SYMONS'S

MONTHLY

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## DAILY ATLANTIC WEATHER MAPS.

HAVING through the courtesy of General Myers received a set of specimens of the current publications of the United States Signal Office, and also a sufficient number of copies of the International Weather Map to enable us to issue one with each copy of this Magazine, we are in a position to resume the consideration of the above subject.*

We will first describe the various publications, and then consider whether they do or do not meet the present requirements of science, and whether they are or are not as good as can be made.

**Daily U.S. Weather Maps.**—These are about eighteen times larger than those issued by the English office—partly because the American ones are drawn on a much larger scale than (more than twice as large as) the English ones, and partly because of the far greater extent of the United States than of the British Isles, even with the parts of France, Spain, Italy, Germany, Denmark, Norway, and Sweden, which are included in the English maps.

They are much handsomer than the English ones, the various data being given upon each in four different colours. The land is shaded with brown according to its altitude; the seas, lakes, and chief rivers (as they should be on all maps) blue; the temperature data and the isotherms are red; and the isobars mauve. We are not sure that this plan is as instructive as the English method of four separate maps, one each for pressure, temperature, wind, and weather. Each system has its merits; but one thing is quite certain, namely, that for good looks the Americans leave our English maps hopelessly in the rear. Why cannot our maps show which is land and which is sea?

In another respect they far surpass us, because they publish maps three times daily, viz., 1 a.m., 7.35 a.m., and 4.35 p.m. We do not know why these irregular intervals of $6\frac{1}{2}$, 9, and $8\frac{1}{2}$ hours were selected, but it is of no moment, the important fact is that the in-

* *Met. Mag.* Vol. VI. p. 86, Vol. XIII. p. 117, and Vol. XIV. p. 2.

tervals are sufficiently short to enable one to trace with certainty the sequence of phenomena. The English Meteorological Office also has three observations made daily, viz., 8 a.m., 2 p.m., and 6 p.m., but the intervals, 6, 4, and 14 hours, are far more unequal, night observations being entirely omitted. To a certain extent it may be claimed that two maps are published daily, since the 6 p.m. observations are partly laid down in the little map published (for six days out of each seven), in the *Times*, the observations being made at the expense of that journal.

We think that it would be a great improvement in the United States Maps if the arrow heads were varied according to the force of the wind, as is done in the English ones.

**Daily Bulletin of International Meteorological Observations.**—Two years ago* we printed an article entitled "Synchronous Observations and Wasted Labour," in which, while we strongly supported General Myers' system, we pointed out the utter absurdity of sending 58 sets of British observations, while on no map of reasonable size could more than one-quarter of them be laid down. We regret to find that there is nearly the same waste of labour in the French returns as in the English ones, and as regards the vicinity of the capital it is even worse, for while the English series contains two representatives of the metropolis, viz., Kew and Greenwich, for Paris we find (1) Observatoire National, (2) Montsouris, (3) St. Maur, (4) Versailles—four stations the two most distant of which are but 16 miles apart, while two of them must be almost within one mile. The sooner steps are taken to cut down these superfluous records the better, and until this disproportion is checked we cannot swerve from our opinion that much labour is being wasted both in Europe and in America.

Along with this International Bulletin is issued the very pretty map of the Northern Hemisphere (Polar Projection), of which we have the pleasure of issuing a specimen herewith.

It is notoriously ungracious to "look a gift horse in the mouth," but honest and impartial criticism is equally obligatory upon us, no matter how courteous may be the authors whose work we have to notice. We have already said that these charts are pretty, and our readers can confirm our verdict—especially those of them who ever read "Meteorographia."

Prettiness is however one thing, and trustworthiness another—they are neither necessarily allied nor necessarily antagonistic. These charts are unquestionably pleasant to the eye, there is no need to discuss that; but we must examine to what extent they are to be trusted. Respecting the accurate representation of the weather in the United States there can be no doubt; a simple reduction from the splendid daily map issued by the office will ensure that, and for Europe also the various weather maps published by the different Govern-

* *Met. Mag.* vol. XII. p. 37.

ments would suffice, but in addition there are the 58 returns sent from the British stations, and the somewhat smaller numbers sent from the far larger countries of France, Germany, &c. We may therefore fairly conclude that for the continents of N. America and Europe the curves drawn upon these maps are nearly perfect. But what is to be said respecting the Atlantic? It is Atlantic Weather Maps for which we specially plead. Do these International ones issued by the United States Signal Office really give so accurate a representation of Atlantic Weather as to supply what is wanted? We heartily recognize the utility of these Maps of the whole Northern Hemisphere, and although we are of opinion that they do not adequately record Atlantic Weather, we should greatly regret to find that opinion misconstrued and represented as being adverse to the present charts. They are not called, and do not profess to be, Atlantic Maps, but International Maps, and we no more censure them when we say that they do not adequately represent Atlantic Weather, than we should censure the English Charts if we said that they did not adequately represent the features of Devonshire climatology. In the first place the scale of the Maps is far too small. It is not much more than one inch for a thousand miles.

In the next place the information from which the isobars and isotherms are drawn is terribly scant.

We have taken from the Bulletin upon which the accompanying map is based all the records which we can find of Atlantic pressure and temperature, and give below a list of (1) Island Stations, and (2) Ship Records; placing in a second class those of the latter of which the barometric values are doubtful either from the error of the barometer not being known, or from their being only aneroid readings :—

*Islands—*

Iceland, Faroe, Azores, Madeira, Cape de Verd, Bahamas, Martinique.

*Ships—*

| CLASS I. | | | | | | CLASS II. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lat. | 51° | 55′ | N. Long. | 6° | 35′ W. | Lat. | 49° | 3′ | N. | 14° | 11′ W. |
| | 48 | 41 | | 36 | 17 | | 48 | 44 | | 32 | 20 |
| | 35 | 42 | | 73 | 54 | | 40 | 47 | | 66 | 45 |
| | 29 | 25 | | 72 | 10 | | 39 | 34 | | 71 | 42 |
| | 6 | 27 | | 22 | 29 | | | | | | |

It will be seen that this leaves a square containing nearly three million square miles without a single observation.

In case this might be an unusually poor supply, we took another day hap hazard (November 19th, 1877) and, as far as we can find, the entire data for the Atlantic are from seven ships and the land stations. No one surely will argue that seven ship records are enough to represent Atlantic Weather. We do not wish to be too hard on the 58 British returns, but if any of our readers desire a little amusement they can work out the following sum :—As the area of the British Isles is to the area of the North Atlantic, so is 58 to

to the few thousand stations requisite to represent the Atlantic with equal completeness.

Joking apart, it is perfectly evident that while we yield to no one in appreciation of the many excellences of Signal Office work, we are bound to state that in this particular branch it is working without adequate materials. We must express our astonishment at the consistency of the facts represented for many consecutive days, but with such paucity of materials there is far too much room for the scientific use of the imagination.

