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THE LEIPZIG CONFERENCE.

(Continued from page 42.)

14. *In counting thunderstorms, should the storms as such, or the days of storm be given? In what way should the instances of sheet lightning be noticed?*

SR. F. DA SILVEIRA (W).—Record separately number of storms and of days. Heat lightning always noted in our records.

M. CARL FRITSCH (W).—Impossible to individualize a storm, and therefore to count them; one might nearly as well try to count the gusts of wind. It is just as difficult to separate days of storm and days of sheet lightning, which in an overwhelming majority of cases is simply a distant storm.

DR. MOHN (W).—Have tried both methods. Perhaps enough to count days. Sheet lightning separately.

MR. SYMONS (W).—Count days of storm, but heat lightning being really a distant storm, is hardly entitled to be included.

THE BORDEAUX MEETING (W).—Both should be done. Regular observations in France prove that thunder is not heard more than 5 or 6 leagues, or lightning seen more than 30.* Heat lightning being generally a sign of a distant storm, should be recorded, and also its azimuth.

THE COMMITTEE recommended only days of storm to be counted. Sheet lightning to be entered when independent.

No discussion or decision reported.

15. *What apparatus is to be recommended for the measurement of evaporation? What is the most suitable exposure for the vaporimeter?*

SR. F. DA SILVEIRA (W).—Whatever is adopted must be universally so. Should be exposed to rain, sun, &c.

* Probably these are the leagues of the old system (=2000 toises) and represent respectively 12 to 15, and 74 English miles.

M. CARL FRITSCH (W).—A vessel similar to a rain gauge, but shallower, exposed to sun and rain, but guarded against undue heating.

Captain HOFFMEYER (W).—Attention must be paid to the temperature of the vaporimeter. Rational experiments on the subject are in progress at Copenhagen.

Prof. RAGONA (W).—Recommends for general use the vaporimeter by Tecnomasio Italiano of Milan, and where cost is no object, the self-recording one designed by himself.

Mr. SYMONS (W).—Very elaborate experiments are in progress at the expense of the Royal Society, and under the superintendence of Mr. Field. Forwarded description of the apparatus employed.

The BORDEAUX MEETING (W).—Think Piche's hygrometer gives the most comparable results.

The COMMITTEE considered the subject required further investigation, and recommended that a committee be appointed to report.

M. PRESTEL recommended his vaporimeter, which is described in Vol. I. p. 193, of the *Zeitschrift*.

M. EBERMAYER (T).—Lamont's should be recommended; he had found it work well.

M. NEUMAYER (T).—It was not desirable to enter into instrumental details. He would communicate the results of his Australian experience to the Committee, and he hoped others would do likewise.

No Committee reported to have been nominated; no decision arrived at.

16. *In what way should the proportion of cloud in the sky be estimated and indicated? Is it desirable to introduce for clouds, hydrometeors, and other extraordinary phenomena, a nomenclature which shall be independent of local language, and therefore universally intelligible?*

Sr. F. DA SILVEIRA (W).—Clear sky = 10, overcast = 0; but uniformity is the essential point. The introduction of universal symbols is very desirable.

M. CARL FRITSCH (W).—During the prevalence of thin cirrus, and the breaking up of ground fog, there is difficulty in determining the true amount of cloud. Thinks the introduction of general symbols desirable.

Dr. MOHN (W). Blue sky 0, overcast 10. Symbols very convenient.

Mr. SYMONS (W).—By all means introduce such symbols if possible.

The BORDEAUX MEETING (W).—The adoption of tenths of clear or cloudy sky will involve the disadvantage of two figures for telegraphy instead of one. Approve use of symbols.

The COMMITTEE recommend 0 = clear sky, 10 = overcast; that symbols be used, and a collection of all those at present in use be submitted for selection at the next Congress.

No discussion or decision reported.

17. *Should other Meteorological Elements than those already enumerated, e.g., Atmospheric Electricity, &c., be included in the scope of normal observations, and what are the best instruments for observing them?*

Sr. F. DA SILVEIRA (W).—Doubtless in first-class stations. A good electrograph would be a great acquisition.

M. CARL FRITSCH (W).—Freedom of choice should be given to every observer.

Capt. HOFFMEYER (W).—The observation of the motion of cirri is very important.

Dr. MOHN (W).—The so-called atmospheric electricity belongs as yet to physics.

Prof. RAGONA (W).—Observation of atmospheric electricity is very desirable.

The BORDEAUX MEETING (W).—There should be no limit as to extra subjects.

The COMMITTEE (T).—The subject should be referred to a committee.

Dr. PRESTEL (T).—Ozonometry should receive attention.

M. EBERMAYER (T).—The level of water in the soil should be observed, and also the "introduction of rain water into the soil by means of the Lysometer."*

The lateness of the hour prevented thorough discussion of the foregoing questions (13 to 17) and they were referred to a committee consisting of MM. Ebermayer, Schoder, and Sohnke for report in 1873.

18. *Can uniform times of observation be introduced for the normal observations?*

Sr. F. DA SILVEIRA (W).—Very desirable, but not easily obtained with an unpaid staff. The duties at secondary stations should be amalgamated with those of schools, telegraphs, lighthouses, &c., so as to secure sufficient control.

M. CARL FRITSCH (W).—Fears that the introduction of uniform hours would lead to a diminution in the number of observers.

Dr. MOHN (W).—Time of observation must be adapted to suit observer.

Prof. RAGONA (W).—Impossible to secure uniformity.

Dr. WOLF (W).—Scarcely possible, e.g., if our Swiss hours 7, 1, 9, were changed to 6, 2, 10, we should probably lose the majority of our mountain stations.

The BORDEAUX MEETING (W).—Very desirable; if not practicable to the fullest extent, there should be some hours common to all systems.

The discussion on this subject was quite conversational, several speakers rising four or more times, as the question gradually split up into various branches not strictly included in the programme.

