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GALE OF APRIL 29TH, AND SEA SPRAY IN LONDON.

WE remember reading, but, until Mr. Ramsay's *Scientific Roll* comes to the rescue, we cannot tell where, that in one great gale all the windows in Leeds which faced W. were covered with a thin film of sea salt. From Leeds to the sea is, in that direction, about 54 miles, and between the two runs the Pennine range of hills with an average height of quite 1500 feet.

On April 29th, 1882, a very violent gale swept over the South of England—at some stations a stronger gale than on either October 13th or November 26th, 1881—and it proved seriously injurious to the young foliage of many trees, notably horse chestnuts. The precise cause of this injury is disputed, and as we think the matter worthy of attention, we reprint *in extenso*, or in abstract, all the notices that we have received or seen respecting it. Some persons hold that the damage was solely mechanical, and was due to the bruising of tender foliage by the violent wind, others contend, and bring evidence in support of their contention, that it was largely due to the atmosphere being charged with salt. We regret being unable to contribute anything worthy of consideration as scientific evidence to the question; for although we noticed that our windows were more obscured than usual, even after a dirty London rain, and that they looked slightly milky or frosty, it did not occur to us to examine them before they were cleaned.

We proceed with the notices upon the subject, taking them as nearly as possible in chronological order.

SATURDAY'S GALE.

To the Editor of the Standard.

SIR,—May I draw your attention to the unusual fact that the wind during the gale on Saturday last was, to the distance of at least thirty miles inland from the South Coast, largely impregnated with sea-salt? The effect of this on the vegetation is very marked. The foliage of this part of the country, which two days ago was dressed in its freshest Spring garb, is now, after some twelve hours of wind, reduced in many cases to a state as black, shrivelled, and scorched as it was before bright and beautiful.

Few people, I imagine, will, at first sight, suspect the true cause of this blighted state of the blossoms and foliage, some no doubt ascribing it to the extreme boisterousness of the wind, which, by knocking the leaves one against the other, beat them to their shrivelled black condition, whilst others will put it down to the peculiar sharpness of the wind. But the actual cause is easily ascertained by applying the tongue to the surface of a large broad leaf which has been plucked from some tree or shrub that has stood in the face of the wind. On some of the leaves which I examined the salt was actually visible, showing how heavily the air must have been laden with it. I had no instrument for determining the extreme velocity of the wind on Saturday, but it must, judging from the effects, have exceeded anything of the kind in this part of the country for the last seven years; probably the pressure per square foot was not far short of forty-five pounds.

I am not aware how far the wind has been known to carry the sea-brine—probably to a distance greatly exceeding thirty miles. What eventual effect this highly salinous top-dressing will produce on the fruit trees of this country remains to be seen, very probably it will manifest itself in a reduction of the crop by one-half.

I am, Sir, your obedient servant,
Tonbridge, May 1st.

E. L. D. S.

To the Editor of the Standard.

SIR,—Saturday's gale produced a similar effect on the trees in the Old Deer Park, in which this Observatory is situated, to that observed by your correspondent at Tonbridge, shrivelling up and blackening the leaves not only of the horse chestnuts, but also of the oaks and elms.

Seeing his letter in this morning's paper, I have examined some of the leaves. These not only give strong evidence of the presence of salt, when water in which they have been soaked is treated with silver nitrate, but on examining their surfaces, crystals may easily be seen, which, when viewed microscopically, are readily identified as salt, by their well-known cubical form.

As this observatory is over fifty miles from the sea, in the direction of south-south-east, in which the wind was blowing during the gale, the evidence of transport of salt to such a distance is interesting.

As to the velocity of the wind in the storm, although our greatest hourly run here was fifty miles, yet I timed several gusts between three and four p.m., when for two or three seconds the rate was from seventy to eighty miles per hour.

The meteorological observations at this observatory have now been made for about forty years, and I do not recollect ever seeing an entry of such an occurrence as that of last Saturday.

I remain, Sir, your obedient servant,

G. M. WHIPPLE, Superintendent.

Kew Observatory, Richmond, Surrey, May 2nd.

To the Editor of the Standard.

SIR,—Your correspondent "E. L. D. S." says that he is not aware how far the wind has been known to carry the sea-brine. I can inform him that it has been credited with conveying it a much greater distance than thirty miles. I remember a storm which occurred on a Sunday, about twenty years ago, when

I was residing at Burton-on-Trent (from which place the sea at its nearest point must be about ninety miles distant), on which occasion the *savants* of the neighbourhood declared that they discovered the presence of sea-spray in the air. For the accuracy of their researches I cannot vouch, but I can attest the fact that throughout that memorable afternoon a seagull was circling over the waters of the Trent, which were lashed by the wind into the miniature resemblance of a storm-tossed ocean.

I am, Sir, your obedient servant,

London, May 2nd.

J. R.

To the Editor of The Times.

SIR,—The gale of Saturday last has entirely changed the appearance of the country in these parts, and has besides effected considerable damage on the fruit trees, especially in exposed situations.

The leaves of the elms and oaks on the south-west sides of the trees might convey the impression that they had been scorched by fire, while the more tender foliage of the lime, maple, and poplar appear to be well-nigh destroyed, and several weeks must elapse before the injuries received can be repaired by fresh growth; though it may be doubted whether these trees will wholly recover throughout the summer, as the young shoots are in many instances entirely destroyed. Pears have suffered much, as far as the leaf is concerned, although the fruit itself, which is now mostly set, does not appear to be greatly injured; still, as every one who has any acquaintance with gardening is aware, fruit cannot grow on trees that are denuded of leaves. The plum trees, though perhaps to a less degree, are a good deal cut about, while the leaves of the apple are blackened and the blossoms crippled. Black-currants are also sufferers, whole branches being torn off from bushes growing in open places, and the remainder appearing as though frosted.

I have never recorded so severe a gale from the south-west during the month of April, nor does the recollection of a similar one occur to the memory of that proverbial individual, "the oldest inhabitant." At this season of the year, if gales take place, they blow almost without exception from the east, or north-east, but this year these winds have been confined to the first ten days in April.