We cannot finish our notice of Signal Office publications this month, and we do not like to leave off with remarks that sound like censure. But it is not censure; we merely say that these maps are what they profess to be—International. They are not and do not profess to be that for which we have asked, and shall continue to ask, *Daily Atlantic Weather Maps.*

## EASTER AT THE SORBONNE.

In accordance with our usual custom we give abstracts of the principal communications bearing upon Meteorology read at the Easter meeting of the Délégués des Sociétés Savantes.

*Variation of Temperature with Altitude.*—M. Alluard, Director of the Observatory on the Puy-de-Dôme, exhibited a series of diagrams giving the daily extremes of temperature at the observatory at Clermont and at that on the summit of the Puy-de-Dôme. The curves of daily maximum temperature are usually parallel, but those of minimum temperature vary irregularly and often cross each other, both in summer and in winter; whence it appears that the temperature on the summit of the Puy-de-Dôme (4813 ft.) at night is often warmer than at Clermont (1273 ft.)—sometimes as much as 10° F.

*Intermediate Station at about* 3000 *ft.*—Partly with a view to a closer examination of the above-mentioned facts, and also that of others relating to variations in barometric pressure, M. Alluard has started a third station nearly intermediate in altitude to the two existing ones.

*Serious Deposits of Hoar Frost on the Mountain Instruments.*—M. Alluard finally called attention to the remarkable quantity of hoar frost deposited in winter on the observatory, and on the instruments, by the passing clouds. It attains a surprising thickness and its weight breaks many of the instruments and in various ways seriously impairs the utility of mountain observatories. The telegraph wire from the summit, which is less than $\frac{1}{4}$ in. in diameter, was coated with frost $\frac{1}{2}$ in. thick, and the lightning conductor, which was at a right angle with the clouds is said to have become $8\frac{1}{4}$ in. thick! Well might the arms of the anemometers be constantly broken by the weight they had to carry.

*Rainfall of Spain and Portugal.*—Prof. Raulin, of Bordeaux, whose works on the rainfall of France and of the Mediterranean we have often had the pleasure of reviewing, forwarded a short note upon the rainfall of Spain and Portugal, based on observations at 28 Spanish and 9 Portuguese stations, with the addition of 6 on the frontier of France. Although this number is admittedly insufficient to give a precise idea of the distribution of rain over the Peninsula, it suffices to point out its general features both as to total quantity and seasonal distribution. As regards total amount, the Pyrenees and the coast of the Bay of Biscay have mean falls ranging from 37 to 50 in., diminishing southwards along the Atlantic coast to 29 in. at Lisbon. In the Eastern Pyrenees the quantity varies from 20 to 34 in. At Gibraltar it is about 29 in. On the table-lands in the interior it varies from 16 to 24 in. The driest parts are, in the East Saragossa in the plain of the Ebro with 12 in., Albacete on the plain of Murcia with 11 in., in the centre Valladolid 13 in., and Salamanca 10½ in., Badajoz 11 in., and Seville 13 in.

*A Costly Silver Thaw.*—M. Duchalais, Sub-Inspector of Forests, gave an account of the effects of two silver thaws in l'Orleanais and especially in Sologne. The first, which occurred only in Sologne on January 9th, and lasted two days, was produced under the influence of a south-easterly current. The second, on the contrary, was during N.W. winds, and lasted from January 22nd to 26th. During the latter period the coating of ice became 1½ in. thick, although the rain gauge only collected 0·09 in.

After having explained its effect upon foliaged trees, he proceeded to dwell upon the injury produced in the pine forests of Sologne, which he estimated at 2,500,000 francs (£100,000).

Finally, the author called attention to the Laricio Pine as the best suited for the reforestation of Sologne, as it had best resisted the late silver thaw.

*Lightning Conductors.*—M. Fabre described the first case in which the system of protection applied by M. Melsens to the Hotel de Ville at Brussels has been adopted in France. The maison centrale at Nismes stands upon a rock about 100 ft. above the rest of the town. As there is no subterranean water, the ordinary earth terminals could not be obtained. Other plans were therefore necessary, and the building has been protected by a system of conductors, including two seven-pointed *aigrettes*, distributed over all the salient angles and ridges. They are iron rods a third of an inch in diameter, and are all attached to a circular conductor, which runs round the building level with the soil, and which is itself in metallic connection with the water and gas mains of the town.

*Forestry.*—M. Demontzey gave a brief summary of the contents of his work, entitled "Etude sur les travaux de reboisement et de gazonnement des montagnes," which has been issued by the National Printing Office. After having briefly summarized the obser-

vations made upon torrents by the numerous savants who have studied them, M. Demontzey explained the series of works of all kinds, which ensure the correction of a torrent and the reforestation of the basin whence it flows, works destined to secure its extinction both present and perpetual. After having dwelt upon the very varied qualifications which the officers of the forest service ought to possess, he insisted upon the necessity of reforestation wherever the extinction of a torrent was necessary.

The author concluded by calling attention to the fact that the reforestation of the mountains was a truly national work, inasmuch as it not only benefited the localities themselves but the public in general.

*A Bolide containing Phosphorus.*—Prof. Lardrey of Dijon, exhibited fragments of phosphorus obtained under the following conditions :— A person reputed to be very trustworthy, but quite ignorant of scientific matters, was passing along the main street of Marsannay-la-Côte, near Dijon, on the evening of October 18th, 1878, a bright light came behind him, and he saw something strike the middle of the street a few hundred yards in front of him. Seeing that there remained something bright on the ground, he picked up some small pieces, took them home and put them in a box, before Prof. Lardrey heard of the occurrence, nearly all the specimens had been scattered, but he obtained a few fragments, and at once hermetically sealed them in a test tube. Prof. Lardrey is so anxious to preserve these portions that he has not experimented directly upon them, but is trying to obtain phosphorus in a state as nearly resembling that of the specimens as possible.

The president (M. Milne-Edwards), reminded the meeting of the long standing mistrust respecting similar records, and called upon Messrs. Daubrée and Dieulafait of Marseilles, to offer some remarks respecting an aerolite which contained sulphur.

M. Dieulafait said, that having examined the specimen, and the conditions under which it was found, he had not thought it necessary to devote much time to the subject.

M. Daubrée expressed his opinion that the specimen which contained sulphur was not an aerolite at all.

M. Wurtz thought it very strange that phosphorus should have been found in an aerolite, as it burns at 104° F., and bolides generally arrive at the earth's surface in an incandescent state.

M. Daubrée added that not only are they incandescent, but actually reach the earth with a vitrified coating.

*Observatory on Mont-Ventoux.*—M. Pamard, presented a copy of a pamphlet written jointly by himself and Messrs. Bouvier and Girard to point out the desirability of establishing a meteorological observatory on the summit of Mont Ventoux. He called special attention to the very favourable conditions which it offered for such an establishment, it was easily accessible in all seasons, and one could

drive to the very summit. The premises would afford accommodation for savants, astronomers, physicists, chemists, naturalists, and medical men, who might be glad to carry on there, researches upon celestial phenomena, upon the properties and composition of the air at great altitudes, on the physics of the globe, on botany, geology or physiology.

