SILVER, F.G.S.

Norton-in-Hales, Salop, January 27th, 1869.

CHRONICLE OF THE MONTH—JANUARY.

1st.—At 0h. 30m. p.m., a meteor burst with a loud explosion, near Upsala, in Sweden, and many fragments were picked up.

2nd.—Snow in many parts, especially in Yorkshire.

3rd.—A south-westerly gale swept away all the snow, and produced slight floods in some places.

4th.—Earthquake shock reported from Weston-super-Mare (Somerset), and Alton (Hants); time about 9.7 a.m.

5th.—The Severn, the (Derbyshire) Derwent, and many other rivers very much flooded and many lives lost.

9th.—Smart shock of earthquake at 11.17 a.m., felt only in a district about 15 miles in diameter, whose centre is Elmswell, near Bury St. Edmunds.

10th.—Serious earthquake in Silchar and Cachar, in Bengal, extending also to Assam and Darjeeling.

13th.—Brighton, 1.20 a.m., "H. C. M." saw the light of a meteor slightly W. of North; three minutes afterwards he and four others heard two reports like two pieces of artillery fired within a second or two of each other. "B. P. E." saw the light at 1.5 a.m. in Bushey Park, but heard no noise. A celebrated cliff in Denmark, known as "Queen's Cliff," about 400 feet high, fell into the sea, "from a shock of earthquake." Considering the character of the season, and the fact that the cliff was a mass of chalk, it is not improbable that rain had as much influence as an earthquake.

21st.—At More, near Bishop's Castle, Salop, the nest of a blue titmouse was found with nine eggs.

22nd.—Fresh strawberries in Paris markets in abundance.

23rd.—Severe frost and heavy snow at Naples.

26th.—The tower of the parish church of St. Issey, Cornwall, fell with a tremendous crash; the roof of the church was broken in and the organ smashed. The heavy gales have gradually brought about this destruction.

27th.—Mr. Angwin, of Mousehole, Cornwall, gathered above 50 good apples from one tree; this was a second crop. In the same garden there is a pear tree in full bloom.

28th.—At Tramore (co. Waterford) the sea broke over the embankment, and shattered the sea wall in several places; large stones, 10 to 20 tons, were rolled about like pebbles.—Part of Glenbrook Pier, Cork, swept away.—Thunderstorm at Bromsgrove; also in Lancashire and Cumberland.—(See p. 16.)

30th.—Severe gale in Ireland; several persons drowned in the floods. Terrific hurricane at Queenstown; two piers, parts of the railway, and Dunkettle and Youghal stations destroyed. The damage to the embankments of the Suir and Barrow is estimated at £50,000. Extraordinarily high tides on the western and southern coasts, with heavy gales, thunder, and lightning. Great destruction of property.

31st.—Unprecedentedly high tides, and serious floods, in all parts

of Ireland, Belfast, Galway, and Cork.—At Worthing, about 150 yards of road and a row of cottages were washed away.

“HIGH TIDES AND HEAVY GALES.—Last year the Thames rose to an unusual height, flooding the densely-inhabited district of Westminster which lies near the river, and overflowing the lowlands of Battersea and Chelsea as far as Kew. On Sunday last, 31st, the river overflowed its banks to such an extent that boys in tubs and even boats were paddling along Millbank as far as Little College Street. On Wednesday next, February 10th, a greater rising of the river is expected, and every conceivable plan has been resorted to, by the construction of embankments and otherwise, in order that the water may not enter the lower rooms of the houses. Every high tide is waited for with much excitement by the people who inhabit the low-lying parts of Westminster. The highest tides known for 20 years in the Channel Islands occurred on Saturday, 30th, Sunday, and Monday, and were accompanied by a heavy gale from the south-west. Considerable damage was done on the Jersey coasts. The water rolled over the top of Albert Pier, and flooded some of the streets of St. Helier's nearest the harbour; about 60 yards of the esplanade wall was knocked down, and the guardhouse at the opening of Elizabeth Castle causeway rendered untenable. The walls of shipbuilding yards have been carried away, timber floated off, boats on the beach sacrificed, and fishermen thereby reduced to distress; cellars flooded, portions of houses carried away, and strongly-built granite landing-slips destroyed. The inhabitants of the coasts generally dwelt in a state of alarm during the prevalence of the gale, which greatly assisted the height of the tide. Several persons narrowly escaped drowning, but no loss of life is reported. The gales and high tides have been much more serious on the Welsh coast than was anticipated. A large building now in course of conversion into the University of Wales has been seriously damaged. Three cottages have been washed away by the high tides at Borth, the inmates narrowly escaping with their lives. A portion of the Welsh Coast Railway which skirts the estuary of the Dovey on each side has been materially injured, and traffic has been entirely suspended as far as Dolgelly, Port Madoc, and Carnarvon are concerned. A pile bridge, about 180 yards in length, crossing the estuary of the Penrhyn river near Port Madoc, has been washed away, and many of the smaller bridges are reported to be insecure. For nearly a mile on each side of Towyn station, near the Dyoyenni river, the surface has been washed away to a depth of 10 ft., and similar gaps have been made by the tides near Aberdovey, Glandovey, and Borth, and the mails have to be conveyed by road.

