SYMONS'S

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PECULIAR CLOUD FORMATION.

To the Editor of the Meteorological Magazine.

SIR,—On the afternoon of Sunday, May the 22nd, an unusual appearance of the sky was very generally observed throughout Ireland. Before describing the phenomenon at length, I may premise that on the preceding day, Saturday, the 21st, a wave of heat crossed Ireland from the S.W. In Dublin the thermometer rose to 73°·1 in the shade. During the ensuing night the wind veered to N.W., and the temperature fell rapidly, the reading at 9 a.m. on Sunday being only 54°·9. The sky was now almost covered by a stratum of low cumulo-stratus cloud, which was driven by a fresh breeze from the north-westward. At noon this cloud system showed signs of breaking up, and through the interstices which formed in it, a diffuse upper cloud, *resembling cirrus*, was seen to overspread the sky. Under the influence of this new formation, the disorganisation of the lower cumulo-stratus became rapidly complete, and the latter soon disappeared. The atmosphere near the ground was at this time remarkably clear, and at 1 p.m. the top of Snowdon was indistinctly visible from Howth, a native of which place remarked that this clearness was due to the presence of "sleet in the air." Through the canopy of cirro-stratus the sun now came into view, being at first of a pale white colour, but soon assuming a pinkish or carmine tint. A strange lurid light spread over the landscape, and it seemed as though a total eclipse was in progress. For some hours the sun was seen under these peculiar circumstances, and several spots were noticed scattered over its disc. At 5 p.m. it totally disappeared from view, as the cloud became denser, but at 7 p.m. it assumed the character of a ball of fire, and so continued until its setting. Shortly afterwards the cloud melted away, and the temperature fell quickly to 42° on the grass at 9 p.m., and finally to 36°.

The cloud which produced the appearance just described, no doubt was a vapour-fog suspended in mid-air, the motion of which was extremely slow. The extent of this cloud formation, again, was remarkable. It was noticed in Wicklow, Dublin, Meath, Cavan, Connemara, Louth, and Antrim.—I am, Sir, yours &c.,

J. W. MOORE, M.B.

Dublin, June 2nd, 1870.

THE WEATHER.—Great heat suddenly came along the coast on Saturday, the thermometer rising nearly 15°, the open sunshine being almost unbearable, this being a strong contrast to the chilliness of the past week. Dense fogs are reported as prevailing in the Irish Channel about Holyhead. On Sunday the temperature again fell considerably, the glass being about 60° in the shade. A hot summer is anticipated. On Sunday afternoon the singularly pink colour of the sun, as seen through a thin film of mist for some hours, attracted general observation.

A Connemara correspondent writes :—"On Sunday last it was remarked that the sun had a strange bright copper colour, and, when looked at through an ordinary opera glass, eight spots were distinctly visible on lower half of disc. The atmosphere was thick, and indeed the sun seemed as if shining through smoke."

SOLAR PHENOMENON—BAILIEBOROUGH, MAY 26, 1870.—On Sunday, the 22nd inst., this town and neighbourhood presented a very extraordinary appearance. From a very early period of the day until late in the evening, groups of people might be seen gazing heavenward, some of them betraying by their looks evident apprehension of danger, and all of them more or less emotions of interest or astonishment, while they continually inquired from one and the other, "What is the matter with the sun?" Young and old, rich and poor, were attracted by the strange and varied attire with which "mighty Sol" decorated himself, ever and anon exhibiting, with almost lightning rapidity, dresses of every tint and colour, simple and compound, in somewhat like the following order :—Light pink, blood red, purple, green, blue, yellow, and then bright like silver. At times the whole of the disc was covered with one or other of the above hues, at other times with combinations of them, but in every aspect considerably minified in apparent size, and so modified in brilliancy that the weakest eye could behold the great orb of day performing his grand masquerade without being in the least degree incommoded! As nothing of the like kind has ever been heard of or recollected here before, I, in common with several others, have been on the look-out for some notices of the event in your columns, but failing to observe any, I think it my duty to furnish you with this communication, and hope that it may elicit some statements explanatory of the causes of such a remarkable phenomenon. I have also to add that the moon on the following night presented a partial duplicate of the sun's drapery on the day before. It would be satisfactory to know had they one wardrobe in common, or were they each private property?—*Correspondent.*

SOLAR PHENOMENON.—*To the Editor of the Daily Express.* SIR,—The strange and unique solar phenomenon about which inquiry was made in your paper of the 27th inst., was caused by a haze of a pink colour, which assumed various depths of intensity of that colour as the passing haze happened to be in greater or lesser volume. The colour here was a true carmine, as I had many tints of colouring made and held up, so as to take in the sun and the tint at the same glance. Carmine alone gave the tint, and only differed as all earthly colours must in the transparent brilliancy of the sun-light. Could we have tinted on burnished gold an exact representation might have been given. The obscuration of the pink veil lasted until five o'clock p.m. During its prevalence all terrestrial objects presented a strange lurid appearance, like as exhibited during a solar eclipse. There were very many spots on the face of the sun, some of them large enough to be seen by the naked eye, which required no defence of darkened glass even in the focus of a three-inch object glass telescope. The thermometer fell to 53, the barometer stood at 30·45. The haze was very evenly spread over the visible heavens, except in the south-east, where very large wool-pack, rainy-looking clouds, were carried S.E. by apparently a strong wind. The wind was light here. Distant thunder was heard towards S.E. I have never seen or heard of a similar phenomenon, but there is no doubt that it was occasioned, as stated, by a pink haze, as the deep tone of the carmine colour became paler as the haze thinned off towards the close. The great variety of colour mentioned by your Bailieborough correspondent was not observed here, the only changes being in the intensity of the pink, with sometimes a tendency to an orange shade round the circumference; neither did anyone of the observers seem alarmed. The phenomenon was very