## SUPPLEMENTARY TABLE OF RAINFALL IN APRIL, 1879.

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

| Div. | STATION. | Total Rain. | Div. | STATION. | Total Rain. |
|---|---|---|---|---|---|
| | | in. | | | in. |
| II. | Margate, Acol ..... | 2·19 | XI. | Port Madoc ..... | 1·55 |
| ,, | Littlehampton ..... | 3·48 | ,, | Douglas ..... | 2·18 |
| ,, | Horsham, Swallowfield. | ... | XII. | Carsphairn ... ..... | 2·48 |
| ,, | Hastings, Manor House | 3·43 | ,, | Melrose, Abbey Gate... | 2·99 |
| ,, | Hailsham ..... | 3·26 | XIV. | Lanark, Baronald .. ... | .. |
| ,, | I. of W., St. Lawrence. | 3·44 | XV. | Islay, Gruinart School.. | 1·12 |
| ,, | Strathfield Turgiss ..... | 3·08 | XVI. | St. Andrew's, Cambo... | 2·10 |
| III. | Great Missenden ..... | 2·95 | ,, | Aberfeldy H.R.S. ..... | 1·80 |
| ,, | Winslow, Addington ... | 2·49 | XVII. | Tomintoul ..... | ... |
| ,, | Oxford, Magdalen Col... | 2·35 | ,, | Keith H.R.S. ..... ..... | 2·80 |
| ,, | Northampton ..... | 2·08 | ,, | Forres H.R.S. ..... ... | ·77 |
| ,, | Cambridge, Merton Vil. | 2·17 | XVIII. | Strome Ferry H.R.S.... | ·57 |
| IV. | Harlow, Sheering ..... | 3·91 | ,, | Lochbroom ..... | ·84 |
| ,, | Diss ..... | 2·21 | ,, | Auchnasheen H.R.S. ... | ·70 |
| ,, | Swaffham ..... | 2·40 | ,, | Tain, Springfield ..... | ... |
| ,, | Hindringham ..... | 1·98 | ,, | Loch Shiel, Glenfinnan. | 2·53 |
| V. | Salisbury, Alderbury... | 2·44 | ,, | Dalwhinnie H.R.S..... | 7·70 |
| ,, | Calne, Compton Bassett | 3·20 | XIX. | Lairg H.R.S. ..... | 2·71 |
| ,, | Beaminster Vicarage ... | .. | ,, | Altnabreac H.R.S. ..... | 1·82 |
| ,, | Dartmoor Prison ..... | 5·14 | ,, | Watten H.R.S. ..... | 2·08 |
| ,, | Langtree Wick ..... | 2·70 | XX. | Fermoy, Glenville ..... | 4·20 |
| ,, | Lynmouth, Glenthorne. | 2·17 | ,, | Tralee, Godfrey Place... | ... |
| ,, | St. Austell, Cosgarne... | 3·37 | ,, | Cahir, Tubrid ..... | 3·07 |
| ,, | Taunton ..... | 2·49 | ,, | Tipperary, Henry St.... | 2·94 |
| VI. | Bristol, Ashleydown ... | 2·98 | ,, | Newcastle West ..... | 1·92 |
| ,, | Wem, Sansaw Hall..... | 3·47 | ,, | Kilrush ..... | 1·98 |
| ,, | Cheadle, The Heath Ho. | 2·86 | ,, | Corofin ..... | 2·24 |
| ,, | Bickenhill Vicarage ... | 2·98 | XXI. | Kilkenny, Butler House | 1·55 |
| VII. | Melton Mowbray ..... | 2·66 | ,, | Ballymore, Eustace ... | ... |
| ,, | Horncastle, Bucknall ... | 2·19 | ,, | Kilsallaghan ..... | 1·82 |
| VIII. | Walton-on-the-Hill..... | 3·03 | ,, | Navan, Balrath ..... | 1·45 |
| ,, | Broughton-in-Furness .. | 2·08 | ,, | Athlone, Twyford ..... | ... |
| IX. | Wakefield, Stanley Vic. | 2·43 | ,, | Mullingar, Belvedere ... | 1·55 |
| ,, | Ripon, Mickley ..... | 2·48 | XXII. | Ballinasloe ..... | 1·90 |
| X. | Gainford ..... | 1·86 | ,, | Clifden, Kylemore ..... | 3·69 |
| ,, | Haltwhistle, Unthank.. | 2·00 | ,, | Crossmolina, Enniscoe.. | 2·47 |
| ,, | Shap, Copy Hill ..... | 1·98 | ,, | Carrick-on-Shannon ... | 1·40 |
| XI. | Llanfrechfa Grange ..... | 3·63 | ,, | Dowra ..... | 1·77 |
| ,, | Llandovery ..... | 1·46 | XXIII. | Rockcorry ..... | 1·19 |
| ,, | Solva ..... | 1·71 | ,, | Warrenpoint ..... | 2·35 |
| ,, | Castle Malgwyn ..... | 1·99 | ,, | Newtownards ..... | 1·97 |
| ,, | Rhayader, Nantgwillt.. | 2·60 | ,, | Larne, Carnlough ..... | 2·04 |
| ,, | Carno, Tybrittle ..... | 2·52 | ,, | Bushmills ..... ..... | 1·33 |
| ,, | Corwen, Rhug ..... | 2·41 | ,, | Buncrana, Rockfort ... | ... |

## THE DETERMINATION OF ANEMOMETER CONSTANTS.*

IN the Transactions of the Royal Irish Academy for 1850, the Rev. Dr. Robinson described his Cup Anemometer, and stated that the ratio of the velocity of the wind to that of the cups was approximately as 3 to 1.

About 20 years afterwards, an extensive series of experiments on cup anemometers, was carried out by M. Dohrandt, at St. Petersburgh, and details published in the "Repertorium für Meteorologie" Band IV. 1874. Eight anemometers of different dimensions were experimented on, five of them being tested by a whirling machine, and four by comparison with these five in the open air. A trial was also made by carrying one of the anemometers on the tender of a locomotive. The general result was to throw doubt on Dr. Robinson's rule, and to prove that the constants varied considerably in different instruments.

In 1875, Dr. Robinson read another paper to the Royal Irish Academy, in which he called in question the accuracy of the results arrived at by M. Dohrandt, chiefly on account of the whirling machine being placed in too confined a space. Great care had been taken by M. Dohrandt in measuring, and allowing for, the circular current of air carried round with the whirling machine, but Dr. Robinson doubted the accuracy of the allowance. An important admission, however, was made by Dr. Robinson, in this paper, viz.—that he had been in error in stating that the ratio of the velocity of the wind to that of the cups was independent of the size of the instrument.

