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INTRODUCTORY.

WE have dropped the habit of penning an introductory paragraph to each volume ; but a 13th volume seems like the commencement of a new series, and therefore we think that a few words will not be inappropriate.

In the first place, we regret to report ourselves as the only independent meteorological periodical in the world. Our highly esteemed contemporary, the *Zeitschrift*, is, as its full title states, the organ of the Austrian Meteorological Society ; then, also, the *Quarterly Journals* of the Meteorological Society and of the Scottish Meteorological Society are the organs of the respective societies ; the *Annuaire* of the Société Météorologique de France, and all the other publications are subsidized in some form or other by Government or Corporate bodies. We, therefore, claim the support of all who think that we strive, without fear or favour, for the advancement of our science, and who believe that an independent field open to all parties is desirable.

Secondly, we wish these pages to be of as much use, and as much interest, to our readers as is possible. That our efforts are successful we are convinced by a steadily increasing list of subscribers, but we wish to advance still faster. We are not going to forsake the old paths, but we hope to improve and to widen them. We have revised the stations inserted in the monthly tables, and in our next we hope to give the latitude and longitude of them all, and also a map of the British Isles showing their position. The reviewing of books is rearranged, as is fully explained in the article entitled "*Books Received and Short Notices thereof.*" The only other changes rest with our readers, and not with ourselves. We think that there has been a falling off in the number of letters sent to us for publication ; if so, it is a pity, because fresh and numerous writers give variety and crispness to any periodical.

Finally, we think that it may be useful to devote a page or so to answering questions put by our readers, and by observers in general. We are not so unreasonable as to assume infallibility, or that we can answer all the questions that may be put; but we will do what we can, and when we leave a question unanswered we hope that some one else will do it for us—nay, rather, for the benefit of all our readers.

THE EARTHQUAKE OF JANUARY 28TH.

EARTHQUAKES are so rare in England that even a slight one is of interest. Moreover, the country is so populous, and well informed people are so scattered over it, that if we could only ensure that clocks were made to keep true time, we might learn much, as to the nature of the crust of the globe in this locality, from the slight shocks which do occur. It is rather singular that our last number contained the following paragraph:—

“On March 17th, 1871, a rather sharp shock of earthquake was felt across England, and in North Wales and Dumfriesshire; unfortunately the reports as to time are not sufficiently accurate to afford positive proof, but they seem to indicate that the shock emanated from North Lancashire. We hope that when the next one occurs every observer will try to report the *true time*.”

Within a fortnight of the publication of that paragraph, even London itself has been shaken, and yet only three of our regular correspondents seem to have noticed it. We give their reports first, and then a summary of the notices in the newspapers, and finally an analysis of them all, and a statement of what they seem to teach.

Mr. Whipple, Director of Kew Observatory, was at the top of that building, felt the shock, and at first considered that it was an earthquake, but second thoughts leading him to attribute it to the slamming of a door, he did not note the precise time. Subsequently he found that a tremour was registered by the magnetometers at 11.55 a.m., and also a rather large vibration of the Thomson Electrograph, as nearly as possible at the same instant, but he states that such changes are not unusual.

The Rev. C. Malden, of St. Lawrence, Isle of Wight, reports, “Earthquake at 11.57 a.m., very distinct.”

Mr. J. E. Vibert, M.A., &c., St. Aubin's, Jersey, reports, “Remarkable shock of earthquake on 28th inst., at 11.45 a.m.” We believe that this is local time; if so, it corresponds to 11.54 a.m., Greenwich mean time.

Admiral W. A. Bailie Hamilton, writing from Macartney House, The Park, Greenwich, reports the time as 11.50 a.m., or it may have been a few minutes earlier. He writes that the disturbance seemed to come from W. or W.S.W., the west walls of the room in which he was sitting first catching the motion, quickly recoiled (but with less force) from the east wall (that wall, however, being chiefly taken up

by a window). The oscillation of the whole room (apparently) but most palpably of the walls, lasted about a second-and-a-half, and was of sufficient force to disturb and shake very audibly whatever was attached to or touched the west wall of the room; the movement of the wall itself being sufficient to excite a momentary fear as to its stability. The wave or motion does not seem to have acted so powerfully, if at all, on those parts of the house (and it is strongly built) where the end walls face the west; but to have exercised its full force where a considerable length of the wall (as in the case of the room referred to) runs or trends N.W. and S.E. Admiral Hamilton adds that although the Royal Observatory is on the same level as, and not 500 yards from, Macartney House, the shock was not observed there.

LONDON.—“Shortly before 12 o'clock, I, and at least six others on the top floor of Harrington House, Whitehall Gardens, now occupied by the Board of Trade, felt ourselves and chairs distinctly swayed backwards and forwards three times. The peculiar sensation of an earthquake—viz., of being moved not only bodily as distinguished from being shaken, but of being moved as a coherent part of things in general, instead of as a separate body—I had felt before several times, and I had no doubt at the time as to the cause of the agitation on Monday morning.”—W. C. MONKHOUSE.

LONDON. 2, *East India Avenue, Leadenhall Street*.—“While engaged writing on Monday last, I most distinctly felt the building oscillate twice, and though I never before experienced the shock of an earthquake, the conclusion that this movement was the result of one forced itself so strongly upon my mind that I took out my watch and noted the time on the paper I was then engaged upon. On reference, I find it was exactly 12½ minutes past 12 p.m.”—Y. J. CONNOLLY.

LONDON. 19, *St. Swithin's Lane*.—“I was sitting alone in my office here, quietly reading my *Times*, and most distinctly felt two upheavings of my chair, the sensation being very much like that experienced on board a screw steamship. The time was about 11.55.”—J. R. CLIPPERTON.

LONDON. *Upper Phillimore Gardens*.—“My daughter told me on Monday that she had felt, about 12 o'clock, a curious sensation of shaking of the house, as if a heavy waggon had passed by, and thought it might have been caused by an earthquake. As this was said to me at the time, and before any notice about an earthquake on Monday had appeared in the papers, it may be worth notice.”—JAMES WESTON.

GREENWICH. *Blackheath Road*.—“I was sitting in our drawing-room, which faces north and north-east, on Monday, when I suddenly felt a very distinct heaving motion of the room, repeated three times, with an oppressive feeling of pressure coming from the north-east window. I immediately said to my sister, who was in the room, ‘What's that?’ She replied, ‘I don't know.’ I listened to ascertain any cause for it round the house, and finding none, directly said, ‘It is the shock of an earthquake.’ My sister said, ‘Look at the clock, and note the time.’ I did so; it was 11.52 a.m. by our hall clock, which is not far out of the Greenwich ball time. The account in the *Times* of to-day of the shock felt at Jersey appears to confirm my notion of yesterday.”—C. C.

BRIGHTON.—“I was sitting writing, when my hand oscillated on the table, and I felt something had happened. I went to the door to ask if the front door (as it blew hard) had been opened, and was met at the door by two friends coming down from the second floor, saying the empty jug in the hand-basin had shook and rattled, and that the sofa had shook and rocked so suddenly as to alarm the occupant, who started up in a fright. The window at the same time rattled to such a degree as to give the impression that furniture was being moved in the room below, in which I was writing. There were two distinct shocks, but the latter was the worse. The time taken—11.55 a.m.—was after the latter.”—ANON.

BRIGHTON.—“A little before midday the table at which I was sitting oscillated perceptibly, other articles of furniture vibrated, and the windows rattled as if shaken by a gust of wind.”—M. W.

ST. LEONARD'S.—“At five minutes to 12 o'clock on Monday I felt two distinct shocks of earthquake here.”—ROBERT FROMAN.

OSBORNE.—The earthquake on Monday last was distinctly felt at Osborne by several persons in different rooms at a few minutes before 12 o'clock.

RYDE.—“The earthquake was felt most distinctly here in Ryde about a quarter or 10 minutes before 12 at noon. It made china and flower-pots rattle in my drawing-room, the leaves of ferns and other plants quiver, and the lustres of the candlesticks sway to and fro, while a member of my family, who was sitting there, felt her chair sink under her three times in quick succession so sensibly that she moved instinctively to save herself from falling. The general movement was also seen and felt by another person in the room.”—EDMUND RANDOLPH.

ROYAL VICTORIA HOSPITAL, NETLEY, SOUTHAMPTON.—“The first shock occurred here at 7 minutes to 12 o'clock exactly, and lasted about 5 or 6 seconds. It was sufficiently strong to cause the door to shake with some violence and many objects in the room continued to vibrate for a considerable time. The second shock occurred a few seconds afterwards, but lasted for a much shorter period.”—DOBSON.

CARLTON CRESCENT, SOUTHAMPTON.—“I was sitting in my drawing room on Monday morning, at 10 minutes to 12 o'clock, reading a newspaper, when I distinctly felt the shock of an earthquake—slight, but sufficiently perceptible to move the chair and to make some small ornaments in the room to jingle. Having experienced an earthquake fifty years ago, when quartered with my regiment in the neighbourhood of Lisbon, I feel that I could not be mistaken, the vibration caused by it being of so very peculiar a character.”—S. TRYON, Major-Gen.

SOUTHAMPTON.—At the upper part of the town, at the *Ordnance Survey Office*, which covers more than four acres of ground, and in which nearly 500 men are daily at work, the effects of the earthquake were perceptible in every department, particularly in that of the draughtsmen. The time of its occurrence was about five minutes to 12 at noon.

FAREHAM.—“The earthquake was distinctly felt here at precisely the same hour and for the same time as in Alderney. Sitting by the fireside reading, I felt the chair rock under me, and remarked to a young lady who was in the room at the time, and who was also sensible of the shock, that either this was an earthquake or that some very heavy guns were being fired at Portsmouth. The motion was sufficient to set some glass pendants on the chimneypiece swinging. The same tremulous motion was felt by a neighbour.”—ANON.