With this fact in view, and considering at the same time the unusual force of wind just experienced from south-west, I have little doubt that this will be the prevalent wind for some weeks to come and, though forecasting for any length of time beforehand is always dangerous, that the early summer, at least, will be more or less wet.

I am, Sir, your obedient servant,

WILLIAM R. C. ADAMSON.

The Rectory, Ashted, Surrey, May 2nd.

To the Editor of the Standard.

SIR,—That the interesting observation of "E. L. D. S." that a deposit containing salt was left after last Saturday's (April 29th) gale was correct, I have been at some pains to verify.

To-day, by washing a third-storey window, in an exposed situation, with distilled water and a piece of cotton wool (previously tested as to absence of chlorides, and not held in my fingers), I obtained a solution which markedly

contains chlorides (with nitrate of silver test) and its evaporated residue crystals of salt. Its taste is decidedly saline.

Yesterday (2nd) I failed to obtain satisfactory proof by testing damaged foliage, for some showed its presence decidedly, whilst on others it was absent, the reason probably being that a later rain had removed it. I was, therefore, unable, without extensive experiments, to say for certain whether the foliage in itself did or did not contain salt.

As to the destructive effect of this salt on the foliage, I cannot but disagree with "E. L. D. S." until I have made further experiments, for frequently only the side of the damaged tree exposed to the blast is the injured side. Surely the other side must have had salt on its young and tender leaves, for they are not yet developed enough to screen one side completely from the other. Then again, each leaf has frequently only its outer edge damaged. Also I have noticed here and there a tender stem blackened in only one spot, where it has bent or been struck. I should imagine that had the destruction been due to salt in the air it would have been more universal, and not confined to those parts exposed in the teeth of the blast. Surely, battering of the leaves and branches can explain it. If due to salt, perhaps those living near the sea can say whether saline air only destroys young foliage.

I am, Sir, your obedient servant,

Tonbridge, May 3rd.

A. C. H.

BUSHEY PARK.—Probably nowhere near London was such destruction caused by Saturday's gale as in the magnificent avenue of chestnut trees in Bushey Park, which the public are informed by the usual notices are "now in full bloom." From Teddington at one end, to Hampton at the other, the scene may be described as one of wreckage. Many large trees were uprooted, while some hundreds of others have suffered severely.

SIR,—The gale of April 29th has here, as elsewhere, done much harm; no one seems to recollect such a gale at this time of the year. It was much worse, in its effect, than that of the 25th, lasting longer, too, though with less rain. The oak trees are blackened, as if by frost; in the less exposed situations, however, one side of the trees remain green. Birches, which last week were in full leaf, now look as bare as in winter. Pear trees have suffered severely, the fresh young leaves being black and scorched. The white cherry-blossom has been suddenly turned brown; in some gardens the currant bushes and young peas are much cut up, and I have seen even rhubarb all bruised and spoilt. The hop-bines in places are so injured as to be useless for tying up, and poles will have to wait for fresh shoots to be properly furnished. So that, altogether, we have a sad interruption to the prospects of a fruitful season.—Yours truly,

J. ELLIS MACE.

Tenterden, May 3rd, 1882.

The terrible wind and rain storm of the 29th ult. is worthy of, and will doubtless meet with, notice in your columns. I do not remember ever seeing such devastation wrought amongst vegetation. In this district of Mid-Surrey no great damage has been done, and not many trees were blown down, but the aspect of vegetation on the side from which the storm came is forlorn in the ex-

treme. The chestnut trees have suffered especially ; so blackened and withered are the leaves and flowers on the storm side in all unsheltered places that it seems doubtful whether they can ever revive through the summer. The contrast between the storm-beaten and other side of trees is most remarkable. Even the bushes of currant and gooseberry bear considerable traces of damage, the very weeds and nettles by the wayside are blackened. Some of the daily papers have spoken of severe frost coming after the storm. I observed nothing of the kind here ; my lowest reading at the time being 35° and 36°, and I am inclined to attribute all to the strange bitterness of the gale, and the cutting blast of hail during one portion of it.—A. C., *Journal of Horticulture*, May 11th, 1882.

ROYAL HORTICULTURAL SOCIETY.—SCIENTIFIC COMMITTEE.—May 23rd, 1882.

Sir J. D. Hooker, F.R.S., in the chair.

Foliage injured by Salt in the late Gale.—Dr. Church described experiments he had made at Cirencester during the last fifteen years to ascertain the amount of salt brought by autumnal gales, especially from S.W. He found from 5 to 7 grs. per gallon, while the ordinary amount was only 0·5 grs. The average winter amount was but little more than that of summer. He noticed that in Oakley Park one side of the trees was severely injured, and that if no rain followed for a few days after the gale, the salt sparkled on the trees even at a distance of 35 miles from the British Channel. The salt abstracted the moisture from the cells and formed a condensed solution, so that the leaf became completely dried up and perished.

Mr. McLachlan added that salt had been observed on windows at Lewisham and at Croydon and elsewhere.

Sir J. D. Hooker remarked that Dalton first noticed it at the beginning of this century. With regard to beeches withstanding the gale better than oaks, as mentioned at the last meeting, it was stated that they were unhurt at Kew and Valewood, Haslemere ; but at Cirencester, in Dorsetshire, and in Cornwall, they suffered severely.

Mr. Blackmore exhibited foliage of pears, &c., from Teddington ; some were quite unhurt ; of other trees growing adjacent to them the leaves were severely cut. Vines and peaches showed similar differences. He suggested that it could not be salt in this case.

The opinion generally entertained was, that such discrimination was due to the trees being relatively hardy and less hardy kinds.

SIR,—My house here stands on a hill-side exposed to the S.W. I look across a valley, and on the opposite horizon see Leith Hill Tower, 5 miles distant, from which the sea is visible. Of course we felt the full violence of the gale last Saturday (29th) ; a torrent of rain fell and streamed down my windows for hours together. The next day (Sunday) was very dry and sunny, and I was surprised at 9 a.m. to find my window panes covered with what looked like a finely-crystallized deposit. Examining this with a lens, I detected regularly formed crystals, and on wiping them up with my finger, and tasting them, I found them to be *salt*. I did not chemically analyse it, but its taste was that of common table salt.

