

S Y M O N S ' S
M O N T H L Y
M E T E O R O L O G I C A L M A G A Z I N E .

CCXVII.]

FEBRUARY, 1884.

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THE STORMS & BAROMETRIC DISTURBANCES JANUARY
20TH—26TH.

WE have often expressed our strong objection to duplicate work. There is little doubt that as the most striking phenomena during the above period occurred in Scotland, we shall in due time receive an exhaustive report from the Scottish Meteorological Society. In the interim a short article, presumably by Mr. Buchan, has appeared in *Nature*, and Mr. Marriott is preparing an outline of the phenomena for the meeting of the Royal Meteorological Society on February 20th. We have therefore transferred to him the communications which we have received upon the subject; and also many of the references to the storm of the 26th which would otherwise have appeared in the "Remarks on the Month."

But it would scarcely be right to issue this number without a few words as to the unusual phenomena.

I. At Stornoway, Isle of Lewis, off the N.W. of Scotland, on January 20th, at 6 p.m. the barometer was 30·17 in., by 10 p.m. it had fallen to 29·21 in., a fall of 0·96 in. in four hours; it is said to be, and probably is, the greatest fall in so short a time yet recorded in the British Isles.

II. During the passage of this storm across the Orkneys, the anemometer at Sandwick Manse indicated a rate of 88 miles an hour, which is said to be "the highest speed at which wind has been known to travel in Great Britain."

III. During the afternoon, evening and night of 26th there was a great decrease of barometric pressure. In London it fell to 28·529 in. at 7·30 p.m., a point only passed four times during the last 26 years—but this was as nothing compared with the depression further north—where it went more than an inch lower. The lowest return which we have yet personally received was one from the Rev. Dr. Beverley of Aberdeen, whose standard barometer with a Kew certificate gave 27·381 inches as the sea level pressure at 11·30 p.m. This is thoroughly supported by a reading made at the same time at the Forest of Glen Tana, by Mr. Cunliffe Brooks, M.P., which works out

27·39 in. *Nature*, however, quotes a reading still lower, but as it does not state whether it was reduced to sea level we can only give it as it is given, "Ochertyre, near Crieff, 27·332 in. at 9·45 p.m."

There is (we consider) no doubt that this is the lowest sea level pressure ever recorded in the British Isles. It is extremely rare for it to be less than 28 inches. In London there is one such case on record, *viz.* December 25th, 1821, reported as 27·93 in. In the North of Scotland, owing to the normal path of storm centres traversing that country, pressures vary more, and are as a rule lower—about 0·20 in. so that the equivalent of the London absolute minimum of 27·93 would be for North of Scotland about 27·73 in. *Nature* tells us that at Gordon Castle between 1767 and 1827 the min. was 28·01 in.; that at Culloden House between 1841 and 1884 the min. was 27·98 in.; and that during the great storm of January 7th 1839 the pressure fell to 27·81 at Inchkeith, to 27·72 at Peterhead, and to 27·70 at Aberdeen. But neither the writer in *Nature* nor any one else seems to have remembered a more recent and more remarkable depression than any of these—*viz.* that of December 31st, 1865. The sea level pressure at 24 Scotch lighthouses is given in *Meteorological Magazine*, Vol. I. p. 16, and from it we find that the pressure at the Butt of Lewis fell to 27·69 in. and at Monach to 27·92 (27·63 is reported from Hoy Low light, but is not supported by the Cantickhead return and therefore we print it in parenthesis, though it is quite possible that the Hoy man watched for the minimum, and that the Cantickhead man did not). It is evident that the recent minimum is at least a quarter of an inch below the lowest of these, and hence we are doubtless justified in believing that it is without precedent since the invention of barometers.

IV. There is one other feature which we believe to be also rare, though perhaps not without precedent—*viz.*, the rapid rise from the lowest point, which occurred in some of the Southern parts of England. All practised observers know that during violent storms the mercury in a barometer "pumps" with nearly every gust of wind, indeed even the hand of a good aneroid will be found to move up and down through ·02 or ·03, but there was something more than the mere rise from a very low point reached during pumping.

The facts for four stations are

County.	Station.	Increase. in.	Time.		Duration. h. m. minutes.	Rate per hour.
			h. m.	h. m.		
Devon	Torquay (Babbacombe)...	0·030	5 18	to 5 22	4	0·45
Middlesex.	Isleworth (Spring Grove).	0·050	7 24	to 7 31	7	0·43
"	Camden Square	0·061	7 33	to 7 41	8	0·46
Essex	Harlow (Toppesfield)...	0·05 or 0·06	...	—	5 to 7	0·55

There is, we think, little doubt as to the cause of this sudden rise, but as Mr. Marriott's attention has been drawn to it and as he has additional details we leave the matter in his hands.

MILD WINTER.

To the Editor of the Meteorological Magazine.

SIR,—I enclose list of plants in blossom. They are all *out-of-door*, garden plants. Although some are of course mere spurts and survivals, most are really fresh blossoms. The frost here on November 15th, 4ft. above ground, 20°·4; grass, 18°·1 (much more severe than in London), cut off almost all then in blossom, and up to that time we had all the tender plants in full bloom, otherwise we should have had a much longer list.—Truly yours,

H. SOUTHALL.

The Graig, Ross, January 12th, 1884.

List of Plants in Blossom in the neighbourhood of Ross, Herefordshire, December 31st, 1883, to January 12th, 1884.