STODHAM PARK, LISS, NEAR PETERSFIELD.—“I was sitting before the fire on Monday morning, a few minutes before 12 o'clock struck, when I suddenly felt my chair violently tilted off the ground. Looking downwards immediately, I perceived that the floor appeared to be heaving, and the next minute the window shook violently.”—E. E. MONEY.

LYME REGIS.—“The shock of an earthquake was distinctly felt in Lyme Regis within a few minutes of 12 o'clock on Monday last. It was of sufficient force to set a bell ringing in the upper part of the house. A strong north-west wind was blowing at the time.”—W. J. A.

BOVEY TRACEY, DEVONSHIRE.—“Two distinct shocks of earthquake were felt here at a few minutes before 12 on Monday last.”—O. N. G.

ALDERNEY.—“A very distinct shock of earthquake, lasting about four seconds, was felt at eastern Alderney at 11.55 a.m. to-day (Monday).”—J. D. WILSON, M.D., Army Medical Staff.

JERSEY.—“Yesterday afternoon a powerful shock of earthquake was felt in the island of Jersey. It was so strong as to cause houses to totter and bells to ring.

Its course was from east to west. There was at the time a heavy gale from the south-west in the English Channel."

PARIS.—"Yesterday at noon, while sitting at my breakfast table, I was suddenly alarmed by a severe shaking of the house, and remarked that the water in a bottle close to me was being tilted up at least three-quarters of an inch. As there was no heavy cart passing at the time, I concluded that this was due to an earthquake shock, and noted the time as 11.58 a.m. During the day I asked different persons if they had felt any shock. As they had not and the newspapers made no mention of it, I thought I must have been deceived; but as I see to-day in your columns that a shock was felt yesterday at Jersey, and the French provincial papers report that shocks were felt towards midday at Havre and Rouen, I no longer doubt that what I remarked was the same movement."—*The Times* Correspondent.

This being the most southern report, we wrote to enquire within what limit of error the above reported time probably was. The writer kindly replied that it was Paris time, and if it erred it was because his clock was a little too fast, but that he does not think that it could have been so by more than two minutes. Hence we have for Paris the time as 11.56 to 11.58; or 11.47 to 11.49 Greenwich time.

Collecting now all the records of time, and expressing the term "a few minutes to 12" by "11.55?", we have the following result for the Greenwich mean time of the shock:—

11.45 to 11.50 Ryde, Isle of Wight.	11.55 Alderney, Southampton, Fare-
11.47 to 11.49 Paris.	ham, St. Leonards, Brighton,
11.48 to 11.50 Greenwich.	London.
11.50 Southampton.	11.57 St. Lawrence, Isle of Wight.
11.52 Greenwich.	11.55? Bovey Tracey, Lyme Regis,
11.53 Netley, near Southampton.	Osborne, Petersfield, Kew.
11.54 Jersey.	

Now, for the lessons we are to learn, they are few, easy, and oft-told tales:—

- I.—It is better to record the times of half-a-dozen slammed doors or heavy waggons passing, than to miss that of an earthquake shock.
- II.—It is most desirable in every possible way to ensure clocks being kept right. The above figures are mainly expressive of clock errors. No one can believe that the shock really occurred ten minutes earlier at Ryde than at St. Lawrence.
- III.—For the above reason the figures are not sufficient to demonstrate the position or depth of the centre whence the shock emanated, but it appears certain that it was south of Paris—possibly under Auvergne.

THE WINTERS IN ALGIERS.

To the Editor of the Meteorological Magazine.

SIR,—I have received only within the last few days that number of your Magazine in which appears my letter of October 1st, 1877. The corrections required in it are as follows:—Insert for May 28th a rainfall of .05 inch, which will make the total for May to be .29 inch.

It may be well also now to add details up to the end of June, which I had not received when I wrote my letter, viz. :—On June 6th, a fall of $\cdot 18$ inch ; on June 21st, of $\cdot 05$ inch ; which will, with the fall of $\cdot 05$ inch already put down for June 1st, make a total for June of $\cdot 28$ inch, and for the whole year, from July 1st, 1876, to June 30th, 1877, of 21 \cdot 08 inches.

While I am writing I will state also that the season of 1877–1878 has hitherto done its best to make up for the heat and drought of its predecessor. It has been, and is, cold for Algiers ; our rainfall from July 1st up to the present date is already 29 inches, comprising such items as—

3 \cdot 25 inches in 18 hours on Nov. 18–19 ;

3 \cdot 43 inches in about 24 hours on Dec. 14–15 ;

and, again,

3 \cdot 58 inches in about 40 hours on Jan. 11–12–13.

This last being an unusually heavy fall of snow on all the mountains. But the fine days, which have come liberally enough after these down-pours, have been fine in a manner extraordinary, even here ; so that on the whole, at least since Christmas, the weather has been favourable to invalids, and far more healthy and pleasant to the community generally than was the unnatural heat of last winter.

N.B.—In my letter of October 1st, for “ Algiers ” read “ Algeria ” the second time that word occurs.

Yours very sincerely,

H. A. BOYS.

Algiers, Jan. 29th, 1878.

PRE-INSTRUMENTAL METEOROLOGY.

WE have great pleasure in stating that the Rev. T. A. Preston, of The Green, Marlborough, has kindly offered to undertake the duties of Secretary and Editor for the purposes mentioned on p. 179 of our last number ; and not only has this offer been accepted, but two important sources have already been submitted to search, and one has been finished. The Saxon Chronicle is searched, and Holinshed is in hand. There is an ample field for all who are rather of a studious than of an observational turn of mind, for almost every parish register or county history will pay for search.

THE WEATHER IN JANUARY.

FROM the 1st to the 5th no very important disturbance occurred in the neighbourhood of these Islands. At first, pressure was highest over France, and a series of depressions passed north-eastwards across Western Europe, causing rather dull warm weather and south-westerly breezes. On the 4th, however, the barometer rose quickly in the North ; two regions of high pressure existed, one over the north of Scotland, the other over the south of France, whilst a large area of comparatively low readings lay over England and the Channel. During the night the mercury again fell in the north and west, but had risen elsewhere.

Readings remained uniform over England and France, but a slight depression was advancing towards the north-west of Scotland. This depression subsequently moved eastward across Scotland, the wind veered to the westward, and the barometer fell everywhere, with the exception of Valentia, where a recovery began.

Next day (6th) pressure was decreasing everywhere, except at a few places in the W.; in the N. the change was very brisk, and a large depression was apparently advancing from the north-westward along the Norwegian coasts. The highest readings lay in the S.W. Wind was westerly to west-north-westerly on all our coasts, but drew into S.W. in Denmark and the south of Scandinavia, and into S.E. at Christiansund; it was light in force in most other places, but blew freshly in the Irish Sea, at Stornoway, and Skudesnæes. In the evening of this day atmospheric pressure was still giving way everywhere, quickly in the N., and the wind was increasing in the W.

The depression noticed as advancing from the northward on the 6th had its centre over the Moray Firth on the 7th. A slight recovery had begun in its rear at Sumburgh Head and Christiansund, but everywhere else the mercury fell, the change varying from over half-an-inch on our N.E. coast to about one-tenth in the S.W. of France. Wind was north-easterly in the Shetlands, and northerly in the Hebrides, but was north-westerly to westerly elsewhere; at most places in the W. it was blowing freshly. During the day the depression continued to move southward, and at 6 p.m. had its centre near the Wash; in the N. the mercury rose briskly, with a north-easterly breeze and fine weather.

This depression continued its course in a southerly direction until it arrived at Toulon on the 9th, while the barometer was rising generally elsewhere.

On the 11th the mercury had fallen somewhat over the Gulf of Bothnia, but had risen everywhere else. A large area of high pressure (at the centre of which the barometer reached a height of 30.6 in.) lay over these Islands, the north of France, North Germany, and the North Sea.

Pressure was still increasing on the 12th over France, the greater part of England, and the countries to the eastwards of the North Sea, but on our western and northern coasts it was decreasing. Readings were highest over the mouth of the Channel (Jersey, 30.72 in.) whence they decreased to 30.33 in. at Stornoway, 30.26 in. at Toulon, and 30.09 in. at Haparanda. Temperature rose in all parts of these Islands, but had fallen several degrees in France, Biarritz, Rochfort, and Lyons, being 7° colder than London, and 20° colder than Stornoway. During the day the barometer fell quickly in the N.W. of Scotland; the southerly winds extended, and increased to a slight gale at Valentia and Stornoway.

From the 13th to the 16th, pressure was highest over Spain, the Bay of Biscay and the S.W. of France, and depressions passed from W. to E. to the northward of our Islands, giving us moderate to fresh westerly winds, accompanied by rather dull weather; a disturbance, which appeared near the Shetlands on the 16th, seems to have passed south-eastward; the area of high readings stretched northward to our S.W. coasts, and north-westerly breezes prevailed. On the 18th the anti-cyclone spread over the whole of these Islands and France, causing fog, cold weather, and very light airs. These conditions lasted until the 19th, when a brisk fall began in Ireland with a southerly breeze, a rise of temperature and rain.

During the five days, Jan. 20th to 25th, atmospheric pressure was highest over France, and a series of depressions passed from W. to E. across, or to the northward of, these Islands. These disturbances occasioned very steep gradients, and severe south-westerly to westerly gales were experienced all round our coasts. On the 25th, pressure increased in the S.W., and gave way over North Germany, so that gradients for north-westerly winds were formed, and breezes from that quarter were felt until the evening of the 26th, when a sudden fall in the W., and a rapid rise over Scandinavia caused a complete change in the distribution, bringing back southerly winds.

