

SYMONS'S MONTHLY METEOROLOGICAL MAGAZINE.

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MAY, 1868.

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THE THUNDERSTORMS OF APRIL.

WE do not know *why* April, 1868, has had more than its share of electrical phenomena, thunderstorms, large falls of hail, and diminutive but very violent *rushes* of wind, but there can be no doubt that a careful collation of such notes as have reached us will assist those who may be induced to undertake the enquiry, inasmuch as in most cases good materials well arranged will tell their own tale. We make, therefore, no apology for giving in detail an account of the storms of April. To save space the following abbreviations are uniformly used:—**T** thunder, **L** lightning, **T S** thunderstorm, **H** hail.

APRIL 20TH.

OWENDOON (IRELAND).—**T** and **H**.

APRIL 21ST.

HAWICK (SCOTLAND).—**T S** and **H**.

APRIL 23RD.

SELBORNE, violent storm in E.; BURY ST. EDMUNDS, **T S**; LYNN, **T**; ULCEBY (LINCOLN), slight **T S** in morning; CIRENCESTER, **T**; DUMFRIES, **T**; ABERDEEN, **T**, **L**, and **H** from 4 to 5 p.m.

APRIL 24TH.

PONTEFRACT.—On Friday afternoon we were visited by a heavy **T S**, when the Dandy wind mill, belonging to Mr. Higgins, was struck, and considerable injury done. One sail was smashed to pieces, the bottom floor of the interior of the mill was torn up, and some scales which were in the same room were destroyed. The bottom of the mill seems materially injured, and there is scarcely a whole pane of glass in the building. Fortunately no one was in the mill at the time.

YORK, **T** at 4.30 p.m.; DUMFRIES, **T**; GLASGOW, **T**; LOGIERAIT, **T**; ABERDEEN, **T**.

APRIL 25TH.

SELBORNE, **T**; BANBURY, **T S**; CIRENCESTER, **T**.

TAUNTON.—At Orchard Portman, near this town, a gigantic oak tree was struck by **L** a few days ago, (25th?) and every limb was torn off and carried a distance of 20 yards. The trunk was stripped of its bark, and was split from top to bottom. A man who witnessed the circumstance was struck down by the **L** and remained unconscious a whole day.

LEOMINSTER.—About 1 o'clock on Saturday (25th), the weather was fine and the ground dry, but there were threatenings of a **TS** in the north, and there had been one clap of **T**; about 2 o'clock the storm commenced with heavy **T** and **L**, and the **H** was incessant for one-and-a-half hours, many of the stones appeared to be as large as small marbles. When it ceased the ground was covered to the depth of about two inches, as though it had been a covering of snow; notwithstanding the great quantity which had run off as water, much of it melted in the afternoon, but there was some remaining the next morning in sheltered places; the ground under the fruit trees was covered with leaves and blossoms and the early peas were sadly injured; such was the force of the **H** that it went through the large leaves, such as rhubarb, &c. The barometer (uncorrected, 230 feet above sea level) that morning was 29·77—58—the maximum thermometer 64°, and the amount of rain 1·66 in the bottle; what may have been lost by splashing I do not, of course, know, but I do not think that the funnel was overfilled at any part of the storm. It does not appear to have extended more than about 2 miles round here, but the storm seemed to go off to the north, in the direction of Ludlow; I have not heard whether it was felt there.—*E. P. Southall.*

SHIFFNAL.—**TS** at noon.

NEWPORT, SALOP.—On Saturday at mid-day a heavy **TS** passed over this town. So dark did it become that gas was lit in many houses. A number of trees on every side of the town have been struck, but no injury or loss of life has been reported. At Vauxhall the **L** struck a poplar tree close to the house of Mr. Taylor, butcher, shattering it entirely, and hurling large pieces a distance of 50 yards. Mr. Taylor's children were in the house alone, and were thrown from their seats by the shock, but were unhurt.

TAMWORTH.—About 2 o'clock on Saturday afternoon (April 25th) a severe **TS** with heavy rain, broke over this town and neighbourhood. The **L** was unusually vivid, and the peals of **T** very loud. 23 sheep, belonging to Mr. Kendrick, of Weeford, which with 70 others were under a thorn bush, were killed. The **L** struck a cottage at Whately and broke in the roof.

ORLETON.—Distant **T** all round till 4.30 p.m.

BROMSGROVE.—Violent **T** and **L** on 25th, commencing at 1.30 p.m.

LEICESTER, **T** and **H**; DERBY, brief but very violent **TS**.

LITTLE CHESTER, DERBY.—During the **TS** on the afternoon of 25th a pinnacle of St. Paul's Church, upwards of 14 feet high, was struck; stones hurled in all directions, the roof damaged, and the lead torn up. Some of the stones were flung a considerable distance.

RHAYADER, **T** and vivid **L** from 3 to 4 p.m.; OWENDOON, **T**.

APRIL 26TH.

SELBORNE, **T**; N. SHIELDS, **TS**; ABERDEEN, **T**.

APRIL 27TH.

HACKNEY.—On Monday afternoon (April 27th) considerable damage was wrought to buildings by the great force of the wind accompany-

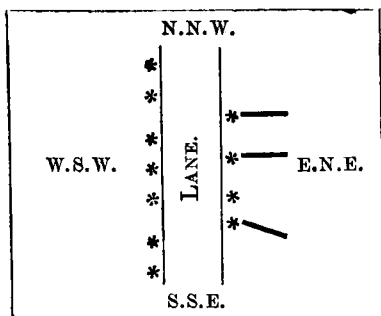
ing the short storm of **H** which at a little after 4 o'clock passed over the metropolis. In all parts of London the rain was very heavy, and, mixed with great hailstones, it lashed the earth violently; but the wind was not generally of extraordinary power. At Cambridge Heath, however, over a comparatively small area, a partial hurricane raged for a short time. It appears to have been confined to one large block of buildings and 150 yards around. At the corner stands Tudor House School. A stack of chimneys was blown from this house; the mass crashed through the roof into the rooms below, and nearly killed an old gentleman and a child. A baker's shop near was partially blown down; bricks, tiles, and falling slates, some of which were cast for a distance of 15 or 20 yards, fell around. While the wind lasted there was great alarm among the inhabitants. At the same time there were two very vivid flashes of **L** accompanied by a peal of distant **T**.

CAMDEN TOWN.—**TS** at 4.35 p.m., with a sharp shower, and moderate **W.** wind.

