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THE EIFFEL TOWER AND ITS USE.

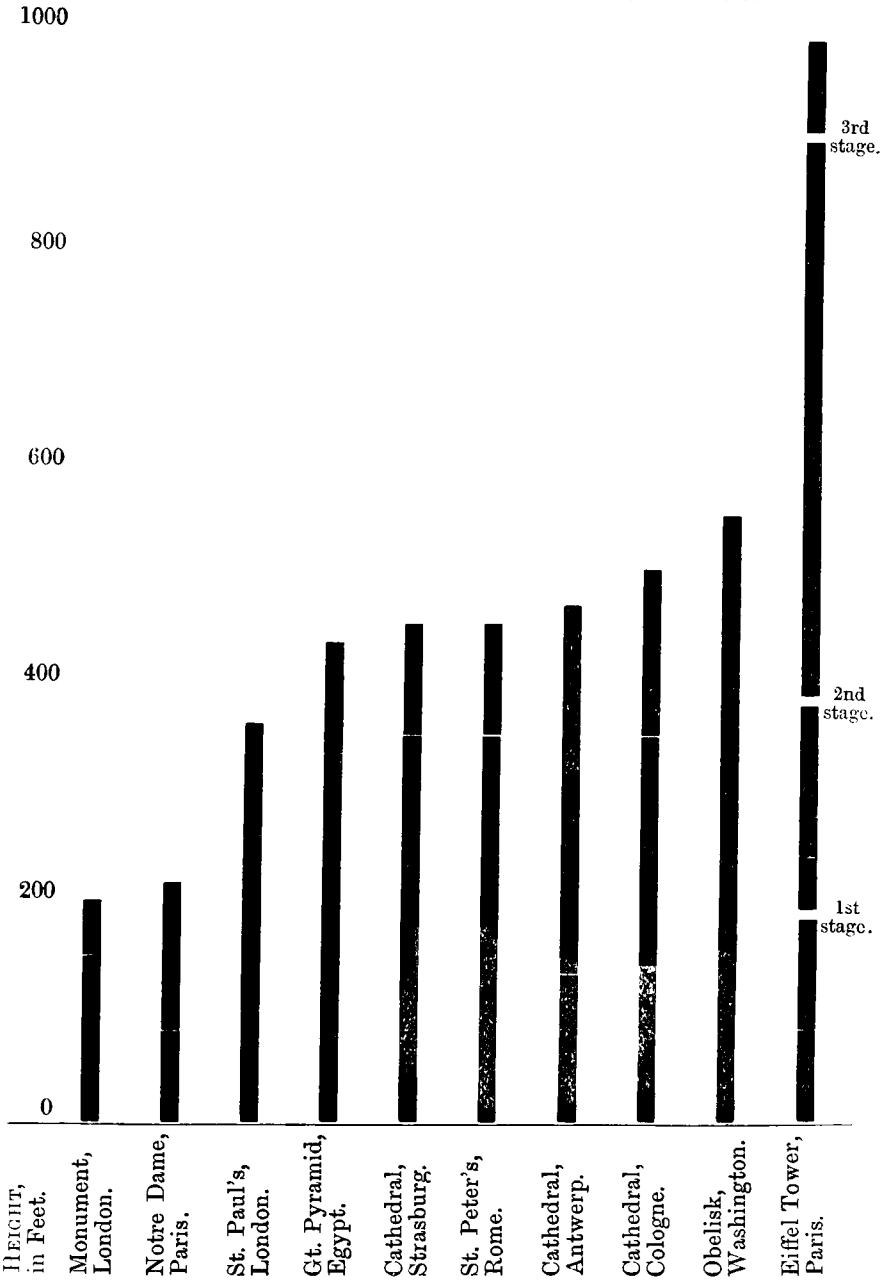
WE did think of giving a sketch of the Eiffel tower in illustration of the following remarks, but we found that to represent the meteorological apparatus even on the smallest scale visible without a magnifier, our view of the tower must be eight feet long, so we gave up the idea.

Almost everybody has either seen the tower or an engraving of it, and almost everybody admits its elegance and the skill shown in its design. It would be interesting to disinter from the press of 1886, a list of the authorities in the "world of light and leading," who then proclaimed the proposal as a mistake, an abomination—a disgrace to Paris, &c. But they are silent now; the tower was built, the world went and saw it, and thought and talked more about it, than about all the other wonders in the monster show.

A company has been formed to erect a somewhat similar tower in the metropolis, and it has received almost as many sneers and as much ridicule as did M. Eiffel's. Perhaps those sneers may be regarded as an augury for good. There are many respects in which a lofty tower might be of enormous utility in London—we mention only two subjects, fires, fogs.