In the "Repertorium für Meteorologie" Band VI. 1878, the results of a further elaborate series of experiments by M. Dohrandt are published. The same whirling machine as before was employed, but considerable improvements were introduced, such as moving the machine by an hydraulic motor — using electrical registration throughout, &c. Experimental anemometers were also tried of various dimensions to test the effect of variations in length of arm and size of cups. The final conclusions arrived at were as follows:—

"In conclusion I will express my opinion, as far as concerns the Robinson's cup anemometers, with reference to the question No. 23 of the programme of the 2nd National Meteorological Congress which was held in September, 1877, at Rome, viz.:—'How are absolute values for the velocity of the wind to be obtained from the direct readings of the usual anemometers?'

"(1). The deduction of the *absolute* values of the velocity of wind from the readings of the anemometers must be given up as long as the usual practice of verification is adopted by moving the anemo-

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* Bestimmung der Anemometer-Constanten (Fortsetzung), von F. Dohrandt. St. Petersburg, 1878.

meters with a given speed against still air without ascertaining by exact experiment whether the pressure of the air moving against a body at rest is really equal to the resistance which the body experiences when moving with equal velocity against still air; or, should there be a difference between the pressure in the two cases, what that difference is. On the other hand, anemometers verified according to the previous method enable the velocity of the wind to be expressed on a uniform scale, and thus enable the wind observations in the most different places to be compared with the greatest strictness.

"(2). Dr. Robinson's rule, according to which the centres of the cups, independently of the dimensions of the anemometer, move with one-third of the velocity of the wind, is inaccurate, and will generally lead to too high velocities of wind. Indeed, under certain conditions, this rule may make the velocities of wind arrived at from a verified anemometer nearly 30 per cent. too high (compare $B_2 = 2{\cdot}2002$ instead of the value given by Dr. Robinson, $B_2 = 3{\cdot}00$, page 25).

"(3). The relation of the velocity of the centre of the cups to the velocity of the wind is dependent on the dimensions of the anemometer. If $r$ signifies the distance of the centre of the cups from the axis of revolution, and R the radius of the cups of the anemometer, of ordinary and not too exceptional dimensions, then the relation ($B_2$) of the velocity of the anemometer to the velocity of the wind will be calculated with an average error of $\pm$ 3% by the following expressions:—

$$B_2 = \alpha_1 + \beta_1 \frac{R^2}{r} + \gamma_1 \frac{R^4}{r^2}*$$

in which $\alpha_1 = 3{\cdot}0133$ $\beta_1 = -53{\cdot}7367$ $\gamma_1 = 1033{\cdot}81$

"(4.) The derivation of the second anemometer-constant from the dimensions can only be looked upon as a make-shift, where it is not practicable to test the anemometer by direct trial.

"(5.) For the direct verification of the anemometers, the Combes revolving apparatus is advantageous for many reasons. The arrangement of the revolving apparatus erected at the Physical Central Observatory at St. Petersburgh, together with the arrangements for putting it in motion, and for registration, must be looked upon as patterns; only it is desirable that such an apparatus should be erected in as large an enlcosed space as possible. The following rules are applicable for testing the anemometers.

"(*a.*) The anemometer must be tested with its axis in a vertical position, in the two opposite directions of revolution, and at somefive different, tolerably equidistant, velocities.

* This is an empirical formula in which $\alpha_1$ $\beta_1$ $\gamma_1$ are experimental constants.

"(*b.*) The amount of the air which moves round with the apparatus during its rotation in an enclosed space (the 'vortex') must be measured and be deducted from the observed velocity of rotation (it is desirable that all anemometers to be tested should register electrically).

"(6). Anemometers of equal dimensions and from the same manufactory have such uniform constants, that as a rule it is sufficient when one of them is tested to treat its constants as applicable to the other similarly constructed anemometers.

"(7). The constants of stationary anemometers of large dimensions —anemographs—can be deduced with great exactness by lengthened comparison with tested anemometers in the open air; in doing this it is necessary that during the trial, winds of as different as possible velocity should be blowing.

"(8.) The anemometer formulæ which express the relation of the registration *(n)* to the velocity of the wind *(v)* must in general have three constants, and when the velocities are calculated according to the following formulæ :—

$$v = a + bn + cn^2$$

shew only slight variations from the observed values. Also, the reduction table, which must be prepared for each anemometer, should be calculated with three constants.

"(9.) The anemometer formulæ, with three constants, even enable velocities of wind which are considerably above the maximum velocities reached during the trial, to be calculated with great probability (for instance, in the anemometers tested in the present trials velocities of some 70 kilometers an hour).

"(10.) Experiments point to the conclusion (compare anemometers 8 and 9, p. 17) that a certain relation exists between the length of the arms and the radius of the cups at which the third member of the anemometer formulæ disappears, and then a linear function expresses the relation of the registered units to the velocity of the wind. Anemometers of this kind would be specially advantageous for the 'Wind-component Integrator.'

"(11.) Anemometers of small dimensions, and with small frictional resistance, are very constant in their action (compare anemometer Schultze No. 5, p. 7), and seldom require to be regulated after they have once been tested. For anemographs, the construction of which necessitates a great and at the same time variable amount of friction, frequent verification is necessary."

## THIRTY WINTERS.

*To the Editor of the Meteorological Magazine.*

SIR,—I hope you will not be frightened by the annexed table. It is a record of 30 years' winters, amongst which the winter which is still raging is quite singular. I cannot get at any satisfactory data for supporting my theory that cold winters are followed by cold summers, as four hot summers followed winters below the average; but some winters of very high average led up to the broiling seasons of 1868, 69, 70, and 1871. The feature of this winter is the low temperatures of December and January; if we had scored a few sensational frosts, which we did not, it would have been more extraordinary still.—Yours truly, W. LUCAS.