The weather for the remainder of the month was very quiet. On the 27th, pressure was increasing over Scandinavia, the South-East of England, North Germany, and the East of France, but decreasing on our Western and Northern

coasts. Readings were high both over the Gulf of Bothnia, and the South-East of France; low off the West coast of Scotland, and over North Germany. During the day, a distinct depression appeared off the West of Scotland, and the wind increased to a moderate gale at Aberdeen and Wick, and to a hard gale in the Shetlands.

On the 31st, pressure had increased over the whole of Western Europe, but was giving way slightly in the North of Scandinavia. It remained high (30·5 in.), and uniform over these Islands; while it was relatively low in the West of Norway and South-East of France. The wind was light on all coasts. Temperature rose over England, and on the Eastern shores of the North Sea; but fell elsewhere. Sky was moderately clear, and the weather was very dry. Snow fell at Nottingham, Cambridge, and Biarritz.

H. E. M.

BOOKS RECEIVED AND SHORT NOTICES THEREOF.

THE stream of meteorological literature still increases in volume, and improves in quality. It is hopeless for us to attempt to review fully all the works which come before us, and, therefore, from the present date we intend to adopt two new courses:—(1), Only to acknowledge serial publications once in each year; (2), to append to the title of all works which seem to call for it a few lines of comment, and to fully review only such books as imperatively need it.

AUSTRALIA.

ELLERY, R. L. J., F.R.S. *Results of Observations in Meteorology, &c. taken at the Melbourne Observatory during 1875.* 8vo. Melbourne.—A compact 8vo pamphlet, giving the daily mean and extreme observations at Melbourne, and abstracts of those made at about 40 subsidiary stations, of which, however, the majority appear to have no instruments except a rain gauge. Mr. Ellery retains for some of his tables the meteorological year commencing with December, 1874, and ending with November, 1875. This ought, if continued, to be distinctly stated, for as it is, it tends, with any but a careful reader, to discredit Mr. Ellery's accuracy, to read on p. 99, "Abstract for the year 1875," "Total rainfall for the year, 30·90 inches in 150 days," and on the very next page to find "Melbourne summary for the year 1875," "Amount of rain for the year 32·87." Both are true, but the former is for the old fashioned year, the latter for the civil year. Mr. Ellery adopts the wise course of prefixing to each volume a map showing the position of his stations.

MACDONNELL, E. *Meteorological Observations in Queensland during 1875 (from the Statistical Register of Queensland, 1875).* Fcap. folio.—There appear to be only two fully equipped stations in Queensland, viz., Brisbane and Cape Moreton, but there are fifty rainfall stations very fairly distributed. We should, however, be glad to see a map showing their precise positions, and also a column giving, at any rate approximately, the altitude of all the localities.

RINGWOOD, A. *Means by which the height of clouds can be obtained by one observer.* 8vo. Adelaide, 1877.—A very unassuming little tract of only eight pages, in which the author shows that—provided the distance of any well defined shadow, or spot of sunshine is determined, together with the position of the object causing it and the known altitude of the sun—it is easy for a single observer to ascertain and compute its precise altitude.

RUSSELL, H. C., B.A. *Meteorological Observations at the Government Observatory, Sydney, June–September, 1876.* 8vo.—The usual monthly reports from Sydney Observatory, giving full daily records (both in tables and diagrams) from that observatory, and abstracts from 44 subsidiary stations. On the 10th of September, 1876, Mr. Russell reports “Terrific gale from S.S.W. after 10.15 p.m. Velocity at 0.30 a.m. on 11th was at the rate of 153 miles per hour, being the greatest yet recorded. For 12 minutes it was at the rate of 112 miles per hour, and for 11 hours 57 miles per hour.”

AUSTRIA.

Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie, Dec. 1st. 1877–Feb. 1st, 1878. Large 8vo, Wien.—Although this periodical received a severe blow in the death of its senior joint-editor, Dr. Jelineck, we are glad to find that, under the judicious direction of Dr. Hann, it fully maintains its extremely high position. All who can read German, and who wish to be informed of what is going on among thoughtful meteorologists, ought to subscribe to the *Zeitschrift*.

BELGIUM.

HOUBEAU, J. C., and BUYS BALLOT, C. H. D. *Observations Météorologiques faites aux Stations Internationales de la Belgique et des Pays Bas, July–Sept. 1877.* 4to.—Daily observations printed in extenso in accordance with the recommendation of the Conference. The stations in the sheets before us are :—

Flessingue, Lon. 3° 35' E, Lat 51° 27' N.	Maeseyck, Lon. 5° 48' E., Lat. 51° 6' N,
Maestricht, Lon. 5° 41' E, Lat. 50° 51' N.	Leeuwarde, Lon. 5° 50' E., Lat. 53° 12'.
Bruxelles, Lon. 4° 22' E., Lat. 50° 51' N.	Arlon, Lon. 5° 48' E., Lat. 49° 40' N.
Furnes, Lon. 2° 40' E, Lat. 51° 4' N.	Tilbourg, Lon. 5° 5' E, Lat. 51° 32' N.

HOUBEAU, J. C. *Annuaire de l'Observatoire Royal de Bruxelles, 1878.* Small 8vo. Bruxelles, 1877.—A very interesting and useful volume. One article, entitled “*Table Chronologique des découvertes en Météorologie,*” though not perfect, is so valuable a storehouse of references respecting the history of the science that we purpose, if possible, translating it for the information of our readers.

LANCASTER, A. *Traits Caractéristiques du Climat de Bruxelles.*—This is an extract from the work just mentioned, and is a praiseworthy compact epitome of the climate of Brussels. We shall if possible quote the leading features in a subsequent number.

CANADA.

Sixth Report of the Superintendent of the Meteorological Office of the Dominion of Canada for the year 1876. 8vo. Ottawa, 1877.—

We regret to find this report issued by the acting superintendent, Mr. Carpmael, but we only regret it because that step has been rendered necessary by the illness of the Director, Professor Kingston. Respecting the report there is not much to say; the revised list of latitudes and longitudes, together with the map of the stations, remove one objection which we have previously made to these reports. In two respects we still desire an entire change; first, the system which requires the "Remarks on the combinations employed for obtaining mean temperature," is a bad one, and it would be far better to give merely the arithmetical mean of the daily maximum and minimum at each station; and, secondly, we read respecting the inspection of stations, "In many cases systematic errors have been committed which were detected on the station being inspected, and their occurrence prevented for the future, but which have, in many instances, made the past observations entirely useless, and in others seriously impaired the value." We cannot understand anyone printing such a statement as this and not saying *which* "past observations are entirely useless." As matters now stand, no one taking up the previous Canadian reports will know what to do with them. Outsiders cannot tell which returns are good and which are bad. Wise men will leave them all alone until the Canadian director follows the example of the United States Signal Office, of the Russians, and others, and publishes the results of his inspections whether they be favourable or the reverse.

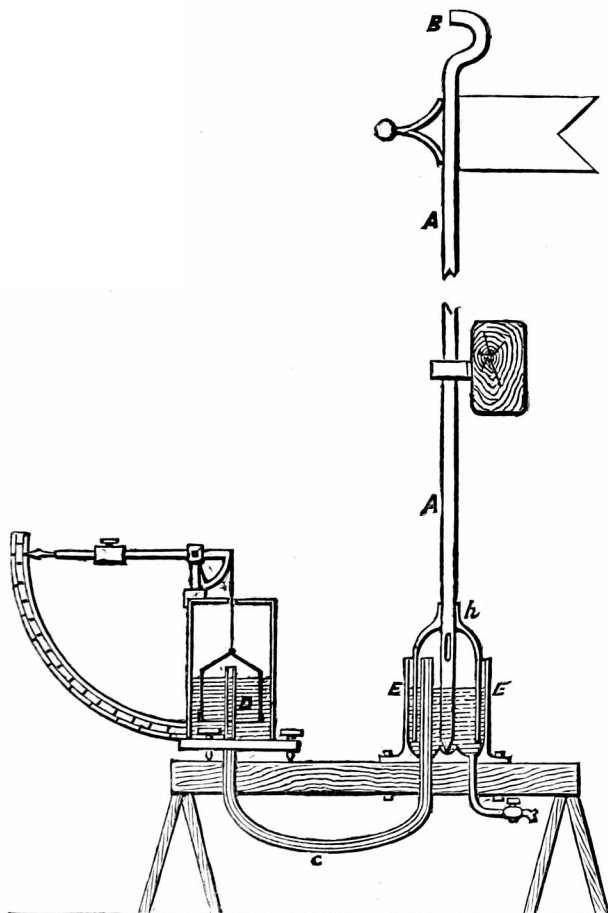
CEYLON.

FYERS, A. B., Lieut.-Col., R.E. *Results of Meteorological Observations in Ceylon, Aug.-Oct., 1877.* Single sheets, folio.—Monthly abstracts of observations at fourteen fully equipped stations, and of the rainfall at thirty-five others. It would be a great convenience to those not resident in the island if the authorities would supplement their numerical tables by a little letter-press, explanatory of the instruments employed and the mode of mounting them; this is especially desirable with respect to the grass minimum thermometers which show tremendous radiation. Moreover, either the latitudes and longitudes of the stations should be given, or a key map to show their positions.

DENMARK.

Bulletin Météorologique du Nord, publié par les Instituts météorologiques de Norvège, de Danemark et de Suède, Nov.-Dec., 1877. Oblong 4to.—The title of this publication is sufficiently explanatory; the three countries of Denmark, Norway and Sweden have joined in the publication of two observations daily for twenty-four stations, 8 in Norway, 7 in Denmark, and 9 in Sweden. When bound together at the end of the year the publication, which is entirely lithographed, is in almost all respects compact, handy and satisfactory.