WINCHMORE HILL.—This neighbourhood was visited yesterday afternoon by a terrific hurricane from the S.W., with **T**, **L**, **H**, and rain, which was remarkable for its brief duration and the narrow limits to which it was confined. The storm commenced at 4.30 p.m. with a tremendous fall of **H**; at 4.35 p.m. there was a very vivid flash of **L**. The greatest fury appears to have passed about 200 yards to the eastward, where ten large elms were torn up within 500 yards of each other. The hail ceased at 4.40., when the fall was 0.11 in. The storm was accompanied by a very great decrease of temperature, viz., 10° in as many minutes; the barometer stood at 29.95 inches having fallen from 30.22 inches at 9 a.m.; at 10.30 p.m. there was a most magnificent display of aurora borealis: a brilliant arch of yellow-red light extending from N.E. by N. to N.N.W., and rising about 20° into the sky; at 10.45 the arch gave place to long streamers of light blue light which continued till 11 p.m., after which it became much dimmer. The light was so bright as to completely eclipse that of the moon.—*T. Paulin*.

[Having visited the spot shortly after, we can add our testimony, and a few additional facts, to Mr. Paulin's note. In the first place we may point out that in the vicinity of London, the wind force was simultaneous, or nearly so; that it was principally felt at three places in a perfectly straight line, S.S.E. to N.N.W., and at nearly equal distances on either side of Bruce Castle, Tottenham, where the maximum force was developed. (Mr. Hill having kindly promised a description of the desolation wrought in his grounds, we leave *that* till our next.) That at intermediate places there were no casualties to be heard of, and the inhabitants would hardly believe what their neighbours had suffered. The whole of the evidence from personal testimony and fallen trees shows that the direction at each locality was W.S.W. At Winchmore Hill every tree fell with its head to some point between E. and N.N.E., and this was also the general direction of the air current in that part of the country. Contrary to general experience, there was nothing like a track to be discovered, it was quite frequent to find a tree laid

down with its root at B, its head at c, and yet to windward at A, perhaps not 15 ft. off, another tree untouched. How did the wind, blowing as it certainly did in the direction B c, avoid injuring A.



In one case, a lane with banks about 6 ft. high, and tall trees growing out of the banks, was at right angles to the gale—the wind blew from W.S.W. to E.N.E., but not a branch was touched on the west side, while on the E. side three large trees were thrown down, the roots being so bound into the bank that several cart loads thereof were torn up with each tree. We have attempted to

make our meaning quite clear by the annexed diagram, wherein the original positions of trees are shown by asterisks, and the direction of fallen ones by lines from the asterisks which show the position of their roots.]

SELBORNE, violent H storm with T at 3 p.m.; BANBURY, H.
ORLETON.—H and rain at 1.30 and 3.30 p.m.

BROMSGROVE.—A sudden and terrific gale of wind at 2.50 p.m., 27th, which only lasted about five minutes; its violence was so great as to make it difficult for persons to keep on their feet, those near trees and fencings gladly seized on them to prevent their losing their equilibrium.

BOSTON, T S, and H as large as marbles; ULCEBY, T S and H in p.m.

LINCOLNSHIRE.—A terrific T S broke over the northern part of this county on Monday, doing immense damage to the large orchards between Barton and Grimsby. At East Halton the L struck a young man named Elm, employed by Mr. Slight, miller. The unfortunate youth, was attending to the brake of the mill when the electric fluid struck him on the face under the left ear. Death was immediate.

ARNCLIFFE, T S; LLANDUDNO, T and H; LOGIERAIT, T; ABERDEEN, T.

NEW INSTRUMENTS.

MESSRS. W. & J. BURROW, of Malvern, have recently brought out self-registering thermometers, good looking, very legible, tested at Kew, and all things considered, very cheap, though we dissent from the opinion that they are "half the price charged for standard thermometers of the same accurate quality." The amount of error indicated by the certificate is a partial guide to the accuracy of a thermometer, it guarantees the purchaser against any large error, but if the thermometer is blown, filled, graduated, and verified within a short period, the verification will, perhaps, give a maximum error of 0.2, and yet if re-verified a year afterwards, it may be half-a-degree or a degree in error. We by no means wish to intimate that any such haste has occurred with reference to these thermometers, but simply to point out the practical lesson of Captain Tupman's letter in our last number, which cannot be too widely known, and amounts to this, that verification *per*

se is not a proof of permanent excellence in a thermometer. We believe it to be the practice of some of the best opticians to keep their thermometers *three years* after they are filled before dividing them, thus as far as practicable guarding against future alteration. The value of verification depends on two elements—the care with which the examination is conducted, and the time which has elapsed since the thermometer was filled; the latter condition is not alluded to in the present Kew certificates, but we hold that the makers should mark on the tubes the date of filling and date of dividing, or keep a record against the number in a book. These data being marked on the certificate, its real import would be known and its value doubled. We beg to submit to the Kew authorities the following note appended to a verification certificate by Mr. Glaisher, dated 1856, to show that this is not a new idea nor one which has always been ignored.

“As mercurial thermometers are liable to read higher by age, it will be desirable at some future time to take a few simultaneous readings with this instrument and one whose index errors then are known, and to alter the number in the last column by the amount of difference thus found, but as the tubes were filled about three years previous to pointing it, it is probable that no such error will take place.

“JAMES GLAISHER.”

To return, however, to the thermometers under notice; they are mounted on handsome porcelain slabs: the maximum is on Phillips' principle, the minimum on Rutherford's, and though for some reasons we do not think them equal to first-class standards, there is no question that their substitution for half the thermometers in use would be a comfort to the observers and a benefit to science.

Mr. Casella, of Hatton Garden has (if we mistake not, at the instigation of the Rev. F. W. Stow) brought out a new *spirit* minimum thermometer for radiation temperatures. This will be a surprise for some, inasmuch as Mr. Casella has been to a considerable extent identified with efforts to abolish *spirit* thermometers for all ordinary purposes; we presume he has found his patent mercurial minimum as difficult to make, as some observers have found it to manage.

Fig. 2.



Whatever may have been the cause of its production, there is no doubt that it is the most sensitive spirit minimum thermometer yet constructed, the temperature rising and falling with every passing cloud. As will be seen from figure 2 this sensitiveness is gained by having a narrow tube and two long cylindrical bulbs, so as to render the exposed surface large in proportion to the amount of spirit contained.

