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A COLD PERIOD.

Two able men have recently and almost simultaneously drawn attention to a long period of cold which has prevailed over some parts of Europe.

M. Lancaster, of Brussels, in his article on the climate of Belgium during 1888, in the *Annuaire de l'Observatoire Royal de Bruxelles* for 1889, begins with the following remarks:—

“The year 1888, like its predecessor 1887, has been very cold. It has even been colder than 1887.

“For nearly four years the temperature has been almost constantly below the average. The persistency of this extraordinary state of things is a fact without precedent.

“From January, 1885, to November, 1888, there have been 35 months, out of 47, in which the temperature has been below the average.

“In 1888 every month up to November was below the average, the deficiency in February being as much as $8^{\circ}3$.

“Only three years (since the establishment of the Observatory in 1833) have been colder than 1888, viz., 1879, $47^{\circ}2$; 1845, $47^{\circ}9$; 1855, $47^{\circ}9$; 1888, $48^{\circ}0$. The mean for 1887 was $48^{\circ}4$, therefore these two years may be regarded as amongst the coldest of the century.”

M. Flammarion's note was, we believe, originally published in the *Petit Journal*; we, however, have only the note as quoted in *Le Figaro*, which is to the following effect:—

“As the result of comparing meteorological observations made in France and abroad, M. Camille Flammarion states that during four years the temperature of our climates has fallen considerably. It is therefore certain that we are passing through a period of cooling. Almost all the months are below their average, and the fall in February and March is striking. The fall on the average of the whole year is from $2^{\circ}7$ to $3^{\circ}6$ for France and Belgium, so that, for example, at Paris, instead of $51^{\circ}4$ it has been $48^{\circ}0$, and at Brussels instead of $50^{\circ}5$ it has been $48^{\circ}0$.”

In the foregoing extracts the old-fashioned year, beginning with December and ending with November, has, we believe, been taken, hence the above values differ slightly from those for the civil year given further on.

Moreover, Mr. Renou calls attention to the fact that the temperature assigned to Paris by M. Flammarion ($51^{\circ}4$) is too high by about $1^{\circ}4$.

We ought also to mention two papers upon the subject read by Mr. C. Harding before the Royal Meteorological Society and reported on pages 86 and 179 of our last volume.

It is obviously of much interest to know the area over which this cooling has prevailed and its relative intensity. At present we have only had time to collect returns from a few stations just as an illustration of what is wanted. The Greenwich values are taken from Mr. Glaisher's tables, those for Paris have been kindly furnished by Mr. Renou from the Observatory Parc St. Maur, those from Brussels by M. Lancaster, of the Observatoire Royal, and those from Toronto are taken from the *Canadian Monthly Weather Review*. The following little table epitomizes the results, whence it will be seen that the effect has certainly been much more marked at Brussels than in this country.

| | Greenwich. | | Paris. | | Brussels. | | Toronto. |
|-------|-------------|---|-----------|---|-----------|---|----------|
| 1885. | ·0 | - | ·5 | - | 1·1 | - | 2·6 |
| 1886. | + ·1 | + | ·6 | - | ·1 | - | ·5 |
| 1887. | - ·8 | - | 2·1 | - | 2·2 | + | ·0 |
| 1888. | - 1·0 | - | 1·9 | - | 2·2 | | |

On considering the above facts, it occurred to us that we had heard of some change in the position of the thermometers at Brussels, and we asked M. Lancaster about it. From his reply, it appears that the values for 1885 to 1888 are from thermometers in a Stevenson screen, whereas up to 1887 the exposure was at a N. window; the yearly mean in the screen is $0^{\circ}5$ lower than at the window, but as the correction for individual months is not accurately known, no corrections have been applied.

If now we apply this correction to the annual values, the above table will become

| | Greenwich. | | Paris. | | Brussels. | | Toronto. |
|-------|-------------|---|-----------|---|-----------|---|----------|
| 1885. | ·0 | - | ·5 | - | ·6 | - | 2·6 |
| 1886. | + 0·1 | + | ·6 | + | ·4 | - | ·5 |
| 1887. | - ·8 | - | 2·1 | - | 1·7 | + | ·0 |
| 1888. | - 1·0 | - | 1·9 | - | 1·7 | | |
| Mean | - ·4 | | - 1·0 | | - ·9 | | |

We do not think that it is necessary to pursue the subject further, as all these values are within the limits of variation of mean annual temperature.

