

# SYMONS'S MONTHLY METEOROLOGICAL MAGAZINE.

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## THE AUTUMN CONGRESSES.

(Continued from p. 120.)

### THE BRITISH ASSOCIATION.

Whether, or not, the need for this organization is decreasing, we do not know. Probably it, like other bodies, must adapt itself to changed circumstances, and there was much evidence, at Leeds, of a desire to do so. Moreover, the scheme for the affiliation of Local Societies is solidifying, and it will undoubtedly greatly strengthen the parent, while benefiting the Corresponding societies. It is not for us to point out here the modifications in the Association which may be expedient; we have to deal only with Meteorology, but as regards it to mention, that we have heard several remarks as to the scant recognition afforded to that subject. The words Meteorology, Electricity, Magnetism, and Astronomy do not occur in the B. A. programme, all these subjects are included in Section A—Mathematics and Physics—while Chemistry, Geology, Biology, Geography, Statistics, Engineering, and Anthropology, has each a section to itself. For nearly half a century, no Meteorologist has been President of Section A, or of the Association. Hence, naturally meteorologists do not rally at the meetings, and papers get yearly more scarce. This year, Mr. Hopkinson tried, by sending in four papers, to galvanize the section, but with a Sectional Committee of 54 members, of whom not more than seven ever worked at meteorology, a strong shock is needed, and the audience, when the papers were read, was not encouragingly numerous.

We now proceed to notice the communications :—

W. J. E. BINNIE.—*On the Size of Drops Falling from a Tube.*

Mr. Binnie has designed an inexpensive form of recording rain-gauge; in it the uniformity of the size of drops is essential; this led him to researches, the result of which is given in his paper.

C. CHAMBERS, F.R.S.—*On Ferrel's Theory of the Winds.*

A very mathematical paper criticizing a review by Mr. H. F. Blanford, F.R.S., of Prof. Ferrel's last work.

DR. BUCHAN.—*Report of the Committee on the Ben Nevis Observatory.*

During the past year, observations had been made continuously at the top of Ben Nevis, and at the sea-level, at Fort William. Mr. Omond had completed an important investigation of the temperature of Ben Nevis, and of the wind force, and Mr. Rankin had photographed clouds, and other meteorological phenomena. In the autumn of last year a grant of £50 was obtained from the Government for carrying on an investigation into the number of dust particles in the atmosphere. Messrs. Omond and Rankin were still engaged with the enquiry into the direction of the winds observed at the top, and at the low level stations at the same hours, and in studying their relation to the weather of North-Western Europe. The comparative frequency with which the winds at the Observatory blow not with, but against, the isobars of low level stations and indicated a force widely different from the barometric gradients of the weather maps of the Meteorological Office, were striking elements in the meteorology of Ben Nevis. At Fort William the mean temperature was  $0^{\circ}8$  under the average, the greatest defect from the mean being  $1^{\circ}8$  in February, and the greatest excess  $5^{\circ}6$  in May. The outstanding feature of the meteorology of the year was the all but unprecedentedly high temperature of May, a temperature, as regarded Scotland, only once exceeded since 1764. At the top of the Ben the excess above the mean was greater, amounting to  $7^{\circ}7$ , as happened during all unusually high summer temperatures. The minimum temperature on Ben Nevis was  $6^{\circ}4$ , which occurred at 7 a.m. of February 10th. This was absolutely the lowest temperature which had been recorded since the opening of the Observatory in December, 1883. The maximum was  $61^{\circ}8$  on July 4th. Thus the extreme range of temperature for the past year was  $55^{\circ}4$ . The registrations of the sunshine recorded showed 634 hours of sunshine, as against 970 hours of the previous year, the latter year thus showing a half more hours. The largest number, 213, was recorded in June; the smallest, 9, in August, being the lowest that had occurred, hitherto, in any summer month. As the highest possible hours for the whole was 4,470, sunshine prevailed on the top of the Ben, in 1889, during only one hour in seven. The amount of the rainfall during the past year was 120.66 in., being about 10 in. less than the average, the least rainfall being 1.94 in. in June, and the greatest 18.04 in. in December, and 17.69 in. in January. The importance of the investigations conducted at Ben Nevis in their relation to cyclones and anti-cyclones was touched upon, and in future meteorological data will be obtained with a view to better forecasts of the weather. They recommended that the committee be re-appointed, Lord McLaren being chairman, in place of Mr. Abercrombie, whose health compelled him to live abroad, and a grant of £150 will be proposed. [Only £50 was granted by the General Committee.]

DR. MILL.—*Report of the Committee for Determining the Seasonal Variation in the Temperature of the Lakes, Rivers, and Estuaries.*

G. J. SYMONS, F.R.S.—*Report of the Committee on Solar Radiations.*

An interim report, stating that the work of the Committee had been seriously interrupted by the death of Prof. Balfour Stewart, F.R.S., and by Prof. Schuster's engagements preventing his taking it up. The whole of the apparatus and correspondence had been found, and Prof. M'Leod, F.R.S., had consented to join the Committee, and make experiments with the apparatus designed by Prof. Balfour Stewart, and constructed by Mr. Casella.

A. L. ROTCH.—*On a Meteorological Observatory recently established on Mont Blanc.*

Mr. Rotch, who has lately visited M. Vallot's observatory, and who handed round photographs of it, said, that until recently, the highest meteorological station in the world was in the United States, on Pike's Peak, at an elevation of 14,134ft. above the sea, and the highest station in Europe was on the Sonnblick, in the Austrian Alps (10,170ft.). The French, who had done so much for high-level meteorology, could now claim the highest station in the world, M. Vallot having established a cabin, provided with many registering instruments at the Rocher des Bosses, 1,460ft. below the summit of Mont. Blanc, or 14,320ft. above the sea. It was hoped to maintain the instruments—which had to be attended to once in 15 days—in action during four months of the year. A series of intermediate stations was projected. Some idea of the difficulty and cost of M. Vallot's undertaking would be afforded by mentioning that the wooden observatory cost in the valley £32, but it made 120 loads for the porters, and by the time it was erected at 14,320ft. it had cost quite £400. Mr. G. J. Symons alluded to the expense of keeping up mountain observatories, where two or three attendants had to be located, and said that he was inclined to think that self-recording instruments would be successful, and if so, the cost would be greatly reduced. If they could be made to go for 15 days, they could be made to go for 31 days; indeed, it was difficult to say where the limit would be. He did not believe that tenths of degrees would be accurately recorded by such instruments, but tenths of degrees were not always of much consequence. In reply to a question, Mr. Rotch said that on account of the cost, the observatory on Pike's Peak had been abandoned.