* Probably the word "Eindringen" would be more appropriately rendered "penetration" than "introduction," inasmuch as the Lysimeter is merely a continental form of Dr. Dalton's percolating gauge."

M. BRUHNS (T).—The hours should be optional, and the observations reduced to true means at the central station of each country. He would not accept returns from stations where less than two equidistant daily observations were made. For tri-daily observations, the hours of 6, 2, and 10 were best.

MM. JELINEK and VON OETTINGEN (T).—Single daily observations should not be rejected, but only those from tri-daily series should be published.

Mr. SCOTT (T).—Agreement as to hours could not be attained.

M. BUYS BALLOT concurred. He recommended 6, 2, 10. Wished to know if observations were to be taken according to local time, or simultaneously; he thought the latter desirable for barometric purposes.

M. VON OETTINGEN concurred and proposed that some of the central stations should observe according to astronomical time, *i.e.*, simultaneously.

MM. BRUHNS & JELINEK (T).—The required information might be obtained from the self-recording instruments.

Mr. SCOTT pointed out that hourly mean values were insufficient.

M. VON OETTINGEN had chosen the hours 1, 4, 7, 10, &c., because they were more rarely used; he wished to know if, where 3-hourly observations were taken, it was necessary that there should be uniformity of hours.

M. WILD (T).—That agreement on simultaneous hours brought with it the hateful question of the first Meridian.

M. VON FREEDEN (T).—That as the even hours were used at sea, it would be well to use them on land also.

M. BUYS BALLOT (T.), the selection of hours immaterial, provided they were capable of yielding by combination true mean values. He objected to systems (such as the Italian) which gave excessive weights to day observations.

M. VON FREEDEN preferred even hours, with 0h. as commencement.

M. JELINEK said that as regarded mean values the point was not important, but it was so with reference to individual observations.

M. VON OETTINGEN wished to know if the day should begin at noon or midnight. MM. BRUHNS and WILD adopted 1 a.m. Again, how should wind velocities which were totals be grouped?

Mr. SCOTT said that the Meteorological Committee made the day begin with noon, and took the total wind between $23\frac{1}{2}$ and $0\frac{1}{2} = 0$, between $0\frac{1}{2}$ and $1\frac{1}{2} = 1$, &c.

M. VON FREEDEN said at sea they always reckoned from 0h. to 0h.

M. BUYS BALLOT (T.) observations on the same day could not be separated.

M. BRUHNS (T.) as opinions were so divided, the question had better be postponed till 1873.

19. *Can rules universally applicable be laid down for the Verification of Instruments and the Inspection of Meteorological stations?*

SR. F. DA SILVEIRA (W.) Certainly.

M. CARL FRITSCH (W.) Yes; it is part of the duty of the Central Bureaux.

DR. MOHN (W.) With difficulty.

The BORDEAUX MEETING (W.) Yes, it would be most advantageous.

M. WILD (T.) Each station should be inspected every 5, or at least every 10 years.

M. BRUHNS said he had obtained funds for an annual inspection, but soon found such frequency unnecessary.

MR. BUCHAN (T.) there should be biennial inspection, not so much with regard to the instruments as to the personal contact of the observer with a competent inspector.

MR. SCOTT found it unnecessary to take testing apparatus with him; their stations were supplied with duplicate instruments, and if they agreed it was assumed that no change had taken place.

M. BRUHNS always took standard instruments with him for comparison.

M. JELINEK (T).—It was desirable to assure oneself from time to time that the standards were themselves unchanged.

M. NEUMAYER said, that the inspection of every station, had in Victoria been made an indispensable preliminary to the publication of its returns. Moreover, the directors of the principal Australian observatories had arranged for mutual comparison of instruments.

After discursive, though interesting conversation, respecting the construction of thermometers, it was resolved that it was desirable to inspect as frequently as possible.

20. *What are the rules and what the intervals of time for which the means of the several Meteorological elements should be calculated? Which is the better plan, to begin the Meteorological year with December or with January?*

Prof. DOVE (W).—Five-day means, beginning with January 1st. Civil year, and months.

SR. F. DA SILVEIRA (W).—Five-day means, decades [ten days? Ed.] months, seasons, and year. We think January is preferable, although at present we begin with December.

M. CARL FRITSCH (W).—Means should be taken for each day, month, and year. If separate means are given for the seasons, the year should begin with December; if otherwise, then with January.

Capt. HOFFMEYER (W).—Dr. Buys Ballot's division of the year, December–December into twelve periods of 30 or 31 days seems suitable.

DR. MOHN (W).—Length of intervals depends on working power of central station. Monthly means should always be given.

Prof. RAGONA (W).—Five-day means, decades, months and years. The 5-day means reckoned consecutively from January 1st, but the year should begin with December.

Mr. SYMONS (W).—On the whole January 1st is preferable.

The BORDEAUX MEETING (W).—The most important period is the day, then the month, season and year. Any other period can be formed from these.

M. PRESTEL (T).—December was best, and in support thereof referred to the temperature curve at Emden.

Mr. BUCHAN gave several instances in which M. Prestel's argument failed, and spoke in favour of January 1st.

M. HANN also pointed out that a system to be adopted all over the globe should not be regulated by the conditions of any one spot.

Mr. SCOTT remarked that he began with January.

M. BUYS BALLOT was in favour of December, because otherwise the winter was partly in two volumes.

M. WILD remarked that it made no difference; no month had any physical basis, and therefore it was much better to adhere to the civil year.

M. JELINEK (T) it immaterial; most systems began with January.

M. PRESTEL urged the importance of seasonal means for agricultural purposes.

M. VON FREEDEN said in the Prussian system December was made the commencement of the year for that very reason.

M. VON OETTINGEN (T) monthly means were a mistake; he would begin with December 2nd.

M. BRUHNS advocated daily, 5-daily, and monthly means. He also always computed the means for both the civil and the meteorological year.