| | GREENWICH. | | | PARIS. | | | BRUSSELS. | | | TORONTO. | | |
|------|--------------------------|------------------|--------|--------------------------|------------------|--------|--------------------------|------------------|--------|--------------------------|------------------|--------|
| | Monthly Mean Temp. | Diff. from Aver. | | Monthly Mean Temp. | Diff. from Aver. | | Monthly Mean Temp. | Diff. from Aver. | | Monthly Mean Temp. | Diff. from Aver. | |
| | | Monthly. | Qrtly. | | Monthly. | Qrtly. | | Monthly. | Qrtly. | | Monthly. | Qrtly. |
| 1885 | Jan... | 36.6 | + .1 | | 31.6 | - 3.2 | | 32.4 | - 3.9 | | 18.0 | - 4.6 |
| | Feb... | 43.9 | + 5.2 | + 1.5 | 44.8 | + 6.3 | + .7 | 44.8 | + 6.0 | + 0.1 | 11.1 | - 11.8 |
| | Mar... | 40.3 | - .8 | | 41.3 | - 1.0 | | 40.5 | - 1.9 | | 18.5 | - 10.6 |
| | April | 47.7 | + 1.6 | | 50.2 | + 1.1 | | 51.1 | + 1.8 | | 37.7 | - 3.1 |
| | May... | 49.9 | - 2.6 | + .1 | 52.2 | - 3.8 | + .1 | 51.8 | - 4.1 | - 0.5 | 51.7 | - .3 |
| | June... | 59.5 | + 1.3 | | 64.5 | + 3.1 | | 63.3 | + 0.7 | | 60.6 | - 1.3 |
| | July... | 63.8 | + 2.1 | | 65.3 | + .7 | | 64.8 | - .4 | | 68.3 | + .7 |
| | Aug... | 58.5 | - 2.4 | - .6 | 61.1 | - 3.0 | - 1.3 | 61.2 | - 3.2 | - 1.7 | 63.5 | - 3.0 |
| | Sept... | 55.1 | - 1.4 | | 57.4 | - 1.5 | | 57.6 | - 1.6 | | 57.0 | - 1.5 |
| | Oct... | 46.1 | - 3.7 | | 47.4 | - 3.5 | | 48.0 | - 3.6 | | 45.8 | - .4 |
| | Nov... | 43.3 | + 1.0 | - 1.0 | 43.2 | + .7 | - 1.3 | 41.0 | - 2.0 | - 2.3 | 38.6 | + 2.6 |
| | Dec... | 38.9 | - .2 | | 35.9 | - 1.1 | | 36.8 | - 1.3 | | 28.2 | + 2.3 |
| 1886 | Jan... | 36.1 | - .4 | | 36.0 | + 1.1 | | 34.8 | - 1.4 | | 19.2 | - 3.4 |
| | Feb... | 33.7 | - 5.0 | - 2.3 | 34.1 | - 4.3 | - 1.3 | 32.4 | - 6.5 | - 3.3 | 19.0 | - 3.8 |
| | Mar... | 39.6 | - 1.5 | | 41.5 | - .7 | | 40.5 | - 2.0 | | 30.2 | + 1.1 |
| | April | 46.4 | + .3 | | 50.9 | + 1.8 | | 49.8 | + .5 | | 44.9 | + 4.1 |
| | May... | 53.3 | + .8 | + .2 | 57.5 | + 1.6 | + .4 | 57.6 | + 1.7 | - .1 | 53.2 | + 1.2 |
| | June... | 57.8 | - .4 | | 59.3 | - 2.1 | | 60.2 | - 2.4 | | 60.9 | - 1.1 |
| | July... | 63.0 | + 1.3 | | 64.9 | + .4 | | 65.5 | + .3 | | 66.8 | - .8 |
| | Aug... | 62.6 | + 1.1 | + 1.5 | 64.3 | + .2 | + 1.3 | 64.3 | - .1 | + 1.3 | 65.7 | - .8 |
| | Sept... | 58.7 | + 2.1 | | 62.3 | + 3.4 | | 62.8 | + 3.7 | | 58.9 | + .3 |
| | Oct... | 53.3 | + 3.8 | | 54.3 | + 3.4 | | 54.5 | + 2.8 | | 48.5 | + 2.1 |
| | Nov... | 44.0 | + 1.6 | + .9 | 44.3 | + 1.9 | + 1.9 | 45.7 | + 2.7 | + 1.6 | 35.6 | - .3 |
| | Dec... | 36.5 | - 2.6 | | 37.4 | + .3 | | 37.2 | - .7 | | 21.6 | - 4.4 |
| 1887 | Jan... | 35.6 | - 1.0 | | 31.6 | - 3.2 | | 33.2 | - 2.9 | | 18.1 | - 4.4 |
| | Feb... | 38.8 | 0 | - 1.5 | 35.9 | - 2.5 | - 3.3 | 36.8 | - 2.2 | - 3.4 | 21.7 | - .8 |
| | Mar... | 37.6 | - 3.5 | | 38.2 | - 4.1 | | 37.4 | - 5.0 | | 24.8 | - 4.1 |
| | April | 44.1 | - 2.0 | | 46.8 | - 2.3 | | 46.4 | - 2.9 | | 39.4 | - 1.5 |
| | May... | 49.8 | - 2.7 | - .7 | 52.5 | - 3.5 | - 1.3 | 52.5 | - 3.4 | - 2.1 | 58.5 | + 6.5 |
| | June... | 60.9 | + 2.6 | | 63.2 | + 1.8 | | 62.6 | 0 | | 63.9 | + 1.9 |
| | July... | 66.5 | + 4.8 | | 66.8 | + 2.3 | | 67.5 | + 2.3 | | 73.1 | + 5.6 |
| | Aug... | 62.5 | + 1.6 | + 1.3 | 63.1 | - .9 | - .9 | 63.3 | - 1.1 | - .5 | 66.2 | - .2 |
| | Sept... | 54.0 | - 2.6 | | 54.9 | - 4.0 | | 56.4 | - 2.7 | | 56.4 | - 2.1 |
| | Oct... | 45.0 | - 4.6 | | 44.0 | - 6.9 | | 46.5 | - 5.2 | | 44.2 | - 2.2 |
| | Nov... | 40.8 | - 1.6 | - 2.4 | 41.0 | - 1.4 | - 3.0 | 41.6 | - 1.4 | - 2.9 | 35.1 | - 0.9 |
| | Dec... | 38.1 | - 1.0 | | 36.2 | - .8 | | 35.8 | - 2.2 | | 28.4 | + 2.6 |
| 1888 | Jan... | 37.8 | + 1.2 | | 33.7 | - 1.1 | | 33.6 | - 2.5 | | 15.0 | - 7.4 |
| | Feb... | 35.0 | - 3.8 | - 1.9 | 31.8 | - 6.6 | - 3.7 | 30.6 | - 8.3 | - 4.9 | 21.9 | - .6 |
| | Mar... | 38.0 | - 3.1 | | 38.9 | - 3.3 | | 38.5 | - 4.0 | | 22.4 | - 6.3 |
| | April | 43.4 | - 2.7 | | 45.5 | - 3.6 | | 45.1 | - 4.1 | | 38.9 | - 1.9 |
| | May... | 53.0 | + .5 | - 0.7 | 56.0 | + .1 | - 1.2 | 55.5 | - .5 | - 1.6 | 50.6 | - 1.6 |
| | June... | 58.3 | 0.0 | | 61.4 | 0 | | 62.5 | - .2 | | 64.4 | + 2.4 |
| | July... | 57.9 | - 3.8 | | 60.3 | - 4.3 | | 60.5 | - 4.7 | | 66.2 | - 1.5 |
| | Aug... | 59.1 | - 1.8 | - 2.1 | 61.5 | - 2.5 | - 2.5 | 62.1 | - 2.3 | - 2.8 | 66.0 | - .3 |
| | Sept... | 55.7 | - 0.8 | | 58.2 | - .7 | | 57.7 | - 1.4 | | 56.5 | - 1.9 |
| | Oct... | 46.0 | - 3.5 | | 45.7 | - 5.2 | | 48.3 | - 3.4 | | 43.4 | - 3.0 |
| | Nov... | 47.0 | + 4.6 | + 0.9 | 46.6 | + 4.1 | - .1 | 45.5 | + 2.5 | + 0.7 | 37.4 | + 1.4 |
| | Dec... | 40.8 | + 1.7 | | 37.7 | + .7 | | 40.8 | + 2.9 | | | |
| 1889 | Jan... | | | | 33.9 | - .9 | | 34.3 | - 2.0 | | | |
| | Feb... | | | | 36.3 | - 2.2 | | 35.1 | - 3.7 | | | |

THE FLOODS OF MARCH 8TH--9TH.

THERE is not time to treat this subject fully in the present number, but we can give a brief outline of the principal injury, and treat the subject fully on a subsequent occasion.

DAMAGE.

Oxford.—Although the rainfall here was continuous, it was not exceptional, but we have had the highest flood for ten years, owing to the enormous quantity of water coming down from Lechlade and the west.

Taunton.—This is one of the towns which generally suffers in time of heavy rain, but as far as we know does nothing towards protecting itself against the floods of the Tone. The water rose to 5 ft. in the main thoroughfares, and near the river to 6 ft., doing of course much damage both to property and to health. Between Taunton and Bridgewater, the main line of the Great Western Railway was 3 or 4 ft. under water, and therefore impassable.

Bath.—The Avon rose 15 ft. above its usual level, and the streets in the lower part of the City became flooded, and of course the houses on each side suffered likewise.

Bristol.—Here a large area has been covered with houses which ought not to have been built upon until proper engineering works were carried out for its protection from floods. Whenever there is a flood at or near Bristol, we always hear of the distress of the poor people in the Baptist Mills district, and we wonder who is responsible for covering that area with "hundreds of houses filled with water to the second storey?" Bristol is not the only place where the greed of some, has led to houses being built upon land which has at intervals been flooded, from time immemorial. This time, however, the flood was not confined to the Baptist Mills district, but invaded the centre of trade and commerce. The damage to property alone is put at £40,000 to £50,000, and to this what is to be added for chills, damp and muddy houses, illness and death?