beautiful and not alarming, although I overheard someone remark that, as the sun had the colour of blood, there would soon be much bloodshed. Any person who had the instrument for spectrum analysis could have easily discovered what was the substance which tinted the haze.—Faithfully yours, GEORGE H. READE.
Inniskeen Rectory, Dundalk, Co. Louth, May 27th.

"On the afternoon of the 22nd a very curious appearance was noticed by many The sky was hazy, and the sun was seen through the haze of a pink colour, inclining to purple. I see by a newspaper that the same was noticed at Dublin. A red or orange sun is common, but I never before saw its colour on the purple side of red.—JOSEPH JOHN MURPHY, Old Forge, Dunmurry, Co. Antrim, May 24th."
—*From "Nature," May 26th.*

"In reference to Mr. Murphy's communication in our last number, respecting the purplish pink colour of the sunlight, we learn from correspondents that it was noticed also at Tynemouth at 5 p.m. on Sunday, the 22nd ult.; at Cambridge at 10 a.m. on 23rd, and in Gloucestershire on both these days. In all these cases the sky is described as being hazy at the time."—*From "Nature," June 2nd.*

[We think that the above collection of extracts, (for most of which we are indebted to Dr. Moore), supplemented by the remarks of some of our regular correspondents, (p. 78—80), will render unnecessary many of our own. We think that there is no doubt that Dr. Moore's explanation is correct, supported as it is by the time assigned to the appearance by several observers, *e.g.*:—

Doo Castle	Sligo	From 9 a.m. to 3 p.m. on 22nd.	
Ballieborough	Cavan	Very early in morn. to late in even., 22nd.	
Dunmurry	Antrim	From 1 to 5 p.m., 22nd.	
Inniskeen	Dundalk	To 5 p.m.	,,
Dublin	Dublin	From 1 to 5 p.m.	,,
,,	,,	In the afternoon	,,
Tynemouth	Northumberland	At 5 p.m.	,,
Cambridge	Cambridge	At 10 a.m. on 23rd.	

These times would agree tolerably with a passage from N.W. to S.E., at an average rate of eight or ten miles an hour, which we believe also agrees with several anemometrical records for that day. *Why* this cloud should have produced such an unusual appearance, we have yet to learn.—ED.]

TERRIBLE STORM.

THE *Industriel Alsacien* says—"Germany has been visited by a dreadful storm. The disasters are immense, houses have been carried away, and a large number of persons have perished. At Grosbun (Siebenburgen) the rain was so heavy that houses and their inhabitants were carried away by the current of water produced. After the subsiding of the flood hundreds of cattle, interspersed with human corpses and the ruins of houses, were discovered in the slime; more than forty dead bodies have been recovered up to the present time; of the sixty families composing the commune, scarcely ten remain alive. At Nazy-Kun eighty houses were carried off by the waters; sixty persons were destroyed by this catastrophe, to say nothing of the loss of property, which is exceedingly great. At Erfurt the lightning struck several objects, notably the steeple of All Saints' Church, consuming the spire."—*Daily News, June 4th.*

ON THE RAINFALL OF SOUTH-WESTERN EUROPE AND ALGERIA.

(Continued from page 52.)

PROFESSOR RAULIN'S remarks on the seasonal distribution of rain are as follows:—

The most superficial examination of the monthly quantities renders evident the Mediterranean characteristics of the seasonal distribution, that is to say, an almost total absence of rain during the three months of June, July and August, at all stations, especially at those nearest the coast.

Closer examination will show that on the shore there is a predominance in the January fall at Oran and at Mostaganem, in that of December at Algiers, Bougie and Djidjeli, and in that of December and March at Jemmapes and La Calle. In the interior the wettest months are, with one exception, January, and March or April. The exception is Batna (on the edge of the desert of Sahara), where the wettest months are March and April.

But the examination of the fall in three-monthly or seasonal groups shows a difference in these two categories.

On the shore of Algeria, as on the whole southern shore of the Western Mediterranean, from the Straits of Gibraltar to Palermo, through 15° of longitude and between 36th and 38th degrees of latitude, the seasonal distribution remains the same: great excess in the winter rains, less excess of autumn rains over those of spring, or even the reverse sometimes even in stations very close together. These last form a mean between the summer and winter rains, whatever the total annual fall may be, whether 19 inches as at Oran, or 52 inches as at Bougie.