Alyssum saxatile (Golden tuft).	Lamium maculatum (variegated dead nettle).
Anemone coronaria.	Laurestinus.
Anthemis tinctoria.	Limnanthes Douglasii.
Arabis albidia ("Snow on the mountains").	Linaria cymbalaria (ivy-leaved toad flax).
Aubrietia grandiflora.	Lithospermum prostratum.
Auricula.	Lychnis dioica.
Bellis perennis flora-plena (double-daisy).	Mathiola flore-pleno (double stock).
Berberis aquifolium.	Megasea crassifolia.
„ Darwinii.	Menziesia polifolia-bicolor.
„ ?	Myosotis dissitiflora.
Brassica.	Nemophila insignis.
Calendula arvensis.	Omphalodes verna.
„ officinalis (marigold).	Penstemon (<i>bud</i>).
Chrysanthemum.	Polyanthus.
Corchorus japonica.	Potentilla alba.
Corydalis lutea (Fumitory).	„ opaca.
Crocus.	Primula vulgaris.
Cyclamen coum.	„ veris (cowslip).
Daphne mezereum.	„ (double lilac).
„ Fioniana.	Pyrethrum parthenium (feverfew).
Dianthus barbatus (Sweet William).	Pyrus japonica.
„ ? (common pink).	Pear.
Doronicum clusii.	Reseda lutea (mignonette).
Eranthis hyemalis (winter aconite).	Rhododendron atrovirens
Erica vagans.	„ ?
„ ciliaris.	Rose (<i>bud</i>).
„ carnea.	Symphytum caucasicum.
„ mediterranea.	Tritoma uvaria (flame-flower).
Erigeron bellidifolius.	Tussilago fragrans (fragrant coltsfoot).
Erysimum pulchellum.	Ulex europæus (furze).
Fragaria vesca (strawberry).	Veronica rupestris.
Galanthus nivalis (snowdrop).	„ taurica.
Garrya elliptica.	„ ?
Helleborus niger (Christmas rose).	Vinca major (periwinkle).
„ foetidus (bear's foot).	„ minor.
Hepatica cærulea.	Viola odorata.
„ rubra.	„ (Russian).
Hesperis albiglora (single rocket).	„ tricolor (garden pansy).
Jasminum nudiflorum (winter jasmine).	Virginian stock.

METEOROLOGY AND THE INTERNATIONAL HEALTH EXHIBITION.

THE important influences which both climate and weather exert upon health render it obvious that an International Health Exhibition would be incomplete without a Meteorological Section. We are glad to be able to state that there seems reason to hope for an efficient representation of those branches of Meteorology which bear upon Public Health.

The Committee nominated to supervise the arrangements consists of—

W. B. Bryan, Esq., M.I.C.E.,
F.R.Met.Soc.
Prof. De Chaumont, M.D., F.R.S.
J. Evans, Esq., D.C.L., F.R.S.
Capt. Douglas Galton, C.B., F.R.S.

Thos. Hawksley, P.P.I.C.E., F.R.S.
R. H. Scott, F.R.S., P.R.Met.Soc.
G. J. Symons, F.R.S., Sec.R.Met.Soc.
J. W. Tripe, M.D., Sec.R.Met.Soc.

The Committee believe that the Royal Meteorological Society will arrange for the establishment in the grounds of a complete climatological station, properly fenced in, but to which a limited number of the public could from time to time be admitted, and it is intended that the instruments should be recorded regularly and the results exhibited on diagrams.

As regards general exhibits, the Committee invite authors of Papers upon the relations between health and disease, rainfall, percolation, evaporation, and flow from ground, and other subjects embraced by the Exhibition, inviting them to exhibit diagrams, models and apparatus illustrative of their researches.

This list of specified subjects indicates the broad views which the Committee entertain, and we submit the invitation to our readers, requesting their attention to it, and merely adding, in conclusion, that all communications should be addressed—

The Secretary,
International Health Exhibition,
(Meteorological Sub-Committee). South Kensington.

THE ATMOSPHERIC DISTURBANCE, DECEMBER 10TH-16TH, AND ITS EFFECTS UPON THE BAROMETER AND THE UNDERGROUND WATER AT MAGHULL, LIVERPOOL.

BY ISAAC ROBERTS, F.G.S., F.R.A.S.

A GALE of great severity, occurred here between the 10th and 16th of this month, causing considerable injury to property. Chimney stacks were blown down and trees were uprooted.

The annexed diagram shows the effects of the atmospheric disturbance upon the barometer and upon the underground water in the Triassic rocks of this district. Referring to the diagram it will be seen that at ten o'clock on Monday morning, the 10th, the barometer stood at 29.82 inches, and the level of the underground water at the same time was 22.80 inches above my zero mark.

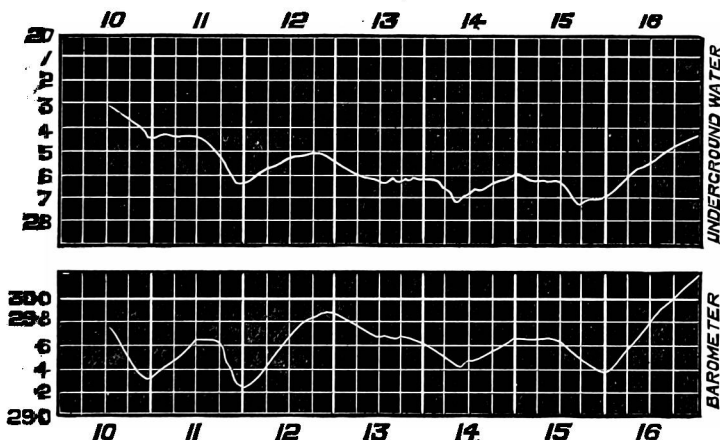
At 11 o'clock at night the water had risen to 24.42 inches, and at midnight the barometer had fallen to 29.30 inches. Between that time and noon of the 11th, the barometer had risen to 29.62 inches, and the water had fallen 0.11 of an inch. The barometer remained steadily at 29.62 inches for 5 hours, but during that interval the water was rapidly rising—it rose 0.73 of an inch during the time, and continued to rise rapidly till half-past 10 o'clock at night on the 11th. The rise of the water between noon and ten o'clock, was 2.20 inches and the barometer had fallen 0.40 of an inch in 5 hours. It was during the night of the 11th (at 1h. 30m. a.m. on 12th) that the force of the gale blew down chimney-stacks and uprooted trees.

The wind continued high during the four following days, and the undulations of the two curves drawn on the diagram, show the periods of varying disturbance.

At four o'clock on the 15th, the water touched the highest point, namely, 27.12 inches, but the barometer did not fall so low as shown on the 11th.

It will be observed in correlating the oscillations shown by the two curves, that the underground water, besides having greater amplitude, is more sensitive to changes of pressure than the barometer, notwithstanding the effects of friction and capillary action, to which the water is subject in the pores of the rock.

Maghull, 27th, December, 1883.