Stratford-on-Avon.—Much ground and some roads under water; one hotel in the town so flooded that the ground floor could not be used.

Evesham.—Some of the streets 2 ft. to 3 ft. under water, and the basements of houses flooded.

Nuneaton.—Mills by the side of the river had to be closed as the ground floors were flooded and the engine fires extinguished.

Tamworth.—Water 3 ft. deep in many of the streets, and the farmers up all night moving their stock to high land; some hay ricks washed away by the floods.

Worcester.—Much damage, manufactories flooded, cattle drowned, and thousands of acres of land submerged.

Leicester.—This is another town in which much land very slightly above the ordinary level of the river Soar has been built upon, with

the natural result of frequent complaints as to floods. It appears from the newspapers that important works for facilitating the passage of storm waters, and thereby diminishing the liability to flooding were in progress, and that the contractors' plant, worth £2,000 or £3,000, was carried away and blocked up a bridge lower down, thus throttling the river and compelling it to rise higher than it would otherwise have done. As to the truth of this story we know nothing at present, but it seems probable as the damage in Leicester appears exceptional considering the rainfall which produced it. Whole streets are said to have been submerged, many factories flooded and the hands thrown out of work, the Great Northern Goods station was flooded, the horses being rescued only when the water had reached 3 ft. in their stalls. At Knight's Shoe Factory, some of the workrooms were said to have had in them 14 ft. of water.

Nottingham.—This town on the River Trent generally suffers when Leicester does so, because (1) the Trent receives the Soar, and also the (Derbyshire) Derwent a very few miles W. of Nottingham; and (2) from Nottingham to the sea the Trent has a long and devious course with a very slight fall. Hundreds of houses are stated to have been flooded, for an immense volume of water poured down from the high grounds, and the flood level rose to the same height as in 1877, that is to say (with three exceptions) to the greatest height this century.

Chester.—It is many years since the Chester Post-office officials experienced such a destructive storm as that which concluded early on Saturday morning. Snow fell continuously for 12 hours, but towards Friday midnight it gave up, and rain descended in torrents for some hours. Telegraphic communication was cut off between Chester and Cholmondeley, Malpas, Tattenhall, and Farndon, while a great number of wires were broken connecting Chester with Manchester, Liverpool and Shrewsbury. On the hills the snow lies a foot in depth.

GROUND ICE, OR ANCHOR ICE.

To the Editor of the Meteorological Magazine.

SIR,—Can you explain the cause of what we call "Anchor Frosts?" They occur only occasionally, sometimes years between. There was a remarkable one yesterday. Ice looking like congealed snow comes up from the *bottom* of the river, which is covered over with it. As the mill was not going it was not affected by it, but I have known it so troublesome in preventing the water coming on the wheel, that the mill had to be stopped.—I remain, yours very truly,

JAS. NUTTER.

[This phenomenon is, we believe, rather rare, and the explanation is not generally known; we therefore use Mr. Nutter's letter as a

nucleus around which to collect a short series of descriptions and explanations, which we will give in chronological order.—ED. M.M.]

METEOROLOGY, BY G. HARVEY, F.R.S., 4to, 1849, p. 144.

“The phenomenon of ice at the bottom of rivers is of very great interest. Mr. Knight discovered some in the river Teme, in Herefordshire, which he has described in the *Philosophical Transactions* for 1816. On a morning succeeding an intensely cold night, the rocky bed of the river appeared covered with frozen matter, which reflected a kind of silvery whiteness, and which upon examination was found to consist of numerous frozen spiculæ, intersecting each other in every direction, but not assuming anywhere, excepting near the shore, the state of firm compact ice.

“Many opinions have been advanced respecting the origin of ice in a situation so different from its ordinary state, and so contrary to what might be anticipated from its known specific gravity. The ordinary laws of radiation, joined to the eddies and gyrations of the running streams to which it is peculiar, seem adequate, however, to account for its formation. On the occasion which afforded Mr. Knight the opportunity of examining this phenomenon, the temperature of the surface water was just at freezing point, small pieces of ice being everywhere formed upon its more stagnant parts near the shores; and upon a millpond just above the shallow streams, in the bottom of which the ice had been formed, millions of frozen spiculæ were floating. At the end of this pond, the water fell over a low weir, and entered a narrow channel, in which its course was obstructed by points of rocks and large stones. Here numerous eddies were formed, which drew the frozen spiculæ under the water, as in a vortex. Mr. Knight found these frozen spiculæ to accumulate most abundantly upon such parts of the stones as stood opposed to the current, wherever it was not very rapid, below the little falls, or most rapid parts of the river. Upon some large stones near the shore, of which parts were out of the water, and upon pieces of native rock, under similar circumstances, the ice beneath the water had acquired a firmer texture, but appeared, from its whiteness, to have been first formed of congregated spiculæ, and to have subsequently frozen into a firm mass, owing to the temperature of the stone or rock. Ice of this kind extended in a few places eighteen inches from the shore, and lay three or four inches below the level of the surface of the water, and did not dissolve nearly so rapidly as that deposited upon stones more distant from the shore.”

PHYSICAL GEOGRAPHY, BY PROF. J. YOUNG, M.D., 8vo., 1874, p. 235.

“*Ground Ice.*—Ground ice, or ice formed at the bottom of rivers, is, in some of the American streams, of considerable importance as a geological agent. The sheet, whose formation is determined by the contact of water with the stones at the bottom, which have become chilled by radiation in clear water under a cloudless sky, rises and

carries with it the fragments among which it was formed, conveying them down the stream into the open sea, and as the ice melts, distributing them over the floor of the ocean."

PHYSICAL GEOGRAPHY, BY W. D. COOLEY, 8vo., 1876, p. 328.

"The existence of what is called ground ice was long doubted; but careful observation has established the fact that at the bottom of rivers, lakes and other shallow waters ice is often formed before it begins to appear at the surface. It may be presumed that in these cases the ground is colder than the water; but the circumstance that seems to give to the bottom of the river the priority in congelation is, that there, under the edge of the stones, and averted from the current, may be found at once the vibration and the perfect shelter required for the formation of the first crystals. The ground ice thus formed grows in vertical flakes, grouped together so as to resemble some kinds of sponge. It often breaks off and floats on the surface, where it promotes congelation. In harbours on the shores of the Baltic Sea large stones, ropes, iron chains, and even anchors have occasionally been raised to the surface, by the luxuriant growth of the ground ice attached to them."

PHYSIOGRAPHY, BY PROF. HUXLEY, F.R.S., 8vo. 1882, p. 152.

"Yet there are certain conditions under which ice may be actually formed at the bottom of a stream, and remain there for some time. This formation of *ground-ice* is occasionally seen in parts of the Thames.