HAGEMANN, G. A. *Om Vindmaalere*. Fcap. folio. Copenhagen, 1877.—This is an extract from Capt. Hoffmeyer's *Annuaire* for 1876, and, like the rest of that publication, is printed in Danish and in French, and fully illustrated. M. Hagemann had been studying the amount of draught in chimneys, and noticing how much it was affected by the velocity of the wind passing over the top, was induced to try various experiments with the view of obtaining a cheap and accurate anemometer. The result is shewn in the annexed figure.



The vane shaft A is hollow, the wind blows in at B, and so through C into the gasometer-like vessel D ; all the rest of the arrangements and the mode of indication are obvious from the sketch. Of course, this really is in principle an improved Lind's anemometer,* but it is inexpensive, and seems worth trial side by side with an Osler and a Robinson.

* *Met. Mag.*, Vol. II., p. 51.

Bidrag til Danmarks Klimatologi. Resultater af 15 aars Jagttagelser paa 4 Stationer. Fcap. folio. Copenhagen, 1877.—Another extract from Captain Hoffmeyer's 1876 *Annuaire*, giving the results of observations made at four stations during 15 years. We quote a few of the leading data, converting them into English measures :

Station.	Copenhagen.	Tarm.	Hindholm.	Smidstrup.
Latitude	55° 41' N. ...	55° 53' N. ..	55° 18' N. ...	57° 23' N.
Longitude.....	12° 34' E. ...	8° 32' E. ...	11° 35' E. ...	9° 55' E.
Altitude	43 ft. ...	22 ft. ...	150 (?) ft. ...	280 (?) ft.
Absolute Max. Temp. ...	90·5 ...	— ...	— ...	—
Mean daily Max. Temp. ...	51·8 ...	— ...	— ...	—
Mean daily Temp.	45·2 ...	45·0 ...	45·3 ...	44·2
Mean daily Min. Temp....	38·7 ...	— ...	— ...	—
Absolute Min. Temp.....	13·0 .	— ...	— ...	—
Days of Frost	98 ...	— ...	— ...	—
Mean barometer at 32° ...	29·863 ...	— ...	— ...	—
Absolute Max.....	30·906 ...	— ...	— ...	—
Absolute Min.	28·245 ...	— ...	— ...	—
Total Rainfall	21·94 ...	26·02 ...	22·92 ...	26·20
Max. in 24 hours	1·96 ...	2·51 ...	— ...	—
Rainy Days	155 ...	152 ...	162 ...	134
Mean. direction of Wind..	S. 42° W. ..	— ..	— ...	—

HOFFMEYER, N. *Le Foehn du Greenland.* 4to.—A clearly written paper, showing that the exceptionally high temperatures prevalent during S.E. gales on the west coast of Greenland may be perfectly accounted for by the same causes as Dr. Hann showed were the source of the Foehn, in the vicinity of the Alps.

FRANCE.

DAVY, M. MARIÉ.—*Annuaire de l'Observatoire de Montsouris pour l'an 1878.* Small 8vo. Paris : Gauthier-Villars.—This capital annual improves every year ; we cannot pretend to epitomize its contents, we therefore merely state that a copy can probably be had in London for two shillings, that it contains more than 500 pages of interesting meteorological matter, with more than 100 engravings. We are sure that no one who buys a copy will fail to thank us for advising them to do so.

DAVY, M. MARIÉ. *Bulletin Mensuel de Montsouris, July–Sept., 1877.* 4to. The daily observations at the observatory, printed in most valuable detail. The magnetic elements, pressure, hygrometer, direction of wind, evaporation, state of sky, electricity, and earth temperature are given for each three hours. The temperature, velocity of the wind, and amount of rain are given for each hour ; and analyses of the matter forming the dust of the atmosphere daily, and of rain and dew whenever they occur.

POEY, A. *Rapports entre les variations barométriques et la déclinaison du Soleil.* 4to.—A short note read before the Academie des Sciences de Paris, calling attention to the relation between the changes of atmospheric pressure and the declination of the sun. The result of

a discussion of the hourly observations at Havanna in 1862 [Have these observations ever been published?] and of various other records have led M. Poëy to the following conclusion—"I find that the low pressures follow precisely the course of the sun, while the high ones pursue an exactly opposite course."

GREAT BRITAIN.

AIRY, SIR G. B., K.C.B., &c. *Greenwich Magnetical and Meteorological Observations*, 1875. 4to, 1877.—The character of this volume is so well known to our readers that we confine our notice of it to repeating the suggestion, in which we concur, that the publication of the absolute values, even at one hour daily, would be very acceptable.

SUPPLEMENTARY TABLE OF RAINFALL IN JAN., 1878.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XI., p. 28., but the list is under revision.]

Div.	Station.	Total Rain.	Div.	Station.	Total Rain.
		in.			in.
II.	Acol	1·69	XI.	Solva	2·32
„	Littlehampton	1·87	„	Castle Malgwyn	2·22
„	Hailsham .....	...	„	Nantgwilt, Rhayader	6·83
„	St. Lawrence, I. of W....	1·90	„	Carno	5·23
„	Strathfield Turgiss	·88	„	Rhug, Corwen	3·52
III.	Addington Manor	1·61	„	Port Madoc	4·10
„	Oxford	1·50	XII.	Carsphairn	7·33
„	Northampton	1·18	„	Melrose	3·16
„	Cambridge	1·36	XV.	Gruinart	5·24
IV.	Sheering	1·45	XVI.	Grandtully .....	...
„	Diss	1·83	XVII.	Tomintoul	1·89
„	Swaffham	2·00	„	Keith	1·53
V.	Alderbury, Salisbury ...	1·75	XVIII.	Dalwhinnie	1·35
„	Compton Bassett	1·99	„	Auchnasheen	9·33
„	Dartmoor	4·82	„	Springfield, Tain	2·20
„	Teignmouth	1·81	„	Glen, Finnan .....	...
„	Langtree, Torrington ..	2·97	XIX.	Watten	1·93
„	Cosgarne, St. Austell ...	3·83	XX.	Glenville, Fermoy	4·17
„	Taunton	1·14	„	Tralee	4·86
VI.	Bristol	1·58	„	Tipperary .....	...
„	Sansaw	1·76	„	Newcastle W., Limerick ..	3·85
„	Cheadle	3·24	„	Kilrush	3·83
„	Bickenhill Vicarage	1·90	XXI.	Kilkenny	2·69
VII.	Coston, Melton Mowbray ..	1·82	„	Kilsallaghan	2·24
„	Bucknall	1·76	„	Twyford, Athlone	3·62
VIII.	Walton, Liverpool	3·08	„	Mullingar, Belvedere ...	...
„	Broughton-in-Furness ..	5·74	XXII.	Ballinasloe	3·61
IX.	Stanley, Wakefield	2·08	„	Kylemore	8·86
„	Mickley, Ripon	3·87	„	Carrick on Shannon	5·93
„	Whitby .....	...	XXIII.	Rockcorry	3·90
X.	Gainford	2·07	„	Warrenpoint .....	...
„	Carlisle, Scothy .....	...	„	Newtownards	3·64
„	Shap	4·74	„	Bushmills	4·89
IX.	Llanfrechfa	2·99	„	Buncrana	5·13