J. HOPKINSON.—*On the Climate of Scarborough compared with that of some other Sea-side Health Resorts.*

After giving reasons for inferring that meteorological observations taken continuously during the decade 1880–89 may advantageously be utilised to deduce the most important elements of the climate of any place in the British Isles, the author showed that observations taken at Scarborough during this period fulfilled the necessary requirements as to accuracy and continuity, and also as to

uniformity with those taken at other places with which he compared the principal results.

A table, showing the monthly and annual means of temperature (mean, mean min., mean max., and mean daily range), relative humidity, cloud, and rainfall; and the extremes of temperature, at Scarborough, for this decade, was given, and the general results of comparison with the climate of four other seaside health-resorts, situated in succession at nearly equal distances round the English coast, was summarised thus :—

1880-89.	TEMPERATURE.						Humidity at 9 a.m.	Cloud at 9 a.m.	RAIN- FALL.
	MEANS.				EXTREMES.				
	Mean.	Min.	Max.	Range.	Min.	Max.			
Scarborough .....	47°·5	42°·6	52°·5	9°·9	10°·5	83°·8	83	0-10	ins.
Lowestoft .....	48°·2	42°·4	53°·9	11°·5	9°·2	87°·0	83	6·6	28·26
Worthing .....	49°·5	43°·7	55°·3	11°·6	13°·5	83°·3	83	6·8	24·15
Babbacombe .....	49°·9	44°·0	55°·9	11°·9	15°·6	85°·6	82	5·9	26·55
Llandudno .....	49°·2	44°·1	54°·3	10°·2	14°·5	84°·0	79	7·0	33·58
Mean .....	48°·9	43°·4	54°·4	11°·0	12°·7	84°·8	82	6·6	28·33

These figures show that Scarborough is 3 per cent. colder than the mean of the five places, has 2 per cent. less mean daily range of temperature (computed as a percentage of the mean temperature), is 1 per cent. more humid, and has the mean amount of cloud and rainfall.

J. HOPKINSON.—*A Comparison of the Climate of Halifax, Bradford, Leeds, Wakefield, and Hull.*

Having shown that meteorological observations had been taken at these five manufacturing towns in the South of Yorkshire during the decade 1880-89 with sufficient uniformity and continuity for a satisfactory comparison to be made, the author gave the principal results for this purpose in the following table :—

1880-89.	TEMPERATURE.						Humidity at 9 a.m.	Cloud at 9 a.m.	RAIN- FALL.
	MEANS.				EXTREMES.				
	Mean.	Min.	Max.	Range.	Min.	Max.			
Halifax .....	46°·5	39°·6	53°·4	13°·8	10°·0	89°·0	83	0·10	ins.
Wakefield .....	47·7	41·0	54·4	13·4	11·5	86·8	84	7·3	36·55
Bradford.....	48·0	42·4	53·7	11·3	12·0	84·4	79	7·2	28·01
Leeds .....	48·8	42·6	55·1	12·5	12·0	87·0	81	7·7	30·15
Hull .....	47·1	39·9	54·3	14·4	6·0	85·0	81	6·7	25·53
Mean .....	47·6	41·1	54·2	13·1	10·3	86·4	82	6·9	27·07

In order to render more perspicuous the relation which the above values bear to the mean and to each other, the deviations per cent. from the mean were deduced (all the deviations in temperature being computed as percentages of the mean temperature), with the following result :—

1880-89.	TEMPERATURE.						Humidity at 9 a.m.	Cloud at 9 a.m.	RAIN- FALL.
	MEANS.				EXTREMES.				
	Mean.	Min.	Max.	Range.	Min.	Max.			
	%	%	%	%	%	%	%	%	%
Halifax .....	— 2	— 3	— 2	+ 1	— 1	+ 5	+ 2	+ 2	+ 24
Wakefield .....	=	=	+ 1	+ 1	+ 2	+ 1	+ 3	+ 6	— 5
Bradford.....	+ 1	+ 3	— 1	— 4	+ 4	— 4	— 3	+ 4	+ 2
Leeds .....	+ 2	+ 3	+ 2	— 1	+ 4	+ 1	— 1	— 3	— 13
Hull .....	— 1	— 3	=	+ 3	— 9	— 3	— 1	9	— 8

J. HOPKINSON.—*The Inland compared with the Maritime Climate of England and Wales.*

The author first endeavoured to show that the chief difficulties in making a satisfactory comparison between our inland and our maritime climate would be removed if a sufficient number of meteorological stations could be found which represent approximately the mean height and the range of the land in the interior and near the coast, and if the mean position of the inland and the maritime places were almost identical and not far distant from the centre of England. From the "Meteorological Record" of the Royal Meteorological Society he selected, as approximately fulfilling these conditions, Buxton, Woburn (Aspley Guise), Croydon (Addiscombe), Cheltenham, and Churchstoke, to represent the interior of the country; and Scarborough, Lowestoft, Worthing, Babbacombe, and Llandudno, to represent the sea-coast. The mean height above the sea of the meteorological stations at the five inland places is 469 feet, and the mean height of those at the five maritime places is 124 feet, the range in the former being from 184 to 987 feet, and in the latter from 21 to 293 feet. The mean latitude of the five inland places is  $52^{\circ} 12' N.$ , the mean longitude  $1^{\circ} 32' W.$ ; the mean latitude of the five maritime places is  $52^{\circ} 22' N.$ , the mean longitude  $1^{\circ} 16' W.$  The mean position indicated is in each case near the centre of England (a little south of Birmingham).