"Dr. Plot, the first keeper of the Ashmolean Museum at Oxford, published in the year 1677 a famous work on the Natural History of Oxfordshire, in which he refers to the freezing of the Thames in the following words:—'I find it the joint agreement of all the watermen hereabout that I have yet talked with that the congelation of our river is always begun at the bottom, which, however surprising it may seem to the reader, is neither unintelligible nor ridiculous. They all consent that they frequently meet the *ice meers* (for so they call the cakes of ice thus coming from the bottom) in their very rise, and sometimes in the underside including stones and gravel.'

"To explain the formation of such ground-ice, it has been suggested that the action of the running stream mechanically mixes the cold surface-water with the warmer water below until the temperature becomes uniform throughout; and when the air is very cold the whole mass may thus be reduced to the freezing point. The formation of ice will then be determined at the bottom, in consequence of the greater tranquillity of the water and the contact of cold stones and other objects which have become chilled by free radiation. This ground-ice is generally found in little masses clinging to stones and weeds; and when the temperature rises after sunrise, the loose bodies are lifted to the surface by the ice, just as if buoyed up with corks. The ice then floats down the river, bearing its little

freight of gravel, which is dropped on the bed of the river when the ice is broken up or melted. The Rev. J. C. Clutterbuck, who has paid great attention to the study of the Thames, tells us that he has seen 'pieces of rock, eight pounds in weight, raised by a mass from the bottom and carried down the river.*' Here then is a geological agent not to be neglected, since it assists the transporting power of streams in carrying solid matter from the land seawards."

THE RAINFALL OF HELIGOLAND.

To the Editor of the Meteorological Magazine.

SIR,—I beg to state that the notice on the rainfall of Heligoland reprinted from the "Athenæum," in the last number of the *Meteorological Magazine* (p. 10), contains some errors. The mean annual rainfall of this island does not amount to 72·50 in., but only to 30·38 in., there having been committed a constant error in the reduction of Parisian cubic inches, read off on the measuring glass, into millimeters published in the reports of the "Kieler Commission zur Erforschung der Deutschen Meere," which established the meteorological station on the upper-land ("Oberland") of Heligoland in 1873.

Inspecting this station, which reports also to the Meteorological Institute at Berlin, in 1884, I placed a new gauge quite near to the old one standing on the little square before the school-house, and found afterwards that the quantities of rain measured in the new and in the old gauge were in the relation of 1 : 2·28. Reducing by this factor the old observations and adding the new and correct ones till the end of 1888, I obtain a mean annual rainfall of 30·38 in., *i.e.*, a little less than on the West-coast of Sleswick-Holstein, as may be seen by the following comparison :—

| | HELIGOLAND. | | MELDORF. |
|-------------|-------------|-------|----------|
| | in. | | in. |
| 1885 | 26·85 | | 34·17 |
| 1886 | 26·66 | | 32·18 |
| 1887 | 22·14 | | 26·56 |
| 1888 | 29·43 | | 36·28 |

In order to know the influence exercised on the quantity of rainfall by the peculiar form of the island rising almost perpendicularly on all sides to a mean height of 150 ft., and therefore forcing the moist sea winds suddenly upwards, I placed another gauge on the down ("Düne") at the height of 8 ft. above the level of the sea. This little flat and sandy island (with an excellent beach for bathing) lies eastward, at the distance of three-quarters of a mile. The observations could only be made there in the months of June till September, because in the remaining part of the year nobody inhabits the down, which is almost inaccessible during rough weather.

* Report of the Thames Commissioners ; appendix 1, 1866.

The simultaneous observations made in the years 1885--87, give the result that on the upper-land falls 13·4 per cent. more rain than on the down; but I am (doubtful) not sure if a great deal of this difference may not be due to the disturbing influence of the wind, which is much stronger on the open and flat down than on the "Oberland," where the raingauge, in spite of the greater height above mean sea-level, is somewhat sheltered by the little town.

Thus, the *amount* of rainfall at Heligoland offers nothing remarkable; but an interesting feature of it is to be found in the fact, that the month of heaviest rainfall is November, whereas on the German coast of the "Nordsee" (German Ocean), this maximum occurs in September. The distribution on the months expressed in per cent. of the yearly total at Heligoland may be seen by the following table:—

| | | | | | |
|----------|---|--------|----|-----------|----|
| January | 8 | May | 5 | September | 11 |
| February | 6 | June | 6 | October | 12 |
| March | 7 | July | 8 | November | 14 |
| April | 3 | August | 11 | December | 9 |

It is my opinion, that this peculiarity—for the most part—can be accounted for by the difference of the temperature of the sea and of the air, this being greatest just in November. Indeed, from ten years' observations I obtain the following differences:—

| | | | | | |
|----------|------|--------|------|-----------|-----|
| January | 3·6 | May | —2·0 | September | 3·4 |
| February | 2·0 | June | —2·2 | October | 5·6 |
| March | 1·3 | July | —0·9 | November | 6·8 |
| April | —1·3 | August | 1·4 | December | 6·1 |

i.e., in November the mean temperature of the surface of the sea is 6·8° Fahr. higher than that of the air in about 160 ft. above the level of the sea.

G. HELLMANN.

Berlin, March 5th, 1889.

ROYAL METEOROLOGICAL SOCIETY.

The usual monthly meeting of the Royal Meteorological Society was held on February 20th, at the Institution of Civil Engineers, 25, Great George-street, Westminster, Dr. W. Marcet, F.R.S., president, in the chair. Mr. H. D. Richmond, F.C.S., and Dr. F. G. Smart, M.A., F.L.S., were elected Fellows of the Society. The following papers were read:—1. "Report on the Helm Wind Inquiry," by Mr. W. Marriott, F.R.Met.Soc. The term "helm wind" is applied to a strong wind coming westwards from the Cross Fell range of mountains in Cumberland, which runs from north-north-west to south-south-east. The range is high and continuous, and is not cut through by any valley. Cross Fell is 2,900 feet above sea level. From the top of the mountains to the plain on the west there is a fall of from 1,000 to 1,500 feet in about a mile and a half

At times when the wind is from some easterly point a helm cloud forms over this district, the chief features of the phenomenon being as follows :—A heavy bank of cloud rests along the Cross Fell range, at times reaching some distance down the western slope, and at others hovering just above the summit, while at a distance of two to six miles west from the foot of the Fell a slender roll of dark cloud appears in mid-air and parallel with the helm cloud : this is the helm bar. The space between the helm cloud and the bar is usually quite clear, while to the westward the sky is generally completely covered with cloud. A cold wind rushes down the sides of the Fell and blows violently till it reaches a spot nearly underneath the helm bar, when it suddenly ceases. The observations that have been made in the district during the past three or four years show that the helm wind is not such a rare occurrence as it was popularly supposed to be, the bar having been observed on forty-one occasions in 1885, on sixty-three in 1886, and nineteen in 1887. 2. "An Atmospheric Sketch," by Mr. F. A. Velschow, F.R.Met.Soc. 3. "The Drought in New South Wales in 1883-4, and Rainfall at Corella, 1879-88," by the Ven. Archdeacon Wynne, F.R.Met.Soc.

SNOWSTORM AT TORQUAY.

To the Editor of the Meteorological Magazine.