Here we have to deal with M. Eiffel's tower solely from a meteorological standpoint—but before going into that branch of the subject we have prepared a diagram giving approximately the relative heights of some of the loftiest buildings in the world. We do not, however, vouch for the correctness of the heights, because we can find no two tables which agree—*e.g.*, in some cases the height is reckoned above the floor of the *crypt*—and there is a tradition that the 404 feet sometimes attributed to St. Paul's Cathedral, is the height of the cross above the Thames!

APPROXIMATE HEIGHT OF LOFTY BUILDINGS.



The public were taken by the lifts up to the 3rd Floor, at the height of 896 ft., but the tower reaches more than 80 ft. above that, and terminates with an iron floor about 4 ft. in diameter,

surrounded by a breast high iron railing, to which are attached a series of meteorological instruments—all supplied by Messrs. Richard Frères. We are not sure that we remember them all, but from memory we give the list as follows :—

Anemometers recording direction, velocity and inclination of wind—thermometer screen with max. min. dry and wet thermometers—recording thermograph, hygrometer and rain gauge—many of these instruments recorded their indications at the ground level, telegraph wires carrying the indications to MM. Richard's case in the *Palais des arts libéraux.* From near the centre of this little platform rose the lightning conductor, and above all (even above the rain gauge !) floated the national flag.

THE TOWER STRUCK BY LIGHTNING.

A very ridiculous idea took possession of some Parisians, they thought that there were more thunderstorms than usual, and declared that the Eiffel Tower produced them. If it had any effect it would probably be to dissipate, rather than to create, storms. But one day it was announced that the tower had been struck by lightning. As it is probably the best lightning conductor in the world, there was no reason why it should not be struck, but strong reason why it should be none the worse for it—and that is what proved to be the case, as is shown by the following account :—

As many exaggerated reports have been circulated concerning the effects of the flash of lightning which struck the Eiffel Tower on the evening of the 19th of August, M. Mascart has drawn up a report upon the phenomenon, which was observed amongst others by M. Foussat, the chief of the electric service, who happened to be on the upper platform of the tower at the time.

The tower is protected by a central rod at the summit and by eight other rods on the balustrade of the third platform. The discharge of lightning occurred at 9.40 p.m. and struck the principal conductor at the summit ; it was accompanied by a terrific noise, resembling the detonation of several pieces of artillery. Some red metallic droplets, were detached from the point of the conductor, and were probably due to the combustion of particles of volatilised iron. The lightning-conductors on the platform appeared to have luminous " brushes " at their points, and a considerable decrepitation was noticed. The official who looks after the light was near his apparatus and two men were at work with the machinery, while M. Foussat was leaning against the balustrade, and it is remarkable that neither of these four persons experienced the least inconvenience at the time of the flash, neither were any of the meteorological instruments damaged.

Almost immediately after the tower was struck, a strongly-electrified cloud (it was raining at the time) surrounded the lantern of the tower, and, no doubt, this circumstance gave rise to the impression, which many observers at some distance from Paris

experienced—namely, that the upper part of the Eiffel Tower, immediately after the discharge, appeared to be enveloped in a *luminous* electric cloud, which almost entirely eclipsed the light from the lantern.

M. Mascart considers that there was nothing very extraordinary connected with the phenomenon; that it has conclusively proved that the tower has perfect communication with the earth, and that the safety of the edifice has been definitely established.

THE ANEMOMETER ON THE EIFFEL TOWER.

The *Comptes rendus* of the Paris Academy of Sciences, of Nov. 4th, 1889, contains a note by M. A. Angot, on the mean hourly velocity of the wind at the summit of the Eiffel Tower, measured during 101 days ending with October 1st, by means of an Anemometer placed at 994 feet above the ground, and compared with the results of a similar instrument at the Paris Meteorological Office, placed at 66 feet above the ground. The average velocity on the tower was 16 miles an hour, being over three times the amount registered at the Meteorological Office, where it was only 5 miles an hour. At the lower station the diurnal variation showed a single minimum about sunrise, and a single maximum about 1 p.m. On the tower the minimum occurred about 10 a.m., and the maximum about 11 p.m., while the characteristic maximum of lower regions about the middle of the day was hardly perceptible on the tower. It is remarkable that this inversion, which is usual upon high mountains, should occur at so small a height as that of the Eiffel Tower. The ratio of increased velocity was constant at about 5·1 between midnight and 5 a.m.; it then decreased rapidly and became 2·1 at about 10 a.m., and maintained this value until 2 or 3 p.m., when it again rose regularly until midnight.