The values for the decade 1880-89 for the chief elements of the climate of the five places situated on the coast having already been given in the author's paper on "The Climate of Scarborough," those for the five places situated in the interior are given in the following

table, with the means, and, for easy comparison, the means for the sea-side places and for the whole :—

1880-89.	TEMPERATURE.						Humidity at 9 a.m.	Cloud at 9 a.m.	RAIN- FALL.
	MEANS.				EXTREMES.				
	Mean.	Min.	Max.	Range.	Min.	Max.			
Buxton .....	44°·6	37°·6	51°·6	14°·0	-4°·0	82°·1	85	0-10	ins.
Woburn .....	47°·6	40°·4	54°·8	14°·6	-1°·0	86°·1	83	7·5	32·06
Croydon .....	48°·8	41°·9	55°·8	13°·9	11°·6	92°·4	80	7·4	25·56
Cheltenham .....	47°·9	40°·4	55°·4	15°·0	-3°·3	87°·8	83	7·0	28·86
Churchstoke .....	46°·7	40°·4	54°·8	14°·4	6°·9	90°·7	83	6·9	24·46
Mean { Inland ...	47°·1	39°·9	54°·3	14°·4	2°·0	87°·8	83	7·2	31·81
	48°·9	43°·4	54°·4	11°·0	12°·7	84°·8	82	6·6	28·33
Mean of all.....	48°·0	41°·7	54°·4	12°·7	7°·4	86°·3	82·5	6·9	30·07

The conclusion to be drawn from this table was, he considered, that in every respect, as far as concerns our comfort and most probably also our health, our maritime climate is on the whole superior to our inland climate, being warmer, owing (it is most important to observe) to the nights not being nearly so cold while the days are no hotter, the extremes of temperature being much less, the air rather less humid, the sky less cloudy, and the rainfall less.

Discussion having been invited,

Mr. Symons said that Mr. Hopkinson's papers were very interesting, and that some day corporations and other representative bodies would perhaps think that climate had something to do with the health of the people, and that it was desirable that accurate meteorological observations should go along with statistics of population. Leeds was no greater sinner in this respect than other towns, but it had not one single well-equipped meteorological observatory. There ought to be one or two places in Leeds, and one on Woodhouse Moor. He ventured to think that, as regarded the West Riding towns, many differences brought forward by Mr. Hopkinson were due to the position of the instruments among chimnies, &c., rather than differences in the five manufacturing towns themselves which were compared with Leeds. He also took exception to the new method of expressing temperature differences as percentages.

Mr. Hopkinson said that Mr. Symons' objections could only apply to the five manufacturing towns; for the other papers read, the results could be relied upon as accurate meteorological statistics. He quite agreed that it would be well to start an observatory in the neighbourhood of Leeds; and all that it would be necessary to do would be for some one to take an observation at nine o'clock

in the morning and forward it to the Royal Meteorological Society, where all the results would be worked out.

The President (Dr. Glaisher) advised Mr. Hopkinson to take other five places at the seaside and five other inland places to make another comparison, because he was rather struck with the result already obtained, viz., that the climate at the sea-coast was better than that inland; and for his own part he thought that it might have been brought about in Mr. Hopkinson's comparison by a sort of give-and-take arrangement, and was not a thing really definitely settled.

J. HOPKINSON, F.R.Met.Soc.—*On Meteorological Photography.*

The author called attention to the increasing importance attached to photography, as a means of illustrating scientific subjects, and aiding scientific research. In no science, he thought, could photography be of greater value than in meteorology, owing to the transient nature of meteorological phenomena.

The appointment of a Committee of the British Association on Meteorological Photography, by which Committee instructions to photographers would be issued with the view of instituting a systematic method of working, &c., would, he felt sure, greatly extend the interest taken in the subject and increase the scientific value of the results. The chief object of such a committee would be to investigate and report upon the means by which photography can most advantageously be applied to the elucidation of meteorological phenomena, such as the forms of clouds and of lightning flashes, and the effects of storms. The Committee would also undertake the collection of photographs of such phenomena and keep a register of them, reporting the additions made each year, and would compile a bibliography of the subject.

In the study of the various forms of clouds the author believed that a satisfactory classification could best be made by the comparison of numerous photographs; the relation between cloud-forms and atmospheric pressure and temperature would be an interesting field for research; and an attempt might be made to ascertain the best means of overcoming the difficulty of photographing light clouds on a blue sky, owing to the blue rays being almost as powerfully actinic as white.

In the investigation of lightning by photography, special attention would be given to the appearance on the plates of so-called dark flashes, with the object of arriving at a conclusive explanation of the phenomenon; and an endeavour might be made to determine whether lightning really forms a streak or a point in excessively rapid motion.

The collection and exhibition of photographs showing the destructive effects of storms, whether the destruction or damage were wrought by rain, by wind, or by lightning, might not be considered of such scientific importance as the investigation of clouds and

lightning, but it would add much to the general interest of the enquiry.

Mr. Symons observed that they would make their section much more attractive if they exhibited photographs of meteorological phenomena, for many people thought that the study of meteorology consisted solely in the calculation of tables of figures, whereas their science was most interesting.

The President (Dr. Glaisher) said that the Committee of the Section had that morning approved of Mr. Hopkinson's proposal, and asked the Committee of Recommendations to appoint a Committee on Meteorological Photography. [This was subsequently approved by the General Committee.].

FRIESE GREENE.—*Exhibition of Photographs of Clouds.*

No paper was read respecting these large and fine photographs, but the President stated that on one of them there were four clouds shown which were not visible to the naked eye; this result had been obtained by taking the negative through yellow glass.