SIR,—We have just experienced (from 2nd to 5th inst.) some of the severest snowstorms ever known here, the depth on the ground at 11 p.m. on the 3rd, viz. 7 in., having been only once equalled (on January 19th and 21st, 1881), and never exceeded since the observations were begun in August, 1876. Snow fell from 7.50 to 10 p.m. and at 11 p.m. on Saturday, 2nd (with an E.S.E. breeze); on the 3rd from the early morning up to 10.30 p.m. (with the exception of half-an-hour from 10.30 to 11 a.m.), with an Easterly breeze veering to S.S.W. at 7 p.m. and backing to S.E. at 9 p.m.; on the 4th from 7.50 to 9.45 a.m., 10.25 a.m., at times to 3.20, and from 3.30 p.m. to the early morning of the 5th, accompanied by a strong S.S.E. wind, backing in the evening of the 4th to E. The amount in the rain-gauge (melted) was 0.32 in. on the 2nd, 0.46 in. on 3rd, and 0.38 on 4th. The ground was covered with snow from 9 p.m. on the 2nd up to to-day, the max depth being 7 in. at 11 p.m. on 3rd; in spite of the thaw on 4th and 5th it was $1\frac{1}{2}$ in. deep this morning. Bar. was about the average height till yesterday, when it rose above it.—Yours truly,

EDWIN E. GLYDE.

Kirkham, Babbacombe, Torquay, March 6th, 1889.

FORMS OF SNOW AS INDICATIVE OF COMING WEATHER.

To the Editor of the Meteorological Magazine.

SIR,—It does not seem to be generally known that the form and character of snow flakes are sure forecasters of coming weather. This fact was mentioned to me more than 30 years ago by Mr. E. T. Loseby, of Leicester, and we have observed and verified it ever since, and it has been verified by very many others to whom it has been shown. It may be relied on most thoroughly; so that the clouds themselves send us true telegrams of the coming weather, and if the rain drops had a form that we could note, no doubt they would do the same.

If snow falls in thin small spikes, like Epsom salts, it will soon pass away, and the weather become milder; but if the flakes be like stars, or asterisks with 6 radii ✱, there is a certainty of cold weather to follow for two and perhaps six weeks. Hard bally flakes have much the same force as forecasters of severe weather. They are whiter, harder, and fall to the ground much more rapidly than other snow, and sometimes in a short shower of less than half-a-minute; shining very markedly on the surface of the main body of fallen snow. On Sunday and Monday, February 24th and 25th, they fell copiously, both stars and balls, and the cold weather which will certainly follow and has followed so far, will confirm the truth of these observations. The larger and harder the stars, the colder will be the weather which follows.

EDWARD N. POCHIN.

Barkby Vicarage, Leicester, Feb. 6th, 1889.

SALT SNOW.

To the Editor of the Meteorological Magazine.

SIR,—During severe squalls from the NN.W. and N., with snow on February 8th, it was noticed by persons exposed to the squalls that the driving snow had a distinctly saline taste, and the following day it was noticed that leaves of evergreens, &c., were encrusted with a very slight film of saline matter; on testing some of the snow it was found that the quantity of salt (Na Cl) contained in a gallon of melted snow was 3·83 grains—the salts of Magnesium and Calcium, always present in sea water were not determined, they would amount to over a grain in the gallon of the snow water, this though by no means a large amount of solid matter in water, is a remarkable amount in snow, considering that the nearest sea coast to this in a NN.W. direction is quite 60 miles distant, from whence the sea water mingled with the snow must have been carried across the country by the squalls.

Yours truly,
P. DUDGEON.

Cargen, Dumfries, N.B.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, AUGUST, 1888.

| STATIONS. (Those in italics are South of the Equator.) | Absolute. | | | | Average. | | | | Absolute. | | Total Rain. | | Aver. |
|--|-----------|-------|----------|--------|----------|------|---------------|-----------|-----------------|-------------------|-------------|-------|-------|
| | Maximum. | | Minimum. | | Max. | Min. | Dew Point. | Humidity. | Max. in Sun. | Min. on Grass. | Depth. | Days. | |
| | Temp. | Date. | Temp. | Date. | | | | | | | | | |
| | ° | | ° | | ° | ° | ° | 0-100 | ° | ° | inches | | 0-10 |
| England, London | 84·6 | 10 | 43·9 | 19 | 69·3 | 52·1 | 52·2 | 79 | 126·6 | 38·4 | 3·61 | 14 | 5·9 |
| Malta | 97·4 | 17 | 64·0 | 21 | 85·1 | 69·8 | 63·3 | 65 | 146·5 | 56·9 | ·08 | 1 | 1·0 |
| Cape of Good Hope. ... | 88·0 | 23 | 38·5 | 12 | 62·3 | 48·1 | ... | ... | ... | ... | 2·90 | 9 | 5·5 |
| Mauritius | 77·5 | 30 | 57·0 | 7 | 74·8 | 64·5 | 59·9 | 74 | 124·5 | 48·1 | 2·87 | 20 | 5·0 |
| Calcutta | 92·5 | 3 | 73·8 | 24 | 86·5 | 77·8 | 77·5 | 85 | 156·5 | 15·7 | 26·02 | 26 | 9·2 |
| Bombay | 86·4 | 9 | 74·8 | 2 | 83·5 | 76·6 | 75·4 | 86 | 138·6 | 73·8 | 11·43 | 30 | 9·3 |
| Ceylon, Colombo | 87·7 | 25 | 73·8 | 3 | 85·9 | 76·4 | 71·9 | 78 | 144·5 | 70·0 | 1·10 | 11 | 6·4 |
| Melbourne | 67·1 | 30 | 30·0 | 5 | 56·7 | 40·1 | 41·0 | 75 | 115·5 | 23·4 | ·99 | 12 | 6·0 |
| Adelaide | 70·7 | 30 | 33·7 | 7 | 59·6 | 44·6 | 43·8 | 74 | 127·5 | 23·5 | 2·39 | 20 | 6·3 |
| Wellington | 62·0 | 20 | 40·0 | 1 | 55·6 | 44·8 | 44·6 | 82 | 120·0 | 29·0 | 5·29 | 21 | 4·5 |
| Auckland | 63·0 | 15 | 43·0 | 2 | 59·2 | 47·9 | 47·2 | 79 | 122·0 | 35·0 | 3·40 | 21 | 7·0 |
| Jamaica, Kingston | 92·9 | 22 | 68·8 | 28 | 90·4 | 73·3 | 72·6 | 77 | ... | ... | 2·44 | ... | ... |
| Barbados | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Toronto | 84·9 | 16 | 47·3 | 23 | 76·1 | 56·5 | 55·9 | 69 | ... | 40·8 | 2·91 | 13 | 5·5 |
| New Brunswick, Fredericton | 78·7 | 10 | 43·5 | 21 | 69·3 | 52·5 | 54·1 | 77 | ... | ... | 4·20 | 21 | 6·8 |
| Manitoba, Winnipeg ... | 97·0 | 23 | 30·3 | 31 | 75·0 | 46·5 | 52·0 | 73 | ... | ... | 1·13 | 13 | 3·5 |
| British Columbia, Victoria | 81·0 | 30 | 43·0 | 21, 27 | 72·5 | 49·4 | ... | ... | ... | ... | ·42 | 2 | .. |

REMARKS, AUGUST, 1888.