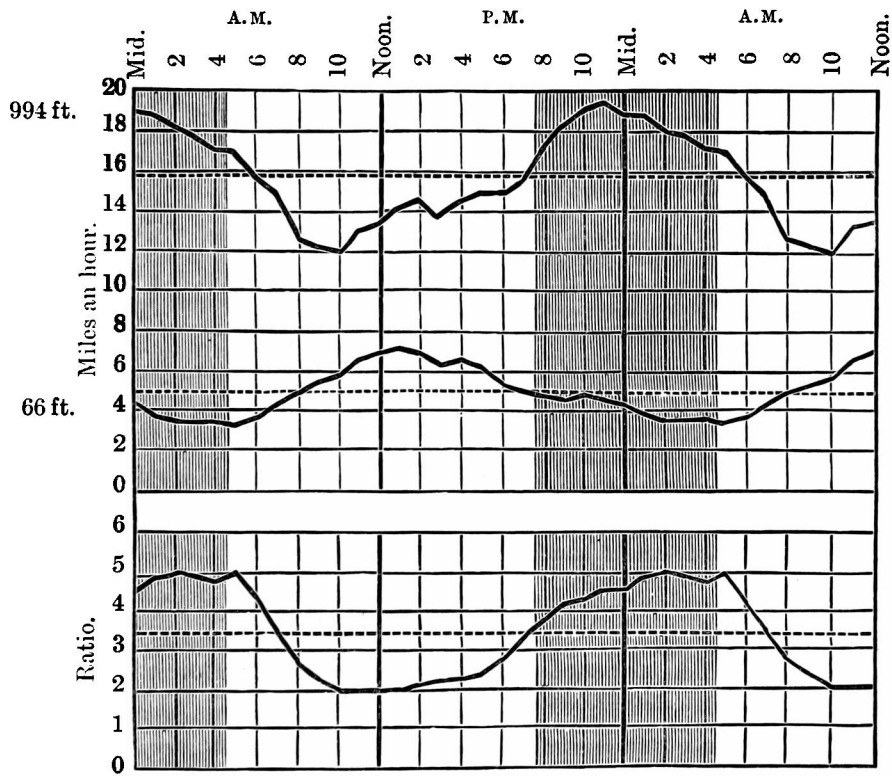
We append the table given by M. Angot, but have converted the wind velocities from metres per second into the equivalent in miles per hour.

Mean Velocity of the Wind upon 101 *days between June* 18*th and September* 30*th*, 1889.

Hour.	Eiffel Tower.	Bureau Central.	Ratio.	Hour.	Eiffel Tower.	Bureau Central.	Ratio.
Midnight...	19·0	4·1	4·6	Noon	13·5	6·9	2·0
1 a.m. ...	18·8	3·9	4·9	1 p.m. ...	14·2	7·1	2·0
2 ,, ...	18·1	3·6	5·0	2 ,, ...	14·4	6·9	2·1
3 ,, ...	17·8	3·6	4·9	3 ,, ...	13·9	6·3	2·2
4 ,, ...	17·2	3·6	4·8	4 ,, ...	14·4	6·4	2·3
5 ,, ...	16·7	3·4	5·0	5 ,, ...	15·0	6·2	2·4
6 ,, ...	15·8	3·7	4·3	6 ,, ...	15·1	5·5	2·7
7 ,, ...	14·7	4·2	3·5	7 ,, ...	15·6	4·7	3·3
8 ,, ...	12·5	4·7	2·7	8 ,, ...	17·3	4·5	3·8
9 ,, ...	12·2	5·4	2·3	9 ,, ...	18·2	4·4	4·1
10 ,, ...	12·0	5·9	2·0	10 ,, ...	19·2	4·6	4·2
11 ,, ...	13·3	6·5	2·0	11 ,, ...	19·6	4·4	4·5

We always hold that diagrams form far the best mode of communicating facts, and the above results are so unexpected that we have tried to make them quite clear. It will be seen that M. Angot's discussion referred to the period between the middle of June and the end of September—for this period sunrise may be roughly taken as about 5 a.m. and sunset as 7 p.m., and in the diagram, shaded space represents the time when the sun was below the horizon—shade = night, white = day.

The diagram represents the average velocity of the wind at the two positions for the 101 days, and it has a further peculiarity, which when understood is a convenience, but unless understood is perplexing—the diagram contains 36 hours—i.e., *the morning hours are repeated after midnight.* This enables one to study the general character of any part of the curve much better than if the night had been given only in two disjointed halves. When one wishes to study the daylight phenomena, one can cover the 3rd 12 hours; when to study those of the night, the 1st 12 hours.



At the Bureau Central, at 66 ft., scarcely a $\frac{1}{4}$ of a mile from the base of the tower, the wind velocity shows the same law as is found at the majority of European observatories, namely, a maximum

velocity shortly after noon and a minimum just before sunrise, the one being double the other.