“On Sunday night, 31st, about 50 yards of the granite coping of the sea wall at Dawlish, Devonshire, was washed away by the sea, in addition to the wall and railway carried away by the morning tide. On Monday morning the tide, though it did not rise so high as the previous day, washed away more of the cliff. During the day a strong body of men set to work to erect a temporary wall, but, on the return of the tide, it was again demolished. On Tuesday renewed efforts were made to erect the wall, and it is hoped the efforts will be successful.

“On Sunday, 31st, the tide was so high at Whitehaven that it overflowed the market-place. Between Whitehaven and Parton the water swept in heavy showers over the railway; near to Harrington a portion of the wall which protects the railway from the sea was damaged, a breakwater running out from the wall was broken, and at Messrs. Bain, Blair, and Patterson's ironworks, an embankment and line of rails were partially destroyed. At Harrington harbour on Sunday the sea damaged the breakwater on the north side; while between Workington and Flimby the sea overflowed, and so seriously injured about 100 yards of the railway as to put a stop to the traffic. The passengers from Whitehaven for Maryport and Carlisle, and other stations east of Maryport, had to travel on Tuesday by the Cockermouth and Workington line to Brigham, and thence along the Derwent Valley branch to Bullgill, to reach their respective destinations.

“On Saturday night, 30th, and Sunday, 31st, Cornwall was visited by a terrific gale, and the highest spring tides which have been seen in the county for 40 years. A large number of people had a hair-breadth escape on the West Cornwall railway on Sunday morning. The up-passenger train had moved slowly out of the

Penzance station, and was about to enter on the long wooden viaduct at Ponsandane, which was at times buried in sea, when a loud crash caused the driver to promptly pull up. Two hundred yards of massive uprights, driven a great depth into the beach, and the whole system of wooden supports, began to shake, and in a few minutes went down with a fearful noise. Immense iron bars were twisted, gigantic bolts of the same metal snapped, and in a very short time the wreck was twirled seaward. The telegraph wires were also carried away. Sand and shingle covered the railway from Penzance to Marazion, the depth in many parts being from 2 ft. to 3 ft. The Penzance promenade, quay, pier, and other places were under water for many hours, and scores of houses were flooded. At Truro the houses and thoroughfares in the lower parts of the town were flooded to a considerable height, and many poor people have suffered great loss by damage done to their furniture. In scores of instances, chairs, tables, &c., were afloat, and many articles were washed away. A boat, laden with coal, went down in the Truro river, and a man named Davey was drowned. At Falmouth a youth named Tregenza was washed overboard and drowned. A large portion of the town of Fowey was covered by from 2 ft. to 4 ft. of water nearly all Sunday, and at Helston, Padstow, and Saltash there was a similar state of things. Many people had to turn out of their houses in their night-clothes and seek refuge elsewhere. Several hundreds of acres of land were under water on Monday, and the continuance of heavy rains was causing serious alarm. House property has suffered considerably.