The gale was from the S.W., and the nearest sea-coast in that direction, in a direct line, is about 35 miles off.

When I read in the *Times* of Thursday the week's weather report from Kew, I was astonished to find that salt had been found *there* on the leaves, so many miles further from the sea than Dorking.—Yours faithfully,

JAMES DIXON.

Harrow Lands, Dorking, May 5th, 1882.

SIR,—We are thirty miles, at least, from the sea, but on the previous Saturday, our windows were thickly coated with salt, and our foliage is ruined for the year, mainly, I think, by the force of the wind, certainly *not* by insects, though they now abound.—Sincerely yours,

E. S. ROWCLIFFE.

Hali Place, Cranleigh, Guildford, 5th June, 1882.

Our readers have now before them all the evidence which we have been able to collect. We shall be glad to see the subject further discussed.

THE METEOROLOGICAL SOCIETY.

THE usual monthly meeting of this Society was held on May 17th, at the Institution of Civil Engineers, Mr. J. K. Laughton, F.R.A.S., President, in the chair. Miss W. L. Hall, Mr. E. J. Pearson, Dr. J. R. Somerville, and Mr. W. J. V. Vandenberg were elected Fellows of the Society.

The following papers were read :—“On the Diurnal Variation of Wind and Weather in their relation to Isobaric lines,” by the Hon. Ralph Abercromby, F.M.S. By constructing synoptic charts at different hours of the same day, and by comparing the wind and weather records at the different hours, and examining their relation to mean curves of diurnal variation, the author shows that the mean diurnal increase of the wind's velocity may be explained by the fact that for the same gradient there is more wind by day than there is by night. The mean diurnal veering of the wind may be explained by the fact that in cyclones the wind is a little more incurved, and in anticyclones a little more outcurved, by night than by day. The mean diurnal increase of the frequency of rain during the day hours may be explained by the fact that in any given cyclone the area of rain is larger by day than by night. The diurnal changes of every element are super-imposed on the larger general changes, and are independent of each other. Great stress is laid on this point, both as explaining and classifying many meteorological questions, and as simplifying the problem of weather forecasting. The author gives a simple hypothesis, from which it appears that the diurnal veering and increase of rain follow as a natural consequence of the diurnal increase of velocity.

“Mechanical conditions of Storms, Hurricanes, and Cyclones,” by W. F. Stanley, F.M.S. The author pointed out many analogies between the phenomena of cyclones, &c., and those of vortex rings, and illustrated his paper by exhibiting the phenomena of the latter.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JAN., 1882.

STATIONS. <i>(Those in italics are South of the Equator.)</i>	Absolute.				Average.				Absolute.		Total Rain.	Aver. Cloud.	
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.		Days.
	Temp.	Date.	Temp.	Date.									
England, London	53·4	6	27·4	25	45·4	36·1	38·2	92	74·4	21·3	1·30	7	8·2
<i>Cape of Good Hope</i> ...	...	...	...	...	...	...	...	...	...	...	...	...	...
<i>Mauritius</i>	86·4	21	68·1	7	82·6	73·7	69·3	76	...	...	11·71	17	6·1
Calcutta	84·5	27	51·9	9	79·2	56·7	58·0	73	144·2	42·7	·13	2	2·4
Bombay	90·8	20	64·0	13	84·8	69·2	65·1	66	145·1	53·6	·00	0	1·1
<i>Ceylon</i>	89·2	15,17	68·0	9	86·4	72·6	69·2	71	152·0	62·0	2·81	9	6·3
<i>Melbourne</i>	110·5	19	46·9	31	78·6	54·8	50·0	60	168·9	39·9	·29	6	4·5
<i>Adelaide</i>	112·0	18	50·5	13	86·1	60·4	49·6	43	180·0	40·0	·24	5	3·7
<i>Wellington</i>	78·3	31	48·5	13	67·9	55·1	...	...	140·0	45·0	4·00	11	...
<i>Auckland</i>	77·6	7	53·2	27	73·3	58·2	57·1	75	132·1	48·5	5·52	11	6·2
<i>Falkland Isles</i>	65·7	16	33·0	1	55·9	42·3	43·4	76	134·0	27·0	2·79	18	7·3
Jamaica	89·9	24	62·0	15	84·8	66·8	66·1	77	...	...	·44	4	2·8
Barbados	80·0	2, 3	68·0	28	78·0	70·0	68·3	80	145·0	66·0	2·02	16	6·0
Toronto	48·1	27	-17·4	24	30·3	15·5	21·2	82	108·0	-23·0	2·01	15	7·0
New Brunswick, S. John	41·0	9	-11·0	18	27·0	8·7	17·7	88	...	...	4·60	18	5·0
Cape Breton, Sydney...	49·5	2	-10·0	26	28·3	9·4	17·8	86	...	...	5·01	15	5·7
Newfoundland, S. John's	37·6	3	-12·0	15	22·1	10·2	10·0	96	98·0	-10·0	4·70	...	7·1
Manitoba, Winnipeg ...	29·3	5	-39·7	23	8·7	-11·2	4·3	97	...	...	1·18	11	5·9

REMARKS, JANUARY, 1882.

Mauritius.—Rainfall, 5·01 in. above average; mean pressure, 29·972 in. Mean hourly velocity of wind, 8·6 miles; extremes, 23·4 miles on 28th, and 0·0 miles on 15th. T and L daily from 16th to 21st and from 27th to 31st.

C. MELDRUM, F.R.S.

CEYLON.—TS occurred on 4 days, and T or L on 3 other days. J. STODDART.

Melbourne.—Mean temp. 1°·1, temp. of dew point 3°·0, and rainfall 1·46 in. below the average; pressure, humidity, and amount of cloud slightly below the average also. Prevailing wind, S.W.; squally on 1st and 2nd, hot wind on 10th, 19th and 29th, with heavy duststorms on 10th and 19th; T and L on 10th.