On the tower the wind is, on the average, much stronger than down below, which is of course readily explained by the absence of retardation by friction against trees and buildings; but what is not easily explained is the further fact that the time of maximum and of minimum are almost reversed—the max. occurring about midnight and the min. about 10 a.m. The sharpness of the effect of sunrise on the winds motion is apparent in all three curves, but especially in the lowest one, which gives the ratio of the velocity at 994 ft. to that at 66 ft. During the night the wind was generally five times as strong as below, but no sooner does the sun rise than the ratio falls rapidly until during the heat of the day it is only twice, and then as the sun declines it rises gradually to its former point of 5 to 1, the average being rather more than three to one.

The Eiffel tower has much yet to teach us, but, besides having in its construction afforded work to thousands, pleasure to the tens of thousands who ascended it, and considerable profit to the builders, it will, we believe, keep off serious accidents from lightning from about 70 acres of Paris; it has already taught us much as to the nature and causes of wind velocities, with perhaps an indirect hint as to factory chimnies, and we know that there is much yet to come with respect to temperature and other phenomena. So much for what we were told would be "a useless abomination."

ON THE BLACK BULB THERMOMETER IN VACUO.

To the Editor of the Meteorological Magazine.

SIR,—In reading Prof. McLeod's valuable paper on the black bulb thermometer in vacuo, I was somewhat surprised that one so evidently conversant with work in Physics had omitted all mention of the dimensions of his thermometers (small and large even in the matter of thermometer bulbs, being decidedly vague). I should be obliged if you would allow the suggestion to appear. That the insertion of the diameters of the bulbs of the thermometers, and also of the bulbs of the vacuum jackets in a subsequent issue of the *Met. Mag.* would add necessary detail for future experimenters in using Prof. McLeod's results. It would also provide ordinary observers with a standard for estimating the value of their own black bulb thermometers.

Faithfully yours,

H. SOWERBY WALLIS.

25, Northwood-road, Highgate,
December 20, 1889.

Stephen Joseph Perry.

ALTHOUGH astronomers are disappointed with the results of the expeditions to observe the last total solar eclipse, that which has most saddened both them and meteorologists is the loss away in British Guiana, of Father Perry, a man respected, and we think we may say loved by all who knew him. Our only hesitation on that point being produced by the remembrance of the action of the Meteorological Council towards the observatory which Perry ably and carefully directed for nearly 30 years.

The obituary notice in the *Times*, though brief, was so much to the point that we reprint it.

Stephen Joseph Perry was born in London in 1833, and, after studying at the Catholic colleges of Douay and Rome, entered the Society of Jesus in 1853. Between this latter date and 1860, he went through a special course of mathematics at Paris, and was appointed professor and director of the observatory at Stonyhurst College in 1860. The only occasions on which he has been absent from Stonyhurst for any length of time were for studying theology at St. Beuno's College (four years) and to take part in scientific expeditions. Among these expeditions we may mention the magnetic survey of France in 1868-9, the transits of Venus in 1874 and 1882, when he was stationed at Kerguelen and Madagascar respectively; and the eclipses of 1886, 1887 and 1889 at the West Indies, Russia and the Salut Isles. He was elected fellow of the Royal Society in 1874, and he belonged to several other learned societies. He commanded the respect of all who were acquainted with his personal character and his scientific work, by his utter self-abnegation when there was work to be done, being always ready to volunteer regardless of the intense sufferings from sea sickness which the expeditions cost him. His death will be a subject of great regret, not only to the small circle of students at Stonyhurst, whose affections he had won, but to men of all classes in North Lancashire to whom he was well-known."

On this we have but two comments to make (1) the peculiar happiness of the phrase "utter self-abnegation," no words in the language better describe Father Perry's character. (2) North Lancashire, and even England will not alone "greatly regret" his loss, we know full well how warm a welcome awaited him in many a home across the seas.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JUNE, 1889.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Maximum. Date.	Minimum. Temp.	Minimum. Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	TotalRain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0–100	°	°	inches		0–10
England, London	84·5	6	46·9	1	72·7	53·4	52·4	74	126·3	39·6	2·03	6	5·6
Malta	99·0	26	58·2	1	81·4	65·4	62·2	72	150·1	52·0	·00	0	1·5
Cape of Good Hope.	74·8	30	37·0	6	62·7	47·3	...	...	...	...	3·42	9	3·8
Mauritius	77·7	4	58·0	18	75·5	65·0	61·0	75	124·4	48·5	1·53	14	5·2
Calcutta	98·4	7, 8	72·5	4	91·3	78·6	78·9	82	161·0	32·8	15·35	21	7·3
Bombay	93·6	4	76·0	21, 27	87·7	80·0	77·8	83	144·0	73·8	19·89	24	7·3
Ceylon, Colombo	87 4	5	73·8	28	85·1	77·1	72·5	78	147·2	71·8	2·33	16	7·7
Melbourne	66·0	2	37·6	27	57·3	46·9	45·3	77	119·2	28·9	2·78	16	7·0
Adelaide	68·3	4	38·5	25	59·1	48·6	47·9	80	119·9	29·9	4·75	22	7·1
Wellington	60·0	1	31·5	13	53·2	42·9	41·7	79	107·0	25·0	4·04	22	5·0
Auckland	68·0	8	40·0	15	58·9	49·6	49·0	81	111·0	32·0	10·41	25	8·0
Jamaica, Kingston	...	...	...	...	...	...	...	...	...	...	...	...	...
Trinidad	92·0	1*a*	67·0	26	88·7	70·9	71·5	75	158·0	60·0	11·66	21	...
Toronto	78·3	20	44·2	6	68·5	52·0	54·0	81	...	38·2	3·56	17	6·8
New Brunswick, Fredericton	85·2	30	41·0	18	73·7	52·8	56·3	74	...	...	2·89	15	6·5
Manitoba, Winnipeg	95·6	28	33·3	3	79·5	46·8	46·9	58	...	...	·45	9	4·6
British Columbia, Victoria	80·0	2	37·0	6	70·4	46·9	...	...	...	...	·77	5	...