| YEARS. | Nov. | Dec. | Jan. | Feb. | March | April. | Average. | Summer. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | ° | ° | ° | ° | ° | |
| 1849-50 ... | 41·5 | 37·0 | 32·3 | 42·3 | 38·1 | 47·8 | 39·8 | hot |
| 1850- 1 ... | 44·0 | 38·8 | 40·5 | 38·2 | 40·8 | 44·5 | 41·1 | medium |
| 1851- 2 ... | 35·0 | 37·5 | 38·5 | 38·0 | 38·5 | 43·0 | 38·5 | hot |
| 1852- 3 ... | 45·3 | 45·0 | 40·0 | 32·1 | 38·5 | 43·1 | 40·3 | medium |
| 1853- 4 ... | 40·6 | 32·6 | 33·9 | 35·1 | 38·0 | 43·0 | 37·2 | hot |
| 1854- 5 ... | 38·9 | 38·9 | 34·0 | 27·0 | 38·0 | 44·5 | 36·9 | medium |
| 1855- 6 ... | 39·2 | 33·6 | 37·0 | 40·3 | 37·5 | 45·5 | 38·9 | medium |
| 1856- 7 ... | 38·8 | 38·2 | 33·6 | 37·7 | 41·1 | 44·3 | 39·0 | hot |
| 1857- 8 ... | 43·7 | 42·3 | 35·5 | 34·0 | 40·1 | 44·8 | 40·0 | hot |
| 1858- 9 ... | 36·5 | 37·1 | 37·2 | 39·0 | 44·0 | 44·1 | 39·6 | hot |
| 1859-60 ... | 38·9 | 34·5 | 36·5 | 32·6 | 39·7 | 41·3 | 37·1 | cold |
| 1860- 1 ... | 38·5 | 32·2 | 31·3 | 39·0 | 41·3 | 39·0 | 36·9 | cold |
| 1861- 2 ... | 37·7 | 36·7 | 36·5 | 39·0 | 41·7 | 46·8 | 39·8 | cold |
| 1862- 3 ... | 35·8 | 40·4 | 38·2 | 39·6 | 41·2 | 47·0 | 40·3 | cold |
| 1863- 4 ... | 42·7 | 39·9 | 33·7 | 34·4 | 39·4 | 47·0 | 39·3 | coldish |
| 1864- 5 ... | 39·4 | 35·7 | 33·6 | 34·3 | 35·0 | 50·4 | 38·0 | medium |
| 1865- 6 ... | 42·1 | 46·6 | 41·0 | 39·5 | 40·6 | 47·7 | 41·9 | medium |
| 1866- 7 ... | 42·1 | 40·9 | 32·7 | 42·5 | 36·0 | 48·1 | 40·3 | medium |
| 1867- 8 ... | 39·6 | 35·0 | 35·8 | 41·5 | 42·1 | 47·0 | 40·1 | hottest in our record |
| 1868- 9 ... | 39·2 | 44·1 | 40·8 | 45·1 | 38·1 | 50·7 | 43·0 | very hot |
| 1869-70 ... | 42·5 | 37·5 | 37·4 | 34·5 | 38·3 | 47·0 | 39·5 | very hot |
| 1870- 1 ... | 39·3 | 30·9 | 31·3 | 41·0 | 43·1 | 47·3 | 38·7 | very hot |
| 1871- 2 ... | 35·0 | 36·0 | 38·5 | 42·3 | 43·0 | 46·0 | 40·1 | hot |
| 1872- 3 ... | 42·1 | 39·0 | 38·3 | 32·9 | 39·3 | 44·2 | 39·2 | medium |
| 1873- 4 ... | 40·3 | 37·2 | 38·2 | 35·6 | 40·8 | 47·7 | 39·9 | hot |
| 1874- 5 ... | 38·5 | 29·2 | 40·0 | 32·1 | 37·8 | 43·7 | 37·0 | cold |
| 1875- 6 ... | 38·5 | 35·5 | 33·0 | 38·1 | 37·7 | 44·0 | 37·9 | hot |
| 1876- 7 ... | 39·9 | 39·6 | 37·9 | 39·2 | 37·1 | 42·9 | 39·2 | cold |
| 1877- 8 ... | 40·5 | 36·3 | 37·5 | 40·0 | 39·9 | 46·5 | 40·1 | medium |
| 1878- 9 ... | 36·9 | 31·0 | 28·9 | 36·0 | 39·1 | 41·1 | 35·3 | |
| MEAN ..... | 39·8 | 37·1 | 36·1 | 37·4 | 39·5 | 45·0 | 39·1 | |

*Hitchen, May 4th, 1879.*

From the above table it will be seen that the temperatures of the last six months have been the lowest for thirty years with the ex-

ception of 4 colder Novembers, 2 colder Decembers, 11 colder Februarys, 13 colder Marchs, and 1 colder April—January and the average for the six months are without precedent.

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## THE WEATHER IN APRIL.

The weather at the beginning of the month was very quiet generally. From the 1st to the 5th very uniform pressures were reported, and very light variable airs with fair weather prevailed. On the 5th the barometer rose fast over North Germany, but was falling briskly in the W., and gradients for S. winds were once more being formed over these Islands, the weather becoming dull, rainy, and unsettled.

Very unsettled weather prevailed during the whole of the second week. During the first few days a rather important depression lay over our western coasts, causing strong winds and gales from S., with overcast skies, but moderately warm weather. This depression continued with but little change in its position until the night of the 8th, but owing to a brisk rise of the bar. in Scandinavia, rather steep gradients for S.E. winds were formed in the N.E., and slight S.E. gales were experienced in Scotland. On the 9th the disturbance passed south-eastwards over the Netherlands, and E. breezes extended further southward, and from that time to the end of the week the highest pressures remained steadily in the N.; fresh E. winds were experienced with cold, inclement weather and frequent falls of snow and sleet.

The changes during the third week were both gradual and irregular. For the first few days pressure was highest in the N., and a depression appearing off our S.W. coasts, E. to N.E. breezes (light to moderate in the N., but fresh to strong in the S.) prevailed on our coasts, with dull, cloudy, cool weather, and some rain. As this disturbance passed off to the eastward, the wind became N. and N.W., and temperature rose somewhat. On the evening of the 17th another change occurred. The mercury fell a little in the South of Ireland, and a band of high pressure was thus formed over Great Britain, while a well-marked depression lay over the Baltic, and another approached the South of Ireland. The band moved slowly eastward over the British Isles during the next few days, bringing very fine weather, but as the depression in the W. continued to increase, very unsettled weather followed, with rain and S. winds, strong to a gale in force.

During the greater part of the fourth week weather was in a very unsettled state. On the 20th a depression lay over Ireland, and E. breezes prevailed everywhere, the north excepted, and W. winds in the south, while the barometer fell briskly generally. On the next day pressure began to increase steadily in the north, while a large depression was shown over the south of the British Islands and France. This depression passed off eastwards and from that time till the close of the week the track of the several disturbances was from N.W. to S.E., so that the prevailing winds were from S.W. to N.W. in the south-west, and from S.E. to N.E. in the north, while in the intervening space the winds varied considerably according to the position of the different cyclones. On the 29th, (by which time these disturbances) had passed away travelling in a south-easterly direction), the barometer rose over the whole of Western Europe. Readings were high and uniform over the British Islands, while areas of low pressure were shown over the southern part of the Baltic, and in the neighbourhood of Genoa. The weather at the same time became fine and dry.

Rain was frequent during the month, but not heavy, except on the 8th, 9th, and 10th, when the amounts reported from some parts of this country and Scotland were large.