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

Adelaide.—Mean temp. 73°·3, 1°·6 below average; although the max. in shade reached 90° on only 9 days, the heat at times was very great, particularly on 18th (see Table), when the old black glass ther. *in vacuo* rose to 168°·5, 2° higher than has ever been recorded before, and at noon the humidity was only 14. No R fell in the neighbourhood of Lake Torrens, and the fall over the agricultural districts, except in the S.E., was far below the mean.

C. TODD.

Wellington.—First two days fine, followed by stormy weather till 9th; thence fine again till 16th, again followed by stormy weather till 22nd; and the remainder of the month fine. Slight earthquakes on 9th and 17th; T on 3rd.

R. B. GORE.

Auckland.—Weather cool, with occasional very heavy R, 2·30 in. falling on 4th; mean pressure 29·865 in., below the average. Wind high from 7th to 12th; prevailing direction S.W.

E. B. DICKSON.

BARBADOS.—Mean pressure below the average; mean temp. 73°·8, slightly above it. Prevailing wind N.E.; average velocity, 14·8 miles; extremes, 18·9 miles and 8·5 miles. Rainfall below, and evaporation above the average.

R. BOWIE WALCOTT.

NEWFOUNDLAND.—The first part of the month was mild; the latter part cold and stormy, with S. Strong gale from S. on 14th.

J. DELANEY.

SUNSPOTS, MAGNETIC STORM, AND AURORA AUSTRALIS.

On the 16th of April last, we had the pleasure of seeing a portion of the solar disc in the great camera of M. Janssen's Observatory at Meudon, near Paris, and examining at leisure the details of the enormous spots then visible on the solar surface. When we remind our readers that the plates used in that camera are so large that the solar image is 4 ft. in diameter, they will readily understand with what ease the details of those great spots were seen.

On Saturday, June 3rd, at the visitation-day of Greenwich Observatory, one of the diagrams specially laid out for examination was one showing while these spots were nearing the sun's centre an extremely violent disturbance of the magnets. Every movement of which, as our readers are doubtless aware, is automatically recorded by photography at the Royal Observatory, Greenwich.

Thus far we had only traced two of the usual triplet of phenomena. On June 5th, we received from our correspondent at Wellington, New Zealand, written details and newspaper reports of exceptionally fine Aurora Australis, almost, if not quite, simultaneous with the magnetic storm silently photographed in the underground chambers of the Royal Observatory.

Some one may say, "Well, there's nothing new in that. We know that sunspots, magnetic storms, and auroræ go together. We know that magnetic storms occur at the same instant of time in all parts of the globe. We know that Aurora Borealis and Aurora Australis are often simultaneous, and perhaps connected." To this we reply, Quite true; some persons know it, all do not; and as no one can yet tell precisely how the phenomena are connected, we think it well to set as many brains at work upon the subject as practicable.

After this digression, we will go back to the Aurora Australis, and reprint verbatim the descriptions given in the New Zealand paper. Adding merely one or two foot notes—

THE MAGNETIC STORM AND AURORA AUSTRALIS.

A very brilliant Aurora Australis was visible intermittently for some hours last evening, 17th. The first symptoms of auroral light were perceptible as soon after sunset as the darkness was sufficient to enable them to be seen, and there is no doubt that the very remarkable colouring and conformation of the clouds which was noticeable at sunset were partially due to the same cause which produced the Aurora, namely, one of those peculiar phenomena known to meteorologists as magnetic storms, which had set in at about 4 o'clock yesterday afternoon, producing extraordinary effects on the telegraph wires over the whole colony, particularly in the South Island. The violence of the disturbance increased as the South Pole was approached,* and was greatest of

* Our Antipodæan friends write as if the South Pole were close to them, but Wellington is no nearer the South Pole than Rome is to the North Pole.

all at Invercargill and The Bluff,† from which no messages could be sent up to nearly midnight. Telegrams for all southern stations had to be refused shortly after 4 p.m., and the lines were only working again by about 9 p.m. The auroral display was at its brightest shortly after 7, and from that hour until 9 o'clock it alternately diminished and again increased in brilliancy. At one time the whole southern heavens presented the appearance of being illumined by the reflection of a vast conflagration. At another time there was a very pale bluish-green light surmounting a seemingly dense mass of pitchy blackness, which, nevertheless, was really so transparent as to permit the stars to shine through. After a time, faint rays shot upward across the background of pale glare, and these rays gradually beamed forth into marvellous vividness, shining with a peculiarly beautiful, pulsating, rosy light. Once or twice the vertical rays ran almost up to the zenith. Toward the end of the auroral display, it became "mixed up" with the light from a genuine gorse fire, which was burning in a gully among the hills to the south-west of the city, and this completely puzzled the spectators, who, by this time, were very numerous. Curiously enough, as the aurora at its outset was mistaken for a distant fire, so afterward this bush fire was mistaken for a fresh and surprising development of the aurora, the actual flames being hidden from view. It will be seen from the telegrams below that the aurora was very remarkable in the southern parts of the colony.

It appears that the phenomenon was also witnessed in the Wairarapa. Shortly before 7 o'clock (says the *Greytown Standard*) the south-eastern sky began to assume a beautiful rose colour, which deepened into a fiery red, the coruscations or streamers of light becoming stronger, until nearly the whole of the southern heavens presented an awfully grand appearance, with dim flashes of light ascending from the horizon.

CHRISTCHURCH, 17th April.

There was a wonderfully brilliant aurora this evening about 7 o'clock. The tints, as seen here, were gorgeous, and extended right to the zenith.

TIMARU, 17th April.

A very brilliant Aurora Australis is visible here to-night.

THE AURORA AUSTRALIS.