a And 4, 25.

REMARKS, JUNE, 1889.

MALTA.—Mean temp. 71°·8; mean hourly velocity of wind 9·0 miles. The Sea temp. rose from 70°·1 to 74°·8. Sea fog on 23rd J. SCOLES.

Mauritius.—Mean temp. of air 0°·4 below, mean dew point 0°·4 above, and R 0·37 in. below their respective averages. Mean hourly velocity of wind 9·5 miles, or 2·0 below the average; extremes 24·9 on 27th and 0·0 on 18th. Prevailing winds S.E. by E. C. MELDRUM, F.R.S.

Melbourne.—Mean temp. of air 3°·0, of dew point 1°·9; amount of cloud ·4, and R 0·82 in. above average; humidity 3, and pressure 0·248 in. below average. Prevailing wind N.; strong on 12 days. Heavy squalls on 4 days; heavy dew on 6 days; dense fogs on 2 days. R. L. J. ELLERY, F.R.S.

Adelaide.—Persistently low barometer during the greater part of the month, due to the continued presence of elongated areas of low pressure S of the continent. Temp. 2° above the average at night and 1° below in the day, giving an unusually small diurnal range. Cloud and R much above the average, and evaporation very small. C. TODD, F.R.S.

Wellington.—A dull wet unpleasant month with only a few fine days, and generally light winds from S.E., with frequent calms. Very cold and frosty on 13th, with H at night. R. B. GORE.

Auckland.—An exceedingly wet and stormy month, the R being the heaviest in June since 1860. Barometric pressure much below the average; mean temp. above it. T. F. CHEESEMAN.

SUPPLEMENTARY TABLE OF RAINFALL, DECEMBER, 1889.