Mr. BUCHAN (T) daily, monthly, and civil year means were best. He thought seasonal means often delusive.

Mr. SCOTT gave 5-day, monthly, and (civil) yearly means.

On a division the majority was for, Days, 5-days, civil months, and civil years.

The meeting proceeded to discuss the mode of forming the 5-day periods, and on another division, Prof. Dove's method was adopted.

GREAT FLOOD AT LLANFAIRFECHAN, NORTH WALES.

Tuesday, April 15th, was a very warm day; Wednesday morning was still, warm and close; soon after noon rain began to descend in hasty showers, and unusually large drops; then came lightning and thunder, which continued for several hours incessantly. Looking eastwardly at the heavens over and beyond Penmaenmawr mountain, the sky was exceedingly dark and gloomy. About 3 o'clock p.m., the river which comes down from the mountains became exceeding full, the water almost black with peat colouring, then, after a time, the water changed to a very dirty red. The flood was at its height about 4 o'clock. The river had transgressed all its usual bounds, and the

rush and roar of the water, and the growl of the rolling boulders, were truly fearful. Four houses standing near the stream were carried away and lost in the flood; they seemed to have vanished, as it were, in a moment, and not a trace of them is left; the inhabitants had only time to escape with their lives, losing everything. Another house and a butcher's shop, and a small brewery and malt house, standing too near the stream, shared the same fate. Several wood bridges crossing the river were carried away. The force of the water was so great, that the wood-work of the washed down houses, brewing utensils, &c., &c., was broken all into fragments. Trees brought down by the torrent were strewn in all directions, many of them buried deep in the rolled down boulders and gravel.

The road up the valley was completely swept away in many places, and numbers of the nicely cultivated gardens of the cottagers are completely ruined, the soil being entirely gone, and nothing but boulder stones and gravel remaining; so complete is the ruin, that it would be next to impossible to say where the gardens were.

Going downwards towards the railway and the sea-shore, the course of the river is filled up with thousands of tons of stones, and gravel, the removal of which will be an immense work.

It appears that the centre of the downpour of water was about the ridge of the mountain called Tal-y-fan, the slopes of which descend north-westwardly towards Llanfairfechan, northwardly towards Penmaenmawr, and eastwardly towards a village called Roe-wen, in the valley of the Conway. At all those places the water rushed down, doing great damage. In the valley of the Conway, bridges have been carried away, and much injury sustained.

I have heard that there was some man on the mountains at the time, who describes the scene where he was as truly awful. There was almost the darkness of night, and the lightning and thunder were incessant, with occasional very heavy peals with a peculiar rattle, and the rain descending in torrents.

At the head of the Llanfairfechan valley, there are three mountain streams, which there unite and form the Llanfairfechan river. One of them rises in the watershed in the east, the middle one rises in the south-east, and the third rises in the south. It was down the first of these little rivers that the flood descended with immense force, the two other rivers shewing no marks of any very great increase of water in them. This would show that the great rainfall which caused the flood at our village was confined to a limited watershed of about a mile and a half from S.E. to S.W., by a mile from N.E. to N.W. The fall of rain over this limited area must therefore have been immense.

The rainfall at Llanfairfechan village during the whole period was only 1 inch.

RICHARD LUCK.

Plas, Llanfairfechan, 28th April, 1873.

"CYCLONE AND ANTI-CYCLONE."

To the Editor of the Meteorological Magazine.

SIR,—I am glad to see in your pages some discussion on the subject of the propriety of the term "anti-cyclone," involving questions of importance.

Dr. Burder's letter contains what appears to me a serious error. If I rightly understand him, he regards the systems of atmospheric circulation which are termed "anti-cyclonic," as simply the interstices or spaces intervening between areas of depression. This is a mistake into which some English meteorologists seem especially liable to fall, as the result partly of the amount of attention devoted to storms, (which are principally of the "cyclonic" type) on our coasts, to the comparative neglect of the more tranquil motions of the atmosphere, partly of the somewhat greater frequency of the "cyclonic" than of the "anti-cyclonic" circulations within the limits of the British Isles.

I have at hand a very large list of examples of areas of high pressure quite as circular in form and far more stable and permanent in respect of geographical position than any areas of depression, and, if desired, I shall be glad to supply dates, descriptions, or charts of these *ad libitum*; though I am quite sure that any one who has worked much at weather charts, even for the British Isles alone, will have met with plenty of such instances.

In our part of the globe there are occasional periods during which circulations of the retrograde type prevail so largely that there are no true "anti-cyclones"; several depression systems are then nearly in juxtaposition, and the spaces of relatively high pressure necessarily existing between them approximate, as represented on an isobaric chart, to the form of all spaces existing between contiguous circles. Periods also occur, (rather less commonly in our Islands, but as commonly in Continental Europe), in which circulations of the direct type are prevalent, and these are sometimes nearly in juxtaposition, so that the spaces of relatively low pressure are those of the above mentioned form; and there are then no true "cyclones." It would almost seem as if Dr. Burder had confined his investigations to periods of the former description. From a similar treatment of those of the latter, any one so disposed may show by the same arguments and by the use of the same arrows, that "cyclones" are nonentities, except as the inter-spaces of the "anti-cyclones."

I cannot, however, reconcile Dr. Burder's remarks on this point with his mention of an area of barometric elevation, as represented by a circle or by concentric rings, for a mere space between circles, which he considers an "anti-cyclone" to be, is by no means a circle.

A causal relation exists just as much between each centre of barometric elevation and the rotation of the winds about it, as between each centre of depression and the rotation of the winds about it, and the student of meteorology who is impressed with the idea of the latter alone will resemble the physiologist who studies the venous to the

neglect of the arterial circulation, or the movements of inspiration to the exclusion of those of expiration.