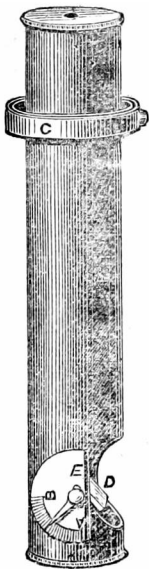


Fig. 3.

Messrs. Pastorelli, of Piccadilly, have recently constructed the little instrument shown in figure 3, and which was thus described in *British Rainfall*, 1867:—
 “It consists of a brass tube, 6 in. long, and three-quarters of an inch in diameter; near the top are double gimbals (c), by the outermost of which the instrument is suspended between the fingers, when, of course, the body assumes a truly vertical position. At the lower end is a small mirror, (D), turning on a horizontal axle, whereof one end is prolonged at (E), and carries a pointer on the graduated arc (A B). If the mirror is (as represented) at an angle of 45° , objects level with the mirror will be seen in its middle, by looking through the small eye-hole at the top; but if objects are above its level, the mirror must be turned by the axle (E) into a more horizontal position, and when the objects are seen crossing the centre of the mirror, the index will be found as many degrees towards (A) as the objects are above the instrument.”

DESIDERATA.

Before leaving the subject of instruments, we wish to draw attention to two matters wherein improvement is necessary. When a thermometer is divided (as all should be) on its own stem, the divisions are simply very shallow cuts, we might almost say scratches, on the glass; in order to render them visible some black substance, usually a compound of lamp-black or ivory black and oil, is rubbed in; however, be the compound what it may, and be the maker who it may, constant exposure to the weather soon fetches it out. Will some chemist or optician introduce a means of rendering these divisions clearly and *permanently* legible? In figure 2 it will be seen that the stem of the thermometer is protected by a Leach's shield, the end nearest the bulb being stopped with india rubber; after a time dependent on the humidity of the room wherein the shield was put on, and the tightness of the packing, moisture is deposited on the inside of the shielding tube, and so bedews it as to render the reading a matter of difficulty; can anyone suggest how this is to be avoided?

THE PERIODICITY OF THE ROYAL CHARTER GALE.

To the Editor of the Meteorological Magazine.

SIR,—In the present discussion respecting the periodicity of the Royal Charter Gale, the following remarks may not be out of place:—

It is a generally received opinion that in these latitudes there are two principal currents of air continually interchanging their relative position—an equatorial and a polar, and I propose making use of this principle in explaining the autumn gale. By using the terms equatorial and polar, I only wish it to be understood that these winds originate in the direction of the Equator and North Pole respectively

and may vary considerably on both sides of the south and north points, more particularly on account of the rotation of the earth on its axis, towards the south-west and north-west. I proceed, then, on the hypothesis that there will be in certain latitudes an upper saturated current flowing from the Equator, and a lower dry one flowing from the North Pole, and that the velocity of these currents may at some place be considered equal. It is evident that the moisture of the upper stratum will be gradually imparted to the lower, and this vapour, having the velocity of the equatorial current, will, when it enters the polar, tend to diminish its velocity. There must, therefore, be necessarily some place where the polar current is moving slower than the equatorial. Hence more air will be carried off in one direction than brought in in the other, and a partial vacuum will be somewhere produced, which will be filled by the saturated equatorial current rushing in from above; this will then part with some of its moisture in the shape of rain. But in the meantime a part of it has been left to flow on by itself overhead, thus creating another partial vacuum which is filled by the polar current, this, therefore, receiving a fresh impulse. After a time the colder polar again comes in contact with the warmer equatorial air and descends, causing a polar wind. These variations are continually taking place in temperate climates, producing the frequent changes in the direction of the wind.

During the summer months the equatorial current becomes saturated with moisture at a high temperature; when the temperature declines this moisture either descends in the shape of rain, or if a less saturated current, like the polar, which is comparatively dry, presents itself, part is discharged into it till its velocity is sufficiently diminished, in the way above-mentioned, when the equatorial current comes to the surface of the earth.

Now the temperature changes most rapidly in the autumn months of September and October, and especially in the latter, when the difference between the mean temperature of the air at the beginning and end of the month is no less than two degrees greater than that of any other month of the year. Hence in this month the greatest amount of loss of vapour on the part of the equatorial current and gain on the part of the polar takes place, which accounts for more frequent and heavier gales with greater rainfall in October than in any other month of the year.

Fixing a particular day or week for these gales to take place is entirely out of the question, as the statistics on this subject produced by your correspondents sufficiently prove.- Yours obediently,

J. S. W.

St. Alban's, March 30th.

COLONIAL RAINFALL.

[Collected from various colonial papers, which have been kindly placed at our disposal by Messrs. S. W. Silver & Co., of Cornhill and Bishopsgate, E.C. We shall always be glad to find space for similar

information, believing that a correct knowledge of the meteorology of our vast colonies is of the highest importance.]

Total Rainfall in 1867 at South Australian Stations.

Stations.	Observers.	Days.	Depth.
			inches.
Adelaide Observatory	C. Todd, Esq.	113	19·05
Angorichina	Mr. H. C. Swan	60	12·41
Kanyaka	Mr. J. Watson	50	13·10
Port Augusta	Mr. H. Mildred	55	14·33
Poonindie, Port Lincoln	Rev. Dr. Hammond	81	15·11
Burra Burra Mines	Mr. W. H. Challoner	86	18·57
Clare	Mr. J. Bastard	97	26·56
Walleroo	Mr. J. Beaton	60	14·12
Auburn	Mr. W. Rossi	78	23·86
Hamilton	Dr. Engelhart	103	31·92
Kapunda	Mr. W. H. Darwin	100	23·14
Gawler	Mr. W. H. Hopkins	108	19·12
Brookside	Mr. J. A. Scott	127	21·03
O'Halloran Hill	Major O'Halloran	133	22·76
Clarendon	Mr. F. Wood	73	24·30
Willunga	Mr. H. R. Pounsett	136	29·31
Goolwa	Mr. A. Baldock	107	15·98
Sunnyside	Hon. W. Milne, M.P.	110	23·83
Mount Barker	Miss Gower	142	32·11
Charleston	Mr. J. W. Disher	95	39·64
Strathalbyn	Mr. H. G. Watson	85	17·68
McGrath's Flat	Mr. J. S. Wood	102	18·29
Guichen Bay	Mr. J. A. G. Little	160	25·24
Mount Gambier	Mr. G. H. C. Mann	123	28·70
Penola	Mr. J. Fletcher	129	29·87
Mount Lofty	Mr. A. Hardy .....	...	41·99

Rainfall at Adelaide, 1863 to 1867 inclusive.