But as soon as we pass to the interior an altered distribution becomes evident. The spring rains sometimes exceed those of winter, and always markedly surpass those of autumn. In the west, in the province of Oran, the spring rains exceed the mean at St. Denis du Sig at 13 miles from the coast, at Mascara 21 miles, at Sidi Bel Abbès at 26 miles; they equal those of winter at Tlemcen at 19 miles. In the east (Province of Constantine), the fact of an excess of spring rains, already sensible at Jemmapes at 7 miles from the shore, is very striking at Constantine at 27 miles. These rains exceed those of winter at Sétif at 21 miles, and still more at Batna at 57 miles.

What occurs still further south and on Sahara? We know not yet; the numerous breaks in the observations made at the military hospitals at Biskra and Laghouat prevent this being yet ascertained.

There are great differences in the mean annual fall at the various stations especially between those on the shore where the altitudes of the stations, are most similar.

From Oran (19 in.) and Mostaganem (18 in.,) where the fall is small, it becomes almost double at Algiers (31 in. and 35 in.,) and triple at

Bougie (52 in.,) then gradually decreases at Djidjeli (42), Phillipeville (30 in.,) and Jemmapes (29 in.); a fresh increase occurs at La Calle (34 in.) Bougie thus possesses a more considerable maximum than Genoa on the opposite coast, and starting from which the quantities decrease, towards the east as far as La Calle and even Palermo, and towards the west as far as the frontiers of Morocco; just the same as starting from Genoa, the quantities go on decreasing towards the south-east as at Naples and Palermo, and towards the west and south-west to Marseilles, Perpignan, and along the coast of Spain.

On the table lands the fall is everywhere less than on the shore. The decrease in the quantity of rain from the coast towards the interior ought to be examined in the two-fold relation of distance from the sea and altitude of the localities. It results from this examination (as may be seen from the following table)—

(1) That in the provinces of Oran (with the exception of Tlemcen) and of Constantine, the rainfall decreases according to the distance from the coast.

(2) That in the same provinces (with the exception of Tlemcen) the rainfall decreases as the altitude above sea-level increases.

Distance from Sea.

57 miles.	27–19 miles.	13–7 miles.	On the Coast.
	Tlemcen.....24 in. 19 miles.		
	Mascara .....17 in. 21 miles.	St. Denis-du-Sig, 15in. 13 miles.	Oran ... .19 in.
	Sidi-Bel-Abbes, 15in. 26 miles.		Mostaganem, 18 in.
			31 in.
.....	.....	.....	Algiers ... 35 in.
Batna, 16 in. 57 miles.	Sétif .....17 in. 21 miles.	Jemmapes.. .....29 in. 7 miles.	Bougie .....52 in.
	Constantine, 27 in. 27 miles.		Djidjeli .....42 in.
			Phillipeville, 30 in.
			La Calle.....34 in.

Altitudes.

Interior.			Coast.
2,500 ft. and above.	1,500 to 2,500 ft.	Under 1,500 ft.	0 to 300 ft.
Tlemcen, 24 in. 2,690 ft.	Sidi-Bel-Abbs, 15 in. 1,542 ft.	St. Denis-du-Sig, 15in. 180 ft.	Oran .....19in. 164 ft.
	Mascara .... 17 in. 1,903 ft.		Mostaga 18 in. 262 ft.
			Algiers, 31 in. 131 ft.
....			Algiers, 35 in. 16 ft.
Sétif .....17 in. 3,533 ft.	Constantine.....27 in. 2,116 ft.	Jemmapes ...29 in. 295 ft.	Bougie ..52 in. 98 ft.
Batna ...16 in. 3,448 ft.			Djidjeli, 42 in. 131 ft.
			Phillippe. 30 in. 197 ft.
			La Calle, 34 in. 82 ft.

It is impossible to avoid noticing in the last place that the relative

amount of rain along the northern coast of Algeria corresponds with the breadth of the eastern basin of the Mediterranean measured along the meridians, that is to say, the extent of water surface supplying by evaporation the vapours, the condensation of which furnishes the rain. In fact, if, as is probable, it is the northerly winds which bring clouds and rain to Algeria, it is not surprising that the winds which come from Marseilles, in crossing the Mediterranean at its greatest breadth, are more charged with vapour than those which come on the west from Spain, crossing only the straits which separate its southern coast from those of Morocco and Oran, and on the east in passing from Germany over Italy and Sardinia, crossing only the comparatively narrow Tyrrhenian Sea before arriving at La Calle, and especially at Palermo.

EVAPORATION.

To the Editor of the Meteorological Magazine.

SIR,—As the month of April, unlike its predecessors, has been favourable for observing the amount of evaporation, having had but five rainy days, with a total rainfall of 0·4 inch, I send you a description of my gauges, all placed within a few feet of each other, and the amount of evaporation from each.