[The diagram sent was a tracing from the instruments on a scale far too large for reproduction. In reducing it we have made several alterations respecting which a few remarks may be useful. The level of underground water rises as atmospheric pressure decreases, therefore a comparison of the curves is facilitated by making them read in opposite directions, so that the run of the curves may be similar. We have therefore reversed the underground water scale so that the parallelism of the two curves becomes self-evident.

Moreover, it is essential that the amplitude of the two scales be nearly the same. The specific gravity of Mercury being $13\frac{1}{2}$, one would on first thoughts expect that the scale for the water should be rather less than $\frac{1}{12}$ th of that for the barometer—but upon trying that scale, it was found to be much too small—possibly because friction plays an important part in underground water fluctuation. At any rate we found that a scale of $\frac{1}{5}$ th was about the best—and that is what we have adopted.

There remain some irregularities as to time, and as to quantity, which are possibly due to the influence of rainfall on subterranean water level, and others for which we cannot at present account—for example it is not obvious why the maximum water level should have been at 4 p.m. on 15th, and the corresponding barometric minimum 6 hours *later*.—ED.]

ROYAL METEOROLOGICAL SOCIETY.

THE Annual General Meeting of this Society was held on January 16th. Mr. J. K. Laughton, F.R.A.S., President, in the Chair.

The Secretary read the Report of the Council, which showed that the past few months mark a very important epoch in the history of the Society. In October the Council received the intimation that Her Majesty had been graciously pleased to grant the Society permission to assume the prefix "Royal." In December the Fellows made certain alterations in the by-laws by which the annual subscription has been increased. The Report also showed that the Society is doing much practical work, not only by holding meetings and publishing the papers read at the same, but also by the establishment of a large number of observing stations, which are regularly inspected, so that the results obtained from them may be strictly uniform and comparable. The number of Fellows is 549, and of Honorary Members 19—thus making a total of 568.

The President then delivered his Address, in which he referred to the experiments made by Mr. Saxon Snell, Mr. Bertram and Mr. Hele Shaw with the object of determining the coefficients of Biran's anemometers; as yet these can scarcely be considered quite satisfactory; for though made with the utmost care, they give results differing from each other by nearly 25 per cent. and from the known truth in opposite directions.

The reduction of barometric readings to sea-level is another problem of great interest and importance, the solution of which is far from perfect, and as applied to the converse determination of altitudes has been pronounced by Mr. Gilbert of the U.S. Geological Survey to be beset with difficulties "so numerous and so baffling, that there is no reason to hope that they will ever be fully overcome." In many cases, too, the reduction, even if correct, implies an accumulation of air in places where no air exists: and isobars so drawn, traversing mighty mountain ranges such as the Rocky Mountains or

the Himalayas, or elevated plateaus, such as those of Central or Eastern Asia, convey an impression which may easily lead to serious mistakes.

The great achievement of the year is unquestionably the gathering in of the observations taken, by international agreement, at nine Arctic stations, in which amidst circumstances of more or less discomfort, parties continued observing through a full period of twelve months. With one station established by the United States on the shores of Lady Franklin Bay, it has been found impossible to communicate : this was established in the summer of 1881, and no trustworthy news has since been received. Preliminary reports have been published from the English station at Fort Rae, on the northern shores of the Great Slave Lake ; from the German station in Cumberland Sound ; from the Austrian at Jan Mayen, and from some of the others ; but the principal interest attaches not to the observations taken separately—but to the collation and comparison of the whole, which may be expected to lead the way towards the solution of problems of the greatest importance to Meteorology. In the present day one science is so mixed up with a number of others, and so involved in them, that it is impossible to separate them, or to define the exact limits of each. Many of the problems of Meteorology belong equally to Geography, or at times even to experimental physics, and an address which speaks of the progress of Meteorology is perhaps apt to appear in some degree discursive. Hence it is that the true student of Nature, whilst limiting his detailed work to one particular direction, must consider her kingdom as a grand and comprehensive whole one and indivisible.

The following gentlemen were elected the officers and council for the ensuing year :—

President.—Robert Henry Scott, M.A., F.R.S., F.G.S.

Vice-Presidents.—Hon. Ralph Abercromby, Edmund Douglas Archibald, M.A. ; John Knox Laughton, M.A., F.R.A.S., F.R.G.S. ; William Marcet, M.D., F.R.S., F.C.S.

Treasurer.—Henry Perigal, F.R.A.S.

Trustees.—Hon. Francis Albert Rollo Russell, M.A. ; Stephen William Silver, F.R.G.S.

Secretaries.—George James Symons, F.R.S. ; John William Tripe, M.D., M.R.C.P.ED.

Foreign Secretary.—George Mathews Whipple, B.Sc., F.R.A.S.

Council.—William Morris Beaufort, F.R.A.S., F.R.G.S. ; George Chatterton, M.A., M.Inst.C.E. ; John Sandford Dyason, F.R.G.S. ; William Ellis, F.R.A.S. ; Charles Harding ; Richard Inwards, F.R.A.S. ; Baldwin Latham, M.Inst.C.E., F.G.S. ; Robert John Lecky, F.R.A.S. ; Edward Mawley, F.R.H.S. ; Cuthbert E. Peek, M.A., F.R.G.S. ; Capt. Henry Toynbee, F.R.A.S. ; Charles Theodore Williams, M.A., M.D., F.R.C.P.

REVIEWS.

Transit Tables for 1884. By LATIMER CLARK, M.I.C.E. London : E. and F. N. Spon. Crown 8vo.

Manual of the Transit Instrument as used for obtaining Correct Time. By LATIMER CLARK, M.I.C.E. London, 1884. E. and F. N. Spon 40 + 16 pages crown 8vo.

THOSE of our readers who remember the persistency with which we have pleaded for greater care being bestowed by meteorologists in the obtaining and keeping of their clocks and watches at "True Time," will understand the pleasure with which we have watched Mr. Latimer Clark's efforts towards popularizing the Transit instrument.

The second of the above works is so low in price and gives so clear a summary of Mr. Clark's efforts, that instead of occupying space with extracts from it, we think it better to advise our readers to get a copy, for even if they do not decide upon purchasing a Transit instrument, they will certainly get a good shilling's worth of instruction.