Year.	Days.	Depth.
1863	145	23·68
1864	123	19·80
1865	108	15·51
1866	115	20·11
1867	113	19·05

TASMANIA.

Rainfall at Westbury, near Launceston, observed by F. Belstead, Esq.

1866	121	30·89
1867	132	35·08

WHAT IS FROST?

To the Editor of the Meteorological Magazine.

SIR,—This very proper inquiry by a correspondent in your Magazine for March is not so easily solved as some may think. Take for example some cases occurring in the past month (April), in the middle of which we had a period of dry, chilly, cold days and nights, when on more than one occasion the thermometer sank below 32°—once to 30°—and yet there was no visible appearance of frost on the ground, while on another occasion, when the atmosphere was more loaded with moisture, damp cloths, wet mats, leaves, &c., showed unmistakable tokens of frost, when

the thermometer stood at 33° ; the instrument, it is proper to say, was about 3 ft. from the ground. Now, in recording such things, I am of opinion that both these cases should be set down as frosts; in the one case the instrument denoted it, and in the other a more natural token indicated the same. In great elevations we are told it is not unusual for the thermometer to sink several degrees below freezing point, without any appearance of a frost, but it is not often so in this country, and in the few cases in which it is, I think we are justified in booking by the instrument (if it be an accurate one), and when slight ground frosts occur, not detected by the thermometer, I yet think we are right in noting them as frosts also. I would certainly do so. A much more knotty point in connection with meteorology is, "What is shade?" On that head many of us are certainly wide at sea.—Yours truly,

JOHN ROBSON.

[Mr. Robson's decision is exactly the reverse of our own, but we are quite willing to abide by it, if it meets general approval. It is evident that in all the above instances, a minimum thermometer on the grass would have been below 32° . The point at issue is simply this—Is the thermometer in the air, or that on the grass, to be our standard of frost? We shall be glad to hear the opinions of observers.—Ed.]

Abstracts of Meteorological Works.

PUBLISHED A.D. 1857.

The Recurring Monthly Periods and Periodic System of the Atmospheric Actions, with Evidences of the Transfer of Heat and Electricity, and General Observations on Meteorology. By W.H.B. WEBSTER, Surgeon, Royal Navy. Large 8vo, 286 pages, one plate. London: Simpkin.

WE believe a work was published some years since with the title of "The Poetry of Science," and that now under notice might almost be termed the Poetry of Meteorology, so frequent are the poetical quotations, added to which the author has a peculiar way of writing which is to us very unpleasant. The following description of Madeira illustrates the style to which we object:—

"It is a garden of nature, and a fruitful vineyard, detached from the world, where the sick may resort and find comfort and ease, with much to delight and to please, until they sink into rest, and take up their abode in mansions more blest, and where only saints immortal reign."

Having entered our protest against this style of writing we dismiss it from further consideration, and proceed to examine the facts and theories set forth. The former appear to have been carefully collected, and generally well support the theories based upon them.

To us, however, it appears unfortunate that the first proposition in the volume breaks down utterly on examination. The author desires to prove the "transfer of heat and electricity," and his first instance may be condensed into the following statement. In England the winter of 1849 was very mild, but "in Canada of extreme rigour,

and at Newfoundland of unprecedented severity;" this, however, is unsupported by evidence, unless the following extract from a letter from New York, dated February 20th, 1849, can be so considered—

"These regions appear more like Greenland and the people like Esquimaux. The cold is so rigorous and intense that most of the men wear long beards for warmth, and incapacity to hold a razor to shave themselves. The thermometer has sunk below the scale usually adapted to habitable lands. At a village called Deposit, at which your correspondent endeavoured to sleep last Friday night, 16th of February, the thermometer was at 21° below zero; and at Bangor in Maine, on the 13th, it was 28° below zero."

If the winter was *remarkable* for its severity, it is rather odd that a single short period of cold should make "the people look like Esquimaux;" the assimilation must have been very rapid; and as to wearing long beards to keep them warm, it was very kind of the beards to grow suddenly long just when they were wanted. Mr. Webster evidently did not take into account the *constant* difference between the climate of the centre of the North American continent and our own sea-girt isles. We may as well prove that the winter of 1849 was not "unprecedented" at any of the following stations, whatever it may have been reported to be at Newfoundland. Mr. Webster does not say what period he takes as winter, but we assume December, January and February: the following table explains itself:—

Stations.	State.	1848-9.		1835-6.		1851-2.	
		Dec.	Jan. Feb.	Dec.	Jan. Feb.	Dec.	Jan. Feb.
Cambridge	Massachussets..	24°·6		27°·0		23°·7	
New Bedford ...	"	26°·1		24°·7		25°·9	
New York	New York	26°·6		25°·9		33°·0	
Baltimore ...	Philadelphia ...	35°·6		27°·1		32°·1	
Charleston	South Carolina.	53°·4		52°·4		48°·2	
New Orleans....	Louisiana	58°·8		49°·6		56°·5	
	Mean	37°·5		34°·5		36°·6	
Greenwich		42°·4		36°·3		41°·1	
St. Petersburg.		15°·5		15°·6		...	

Means :—Greenwich, 37°·8; St. Petersburg, 18°·2.

We have not the mean temperatures at the North American stations, but allowing it to have been a cold winter, it was evidently not unprecedentedly so, since 1835-6 and 1851-2 were both colder. However, the three above-named winters were all cold in America, our table shows they were also rather cold in Russia. To support Mr. Webster's theory they should have been warm in England—two out of the three were rather so—but the winter of 1835-6 was the coldest in America for many years; it was severe also at St Petersburg, and, contrary to the theory, it was also cold in the British Isles.