H. E. M.

## *Winter Temperatures in Stevenson's Stands*, 1878-79.

| Stations. | November. | | | | | December. | | | | | January. | | | | | February. | | | | | Summary of 4 Months. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Extremes. | | Mean Daily. | | | Extremes. | | Mean Daily. | | | Extremes. | | Mean Daily. | | | Extremes. | | Mean Daily. | | | Extremes. | | Mean Daily. | | |
| | Max. | Min. | Max. | Min. | Mean | Max. | Min. | Max. | Min. | Mean | Max. | Min. | Max. | Min. | Mean | Max. | Min. | Max. | Min. | Mean | Max. | Min. | Max. | Min. | Mean |
| | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° |
| Jersey | 55·2 | 34·9 | 48·9 | 40·9 | 44·9 | 54·6 | 27·5 | 44·7 | 36·1 | 40·4 | 52·6 | 25·0 | 40·9 | 34·5 | 37·7 | 52·8 | 30·4 | 46·9 | 38·5 | 42·7 | 55·2 | 25·0 | 45·3 | 37·5 | 40·4 |
| Babbacombe | 52·9 | 31·0 | 46·1 | 37·0 | 41·6 | 52·8 | 20·6 | 41·9 | 31·4 | 36·7 | 52·8 | 19·1 | 39·8 | 32·6 | 36·2 | 53·9 | 28·2 | 46·7 | 36·8 | 41·8 | 53·9 | 19·1 | 43·6 | 34·5 | 39·1 |
| Ventnor | 52·3 | 31·8 | 46·2 | 37·5 | 41·8 | 50·7 | 24·1 | 42·0 | 32·8 | 37·4 | 49·2 | 22·2 | 38·8 | 32·5 | 35·6 | 50·3 | 26·1 | 44·0 | 36·1 | 40·0 | 52·3 | 22·2 | 42·7 | 34·7 | 38·7 |
| Torquay | 52·7 | 30·9 | 45·8 | 36·3 | 41·0 | 52·7 | 19·7 | 41·6 | 31·2 | 36·4 | 51·7 | 19·5 | 39·4 | 31·9 | 35·6 | 53·7 | 27·6 | 45·8 | 36·1 | 41·0 | 53·7 | 19·5 | 43·2 | 33·8 | 38·5 |
| Worthing | 53·0 | 31·4 | 46·0 | 36·5 | 41·2 | 49·8 | 21·0 | 40·1 | 30·9 | 35·5 | 49·3 | 19·7 | 38·3 | 30·4 | 34·3 | 47·0 | 26·4 | 41·9 | 35·0 | 38·4 | 53·0 | 19·7 | 41·6 | 33·2 | 37·3 |
| Barrow | 51·0 | 27·0 | 44·9 | 34·7 | 39·8 | 47·0 | 16·0 | 38·0 | 28·3 | 33·2 | 45·0 | 20·0 | 36·4 | 28·4 | 32·4 | 45·0 | 28·0 | 41·9 | 33·4 | 37·6 | 51·0 | 16·0 | 40·3 | 31·2 | 35·8 |
| Addiscombe | 52·5 | 28·1 | 44·3 | 35·1 | 39·7 | 55·3 | 11·4 | 37·6 | 29·0 | 33·3 | 50·9 | 18·3 | 35·6 | 28·0 | 31·8 | 52·7 | 20·9 | 42·8 | 34·4 | 38·6 | 55·3 | 11·4 | 40·1 | 31·6 | 35·8 |
| Isleworth | 53·5 | 27·5 | 44·6 | 34·1 | 39·3 | 54·8 | 8·8 | 38·2 | 27·6 | 32·9 | 48·3 | 10·8 | 35·8 | 27·7 | 31·8 | 54·1 | 10·5 | 43·0 | 32·8 | 37·9 | 54·8 | 8·8 | 40·4 | 30·5 | 35·5 |
| Watford | 50·9 | 25·6 | 44·4 | 33·9 | 39·1 | 54·7 | 8·8 | 37·4 | 27·4 | 32·4 | 47·0 | 15 2 | 34·2 | 26·3 | 30·2 | 52·3 | 20·4 | 41·8 | 33·9 | 37·8 | 54·7 | 8·8 | 39·4 | 30·4 | 34·9 |
| Hodsock Priory | 49·7 | 24·7 | 43·4 | 32·6 | 38·0 | 53·1 | 9·8 | 37·6 | 25·5 | 31·5 | 47·8 | 6·3 | 36·0 | 24·8 | 30·4 | 60 2 | 17·7 | 41·5 | 32·2 | 36·9 | 60·2 | 6·3 | 39·6 | 28·8 | 34·2 |
| Addington | 51·0 | 27·0 | 43·0 | 33·0 | 38·0 | 52·0 | 5·0 | 35·0 | 25·0 | 30·0 | 46·0 | 11·0 | 34·0 | 23·0 | 28·5 | 54·0 | 18·0 | 41·0 | 32·0 | 36·5 | 54·0 | 5·0 | 38·3 | 28·3 | 33·3 |
| Cockermouth | 47·7 | 23·0 | 42·8 | 32·3 | 37·6 | 48·0 | 6·1 | 34·4 | 22·0 | 28·2 | 47·6 | 14·6 | 36·3 | 25·4 | 30·8 | 48·0 | 21·6 | 41·3 | 31·9 | 36·6 | 48·0 | 6·1 | 38·7 | 27·9 | 33·3 |

REMARKS.—*Jersey, St. Aubin's School*, 139 ft. above sea. J. E. Vibert, M.A.—*Babbacombe*, 294 ft. above sea. E. E. Glyde, F.M.S.—*Ventnor, Consumption Hospital*, 150 ft. above sea. E. Mawley, F.M.S.—*Torquay, Rocombe*, 400 ft. above sea. H. Hearder, F.M.S.—*Worthing*, 21 ft. above sea. W. J. Harris, M.R.C.S., F.M.S.—*Barrow*, 60 ft. above sea. F. Slade, C.E.—*Croydon, Addiscombe*, 202 ft. above sea. E. Mawley, F.M.S.—*Isleworth*, 64 ft. above sea. E. A. Ormerod, F.M.S.—*Watford, Wansford House*, 324 ft. above sea. J. Hopkinson, F.L.S., F.M.S. — *Worksop, Hodsock Priory*, 67 ft. above sea. H. Mellish. — *Winslow, Addington*, 309 ft. above sea. J. Mathison.—*Cockermouth*, 144 ft. above sea. H. Dodgson, M.D., F.M.S.