G. J. SYMONS.—*On the arrangements for recording Phenological Phenomena.*

This was a short paper read in the Biological Section in order to bring to the knowledge of naturalists the important work done in this subject under the auspices of the Royal Meteorological Society, and to draw attention to the simplified form now issued. Instead of occupying space with the paper, we appropriate it to advising our readers to apply for a specimen of the form to E. Mawley, Esq., F.R.Met.Soc., Rosebank, Berkhemsted, Herts, and if possible to help him in the work which he is doing for the society.

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“FATHER PERRY” MEMORIAL.

THAT which men will not do for the living, they frequently will do in honour of the dead who cannot profit thereby. Our opinion of Father Perry and of his work has already been given (Met. Mag. Vol. xxiv. p. 183), such a character needs no praise, and no memorial, but when one is proposed, it becomes an insult rather than an honour if it is not supported.

A very strong committee is trying to collect £2,700, wherewith to present a 15-inch equatorial to Stonyhurst, where Perry would have used one so well. We do not allow ourselves to doubt that the amount will be raised, but all who would share in the good work should send direct to the treasurer, A. C. Thomas, Esq., Marlton Chambers, 30, North John-street, Liverpool.

## HEAVY HOURLY RAINFALL ON BEN NEVIS.

*To the Editor of the Meteorological Magazine.*

SIR,—I enclose the hourly rainfall on Ben Nevis for the 25th, 26th, and 27th of September. You will see that the torrential down-pour which did so much damage in the vicinity of Fort William, commenced at 6 p.m. of the 25th, and lasted till noon of the next day, the rainfall for these eighteen hours being 6·264 in., of which 4·514 in. fell in the 8 hours ending 5 a.m. of the 26th.

Yours very truly,

R. C. MOSSMAN.

10, Blacket Place, Edinburgh, Oct. 2nd, 1890.

September 25th.		September 26th.		September 27th.	
Hours ending.	Amount.	Hours ending.	Amount.	Hours ending.	Amount.
1	·022	1	·808	1	·100
2	·009	2	·750	2	·144
3	·042	3	·511	3	·147
4	·009	4	·369	4	·203
5	·008	5	·619	5	·108
6	·004	6	·218	6	·116
7	·036	7	·205	7	·220
8	·040	8	·160	8	·196
9	·018	9	·140	9	·168
10	·008	10	·168	10	·160
11	·028	11	·182	11	·164
Noon	·015	Noon	·154	Noon	·170
13	·013	13	·050	13	·180
14	—	14	·025	14	·150
15	·014	15	·010	15	·071
16	·008	16	·006	16	·151
17	·012	17	·005	17	·151
18	·025	18	—	18	·048
19	·227	19	—	19	·078
20	·113	20	·032	20	·024
21	·183	21	·076	21	·025
22	·269	22	·049	22	·042
23	·402	23	·083	23	·055
Midnight	·786	Midnight	·074	Midnight	·040
Sums	2·291	Sums	4·694	Sums	2·911

[This gives for the rainfall day of 25th 5·88 in., and of 26th 2·32 in., but, for the newspapers, the Ben Nevis day seems to end at 9 p.m., and that gave 5·95 in. for 26th, and 2·57 in. for 27th. All these values are, however, surpassed by the record (up to 9 p.m.) for Oct. 3rd, which was 8·07 in.—Ed.]

FURTHER REMARKS ON THE DISCUSSION CONCERNING  
BAROMETRIC DEPRESSIONS.

*To the Editor of the Meteorological Magazine.*

SIR,—I had not intended to intervene again in this discussion, but I am induced, by some remarks in this Magazine for September, 1890, pp. 121 and 122, to ask your permission to offer a few further observations by way of explanation.

The supposition that the greater fluctuations of atmospheric pressure are the result of the outflow of currents of highly heated air from the equatorial regions, so far from having been put forward by me "as new and altogether the better for being new," was avowedly a reproduction, with some modifications, of the view held by the late Sir John Herschel, and elaborated by him in considerable detail in his latest utterance on the subject (*Familiar Lectures on Scientific Subjects*, article, "Weather"). It was impossible to pursue the subject in detail without trespassing too far upon your space, but as my critic seems to suppose that I was writing at random and in ignorance of elementary facts, which, if I had been acquainted with them, would have prevented me from writing such unmitigated nonsense, as it seemed to him, I may now add that the powerful upward movement of the heated currents would account for the absence of any increase of pressure over the regions traversed by them in the earlier part of their course, while the fact that they were moving polewards over converging meridians would explain—(1) the greater frequency and intensity of the barometric fluctuations experienced in the temperate as compared with the tropical zones; (2) the tendency of two or more anti-cyclonic areas to coalesce; and (3) the piling up of the air in the form of huge anti-cyclones in high latitudes. Such an anti-cyclone as that which prevailed over Western Europe about the middle of last November might well have been caused in this way; it could hardly have been occasioned by cold, as temperature was quite exceptionally high at the time. I am aware that, according to the orthodox view, the influence of these equatorial currents does not extend beyond 30° or thereabouts on either side of the equator. But it is highly improbable that there should be any such uniform limit to their range. Such a supposition would involve the incredible assumption that the effective heating power of the sun is as great over water as over land, and no greater over a treeless and arid region, such as the Sahara, than over a relatively cool and moist region, like that covered by the great equatorial forest described by Stanley in "Darkest Africa." But, independently of any such *à priori* grounds, we have plenty of positive evidence, as, for instance, in the behaviour of the Krakatoa dust, to show that the overlapping upper currents extend much farther northward and southward of the equator than is commonly supposed.