Mr. Webster then waxes more bold, and tries to prove the "transfer of heat from the Persian Gulf to us, although 3,000 miles apart," by accidental coincidences like the following :—

"In 1848 March 31st and April 1st and 2nd were very bright, and hot as

summer; in short, such days so early were perhaps never before recorded in England. The thermometer stood from 72° to 76°. But hear what the 'Jewish Intelligencer' gives from the journal of the Rev. A. Stern, a missionary in Persia, under the head of 'A Missionary Cruise in the Persian Gulf, latitude 27° N. and longitude 53° E, in the Honourable Company's ship Clive, Commodore Hawkins.' 'Friday, 31st March, the wind suddenly changed and blew furiously from N.W., and raged incessantly during the night; the thermometer fell from 94° to 54°, and bitter cold. This terrific commotion lasted until Sunday, 2nd of April, when the sun again shed his cheerful beams.' "

Need we remark that isolated facts of this kind prove nothing; if the heat, for instance, which we experienced on April 1, 1846, did come from Persia in 24 hours we think its progress should have been, and might have been, tracked. We dismiss this theory with the Scotch verdict "not proven." Mr. Webster has placed it in the first chapter, hence we are obliged to begin in rather a severe strain, but the bulk of his work is upon the short title by which it is known, "Recurring Atmospheric Periods," and is, we think, too little appreciated by meteorologists. In the first place, we will let Mr. Webster give his definition of the term.

"By the designation 'Recurring Monthly Periods of Atmospheric Action,' it is intended to denote a 'mean period of 30 days 12 hours,' corresponding very nearly to a solar month, or that space of time in which the sun passes through one sign of the zodiac. There is a variation of two days on either side of the mean, so that we have the following series:—

"28-29th, 30th, 31-1st days of the month, and so on throughout. Any state or condition of the atmosphere recurring in succeeding months within two days of the same time of each other is included in, and constitutes, a recurring monthly period.

"For convenience and propriety, the specific points of highest and lowest state are taken for standard reference and exemplification, and not that they are the only recurring points or conditions.

"The mean period was deduced from the 'Greenwich observations,' in which alone the precise hours of the highest and lowest states are given in the comprehensive and useful abstracts. It was not a fanciful conjecture in taking this period, which so remarkably accords with the assigned solar month; and when I so uniformly and constantly found the recurring monthly periods to be the same in all the tables of fifty years, and all places from which I could obtain tables, the evidence appeared irresistible."

By taking two days on each side of the true date, five days are evidently included, and as the occurrence of either the highest or lowest reading within that period is held to prove a "recurring period" the chances (irrespective of law) are that that they will recur once in three times; when we add to this that breaks in the series are admitted, it is not surprising that an apparently overwhelming frequency of recurring periodicity is established. Instead of testing the question by the examples given in the work before us, we will take some of the Greenwich observations at hap-hazard, say 1858 and 1865.

1858.—BAROMETER.

Highest	17	25	22	22	26	23	3	7	25	30	9	6
Lowest	20	4	6	8	1	17	25	18	30	7	27	23

THERMOMETER.

Highest	9	5	24	16	31	16	15	12	12	3	26	21
Lowest	6	26	11	2	7	28	29	29	25	30	24	7

A mere glance at the barometric dates given above, shows that in this chance selected year the 25th was a frequent date, and analysis shows that dates between 22nd and 26th are just twice as frequent as might have been expected. The thermometric dates are not nearly so accordant, but they are about 28 per cent. in excess.

Thus 1858 confirms the theory; now let us try 1865.

1865.—BAROMETER.

Highest	7	10	3	6	20	8	26	30	23	3	12	15
Lowest	14	1	6	3	10	30	31	23	8	27	22	29

THERMOMETER.

Highest	10	28	31	27	21	23	15&27	27	8	2	24	7
Lowest	22	15	21	2	1	12	12	3	23	20	5	24

This case seems also evidence that there is something more than *chance* in the frequent recurrence of similar dates. We will take a third year—from Icelandic returns—observations made at Reikiavik in 1830.

BAROMETER.

Highest	11	17	31	1	9	15	3	18	3	26	23	17
Lowest	25	7	14	19	1	12	21	1	9	20	9	15

Here the indications of a recurring period are slight, though an enthusiast might point out the sequences 11, 17, 14, 19, 9, 15, 21, 18, 9, 20, 23, 17, or again 31, 1, 1, (12,) 3, 1, 3.

Need we remark that all our readers have the means of further examination in their own hands, both in their observation books and in our own pages.

In concluding these notes we should not omit to mention that a chapter is devoted to the various celestial phenomena supposed to influence the weather, such as the Metonic cycle, Howard's 18 year cycle, new and full moon, and lunar influence generally, none of which are believed by Mr. Webster to accord with recurring periods. He quotes, however, one paragraph from the Greenwich observations which had previously escaped our notice, and which, being of considerable interest, we transcribe:—

“The general fact of a daily lunar tide is indicated, by the mean readings increasing from six hours W. to six hours E., and diminishing from two hours E. to six hours W., hour angles respectively.*

“It appears that the mean height of the barometer is increased by the moon's position in south declination.

“When the moon was at or near her mean distance, and particularly when coming nearer to the earth, the mean height of the barometer was greatest. It would seem that the mean pressure of the atmosphere was greatest when the moon was about 14 days old.

Mr. Webster's work contains much other matter, among which may be noticed a description of the frost fair on the Thames in 1814, of the meteorology of Melville Island, Mauritius, Madeira, and other places, and many short and interesting notes.

* On reference to the Greenwich volume, we find Mr. Webster has not quoted the whole of the sentence, and thereby given it a different value. In the original the sentence concludes—“but these times are not in accordance with those deduced from the observations of previous years.”