No. 1, although not sufficiently large, is my best gauge, 18 inches diameter; full particulars of its construction are given on page 167 of your *British Rainfall* for 1869. The mode of measurement as there described, after some months' trial, has proved satisfactory, and its indications may be depended upon to the $\frac{1}{500}$th part of an inch. As this one gauge was taken every morning with other instruments, I send you the amount for each day, noted down at the time of observation.

	in.		in.		in.
April 1.....	·012	April 11.....	·041	April 21.....	·211
,, 2.....	·078	,, 12.....	·087	,, 22.....	·205
,, 3.....	·042	,, 13.....	·140	,, 23	·251
,, 4.....	·091	,, 14.....	·148	,, 24.....	·208
,, 5.....	·090	,, 15.....	·093	,, 25.....	·149
,, 6.....	·094	,, 16.....	·109	,, 26.....	·168
,, 7.....	·120	,, 17.....	·128	,, 27.....	·213
,, 8.....	·117	,, 18.....	·165	,, 28.....	·120
,, 9.....	·153	,, 19	·146	,, 29.....	·064
,, 10.....	·132	,, 20.....	·173	,, 30.....	·068

The temperature of the water in this gauge varied during the month from 32° to 77°, that of the water in the river Mole from 39° to 60°·3.

No. 2 is 8 inches in diameter, 6 inches deep, and (bottom excepted exposed to the air. The measurements in this gauge are taken by a vertical float, with a vernier attached.

No. 3 is 5 inches in diameter, 2½ inches deep, and (bottom excepted) exposed to the air; the mode of measurement similar to No. 1.

No. 4 is 4 inches in diameter, 2 inches deep, fixed at the top of the thermometer stand; in order to keep the temperature of the water

more even, the outside is covered with felt, but not so as to interfere with the rainfall. The measurements are now taken by the glass of rain gauge, a graduated glass tube below having been destroyed by the frost.

No. 5 is a 5-inch Casella rain gauge, with stand-pipe fixed in centre any overflow passing into the bottle below.

The evaporation from the several gauges during the month was as follows:—

No. 1	3·816	inches.
,, 2	5·66	,,
,, 3	6·71	,,
,, 4	6·37	,,
,, 5	4·65	,,

Nos. 2 and 3 gauges were placed by the side of the 18-inch gauge, about 4 feet from the ground. No. 5 stands by the side of other rain gauges one foot above ground.

There being so little danger from rain during the month, the water in Nos. 1, 2, 3, and 4 was generally kept about half-an-inch below the edge of the vessels; No. 5 was rather lower—about an inch. After the gauges were once filled, the quantity of water put into them was carefully measured, the errors therefore from any deficit in the different modes of measurement cannot amount to much; any rainfall was of course allowed for.

It will be seen that the evaporation from gauge No. 3 was 76 per cent. greater than that from No. 1. I shall not enter at present into the reason for this difference; had the evaporation during the day time only been given, the difference would have been far greater, as whenever the opportunity of observing the gauges twice during the 24 hours has occurred, the evaporation from the smaller gauges during the night has been much less than from the larger ones.

On page 156 (*British Rainfall*, 1869) the following sentence occurs:—"We have already pointed out that we consider the accuracy of an evaporator is largely dependent on its capabilities of retaining the temperature of the contained water at as nearly as possible that of large volumes of water, such as reservoirs, rivers, and ponds." What you have there said I fully endorse. There are other points yet to be determined, but unless this one is attended to, evaporating gauges are only a "delusion and a snare." They may answer for the purposes of comparison, but are of no use whatever in determining the true amount of evaporation. The result of one simple experiment, (only one of many,) made at the same time and place, with an accurate balance, must be my justification for writing thus strongly.

From water, the temperature of which varied from 90°·7 to 85°, the evaporation was at the rate of ·015 inches per hour; from water at 62°, the temperature of the room, the evaporation was at the rate of ·0031 inches per hour.

As some of your readers may have both the time and opportunity for investigating this subject, allow me to suggest a plan for doing so.

Between the levels of the upper and lower water of a canal lock, or a mill-pond, fix a moderate-sized cistern, with a small pipe attached leading from the higher water, and an overflow into the lower. In this cistern place the vessel containing the water exposed to evaporation. In determining the height which the edge of the evaporating vessel should be above the water, we have only a choice of evils; if the water is too low the evaporation will be less, if too high the in and out splash of the rain would affect the results; but as one splash would probably be compensated by the other, I should prefer the water being kept within about an inch of the edge of the vessel, supposing the evaporation taken daily. I need scarcely add, that a rain gauge must be fixed close by, and water occasionally measured into and out of the evaporating vessel. G. DINES.

Cobham, Surrey, May 2nd, 1870.

Postcript.—During the last month the evaporation from the same gauges was as follows:—

No. 1	4·927 in.
,, 2	5·621 in.
,, 3	6·542 in.
,, 4	8·111 in.
,, 5	5·340 in.

The positions of Nos. 1, 4. 5, have not been altered, but Nos. 2 and 3 have been placed, for experiment, sometimes in earth and sometimes in water nearly to the level of the upper rim.*

June 1st, 1870. G. D.

To the Editor of the Meteorological Magazine.