My critic says that he has "roughly reviewed" this discussion. Yes! very roughly, as far, at any rate, as Dr. Muirhead and myself

are concerned. Dr. Muirhead graphically, but not too forcibly, indicated the tone and tenour of his first letter when he described him as "knocking together the heads of two ignorant scribblers and sending them to learn their lessons" (*Met. Mag.*, July, 1890, p. 88). In his latest communication he refers to us, by implication, as meteorological quacks who, by our foolish meddling with matters that are too high for us, deter better qualified men from the study of meteorological problems. I venture to think that the peculiar style of controversy adopted by our critic, and the *de haut en bas* attitude which he thinks it fitting to assume towards fellow-seekers after the truth are much more likely to "lend a deterrent aspect to a most interesting branch of science."

I entered upon this discussion with the hope that, through the courtesy of some of your readers, who had been able to devote more time and study to the consideration of meteorological problems than myself, I should obtain much valuable information upon the subject to which I had invited attention. I leave it with the conviction, forcibly impressed upon my mind by the course which the discussion has taken, that no satisfactory theory of the origin of a depression system has as yet been formulated, and that, in the existing state of our knowledge, the really wise men are the Abercrombys who, when asked their opinion upon the subject, shake their heads and confess that they do not know.

G. T. RYVES.

*Tean Vicarage, October 1, 1890.*

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### SUNBURN.

*To the Editor of the Meteorological Magazine.*

SIR,—I hope that the interesting question you raised at the beginning of your number for September, 1890, in the notice of Dr. Bowles's "Sunburn on the Alps," as to the cause of sunburn, will elicit a more satisfactory explanation than has been, so far, given.

Professor Tyndall's experience of having been more burnt at the North Foreland than on Alpine snows is borne out by the well-known browning or bronzing of sailors and boatmen who are much exposed on the sea. My own experience on land, in Britain and in India, from sea-level to a height of 10,000 feet and upwards, is that I have felt more burnt by the sun under light clouds and mist than under a cloudless sky. This may be partly due to the fact that one exposes oneself more freely, and protects one's skin less, during cloudy weather than in bright sunshine.

I am inclined to believe that the suffusion of the air with sunlight by means of reflection from all bright surfaces, and by refraction at the same time, has much to do with the phenomenon of sunburn.

Yours truly,

B. R. BRANFILL.

*Billericay, October 1, 1890.*

## CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, MARCH, 1890.

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.	Cloud.
	Temp.	Date.	Temp.	Date.									
	°		°		°	°	°	0-100	°	°	inches		0-10
England, London .....	66·2	28	15·6	4	51·1	36·5	38·1	80	103·7	12·8	1·76	14	6·9
Malta.....	72·2	31	40·2	3	62·8	50·4	48·0	77	129·7	34·0	1·02	8	4·5
Cape of Good Hope ...	96·8	18	47·2	2	77·7	57·6	...	...	...	...	·19	...	2·2
Mauritius.....	83·5	25	70·4	3	81·2	73·2	71·5	85	136·0	65·2	11·36	25	7·6
Calcutta.....	100·8	29	62·8	1	91·5	71·1	69·3	70	152·6	54·6	·33	6	3·0
Bombay.....	89·4	19a	71·8	6	85·8	74·3	69·5	71	140·0	60·9	·00	0	2·1
Ceylon, Colombo .....	90·5	29	71·8	4, 5	88·2	75·0	71·9	76	147·0	67·0	5·34	22	5·2
Melbourne.....	94·6	5, 16	49·0	1, 2	77·3	58·0	56·0	70	148·1	38·1	1·62	10	6·1
Adelaide .....	97·7	15	49·8	28	81·9	60·4	52·5	51	159·9	42·5	·58	3	2·7
Wellington .....	76·8	2	43·0	30	68·0	52·4	50·1	69	139·0	34·0	2·23	13	4·2
Auckland .....	78·0	3	46·0	25	72·7	57·5	54·0	68	140·0	42·0	...	...	4·7
Jamaica, Kingston.....	89·3	24	61·4	14	85·5	66·8	66·3	75	...	...	3·27	...	...
Trinidad .....	89·0	9ab	62·0	15	86·2	68·8	67·2	75	158·0	62·0	2·09	13	...
Toronto .....	53·5	25	—2·7	6	34·7	20·9	23·2	77	...	—7·1	1·48	20	6·0
New Brunswick, Fredericton .....	48·8	12	—11·2	...	36·2	18·5	22·6	68	...	...	4·39	16	6·6
Manitoba, Winnipeg ...	38·0	10	—32·2	4	19·6	— 5·5	9·3	91	...	...	1·54	14	3·7
British Columbia, Victoria .....	54·0	19	29·0	5	47·7	37·0	...	...	...	...	1·50	16	...

a And 24. b And 27.

## MARCH REMARKS.

MALTA.—Mean temp.  $55^{\circ}5$ ; mean hourly velocity of wind 12·7 miles. Sea temp. rose from  $59^{\circ}8$  to  $62^{\circ}3$ . J. SCOLES.

Mauritius.—Mean temp. of air  $1^{\circ}2$  below, of dew point  $1^{\circ}7$  above, and R 3·37 in. above, their respective averages. Mean hourly velocity of wind 7·1 miles, or 3·0 below the average; extremes 20·0 on 1st, and 0·0 on 20th; prevailing direction E. by N. to S.E. by E. T and L on nine days; T on two days, and L on five days.

C. MELDRUM, F.R.S.

CEYLON, COLOMBO.—Thunderstorms occurred on fifteen days, and L was seen on six other days. J. C. H. CLARKE, Lt. Col. R.A.

Melbourne.—Mean temp. of air  $3^{\circ}0$ , of dew point  $4^{\circ}0$ , humidity 2, amount of cloud 0·5 above, and R ·44 in. below, their respective averages. Prevailing winds S.E. and S. Strong on seven days. Heavy dew on four days, TSS on four days.

R. L. J. ELLERY, F.R.S.

Adelaide.—Mean temp.  $0^{\circ}8$  above the average. R about half an inch below the average. C. TODD, F.R.S.

Wellington.—The early part of the month was generally fine with occasional showers, the latter part showery. Prevailing winds N.W. and S.E., strong from N.W. on six days. Mean temp.  $1^{\circ}9$  below the average. R ·59 in. below the average.