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

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in			in.
II.	Dorking, Abinger Hall.	2·03	XI.	Castle Malgwyn	3·24
,,	Margate, Birchington...	1·26	,,	Rhayader, Nantgwillt..	4·25
,,	Littlehampton	1·52	,,	Carno, Tybrith	3·50
,,	Hailsham	1·93	,,	Corwen, Rhug	1·97
,,	Ryde, Thornbrough	2·26	,,	Port Madoc	7·20
,,	Alton, Ashdell.....	2·64	,,	I. of Man, Douglas	3·54
III.	Oxford, Magdalen Col...	1·04	XII.	Stoneykirk, Ardwell Ho.	3·66
,,	Banbury, Bloxham	1·87	,,	New Galloway, Glenlee	6·81
,,	Northampton	1·55	,,	Melrose, Abbey Gate...	2·17
,,	Cambridge, Beech Ho...	1·21	XIII.	N. Esk Res. [Penicuick]	3·40
,,	Wisbech, Bank House..	1·48	XIV.	Ballantrae, Glendrishaig	4·14
IV.	Southend	1·22	,,	Glasgow, Queen's Park.	2·98
,,	Harlow, Sheering	1·21	XV.	Islay, Gruinart School..	7·49
,,	Rendlesham Hall	1·17	XVI.	Dollar.....	2·06
,,	Diss	1·22	,,	St. Andrews, Pilmour Cot	1·42
,,	Swaffham	1·66	,,	Balquhidder, Stronvar..	8·03
V.	Salisbury, Alderbury...	2·15	,,	Dunkeld, Inver Braan..	3·19
,,	Warminster	2·01	,,	Dalnaspidal H.R.S. ...	5·86
,,	Bishop's Cannings	1·82	XVII.	Keith H.R.S.	1·53
,,	Ashburton, Holne Vic....	4·88	,,	Forres H.R.S.	1·25
,,	Hatherleigh, Winsford.	2·81	XVIII.	Strome Ferry H.R.S....	8·50
,,	Lynmouth, Glenthorne.	2·85	,,	Fearn, Lower Pitkerrie.	1·23
,,	Probus, Lamellyn	3·08	,,	Loch Shiel, Glenaladale	13·61
,,	Launceston, S. Petherwin	3·15	,,	N. Uist. Loch Maddy ...	7·78
,,	Wincanton, Stowell Rec.	2·31	,,	Invergarry	7·55
,,	Taunton, Lydeard Ho...	2·02	,,	Loch Ness, Drumnadrochit	2·25
,,	Wells, Westbury	2·19	XIX.	Lairg H.R.S.	·66
VI.	Bristol, Clifton	2·25	,,	Forsinard H.R.S.	...
,,	Ross	1·22	,,	Watten H.R.S.	1·87
,,	Wem, Clive Vicarage ...	2·02	XX.	Dunmanway, Coolkelure	7·83
,,	Cheadle, The Heath Ho.	2·13	,,	Fermoy, Gas Works ...	3·71
,,	Worcester, Diglis Lock	1·43	,,	Tipperary, Henry Street	3·18
,,	Coventry, Coundon	2·25	,,	Limerick, Kilcornan ...	..
VII.	Ketton Hall [Stamford]	1·66	,,	Miltown Malbay.....	5·95
,,	Grantham, Stainby	1·90	XXI.	Gorey, Courtown House	3·13
,,	Horncastle, Bucknall ...	1·43	,,	Navan, Balrath	...
,,	Mansfield, St. John's St.	1·88	,,	Mullingar, Belvedere...	2·96
VIII.	Neston, Hinderton	2·62	,,	Athlone, Twyford	3·48
,,	Knutsford, Heathside ...	2·47	,,	Longford, Currygrane...	3·29
,,	Lancaster, South Road.	3·03	XXII.	Galway, Queen's Coll...	4·30
,,	Broughton-in-Furness ..	8·12	,,	Clifden, Kylemore	8·09
IX.	Wakefield Prison	1·73	,,	Crossmolina, Enniscoe..	4·78
,,	Ripon, Mickley	1·34	,,	Collooney, Markree Obs.	4·98
,,	Scarborough, West Bank	1·40	,,	Ballinamore, Lawderdale	...
,,	East Layton [Darlington]	1·22	XXIII.	Warrenpoint	3·01
,,	Middleton, Mickleton..	1·45	,,	Seaforde	2·32
X.	Haltwhistle, Unthank..	2·14	,,	Belfast, New Barnsley .	3·25
,,	Shap, Copy Hill	4·34	,,	Bushmills, Dundarave...	4·29
XI.	Llanfrechfa Grange	1·95	,,	Stewartstown	3·11
,,	Llandovery	3·64	,,	Buncrana	3·55