SIR,—In your *British Rainfall*, 1869, you gave some observations on evaporation, by Mr. H. H. Watson, at Bolton-le-Moors. I would suggest that if you are in possession of Mr. Watson's previous observations, it would be interesting to publish them. Mr. Watson's observations appear to me noteworthy, not only from his having been a pupil of Dr. Dalton, and using the form of gauge recommended by him, but also from their remarkable agreement with Mr. Greaves's observations at the East London Water Works (*British Rainfall*, p. 161), which, as far as our present knowledge goes, probably more nearly represent the actual evaporation from a natural water surface than the majority of observations do.

I am, Sir, yours truly,

ROGERS FIELD.

6, *Cannon Row, Westminster, May 5*, 1870.

[We have much pleasure in supplying the information requested, and for the sake of completeness have reprinted the values for 1856-69, and taken the decennial means.—ED.]

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* The temperature of the water in gauge No. 1 varied from 33° to 84°, that of the water in the river Mole from 46° to 66°·8.

Evaporation at Bolton during 39 years.

Year.	Amount.	Year.	Amount.	Year.	Amount.	Year.	Amount.
	in.		in.		in.		in.
1830	...	1840	23·79	1850	29·23	1860	21·94
1831	22·07	1841	24·51	1851	26·40	1861	19·45
1832	22·35	1842	24·69	1852	35·93	1862	17·80
1833	24·23	1843	24·02	1853	23 85	1863	19·04
1834	24·18	1844	22·60	1854	21·17	1864	20·31
1835	23·78	1845	23·39	1855	17·86	1865	20·24
1836	24·36	1846	24·16	1856	20·03	1866	19·03
1837	17·12	1847	22·76	1857	22·52	1867	18·88
1838	20·16	1848	22·02	1858	22 21	1868	23·41
1839	24·71	1849	26·21	1859	18·99	1869	19·24
Mean...	22·551		23·815		23·819		19·934

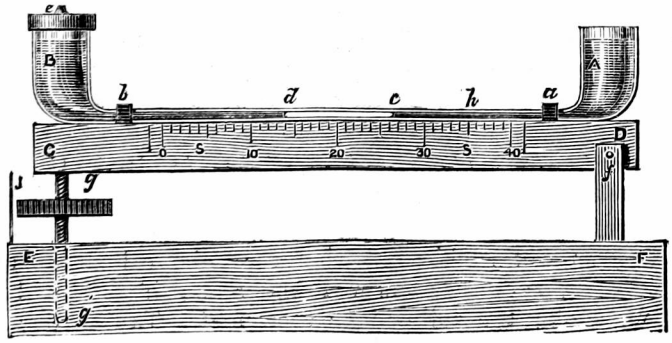
LAMONT'S VAPORIMETER.

To the Editor of the Meteorological Magazine.

SIR,—In *British Rainfall*, 1869, you gave as an appendix a valuable paper on evaporation, wherein will be found a description of the various instruments proposed for the measurement of evaporation. However, I find you have not mentioned Lamont's Vaporimeter, which appears to be worthy of consideration. Accordingly I submit the following sketch of the instrument, together with the description, which has been translated by my friend Mr. J. S. Harding, F.M.S. I will only add, that to render the dimensions of the instrument apparent to the general reader, it may be stated that, with vase B one inch in diameter, and the tube *b* one-tenth of an inch in bore, the scale between *a* and *b* should be 25 inches long, which divided into 25 equal parts, each division would represent ·01 of an inch of the water evaporated. On account of the length of the bubble it would be advisable to make the scale extend to 30 inches at least.—Yours faithfully,

R. STRACHAN.

11, *Offord-road, Barnsbury, N., 6th May*, 1870.



Description from the Bulletin of the Munich Observatory.—"The arrangement is extremely simple, and consists, as shown by the accom-

panying figure, of two glass vessels, A and B, connected by a tube *a b*. The vase A is open, and B is closed by a metal cover, in which there is the smallest possible opening at *e*. If the instrument be filled with water so that an air bubble *c d* is left in the communicating tube, the evaporation goes on uninterruptedly in the open vase A, whilst from the vase B only an infinitessimal amount of water will evaporate; and, as the water must remain level in both vases, the air bubble *c d* will advance towards *a* as the water in the vase A diminishes. This is the whole theory of the principle of the vaporimeter, but the manner of setting it up must be more fully explained. The glass tube is fastened by two clamps *a* and *b*, to the wooden support C D; this support is itself fixed to a box E F, serving as a base, and has a vertical movement round the horizontal axis *f*, just under the centre of the vase A. To produce the vertical movement, that is, to change the incline towards the horizon, the headed screw *g g'*, furnished in the usual manner with an index J and divided on the rim is used. The screw works in the box E F, and is brought to bear exactly under the centre of B. If, by turning the screw the vase B be raised one inch, the water in A will rise half-an-inch (*h*), and the air bubble will advance towards *a* on the scale *s s*, to be read off in amount of *p* scale divisions to which this change of level of half-an-inch corresponds. To convert the readings of the scale into amount of evaporation, they have only to be multiplied by the factor $\frac{h}{p}$. The screw *g g'* also serves to bring the air bubble into the communicating tube; for this purpose the vase B is lowered about half-an-inch below the horizontal position, and water is poured into A until the surface reaches the point *a*, then turn the screw again until the surface reaches *h*, and then pour in water and a bubble of the length *a h* is obtained. While completing the filling the support C D must be gradually raised to the horizontal by means of the screw, so that the bubble comes within the scale and near the commencement of it. On reading off the scale, both ends of the bubble must be noted, and the mean of their sum must be taken as the state of the bubble. There is only one obstacle in the way of obtaining an accurate observation, that an air bubble in a glass tube only moves perfectly easily when the interior surface is moist, and this obstacle may be easily removed by causing the bubble to pass to and fro before reading off by means of the screw."