The Aurora Australis was visible again last evening (20th) for some hours. Between 7 and 8 it was peculiarly fine. The light was scarcely so bright as in Monday's display (17th); but the colouring was even more vivid, a singularly rich deep crimson tint prevailing on the upper portion of the aurora, shading off into "cardinal," scarlet and pink as the horizon was approached. Across this mass of gorgeous colouring, rays of creamy-hued light shot upward to a height of 30 or 40 degs. The variations of colour, shading, and intensity changed almost every moment, producing effects of marvellous beauty. The sky being perfectly clear the full view was not obstructed by clouds, as was sometimes the case on Monday. The streets were crowded during the evening with spectators of the display. As in the former instance, it was mistaken by many people for a fire, and one excited alarmist was only just prevented in time from ringing the fire-bell. The aurora had not wholly faded away by 11 p.m. The telegraphic wires were only slightly affected on this occasion by the magnetic

† These two stations are, it is true, at the extreme S. of New Zealand, but they are only in the same degree of S. latitude that Geneva is of N. latitude.

disturbance. A correspondent informs us that she observed an aurora on Sunday evening (16th), at 7 o'clock, in a due southerly direction. Some interesting telegrams relative to last night's display appear below.

DUNEDIN, 20th April.

The Aurora Australis was again very brilliant here to-night.

The Rev. Dr. Roseby, writing in the *Herald* this morning, says that there is a close connection between the electrical disturbances and sun-spots, and adds:—"We are just at about the epoch (the period is a little more than eleven years) of maximum sun-spots, and certainly the sun, for the last few days, has displayed a strangely unusual appearance. Two groups of spots of enormous magnitude are now to be seen on its surface. They are so large as to be distinctly visible, the eye being, of course, duly protected, without any telescopic aid whatever. It is a matter of startling and unusual interest to know that a piece of smoked glass will just now enable any person with good eyes to see spots on the sun. They will only be visible, however, for the next few days."

SIGNS OF SUMMER.

To the Editor of the Meteorological Magazine.

SIR,—I send the enclosed table of the arrival of some of our summer birds, as it may interest some of your readers:—

YEAR.	CUCKOO.	SWALLOW.	CORNCRAKE.
1873	April 22nd.	April —	May 7th.
1874	April 27th.	April 21st.	May —
1875	April 24th.	April 22nd.	May —
1876	April 29th.	April —	May 8th.
1877	April 26th.	April 27th.	May 10th.
1878	April 22nd.	April 24th.	May 18th.
1879	April 27th.	April 26th.	May 9th.
1880	April 24th.	April 24th.	April 27th.
1881	May 1st.	April 18th.	April 28th.
1882	April 25th.	April 29th.	April 21st.
AVERAGE ...	April 26th.	April 23rd.	April 30th.

Yours truly,

C. PERCEVAL BOLTON, F.M.S.

Brook Lodge, Waterford.

SUNLIGHT AND SUNSHINE.

In the annual report of the inspector under the Alkali Acts is contained a table showing the results of an entirely new process for investigating the state of the atmosphere as a conveyer of solar light. The active power of the light, or, in Mr. Angus Smith's words, its "actinic strength," is tested by the decomposition of iodide of potassium in the presence of acid when exposed to the open air. This test has been applied at Manchester for a period of over

twelve months, ending with the July of last year, and the results are given in weekly and monthly averages extending throughout that time. It is to be noted that this actinism of the light has no direct connection with the actual sunshine, so that it cannot be estimated in any but the most vague and imperfect way by the unaided eye. "The value of the sun to us," is, however, as the inspector observes, "measured not by clear sunshine, but by total effective light." The tables now for the first time given have, therefore, according to this theory, far greater value than any mere observations of cloudy or cloudless days, such as those which have been taken by Sir H. Brand amongst other persons in late years. The figures in the Manchester return show very great diversity in the actinic strength exerted in different months and years. Although, of course, the summer months show the best results, they are by no means uniform according to their order in the calendar. Thus, in the first seven months of last year April was by far the brightest month, scoring a total of 44·2, and from the end of that month until the end of July, there was a steady falling off, until the return for July descended as low as 25·4, against a return of 55 for the July of the preceding year. December and January show the low total of 2·1, and of the months next to them November, with 13·9, stands a long way above February with 6·8. The highest score mentioned in the return is 66·6, which is credited to the month of August in 1880.—*The Globe*.

THE HEAT IN AUSTRALIA IN JANUARY.

SOME statements respecting the excessively high temperature in South Australia and in Victoria during some days of January last, will be found in the table and remarks from the observatories at Adelaide and Melbourne on a previous page (71).

We are glad to supplement them by the following table from a station more than 500 miles distant from both Adelaide and Melbourne. We may add that these two cities are about 400 miles apart :—

SHADE TEMPERATURE AT MOUNT HARRIS ON THE MACQUARIE RIVER, NEW SOUTH WALES, JANUARY, 1882.

A correspondent, writing from Mount Harris, on the Macquarie River, forwards us the following record of the temperature (in the shade) in that locality during the best part of last month :—

1882.	Deg.	1882.	Deg.
January— 9th, 3 p.m. ...	112	January—19th, 1 p.m. ...	106
10th, 2 p.m. ...	113	20th, 12 noon ...	112
11th, 2 p.m. ...	113	21st, 2 p.m. ...	114
12th, 2 p.m. ...	94	22nd, 2 p.m. ...	115
13th, 2 p.m. ...	90	23rd, 2 p.m. ...	110
14th, 2 p.m. ...	103	24th, 2 p.m. ...	104
15th, 3 p.m. ...	108	25th, 2 p.m. ...	102
16th, 2 p.m. ...	105	26th, 2 p.m. ...	104
17th, 11 a.m. ...	106	27th, 2 p.m. ...	101
„ 2 p.m. ...	100	28th, 3 p.m. ...	106
18th, 2 p.m. ...	108	29th, 2 p.m. ...	112

30th, at 6 a.m., 88°; very sultry all last night, with T at intervals. 7 a.m., 80°, heavy T, with R and wind for about half-an-hour. Looking now likely for cooler weather.

THE MONSOON.