With regard to the use of the terms "cyclone" and "anti-cyclone," I venture to submit that these are in a high degree both succinct and descriptive, and are therefore just what is much wanted in our terminology. They ought to be welcome to any one who knows the trouble of the alternative between using an incorrect or inadequate word, and employing, perhaps several times in a sentence, some such fearful phrase as "an approximately circular area, bounded by isobarics, having lower [or higher] pressures than those of the surrounding regions, and currents retrograde in the Northern, and direct in the Southern hemisphere [or vice versa], &c."

It is therefore satisfactory, I think, to see indications that the term "cyclone" is coming into more general use, as applied to our ordinary depression systems. Though originally employed only of certain depressions of exceptional intensity, it does not seem necessarily to involve either any comparison between these and our ordinary systems, or any theory as to the identity or otherwise of the atmospheric conditions which originate them; and it may be applied to either, just as the term "thunderstorm" is, either to the mildest shower of the kind in our own climate, or to the most violent electric tempests of some of the warmer regions of the globe. But should the term "cyclone" be ever thus popularized, its faithful and necessary correlative will be so too.—I am, Sir, yours truly,

W. CLEMENT LEY.

Breinton, Hereford, April, 23, 1873.

THE APRIL FROST.

To the Editor of the Meteorological Magazine.

SIR,—The cold of last week was more severe than we ordinarily experience at the end of April. Perhaps the following figures may be of interest for comparison with those recorded elsewhere. Thermometers in louver board screens, 4 ft. above ground, except where otherwise mentioned :—

| HARPENDEN, 350 ft. | | | | | ANEMOMETER STATION, 416 ft. | | | | |
|--------------------|------------------|----------|-------------------|----------------------------|-----------------------------|----------|-----------------------------|----------|--|
| April, 1873 | Max. at 4 ft. | Min. | Min. on grass. | Max. in sun at 4 ft. | Max. at 4 ft. | Min. | Max. 18 ft. above ground | Min. | |
| 23..... | 48·7 | ... 31·3 | ... 22·8 | ... 114·0 | 45·8 | ... 31·3 | ... 44·7 | ... 31·7 | |
| 24..... | 46·2 | ... 29·6 | ... 21·2 | ... 107·8 | — | ... 29·5 | ... — | ... 29·7 | |
| 25..... | 48·1 | ... 24·0 | ... 11·7 | ... 112·2 | 45·2 | ... 27·9 | ... 43·0 | ... 29·0 | |
| 26..... | 48·5 | ... 22·8 | ... 11·8 | ... 99·0 | 48·7 | ... 26·6 | ... 47·4 | ... 27·5 | |
| 27..... | 46·9 | ... 30·8 | ... 23·7 | ... 101·0 | — | ... 33·5 | ... — | ... 36·0 | |

The air was very dry till midday of the 26th, and radiation, both solar and terrestrial, was excessive. On the 25th the mean temperature of the air was about 36°·4, and the dew-point 25°·5. There were snow showers on the 23rd, 24th, and 25th, and hail fell on the 27th, on which day the wind had the force of a gale (30 miles an hour), for two hours. Plants are less injured than one would expect.

I am, Sir, yours truly,

F. W. STOW.

Harpenden, April 30, 1873.

THE METEOROLOGICAL COMMITTEE AND THE SCOTTISH METEOROLOGICAL SOCIETY.

WE are very glad that the wish expressed in our last that the antagonism between these two bodies would be removed before the issue of this number of the magazine has been gratified. The following extract speaks for itself :—

“SCOTTISH METEOROLOGICAL SOCIETY.—At a meeting of the Council of this Society, held on the 28th ult., a letter was read from the Board of Trade transmitting a communication from the London Meteorological Committee, in which that body consented most readily to conform to the wish of the Scottish Meteorological Society, that observers furnishing information to them should not be engaged to observe also for the Committee without the previous concurrence of the Scottish Meteorological Society. The Council resolved to communicate to the Board of Trade their complete satisfaction with the result of this correspondence as to the complaint which they felt obliged to make regarding the interference of the London Meteorological Committee with their observers.

REVIEW.

Saint Swithin and other Weather Saints. By REV. LEONARD JENYNS, M.A., F.L.S., F.G.S., &c. [Proc. Bath Nat. Hist. and Antiquarian Field Club. Vol. II. No. 2.] 8vo. 30 pages. *Chronicle* Office, Bath.

THE author of this paper is one of the little band whose observations reach back to the early years of the present century. It is fifteen years since his excellent “Observations in Meteorology” was published, forty-three years since he commenced his observations at Swaffham Bulbeck, with standard instruments of the best construction, and we know not how many more years since he first commenced to record observations in Meteorology.

He consequently brings to the consideration of the above subject a mind trained in the school of systematic observation, and stored with the experience of more than half-a-century; those who are acquainted with his other works will, therefore, form high anticipations respecting this,—and they will not be disappointed.

Mr. Jenyns originally intended to treat of weather proverbs in general, but found that their number and variety was too great to be attempted at once, hence the limitation implied by the title of the paper.

He groups the saints according to the weather associated with them, deposes St. Swithin, at any rate from his supremacy, and quotes various authors in support of St. Vitus, (June 15); St. John the Baptist, (June 24); St. Simon and St. Jude, (October 28); Bullion's Day, (July 4); St. Medard, (June 8); St. Gervais, (June 19); the Festival of the Seven Sleepers, (July 27); St. Galla's, (October 5). Then he

notices the autumnal period most generally known as St. Martin's summer, and the claim to it on behalf of other Saints. The Icy Saints follow, *e.g.* :—

“ Saint Mamert, Saint Pancrace,
Et Saint Servais,
Sans froid ces Saints de Glace,
Ne vont jamais,”

respecting which he remarks :—

“ The festivals of these Saints occur on three consecutive days, the 11th, 12th, and 13th days of May, and the noticeable thing is that these three days coincide with one of those short periods of anomalous cold, or wintry relapse, which occur in the earlier months, and of which that in May is, perhaps, the one most generally known ; thereby again establishing the truth of an old adage, though the phenomenon to which it bears reference has only of late years, comparatively speaking, attracted the attention of meteorologists, or been clearly ascertained to be a fact.”