APRIL, 1868.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.						Days on which .01 or more fell.	TEMPERATURE.				No. of nights below 32°.
		Total Fall.	Difference from average 1860-5	Greatest Fall in 24 hours.		Max.	Min.						
				Dpth	Date.		Deg.		Date.				
										inches	Inches.	in.	
I.	Camden Town	1.49	+ .36	.66	20	12	68.8	30	30.5	12	1		
II.	Staplehurst (Linton Park) ...	1.21	— .01	.36	20	11	72.0	4	27.0	12	4		
	Selborne (The Wakes).....	2.85	+ 1.35	1.09	19	12	68.0	28	23.0	12	8		
III.	Hitchen	1.65	+ .65	.50	20	13	64.0	30	25.0	11	5		
	Banbury	1.58	+ .42	.51	20	15	64.5	30	23.0	13	5		
IV.	Bury St. Edmunds (Culford) ..	1.68	+ .93	.37	20	15	65.0	7, 30	28.0	11+	9		
V.	Bridport	2.00	+ .52	.74	19	12	68.0	16	24.0	13	10		
	Barnstaple.....	2.50	+ .49	.61	20	14	...	...	...	...	...
	Bodmin	3.85	+ 2.15	1.08	19	12	62.0	4	32.0	11	0		
VI.	Cirencester	2.20	+ .91	.65	21	12	55.0	30	40.0	13	0		
	Shifnall	1.51	+ .36	.44	20	13	61.0	15	26.0	13	8		
	Tenbury (Orleton)	1.80	+ .26	.44	19	13	68.2	15	24.0	13	9		
VII.	Leicester (Wigston)	1.27	— .03	.48	21	9	70.0	4	22.0	12	9		
	Boston	1.75	+ .78	.52	8	18	66.0	30	29.0	13	1		
	Gainsborough	1.37	+ .55	.36	19*	11	67.0	2+	25.0	12	4		
	Derby.....	1.55	+ .12	.51	20	14	65.0	15	26.0	13	2		
VIII.	Manchester	1.68	— .08	.49	15	14	66.0	26	27.0	12	6		
IX.	York	1.82	+ .72	.58	20	17	64.5	15	27.0	13	2		
	Skipton (Arncliffe)	3.83	+ .79	.76	20	19	66.0	17	30.0	12	1		
X.	North Shields	3.04	+ 1.73	.81	7	17	65.6	16.	29.5	12	1		
	Borrowdale (Seathwaite).....	...	...	...	...	...	...	...	...	...	...
XI.	Cardiff (Town Hall).....	2.48	...	.70	20	12	...	...	...	...	...
	Haverfordwest	2.03	+ .17	.92	19	7	61.1	16	25.0	10	9		
	Rhayader (Cefnfaes).....	2.79	+ .90	.90	20	13	65.0	...	24.0	...	...
	Llandudno.....	1.46	— .04	.42	20	11	65.2	15	32.0	11	0		
XII.	Dumfries	3.01	+ 1.34	.47	20	18	67.0	24	28.5	11	4		
	Hawick (Silverbut Hall)....	3.39	...	.91	7	15	...	...	...	...	8
XIV.	Ayr (Auchendrane House) ...	3.52	+ 1.30	.91	22	15	61.0	15	26.0	10	4		
XV.	Castle Toward	3.52	+ 1.02	.62	7	16	67.0	24	26.0	10	5		
XVI.	Leven (Nookton)	2.89	+ 1.64	.76	22	12	65.0	16	31.0	14	3		
	Stirling (Deanston)	3.91	+ 2.16	.95	22	18	60.8	26	25.0	10	5		
	Logierait	4.02	...	1.63	19	14	...	...	...	...	...
XVII.	Ballater	4.19	...	1.50	19	18	65.5	16	25.0	11	5		
	Aberdeen	2.55	...	.38	22	19	65.2	15	29.2	11	2
XVIII.	Inverness (Culloden)	2.26	...	.67	30	11	60.3	16	33.4	10	...
	Fort William	4.23	...	.69	29	18	...	...	...	...	...
	Portree	5.61	+ .34	1.12	4	19	56.2	13	28.0	10	2		
	Loch Broom	2.48	...	.53	28	20	...	...	...	...	...
XIX.	Helmsdale.....	2.55	...	.83	29	15	...	...	...	...	...
	Sandwick	3.31	+ 1.57	.80	29	20	53.0	2	33.6	9	0		
XX.	Cork	2.97	...	.76	22	11	...	...	...	...	...
	Waterford	3.04	+ .81	.80	19	14	72.0	16	38.0	1, 9	0		
	Killaloe	3.22	+ 1.09	.71	22	16	66.0	15	30.0	9	2		
XXI.	Portarlinton	2.14	+ .13	.59	23	14	54.0	14	34.0	9	0		
	Monkstown	1.86	+ .22	.67	22	13	68.5	15	29.3	2	4		
XXII.	Galway	2.28	...	.53	6	16	58.0	2	36.0	8	0
	Bunninadden (Doo Castle) ...	1.49	...	.32	20	14	57.0	2	28.0	1	1
XXIII.	Bawnboy (Owendoon)	2.27	...	.34	27	16	65.0	1	35.5	8, 27	0
	Waringstown	2.19	...	.46	22	12	66.0	16	26.0	10	2
	Strabane (Leckpatrick)	2.11	...	.64	7	14	66.0	15	31.0	24||	2

* And 27th. + And 15th, 16th & 24th. ‡ And 18th. || And 28th.

+ 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.

CAMDEN TOWN.—Lunar halo on 6th; TS on 27th at 4.35 p.m.; aurora on 27th at night.

LINTON PARK.—A fine, dry month, the beginning and end especially; fog on 7th and 17th; sharp frost on 12th, with dull, cold weather before and after that time. Great promise of fruit, the blooming of which is early; cuckoo not heard till 21st, delayed no doubt by the preceding cold.

SELBORNE.—Cuckoo first heard on 19th; swallow first seen on 22nd; T and H at 2 p.m. on 23rd—violent storm some miles to eastward; violent H storm at 3 p.m., with T, on 27th; T on 25th and 26th; bright aurora extending far to W. on 27th; diffused aurora on 28th; dense fog on 26th. Agricultural operations retarded by damp state of ground until the latter part of the month.

HITCHIN.—Heavy snow storms on 9th.

BANBURY.—S on 8th and 9th; H on 25th, and 27th; T and L on 25th.

CULFORD.—H on 8th and 9th; TS on 23rd.

BRIDPORT.—Swallows seen on 9th; cuckoo heard on 20th; horse chesnut in leaf on 10th; cowslip out on 11th; elms in leaf on 18th. Very sharp frost on 13th; ther. 8 deg. below freezing point; potatoes cut, and taps in open air frozen up; heavy westerly gale on the 19th, bar. at 9 a.m. stood at 29.40, at 10 p.m. 28.95. First half of the month fine and dry, the latter wet and stormy.

BODMIN.—Cuckoo first seen on 8th; first heard on 29th. A mild month.

CIRENCESTER.—The weather until the 19th was dry, with E. and N. winds; perfect weather for the farms; serene and sunny, with slight night frosts; afterwards it became windy; S.W. gales and R to the end; T on 23rd and 25th. On 16th appeared at sunset, and half an hour after, a sun column, which, agreeing with my note of April 9th, 1852, will describe it: "Saw a little before sunset a column of light rising perpendicularly from the sun to 25°, and visible half an hour after sunset; no cloud at sunset." April 19th, 1852: "Saw the sun column again." A similar appearance in March last was noticed by a correspondent of yours. I only notice it as unusual; I have no faith in its indicating the character of the coming summer, still the fact of 1852 was that it preceded the wettest summer ever known, commencing in June with 6.82 in. of rainfall, and a total of 38.25 in. in the seven last months of the year, instead of 19.13, the average of 24 years. [Probably the zodaical light.]