THE present month may be called the turning-point of the season in India, whose agricultural prospects are, humanly speaking, assured by the news which has reached us from Bombay of the bursting of the monsoon. This phenomenon, on whose regular occurrence the fate of the whole of India may be said to hang, is one which excites the awe of those who witness it for the first time, and arrests the attention of all who have an interest in our Great Empire in the East. Even by Anglo-Indians at home the intelligence of the bursting of the monsoon is anxiously looked for as every succeeding June comes round. The moment at which the rain-laden clouds actually burst, after having been rolled up in dense volumes by the steady wind which at the end of April or beginning of May begins to blow across the continent from the Indian Ocean, is one of supreme grandeur. The sudden advent of a summer thunderstorm in this country, after the dark masses of cloud have been slowly brought overhead, when the lightning flash seems to rend the heavens in twain, and the reverberating thunder to shake earth and sky alike, is but a small presentment of what happens among the hills of India. There, after perhaps days of close, sultry weather, during which the dark blue sky has become hidden amid dense volumes of vapour, the cloud assumes a deep fiery hue, apparently reflecting the heat which is felt on all sides. Then, instead of a lull in the regular movement of the air, a sudden squall springs up, followed almost immediately by vivid flashes and sheets of lightning, amid the play of which the rain begins to fall, first in heavy drops and then in torrents, that appear likely to carry all before them. The parched earth eagerly drinks in the moisture; the heaviness of the storm passes off, the atmosphere becomes cool and quiet, and then, in the next valley and amid the adjoining hills, the same impressive sight is witnessed, till gradually the whole country from south to north is visited, and the "rainy season," bringing fertility to the soil, is safely ushered in.—*The Colonies and India.*

A WET APRIL.

RAINFALL REGISTERED AT LONG WITTENHAM, BERKS.

Lat. 51°, 39' N.; Lon. 1°, 13' W.

IN THE MONTH OF APRIL, 1851—1882 INCLUSIVE.

1851...	·95	.....	1862...	2·51	.....	1873...	·79
1852...	·54	.....	1863...	1·37	.....	1874...	1·04
1853...	1·93	.....	1864...	1·71	.....	1875...	1·21
1854...	·59	.....	1865...	·93	.....	1876...	2·74
1855...	·38	.....	1866...	1·76	.....	1877...	2·69
1856...	2·56	.....	1867...	2·40	.....	1878...	2·75
1857...	1·74	.....	1868...	1·65	.....	1879...	2·32
1858...	2·11	.....	1869...	1·65	.....	1880...	2·76
1859...	1·98	.....	1870...	·63	.....	1881...	·79
1860...	·84	.....	1871 ..	2·05	.....	1882...	3·84
1861...	1·04	.....	1872...	2·18	.....	

J. CLUTTERBUCK.

[The fall in 1882 was, therefore, more than double the average (1·70 in.), and about 40 per cent. greater than in any one of the previous 31 years.]—Ed.

SUPPLEMENTARY TABLE OF RAINFALL,
MAY, 1882.

[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	1·35	XI.	Castle Malgwyn	2·24
"	Margate, Birchington...	1·37	"	Rhayader, Nantgwilt..	2·43
"	Littlehampton	1·06	"	Carno, Tybrite	2·51
"	St. Leonards	1·96	"	Corwen, Rhug	2·33
"	Hailsham	1·18	"	Port Madoc	2·18
"	I. of W., St. Lawrence.	1·00	"	I. of Man, Douglas	1·07
"	Alton, Ashdell	1·92	XII.	Carsphairn	2·28
III.	Great Missenden	2·15	"	Melrose, Abbey Gate ...	2·53
"	Winslow, Addington ...	2·10	XIII.	N. Esk Res. [Penicuik]	2·65
"	Oxford, Magdalen Col... 1·66	1·66	XIV.	Ayr, Cassillis House ..	1·51
"	Northampton	1·87	"	Glasgow, Queen's Park.	2·41
"	Cambridge, Beech Ho... 1·45	1·45	XV.	Islay, Gruinart School..	1·73
IV.	Southend	1·08	XVI.	Cupar, Kemback	2·70
"	Harlow, Sheering	1·20	"	Aberfeldy H.R.S.	2·04
"	Diss	1·45	"	Dalnaspidal	4·69
"	Swaffham	1·71	XVII.	Tomintoul	1·69
"	Hindringham	2·01	"	Keith H.R.S.	1·93
V.	Salisbury, Alderbury ...	2·10	XVIII.	Forres H.R.S.	1·58
"	Calne, Compton Bassett	1·78	"	Strome Ferry H.R.S. ...	3·26
"	Beaminster Vicarage ...	1·78	"	Lochbroom	2·66
"	Ashburton, Holne Vic..	2·48	"	Tain, Springfield	1·78
"	Torrington, Langtree W.	2·99	"	Loch Shiel, Glenaladale	5·29
"	Lynmouth, Glenthorne.	2·07	XIX.	Laigr H.R.S.	·52
"	St. Austell, Cosgarne ...	...	"	Forsinard H.R.S.	1·68
"	Taunton, Fullands	1·68	"	Watten H.R.S.	1·54
VI.	Bristol, Clifton	1·93	XX.	Fermoy, Glenville	3·04
"	Ross	2·01	"	Tralee, Castlemorris ...	2·68
"	Wem, Sansaw Hall	1·68	"	Cahir, Tubrid	3·12
"	Cheadle, The Heath Ho.	2·89	"	Newcastle West	1·95
"	Worcester, Diglis Lock	1·79	"	Kilrush .....	...
"	Coventry, Coundon	1·57	"	Corofin	2·18
VII.	Melton, Coston	2·04	XXI.	Kilkenny, Butler House	...
"	Ketton Hall [Stamford]	1·34	"	Carlow, Browne's Hill..	4·10
"	Horncastle, Bucknall ...	2·38	"	Navan, Balrath	3·09
VIII.	Macclesfield, The Park	1·65	"	Athlone, Twyford	4·03
"	Walton-on-the-Hill	1·26	XXII.	Mullingar, Belvedere ...	3·18
"	Broughton-in-Furness ..	3·30	"	Ballinasloe	3·31
IX.	Wakefield, Stanley Vic.	·94	"	Clifden, Kylemore	3·09
"	Ripon, Mickley	1·33	"	Crossmolina, Enniscoe..	3·24
"	Scarborough	1·21	XXIII.	Carrick-on-Shannon ...	1·87
"	East Layton [Darlington]	1·55	"	Dowra	1·96
"	Middleton, Mickleton ...	1·90	"	Rockcorry	3·30
X.	Haltwhistle, Unthank..	1·55	"	Warrenpoint	3·04
"	Shap, Copy Hill	3·15	"	Newtownards	1·57
XI.	Llanfrechfa Grange ...	2·42	"	Belfast, New Barnsley..	2·28
"	Llandoverly	2·50	"	Bushmills	2·15
"	Solva	·77	"	Buncrana	2·32

MAY, 1882.