DECEMBER, 1889.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average. 1870–9	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE Max. Deg.	Max. Date	Min. Deg.	Min. Date	No. of Nights below 32° In shade.	On grass.
			inches	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	1·23	— ·94	·30	21	15	53·2	17	22·8	29	14	23
II.		Maidstone (Hunton Court)...	1·54	— ·86	·36	22	16	...	...	...	...	...	...
,,		Strathfield Turgiss	1·58	— ·44	·25	22	16	53·9	17	18·6	2	23	28
III.		Hitchin	·85	— 1·20	·21	21	13	53·0	17	22·0	28	17	...
,,		Winslow (Addington)	1·34	— ·77	·24	21	18	55·0	22*a*	15·0	29	20	23
IV.		Bury St. Edmunds (Westley)	1·36	— ·64	·34	21	17	...	...	...	...	...	...
,,		Norwich (Cossey)	1·27	— 1·05	·30	8	12	...	...	...	...	...	...
V.		Weymouth(LangtonHerring)	2·38	...	·56	22	18	52·0	22	26·0	4	9	...
,,		Barnstaple	2·44	— 1·32	·35	21	14	57·0	20	25·0	29	...	...
,,		Bodmin (Fore Street)	3·88	— 1·60	·78	21	19	..	...	...	...	..	...
VI.		Stroud (Upfield)	1·70	— ·73	·61	6	17	55·0	17*a*	22·0	28	21	...
,,		ChurchStretton(Woolstaston)	2·17	— ·62	·40	6	17	52·5	16	24·0	4	15	22
,,		Tenbury (Orleton)	1·83	— ·68	·48	6	16	54·3	17	19·0	29	20	23
VII.		Leicester (Barkby)	1·85	— ·07	·50	21	17	54·0	18	15·0	28*e*	23	26
,,		Boston	1·00	— 1·07	·25	8	10	52·0	17	20·0	29	22	...
,,		Hesley Hall [Tickhill].....	1·18	...	·43	6	14	55·0	17	21·0	29	22	...
VIII.		Manchester(PlymouthGrove)	2·30	— ·15	·50	8	15	52·0	17*b*	27·0	7, 11	16	18
IX.		Wetherby (Ribston Hall) ..	1·78	— ·43	·54	7	10	...	...	...	...	...	..
,,		Skipton (Arncliffe)	3·74	— 1·54	·48	17	17	50·0	19	24·0	14	21	...
,,		Hull (People's Park)	1·40	— 1·12	·38	8	14	...	...	...	...	...	...
X.		North Shields	1·42	— 1·67	·53	6	13	57·5	25	25·0	29	17	20
,,		Borrowdale (Seathwaite).....	16·33	+ 2·60	3·86	19	20	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	2·57	— 1·34	·74	21	16	...	...	...	...	...	...
,,		Haverfordwest	4·03	— 1·10	·72	19	18	52·1	15	25·4	4	10	18
,,		Plinlimmon (Cwmsymlog) ...	5·00	...	·86	22	18	..	...	...	...	...	...
,,		Llandudno.....	2·98	+ ·13	·67	19	13	55·2	17	29·0	4	4	...
XII.	SCOTLAND.	Cargen [Dumfries]	3·90	— ·63	·59	19	18	53·0	9	23·6	28	12	...
,,		Jedburgh (Sunnyside).....	1·54	— ·91	·23	19	13	55·0	8*a*	25·0	14*f*	12	...
XIV.		Old Cumnock	5·01	+ 1·13	·75	19	21	52·0	17	21·0	10*g*	13	...
XV.		Lochgilphead (Kilmory).....	7·92	+ 1·74	1·35	8	23	...	...	..	...	...	...
,,		Oban (Craigvarren)	8·38	...	1·22	8	25	52·3	17	30·8	29	5	...
,,		Mull (Quinish).....	9·14	...	1·16	30	26	...	...	...	...	...	...
XVI.		Loch Leven Sluices	2·40	— 1·26	1·20	20	11	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	1·15	— 2·12	·25	20	11	54·8	17	23·3	12	13	...
XVII.		Braemar	1·86	— 1·57	·51	19	13	52·0	17	15·7	12	17	20
,,		Aberdeen (Cranford)	2·25	...	·35	22	20	54·0	9, 17	24·0	11*h*	12	...
XVIII		Lochbroom	5·64	...	·68	17	20	...	...	...	...	...	...
,,		Culloden	·97	— ·87	·26	19	...	54·0	9	25·0	5	8	24
XIX.		Dunrobin	2·10	...	·30	22	15	58·0	17	23·5	12	12	...
,,		S. Ronaldsay (Roeberry).....	3·05	— ·31	·37	7	24	49·0	1	29·0	12	2	...
XX.	IRELAND.	Cork (Blackrock).....	3·95	— ·81	·60	19	17	55·0	10*c*	27·0	11	5	...
,,		Dromore Castle	5·82	...	·80	28	24	59·0	30	29·0	11	...	...
,,		Waterford (Brook Lodge) ...	4·40	...	·84	28	20	55·0	9	23·0	12	4	..
,,		O'Briensbridge (Ross)	4·62	...	·53	6	20	53·0	28*d*	30·0	...	8	...
XXI.		Carlow (Browne's Hill)	4·45	+ ·94	·93	24	20	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	1·55	— 1·03	·27	19	15	56·6	17	30·9	6*h*	4	20
XXII.		Ballinasloe	3·81	+ ·33	·57	28	21	50·0	17	24·0	6	14	...
XXIII		Waringstown	3·11	+ ·15	·63	6	19	56·0	17	26·0	13	14	19
,,		Londonderry (Creggan Res.).	4·16	...	·65	23	23	...	...	...	...	...	...
,,		Omagh (Edenfel)	4·39	+ ·99	·52	23	22	51·0	17	28·0	13	8	15

a And 23. *b* And 18. *c* And 17. *d* And 29. *e* And 30. *f* And 29, 30. *g* And 27. *h* And 12.

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

METEOROLOGICAL NOTES ON DECEMBER, 1889.

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

ENGLAND.

STRATHFIELD TURGISS.—Very variable temp., but on the whole above the average. From an agricultural point of view the weather of the entire year was exceptionally favourable. S on 5th and 6th.

ADDINGTON.—Great variations of temperature, the extreme range being 40°; the max. six times above 50, and the min. three times below 20. R fell on a good many days, but in no great quantity. Not much foggy weather, but very dense fogs on 14th and 31st, the trees being beautifully covered with rime on the latter day.

LANGTON HERRING.—R ·62 in. below the average of 14 years. Sudden and great changes of temp. were a notable feature, and the mean at 9 a.m. was 1° below the average. A fine solar halo was observed on the 4th.