REVIEWS.

Table to facilitate Finding the Humidity of the Air. By H. C. RUSSELL, B.A., Government Observatory, Sydney, N.S.W. London: W. D. Thomson, Upper Street, Islington. Single sheet, card, folio.

THIS is a diagram, not a table, but whatever it be called, it is a very useful publication, as our readers will understand if they will follow us while we make the following experiment. Taking our 9 a.m. readings this day, dry bulb 62·8, wet bulb 58·6, the curve gives by simple inspection 75·5. Let us now obtain the same from Glaisher's tables in the usual way.

	Humidity.
Dry Bulb 62, and Wet Bulb 58	77·0
Diff. for increase of 1° in dry = —5 ∴ for 0°·8 =	—4·0
	73·0
Diff for increase of 1° in wet +5 ∴ for 0°·6 ..... =	+3·0
Humidity corresponding to 62·8 and 58·6 ..... =	76·0 by calculation.
,, ,, ,, ,, ... =	75·5 by diagram.

Careful examination of the curves shows that they are generally as near in their agreement with Mr. Glaisher's Hygrometrical Tables (4th Edition) as in the above case, and we therefore consider them a boon to all persons who require to reduce their observations according to that edition of those tables. We make this distinct reference to the fourth edition, because when first examining Mr. Russell's diagram we were perfectly staggered at the utter inconsistency of his diagram and Guyot's tables. We do not for a moment presume to decide between Messrs Guyot and Glaisher, but as an incentive to the examination of the subject by those competent so to do, we annex a copy of the table we first drew up in order to test Mr. Russell's diagram :—

Dry Bulb.	Wet Bulb.	Humidity. (Saturation, 100·0.)			
		Guyot.	Glaisher's Tables.		Russell's Diagram.
			1st edition.	4th edition.	
°	°				
56·0	45·0	34·6	52·7	44·0	44·0
61·0	50·0	40·2	53·0	47·0	46·4
66·0	55·0	45·0	55·3	48·0	48·4
71·0	60·0	49·0	57·9	50·0	50·1
76·0	65·0	52·4	58·2	52·0	51·8
81·0	70·0	55·4	58·7	53·0	53·1
86·0	75·0	57·9	59·0	55·0	54·5

From the above it will be seen that (leaving out of the question the values in the early edition), the difference between Mr. Russell's diagram and Mr. Glaisher's fourth edition, averages only about 2 in 1000, while the difference between Messrs. Glaisher and Guyot is seldom less than ten times as great. We need not dwell upon the necessity for ascertaining which values are correct. Reverting for a moment to Mr. Russell's diagram, we must express our astonishment that any observer, especially one attached to Sydney Observatory, should publish a scale of humidity not extending through a greater range than 100 to 40; 100 to 25 would have rendered the diagram even more generally useful than it is in its present form.

Fourth Annual Report on the Sanitary Condition of Merthyr Tydfil, being for the year 1868. By T. J. Dyke, F.R.C.S. Merthyr: White and Sons. 8vo, 26 pages.

Having on previous occasions noticed Mr. Dyke's Reports, lengthy remarks are now needless, especially as the present one differs little

from its predecessors. We regret that Mr. Dyke dismisses the quantity and quality of the water supplied to the town with so brief a notice as the following:—"The purity of the water supplied from your works has been maintained at its usual high standard of excellence."

Merthyr being at some little distance from any of the stations whence we are in the habit of printing detailed returns, it may not be inexpedient to transfer Mr. Dyke's meteorological report to our pages. It must be remembered it is for 1868, not for 1869.

"*The Weather in* 1868.—1st Quarter. The mean temperature in the first week in January was 5° below the freezing point of Fahrenheit. East winds prevailed until the 12th, when a gale came on from the west and continued until the 20th. The direction of the wind was from the same quarter until the end of the month; the temperature of the air increased and much rain fell. The mean heat was 35°. The rainfall on 17 days amounted to 6·75 inches. A great gale of wind from the N.W. set in on the last night in January, and continued until noon on the 1st of February. Very stormy weather occurred also on the 5th, 19th, and 22nd of this month. The mean temperature was 41°. Rain fell on 11 days to the depth of 4·36 inches. Stormy winds from the north blew from the 2nd to the 5th of March, and again on the 10th and 24th. The mean temperature of the month was 43°; and 4·47 inches of rain fell on 17 days. The rainfall during the quarter was 15·58 inches on 44 days, the mean temperature 39°·5.