As regards the Transit tables, we have only one (and it is a very small) complaint to make. We think that the table should give the time of passage of semi-diameter of Sun for each day. It is often impossible to observe more than one limb, and then this datum is indispensable ; it would only need a very narrow column, and space could easily be made for it. On all these grounds we rely upon the author adding it in his next annual tables. It is true that the information is (incompletely) given in his other books, but it ought to be handy in an adjoining column.

Mr. Latimer Clark has not limited his efforts to teaching persons how to observe, and reducing the difficulty of calculations to a minimum, but he has brought his well-known mechanical skill to bear upon the construction of cheap and hardy instruments, and brought out patterns which have met the approval of such men as Col. Tupman and Mr. Lecky, to which it is needless to add our own opinion. But, in conclusion, we should like to suggest for Mr. Latimer Clark's consideration, that we desire to see an instrument which would be less accurate than are his, and, of course, which should be obtainable at a proportionally less price. Mr. Lecky says that with Mr. Clark's smaller Transit Instrument, a fair night's work ought to fix the time to a fifth of a second. Now none but those possessed of exceptionally good chronometers or regulators can *keep* such time when they have got it.

Mr. Lecky evidently was speaking of the average of a number of observations, and the precision would increase with the number. While we have no objection to such precision, we think that it would be reasonable to say that all ordinary meteorological requirements will be met by an instrument whereby a single observation

should always be true to 15 seconds, which probably implies that its delicacy should be about one-tenth that of those now submitted.

If observers will keep their clocks and watches right to a second, by all means let them do so ; no one would rejoice at such a state of things more than we should. But rather than that they should continue to let them be anywhere "within five minutes," let us try to place before them something which shall give them Time, true within a quarter of a minute, as easily as possible, and at a price which cannot be made an excuse for not providing it.

A Manual of Practical Hygiene, by E. A. PARKES, M.D., F.R.S., edited by F. S. B. FRANÇOIS DE CHAUMONT, M.D., F.R.S. Sixth Edition. J. and A. Churchill, London, 1883. 8vo., xix—731 pp.

We can readily imagine that a meteorologist running along a shelf of new books to see if there was anything that would suit him, would pass this handsome volume. But he would make a grave mistake. The book is a sort of encyclopædia, crammed with all that two clever men can put into it. The original author, Dr. Parkes, may be regarded as the founder of Hygiene as a science, and has had the rare distinction of a temple being built in his honour—the Parkes Museum (in Margaret Street, Oxford Street, W.) Of the present editor, Dr. De Chaumont, we must not say much, since happily he bids fair to go on benefiting his country for years to come, but he is certainly a worthy successor to Dr. Parkes in the Professorship of Military Hygiene at Netley.

Thus far, however, we have not given evidence in support of our assertion, that the book is one of considerable interest for meteorologists. Chapter XIV. is devoted to "Climate," and occupies 14 pages. Chapter XV. is entitled, "Description of the Meteorological Instruments, and a few notes on Meteorology." This occupies 21 pages, and is extremely good. But besides these chapters and others on Air and on Water, the calculation of averages, the drawing of diagrams, air meters, wells, ventilation, the climate of foreign stations, meteoric and volcanic dust, and a host of other subjects, are discussed at various length in this excellent work, not the least important feature in which is an index of about 3,000 entries.

PINK SEMI-CIRCLE OPPOSITE THE SUN.

To the Editor of the Meteorological Magazine.

SIR,—Mr. Backhouse inquires whether the pink semi-circle opposite the sun is of frequent occurrence. I can say nothing as to sunrise, as, being in the town, I have no opportunity of observing, but at sunset they have frequently been seen, notably so on the evenings of the 10th and 11th of this month, when it was unusually brilliant, and with the rising full moon on its southern edge, and Venus shining brightly in the red orange sun-set, the sky presented a glorious sight. The phenomenon has accompanied sunsets of a

deep orange red and green colour, with a fiery red after-glow for an hour or more after the sun itself had set, but I have never observed it with an ordinary red sunset.

Leaving to others, better able to form an opinion, to say whether Krakatoa or aqueous vapour, is responsible for these unusual sunsets, I will merely observe that they were remarked before Krakatoa was heard of, and that those most brilliant, and leaving an after-glow have been followed by rain or snowstorm of some days duration, so much snow not having been known here within memory, whether in the plain country or in the mountains. The sunsets of the 10th and 11th were followed from midnight of the 11th by almost incessant snow till the morning of the 16th, turning to sleet all that day, with very dark overcast days till the night of the 18th. There was but one break in the clouds during that time, viz., on the afternoon of the 13th, when there was another green and orange sunset with lurid red after-glow.—Truly yours,

M. F. WARD, F.R.A.S.

Munich, Jan. 29th, 1884.

[Can Col. Ward oblige us with copies of any printed notices of unusual sunsets, afterglows, &c., published before August 26th?—Ed.]

THE KRAKATOA ERUPTION.

To the Editor of the Meteorological Magazine.

SIR,—The Council of the Royal Society has appointed a committee for the purpose of collecting the various accounts of the volcanic eruption at Krakatoa, and attendant phenomena, in such form as shall best provide for their preservation and promote their usefulness.

The Committee invite the communication of authenticated facts respecting the fall of pumice and of dust, the position and extent of floating pumice, the date of exceptional quantities of pumice reaching various shores, observations of unusual disturbances of barometric pressure and of sea level, the presence of sulphurous vapours, the distances at which the explosions were heard, and exceptional effects of light and colour in the atmosphere.

The Committee will be glad to receive also copies of published papers, articles, and letters bearing upon the subject. Correspondents are requested to be very particular in giving the date, exact time (stating whether Greenwich or local), and position whence all recorded facts were observed. The greatest practicable precision in all these respects is essential.

All communications are to be addressed to

Your obedient servant,

G. J. SYMONS.

Chairman Krakatoa Committee.

*Royal Society, Burlington House, W.,
February 12th, 1884.*

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JUNE, 1883.