The above is a fair specimen of Mr. Jenyns' mode of treatment, and will suffice to confirm the general tenour of his conclusions, that though in many cases the connexion is accidental or imaginary, there are others in which the proverbs are based on a substratum of truth ; some of the dates which we now hear of in connexion with “ weather saints,” for the first time, have long been known (or fancied) by ourselves as identified with weather of the very type assigned to them. This looks like a coincidence—and something more.

BOOKS RECEIVED.

ENGLAND.

- EVERETT, PROF. D.C.L.—“On the Optics of Mirage.” [*Phil. Mag.*, Mar., 1873.] 8vo.
- KEW COMMITTEE.—“Report for fifteen months ending October 31, 1872.” [*Proc. Roy. Soc.*] 8vo.
- METEOROLOGICAL COMMITTEE.—“Report of the Proceedings at the Meteorological Conference at Leipzig—Protocols and Appendices.” [Translated from the *Zeitschrift*, appendix to No. 24, vol. VII.] Published by authority of the Meteorological Committee. 8vo. Stanford.
- “Quarterly Weather Report, April–June, 1872.” 4to. Stanford.
- STONYHURST OBSERVATORY.—“Results of Meteorological and Magnetical Observations, 1872.” Small 8vo. Robinson, Cannon Street, Preston.
- “Results for January and February, 1873.” Small 8vo.
- SAWYER, F. E., F.M.S.—“A Hurricane in Sussex.” [Reprinted from *Brighton Herald*, of March 29th, 1873.]
- WHITMORE, J., M.D.—“Reports on Health and Meteorology of Marylebone for February and March, 1873.” 8vo.
- WOOLHOPE CLUB.—“Transactions of the Woolhope Naturalists Field Club, 1871.” 8vo. *Hereford Times* Office, Hereford, 1872.

BARBADOES.

- RAWSON, THE HON. R. W.—“Rainfall returns at 181 stations for November, December, 1872, and January, 1873 ; and for the year 1872.” Government Notices. 4to and folio.

BELGIUM.

CAVALIER, M. J.—Sommaire Météorologique de 1872. [*L'Echo d'Ostende.*] folio.

CEYLON.

———“Official returns of Rainfall and Meteorology of 1873.” [*Ceylon Observer.*] Folio.

DENMARK.

HOFFMEYER, CAPT.—“L'Institut Météorologique Danois.”—(Daily Observations at ten stations). December, 1872, to March, 1873. Oblong 4to.

FRANCE.

SOCIÉTÉ MÉTÉOROLOGIQUE DE FRANCE.—“Annuaire ; Tome Seizième, Tableaux, Feuilles 11—14.” 8vo.

“Tome Dix Septième, Tableaux, Feuilles 1—4.” 8vo.

“Tome Dix Huitième Bulletin des Séances, Feuilles 9—14.” 8vo.

BELGRAND, M.—“La Seine, Études hydrologiques, Régime de la pluie, des sources, des eaux courantes—Applications à l'Agriculture.” 2 vols, one in large 8vo, and one folio atlas of plates. Paris : Dunod, Quai des Augustins.

ITALY.

RAGONA, PROF. D.—“L'Umidità lettura.” Milan, Treves, Small 8vo.

“Lettere Meteorologiche dirette al Sig. Ing. Conte Guido Vimercati in Firenze.” Florence, 1872. 8vo.

“Relazione tra le variazioni diurne della Elettività atmosferica a ciel sereno e quelle del barometro. Modena, Gaddi, 1873. 8vo.

MAURITIUS.

METEOROLOGICAL SOCIETY.—“Abstract of Meteorological Observations, at the Observatory, Pamplemousses, and of the Rain Returns throughout the Island, for 1871. fcap. folio.

Monthly Notices, October, November, 1872, and February, 1873. fcap. folio.

NATAL.

WILKINSON, A.—“Rainfall at Ottawa, near Durban, 1870, 1871, 1872.” [*Natal Colonist.*]

NETHERLANDS.

DR. BUYS BALLOT.—“A Sequel to the Suggestions on a Uniform System of Meteorological Observation.” Utrecht, Manssen ; London, Stanford. Large 8vo.

“Nederlandsch Meteorologisch Jaarboek voor 1868.” Part II. Utrecht, Kemink en Zoon, 1872. Oblong 4to.

“Nederlandsch Meteorologisch Jaarboek voor 1872.” Part I. Utrecht, Kemink en Zoon, 1872. Oblong 4to.

NEWFOUNDLAND.

DELANEY, J., Esq.—“General Meteorological Register for 1872 at St. John's, Newfoundland.”

“Abstract of Meteorological Observations at St. John's, 1857 to 1864.”

PRUSSIA.

DR. PRESTEL.—“Meteorologische Korrespondenz—Das wetter im monat Januar, 1873. Das wetter auf der nördlichen hemisphäre im monat Mars, 1873.” Single sheets folio.