"2nd Quarter. During the first week in April, east winds prevailed; the temperature at night was but slightly above freezing, while in the day it rose to 60° in the shade and to 90° in the sun. On the 13th the night temperature was but 26°; in the day, in shade, 60°. On the 19th the wind veered round to the west, much rain and a more genial warmth followed. On 13 days 3·92 inches of rain fell, the mean temperature of the month being 45°·5. South and south-westerly winds ushered in May showers. Rain was collected on 12 days to the amount of 3·62 inches. Thunderstorms occurred on the 19th and 29th. The mean temperature was 47°·5. June was almost a dry month; it rained on six days only, on each of three of these days but the $\frac{1}{100}$th of an inch fell—the whole rainfall being half-an-inch. The mean temperature was 58°·5. On the 27th the heat in the sun was 116°, and, on the 30th, 118°. The mean temperature of the quarter was 47°, and it rained on 31 days to a depth of 8·05 inches.

"3rd Quarter. The month of July was nearly cloudless and rainless. Rain fell only on the 29th and 30th, and then but to the extent of $\frac{47}{100}$ths of an inch. The mean temperature was 63°·5. On the 21st and 22nd the heat in the sun was 118°. It continued fine until the 6th of August, when the wind went round to the west, and from that date until the end of the month rain fell on 18 days, to the depth of 9·32 inches. The mean temperature was 58°·8. Up to the 18th September fine clear weather prevailed, after that day until the end of the month, rain, which fell on 11 days, was collected amounting to 5·23 inches. The temperature was 53°·7. During the quarter the rainfall amounted to 15·02 inches on 31 days. The mean temperature was 58°·5.

"4th Quarter. In October the wind blew chiefly from the north, and bright days were frequent. The mean temperature fell to 42°·5, and, though it rained on 17 days, the quantity of water collected was but 3·64 inches. On the 30th October, at 10.40 p.m., a shock of earthquake was felt, which lasted about three seconds. In November fine clear days predominated. It rained on 12 days, the gauge recorded 5·61 inches. The mean temperature was reduced to 39°·7. In December, stormy winds from the west brought with them a more elevated temperature and much rain. The fall on 24 days amounted to 13·69 inches; the mean temperature was 44°. A heavy thunderstorm broke over the town on the 28th. The rainfall of the quarter on 53 days was 22·94 inches. The mean temperature being 48°·9.

"*Rainfall of the Year.*—The rainfall during the year 1868, on 159 days, amounted to 61·59 in. In 1867, the rain collected was 51·78 in. on 164 days; 1866, 58·39 inches on 204 days. The mean rainfall of the three years would be 57¼ inches, on 176 out of 365 days."