STATIONS. (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain.		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
°		°		°	°	°	0-100	°	°	inches			
England, London	85·6	29	41·3	17	71·4	50·4	49·1	70	125·5	36·8	1·35	12	5·7
Cape of Good Hope ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mauritius	79·4	7	59·4	11	75·8	65·2	61·2	71	...	...	1·97	13	4·3
Calcutta	98·7	1	73·2	5	90·8	77·7	78·0	80	161·9	71·4	10·20	20	8·0
Madras .....	...	...	...	...	...	...	...	...	...	...	...	...	...
Bombay	92·3	1	73·7	7	87·0	78·1	77·4	84	149·4	71·1	13·65	25	8·9
Ceylon, Colombo	87·8	2	72·8	9	85·4	76·7	73·1	77	148·0	...	11·71	20	8·0
Melbourne	65·2	15*	37·3	10	60·1	47·9	45·4	75	117·4	31·0	1·96	11	7·3
Adelaide	65·5	13	44·5	28	61·6	49·4	47·5	75	127·4	36·4	2·77	16	6·2
Wellington	63·0	25	33·5	13	56·3	43·9	...	...	112·0	30·0	1·60	8	...
Auckland	62·5	22	40·0	13	58·9	48·3	45·7	74	130·0	35·0	3·30	15	6·1
Falkland Isles	44·9	10	11·8	19	40·7	32·2	35·0	95	87·6	13·6	1·73	23	7·9
Jamaica, Kingston .....	...	...	...	...	...	...	...	...	...	...	...	...	...
Barbados	83·0	27†	70·0	7, 8	81·0	72·0	73·6	86	147·0	69·0	8·43	19	6·5
Toronto	78·9	24	39·2	1	71·2	52·5	56·0	77	142·0	32·4	4·96	14	6·5
New Brunswick, Fredericton	87·7	27	40·0	2	75·2	51·1	54·0	74	...	...	3·01	17	6·2
Manitoba, Winnipeg ...	94·2	27	28·0	2	73·8	48·5	53·2	52	...	...	3·91	10	5·2
British Columbia, Yale	...	...	...	...	...	...	...	...	...	...	...	...	...

* And 16. † And 29.

REMARKS, JUNE, 1883.

Mauritius.—Rainfall ·09 in. below the average; mean pressure 30·126 in.; mean hourly velocity of wind 10·8 miles, extremes 29·8 miles and 2·3 miles; prevailing direction S.E.; strong trade wind from 24th to end of month. C. MELDRUM, F.R.S.

CEYLON.—TSS on four days, and L four other days. J. H. SYMONDS.

Melbourne.—Mean temp. 4° above the average; temp. of dewpoint and amount of cloud also above the average; humidity, pressure, and rainfall all very slightly below it; prevailing direction of wind N., strong breezes occurring on 9 days; violent gusts from N. on the morning of 22nd; heavy dew on 10th and 11th; heavy T and H storm on 23rd; auroral light seen on 27th. R. L. J. ELLERY, F.R.S.

Adelaide.—Mean pressure 30·136 in., being slightly above the average of 26 years; mean temp. (55·5) 1°·9 above the average, and the highest since 1871; mean daily range (12°·2) 1°·6 below the average, and the total range, 21°·0 was the least monthly range on record; amount of cloud below the average; rainfall 17 in. above it. Although the rainfall at Adelaide was only 2·77 in., yet over the agricultural districts generally it was very heavy; on 21st and 22nd the R was steady and heavy, especially in the Mt. Lofty ranges, where at places upwards of 3 in. fell in 24 hours, and the country was everywhere flooded. C. TODD.

Wellington.—Up to the 10th fine with moderate winds, chiefly from S.E.; on night of 10th wind changed to S.W., with H, L, and slight B; a S.W. gale blew on night of 13th, with R and H; from 15th to 23rd generally fine, with frequent strong N.W. wind; heavy B on night of 24th, then fine until 30th. R. B. GORE.

Auckland.—Mean pressure slightly below the average; temp. about the average; rainfall much below it. T. F. CHEESEMAN.

BARBADOS.—Mean temp. (75°·8) (1°·5) below the average of 25 years; prevailing direction of wind N.E.; mean hourly velocity, 15·4 miles, extremes 19·8 miles and 8·9 miles; rainfall 33 per cent., and evaporation 19 per cent., above the average; nine days were overcast; L on 1st, T on 21st. R. BOWIE WALCOTT.

SUPPLEMENTARY TABLE OF RAINFALL, JANUARY, 1884.