SHIFFNAL.—Very dry the early part of the month, so much so that the red spider attacked the young gooseberry leaves. Great absence of E. winds, as in last month, but many white frosts injured unprotected wall fruit. Latter end of the month April weather—sunshine and showers. Heavy TS at noon on 25th, but little R. White butterflies first appeared on 3rd; chaff-chaff first heard on 7th; sand martens first seen on 14th; swallow first seen on 24th.

BOSTON.—Dull and mild up to the 8th, with cloudy skies; to 15th cold and dull, rest of month showery, but favourable to the progress of vegetation; crops of wheat, &c. looking better than they have done at this time for several years. Cuckoo heard on 25th; swallow seen on 10th. Horse chesnuts and poplars in leaf on 20th; hawthorn on 15th; lime and sycamore on 24th; S fell on 8th, 9th and 10th, and H on 8th, 9th and 27th; on the latter date H fell during a TS at 4 p.m., and the pellets of ice were as large as small marbles, causing great damage to fruit trees. Lunar halo on 5th.

GAINSBOROUGH.—The month was generally fine, but squally. S and H on 8th. Plums in full blossom, but nipped on the nights of the 11th and 12th. Ozone very freely developed from 7th to 10th, and also from 17th to the end of the month. Swallows first seen on 19th; cuckoo first heard on 23rd; lilac in flower on 25th.

DERBY.—The weather during the month remarkably fine; very few frosts recorded, and N.E. winds only on 4 days. TS on 25th, violent, but lasting only

a few minutes ; a church was struck, doing considerable mischief ; the concussion burst open doors and shook windows throughout the town, like a little earthquake.

YORK.—S on 9th ; T at 4.30 p.m. on 24th ; fine aurora at 10.30 p.m. on 27th.

ARNcliffe.—T S on 27th.

NORTH SHIELDS.—Lunar halo on 3rd and 6th ; H on 8th and 9th ; S on 8th and 9th ; T S on 26th.

W A L E S.

HAVERFORDWEST.—First fortnight bright, clear, and sharp night frosts ; then change of weather, with milder temperature for a few days. Tremendous gale, commencing on the night of the 18th ; great fall of R, and very low barometric pressure, lowest at midnight, 28.525 on the 19th ; storm abated a little during the 20th ; blowing harder than at all during the night of the 20th, and on the morning of the 21st wind shifted from N.W. to S.E., from which point it again blew tremendously ; the weather continued unsettled, stormy and cold to the end of the month.

CEFNFAES.—A dry month, nights cold and frosty, hot sunny days ; early fruit trees in blossom much injured by the frosts ; hailstorms frequent ; T and vivid L between 3 and 4 in the afternoon of 25th.

S C O T L A N D.

DUMFRIES.—There was little R the first part of the month ; the latter half showery. Very fine growing weather, and the season three weeks earlier than usual ; a fine seed-time at beginning of the month, and the brairds of oats and barley very strong. S on hills on 8th and 28th ; T on 23rd and 24th ; cuckoo heard on 24th ; swallows seen on 20th. The country looking very fresh and beautiful ; the rainfall 1.21 in. above the average of 5 years.

HAWICK.—Hills white with S, accompanied with biting frost, on the 8th and 10th ; T, H, and L on 21st. Bats out in the twilight on the 23rd ; swallows first observed on the 25th. Heavy gales on the 27th, 28th, 29th and 30th. The month on the whole has been genial, and most favourable for the sowing of seeds, and the country bears a greener mantle than usual on the 1st of May. T on 26th.

AYR.—Rainfall in excess of the mean 12 years for April. Like the preceding three months of this year, the bar. pressure is about the April mean of last three years, but the bar. range is greater than said mean. Vegetation, &c., three weeks in advance.

CASTLE TOWARD.—The first six days mild ; wind S. and S.W., with S on the hills ; the wind changing to E., N.E. and N., the ther. fell to 26° on the 10th. Many of the rhododendrons which were in flower had their flowers destroyed, and fruit blossom, which was very abundant, much injured ; since the 12th the wind kept into the S. and S.W., and has been mild and rather wet. The spring garden is quite gay with hundreds of plants flowering profusely. Aurora on 28th from 9 to 11 p.m. ; strong gale on 29th, breaking down branches, and stripping the trees of their tender foliage.

DEANSTON.—Very dry till 19th, but some frosty mornings, though doing no injury to vegetation. Latter part of the month very wet and boisterous, especially on 28th and 29th, very stormy and chilly ; brilliant colourless aurora on night of the 27th.

LOGIERAIT.—A favourable month for vegetation, though not towards the close ; severe gale on the night of the 28th ; T on 24th and 27th ; aurora on 27th ; cuckoo heard on 26th ; swallow seen on 27th.

BALLATER.—A month of unsteady weather ; about an inch of S covered the ground on the morning of the 8th, but notwithstanding occasional sharp frosts during the month, fruit trees and bushes promise well ; the fields look remarkably fresh and beautiful.

ABERDEEN.—Rather wet, but warm, quiet, genial month ; crops fully a month in advance of last year. S on 7th, 8th, and 9th ; H on 7th, 8th, 9th, 10th, and 23rd ; fog on 12th, 13th, 19th, 20th, 21st, and 22nd ; T and L from 4 to 5 p.m. on 23rd ; T on 24th, 26th and 27th ; auroræ on 10th, 12th, 13th, 15th, 20th, 26th, 27th, and 29th.

FORT WILLIAM.—A pleasant and genial month till near the end ; S low on hills on 7th.

LOCHBROOM.—The month has been the best and most beautiful April remembered. Vegetation and agricultural works are in a very forward state, and until the end of the month it was more like summer than spring. The 28th gave indications of an approaching change, but the 29th was a terrific stormy day from W. and S.W.

SANDWICK.—April has been wet and warm, so that from this, and the extra warmth of the preceding months, vegetation and agricultural operations are far advanced. There was a gale at 40 miles an hour from 12 to 6 a.m. on 6th, and two on 29th, one of them 40 miles and the other 50 miles an hour. Auroræ on 10th and 28th; solar halo on 30th.