# APRIL, 1879.

| Div. | | STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.] | RAINFALL. Total Fall. | Difference from average 1860–5 | Greatest Fall in 24 hours. Dpth | Greatest Fall in 24 hours. Date. | Days on which ·01 or more fell. | TEMPERATURE. Max. Deg. | Max. Date. | Min. Deg. | Min. Date. | No. of Nights below 32°. In shade. | No. of Nights below 32°. On grass. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | inches | inches. | in. | | | | | | | | |
| I. | ENGLAND. | Camden Square | 2·72 | + 1·59 | ·53 | 9 | 16 | 61·7 | 26 | 26·8 | 12 | 7 | 12 |
| II. | | Maidstone (Hunton Court) | 2·85 | + 1·70 | ·46 | 23 | 15 | ... | ... | ... | ... | ... | ... |
| ,, | | Selborne (The Wakes) | 3·29 | + 1·79 | 1·11 | 6 | 17 | 58·5 | 26 | 22·0 | 29 | 10 | 16 |
| III. | | Hitchen | 2·33 | + 1·33 | ·39 | 6 | 18 | 56·0 | 26 | 26·0 | 11 | 12 | ... |
| ,, | | Banbury | 3·01 | + 1·85 | ·58 | 6 | 20 | 57·5 | 26* | 26·0 | 13 | 13 | ... |
| IV. | | Bury St. Edmunds (Culford) | 2·68 | + 1·93 | ·95 | 12 | 19 | 62·0 | 26* | 23·0 | 11 | 11 | 16 |
| ,, | | Norwich (Sprowston) | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| V. | | Bridport | 2·98 | + 1·50 | ·71 | 6 | 17 | ... | ... | ... | ... | ... | ... |
| ,, | | Barnstaple | 2·37 | + ·36 | ·54 | 26 | 15 | 62·0 | 28† | 27·0 | 12 | ... | ... |
| ,, | | Bodmin | 3·49 | + 1·79 | ·80 | 19 | 17 | 58·0 | 27‡ | 26·0 | 12 | 3 | 14 |
| VI. | | Cirencester | 3·11 | + 1·82 | ·66 | 6 | 18 | ... | ... | ... | ... | ... | ... |
| ,, | | Shifnal (Haughton Hall) | 2·49 | + 1·34 | ·40 | 9 | 17 | 56·0 | 26 | 23·0 | 13 | 12 | 17 |
| ,, | | Tenbury (Orleton) | 2·96 | + 1·42 | ·46 | 6 | 20 | 57·8 | 27 | 23·8 | 13 | 12 | 17 |
| VII. | | Leicester (Town Museum) | 2·11 | ... | ·49 | 14 | 18 | 57·9 | 26 | 28·5 | 22 | 8 | 24 |
| ,, | | Boston | 2·25 | + 1·28 | ·52 | 9 | 17 | 60·0 | 7 | 29·0 | 4 | 6 | ... |
| ,, | | Grimsby (Killingholme) | 2·04 | ... | ·30 | 26 | 18 | 57·0 | 25 | 30·5 | 13 | 1 | ... |
| ,, | | Mansfield | 2·67 | ... | ·51 | 9 | 19 | 58·5 | 7 | 26·0 | 13 | 7 | 12 |
| VIII. | | Manchester (Ardwick) | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| IX. | | York | 1·50 | + ·40 | ·30 | 8 | 16 | 61·5 | 26 | 26·0 | 13 | 9 | ... |
| ,, | | Skipton (Arncliffe) | 2·52 | — ·52 | ·47 | 23 | 18 | ... | ... | ... | ... | ... | ... |
| X. | | North Shields | 2·35 | + 1·04 | ·57 | 7 | 18 | 54·7 | 2 | 29·0 | 13 | 3 | 5 |
| ,, | | Borrowdale (Seathwaite) | 4·76 | — 2·14 | 1·38 | 5 | 13 | ... | ... | ... | ... | ... | ... |
| XI. | WALES. | Cardiff (Crockherbtown) | 2·64 | ... | ·73 | 19 | 17 | 62·0 | 27 | 30·0 | 12 | 4 | ... |
| ,, | | Haverfordwest | 3·22 | + 1·36 | 1·12 | 7 | 13 | 57·2 | 26 | 25·0 | 11 | 9 | 16 |
| ,, | | Aberdovey | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| ,, | | Llandudno | 1·49 | — ·01 | ·44 | 20 | 14 | 55·7 | 25 | 30·0 | 13 | 2 | ... |
| XII. | SCOTLAND. | Cargen | 1·34 | — ·50 | ·34 | 5 | 10 | 56·0 | 26 | 27·8 | 19 | 7 | ... |
| ,, | | Hawick (Silverbut Hall) | 1·61 | ... | ... | ... | 17 | ... | ... | ... | ... | ... | ... |
| XIV. | | Annanhill | ·91 | ... | ·24 | 25 | 13 | 55·7 | 27 | 26·4 | 13‖ | 6 | 14 |
| XVI. | | Kilmory | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| ,, | | Mull (Quinish) | 1·82 | ... | ·39 | 6 | 11 | ... | ... | ... | ... | ... | .. |
| ,, | | Loch Leven | 2·50 | + ·98 | ·60 | 8 | 12 | ... | ... | ... | ... | ... | ... |
| ,, | | Tyndrum (Ewick) | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| XVII. | | Arbroath | 2·11 | + ·92 | ·54 | 7 | 11 | 52·0 | 1, 4 | 31·0 | 17 | 3 | ... |
| ,, | | Braemar | 2·10 | + ·70 | ·55 | 7 | 14 | 51·3 | 26 | 23·8 | 3, 4 | 12 | 23 |
| XVIII | | Aberdeen | 3·53 | ... | 1·39 | 7 | 20 | 53·5 | 4 | 30·3 | 19 | 3 | 13 |
| ,, | | Portree | 1·58 | — 3·69 | ·30 | 5 | 10 | ... | ... | ... | ... | ... | ... |
| ,, | | Inverness (Culloden) | 1·67 | + ·20 | ·75 | 17 | 8 | 53·7 | 5 | 28·0 | 13 | 7 | 18 |
| XIX. | | Dunrobin | 1·92 | + ·68 | ·71 | 7 | 12 | 52·0 | 4 | 28·0 | 3 | 4 | ... |
| ,, | | Sandwick | 1·70 | — ·04 | ·61 | 7 | 15 | 48·8 | 6 | 29·4 | 16 | 3 | 19 |
| XX. | IRELAND. | Cork | 2·42 | ... | ·90 | 19 | 10 | ... | ... | ... | ... | ... | ... |
| ,, | | Caherciveen Darrynane Abbey | 5·02 | ... | 1·26 | 19 | 17 | ... | ... | ... | ... | ... | ... |
| ,, | | Waterford | 2·37 | + ·14 | ·61 | 19 | 16 | 60·5 | 25 | 30·0 | 12§ | 7 | ... |
| ,, | | Killaloe | 2·22 | + ·09 | ·40 | 5 | 16 | 68·0 | 29 | 26·0 | 2 | 9 | ... |
| XXI. | | Portarlington | 2·02 | ·00 | ·52 | 23 | 22 | 59·5 | 25 | 28·5 | 12 | 7 | ... |
| ,, | | Monkstown, Dublin | 2·04 | + ·40 | ·37 | 7 | 16 | .. | ... | ... | ... | ... | ... |
| XXII. | | Galway | 2·45 | ... | ·75 | 19 | 19 | 59·0 | 30 | 29·0 | 3 | 6 | ... |
| XXIII | | Waringstown | 1·65 | ... | ·34 | 7 | 14 | 61·0 | 26 | 25·0 | 2 | 9 | 15 |
| ,, | | Edenfel (Omagh) | 2·32 | ... | ·73 | 7 | 15 | 56·0 | 26 | 25·0 | 2 | 14 | ... |
| ,, | | Ballyshannon | ... | ... | ... | ... | ... | ... | .. | ... | ... | ... | ... |

* And 27. † And 30. ‡ And 28. ‖ And 18. § And 13, 18.