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

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger	2·60	XI.	Carno, Tybrith	8·20
„	Margate, Birchington...	1·64	„	Corwen, Rhug	4·20
„	Littlehampton	3·12	„	Port Madoc .....	...
„	Hailsham .....	...	„	I. of Man, Douglas	6·85
„	I. of W., St. Lawrence.	3·45	XII.	Stoneykirk, Ardwell Ho.	5·76
„	Alton, Ashdell	4·49	„	Melrose, Abbey Gate...	5·52
III.	Winslow, Addington ...	2·50	XIII.	N. Esk Res. [Penicuik]	4·95
„	Oxford, Magdalen Col...	2·30	XIV.	Ayr, Cassillis House ...	7·44
„	Northampton	2·22	„	Glasgow, Queen's Park.	5·55
„	Cambridge, Beech Ho...	1·35	XV.	Islay, Gruinart School..	5·85
IV.	Southend	1·73	XVI.	St Andrews, Newton Bk	3·78
„	Harlow, Sheering	2·03	„	Balquhider, Stronvar..	12·73
„	Diss	1·58	„	Dunkeld, Inver Braan..	6·51
„	Swaffham	1·92	„	Islay, Gruinart School..	9·45
„	Hindringham	2·18	XVII.	Keith H.R.S.	3·20
V.	Salisbury, Alderbury ...	3·54	„	Forres H.R.S.	3·36
„	Warminster	3·77	XVIII.	Strome Ferry H.R.S...	10·17
„	Calne, Compton Bassett	3·34	„	Lochbroom	11·08
„	Ashburton, Holne Vic..	9·72	„	Tain, Springfield.....	4·05
„	Holsworthy, Clawton...	4·24	„	Loch Shiel, Glenaladale	18·91
„	Lynmouth, Glenthorne.	6·65	„	Invergarry	14·32
„	Probus, Lamellyn	4·15	XIX.	Lairg H.R.S. ....	...
„	Wincanton, Stowell Rec.	3·45	„	Forsinard H.R.S.	4·53
„	Taunton, Fullands	3·26	„	Watten H.R.S.	3·65
VI.	Bristol, Clifton	4·82	XX.	Dunmanway, Coolkelure	10·59
„	Ross	3·28	„	Fermoy, Gas Works ...	3·40
„	Wem, Sansaw Hall.....	2·86	„	Tralee, Castlemorris ...	4·43
„	Cheadle, The Heath Ho.	2·98	„	Tipperary, Henry Street	4·95
„	Worcester, Diglis Lock	3·02	„	Newcastle West	5·32
„	Coventry, Coundon	3·26	„	Milton Malbay.....	4·70
VII.	Melton, Coston	2·27	„	Corofin	5·75
„	Ketton Hall [Stamford]	1·93	XXI.	Carlow, Browne's Hill..	4·16
„	Horncastle, Bucknall ...	2·20	„	Navan, Balrath	3·37
„	Mansfield, St. John's St.	3·51	„	Mullingar, Belvedere...	4·54
VIII.	Macclesfield, The Park.	4·03	„	Athlone, Twyford	7·46
„	Walton-on-the-Hill.....	3·59	XXII.	Galway, Queen's Col...	5·41
„	Lancaster, South Road.	5·46	„	Clifden, Kylemore .....	...
„	Broughton-in-Furness..	8·19	„	Crossmolina, Enniscoe..	7·85
IX.	Wakefield, Stanley Vic.	2·81	„	Carrick-on-Shannon ...	4·08
„	Ripon, Mickley	4·71	XXIII.	Dowra .....	...
„	Scarborough	2·99	„	Rockcorry.....	5·08
„	East Layton [Darlington]	4·31	„	Warrenpoint	5·15
„	Middleton, Mickleton ..	7·33	„	Newtownards	5·14
X.	Haltwhistle, Unthank..	6·98	„	Belfast, New Barnsley .	6·15
„	Shap, Copy Hill	9·68	„	Cushendun	7·24
XI.	Llanfrechfa Grange ...	6·65	„	Bushmills	5·17
„	Llandovery	8·38	„	Stewartstown	6·02
„	Solva	3·12	„	Donegal, Revelin Ho....	...
„	Castle Malgwyn	5·08	„	Buncrana	5·55
„	Rhayader, Nantgwillt..	9·41	„	Carndonagh	5·01

JANUARY, 1884.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					Days on which .01 or more fell.	TEMPERATURE.				No. of Nights below 32°.	
		Total Fall.	Difference from average 1870-9	Greatest Fall in 24 hours.		Deg.		Date	Deg.	Date			
				Dpth	Date.								
											inches	inches	in.
I.	London (Camden Square)	2.30	— .05	.55	26	16	55.6	29	32.2	1	0	8	
II.	Maidstone (Hunton Court)....	2.33	— .24	.70	25	17	...	...	...	...	...	...
III.	Strathfield Turgiss	2.83	+ .28	.80	26	19	56.3	30	30.2	1	1	13	
IV.	Hitchin	2.14	— .08	.62	26	16	52.0	23b	29.0	28	6	...	
V.	Banbury	2.75	+ .37	.55	26	19	54.0	23c	29.5	28	5	...	
VI.	Bury St. Edmunds (Culford) ..	1.84	— .00	.47	26	17	58.0	23	29.0	1	7	...	
VII.	Norwich (Cossey)	1.37	— .33	.23	26	14	56.0	30	31.0	19	1	8	
VIII.	Weymouth (Langton Herring) ..	3.31	...	.63	26	19	52.0	29b	32.0	1, 27	2	...
IX.	Barnstaple	4.63	+ .37	.75	25	19	56.0	5	35.0	1, 2	0	...	
X.	Bodmin	5.07	— 1.44	.75	26	23	53.0	4d	33.0	27	0	4	
XI.	Cirencester	3.79	+ .41	.55	23	19	...	...	...	...	...	...
XII.	Church Stretton (Woolstaston) ..	3.20	— .23	.53	26	18	52.0	29	29.0	2	6	6	
XIII.	Tenbury (Orleton)	3.28	+ .29	.66	26	17	55.8	22	30.0	29	2	6	
XIV.	Leicester	2.14	...	.30	23	19	54.2	24	30.6	27	1	2
XV.	Boston	1.90	+ .18	.34	3	10	54.0	23	33.0	26	0	...	
XVI.	Grimsby (Killingholme)	2.76	+ 1.00	.64	23	19	53.0	22e	32.0	28	0	...	
XVII.	Hesley Hall (Tickhill)	2.90	...	.48	23	18	55.0	...	32.0	2	4	...
XVIII.	Manchester (Ardwick)	4.43	+ 1.19	.62	25	20	52.0	...	31.0	28	5	...	
XIX.	Wetherby (Ribston Hall) ..	3.42	+ 1.20	.74	3	12	...	...	...	...	...	...
XX.	Skipton (Arneliffe)	11.57	+ 4.64	2.55	22	27	51.0	9, 22	33.0	2	0	...	
XXI.	North Shields	2.93	+ 1.09	.57	3	19	55.5	9	29.0	29	8	9	
XXII.	Borrowdale (Seathwaite)	22.51	+ 3.76	4.07	22	29	...	...	...	...	...	...
XXIII.	Cardiff (Ely) ..	6.35	+ 1.64	1.06	31	20	...	...	...	...	...	...
XXIV.	Haverfordwest	5.76	— .51	1.00	2	26	53.5	23	31.9	26	1	2	
XXV.	Plinlimmon (Cwmsymlog) ...	6.88	...	1.62	22	23	...	...	...	...	...	...
XXVI.	Llandudno	4.52	+ 1.56	.88	22	19	54.0	5	32.2	2	0	...	
XXVII.	Cargen [Dumfries]	8.41	+ 2.30	1.21	26	23	51.8	9	26.6	3	4	...	
XXVIII.	Hawick	6.05	+ 2.83	.71	23	22	...	...	...	...	...	...
XXIX.	Douglas Castle (Newmains) ..	8.72	+ 3.28	1.15	29	22	...	...	...	...	...	...
XXX.	Lochgilphhead (Kilmory)	10.40	+ 2.53	1.69	26	28	...	...	...	...	...	...
XXXI.	Oban (Craigvarren)	7.56	...	.99	24	29	52.0	19	29.7	26	3	...
XXXII.	Mull (Quinish)	7.51	...	.71	22	26	...	...	...	...	...	...
XXXIII.	Loch Leven Sluices	5.60	+ 1.78	.90	5, 25	17	...	...	...	...	...	...
XXXIV.	Arbroath	3.06	+ .61	.55	4	16	50.0	9	26.0	3, 26	7	...	
XXXV.	Braemar	4.80	+ 2.02	.97	4	22	50.0	21f	14.3	3	14	27	
XXXVI.	Aberdeen	3.02	...	.87	23	17	55.0	15	25.0	26	11	...
XXXVII.	Skye (Sligachan)	16.37	...	3.00	20a	26	...	...	...	...	...	...
XXXVIII.	Culloden	3.74	+ 1.97	...	...	...	52.0	5	26.0	1	10	21
XXXIX.	Dunrobin	4.73	...	.84	23	23	56.0	21	25.5	26	5	...
XL.	Orkney (Sandwick) .....	...	...	...	...	...	...	...	...	...	...	...
XLI.	Cork (Blackrock)	6.85	+ .83	1.08	2	19	56.0	29	30.0	26	1	...	
XLII.	Dromore Castle	9.15	...	1.44	22	23	57.0	22	32.0	25g	3	...	
XLIII.	Waterford (Brook Lodge) ...	5.11	...	.78	2	20	55.0	22	29.0	27	3	6
XLIV.	Killaloe	6.07	...	.82	25	25	54.0	var.	30.0	27	2	...
XLV.	Portarlington	3.30	+ .24	.62	22	21	55.0	22	32.0	27	2	...	
XLVI.	Dublin (Fitz William Square) ..	2.36	+ .10	.38	22	18	55.8	29	31.2	27	4	6	
XLVII.	Ballinasloe	5.40	+ 1.04	.95	22	29	51.0	4	26.0	27	4	...	
XLVIII.	Waringstown	4.65	+ 1.24	.75	22	24	55.0	9, 22	28.0	25	6	12	
XLIX.	Londonderry (Creggan Res.) ..	6.31	...	.74	3	27	...	...	...	...	...	...
L.	Omagh (Edenfel)	5.70	+ 1.93	.76	22	27	59.0	14	23.0	25	13	...	