IRELAND.

DOO CASTLE.—From 25th of March, and entire of April, have been unequalled for years for farming operations. The farmers are luxuriating in this long spell of good and favourable weather, and look forward for an abundant harvest. We would just now have no objection to more moisture, grass, &c., suffering slightly, but the tables of the few last springs have been so completely turned in our favour, that we cannot reasonably complain.

OWENDOON.—S on mountains on 7th; T on 20th and 25th; H on 20th; very early growth, fully three weeks more forward than last year; old men say it has been the most favourable April they can remember.

WARINGSTOWN.—One of the finest months I ever recollect, especially the first three weeks. Spring forward, and labour getting on well.

LECKPATRICK.—Fine month; very warm from 12th to 17th; gale of wind on 28th from S. Swallow last of the month.

FLOOD ON THE SPEY, FEBRUARY 1st.

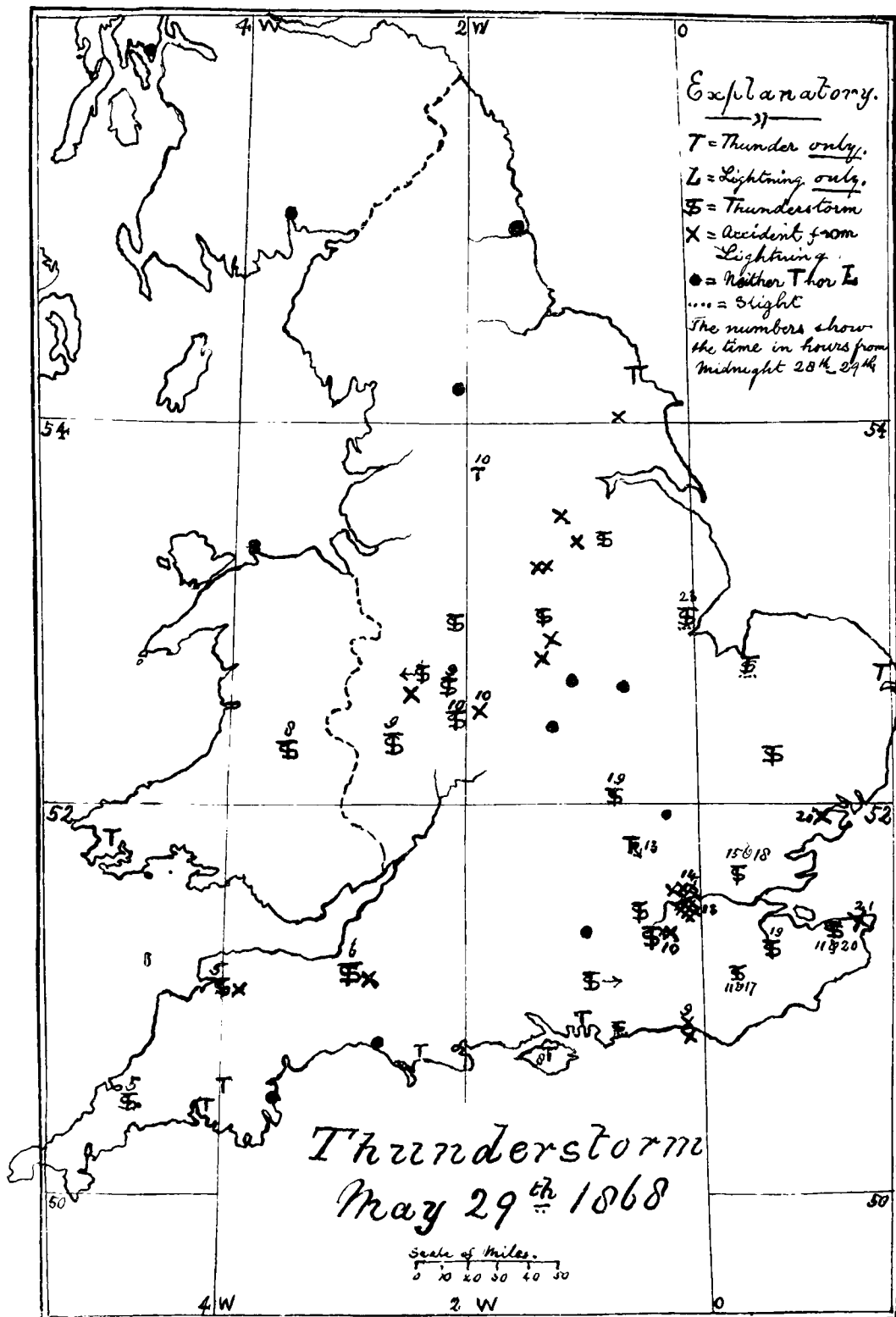
To the Editor of the Meteorological Magazine.

SIR,—During the latter part of January there had been hard frost, and much snow collected on the mountains. Between 9 p.m. January 30th, and 9 a.m. 31st, 0·48 inches of rain fell; 1·00 inches followed in the next 12 hours, and 44 in the next: so that the total in 36 hours was 1·92. This rainfall was preceded by a stiff breeze from the west, which melted the snow on the Cairngorm range, and on Friday, January 31st, the Spey came down with all the suddenness of a dam let off and with the speed of a race-horse, spreading far beyond her usual flood marks. The embankments gave way in many places, and from Ballifurth to Boat of Gordon (?), a distance of six miles, a fleet of steamers might have plied, without once entering the channel of the river. Looking westward from Ballifurth (where the valley of the Spey is about a mile in breadth) all was one unbroken sea, and appeared as navigable as the Firth of Forth. On Saturday, February 1st, the river rose to within 19 inches of the memorable flood of August, 1829, so graphically described by the late Sir Thomas Dick Lauder, of Fountainhall. The rainfall on that occasion (as registered by the gardener at Huntly Lodge) was, however, $3\frac{3}{4}$ inches in 24 hours. Since the spate of February 1st we have had heavy rainfalls: 0·89 inch was registered on the morning of February 28th, and the river has several times overflowed the injured embankment. While I write several hundred acres are under water, and fears are entertained lest the ground must remain fallow during the ensuing season.—Very truly yours,

WM. DUNCAN.

Grantown, Strathspey, N.B.

[Several important communications must stand over till our next.]



G. F. Symons, Litho.