R. B. GORE.

Auckland.—The early and middle parts of the month were fine and dry; much cooler with frequent showers at the close. Mean temp. and R both close to the average; bar. pressure much above it. T. F. CHERSEMAN.

SUPPLEMENTARY TABLE OF RAINFALL,  
 SEPTEMBER, 1890.

[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.	1·08	XI.	Castle Malgwyn .....	2·26
„	Margate, Birchington...	·75	„	Builth(Llanwrtyd Wells)	2·29
„	Littlehampton .....	·95	„	Rhayader, Nantgwillt..	2·50
„	Hailsham .....	1·24	„	Carno, Tybrith .....	1·85
„	Ryde, Thornbrough .....	·74	„	Corwen, Rhug .....	1·17
„	Alton, Ashdell .....	·86	„	I. of Man, Douglas .....	4·12
III.	Oxford, Magdalen Col...	1·02	XII.	Stoneykirk, Ardwell Ho.	2·53
„	Banbury, Bloxham .....	1·39	„	New Galloway, Glenlee	4·37
„	Northampton .....	·76	„	Melrose, Abbey Gate...	1·44
„	Cambridge, Fulbourne..	·24	XIII.	N. Esk Res. [Penicuik]	4·85
„	Wisbech, Bank House..	·39	XIV.	Ballantrae, Glendrisaig	5·35
IV.	Southend .....	·76	„	Glasgow, Queen's Park.	3·50
„	Harlow, Sheering .....	·39	XV.	Islay, Gruinart School..	6·76
„	Rendlesham Hall .....	·97	XVI.	Dollar .....	4·02
„	Diss .....	1·00	„	Balquhider, Stronvar..	7·35
„	Swaffham .....	·58	„	Coupar Angus Station..	2·98
V.	Salisbury, Alderbury...	1·61	„	Dunkeld, Inver Braan..	3·39
„	Warminster .....	1·47	„	Dalnaspidal H.R.S. ....	4·01
„	Bishop's Cannings .....	1·91	XVII.	Keith H.R.S. ....	2·17
„	Ashburton, Holne Vic...	2·01	„	Forres H.R.S. ....	1·40
„	Hatherleigh, Winsford.	·79	XVIII.	Fearn, Lower Pitkerrie.	2·01
„	Lynmouth, Glenthorne.	·99	„	Loch Shiel, Glenaladale	11·36
„	Probus, Lamellyn .....	2·45	„	N. Uist. Loch Maddy ...	3·45
„	Launceston, S. Petherwin	2·95	„	Invergarry .....	3·60
„	Wincanton, Stowell Rec.	1·99	„	Aviemore H.R.S. ....	1·77
„	Taunton, Lydeard Ho...	...	„	Loch Ness, Drumnadrochit	1·74
„	Wells, Westbury .....	1·55	XIX.	Lairg H.R.S. ....	3·19
VI.	Bristol, Clifton .....	1·43	„	Scourie .....	2·47
„	Ross .....	1·62	„	Watten H.R.S. ....	2·58
„	Wem, Clive Vicarage ...	·88	XX.	Dunmanway, Coolkelure	3·77
„	Cheadle, The Heath Ho.	·75	„	Fermoy, Gas Works ...	2·77
„	Worcester, Diglis Lock	·81	„	Tipperary, Henry Street	2·09
„	Coventry, Coundon .....	1·30	„	Limerick, Kilcornan ...	2·48
VII.	Ketton Hall [Stamford]	·68	„	Milton Malbay .....	4·64
„	Grantham, Stainby .....	·87	XXI.	Gorey, Courtown House	2·10
„	Horncastle, Bucknall ...	·65	„	Navan, Balrath .....	1·99
„	Worksop, Hodsock Priory	1·21	„	Mullingar, Belvedere...	3·91
VIII.	Neston, Hinderton .....	1·11	„	Athlone, Twyford .....	3·00
„	Knutsford, Heathside ...	·98	„	Longford, Currygrane...	3·34
„	Lancaster, South Road.	3·96	XXII.	Galway, Queen's Coll...	2·70
„	Broughton-in-Furness ..	6·61	„	Clifden, Kylemore .....	9·20
IX.	Wakefield Prison .....	1·46	„	Crossmolina, Enniscoe..	3·03
„	Ripon, Mickley .....	2·12	„	Collooney, Markree Obs.	3·65
„	Scarborough, West Bank	1·57	„	Ballinamore, Lawderdale	3·64
„	East Layton [Darlington]	1·69	XXIII.	Warrenpoint .....	2·27
„	Middleton, Mickleton..	1·81	„	Seaforde .....	2·19
X.	Haltwhistle, Unthank..	2·46	„	Belfast, New Barnsley..	4·25
„	Shap, Copy Hill .....	...	„	Bushmills, Dundarave...	3·56
XI.	Llanfarcha Grange .....	1·66	„	Stewartstown .....	3·34
„	Llandovery .....	2·36	„	Buncrana .....	4·98