JANUARY, 1878.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.				Days on which "01 or more fell.	TEMPERATURE.				No. of Nights below 32°	
		Total Fall.	Differ- ence from average 1860-5	Greatest Fall in 24 hours.			Max.		Min.			
				Dpth	Date.		Deg.	Date.	Deg.	Date.		
		inches.	inches.	in.							In shade	On grass*
I.	Camden Town	1.31	— .64	.30	28	15	55.6	21	26.9	12	10	18
II.	Maidstone (Hunton Court)...	1.20	— .84	.44	28	8	...	...	...	...	...	...
III.	Selborne (The Wakes).....	1.47	— 1.80	.37	27	15	52.5	21	18.5	12	10	14
III.	Hitchen	1.51	— .63	.35	27	19	53.0	21	24.0	10	16	...
IV.	Banbury	1.51	— .58	.44	3	21	54.0	21	23.0	30	15	...
IV.	Bury St. Edmunds (Culford)...	1.81	— .06	.33	27	15	57.0	21	20.0	10	13	22
V.	Norwich (Sprowston).....	1.76	...	.37	23	22	...	...	...	...	...	...
V.	Bridport	1.63	— 1.56	.46	27	14	...	...	...	...	...	...
V.	Barnstaple.....	2.92	— .60	.62	23	19	56.0	22	28.0	31	...	...
V.	Bodmin	3.05	— 2.14	.56	24	20	55.0	22	23.0	3	5	8
VI.	Cirencester	1.25	— 1.75	.42	3	16	...	...	...	...	...	...
VI.	Shifnal (Haughton Hall) ...	2.02	+ .12	.73	27	16	55.0	21	23.0	30	10	16
VI.	Tenbury (Orleton)	1.83	— .70	.71	27	18	56.8	21	23.3	30	10	12
VII.	Leicester (Town Museum) ...	1.57	...	.48	27	19	55.9	21	26.0	25	6	19
VII.	Boston	1.40	...	.47	27	14	55.0	21	25.0	26	12	...
VII.	Grimsby (Killingholme).....	2.08	...	.40	27	20	56.0	21	27.0	25	7	...
VII.	Mansfield .....	...	...	...	...	...	...	...	...	...	...	...
VIII.	Manchester (Ardwick).....	3.76	+ 1.54	.63	15	20	55.0	21	26.0	30	7	...
IX.	York	1.15	— .43	.55	27	...	...	...	...	...	...	...
IX.	Skipton (Arncliffe)	7.96	+ 2.32	1.89	21	21	...	...	...	...	...	...
X.	North Shields	2.99	+ .88	.83	21	17	53.0	20*	23.0	25	12	15
X.	Borrowdale (Seathwaite).....	17.06	+ .70	3.31	21	20	...	...	...	...	...	...
XI.	Cardiff (Crockherbtown).....	1.73	...	.35	27	17	53.5	21	28.0	31	7	...
XI.	Haverfordwest	3.49	— 1.56	.48	3	17	54.0	21	22.5	31	7	11
XI.	Aberdovey.....	3.58	...	.92	27	22	57.0	4	28.0	10	6	...
XI.	Llandudno.....	2.71	+ .17	.45	27	18	57.9	21	28.0	25	1	...
XII.	Dumfries (Crichton Asylum)	3.65	— .54	.62	21	18	52.4	16	22.2	26	16	19
XII.	Hawick (Silverbut Hall).....	3.55	...	1.12	21	16	...	...	...	...	...	...
XIV.	Glasgow (Cessnock Park) ...	5.34	+ 1.16	1.22	20	19	49.0	17	22.0	22	...	...
XVI.	Mull (Quinish)	5.92	...	.67	20	24	...	...	...	...	...	...
XVI.	Loch Leven .....	...	...	...	...	...	...	...	...	...	...	...
XVI.	Tyndrum (Ewick)	9.97	...	...	...	...	...	...	...	...	...	...
XVI.	Arbroath	1.77	— .75	.72	27	8	50.0	3	26.5	31	12	...
XVII.	Braemar	1.27	— 1.86	.54	21	12	48.8	16	11.0	31	18	29
XVII.	Aberdeen	1.49	...	.52	27	16	52.5	15	24.4	25	12	27
XVIII.	Gairloch	4.39	...	1.01	14	22	...	...	...	...	...	...
XVIII.	Portree	8.70	— 4.39	1.18	15	28	...	...	...	...	...	...
XVIII.	Inverness (Culloden) .....	...	...	...	...	...	...	...	...	...	...	...
XIX.	Dunrobin	2.20	— .45	.57	27	18	54.0	21	23.0	25	9	...
XIX.	Sandwick	3.76	+ .47	.42	15	30	51.0	3	24.5	25	4	12
XX.	Caheciveen Darrynane Abbey	5.94	...	.90	23	24	...	...	...	...	...	...
XX.	Cork	2.82	...	.51	23	16	...	...	...	...	...	...
XX.	Waterford	2.47	— 2.39	.32	3	21	54.0	16	23.0	11	7	...
XX.	Killaloe	5.42	+ .56	.62	3	19	55.0	21	21.0	10	5	...
XXI.	Portarlington	2.68	— 1.33	.63	3	26	54.0	20	26.0	10	14	...
XXI.	Monkstown, Dublin	1.72	— 1.67	.65	3	14	58.0	22	22.0	31+	7	9
XXII.	Galway .....	...	...	...	...	...	...	...	...	...	...	...
XXIII.	Waringstown	4.26	...	.81	26	24	55.0	20	23.0	31	18	22
XXIII.	Edenfel (Omagh)	4.23	...	.72	26	25	52.0	20*	24.0	31	16	...
XXIII.	Ballyshannon	5.24	...	1.10	26	22	...	...	...	...	...	...

* And 21.

+ 11.

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

METEOROLOGICAL NOTES ON JANUARY.

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

ENGLAND.

CAMDEN SQUARE.—Extremely high temp. on the 21st and 22nd; min. on the latter day being $51^{\circ}0$.

SELBORNE.—A very foggy, damp month, with variable winds; S in the afternoon, and T and L in the evening of the 23rd.

BANBURY.—A good deal of high wind and fog during the month; S, H, T and L on the 23rd.

SPROWSTON.—About the average rainfall, no heavy amount any day, but a succession of slight storms throughout the month; a little S, but temperature above the average.

BODMIN.—Average temperature of the month $43^{\circ}3$.

SHIFNAL.—Unusually mild and moist up to the 24th, when frost set in, with 2 in. of S (producing $\cdot 23$ in. when melted), but changing suddenly to R on night of 27th, when $\cdot 73$ in. fell, then frost again (enabling us to fill our ice houses with ice 1 in. thick) till the close. Vegetation by no means forward, owing chiefly to the absence of sun. Bees out on the 21st, with ther. at 52° at 9 a.m. Throstle singing on the 3rd, aconites in flower on the 15th.

ORLETON.—Although the total fall of R in the month was much less than the average, the sky was generally clouded over and there was very little sunlight. The bar. was generally high, and on the 11th it stood at $30^{\circ}34$ (uncorrected). The temperature was very variable, but the mean of the month was nearly $3\frac{1}{2}^{\circ}$ above the average. The ground was covered with S on the 25th, followed by R, and there were frosts every morning of the last week.

GRIMSBY.—A fine month for the season; the frost at the close very serviceable in checking the precocious vegetation induced by the mild weather preceding; T and L at night on the 25th. Aconite in flower on 5th, primrose on 28th.

NORTH SHIELDS.—Lunar Halos on the 12th, 16th, and 18th; T heard on the 20th; L seen on the 25th.

SEATHWAITE.—L seen on 28th.

WALES.

HAVERFORDWEST.—Less R than usual for this month, but very damp, mild, and foggy; very little frost; S fell, completely covering the the Precelley range on the 25th; the S storm was accompanied by a severe N.W. gale; cold weather and rather sharp frosts; continued from this date to the end of the month.

ABERDOVEY.—Mean temperature for the month $43^{\circ}1$; heavy S on the 25th; fine, clear, and calm towards the close.

SCOTLAND.

DUMFRIES.—A cold, moist month, with an average rainfall and a low mean temperature; S fell on several occasions, but in this district the fall was light; winds in general were light, but violent gales from the N.W. were experienced towards the end of the month; these were followed by a sharp frost. Mean height of bar. above average.

HAWICK.—First half of the month very mild and spring-like; the latter half rather wintry; a very severe storm of wind and R on the 20th and 21st.

GLASGOW.—L, T, H and R on the 23rd.

BRAEMAR.—T and L on the 22nd.

ABERDEEN.—On the whole, a fine quiet, dry month, with fewer gales and much less S than usual but a good deal of hoar frost; mean temp. of month $37^{\circ}6$ or $0\cdot 5$ above mean of 21 years. Rainfall lower than mean of 21 years.

PORTREE.—A wet stormy month, with heavy falls of S on 24th and 28th, frost and sleet throughout the month; very unhealthy weather.

DUNROBIN.—On the 10th a peculiar colourless rainbow in the N.N.E, it lasted from 10 a.m. till 1.30 p.m., during the most of the last hour the sun was obscured by a film of clouds.

SANDWICK.—January was remarkable for the great number of days on which R fell, .01 or more having fallen every day, but the total was less than the mean of the previous 36 years; the weather was mild for the season, the ground being covered with S only one day (24th;) there were gales of from 50 to 55 miles an hour on the 14th, 21st, and 24th; aurora on 3 nights, but never bright.

IRELAND.

DARRYNANE ABBEY.—A mild month, and rainfall rather below the average; wind very variable, generally moderate, but strong gale from N.W. on 23rd, 24th, and 25th, veering to N.N.E. in the afternoon of the 25th; H on the 23rd and 25th, and a slight shower of S on the latter date.

WATERFORD.—Lunar halo and corona on 17th; L seen on 22nd, but no T heard.

KILLALOE.—The most remarkable meteorological feature of the month was the high range of bar. The readings being below 30.0 in. on only four days, lowest 29.72 on 24th. From 9th until 19th it varied from 30.50 to 30.55, and now, 4th February, is steady at 30.58; S on hills on 22nd.

WARINGSTOWN.—Mild, and until the 20th, not very wet, but the fall of that day and the next, with those of the 26th and 27th, thoroughly soaked the ground; the last 4 days fine and frosty, now succeeded by a mild thaw.

EDENFEL, OMAGH.—Weather wet, with but little intermission, frequent gales; centre fortnight abnormally mild.

BALLYSHANNON.—The first part of the month exceedingly wet and warm for the season; dry frosty weather during the latter part, with very high bar.; rainfall less than corresponding period in 1877, 2.45 in.

HULL RAINFALL.

MANY meteorological observers are in the habit of sending summaries of their observations for publication in local newspapers, some of them obtain slip copies for private distribution, and some have the tables, &c., set up solely for private circulation. Many of these communications are of such permanent interest and utility that their limited circulation is to be regretted. An exchange of such papers was once proposed, but that would involve much labour in addressing the copies, considerable expenditure for postage, and would after all only slightly enlarge the circulation. Another plan occurred to us while looking over the copy of the enclosed table, sent to us by Mr. Harold Smith, viz., print off a sufficient number of copies to enable us to forward one with every copy of this magazine. When a table is once set up, the extra cost for paper and printing is not large, and without any further outlay, circulation throughout the meteorological centres of both hemispheres is ensured. We submitted the proposal to Mr. Smith, he telegraphed his approval, and we trust that, inserted in this number, every subscriber will find a copy of his very compact and interesting abstract. Thanks to Mr. Smith's ready help, the proposal in its complete form is now before our readers, its adoption, of course, depends upon others, not upon ourselves.

RAINFALL AT HULL:

Results of 20½ Years' Observations on the Beverley Road.