MALTA.—Mean temp. 76°·4 ; mean hourly velocity of wind 8·7 miles. Sea temp. fell from 79°·9 to 76°·4. L seen on 26th and 27th. J. SCOLES.

Mauritius.—Mean temp. of air 0°·4, of dew point 1°·2, and R 1·02 in. above their respective averages. Mean hourly velocity of wind 11·7 miles, or 1·2 below average ; extremes 27·8 on 5th and 1·7 on 22nd. Prevailing direction, E.S.E.

C. MELDRUM, F.R.S.

Melbourne.—Mean temp. of air 1°·8, and of dew point 1°·1 below average ; humidity and mean amount of cloud very near the average ; R ·87 in. below average. Prevailing winds N. and N.W. ; strong on 8 days. Heavy dew on 9 days. Hoar frost on 9 days. Fogs on 5 days. Ice on 5th. R. L. J. ELLERY, F.R.S.

Adelaide.—Mean pressure ·056 in. above average. Mean temp. 2°·0 below average. Sky considerably more clouded than usual, but rainfall only slightly higher than the average for previous 31 years. C. TODD.

Wellington.—Generally showery. Prevailing winds S. and S.E. Hail on 30th and 31st. Slight earthquakes on 16th and 17th. Mean temp. 2°·2 above the average. Rainfall slightly, and wet days considerably, more than the average. R. B. GORE.

Auckland.—A warm, mild month. Rainfall nearly an inch below the average, mean temp. considerably above the average, and barometric pressure slightly above.

T. F. CHEESEMAM.

SUPPLEMENTARY TABLE OF RAINFALL,
 FEBRUARY, 1889.

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

| Div. | STATION. | Total Rain. | Div. | STATION. | Total Rain. |
|-------|---------------------------|----------------|--------|--------------------------|----------------|
| | | in. | | | in. |
| II. | Dorking, Abinger | 2·91 | XI. | Castle Malgwyn | 2·37 |
| „ | Margate, Birchington... | 2·14 | „ | Rhayader, Nantgwilt.. | 5·67 |
| „ | Littlehampton | 2·00 | „ | Carno, Tybrith ... | 3·03 |
| „ | Hailsham | 2·62 | „ | Corwen, Rhug | 1·65 |
| „ | Ryde, Thornbrough | 1·82 | „ | Port Madoc | 4·44 |
| „ | Alton, Ashdell..... | 2·31 | „ | I. of Man, Douglas | 3·08 |
| III. | Oxford, Magdalen Col... | 1·82 | XII. | Stoneykirk, Ardwell Ho. | 3·09 |
| „ | Banbury, Bloxham | 1·91 | „ | New Galloway, Glenlee | 4·01 |
| „ | Northampton | 1·75 | „ | Melrose, Abbey Gate... | 2·20 |
| „ | Cambridge, Beech Ho... | 1·52 | XIII. | N. Esk Res. [Penicuik] | 2·00 |
| „ | Wisbech, Bank House.. | 1·89 | XIV. | Ballantrae, Glendrisaig | 2·74 |
| IV. | Southend | 1·71 | „ | Glasgow, Queen's Park. | 2·55 |
| „ | Harlow, Sheering ... | 1·90 | XV. | Islay, Gruinart School.. | 2·98 |
| „ | Rendlesham Hall | 2·25 | XVI. | Dollar..... | 2·41 |
| „ | Diss | 2·66 | „ | St. Andrews, Pilmour Cot | 1·04 |
| „ | Swaffham | 1·65 | „ | Balquhider, Stronvar.. | 4·73 |
| V. | Salisbury, Alderbury ... | 1·65 | „ | Dunkeld, Inver Braan.. | 1·30 |
| „ | Warminster | 2·28 | „ | Dalnaspidal H.R.S. ... | 5·37 |
| „ | Bishop's Cannings | 1·90 | XVII. | Keith H.R.S. | 2·67 |
| „ | Ashburton, Holne Vic... | 3·90 | „ | Forres H.R.S. | 2·89 |
| „ | Hatherleigh, Winsford. | 4·39 | XVIII. | Strome Ferry H.R.S.... | 5·12 |
| „ | Lymouth, Glenthorne. | 3·58 | „ | Fearn, Lower Pitkerrie. | 2·34 |
| „ | Probus, Lamellyn | 3·05 | „ | Loch Shiel, Glenaladale | 10·51 |
| „ | Launceston, S. Petherwin | 3·50 | „ | N. Uist, Loch Maddy ... | 3·24 |
| „ | Wincanton, Stowell Rec. | 2·28 | „ | Invergarry | 4·49 |
| „ | Taunton, Lydeard Ho... | 2·26 | „ | Loch Ness, Drumnadrochit | 4·14 |
| „ | Wells, Westbury | 2·17 | XIX. | Lairg H.R.S. | ... |
| VI. | Bristol, Clifton | 1·54 | „ | Forsnaird H.R.S. | ... |
| „ | Ross | 1·29 | „ | Watten H.R.S. | 2·73 |
| „ | Wem, Clive Vicarage ... | 1·32 | XX. | Dunmanway, Coolkelure | 4·26 |
| „ | Cheadle, The Heath Ho. | 2·48 | „ | Fermoy, Gas Works ... | 2·85 |
| „ | Worcester, Diglis Lock | 1·50 | „ | Tipperary, Henry Street | 3·35 |
| „ | Coventry, Coundon | 2·00 | „ | Limerick, Kilcornan ... | 3·09 |
| VII. | Ketton Hall [Stamford] | 2·10 | „ | Miltown Malbay..... | 2·93 |
| „ | Grantham, Stainby | 1·81 | XXI. | G ore, Courtown House | 2·32 |
| „ | Horncastle, Bucknall ... | 1·87 | „ | Navan, Balrath | 2·35 |
| „ | Mansfield, St. John's St. | 1·98 | „ | Mullingar, Belvedere... | 2·59 |
| VIII. | Neston, Hinderton | 1·72 | „ | Athlone, Twyford | 2·31 |
| „ | Knutsford, Heathside ... | 1·99 | „ | Longford, Currygrane... | 1·89 |
| „ | Lancaster, South Road. | 2·73 | XXII. | Galway, Queen's Coll... | 4·07 |
| „ | Broughton-in-Furness .. | ... | „ | Clifden, Kylesmore ... | 3·53 |
| IX. | Wakefield Prison | 1·68 | „ | Crossmolina, Enniscoe.. | 4·83 |
| „ | Ripon, Mickley | 1·40 | „ | Collooney, Markree Obs. | 3·43 |
| „ | Scarborough, West Bank | 1·76 | „ | Ballinamore, Lawderdale | ... |
| „ | East Layton [Darlington] | 1·25 | XXIII. | Warrenpoint | 2·57 |
| „ | Middleton, Mickleton .. | 1·57 | „ | Seaforde | 2·88 |
| X. | Haltwhistle, Unthank.. | 2·25 | „ | Belfast, New Barnsley.. | 3·71 |
| „ | Shap, Copy Hill | 1·94 | „ | Bushmills, Dundarave... | 3·24 |
| XI. | Llanfrehfa Grange | 1·23 | „ | Stewartstown | 2·36 |
| „ | Llandovery | 4·02 | „ | Buncrana | 3·57 |