APRIL, 1873.

| Div. | STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.] | RAINFALL. | | | | | | Days on which not or more fell. | TEMPERATURE. | | | | No. of Nights below 32° |
|----------|---|----------------|--|----------------------------------|-------|-----------------------|------|------------------------------------|--------------|------|-------|-----|----------------------------------|
| | | Total Fall. | Differ- ence from average 1860-5 | Greatest Fall in 24 hours. | | In shade On grass. | Max. | | Min. | | | | |
| | | | | Dpth | Date. | | Deg. | | Date. | Deg. | Date. | | |
| | | | | | | | | | | | | | |
| | | inches. | inches. | in. | | | | Deg. | Date. | Deg. | Date. | | |
| I. | Camden Town | 55 | — | 58 | 12 | 28 | 11 | 75.5 | 15 | 29.9 | 25 | 3 | 11 |
| II. | Maidstone (Linton Park) | 81 | — | 41 | 15 | 18 | 15 | 81.0 | 16 | 26.0 | 26 | 5 | ... |
| III. | Selborne (The Wakes) | 54 | — | 96 | 14 | 17 | 9 | 70.2 | 16 | 25.0 | 26 | 7 | 11 |
| IV. | Hitchin | 83 | — | 17 | 30 | 4 | 11 | 67.0 | 15 | 25.0 | 24 | 6 | ... |
| V. | Banbury | 44 | — | 72 | 11 | 26 | 12 | 70.0 | 16* | 29.0 | 26 | 4 | ... |
| VI. | Bury St. Edmunds (Culford) .. | 1.31 | + | 56 | 34 | 26 | 12 | 71.0 | 16 | 25.0 | 25 | 8 | 14 |
| VII. | Bridport | 78 | — | 70 | 26 | 18 | 9 | 70.0 | 16 | 27.0 | 26 | 4 | ... |
| VIII. | Barnstaple | 1.11 | — | 90 | 40 | 16 | 10 | 66.0 | 21 | 31.5 | 26 | ... | ... |
| IX. | Bodmin | 66 | — | 1.04 | 13 | 16 | 12 | 68.0 | 15 | 30.0 | 26 | 1 | 5 |
| X. | Cirencester | 82 | — | 47 | 24 | 6 | 10 | ... | ... | ... | ... | ... | ... |
| XI. | Shiffnal (Haughton Hall) .. | 78 | — | 37 | 24 | 16 | 10 | 67.0 | 15 | 27.0 | 26 | 5 | ... |
| XII. | Tenbury (Orleton) | 87 | — | 67 | 37 | 16 | 12 | 71.7 | 15 | 28.7 | 26 | 5 | 12 |
| XIII. | Leicester (Wigston) | 57 | — | 73 | 14 | 27 | 10 | 75.0 | 15 | 28.0 | 25 | ... | ... |
| XIV. | Boston | 66 | — | 31 | 21 | 6 | 16 | 72.0 | 15 | 30.0 | 26 | ... | ... |
| XV. | Grimsby (Killingholme) | 71 | ... | ... | 20 | 26 | 15 | 59.0 | 30 | 31.5 | 26 | ... | 1 |
| XVI. | Derby | 46 | — | 97 | 17 | 6 | 9 | 71.0 | 15 | 29.0 | 26 | 2 | ... |
| XVII. | Manchester | 52 | — | 1.24 | 17 | 30 | 9 | 74.0 | 15 | 28.0 | 26 | 3 | 13 |
| XVIII. | York | 80 | — | 30 | 16 | 6 | 14 | 63.0 | 15 | 30.0 | 26 | 3 | ... |
| XIX. | Skipton (Arnccliffe) | 69 | — | 2.35 | 21 | 7 | 10 | ... | ... | ... | ... | ... | ... |
| XX. | North Shields | 1.06 | — | 25 | 23 | 22 | 17 | 57.4 | 30 | 29.6 | 25 | 2 | 3 |
| XXI. | Borrowdale (Seathwaite) | 1.76 | — | 5.14 | 1.00 | 1 | 10 | ... | ... | ... | ... | ... | ... |
| XXII. | Cardiff (Ely) | 31 | — | 1.62 | 24 | 17 | 4 | ... | ... | ... | ... | ... | ... |
| XXIII. | Haverfordwest | 96 | — | 90 | 49 | 16 | 7 | 68.0 | 17 | 28.0 | 25 | 4 | 13 |
| XXIV. | Rhayader (Cefnfaes) | 1.87 | — | 02 | 97 | 16 | ... | 66.0 | ... | 26.0 | ... | ... | ... |
| XXV. | Llandudno | 1.04 | — | 46 | 60 | 16 | 7 | 67.0 | 15 | 33.4 | 26 | ... | ... |
| XXVI. | Dumfries | 14 | — | 1.53 | 04 | 15 | 8 | 70.0 | 21 | 30.0 | 24 | 5 | 11 |
| XXVII. | Hawick (Silverbut Hall) | 60 | ... | ... | 13 | 24 | 9 | ... | ... | ... | ... | ... | ... |
| XXVIII. | Kilmarnock (Annanhill) | 20 | ... | ... | 08 | 15 | 7 | 64.4 | 22 | 27.2 | 24 | 6 | ... |
| XXIX. | Castle Toward | 39 | — | 2.11 | 13 | 17 | 6 | 69.0 | 21 | ... | ... | 4 | ... |
| XXX. | Leven (Nookton) | 29 | — | 96 | 09 | 2 | 11 | 59.0 | 21 | 28.0 | 21 | 5 | 21 |
| XXXI. | Stirling (Deanston) | 38 | — | 1.37 | 11 | 2, 3 | 10 | 70.0 | 21 | 26.4 | 21 | 11 | 16 |
| XXXII. | Logierait | 78 | ... | ... | 25 | 19 | 11 | 70.0 | 20 | 19.0 | 28 | 7 | ... |
| XXXIII. | Braemar | 1.74 | + | 34 | 42 | 6 | 15 | 61.8 | 20 | 26.3 | 24 | 8 | 15 |
| XXXIV. | Aberdeen | 1.02 | ... | ... | 13 | 6 | 18 | 57.5 | 30 | 31.8 | 24 | 1 | 13 |
| XXXV. | Inverness (Culloden) | 87 | — | 60 | 12 | 5 | 22 | 57.7 | 16 | 34.7 | 24 | 0 | 13 |
| XXXVI. | Portree | 1.57 | — | 3.70 | 25 | 29 | 13 | ... | ... | ... | ... | ... | ... |
| XXXVII. | Loch Broom | 3.05 | ... | ... | 44 | 28 | 19 | ... | ... | ... | ... | ... | ... |
| XXXVIII. | Helmsdale | 2.40 | ... | ... | 41 | 5 | 20 | ... | ... | ... | ... | ... | ... |
| XXXIX. | Sandwick | 1.44 | — | 30 | 18 | 4 | 17 | 53.4 | 20 | 31.6 | 25 | 1 | 4 |
| XL. | Caherciveen Darrynane Abbey .. | 2.26 | ... | ... | 65 | 13 | 15 | ... | ... | ... | ... | ... | ... |
| XLI. | Cork | 1.98 | ... | ... | 98 | 13 | 8 | ... | ... | ... | ... | ... | ... |
| XLII. | Waterford | 1.02 | — | 1.21 | 34 | 13 | 8 | 63.0 | 19† | 30.0 | 1, 13 | 4 | ... |
| XLIII. | Killaloe | 2.71 | + | 58 | 78 | 18 | 13 | 69.0 | 14† | 27.0 | 25 | 5 | 6 |
| XLIV. | Portarlinton | 2.13 | + | 11 | 56 | 1 | 18 | 63.0 | 19 | 29.0 | 24 | 5 | ... |
| XLV. | Monkstown | 62 | — | 1.02 | 21 | 17 | 6 | ... | ... | ... | ... | ... | ... |
| XLVI. | Galway | 3.22 | ... | ... | 1.23 | 16 | 13 | 70.0 | 17 | 31.0 | 24 | 2 | ... |
| XLVII. | Bunninadden (Doo Castle) .. | 1.29 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| XLVIII. | Waringstown | 45 | ... | ... | 14 | 3 | 7 | 71.0 | 22 | 27.0 | 25 | 4 | 10 |
| XLIX. | Edenfell (Omagh) | 56 | ... | ... | 10 | 3 | 15 | 62.0 | 21 | 26.0 | 24 | 8 | ... |