"The floods have risen very rapidly in the neighbourhood of Reading, and on Tuesday were higher and more extensive than had been known for several years. An immense body of water has come down the Thames, which has overflowed its banks for many miles, and laid a great quantity of land under water to the depth of several feet. For a considerable distance east and west of this town the immediate course of the river is scarcely perceptible, the floods being on a level. There has been a great fall of rain during the last few days, and the water continues to rush on with much force, interfering seriously with the construction of the new bridge across the Thames at Caversham. The whole of the meadows on which the races are held are submerged, and, consequently, the public bathing-houses, as also the building belonging to the Reading Cricket Club, are quite insulated. A house occupied by a family named Knight may be said to stand in the midst of a vast lake. The water rushes completely over the foot-bridge and the road which form the means of communication between the town and Lower Caversham, while the path leading to Sonning is likewise under water. The timber yard of Messrs. Talbot and Sons is partly inundated, and the floods wash over a portion of the Caversham Road itself, and have reached the boundary walls of the Great Western Iron Works, and the casting foundry of Mr. Hood. The Kennet and Avon Canal has flooded the valley between Devizes and Reading; navigation is entirely stopped, and work at several flour mills suspended. Between Coley, Mortimer, and Theale the country presents a perfect sea. The canal has almost reached the level of the coal wharves in Bridge Street, and the road leading to the corn stores and dwelling-houses in rear of the King's Road is quite impassable. The river Loddon has inundated a large breadth of land. Fortunately no loss of life has resulted from the floods, but the gales have caused much damage."

FROST IN YORKSHIRE.

To the Editor of the Meteorological Magazine.

SIR,—The severity of the frost experienced at Ripon on January 1st seems to have been so local that it may be worth a corner in your magazine. A heavy fall of snow, 4 or 5 inches deep, and gauging 0·78 in., took place on the 29th and 30th December. The heat from the earth being thus cut off, the thermometer at 4 ft. fell to 9°·5 on Jan. 1st, and on the surface of the snow to 6°. The ice was strong enough for skating both on the 1st and on the 2nd.

I am, Sir, your obedient servant,
Timbridge Wells, Jan. 28th, 1869,

F. W. STOW.

JANUARY, 1869.

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° on grass
		Total Fall.	Difference from average 1860-5	Greatest Fall in 24 hours.		Deg.	Date.		Max.		Min.				
				Dpth	Date.				Deg.	Date.					
											inches	inches.	in.	Deg.		Date.
I.	Camden Town	2.76	+ .81	.58	28	15	56.3	31	25.0	24	6				
II.	Staplehurst (Linton Park) ...	3.04	+ .98	.52	31	12	54.0	31	22.0	25	11				
	Selborne (The Wakes).....	4.53	+ 1.26	.59	28	19	...	...	19.0	25	9		
III.	Hitchen	2.58	+ .44	.45	28	19	54.0	31	25.0	24	6				
"	Banbury	4.31	+ 2.22	.84	28	17	54.0	31	23.0	25	11				
IV.	Bury St. Edmunds (Culford).	2.08	+ .21	.47	6	15	55.1	31	21.0	21	9				
V.	Bridport	4.59	+ 1.40	.83	28	17	55.5	17*	26.0	25	4				
"	Barnstaple.....	4.69	+ 1.17	.70	28	20	56.0	29	30.0	25	2				
"	Bodmin	7.36	+ 2.17	1.54	28	22	55.0	7	32.0	22†	...				
VI.	Cirencester	5.60	+ 2.60	1.00	29	13	51.0	31	30.0	28	3				
"	Shifnall (Haughton Hall) ...	2.91	+ 1.01	.49	28	17	54.0	31	22.0	25	7				
"	Tenbury (Orleton)	4.52	+ 1.99	.71	28	20	55.5	5	23.3	25	8				
VII.	Leicester (Wigston)	2.82	+ .84	.42	28	17	53.0	31	19.0	24	6				
"	Boston	2.52	+ .81	.49	1	20	55.2	31	25.2	25	3				
"	Derby.....	2.96	+ 1.17	.48	1	21	54.0	17†	24.0	25	7				
VIII.	Manchester	2.69	+ .17	.33	21	21	54.0	31	26.0	1	7				
IX.	York	2.94	+ 1.36	.65	16	19	52.0	5	25.0	1¶	9				
X.	Skipton (Arncliffe)	7.89	+ 2.25	1.05	31	22	...	...	...	...	...
"	North Shields	2.28	+ .17	.57	16	16	55.5	31	26.6	...	6				
"	Borrowdale (Seathwaite).....	17.43	+ 1.07	3.64	17	24	...	...	...	...	...
XI.	Cardiff (Town Hall).....	5.29	...	.91	4	18	...	...	...	...	...
"	Haverfordwest	9.05	+ 4.00	1.34	16	19	53.0	31	26.5	23	...				
"	Rhayader (Cefnfaes).....	5.56	+ 1.04	1.00	2	19	52.0	...	23.0	...	4				
"	Llandudno	4.12	+ 1.58	.74	31	19	54.6	16§	32.4	25	...				
XII.	Dumfries	5.16	+ .56	1.30	16	23	52.0	31	24.5	1	4				
"	Hawick (Silverbut Hall) ...	3.79	...	.66	16	20	...	...	...	...	...
XIV.	Ayr (Auchendrane House) ...	4.60	+ .08	.78	16	18	54.0	5	24.0	1	9				
XV.	Castle Toward	6.24	— .05	.93	16	22	52.0	9	26.0	25	9				
XVI.	Leven (Nookton)	3.61	+ .74	.80	16	18	50.0	5	21.0	1	5				
"	Stirling (Deanston)	6.51	+ 1.79	.84	16	26	52.2	5	19.2	1	9				
"	Logierait	5.48	...	.92	17	19	...	...	...	...	...
XVII.	Ballater	4.93	...	1.05	1	20	50.0	8	16.0	1	9				
"	Aberdeen	3.98	...	.77	16	19	49.4	31	25.2	1	14		
XVIII.	Inverness (Culloden)	12.27	...	1.74	4	26	...	...	...	...	...
"	Fort William	12.46	— .63	2.16	31	18	...	...	...	...	...
"	Portree	5.25	...	.82	31	19	...	...	...	...	...
"	Loch Broom	2.29	...	.55	31	17	...	...	...	...	...
XIX.	Helmsdale	3.83	+ .54	.60	5	21	50.0	9	31.8	24	1				
"	Sandwick	8.59	...	.93	30	28	...	...	...	...	...
XX.	Cork	8.42	+ 3.56	.78	20	27	52.0	9, 11	34.0	1	0				
"	Waterford	5.02	+ .16	.48	16	24	53.5	12	28.0	1	6				
XXI.	Killaloe	4.53	+ .52	.61	17	28	53.5	16	31.0	25	2				
"	Portarlington	4.63	+ 1.24	.75	28	21	55.5	16	28.0	1	4				
"	Monkstown	4.27	...	.47	1	22	54.0	13¶	32.0	6**	...		
XXII.	Galway	4.68	...	.49	28	19	51.0	19	25.0	7	3		
XXIII.	Bunninadden (Doo Castle) ...	4.06	...	.52	4	22	52.0	16	27.0	6††	4		
"	Bawnboy (Owendoon)	3.23	...	.70	16	17	53.0	16	27.0	25	6		
"	Waringstown	3.53	...	.48	4	22	52.0	16	27.0	22††	9		
"	Strabane (Leckpatrick)														