Div	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					TEMPERATURE.				No. of Nights below 32° In shade. On grass.		
		Total Fall.	Difference from average 1870-9	Greatest Fall in 24 hours.		Days on which .01 or more fell.	Max.		Min.				
				inches	inches		in.	Dpth	Date.	Deg.	Date.	Deg.	Date.
I.	London (Camden Square) ...	1.20	-.72	.41	5	11	74.2	29	37.3	16	0	0	0
II.	Maidstone (Hunton Court)...	1.07	-.95	.23	25	8	...	...	...	...	...	...	...
III.	Strathfield Turgiss	1.32	-.36	.47	5	8	71.4	29	33.1	17	0	8	3
III.	Hitchin	1.26	-.73	.39	5	9	70.0	22	30.0	16	3	0	0
IV.	Banbury	2.13	-.00	.87	22	14	70.0	30	30.0	17	1	1	1
IV.	Bury St. Edmunds (Culford)	1.67	-.23	.53	25	9	74.0	28	31.0	15d	3	3	3
V.	Norwich (Cossey)	1.61	-.20	.55	24	8	74.0	23	33.0	18	0	0	0
V.	Bridport .....	...	...	...	...	...	...	...	...	...	...	...	...
V.	Barnstaple	1.92	-.18	.43	25	9	72.0	31	39.0	1, 17	0	0	0
V.	Bodmin	1.83	-1.01	.39	25	11	72.0	31	38.0	16	0	0	0
VI.	Cirencester	2.09	-.09	.67	25	10	...	...	...	...	...	...	...
VI.	Churchstretton (Woolstaston)	2.26	-.13	.41	3	15	68.5	10	34.0	16	0	0	0
VI.	Tenbury (Orleton)	2.87	+.44	.54	25	13	70.7	30	30.8	16	2	6	6
VII.	Leicester	2.41	...	.82	7	14	72.6	22	35.0	17	0	0	0
VII.	Boston	1.72	-.05	.69	25	9	73.0	23	37.0	16	0	0	0
VII.	Grimsby	2.04	+.39	.42	3	12	68.0	29	35.0	16	0	0	0
VII.	Mansfield .....	...	...	...	...	...	...	...	...	...	...	...	...
VIII.	Manchester (Ardwick).....	2.14	-.09	.44	5	14	70.0	11a	38.0	1	0	0	0
IX.	Wetherby (Ribstone Hall) ...	1.86	+.04	.52	4	8	...	...	...	...	...	...	...
IX.	Skipton (Arncliffe)	3.44	+.32	.66	25	12	75.0	18	32.0	16	0	0	0
X.	North Shields	2.40	+.55	.72	7	14	70.5	28	33.0	17	0	2	2
X.	Borrowdale (Seathwaite).....	8.48	+1.50	4.51	24	13	...	...	...	...	...	...	...
XI.	Cardiff (Ely)	2.26	-.34	.59	25	13	...	...	...	...	...	...	...
XI.	Haverfordwest .....	.83	-1.86	.36	23	8	69.0	22	32.3	4	0	6	6
XI.	Plinlimmon (Cwmsymlog) ...	2.76	...	.86	23	14	...	...	...	...	...	...	...
XI.	Llandudno	1.03	-.59	.41	23	10	65.5	23b	33.8	4	0	0	0
XII.	Cargen [Dumfries]	1.37	-1.16	.36	1	12	73.6	18	33.6	16	0	0	0
XII.	Hawick	1.49	-.65	.30	8, 23	11	...	...	...	...	...	...	...
XIV.	Douglas Castle (Newmains)	2.31	-.03	.58	1	14	...	...	...	...	...	...	...
XV.	Lochgilphead (Kilmory).....	3.22	+.46	.62	26	15	...	...	32.0	3, 5	2	2	2
XV.	Appin (Airds)	3.07	...	...	...	...	...	...	...	...	...	...	...
XV.	Mull (Quinish)	4.61	...	.80	1	14	...	...	...	...	...	...	...
XVI.	Loch Leven Sluices	2.70	+.41	.90	8	12	...	...	...	...	...	...	...
XVI.	Arbroath	2.21	+.44	.61	7	11	66.0	28	36.0	16	0	0	0
XVII.	Braemar	2.51	+.09	.47	1	16	71.0	17	28.0	16	4	19	19
XVII.	Aberdeen	1.44	...	.39	11	10	68.0	29	34.0	16	0	0	0
XVIII.	Skye (Sligachan)	7.22	...	1.92	9	14	...	...	...	...	...	...	...
XVIII.	Culloden .....	.86	-.92	...	...	...	74.0	19	31.0	16	2	14	14
XIX.	Dunrobin	1.57	...	.68	11	10	65.0	19	38.0	12	0	0	0
XIX.	Orkney (Sandwick).....	1.37	-.50	.27	11	14	63.2	27	35.6	8	0	5	5
XX.	Cork (Blackrock)	2.52	+.36	.54	24	15	80.0	30	33.0	16	0	0	0
XX.	Dromore Castle	2.65	...	.50	2	11	68.0	18	34.0	3, 16	0	0	0
XX.	Waterford (Brook Lodge) ...	2.90	...	.94	23	11	70.0	31	33.0	4	0	0	0
XX.	Killaloe	2.65	...	.56	24	13	81.0	30	31.0	5	2	1	1
XXI.	Portarlinton	4.01	+2.16	.71	23	19	71.0	18	31.0	16	1	1	1
XXI.	Dublin (Monkstown)	1.79	...	.54	24	15	...	...	...	...	...	...	...
XXII.	Galway (Queen's College) ...	2.43	-.24	.50	2	14	...	...	...	...	...	...	...
XXIII.	Waringstown	2.09	-.02	.28	24	15	77.0	29c	33.0	4	0	0	0
XXIII.	Londonderry .....	...	...	...	...	...	...	...	...	...	...	...	...
XXIII.	Omagh (Edenfel)	2.33	-.02	.44	24	16	70.0	18	30.0	4	3	3	3

+ Shows that the fall was above the average ; - that it was below it.
a And 22. b And 29. c And 31. d And 17.