YEARLY FALL.						QUARTERLY FALL.							
Year.	Fall in Inches.	Days.			Inches.	Days.	Wettest Quarters		Average.		Driest Quarters.		
			Year.	Inches			Inches	Days	Year.	Inches			
1858	22·42	135	Average		25·65	179	First Quarter ..	1872	8 60	5·17	48	1858	1·50
1859	21·12	170	Wettest Year—1872		36·51	221		1860	7·90	5·13	39	1874	3·14
1860	31·74	205	Year with largest number of Days—1877		29·33	222		1866	11·25	7·73	39	1864	3·59
1861	19·97	163	Driest Year—1864		18·27	152		1876	12·00	7·46	52	1857	2·08
1862	23·69	174	Year with least number of Days—1858		22·42	135							
1863	24·63	155											
1864	18·27	152											
1865	23·80	170											
1866	29·20	202											
1867	24·10	184											
1868	26·54	163											
1869	28·29	189											
1870	25·81	172											
1871	25·69	170											
1872	36·51	221											
1873	22·09	180											
1874	20·19	176											
1875	28·87	178											
1876	30·77	191											
1877	29·33	222											

AVERAGE YEARLY FALL IN EACH 5 YEARS.					
Years.		Inches.	Days.		
1858 to 1862		23·77	169		
1863 to 1867		25·00	173		
1868 to 1872		28·57	183		
1873 to 1877		26·25	189		

The driest Fourth Quarter, 1857, was followed by the driest First Quarter; the total Rainfall for the six Months October, 1857, to March, 1858, being only 3·58.

Wettest Half-Year was the second half of 1872, with fall of 21·52.

MONTHLY FALL.						Number of Days in which 1 Inch or more fell in the 20½ Years.		AVERAGE RAINFALL.	
Wettest Months.		Average.		Driest Months.					
Year.	Inches	Inches	Days	Year.	Inches				
January ..	1863 3·48	1·80	16	1858	·29	January	1	At Hull	25·65
February ..	1872 2·65	1·51	15	1858	·26	February	0	At Blackpool .	32·44
March	1876 3·66	1·85	17	1875	·81	March	0	„ Harrogate .	30·90
April	1877 3·73	1·59	12	1876	·47	April	2	„ Clifton,	
May	1869 4·69	1·64	13	1859	·47	May	1	„ Malton ..	27·09
June	1860 4·32	1·89	13	1874	·57	June	2	„ Boston	22·70
July	1872 4·83	2·23	12	1869	·25	July	7	„ Manchester	29·40
August	1857 5·96	2·86	13	1861	·45	August	13	„ London ..	24·99
September .	1866 5·34	2·68	14	1865	·47	September	5	„ Bolton	46·99
October	1870 5·79	2·61	17	1857	·79	October	3	„ Plymouth..	43·28
November ..	1875 5·76	2·46	17	1857·62	1·04	November	2	„ Seathwaite,	
December ..	1868 6·45	2·47	18	1857	·25	December	3	„ Cumberld.	144·83

Fall of Rain at the Styre, Head of Borrowdale, in 1872, amounted to 243·98 inches.	
HAROLD SMITH.	
Hull, Feb., 1878.	

Heaviest Fall in one Day, 2·81 on August 14, 1867.	
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MONTHLY FALL.

	Wettest Months.		Average.		Driest Months.	
	Year.	Inches	Inches	Days	Year.	Inches
January ..	1863	3·48	1·80	16	1858	·29
February ..	1872	2·65	1·51	15	1858	·26
March	1876	3·65	1·85	17	1875	·81
April	1877	3·73	1·59	12	1875	·47
May	1869	4·69	1·64	13	1859	·47
June	1860	4·32	1·89	13	1874	·57
July	1872	4·83	2·23	12	1869	·25
August	1857	5·96	2·86	13	1861	·45
September ..	1866	5·34	2·68	14	1865	·47
October	1870	5·79	2·51	17	1857	·79
November ..	1875	5·76	2·46	17	1857-62	1·04
December ..	1868	6·45	2·47	18	1857	·25

Number of Days in which 1 Inch or more fell in the 20½ Years.

January	1
February	0
March	0
April	2
May	1
June	2
July	7
August	13
September	5
October	3
November	2
December	3

Heaviest Fall in one Day, 2·31 on August 14, 1857.

AVERAGE RAINFALL.

At Hull	25·65	At Blackpool ..	32·45
„ Harrogate ..	30·90	„ Clifton	
„ Malton	27·09	„ Bristol	33·11
„ Boston	22·70	„ Plymouth	43·28
„ Manchester ..	29·40	„ Seathwaite ..	
„ London	24·99	„ Cumberld.	144·83
„ Bolton	46·99		

Fall of Rain at the Styte, Head of Borrowdale, in 1872, amounted to 243·98 inches.

HAROLD SMITH.

Hull, Feb., 1878.

: Days—by “Days” is meant the number of days in which any Rain was measured, without any reference to quantity.

A Fall of One Inch of Rain is equal to 100 Tons per Acre.

EXTRACT FROM THE TWENTY-SIXTH HALF-YEARLY
REPORT OF THE MARLBOROUGH COLLEGE
NATURAL HISTORY SOCIETY.

Latitude..... 51°26 N.

Longitude 1°43 W.

Barometer—A standard on Fortins' principle, brass mounted, suspended
474 feet above Sea Level.

Dry and Wet Bulb Thermometers—by Negretti and Zambra.

Maximum—Negretti's Patent.

Minimum—Rutherford's Construction.

In a Stevenson's Stand, the bulbs of the thermometer being 4
feet above the ground, and have all been tested at Kew.

Maximum Thermometer in the Sun's Rays—Negretti's latest patent,
on a post 4 feet above the ground.

Minimum on Grass—Negretti's latest patent.

Rain Gauge—472 feet above Sea level; the funnel 5 inches in diameter,
and 1 foot above ground.

The observations are taken at 9 a.m. and 9 p.m.

The garden in which the Thermometer Stand and Rain Gauge are
exposed is quite level, but is surrounded by low buildings on the south and
south-east, and by somewhat higher ones on the north; none, however, rise
above 25° and only in one point exceed 20°. The elevation of the greater
part is under 10°.

The "Mean Temperature" is the simple arithmetical mean of the
9 a.m. and 9 p.m. dry-bulb readings, combined with the maximum and
minimum for the day.

The velocity of the wind in miles is recorded by a Robinson's
Anemometer, in an exposed garden at the back of the High-street, and which
has been read twice daily.

The figures in column 20 give the velocity for the 24 hours ending
9 p.m.

1877.

SUMMARY.

Month.	Mean Reading of the Barometer (reduced to Sea Level.)	Temperature.						In the Shade.				Dew Point.			Mean of all the		Degree of Humidity (Saturation=100).	Wind.							Amount of Cloud.	No. of Days it fell.	Amount Collected.
		Highest.	Lowest.	Mean of all the Highest.	Mean of all the Lowest.	Adopted Mean.	Mean of all the	Highest in the Sun's rays.	Mean of all the Lowest on the Grass.	Direction. Proportion of																	
										N.	N.E.	E.	S.E.	S.	S.W.	W.		N.W.	Velocity.								
January	ins. 29.845	53.3	28.8	47.9	36.5	42.0	38.9	66.0	33.6	94	2	1	1	0	9	6	9	3	7.117	6.9	28	ins. 5.65					
February ...	.977	56.2	24.7	48.6	38.4	42.8	39.2	78.3	34.9	92	0	0	0	0	1	7	12	8	7350	7.2	19	1.61				
March .....	.789	57.8	20.8	47.9	33.6	40.2	35.5	87.5	29.1	87	4	2	0	2	3	3	12	5	4467	6.3	19	2.41				
April .....	.770	59.5	30.2	52.2	38.7	44.9	40.1	92.3	35.0	86	5	2	9	2	5	1	6	0	7105	7.9	19	3.67				
May	29.893	64.5	25.8	56.8	39.9	48.2	40.9	105.3	34.2	78	10	1	4	1	3	4	7	1	4074	6.7	14	2.59					
June	30.027	81.8	40.7	70.5	50.4	60.2	51.0	120.3	45.7	74	3	2	5	1	4	8	3	4	4944	5.2	8	1.12					
July	29.939	82.5	41.4	67.9	50.4	58.9	53.3	118.6	44.6	84	1	0	0	1	1	10	15	3	4082	7.0	20	5.03					
August	29.883	77.3	36.2	68.3	52.4	59.8	54.2	117.7	47.3	85	4	1	1	1	4	10	8	2	4008	6.4	17	4.81					
September ...	30.094	66.5	33.1	61.1	43.8	52.0	46.8	105.7	37.5	85	10	5	3	0	1	5	2	4	3409	6.0	6	2.95					
October	30.046	66.1	24.5	57.6	39.	48.3	43.3	94.4	31.0	88	5	4	2	0	2	12	5	1	5017	4.7	15	2.49					
November ...	29.690	57.4	31.2	51.5	38.1	44.3	41.1	80.4	29.6	94	0	1	0	1	3	13	12	0	7038	5.9	23	7.02					
December ...	30.074	51.9	26.7	45.1	34.6	39.3	36.9	62.8	26.3	95	2	0	0	0	2	7	17	3	3787	6.5	19	2.39					
Year	29.919	82.5	20.8	56.3	41.3	48.4	43.4	94.1	35.7	86.8	46	19	25	9	38	86	108	34	62698	6.4	207	41.74					

SUMMARY OF THE WEATHER FOR 1877.

JANUARY.

“A January spring is worth naething.”

The mild weather which was prevalent at the end of December, continued, with a slight exception from the 10th to the 13th, throughout this month; the mean temperature for the first 9 days being as high as $45^{\circ}5$. The maxima exceeded 50° on 10 occasions, while the minima only 5 times descended below 32° . The highest temperature during the month was $53^{\circ}3$ on the 19th, the lowest $28^{\circ}8$ on the 12th, and the mean $42^{\circ}0$.