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

# METEOROLOGICAL NOTES ON APRIL.

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.

SELBORNE.—A bleak cold unhealthy month; much typhoid fever and pulmonary disease. Wind mostly N.E. or N.W. S on 12th, 13th, and 14th, Swallows first seen on 17th; cuckoo first heard on 22nd.

HITCHEN.—S on the 12th.

BANBURY.—S daily from 11th to 15th; high wind on 6th and 9th.

CULFORD.—April was an exceedingly cold and wintry month. The heaviest fall of S in 24 hours, for at least the last 30 years, occurred on the 12th, yielding ·95 in. of water. Mean temp. 42°·2; and polar winds prevailed during 15 days. Cuckoo and nightingale first heard, and swallows first seen on 22nd; S on 11th, 12th, and 13th; TS with H on 15th.

BODMIN.—Mean temp. 48°·3; 2°·4 below the average. S on 12th and 13th.

CIRENCESTER.—S on the 11th, 12th, and 13th

SHIFNAL.—A cold ungenial month; S during the month yielded ·74 in. Easter day (13th) the coldest for at least 45 years, min. temp. 23°, max. 40°, mean 36°; the next coldest 1836 (April 3rd), min. 32°, max. 44°, mean 38°. The max. temp. of the month was only 56°. Winds N. and N.E. with few exceptions, and bar. most spasmodic throughout. Distant T in S.E. on 26th, and again on 30th. Vegetation at least three weeks behindhand; asparagus only just peeping on 30th; throstle first heard on 2nd; coltsfoot in flower and first humble bee on 4th; rooks building on 6th; sand martins returned on 14th; cuckoo first heard on 22nd; first swallow seen on 23rd; first white and first tortoiseshell butterflies both seen on 29th; S from 11th to 15th.

ORLETON.—A very cold and cloudy month, with very little sunshine and the wind generally from N. and E. S on ground from 12th to 15th. Mean temp. nearly 6°·5 below the average, and lower than that of any other April for 24 years. Chiff-chaff seen on 1st; swallows on 17th; and cuckoo heard on 20th. No fruit trees in flower by 30th. T heard on 1st and 2nd, and a storm of L and T on 26th.

LEICESTER.—S daily from 11th to 14th.

KILLINGHOLME.—Another month of wintry weather and polar winds; vegetation very backward, giving painful recollections of the disastrous year 1860. Corn sowing is almost if not quite finished, and the state of the arable land is favourable. Grass very scarce. First swallow seen on 21st; cuckoo heard on 30th. TS with H and R on 26th.

MANSFIELD.—S on 12th and 14th.

YORK.—Mean temp of month, 43°·5; in 1878 it was 47°·4, and in 1877 43°·2. S on three days.

ARNCLIFFE.—S at the end of the month.

NORTH SHIELDS.—S from 11th to 15th and on 17th.

SEATHWAITE.—The month was very cold and dry, with the wind generally in the E. There was only one day on which the fall exceeded 1·00 in., and the total for the month is considerably below the average.

## WALES.

HAVERFORDWEST.—S on 11th, 12th, and 13th. Much very cold wind.

LLANDUDNO.—The month began and ended fine, but was snowy and stormy in the middle. Mean temp. exceptionally low, being more than 5°·5 below the average, though there were only two nights of frost. Vegetation late; swallows seen on 11th; cuckoo heard and seen on 28th.

## SCOTLAND.

CARGEN.—Easterly winds prevailed on 24 days. Vegetation generally about a month behindhand.

HAWICK.—Very little sun during the month, and an unusual amount of S and H. All wild flowers very late.

ANNANHILL.—A considerable amount of frost was recorded during the month. Rainfall was slight and ozone scarce, this latter being attributable to the great continuance of easterly winds, these being the prevailing winds during the month, and usually moderate to fresh breezes. S fell on the 12th, 13th, and 14th, and H on the 12th. Skies were generally cloudy, the prevailing species of cloud being the cumulus and cumulo-stratus.

QUINISH.—1st to 9th cold and wet, 10th to 30th bright sun with cold E. and N.E. winds, except on 25th, when there was warm R from S. Very low temp. and backward spring, R much needed.

ABERDEEN.—A dull, cold, wet month, with much fog. Mean temp. 41°·2, 2°·6 below average of 22 years. Rainfall 1·35 in. above 22 years average; H on 12th, 15th, and 17th; fog on 7 days.

PORTREE.—An unprecedentedly cold month, with strong frosts and N. winds. Grass and shrubs quite brown. Sheep suffering much, especially ewes and young lambs.

CULLODEN.—Vegetation very backward, but promise of an abundant fruit crop. All early spring flowering plants very late.

DUNROBIN.—Cold E. winds most of the month, and consequently vegetation made no perceptible progress. High tide and easterly winds on 7th and 8th did considerable damage on east coast.

SANDWICK.—April was remarkably cold: the ther. on grass falling below 32° on 19 nights, while in April 1878 it only occurred on 7. The days were frequently fine, though cold, and so dry as to allow agricultural operations to be carried on, and the seed sown, but vegetation is very backward. May, however, commences more favourably; but those who were early in search of May dew would find it in a frozen state. Bright aurora on 19th.

## IRELAND.

DARRYNANE ABBEY.—A cold ungenial month, but with some very fine days. Vegetation made very little progress till the last week. Cuckoo heard on 25th; swallows seen on 29th. S on Easter Sunday (13th), but not enough to yield ·01 in.

KILLALOE.—Cold and very backward up to 20th, with frequent frost; mean temp. more than 3° below average. Some milder days with R towards the end of the month, gave a more spring-like appearance to the country; but cold winds and sharp frosts returned on May 2nd. Prevailing winds E. and N.E.

PORTARLINGTON.—S on 12th, 13th, and 14th.

MONKSTOWN.—A very variable month, with much cold wind, but some warm days. Heavy snow on 13th.

WARINGSTOWN.—Unusually cold; deep snow on morning of Easter Sunday.

EDENFEL.—The weather of the entire month, whether wet or dry, was uniformly cold and inclement, and there was not one that could be called a "growing day"; as a result, the hedges are still brown, and vegetation in general is three weeks behind time. No summer visitants except a few stray swallows.