FEBRUARY, 1889.

| Div. | STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.] | RAINFALL. | | | | | | TEMPERATURE | | | | No. of Nights below 32° | |
|--------|---|-------------|---------------------------------|----------------------------|-------|---------------------------------|-------|-------------|------|-------|-----------|-------------------------|--|
| | | Total Fall. | Difference from average. 1870-9 | Greatest Fall in 24 hours. | | Days on which .01 or more fell. | Max. | | Min. | | In shade. | On grass. | |
| | | | | Dpth. | Date. | | Deg. | Date. | Deg. | Date. | | | |
| | | | | | | | | | | | | | |
| I. | London (Camden Square) ... | 2.28 | + .64 | .63 | 10 | 18 | 58.1 | 17 | 20.4 | 13 | 18 | 22 | |
| II. | Maidstone (Hunton Court)... | 2.43 | + .81 | .85 | 10 | 20 | ... | ... | ... | ... | ... | ... | |
| III. | Strathfield Turgiss | 1.86 | + .11 | .54 | 10 | 15 | 56.3 | 17 | 13.5 | 13 | 18 | 23 | |
| III. | Hitchin | 1.63 | + .03 | .42 | 6, 10 | 17 | 54.0 | 17 | 16.0 | 12 | 23 | ... | |
| IV. | Winslow (Addington) | 2.29 | + .48 | .59 | 10 | 17 | 54.0 | 17 | 12.0 | 12a | 18 | 23 | |
| V. | Bury St. Edmunds (Culford) .. | 1.29 | — .48 | .50 | 9 | ... | 46.0? | 28 | 11.0 | 9 | ... | ... | |
| V. | Norwich (Cossey) | 1.37 | — .38 | .20 | 11a | 18 | ... | ... | ... | ... | ... | ... | |
| V. | Weymouth (Langton Herring) .. | 2.04 | ... | .44 | 10 | 12 | 52.0 | 17b | 24.0 | 10 | 16 | ... | |
| V. | Barnstaple | 2.58 | — .61 | .82 | 13 | 12 | 60.0 | 20c | 28.0 | 10 | ... | ... | |
| VI. | Bodmin | 3.04 | — 1.83 | .58 | 13 | 22 | 50.0 | 1, 17 | 27.0 | 28 | 11 | 15 | |
| VI. | Stroud (Upfield) | 1.58 | — .67 | .51 | 10 | 17 | 54.0 | 18b | 21.0 | 11 | 20 | ... | |
| VI. | Church Stretton (Woolstaston) .. | 1.27 | — 1.23 | .23 | 10 | 15 | 54.5 | 17 | 18.5 | 11 | 19 | 22 | |
| VI. | Tenbury (Orleton) | 1.62 | — .85 | .51 | 10 | 16 | 58.8 | 17 | 16.2 | 12 | 15 | 17 | |
| VII. | Leicester (Barkby) | 1.89 | + .25 | .46 | 6 | 16 | 56.0 | 1 | 8.0 | 12 | 24 | 27 | |
| VII. | Boston | 2.01 | + .23 | .45 | 10 | 17 | 55.0 | 1 | 11.0 | 12 | 18 | ... | |
| VII. | Hesley Hall [Tickhill] | 1.51 | ... | .36 | 10 | 18 | 58.0 | 1 | 21.0 | 13 | 18 | ... | |
| VIII. | Manchester (Ardwick) | 2.26 | + .07 | .52 | 13 | 15 | 59.0 | 17 | 29.0 | 10g | 4 | ... | |
| IX. | Wetherby (Ribston Hall) ... | 1.67 | — .48 | .54 | 3 | 14 | ... | ... | ... | ... | ... | ... | |
| IX. | Skipton (Arnccliffe) | 4.55 | — .09 | 1.76 | 12 | 13 | ... | ... | ... | ... | ... | ... | |
| IX. | Hull (People's Park) | 1.65 | — .60 | .25 | 10 | 22 | ... | ... | ... | ... | ... | ... | |
| X. | North Shields | 1.31 | — .53 | .26 | 11 | 19 | 57.0 | 1, 18 | 19.5 | 10 | 18 | 20 | |
| X. | Borrowdale (Seathwaite) | 9.53 | — 1.92 | 3.12 | 13 | 17 | ... | ... | ... | ... | ... | ... | |
| XI. | Cardiff (Ely) | 2.22 | — 1.44 | .55 | 10 | 17 | ... | ... | ... | ... | ... | ... | |
| XI. | Haverfordwest | 3.40 | — 1.05 | .70 | 13 | 21 | 51.7 | 17d | 25.4 | 25 | 13 | 21 | |
| XI. | Plinlimmon (Cwmsymlog) ... | 4.50 | ... | .85 | 6 | 18 | ... | ... | ... | ... | ... | ... | |
| XI. | Llandudno | 1.94 | — .35 | .58 | 6 | 16 | 54.0 | 1 | 27.5 | 11 | 6 | ... | |
| XII. | Cargen [Dumfries] | 1.68 | — 2.13 | .38 | 13 | 12 | 52.8 | 1 | 20.8 | 10 | 19 | ... | |
| XII. | Jedburgh (Sunnyside) | 1.35 | — .41 | .28 | 12 | 10 | 54.0 | 1e | 18.0 | 10 | 21 | ... | |
| XIV. | Old Cumnock | 3.17 | + .31 | .49 | 12 | 16 | 52.0 | 1, 18 | 12.0 | 11h | 22 | ... | |
| XV. | Lochgilphhead (Kilmory) | 4.81 | + .42 | .82 | 13 | 17 | ... | ... | ... | ... | ... | ... | |
| XV. | Oban (Craigvarren) | 4.03 | ... | .65 | 12 | 20 | 51.3 | 18 | 21.6 | 10 | 9 | ... | |
| XV. | Mull (Quinish) | 4.42 | ... | 1.04 | 13 | 21 | ... | ... | ... | ... | ... | ... | |
| XVI. | Loch Leven Sluices | 1.90 | — 1.06 | .30 | 14 | 11 | ... | ... | ... | ... | ... | ... | |
| XVI. | Dundee (Eastern Necropolis) .. | 1.40 | — 1.15 | .35 | 25 | 13 | 53.9 | 18 | 19.9 | 10 | 20 | ... | |
| XVII. | Braemar | 2.60 | — .07 | .74 | 8 | 19 | 50.8 | 1 | 17.3 | 10 | 20 | 26 | |
| XVII. | Aberdeen (Cranford) | 2.40 | ... | .40 | 25 | 24 | 56.0 | 1 | 22.0 | 9 | 14 | ... | |
| XVIII. | Lochbroom | 5.70 | ... | 1.16 | 18 | 23 | ... | ... | ... | ... | ... | ... | |
| XVIII. | Culloden | 2.53 | + 1.48 | ... | ... | ... | 55.0 | 1 | 18.0 | 10 | 14 | 25 | |
| XIX. | Dunrobin | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| XIX. | S. Ronaldsay (Roeberry) | 3.95 | + 1.96 | .49 | 16 | 22 | ... | ... | ... | ... | ... | ... | |
| XX. | Cork (Blackrock) | 2.71 | — 1.88 | .68 | 2 | 15 | ... | ... | ... | ... | ... | ... | |
| XX. | Dromore Castle | 4.87 | ... | 1.15 | 13 | 14 | 56.0 | 7 | 27.0 | 23 | ... | ... | |
| XX. | Waterford (Brook Lodge) ... | 2.41 | ... | .45 | 12 | 18 | 57.0 | 1 | 25.0 | 11 | 11 | ... | |
| XXI. | O'Briensbridge (Ross) | 4.46 | ... | 1.03 | 10 | 18 | 53.0 | 20 | 25.0 | 17 | 15 | ... | |
| XXI. | Carlrow (Browne's Hill) | 2.09 | — .83 | .54 | 10 | 22 | ... | ... | ... | ... | ... | ... | |
| XXI. | Dublin (Fitz William Square) .. | 2.45 | + .29 | .74 | 10 | 20 | 55.0 | 1 | 21.7 | 11 | 4 | 21 | |
| XXII. | Ballinasloe | 2.55 | + .04 | .57 | 10 | 21 | 50.0 | 1f | 20.0 | 11 | 16 | ... | |
| XXIII. | Waringstown | 2.23 | — .02 | .31 | 6 | 19 | 55.0 | 16 | 8.0 | 10 | 18 | 21 | |
| XXIII. | Londonderry (Creggan Res.) .. | 4.26 | ... | .45 | 2 | 24 | ... | ... | ... | ... | ... | ... | |
| XXIII. | Omagh (Edenfel) | 2.65 | + .37 | .58 | 13 | 27 | 51.0 | 17 | 18.0 | 10 | 16 | ... | |