WOOLSTASTON.—A cold month, with sudden and abrupt variations of temp. Mean temp. 37°·7

ORLETON.—With the exception of the 9th and 10th the first 15 days were cold and frosty, with an average temp. of about 32°·5; the weather then became warmer and very changeable, with a S. or W. wind and frequent R, but not in heavy falls, till 25th, when frost set in again, and after a very fine day a cloudy sky and cold wind followed. Fogs were very frequent. Pressure was high and generally steady during the greater part of the month. Mean temp. nearly 1° below the average of 28 years. S on morning of 7th two to three inches deep and six inches on the hills.

MANCHESTER, PLYMOUTH GROVE.—Very changeable throughout. Snow and sleet on the 7th; dense fog on the 14th.

HULL.—The weather was generally overcast or cloudy, often with fog or mist.

SEATHWAITE. - In the three days 17th to 19th 7·08 in. of R fell.

WALES.

HAVERFORDWEST.—The first six days were fine, with sharp frost. From the 7th to the 23rd the weather was very changeable, every day wet and some sharp frosts. From the 24th to the end, cold, dry, frosty weather prevailed, with a considerable amount of bright sunshine. Temp. about or rather below the average of 20 years. Winds principally from S.W. and E.S.E. Lunar halo on 30th.

SCOTLAND.

JEDBURGH.—The weather was mild, and vegetation preserved its freshness, garden flowers such as primroses being in bloom all the month. The atmosphere was singularly still, with the exception of the 18th and 19th, when there was a moderate gale.

OBAN, CRAIGVARREN.—Temp. very low, but equable, throughout the month. Frequent R. Growth continued and wall-flowers remained in bloom.

LOCHBROOM.—The first and the last weeks of the month were both dry, but otherwise quite contrary, for the first was frosty and intensely cold; the latter like summer. The rest of the month was as wintry as it could be, every variety of rough weather occurring.

INVERNESS, CULLODEN.—The month generally was very fine. There were no fogs, and some of the sunrises and sunsets were exceedingly beautiful.

ROEBERRY.—Dull and damp, with winds generally from S. to S.W.

IRELAND.

CORK.—A fine average month without extremes.

DROMORE.—A very mild and open month.

WATERFORD.—R ·20 in. above the average. Mean temp. 43°·6.

O'BRIENSBRIDGE, ROSS.—Mild and open weather throughout.

DUBLIN.—A quiet, mild, but damp month, with prevalent S.W. winds. The mean temp. 43°·8, was 2°·7 above the average. High winds on 13 days; gales on two days; fog on 7 days. L on 12th. A little sleet on the 28th.

WARINGSTOWN.—The whole month was unusually mild, but vegetation did not seem to be unduly forward. Snowdrops only just showing at the close.

OMAGH, EDENFEL.—The beginning of the month was very fine and mild, but from the 6th till the 23rd the weather was raw, cold, and wet, with constantly alternating frosts and thaws. Christmas day was mild and fine, the mean temp. being 46°, and the end of the month was raw and rainy.

THE ROYAL METEOROLOGICAL SOCIETY.

The usual monthly meeting was held on Wednesday, December 18th at the Institution of Civil Engineers; Dr. W. Marcet, F.R.S., President, in the chair. Thirty-nine new Fellows were elected. The following papers were read:—"Report of the Wind Force Committee on the Factor of the Kew Pattern Robinson Anemometer." This has been drawn up by Mr. W. H. Dines, who has made a large number of experiments with various anemometers on the whirling machine at Hersham. Twelve of these were made with the friction of the Kew anemometer artificially increased, seven with a variable velocity, and fourteen with the plane of the cups inclined at an angle to the direction of motion. In discussing the results the following points were taken into consideration—viz., the possibility of the existence of induced eddies, the effect of the increased friction due to the centrifugal force and gyroscopic action, and the action of the natural wind. The conclusion that the instrument is greatly affected by the variability of the wind to which it is exposed seems to be irresistible; and, if so, the exact value of the factor must depend upon the nature of the wind as well as upon the mean velocity. There is evidence to show that during a gale the variations of velocity are sometimes of great extent and frequency, and there can be but little doubt that in such a case the factor is less than 2·15. The one point which does seem clear is that for anemometers of the Kew pattern, the value 3 is far too high, and consequently that the published wind velocities are considerably in excess of the true amount.

"On Testing Anemometers," by Mr. W. H. Dines, B.A. The author describes the various methods employed in the testing of anemometers, points out the difficulties that have to be encountered and explains how they can be overcome.

"On the Rainfall of the Riviera," by Mr. G. J. Symons, F.R.S. The author has collected all the available information respecting rainfall in this district. He believes that the total annual fall along the coast from Cannes to San Remo, is about 31 inches, and that any difference between the several towns has yet to be proved.

"Report on the Phenological Observations for 1889," by Mr. E. Mawley. This is a discussion of observations on the flowering of plants, the appearance of insects, the song and nesting of birds, &c. Taken as a whole 1889 was an unusually gay and bountiful year.