Atmospheric pressure was subject to much fluctuation, and consequently brought wet and stormy weather. The lowest reading of the barometer was 28.712 in. at 9 a.m. on the 1st, the highest 30.653 in. at 9 p.m. on the 21st (a difference of nearly 2 inches), and the mean 29.845 in. Rain fell every day except on the 11th, 12th, and 22nd, the amount being 5.65 in. Fog occurred on 6 occasions, and lunar halos were seen on the 24th and 27th.

FEBRUARY.

“Who doffs his coat on winter’s day,
Will gladly put it on in May.”

The mild weather of the previous month continued during February, the last 3 days only being cold. The mean temperature from the 1st to the 19th was about 45° , the minimum during that interval not being lower than $32^{\circ}8$; the mean from the 26th to March 1st was, however, only $33^{\circ}6$. The highest temperature during the month was $56^{\circ}2$ on the 7th, the lowest $24^{\circ}7$ on the 28th; and the mean $42^{\circ}8$.

Atmospheric pressure was much more settled than last month, and from the 1st to the 9th was above 30 inches. The highest was 30.399 in. at 9 p.m. on the 28th, the lowest 29.260 in. at 9 a.m. on the 26th, and the mean 29.977 in. Rain fell on 19 days to the amount of 1.61 in. Fog occurred on the 8th and 9th; snow fell on the 22nd, 26th, and 27th; hail on the 19th and 20th; and a lunar halo was seen on the 24th.

MARCH.

"March many weathers."

This month consisted of short periods of alternate cold and mild weather; the temperature on the whole was below the average, the mean $40^{\circ}2$, the maximum $57^{\circ}8$ on the 30th, and the minimum $20^{\circ}8$ on the 1st. Frost on the grass occurred on 20 occasions.

Atmospheric pressure was rather low, especially during the latter part of the month; the mean was 29.789 in., the highest 30.420 in. on the 1st at 9 a.m., and the lowest 28.870 in. on the 25th, at 9 a.m. Rain fell on 19 days, and the amount measured was 2.41 in. Fog occurred on 4 days, and thunderstorms on 2, viz., 26th and 29th. Snow fell on the 7th, 9th, 10th and 16th, and hail on the 7th and 18th.

APRIL.

"Cloudy April, dewy May."

This was a very dull and cloudy month. The first half was mild and damp, and the latter half cool, with a prevalence of E. winds. The mean temperature from the 1st to the 15th was $46^{\circ}2$, and from the 16th to the 30th, $43^{\circ}0$. The highest temperature was $59^{\circ}5$ on the 22nd, the lowest $30^{\circ}2$ on the 17th, and the mean $44^{\circ}9$.

Atmospheric pressure was low, the mean being only 29.770 in.; the highest reading 30.267 in. occurred at 9 a.m. on the 20th, and the lowest 29.113 in. at 9 p.m. on the 4th. Rain fell on 19 days, the amount being 3.67 in.; on 3 occasions more than half an inch was measured. Hail fell on the 6th and 17th, and a lunar halo was observed on the 16th.

MAY.

"May; come she early or come she late,
She'll make the cow to quake."

This month was very cold,—the first week being especially so. Severe frosts occurred on the 4th, 5th and 6th, when the minimum temperatures were respectively $27^{\circ}7$, $25^{\circ}8$ and $28^{\circ}5$. The lowest temperatures in May during the last 12 years have been as follows:—

1865.	$33^{\circ}2$	1869.	$29^{\circ}1$	1873.	$26^{\circ}7$
1866.	$25^{\circ}7$	1870.	$26^{\circ}0$	1874.	$26^{\circ}4$
1867.	$25^{\circ}5$	1871.	$31^{\circ}1$	1875.	$38^{\circ}0$
1868.	$32^{\circ}3$	1872.	$29^{\circ}2$	1876.	$29^{\circ}8$

Intense frost occurred on the grass from the 1st to the 8th; on the 4th and 5th the minimum thermometer registered $18^{\circ}5$ and $17^{\circ}4$. The mean temperature for the first six days was as low as $40^{\circ}6$, and the mean for the

month was only $48^{\circ}2$; the highest $64^{\circ}5$ occurred on the 26th, and the lowest $25^{\circ}8$ on the 5th.

Atmospheric pressure continued low, but was not subject to any great fluctuations. The mean was 29.893 in.; the highest 30.422 in. occurred at 9 p.m. on the 1st, and the lowest 29.240 in. at 9 a.m. on the 28th. Rain fell on 14 days, the amount measured being 2.59 in. A solar halo was seen on the 27th.

JUNE.

“Calm weather in June

Sets corn in tune.”

This was the warmest month of the year. The mean temperature was $60^{\circ}2$, which is 12° higher than that for May, and more than 4° above the average of the past 12 years. The following are the mean temperatures for June from 1865 to 1876:—

1865.	$58^{\circ}5$	1869.	$52^{\circ}7$	1873.	$55^{\circ}3$
1866.	$57^{\circ}9$	1870.	$57^{\circ}6$	1874.	$54^{\circ}3$
1867.	$54^{\circ}9$	1871.	$52^{\circ}2$	1875.	$57^{\circ}6$
1868.	$57^{\circ}0$	1872.	$54^{\circ}8$	1876.	$57^{\circ}9$

The highest temperature $81^{\circ}8$ occurred on the 18th, and the lowest $40^{\circ}7$ on the 24th.

Atmospheric pressure was rather steady and above the average, the mean being 30.027 in.; the highest 30.276 in. occurred at 9 a.m. on the 28th, and the lowest 29.285 in. at 9 a.m. on the 1st. Rain fell only on 8 days, the amount being 1.12, half of which was measured on the 1st. Thunderstorms occurred on the 1st and 12th.

JULY.

“No tempest, good July,

Lest the corn look ruefully.”

With the exception of the last 3 days, this month was cold, the mean temperature being above 60° on 5 days only and then not exceeding $61^{\circ}2$. The mean for the last 3 days was $66^{\circ}5$. The highest temperature was $82^{\circ}5$ on the 31st, the lowest $41^{\circ}4$ on the 7th, and the mean $58^{\circ}9$.

Atmospheric pressure was slightly below the average, the mean being 29.939, the highest was 30.341 at 9 a.m. on the 9th, and the lowest 29.215 at 9 p.m. on the 14th. Heavy rain occurred on the 14th and 23rd, the amounts being 1.95 in. and 1.05 in. respectively; the total fall for the month was 5.03 in., with 20 rainy days. Thunderstorms occurred on the 6th and 7th, and Fog on the 30th and 31st. A lunar halo was seen on the 20th.

AUGUST.

“August ripens, September gathers in.”

This Month with the exception of from the 13th to the 20th was cool, but not quite so cold as the preceding month, the mean $59^{\circ}8$ being almost 1° warmer than that for July. The maximum temperature exceeded 70° on 9 occasions only, while the minimum was as many times below 50° . The lowest temperature was $36^{\circ}2$ on the 24th, when a frost occurred on the grass. The minimum temperatures for the last 12 years are:—

1865.....	$40^{\circ}2$	1869.....	$32^{\circ}4$	1873.....	$44^{\circ}3$
1866.....	$38^{\circ}7$	1870.....	$35^{\circ}2$	1874.....	$38^{\circ}9$
1867.....	$40^{\circ}1$	1871.....	$40^{\circ}4$	1875.....	$41^{\circ}2$
1868.....	$40^{\circ}3$	1872.....	$39^{\circ}1$	1876.....	$39^{\circ}8$

The highest temperature recorded in the month was $77^{\circ}3$ on the 23rd. Atmospheric pressure was low and somewhat unsteady; the mean was $29\cdot885$ in., the highest $30\cdot201$ in. at 9 a.m. on the 24th, and the lowest $29\cdot397$ at 9 p.m. on the 8th. The rainfall $4\cdot81$ in. was about two inches above the average and exceeded that of any August from 1865 to 1876. The number of rainy days was 17.

SEPTEMBER.

“And cold out of the north.”

This month was excessively cold, being nearly 8° lower than that of August, and considerably below the average. From the 21st to the 25th, the weather was exceptionally cold, the mean for these 5 days being as low as $46^{\circ}7$. The following figures may be interesting and will show the coldness of this month as compared with the Septembers of the past 12 years.

Year	Maximum.	Minimum.	Mean.	Mean.	Mean.
			Maximum.	Minimum.	
1865	$82^{\circ}5$	$35^{\circ}2$	$73^{\circ}4$	$49^{\circ}3$	$60^{\circ}5$
1866	$65^{\circ}8$	$37^{\circ}1$	$60^{\circ}9$	$48^{\circ}9$	$53^{\circ}9$
1867	$76^{\circ}7$	$32^{\circ}4$	$64^{\circ}0$	$48^{\circ}2$	$55^{\circ}4$
1868	$85^{\circ}5$	$38^{\circ}8$	$67^{\circ}3$	$47^{\circ}6$	$56^{\circ}7$
1869	$73^{\circ}2$	$31^{\circ}9$	$64^{\circ}4$	$48^{\circ}9$	$55^{\circ}8$
1870	$70^{\circ}0$	$31^{\circ}1$	$65^{\circ}4$	$43^{\circ}0$	$53^{\circ}6$
1871	$78^{\circ}0$	$34^{\circ}0$	$62^{\circ}6$	$47^{\circ}8$	$54^{\circ}4$
1872	$76^{\circ}6$	$30^{\circ}2$	$63^{\circ}6$	$47^{\circ}8$	$54^{\circ}7$
1873	$70^{\circ}8$	$36^{\circ}5$	$61^{\circ}4$	$45^{\circ}8$	$52^{\circ}6$
1874	$74^{\circ}2$	$39^{\circ}2$	$63^{\circ}4$	$49^{\circ}0$	$55^{\circ}4$
1875	$78^{\circ}0$	$41^{\circ}2$	$68^{\circ}2$	$50^{\circ}8$	$58^{\circ}8$
1876	$71^{\circ}5$	$40^{\circ}8$	$63^{\circ}8$	$48^{\circ}7$	$55^{\circ}6$
1877	$66^{\circ}5$	$33^{\circ}1$	$61^{\circ}1$	$43^{\circ}8$	$52^{\circ}0$

Atmospheric pressure was high and not subject to much variation; the highest was 30·419 in. at 9 a.m. on the 27th, the lowest 29·738 in. at 9 a.m. on the 3rd, and the mean 30·094 in. The rainfall was 2·95 of which 0·51 was measured on the 2nd, 1·23 on the 3rd, and 0·87 in. on the 11th. The month was dry, there being only 6 rainy days. The general direction of the wind was from the North. Fog occurred on the 27th to the 30th.