## SEPTEMBER, 1890.

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. 1880-9	Greatest Fall in 24 hours.		Max.		Min.		In shade.	On grass.		
				Dpth	Date.			Deg.	Date				Deg.
		inches	inches.	in.				Deg.	Date	Deg.	Date		
I.	London (Camden Square) ...	.65	— 1.86	.26	17	5	75.9	10	37.8	1	0	0	
II.	Maidstone (Hunton Court) ...	.98	— 1.61	.36	17	6	...	...	...	...	...	...	
III.	Strathfield Turgiss .....	.75	— 1.70	.33	21	9	75.8	10	32.5	1	0	1	
III.	Hitchin .....	.26	— 2.24	.08	17	6	72.0	5	47.0	12	0	...	
IV.	Winslow (Addington) .....	1.15	— 1.52	.65	22	11	76.0	27	34.0	1	0	1	
IV.	Bury St. Edmunds (Westley) ...	.63	— 2.07	.19	20	7	...	...	...	...	...	...	
V.	Norwich (Cossey) .....	.93	— 1.73	.32	21	7	73.0	10a	35.0	1	0	...	
V.	Weymouth (Langton Herring) ...	1.41	— 1.01	.41	17	8	75.0	6	44.0	1	0	...	
V.	Barnstaple .....	1.64	— 1.85	.41	17	10	73.0	9	37.5	1	0	...	
VI.	Bodmin (Fore Street) .....	2.28	— 2.19	1.18	17	14	...	...	...	...	...	...	
VI.	Stroud (Upfield) .....	1.03	— 1.88	.32	17	8	74.0	6, 8b	47.0	21d	0	...	
VI.	Churchstretton (Woolstaston) ...	.78	— 1.72	.23	17	10	74.5	9	43.0	1	0	0	
VII.	Tenbury (Orleton) .....	1.09	— 1.52	.59	17	7	77.0	9, 27	32.0	1	1	1	
VII.	Leicester (Barkby) .....	1.64	— 1.00	.73	21	15	79.0	8	37.0	11	0	0	
VII.	Boston .....	.41	— 2.36	.17	3	5	85.0	24	40.0	13	0	...	
VIII.	Hesley Hall [Tickhill] .....	1.28	— .88	.56	21	10	78.0	8	35.0	1	0	...	
VIII.	Manchester (Plymouth Grove) ...	1.13	— 2.34	.20	30	15	80.0	8	42.0	1	0	0	
IX.	Wetherby (Ribston Hall) ...	2.40	— .06	.48	22	9	...	...	...	...	...	...	
IX.	Skipton (Arncliffe) .....	4.04	— .72	1.27	30	17	79.0	8	42.0	13	0	...	
X.	Hull (The Park) .....	1.44	— 1.00	.72	21	11	...	...	...	...	...	...	
X.	North Shields .....	2.65	— .01	.70	23	15	73.5	8	...	...	...	...	
XI.	Borrowdale (Seathwaite) .....	15.88	+ 4.15	6.79	30	19	...	...	...	...	...	...	
XI.	Cardiff (Ely) .....	.87	— 2.87	.40	19	9	...	...	...	...	...	...	
XI.	Haverfordwest .....	3.02	— 1.38	1.22	17	14	70.0	6	39.0	10	0	0	
XII.	Plinlimmon (Cwmsymlog) ...	2.89	...	.45	23	12	...	...	...	...	...	...	
XII.	Llandudno .....	1.68	— .54	.40	30	15	75.1	8	47.9	13	0	...	
XII.	Cargen [Dumfries] .....	3.03	— .53	.54	20	17	71.6	6c	39.8	1	0	...	
XIV.	Jedburgh (Sunnyside) .....	1.64	— 1.05	.39	30	14	75.0	3, 8	43.0	13e	0	...	
XIV.	Old Cumnock .....	5.72	+ 1.89	.89	2	18	72.5	8	34.0	9	0	...	
XV.	Lochgilhead (Kilmory) .....	8.13	+ 3.00	1.84	30	21	...	...	...	...	...	...	
XV.	Oban (Craigvarren) .....	6.80	...	1.85	30	21	70.0	8	46.0	30	0	...	
XVI.	Mull (Quinish) .....	5.86	+ .83	1.11	25	21	...	...	...	...	...	...	
XVI.	Loch Leven Sluices .....	3.60	+ .81	2.20	30	8	...	...	...	...	...	...	
XVII.	Dundee (Eastern Necropolis) ...	2.85	+ .34	1.35	30	8	75.6	7	42.4	1	0	...	
XVII.	Braemar .....	3.01	+ .15	1.08	30	16	72.2	7	37.3	13	0	3	
XVIII.	Aberdeen (Cranford) .....	1.51	...	.65	30	13	76.0	3, 8	41.0	29	0	...	
XVIII.	Strome Ferry .....	5.52	+ .65	2.05	25	21	...	...	...	...	...	...	
XIX.	Inverness (Cullogen) .....	1.71	— .74	...	...	...	74.0	7	50.0	30	0	0	
XIX.	Dunrobin .....	2.72	+ .13	1.30	30	11	69.5	7	40.0	6	0	...	
XX.	S. Ronaldsay (Roeberry) .....	2.92	+ .26	.65	30	18	63.0	7	48.0	30	0	...	
XX.	Cork (Blackrock) .....	2.24	— .76	.92	20	11	78.0	5, 27	32.0	26	1	...	
XX.	Dromore Castle .....	3.65	— .38	.82	20	17	68.0	6	40.0	1	0	...	
XX.	Waterford (Brook Lodge) ...	2.32	— .60	.86	20	10	72.0	3, 11	43.0	18	0	...	
XXI.	O'Briensbridge (Ross) .....	3.66	...	1.43	21	16	75.0	6	45.0	22f	0	...	
XXI.	Carlow (Browne's Hill) .....	2.28	— .54	.65	20	15	...	...	...	...	...	...	
XXII.	Dublin (FitzWilliam Square) ...	2.47	+ .50	.88	20	14	71.2	7	48.3	23	0	0	
XXII.	Ballinasloe .....	3.42	+ .63	.93	30	18	68.0	7	40.0	17	0	...	
XXIII.	Waringstown .....	3.23	+ .07	.60	20	20	77.0	9	39.0	18d	0	0	
XXIII.	Londonderry (Creggan Res.) ..	5.57	+ 1.79	1.18	22	22	...	...	...	...	...	...	
XXIII.	Omagh (Edenfel) .....	3.56	+ .18	.86	17	19	70.0	7	43.0	9, 24	0	0	

a And 19, 28. b And 9, 10. c And 7, 15. d And 22. e And 29. f And 23, 25.

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

# METEOROLOGICAL NOTES ON SEPTEMBER, 1890.

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.—A beautiful month, with cloudless skies and a high temperature. The R in the third week was very welcome for root crops. Numerous wild flowers in full bloom.