METEOROLOGICAL NOTES ON MAY.

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.—The month was very favourable to the growing crops; the temp. high during the day, and the nights warm; lunar rainbow at 11 p.m., on 26th; hawthorn and ox-eye daisy in flower on 1st, dog-rose on 16th, fox-glove on 19th, blackberry on 22nd, first swift seen on 5th, wheat in ear on 29th.

BANBURY.—Mean temp. $52^{\circ}3$; TSS on 3rd and 22nd, and T and L on 7th, 23rd, and 28th; high wind on 19th, 20th, and 24th, H on 2nd and 22nd.

CULFORD.—A fine but rather dry month with cold nights; cereals forward and looking well; L on 3rd, T on 21st, H on 7th.

COSSEY.—A dry month with many bright days and cold nights; distant TS on 7th with local heavy showers.

BODMIN.—A warm genial month with beneficial rains from 21st to 28th; mean temp. $56^{\circ}0$.

CIRENCESTER.—On the whole a favourable month for the crops, but the prospect for fruit damaged by strong winds.

WOOLSTASTON.—Mean temp. of the month $51^{\circ}9$; a severe S from 3 to 3.45 p.m. on 3rd.

ORLETON.—The first week of the month was warm and rainy with a S wind; the weather then became fine and dry with frosty nights and a steady wind from N. and E., on the 22nd the wind changed again to the S. with violent TSS and heavy R for a week; the last four days of the month were again fine and dry. Mean temp. about $1^{\circ}2$ above the average of 20 years; T was heard on 5 days and L seen on 4 days. A violent storm of L, T, and H, passed over on 3rd, when many of the H stones were more than 1 inch in length; the fall of H lasted about 9 minutes, and in that time the R gauge registered about $\cdot50$ in.; great but short storms of L, T, and R, occurred also on the 22nd and 23rd, many trees in the neighbourhood being struck by the L.

LEICESTER.—The month was a very genial one; grass abundant, corn promising well; a very heavy TS occurred on the 7th with $\cdot82$ in. of R, the greater part of which fell in one hour, and a short TS at 3.30 p.m. on 23rd.

KILLINGHOLME.—Very dry in the middle of the month followed by some very acceptable rains from 22nd to 28th; close of the month very fine; T and L at night on 7th, T at mid-day on 24th and 27th.

ARDWICK.—The month opened in a somewhat unpromising manner, but as it advanced became fine; cold E. winds prevailed from about the middle to the 22nd, but on that day beneficial rains commenced. Temp. of the month rather low.

ARNCLIFFE.—Thunder daily from 1st to 4th, and on 7th.

NORTH SHIELDS.—TSS on 3rd and 26th, T on 27th and 29th.

WALES.

HAVERFORDWEST.—One of the driest Mays recorded; it commenced with high wind and R, but after the 3rd the days were fine and bright, and the nights frosty; some R fell on the 9th, but with that exception there was an absolute drought from the 2nd till the 22nd; that day and the four following days were wet and warmer, the warmth continuing to the close of the month.

LLANDUDNO.—A bright and dry month, perhaps too dry for the farmer and gardener, but most enjoyable for health and pleasure seekers; measurable quantities of R fell on 10 days but the amounts were small except on the 23rd, on which day a TS occurred between 4 and 5 p.m. Mean temp. $52^{\circ}4$, as nearly as possible the average; mean degree of humidity 75; the winds were moderate in force and about half polar and half equatorial; duration of bright sunshine 380 hours.

SCOTLAND.

CARGEN.—A bright warm month, duration of sunshine about 50 hours above the average, R much needed; mean temp. $52^{\circ}3$, $1^{\circ}4$ above the average; T on 7th, 11th, and 26th.

HAWICK.—The month was free from anything of a wintry character, and the country is looking beautiful.

ARBROATH.—A violent whirlwind occurred on the 27th at 5 p.m., and lasted ten minutes.

BRAEMAR.—The early part of the month was cold with frosts at night, the latter part fine and warm; T at 5 p.m. on 27th.

ABERDEEN.—Very fine growing weather, vegetation made rapid progress but the rainfall was somewhat deficient, being about half an inch below the average; fresh N.W. gale on 12th, and squally on 11th.

CULLODEN.—Weather very dry, partial showers only occurring, very fine, particularly between 12th and 26th.

SANDWICK.—The weather was fine, and generally favourable to vegetation.

IRELAND.

DROMORE CASTLE.—A fine genial month, all crops promising; mean temp. 52° .

WATERFORD.—T on 7th, 10th, 23rd, and 26th, L on 26th also; strawberries ripe on 25th, oak in leaf some days before the ash.

KILLALOE.—A very fine month; very little frost, abundant brilliant sunshine, and sufficient R to make vegetation vigorous; T and L for several hours on 23rd.

EDENFEL.—A very favourable month for vegetation, very little night frost, and more than the average amount of sunshine, but the bloom of all kinds of fruit, and of thorn, laburnum, &c., conspicuously absent.

ERRATA IN THE *METEOROLOGICAL MAGAZINE*
FOR 1881.

IN discussing the annual returns of Rainfall for 1881, the following errors have been detected in the tables printed in the last volume of the *Meteorological Magazine*. R denotes Regular Table; S, Supplementary:—

R.	January.....	Boston	should be.....	'81
S.	„	Port Madoc.....	„	1'40
S.	„	Melrose	„	1'93
S.	April	St. Lawrence.....	„	1'13
R.	May	Portarlinton	„	2'24
S.	November.....	Dowra	„	3'72
S.	December	Taunton	„	2'26