*And 17. †And 22, 30. ‡And 15.

+ 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; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

LINTON.—A dry month; TS on 6th and 17th; very cold from 5th to 13th, then four very warm days, followed by drying N.E. winds, with sharp frosts from 23rd to 27th. Ice nearly half-an-inch thick on 26th, but the atmosphere being dry it is hoped the damage to fruit trees is not serious. Cuckoo heard on 13th.

SELBORNE.—An extremely dry month and very bleak; prevailing winds N.E.; L in the evening of 15th, and faint in evening of 16th, and TS at 1 a.m. on 17th. H at 11 a.m. on 6th and on 23rd; a few flakes of S at 3 p.m. on 23rd, and a little also on 24th; white frosts on 2nd and 20th.

HITCHEN.—Lowest temperature (at this season) since 1855.

BANBURY.—Aurora between 8 and 9 p.m. on 1st; slight snow on 6th, 24th, and 25th.

CULFORD.—A month of almost sunless weather, with T, H, and S on 6th and 23rd; H on 24th, S on 25th; swallows first seen and nightingale first heard on 14th. The cuckoo was heard on 16th, and soon after that the weather became colder, and he has not been heard since; polar winds have prevailed during 20 days; on the morning of 29th, the wind changed to the W., and the weather became slightly more mild but still continued sunless; the mean temperature of the month was 45°·8.

BRIDPORT.—North-westerly gale on 6th; TS on 14th; L on 15th, 16th, and 17th; very fine dry month and generally mild; chestnut in leaf on 5th; cuckoo heard on 12th.

BODMIN.—Average temperature 51°·5. The difference between the wet and dry bulbs on 19th was 11°; the difference between the temperature on the grass and at 4 ft. from the ground was 13° during the night of the 28th.

HAUGHTON HALL, SHIFNAL.—The month came in mild as March went out, but with the exception of two days (15th and 16th), when the temperature reached 67° and 65° respectively, it was for the most part cold and ungenial; vegetation making little progress, owing to the cold E. winds from 9th to 23rd, and the equally cold ones from the N. and N.W.; sad losses among the ewes and lambs; S and H fell on 6th, with TS in N.E.; L at night with heavy R on 16th; S and H again on 23rd, 24th, and 25th; large humblebee first seen on 2nd; white butterfly on 15th; apricot blossom most scantily on 3rd; hawthorn bursts on 9th; willow blossoms on 10th; blackthorn blossoms on 22nd; wild cherry on 24th; blackcap heard on 15th; willow wren on 22nd, and swallow on 16th.

ORLETON.—A cold dry month, with rough winds and little sunshine; warmer from 14th to 21st; severe frosts on the morning of 24th and 26th; L seen on 15th and 16th, and much distant T heard from 8 till 9.30 p.m. on 16th; temperature of the month rather more than 2° below the average; cuckoo first heard on 19th; swallow seen on 18th and redstarts on 16th, but no white throats during the month; cherry trees and damson trees in bloom about the 20th.

WIGSTON.—A very dry month, with great range in the temperature; upon the whole an ungenial month; easterly winds prevailing, which have retarded vegetation; T on 15th and 16th.

BOSTON.—Swallows appeared on 13th, but decidedly did not make a summer, the weather at the latter part of the month being cold and wintry; S falling on 23rd, 24th, and 26th; T SS on 6th and 15th.

GRIMSBY.—The month very ungenial, the pastures and corn lands on the heavy soils looking very backward and bare; after the 4th northerly winds prevailed till the last day of the month; cuckoo heard on 16th, and willow warbler on 26th; swallows seen on 17th.

DERBY.—The temperature during the first part of the month was remarkably high, rising on 15th to 71° in the shade, and 115° in the sun, the usual maximum

in sun in the hottest days of June and July being only (as recorded by the solar thermometer) 130° , or 15° above that of 15th; vegetation very dormant, not having any of the warm showers usual in April, and owing to the great evaporation caused by the cold winds.

MANCHESTER.—L in after part of 14th; S on 24th.

YORK.—S on 24th, 25th, and 26th.