α And 13. b And 20. c And 21. d And 18. e And 17, 18. f And 16, 17. g And 12, 13. h And 12.

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

METEOROLOGICAL NOTES ON FEBRUARY, 1889.

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

ENGLAND.

STRATHFIELD TURGISS.—The chief characteristic of this month was that no kind of weather lasted long together. Frosts of great severity ($10^{\circ}8$ on grass on 13th) were followed immediately by mild weather. Even the deep S of the 10th was of short duration. The end of the month was cold and winterly. Gale on 3rd.

HITCHIN.—A most winterly month; amongst the coldest Februaries in our record. Very deep snow on the 10th.

WINSLOW, ADDINGTON.—The first day of February was very mild, with a max. temp. of 53° and a min. of 45° , but from that date until the 17th it was cold and unsettled, particularly cold on the 12th and 13th. From 17th to 20th was much milder again, and the remainder of the month was cold and comfortable. On the 14th a large flood occurred, caused by the rapid melting of the snow that fell on the 10th.

WEYMOUTH, LANGTON HERRING.—R or S fell on no less than 20 days, but on 8 of these days less than $\cdot 01$ fell, mostly as S; total fall $\cdot 65$ in. below the average. Mean temp. ($37^{\circ}8$) $2^{\circ}3$ below the average. The fluctuations of the bar. on the first 16 days of the month was exceptionally great. During the last 6 days the temp. never reached 40° .

BODMIN.—Mean temp. for the month $39^{\circ}1$.

UPFIELD, STROUD.—Snow on the 10th, about five inches in depth.

WOOLSTASTON.—The first 12 days were bitterly cold, S falling on five days; on the 13th a rapid thaw set in, but cold weather returned during the last week and S again fell on the last two days. There was a violent gale on the 3rd. Mean temp. $36^{\circ}2$.

ORLETON.—With the exception of a warmer period from 13th to 22nd, the month was generally cloudy, gloomy, and cold, with severe frosts and a mean temp. $1^{\circ}8$ below the average of 28 years. S fell on the 10th, covering the land to the depth of about 7 inches, which cleared off again on the 14th. Before and after that time it was frequently lightly covered with S. The fall of R and S was nearly an inch below the average, but pressure was subject to frequent sudden, but not great fluctuations, and there was consequently a prevalence of rough winds, chiefly from the N. and N.W. There was distant L on the night of the 2nd, with S and a great wind for several days.

BARKBY.—A cloudy month. Mean temp. $35^{\circ}3$. Gale on 3rd. Snow fell to the depth of about 9 inches on 10th.

BOSTON.—Temperature of the month two degrees below the average. Heavy gales on the 8th and 9th.

MANCHESTER.—The month was rather unpleasant, with cold east wind, R and S at intervals, and some fair days. The temp. was not low, except early in the month.

HULL.—The weather during the month was remarkable for the frequent, though generally slight, falls of H, sleet, and S. The H stones were often exceeding small and always soft.

WALES.

HAVERFORDWEST.—The first week was very cold, and it continued cold up to the 15th. It was then rather milder and very wet up to the 23rd, from which date sharp frosts prevailed to the end of the month.

SCOTLAND.

CARGEN.—The first half of the month was very unsettled, the fluctuations both of the bar. and ther. being sudden and great. Severe squalls from the N.N.W. and N. with S occurred on the 8th. Mean temp. $2^{\circ}4$ below the average.

JEDBURGH.—The weather was cold and ungenial with frequent showers of S, which was melted quickly by the sun. Vegetation has been still, but country work has not been stayed much, and land is in good order for seed.

OBAN, CRAIGVARREN.—Rainfall was pretty general throughout the month, and several severe gales were experienced. The temp. was normal, but very little S fell.

MULL, QUINISH.—A cold wet month, the first half being unusually stormy. A tremendous gale from N.W. on the 8th.

LOCHBROOM.—The bad weather that began on the 22nd of January continued without interruption until the 22nd of February with varying rigour, but at times with great storms, especially on 18th, when we had a terrific gale and an unusually high flood. Seldom were our small rivulets seen in such force.

CULLODEN.—The month was free from heavy S storms; frost, however, prevailed, all through the month. Labour well forward.

ROEBERRY.—Very rough from 1st to 19th; gales from S. to N.E. The remainder of the month had moderate winds but was cold. On the whole a very unsettled month.

IRELAND.

CORK.—Cold and at times stormy, with frequent showers and a few slight falls of S.

WATERFORD.—Mean temp. $41^{\circ}1$. R nearly an inch below the average.

DUBLIN.—An unsettled, windy, wet and cold month, with N.W. wind preponderating. A severe snowstorm on the 10th, and on the 1st a fresh gale from W. Very changeable weather prevailed during greater part of week ending 16th, which began with a snowstorm and ended with warmth and squalls; the third week, at first mild, soft and cloudy, became cooler, drier and brighter, and for the remainder of the month the weather was very inclement. S or sleet fell on 8 days, H on 7 days, fogs on 4 days, high winds on 13 days reaching the force of a gale on 5 days. The temp. exceeded 50° in the screen on 8 days, and on 7 days did not rise to 40° .

EDENFEL, OMAGH.—The month commenced with the mild and rainy weather which has been characteristic of the winter, but on the 7th gave place to violent snow squalls, followed on the 10th by a steady snow fall, averaging 6 inches in depth, with a temp. of 18° . On the 13th a thaw with heavy rain again set in, and the remainder of the month was generally wet and unsettled, with a tendency to dry polar winds and light snow on 27th and 28th.