* And 28th & 31st. † And 31st. § And 30th. ¶ And 17th. ‡ And 23rd & 24th.

¶ And 2nd and 25th. ** And 21st & 25th. †† And 25th. ‡‡ And 26th.

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

METEOROLOGICAL NOTES ON THE MONTH.

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

ENGLAND.

LINTON PARK.—A very mild month; no S, and the frosts from 20th to 27th did not produce ice more than an inch thick. T on 30th; fogs frequent; winds, which were sometimes high, were S. or its compounds. Bar. 28·70 on 29th.

SELBORNE.—On the whole a tempestuous month, and unprecedentedly mild, the wind, though high, being S.W. to S.E., T on 1st at 10 p.m., 3rd in morn., and 28th at 11 p.m., and with L at 5 a.m. on 3rd, and at the same hour on 31st; frequent fogs from 8th to 18th.

HITCHEN.—T on 5th; bar. very low on 29th.

BANBURY.—High wind on 4th, and from 28th to end of the month; fogs on 7th, 18th, 21st, and 28th; TS on 29th.

CULFORD.—A slight but distinct shock of earthquake was felt here and throughout the eastern counties on Saturday, the 9th, about 11.20 a.m. High wind on 2nd, 29th, and 31st. The weather throughout the month has been (for the season) remarkably mild; no S, and frost but of short duration; mean temp. of month, 39°·9. Vegetation remarkably forward: gooseberry bushes almost in leaf, and apricot blooms nearly open; the yellow crocus on 20th in full bloom.

BRIDPORT.—Very mild month; very heavy gale from S. to W.S.W. sprang up on the morning of the 28th, and continued to the end of the month; on the afternoon of the 29th much H with vivid flashes of L; nearly 2 in. of rain fell during the last four days. Bar. 29·05 at 9 a.m. on 29th; very rough sea and high tide on 31st, water flowing over the quay and inundating the houses.