NORTH SHIELDS.—Aurora on 18th and 19th; S on 22nd, 23rd, 24th, and 25th.

SEATHWAITE.—More than 5 in. below the average. Total fall 1.76, of which 1.00 fell on 1st. TS, with H, on 6th.

W A L E S .

Haverfordwest.—One of the coldest and driest Aprils of which I have any record; from the 7th to the 12th and from 20th to 27th very wintry, thermometer not higher than 35° on twelve nights; vegetation very backward; cuckoo heard on 24th. Notwithstanding the enormous rainfall of the winter, water is becoming scarce, and some of the wells already show signs of failure; from 14th to 18th was remarkable for sudden and unusual rise in the temperature; air sultry and much L on the night of 16th; splendid aurora (pink and yellow) on night of 18th.

CERNFAES.—The month cold and frosty, wind generally either N.E. or N.W., much T and L; on 16th heavy and continued TS for six hours; rain almost identical with average.

LLANDUDNO.—T heard on 15th, and severe TS in afternoon of 16th. S on the distant hills during the first week, and again on 24th and 25th. S at 8.30 p.m. on 25th. H at 8 a.m. on 26th; cuckoo on 29th. The general character of the month has been dry and sunny, but with cold winds.

S C O T L A N D .

DUMFRIES.—The weather throughout the month has been very dry, with frequent frosty nights; such a dry April has not occurred for at least twenty years, the rainfall being less than one-tenth of the average. On 23rd and 25th slight snow showers; from 14th to 21st very warm by day; on 21st the difference between night and day temperature was $38^{\circ}5$; mean temperature of month $48^{\circ}3$, or $1^{\circ}5$ above that of April, 1872. Pastures suffering much from want of rain.

SILVERBUT HALL, HAWICK.—A month of cold E. winds. Hills white with S on 6th, 7th, 24th, and 25th. Swallows first seen on 17th. Sheep pastures suffering dreadfully from frost and drought, and a more barren April has not been known here for many years.

ANNANHILL.—Bar. high and equable; temperature variable, and $4^{\circ}6$ above that of preceding month; prevailing winds E. or N.E. Month generally fine; rainfall very deficient, ozone fairly developed. Pastures improving, but still backward; fruit trees coming rapidly into leaf; oats and all cereals much in want of rain.

CASTLE TOWARD.—A fine dry month; severe frost on the mornings of 24th and 25th, doing much mischief to tender and unprotected plants, in many cases the leaves have a scorched appearance, and even pansies and other flowering plants suffered greatly, but under the influence of fine weather the sowing of cereals is nearly finished. On the 30th a welcome rain refreshed our fields and gardens.

NOOKTON.—H on 6th, 7th, and 23rd; aurora at 9 p.m. on 18th; prevailing wind E.; R much below the average.

DEANSTON.—The driest month here for a long time; fine seedtime, and crops look well. Pasture fields in want of rain; N. winds very prevalent throughout the month.

ABERDEEN.—A tolerably dry though rather dull month, and with low temperature; winds N.W., N. and S.E. much more frequent than the average; estimated pressure a little under the average. Aurora on 10 nights, H on 8 days, fog on 4 days; temperature on grass $20^{\circ}5$ on 21st, and in sun, in vacuo, on 29th $117^{\circ}0$. T on morning of 2nd.

CULLODEN HOUSE.—Solar halos on 13th and 15th; aurora on 19th.

PORTREE.—The driest month of April since 1861, but more frost than usual. The crops were never got into the ground in better condition than they were this season.

LOCHBROOM.—With the exception of the end of the month, which was cold and stormy, the month was a very favourable one for out-door labour and all agricultural and grazing purposes, the crops were never got into the soil in better condition, and stock continued in prime order during the whole of the spring, and this month is no exception.

SANDWICK.—From 5th to 11th, and again from 20th to 29th, there were cold N. and N.W. winds, with sleet or hail showers. Auroræ on 5 nights, that on 17th being brilliant and corruscating to zenith and south horizon.

I R E L A N D .

MONKSTOWN.—Month extremely dry, with cold northerly winds; vegetation very backward, but now advancing rapidly; swallows appeared on 15th.

GALWAY.—T and L on 16th, 19th, and 20th.

DOO CASTLE.—One of the finest months of April ever remembered here; crops put in under the most favorable circumstances. Farmers are now complaining for want of rain.

WARINGSTOWN.—Grass very backward in consequence of the prevalence of the N. and E. winds, and young crops suffering from want of rain.

EDENFELL, OMAGH.—As a seed-time the month has been highly favorable, but vegetation has (especially during the latter part) made but little progress, owing to the dry parching days and frequent frosty nights.

THE COMING SUMMER.

To the Editor of the Meteorological Magazine.

SIR,—When at Greenwich the rainfall of March amounts to an inch or more, and the mean temperature of the period from the 15th February to 16th March is below $38^{\circ}5$, the mean temperature of the following summer (reckoning from June to August inclusive) has *always* been below the Greenwich average of the last 50 years. 1814, 1820, 1821, 1832, 1836, 1838, 1839, 1845, 1853, 1855, 1860, and 1866 are all the instances since 1813 when the above conditions have occurred, and in every instance the sequel has been as above stated. This year the mean temperature of the corresponding period was $37^{\circ}8$ and the rainfall of March about 1.3 in. at Greenwich, therefore the mean temperature of the summer (June to August inclusive) should be cooler than the average of the last 50 years. In cool seasons and even in most really cold summers we have some intervals of warm weather, at least for a few days. I do not expect that the coming summer will be an exception to this rule. One of these periods should begin about the commencement of August or end of July, and it ought to be a period of considerable excess of heat. At Greenwich, for several successive days at that time, the daily mean temperatures should be rather high. But it seems almost certain that the mean of July will be below the Greenwich average of the last 50 years.

GEORGE D. BRUMHAM.

May 3, 1873.