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

a And 24. b And 30. c And 24. d And 23, 29. e And 23. f And 22. g And 26, 27.

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.

STRATHFIELD TURGISS.—The weather was very rough towards the close of the month, and the temp. rather lower than it had been in the earlier part; heavy gales occurred from S.W. on 20th and 26th, during which much R fell; some serious damage was done by the force of the wind, some firs nearly 90 ft high being snapped off about 8 ft. from the ground; TSS of great violence, accompanied by H, occurred on the 25th and 26th.

HITCHIN.—Terrific gale on 26th; bar. reading 28.32 in.

BANBURY.—A remarkable month, mean temp. $43^{\circ}5$, about 8° above the average; the first week was rather wet, the second and third weeks were very fine with high barometric pressure; the rest of the month was stormy, especially from 25th to 28th, the bar. on 26th falling to 28.423 in. (cor. and red.) at 6.30 p.m., with tremendous wind, doing much mischief; S on 1st and 27th; H on 1st, 11th and 25th; high wind on 11 days, fog on four days.

CULFORD.—The month was remarkable for high winds, but was very mild and open; very stormy with L on 26th.

COSSEY.—Gale on 26th, with R, H and L.

LANGTON HERRING.—A very mild month, the temp. falling to 32° on only two occasions; the first 10 days were unsettled, R falling each day, succeeded by 10 very fine dry days, with remarkably steady pressure and the air perfectly calm; a violent storm was experienced on 26th and 27th, with T and L; mean temp. of the month $44^{\circ}0$, $4^{\circ}5$ above the average of 12 years.

BODMIN.—Very heavy gales occurred on the 23rd, 25th, 26th and 27th, but little damage was sustained in this neighbourhood; mean temp. $45^{\circ}9$; L on 26th and 27th.

WOOLSTASTON.—A slight fall of S on the 1st was followed by three weeks of beautiful mild and open weather; a series of gales commencing on the 22nd culminated in one of extreme violence on 26th; the bar. at its lowest at 5.30 p.m. on that day, after which it slowly rose; mean temp. of the month $42^{\circ}1$.

ORLETON.—The temp. was very high and steady during the whole of the month, the mean being $6^{\circ}5$ above the average of 23 years; light falls of R occurred on six out of the first seven days, which were generally cloudy and damp; after this R fell on only one day till the 22nd, and the weather was generally cloudy and dry, and the bar. very high and steady. The remainder of the month was very stormy and rainy; bar. lowest at 6 p.m. on 26th, accompanied by a great storm of wind and R which flooded the river Teme on the following morning.

LEICESTER.—Another very mild month and very dry from 9th to 21st; on 24th, and 26th, the wind was very high, and the bar. on the latter day fell to 28.427 in. (corrected) flashes of L were seen on the evenings of 15th, 26th, and 27th.

BOSTON.—Very heavy gales from 20th to 27th; on 26th the force of the wind amounted to a mild hurricane; a small fall of S on 27th.

GRIMSBY, KILLINGHOLME.—A very mild month, winds light in the early part but very high on several occasions in the latter part; gale on 23rd, great gale on 26th with T and L.

HESLEY HALL [TICKHILL].—Mild weather prevailed throughout the month generally, but from the 22nd to the end south-westerly gales with much R brought colder weather, and caused great damage to trees.

ARNcliffe.—A very wild rainy month, the fall of 2.55 in. on 22nd is most unusual.

NORTH SHIELDS.—Very stormy on 26th with L; at 10 p.m. the bar. stood at 27.90 in. and continued to fall till it reached 27.63 in., it then rose, and at

2 a.m. on 27th stood at 28.00 in. It seems that there was a more violent gale in January 1839, but during 44 years the bar. never fell so low.

SEATHWAITE.—Falls of R exceeding one inch in 24 hours occurred on 11 days during the month, and on the three days 21–23, 7.41 in. fell causing a great flood ; gales also did much damage ; on 23rd about 5 p.m. it blew with such force that walking was quite a difficulty, and another terrific gale blew on the 26th.