OCTOBER.

“The dews of the evening industriously shun,
They’re the tears of the sky for the loss of the sun.”

The cold weather of September continued during the early part of this month; from the 20th to the 31st the weather was much milder. The highest temperature 66°1 occurred during the gale on the evening of the 14th; the mean for the month was 48°3, and the lowest 24°5 on the 18th. The nights were for the most part clear, and consequently radiation from the earth was great, the mean minimum temperature on the grass being 8°2 lower than in the air.

Atmospheric pressure was above the average, the mean being 30·045; the highest was 30·688 in. at 9 a.m. on the 6th, and the lowest 29·266 in. at 9 a.m. on the 25th. The first part of the month was dry, but rain fell every day from the 20th to the 30th, the total number of rainy days was 15, and the rainfall 2·49 in. Fog occurred on 8 days and hail on 1; lightning was seen on the 16th, a solar halo on the 6th, and a lunar rainbow on the 24th.

NOVEMBER.

“Untimely storms make men expect a dearth.”

The milder weather which set in at the latter end of October continued throughout the greater part of this month. The mean temperature was 44°3; the highest 57°4 occurred on the 1st and the lowest 31°2 on the 26th.

This was for the most part a dull wet and stormy month. The gale on the 11th was most severe, the reading of the barometer—28·664 in. at 9 p.m.—exceptionally low, and the rainfall 1·65 in. excessive. The rainfall for the month 7·02 in. was very great and nearly 4 inches above the average of the past 13 years. The following is the rainfall in November from 1864:—

	in.		in.		in.
1864.	3·15	1869.	2·57	1874.	3·52
1865.	3·82	1870.	2·04	1875.	4·33
1866.	3·04	1871.	0·69	1876.	4·34
1867.	1·48	1872.	5·23	1877.	7·04
1868.	1·65	1873.	3·29		

Atmospheric pressure was very unsettled and much below the average, the mean being only 29.690.

Rain fell on 23 days and hail on 1. Fog occurred on 6 days, thunder on 1, and lightning on 3. Lunar halos were seen on the 14th, 17th and 23rd, and lunar rainbows on the 14th and 22nd.

DECEMBER.

“The Ivy and Holy Berries are seen,
And Yule Log and Wassail come round again.”

This month was mild, the only cold weather being from the 25th to the 28th, when the mean temperature was 32°6. The highest temperature during the month was 51°9 on the 6th, the lowest 26°7 on the 26th, and the mean 39°3.

Atmospheric pressure was high, that from the 14th to the 21st being especially so; the mean for the month was 30.074 in., the highest 30.695 in. at 9 a.m. on the 20th and the lowest 29.273 at 9 a.m. on the 1st. Rain fell on 19 days amounting to 2.39. Fog occurred on 7 days and snow on 3.

TABLE SHOWING THE MONTHLY AND YEARLY RAINFALL AT
MARLBOROUGH—1864 TO 1877.

Years.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.
1864	—	—	3·27	1·92	1·54	1·63	0·65	0·52	2·46	1·95	3·15	2·14	—
1865	3·80	2·27	1·16	0·97	2·55	2·79	2·51	3·90	0·28	7·25	3·82	2·39	33·69
1866	4·32	3·79	2·26	2·32	1·87	3·17	1·55	2·97	6·97	1·74	3·04	3·24	37·24
1867	4·02	2·48	3·77	2·79	2·39	1·66	3·99	2·53	2·28	3·48	1·48	1·58	32·45
1868	5·34	2·21	1·84	2·61	1·52	0·46	0·98	4·78	5·05	2·74	1·65	5·71	34·89
1869	3·77	2·52	1·53	1·54	4·03	1·23	0·75	1·55	5·72	2·01	2·57	3·69	30·91
1870	1·89	2·44	2·10	0·55	2·14	0·36	1·75	1·91	1·29	4·56	2·04	2·51	23·54
1871	2·93	1·51	1·63	3·85	1·00	2·99	3·63	1·18	6·22	1·88	0·69	2·49	30·00
1872	6·84	2·64	2·40	2·01	2·32	3·41	2·64	2·33	1·09	5·66	5·23	5·52	42·09
1873	4·13	1·53	2·62	1·26	1·89	1·62	2·15	2·70	2·96	2·68	3·29	0·88	27·71
1874	3·17	2·67	0·97	1·78	0·68	1·25	1·47	2·57	4·65	4·64	3·52	2·78	30·15
1875	4·53	2·13	1·33	1·64	2·51	2·78	5·60	2·12	3·78	7·64	4·33	1·31	39·70
1876	2·51	3·11	4·20	3·41	0·98	1·98	0·88	4·75	6·88	1·67	4·34	7·20	41·91
1877	5·65	1·61	2·41	3·67	2·59	1·12	5·03	4·81	2·95	2·49	7·02	2·39	41·74
Means 13 years.	4·07	2·38	2·17	2·19	2·04	1·91	2·53	2·93	3·85	3·72	3·31	3·21	34·31

TABLE SHOWING THE NUMBER OF DAYS OF RAIN AT
MARLBOROUGH, 1864 to 1877.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Augt.	Sep.	Oct.	Nov.	Dec.	Totals.
1864	—	—	16	12	12	18	8	11	26	13	18	12	—
1865	18	18	11	9	18	5	14	17	2	22	19	13	166
1866	23	22	15	18	10	16	12	20	26	16	16	20	214
1867	17	21	21	21	12	12	18	11	15	21	7	10	189
1868	14	12	18	13	8	3	4	15	12	16	13	27	155
1869	15	19	15	12	18	9	9	11	19	13	19	22	181
1870	14	12	14	2	9	4	10	10	10	19	11	13	128
1871	18	15	10	16	6	15	20	7	14	18	9	15	163
1872	27	22	14	13	18	17	10	15	16	21	22	25	220
1873	22	12	20	13	14	11	16	17	15	16	17	9	182
1874	17	17	13	12	11	9	11	15	16	21	19	14	175
1875	23	13	8	11	13	18	13	13	17	17	18	16	180
1876	11	20	20	19	6	9	8	12	24	14	17	22	182
1877	28	19	19	19	14	8	20	17	6	15	23	19	207
Means 13 years.	19	17	15	14	12	10	13	14	15	18	16	17	180

TABLE SHOWING THE GREATEST FALL OF RAIN WITH THE DATE IN EACH MONTH AT
MARLBOROUGH, 1864 TO 1877.

Years.	Jan.		Feb.		March.		April.		May.		June.		July.		August.		Sept.		Oct.		Nov.		Dec.	
	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.
1864.....	—	—	—	—	.96	6	.60	17	.54	5	.39	10	.25	3	.21	9	.55	16	.69	21	.66	24	.79	8
1865.....	.67	26	.56	16	.47	4	.31	18	.53	8	.83	29	.49	31	.87	23	.17	20	1.66	16	1.18	19	.56	28
1866.....	.62	10	.62	11	.54	23	.60	28	.73	26	.83	30	.40	2	.79	29	.90	1	.42	21	.86	13	.68	5
1867.....	.70	7	.38	5	.68	13	.54	14	.67	20	.35	2	.71	16	.56	15	.93	2	.57	9	1.07	30	.72	1
1868.....	.99	21	.82	29	.46	7	.84	19	.35	19	.33	21	.36	12	1.18	17	1.03	29	.60	28	.47	21	.52	7
1869.....	.76	28	.64	11	.48	19	.38	14	1.15	18	.34	13	.28	28	.41	2	.88	30	.63	1	1.14	27	.84	16
1870.....	.28	11	.91	6	.65	1	.36	9	.77	11	.23	16	.85	31	.61	27	.36	8	.71	22	.56	24	.73	13
1871.....	.72	15	.28	9	.47	9	1.01	18	.49	27	.59	17	1.24	10	.35	17	1.30	29	.36	17	.39	14	.56	19
1872.....	.92	23	.39	22	.67	28	.49	27	.36	13	.53	6	1.15	25	.67	7	.27	1	1.06	24	.57	4	1.11	16
1873.....	1.10	17	.45	23	.73	15	.28	16	.41	3	.51	28	.83	12	.37	28	.63	1	.59	12	.94	1	.28	31
1874.....	.58	18	.88	25	.10	{ 18 } 29	.52	8	.24	7	.29	23	.41	26	.36	11	.91	2	1.17	5	1.40	27	.76	7
1875.....	.56	1	.62	6	.57	6	.34	6	.58	28	.54	13	2.32	14	.97	12	.83	21	1.32	9	.79	13	.35	2
1876.....	1.51	21	.52	14	.58	11	.65	20	.63	22	.60	15	.31	31	.94	20	1.64	5	.47	6	.80	27	.91	7
1877.....	.84	6	.36	19	.37	23	.55	3	.47	12	.56	1	1.95	14	.90	14	1.26	3	.51	29	1.65	11	.53	28