BODMIN.—Very heavy gales on 28th and 31st.

CIRENCESTER.—The S.W. gales, which generally bring rain, continued until the 9th, from which time till the 28th we had serene weather, with a few black frosts. On the 28th the weather became very windy and wet, the total fall being nearly twice the average.

HAUGHTON HALL.—Snowdrops up on 7th; seven-spot ladybird out on 10th; throats singing all the month; crocus in flower on 31st. The new year came in clear and frosty, and good hope of change from the excessive rain of last month, but on the 3rd rain returned with L at night, and such, with slight intermission, it continued to the end; wind southerly throughout; max. ther. seldom below 45°·0; T with heavy R at midday on 29th; violent wind on 31st. We shall suffer for this mild January, if the old adage holds good—

“When January calends are summery, say
‘Twill be winterly weather till calends of May.”

WIGSTON.—Our experience of the temperature and rainfall of this month was the same as that of the country generally, both being above the average; vegetation in many of the fruit and other trees being more forward than I ever remember.

BOSTON.—Remarkably mild weather, dull with little sunshine and much mist. Influenza epidemic in this district. Heavy gales on 4th, 28th, 30th, and 31st. Mezereon in flower on 30th.

DERBY.—The exceptionally high temp. which prevailed during the greater part of 1868, still continues; the excess over the average on the last seven years being no less than 5°·2. Vegetation, as may be supposed, is forced forward, the fields and gardens having more the appearance of April than January; the proximate cause of the warmth of the season arises, no doubt, from the prevalence of southerly winds, but why they should prevail at this season is a mystery; the heat of the past summer may to some extent influence the present temp. The thorns were never fuller of fruit, and the country folk even to the present prophesy bad weather.

ARNcliffe.—The whole month unusually gloomy, but very mild.

NORTH SHIELDS.—Cloudy or rainy nearly all the month; S on 24th; L on 29th.

W A L E S.

HAVERFORDWEST.—January commenced with a continuance of the same wet, tempestuous weather which had characterized December; very mild; from the

8th to the 13th, the weather was better ; again an exceedingly wet period occurred ; less rain but constant drizzle and fog from the 19th to 22nd ; the wind changed to the E., and two or three fine days with sharp frost occurred. From the 26th to the end of month very wet and unusually stormy ; great storm on the night of the 28th. On the evening of the 31st an awful storm, the floods from the hills coming down the valley of the river Cleddy in great volume, and meeting the spring tide impelled by the hurricane violence of the S.E. wind, caused such an inundation as had not been remembered for 40 years.

CEFNFAES.—A stormy and wet month, wind generally S.E., frequent T and L, with storms of hail, &c. Vegetation forward.

SCOTLAND.

DUMFRIES.—The month with the exception of the second week has been very wet, and throughout has been unusually mild ; S on the 3rd ; T on 3rd and 29th ; both temp. and rainfall above the average ; vegetation very forward, fields quite green, snowdrops in flower on the 7th, and hepatica in bloom on 12th.

HAWICK.—Keen frost on 1st, but taken as a whole the mildest January ever remembered here. Daisies have been in bloom all the month, gooseberries in flower on the 16th, and the blossoms of the ribes sanguinem all but expanded. Pastures look more green than they do generally in April. The hills were white with a thin covering of snow on the 23rd, 24th, and 25th. Boisterous westerly winds from 28th to the end of month.

AUCHENDRANE.—Very boisterous weather on 2nd, 5th, and 18th, from equatorial gales, but on the 14th the gale was a polar one ; from 27th to the end of the month the equatorial gales never ceased.

CASTLE TOWARD.—The month has been mild, too mild for the season. Bar. comparatively high (although only nine dry days) until the last few days ; it fell to 28.64 on 30th, but soon rose again. Thirty head of dairy stock have been quite comfortable on the grass during the month. The winter garden quite gay with rhododendrons, heaths, laurestinas, &c. The tide rose very high on the 31st, overflowing the banks and doing much damage.

NOOKTON.—First fortnight fine, second wet, the last three days stormy.

DEANSTON.—The month generally very dull, dark, wet, and occasionally hazy ; some frost on 1st, 18th, 22nd and 26th, but no ice more than a quarter of an inch thick ; S only once, half an inch on 24th ; gales on the night of the 28th, and during the day of the 31st.