WALES.

HAVERFORDWEST.—This January was characterized by entire absence of frost, great gloom and damp and remarkable calmness of the atmosphere with very high bar. (30.705 in. cor. on 15th) until the memorably stormy period which began on the night of 21st ; it was exceedingly wild all day on 23rd ; ominously calm on 24th ; very stormy all day with E, L and R and tempest at night on 25th, culminating in the great storm of Saturday the 26th. Pressure at 9 a.m. on 26th, 28.958 in. (cor.) noon 28.731 in., 5 p.m. 28.418 in. the lowest point observed, and at 11 p.m., 28.634 in. R and gloom prevailed to the end of the month.

LLANDUDNO.—The month was exceptionally mild and equable as regards temp., the mean being more than 4° above the average and the range both diurnal and monthly markedly below it ; the R, however, was excessive. There was a terrific gale of wind from S.W., on the afternoon of the 26th, at its worst about 3.30 p.m. ; the dome of the Grand Pavilion which was just completed sustained serious damage.

SCOTLAND.

CARGEN.—A very stormy, wet, dull month, mean temp. (42° 6) nearly 4° 5 above the average ; rainfall more than one-third above the average, and sunshine not much more than half the usual amount ; a very heavy gale was experienced on the 23rd, and did considerable damage ; it lasted from four to five hours ; the gale of 26th was one of extreme violence, and lasted 14 hours, and was most disastrous in its effects ; from reports from the district it appears to have caused more destruction than the storm of 11th–12th Dec., 1883 ; on one large estate in the district it is estimated that upwards of 1,000,000 trees have been blown down by these storms, the bar. on 26th fell to the exceedingly low point of 27.660 in. which is .480 in. below the lowest point recorded during the previous 24 years.

HAWICK.—Very stormy weather on 3rd, 21st, 26th, 27th and 29th, much L on the nights of 20th and 29th ; mild from 5th up to 20th ; the storm of the 26th was the most severe we have had since the Tay Bridge disaster.

OBAN, CRAIGVARREN.—Rainfall unusually large, and on no less than 19 days there were heavy gales ; the temp. was on the whole high, but the range was considerable ; on the 26th a terrific gale occurred from S.W., the tide rose two feet above ordinary springs, and the bar. at 9 p.m. stood at 27.39 in.

BRAEMAR.—An usually fine month up to the 22nd ; primroses in flower, and rose bushes and honeysuckle budding ; on 26th at 9 p.m. the bar. read 26.350 in. (1,114 ft. above sea level), the lowest reading by an inch recorded during 27 years.

ABERDEEN.—Rainfall somewhat above the average ; fair seasonable weather prevailed during the greater portion of the month till the 23rd, when a heavy rainfall occurred, succeeded by violent gales on 26th and 27th ; at midnight on 26th, the bar reached the lowest point ever recorded here—viz., 27.40 in. (cor. and red.)

SLIGACHAN.—The first three days of the month were very fine ; the rest of the month was very stormy ; terrible gales from S.W. veering to N.W. blew on the nights of 19th and 21st, and a heavy fall of S occurred on 26th, with high wind from N.W., veering to S.W. ; it was the wildest day I ever experi-

enced, a great number of sheep were lost throughout the island buried in the snowdrift.

CULLODEN.—The first and second weeks were very fine, from the 6th to 20th particularly so; the 26th and 27th will be long remembered, a storm of S with tremendous drifts visiting the north, and indeed Scotland generally; the bar. fell to a point lower than any observed during many years, the lowest reading being at 11 p.m. on 26th, 27·386 in.

IRELAND.

BLACKROCK.—Temp. generally high in the first part of the month, but it changed colder about the 21st, followed by storms on 23rd and on 26th, with violent R (·735 in., nearly all in one hour) and T; part of the dome of the observatory was blown off and carried many yards away; the bar. fell to 28·53 in. at noon on the 26th.

WATERFORD.—Rainfall one inch above the average; the early part of the month was very mild, primroses in bloom and woodbine in leaf; from the 21st to the end of the month was very wild and wet; S fell on three days; H on 1st and 23rd, and L was seen on 21st and 25th.

KILLALOE.—Very mild open weather prevailed, with average rainfall, until the 17th, after which date it blew heavily at intervals, rising to a very severe gale on the 26th, followed by a fall of S; some T and L on days preceding the storm.

DUBLIN, FITZWILLIAM SQUARE.—A singularly open frostless month, with scarcely any easterly wind, but a great excess of cloud; a protracted mild, quiet, and dull period was succeeded on the 22nd by a series of strong westerly gales and frequent heavy rainfalls, the atmospheric disturbances culminating on the 26th in a storm of exceptional violence; at 2.15 p.m. the bar. stood at 28·150 in. The mean temp. (45°·2) was slightly over 4° in excess of the average, and the rainfall and rainy days were both also above the average; H occurred on 1st and 30th; S or sleet on 25th, 26th, and 27th; L was seen on the nights of 20th and 25th.

BALLINASLOE.—Generally very wet, with unusually high temp., there being only four days frost in the month; violent gales on 22nd and 26th.

WARINGSTOWN.—The beginning of the month was wet, followed by a fortnight of fine dry weather, on the breaking up of which we experienced two of the most severe gales I have witnessed; that of the 26th was awful, and the damage done equals that of January 6th-7th, 1839; the bar. fell to 27·556 in., much the lowest point touched since I have kept a record.

LONDONDERRY, CREGGAN RES.—The month was very stormy; especially severe westerly gales blowing on the 23rd and 26th.

WIND PRESSURE AT THE FORTH BRIDGE.

During the storm of the 12th of last month (December, 1883), which seems to have been general in its violence all over the country, the pressures of wind recorded on the boards erected by Mr. Baker were—on the small board, about 1·5 ft. square, 38·5 lbs. per square foot; on the large board, having an area of 300 square feet, the pressure recorded was 21·5 lbs. per foot. At Wexford, at the same time, the maximum pressure recorded on a board about 2 ft. square was 28 lbs.—*The Engineer*, Jan. 4, 1884. Vol. lvii. p. 12.