HITCHIN.—The driest September in the 40 years recorded here, and the hottest but one.

ADDINGTON.—The whole month very fine. In low-lying places tender plants were much injured by frost on the 1st of the month, the temp. on grass falling below 30°.

BURY ST. EDMUNDS, WESTLEY.—The R of the month is less than that of any other September since 1865, when it was 11 in. A lovely warm month, but R much wanted at the close. T on the 17th and 23rd.

LANGTON HERRING.—A most beautiful month, and very favourable for the ingathering of the late harvest. On the 6th the temp. rose to 75°·0, only 1° below that of the hottest day (May 25th); only on the 1st did the temp. fall below 50°, and throughout the month the temp. was very equable, and the mean is 1°·7 above the average of 18 years.

BODMIN, FORE STREET.—A remarkably dry September. Brilliant and mild weather to the 16th; heavy R on the 17th; high winds on 19th, 20th, and 30th; very hot on the 28th and 29th.

WOOLSTASTON.—A warm, bright month of summer weather; a perfect harvest month. Mean temp. 58°·7.

BARKEY.—A lovely month; abundance of sunshine; temp. very high; harvest well ripened and well got. Some splendid sunsets. Mean temp. 59°·5, considerably above the average.

MANCHESTER, PLYMOUTH GROVE.—R the smallest in September for 24 years. Summer weather from the 6th to the 19th; the rest of the month very unsettled. Mean temp. 59°·7.

HULL, PEARSON PARK.—The weather during the month was unusually fine, with a small amount of cloud, and nearly free from fogs or mist.

SEATHWAITE.—Very heavy R on the 30th, 6·79 in.

## WALES.

HAVERFORDWEST.—The first five days were cloudy, damp, and relaxing; after that a remarkably fine warm period set in, with constant bright sunshine; this continued until the 17th, when a rather sudden change occurred, with violent gale, and much R; the day temp. fell very much, but the night temp. continued high up to the end of the month, the mean being about the average

## SCOTLAND.

CARGEN.—The mean temp of the month, 57°·6, is 3°·1 above the average, and the month was the warmest month of the year, the mean temp. being 3° above that of June, 1°·4 above that of July, and 1°·7 above that of August. On only two occasions during 31 years has the mean temp. of this month been exceeded in September, viz., 1880, when it was 58°, and 1865, when it was 60°. The night temp. was unusually high, 3°·2 above the average. On the night of the 27th the temp. did not fall below 60°·4; on only one occasion has the temp. been exceeded in September. Duration of sunshine below the average. L on 17th, 18th, and 20th.

JEDBURGH.—The weather during the month was on the whole very fine, and such as to allow the cereal crops to be generally secured except in the higher districts.

OBAN.—A very broken, wet month, typical of the whole summer season; farming operations almost arrested, and most of the corn crops obliged to

remain uncut. The R storms of the 28th and 30th produced serious floods, which did much damage.

CULLODEN.—Much sunshine throughout the month, the days being beautifully fine. Harvest well advanced by the close, except in exposed and high districts; all crops exceedingly full and heavy.

ROEBERRY.—The first part of the month was fine, the last part rough and unsettled. Heavy gale on 29th from westward, doing great damage to uncut crops.

### IRELAND.

DROMORE.—The latter half of the month was very unsettled.

WATERFORD, BROOK LODGE.—Fog on 8th, 9th, 18th, and 27th. Gale from the S. on the 20th. Mean temp.  $58^{\circ}\cdot 1$ .

O'BRIENSBRIDGE, ROSS.—A short but brilliant Michaelmas summer from 4th to 14th. The last week of the month wild and wintry, wind S. and S.W.

DUBLIN.—As in 1888 and 1889, so in 1890, September proved a fine month, with a high mean bar. The prevailing winds were from warm quarters, chiefly S.W. There was no excessive R, and the temp. was remarkably high. From the 5th to the 15th inclusive conditions were anti-cyclonic, and the weather was summerlike. On the 20th a violent gale occurred, accompanied by heavy R. Taken as a whole, however, the month was very favourable from an agricultural as well as from a health point of view, and was the warmest September for a quarter of a century.

OMAGH, EDENFEL.—The month commenced in the same rainy humid weather that has been so characteristic of the summer, but from the 5th to the 15th there followed a magnificent spell of fresh, clear, warm weather, as nearly perfect as it could be. On the 16th it again became unsettled, with R and strong winds, and from the 20th to the end continued wet.

### A DRY PERIOD.

*To the Editor of the Meteorological Magazine.*

SIR,—The deficiency in our rainfall continues with increased intensity. September, the average for which on 17 years is  $2\cdot 52$  in., only yielded  $0\cdot 66$  in. The total deficiency on the first nine months of 1890 is  $6\cdot 26$  in. from an average of  $19\cdot 00$  in. For the 12 months (October 1st, 1889, to September 30th, 1890) it is  $8\cdot 68$  in., from an average of  $26\cdot 56$  in.; and for the 16 months since June 1st. 1889, it is  $11\cdot 44$  in. from an average of  $36\cdot 55$  in. May 1889 was the last really wet month we had; of the 16 which have passed since then, only two were at all above the average, viz.: January, 1890 +  $0\cdot 07$  in. and March, 1890 +  $0\cdot 57$  in. The following have all produced considerably less than 1 inch of rain:—

		inch
1889.	June .....	$0\cdot 55$
„	November .....	$0\cdot 77$
1890	February .....	$0\cdot 82$
„	April .....	$0\cdot 55$
„	September .....	$0\cdot 66$

As compared with the 13 years average (1874—1886), the deficit of the last 12 months would be  $9\cdot 93$  in. These results as compared with the heavy rainfalls in other parts seem remarkable.

Yours very truly,  
G. H. MULLINS.

*West Deyne, Uppingham, Oct. 2nd 1890.*