LOGIERAIT.—Heavy rainfall, high temp. ; severe gales of wind ; no frosts yet, and flowers, &c., progressing as if it was spring.

BALLATER.—A very mild and open month ; prevailing winds westerly, increasing occasionally to a gale ; a very heavy gale on 30th ; rainfall above the average ; snowdrops in flower on the 22nd ; a very bright meteor seen on the evening of 11th.

ABERDEEN.—A very brilliant meteor, one-third the size of the moon, seen at 7.35 p.m. on the 11th. A remarkably mild month ; no S, except a few flakes on the 25th ; no severe frosts, and hoar frosts on 6 or 7 days only ; dull, dark weather, scarce two hours' sunshine a day on an average. Grass growing as if in March or April ; whin in bloom all the month ; Eranthis, hiemalis, and Petasites vulgaris in bloom in the middle of the month.

ROSSE PARSONAGE.—With the exception of frost on the 21st and 22nd, and night of 25th, the month has been wet and mild throughout ; very stormy on the night of 29th, with T and L ; on three days, the 4th, 29th, and 31st, more than inch of R was registered.

SANDWICK.—Heavy gales on 1st, 2nd, 14th, and 16th ; auroræ on 4th, 5th, 12th, 16th, 17th, and 24th ; lunar halos on the 27th and 28th.

IRELAND.

GALWAY.—There was a severe storm on the night of the 28th, continuing on the 29th, and accompanied by an unusually high tide, which did much injury, and exactly the same took place on the morning of the 31st, about 6.30 a.m., great damage being done along the sea coast.

Doo CASTLE.—The high temp. of this month was something extraordinary, spring operations going on all through the month.

WARINGSTOWN.—Heavy gales at the beginning, and again at the end of the month ; weather variable, wind and R, interspersed with some unusually fine warm days ; temp. much above the average.

LECKPATRICK.—Very mild month ; ribes and laurel coming into flower, primrose and hepatica in flower. Bar. fell to 28.425 (corrected) at 10 p.m. on 28th.

EFFECT OF LIGHTNING AT BRAYSTONES.

To the Editor of the Meteorological Magazine.

SIR,—On the 29th of last month (January), the sky became very dark in the north, between twelve and one at noon, and after a few peals of distant thunder being heard in that direction, there was here, during a heavy storm of hail, at five minutes before one, a very vivid flash of lightning, immediately followed by a loud peal of thunder ; after which there were several other peals of thunder not so loud, accompanied by lightning less vivid. At the time of the most vivid flash, a large ash tree in the Mill Lane, Beckermont (distant about a mile and a quarter from Braystones), growing in a corner of the fence of Mr. Atkinson's meadow, was struck by the electric fluid. The fluid struck the tree near the top, stripping bark off in a continuous line to the bottom of the trunk, throwing the soil off two of the large roots (which in their ordinary position grew extending from the tree in contrary directions), and tearing one of them away. The fences into which the roots of the tree extended were considerably thrown down, and a number of large stones, of which one of the fences was partly formed, were scattered about the lane, eight of them being hurled into a field over a hedge (6 ft. in height), on the opposite side of the lane, which is 20 ft. wide. The largest of the stones thus hurled into the field was found to weigh $47\frac{1}{2}$ lbs., and the smallest weighed 6 lbs. 6 oz. The largest of these stones was hurled the greatest distance, namely, 63 ft. from where it had formed a portion of the fence. The line where the bark was stripped off the tree was only about an inch wide at the top, but the width of it gradually increased as it extended downwards, till at the bottom of the trunk it was about eight inches. The substance of the trunk of the tree was not split or damaged. Is not this fact curious, and one worthy of observation ? so little damage done to the top of the tree, where the electric fluid struck it, while where the fluid became diffused and left the tree, at the bottom, the results to be seen are indications of immense violence. Windows in several houses about 200 yards from the tree were broken by the concussion made by the thunder.

The storm passed on in a southerly direction, the newspapers reporting it as being at Bolton-le-Moors at half-past one, and at Manchester at a little before two, the electric fluid having struck a factory chimney at Bolton, "breaking a large stone at the summit and displacing another"—a contrast between the chimney and the tree.

WILLIAM HENRY WATSON.

Braystones, Cumberland, February 3rd, 1869.

[Was it not an up-stroke at Braystones ?—ED.]

Several articles unavoidably postponed—"Magnetic Variation," "Meteorological Society," &c.