MAY, 1870.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1860–5	Greatest Fall in 24 hours. Dpth	Greatest Fall in 24 hours. Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date.	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade	No. of Nights below 32°. On grass
			inches	inches.	in.								
I.	ENGLAND.	Camden Town	·70	— 1·80	·32	11	6	85·1	21	30·8	4	2	5
II.		Maidstone (Linton Park)	1·14	— 1·10	·39	12	7	87·0	21	27·0	3	6	...
„		Selborne (The Wakes)	1·95	— ·53	·87	11	7	76·5	21	26·0	4	7	10
III.		Hitchen	·85	— 1·08	·31	11	8	75·0	21	30·0	8	2	...
„		Banbury	1·17	— 1·05	·52	11	8	77·0	21	29·0	4	2	...
IV.		Bury St. Edmunds (Culford)	·36	— 1·80	·21	11	4	84·0	21	30·0	2‖	6	10
V.		Bridport	1·44	— ·59	·80	11	9	72·0	28	27·0	3	5	...
„		Barnstaple	1·63	— ·81	·52	11	10	74·5	20*	36·0	3	0	..
„		Bodmin	2·85	+ ·39	·92	11	12	73·0	21	31·0	3	1	1
VI.		Cirencester	1·80	— ·48	·85	10	6	...	...	...	...	...	...
„		Shifnall (Haughton Hall)	·76	— 1·50	·40	11	9	79·0	21	33·0	3	0	...
„		Tenbury (Orleton)	1·40	— 1·48	·61	11	10	78·8	21	29·8	5	3	5
VII.		Leicester (Wigston)	·71	— 1·41	·46	11	7	82·0	21	32·0	2¶	...	...
„		Boston	·58	— 1·36	·27	11	7	82·6	21	31·4	4	1	11
„		Grimsby (Killingholme)	·74	..	·31	11	8	74·0	20*	35·0	3	0	...
„		Derby	·72	— 1·44	·34	11	7	78·0	21	33 0	3	0	...
VIII.		Manchester	·75	+ 1·91	·41	11	9	77·0	29	30·8	4	1	1
IX.		York	1·08	— ·87	·43	11	8	76·0	21	34·0	3	0	...
„		Skipton (Arncliffe)	2·48	— ·87	·85	12	10	74·0	22	27·0	3	3	..
X.		North Shields	1·40	— 1·24	·42	11	12	70·4	20	33·5	3	0	1
„		Borrowdale (Seathwaite)	15·00	...	...	..	...	...	...	...	...	...	...
XI.	WALES.	Cardiff (Town Hall)	...	...	...	...	...	...	...	...	...	...	...
„		Haverfordwest	3·26	+ ·54	2·60	11	6	75·0	27	32·6	2	0	3
„		Rhayader (Cefnfaes)	2·73	— ·12	·93	10	9	70·0	...	30·0	...	...	...
„		Llandudno	·73	— 1·65	·22	11	9	74·0	21	39·7	2	0	...
XII.	SCOTLAND.	Dumfries	2·49	+ ·10	·73	11	14	76·5	27	31·5	4	1	...
„		Hawick (Silverbut Hall)	1·93	...	·53	12	16	...	...	...	...	...	...
XIV.		Ayr (Auchendrane House)	4·15	+ 1·04	1·04	31	16	67·0	27	27·0	4	1	3
XV.		Castle Toward	3·98	+ ·59	·58	14	15	73·0	27	29·0	4	3	5
XVI.		Leven (Nookton)	1·72	— ·29	·64	11	15	69·0	25†	31·0	2	1	6
„		Stirling (Deanston)	2·96	+ ·31	·37	19	18	74·8	27	27·8	4	2	7
„		Logierait	1·90	...	·48	12	9	...	...	...	...	...	...
XVII.		Ballater	1·72	...	·50	1	8	70·5	27‡	33·0	3	0	...
„		Aberdeen	1·49	...	·34	21	13	63·8	27	34·9	3	0	6
XVIII		Inverness (Culloden)	·74	...	·24	23	8	63·9	29	36·4	2	0	3
„		Portree	5·48	+ ·15	·91	18	19	...	...	...	...	...	...
„		Loch Broom	1·58	...	·42	21	19	...	...	...	...	...	...
XIX.		Helmsdale	1·20	...	·43	21	5	...	...	...	...	...	...
„		Sandwick	1·67	— ·59	·32	21	21	58·1	13	34·7	3	0	2
XX.	IRELAND.	Cork	2·38	...	·51	10	15	...	...	...	...	...	...
„		Waterford	3·50	+ 1·25	·70	11	18	57·0	24	31·0	2	1	...
„		Killaloe	3·94	+ ·76	·55	10	19	73·0	26§	30·0	3	1	...
XXI.		Portarlington	2·15	— 1·04	·40	10	18	71·0	26	35·5	1	0	...
„		Monkstown	1·37	— ·54	·42	9	11	...	...	...	...	...	...
XXII		Galway	4·36	...	·72	9	19	72·0	29	40·0	12	0	...
„		Bunninadden (Doo Castle)	3·30	...	·59	11	20	70·0	26§	34·0	3	0	...
XXIII		Bawnboy (Owendoon)	...	...	..	...	...	...	...	...	..	...	...
„		Waringstown	2·18	...	·45	13	16	78·0	26	36·0	8	0	1
„		Strabane (Leckpatrick)	2·51	..	·37	12	19	73·0	27	31·0	8	1	2

* And 21. † And 26. ‡ And 28. § And 27. ‖ And 3, 8, 9. ¶ And 4, 9.
+ Shows that the fall was above the average; —that it was below it.

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.

Camden Town.—21st, frequent L in S.E. after 11.50 p.m. ; fifteen flashes per minute at 0·15 a.m. 22nd, and in S.S.W., passing to S.S.E. from 0.17 to 0.32 a.m. T at 0.22 a.m.

Linton Park.—A dry month, sharp frosts on the 3rd and 4th, and more slight on 6th, 9th, 10th, and 11th. Very hot from 15th to 22nd. T on 1st and 22nd ; R much wanted for vegetation, and fears are entertained for the water supply for general use, as only 6 inches of R has fallen this year.

Selborne.—Hail at 2.3, and hailstorm at 5 p.m. on 1st ; R at 9 a.m. on 11th, continuing for 12 hours = ·87 in. 22nd, min. ther. 50°, the warmest night this year. Fog in early morning of 28th ; prevailing winds—first week, N. and E.; from 11th to 21st, S.W.; last week variable. Vegetation very backward until the rain of the 11th, since which the gardens and fields have progressed rapidly.

Banbury.—H on 1st, and very slight S. on 2nd.

Culford.—A month of excessive drought ; great appearance of rain during the last three days, but without its realization at this station, where it is much required, though I believe it has fallen to some amount during that time at places only a few miles distant.

Bodmin.—This month has been one of great drought, and the streams have never been so low in May. Remarkable evaporation on the 25th and 26th, with a fresh N.E. wind, the wet and dry bulbs differing 12°.

Cirencester.—Dryness and sunshine the rule of the month, with one happy exception, succeeded by cloudless skies ; the rain on the 10th from the S.E. was unintermitting for 13 hours, and being succeeded by showery weather, incalculable benefit accrued to the spring corn, but not being followed by mild weather, grass crops are very backward.

Shifnall.—An unusually dry May, none approaching it in 20 years but those of 1853 and 1861, when ·79 and ·75 in. only were registered. We had but one day's R of any amount, viz., ·40 on the 11th, the other 8 being only slight showers. Vegetation very backward, especially the grass. The early part of the month cold, with N.W. winds ; S.E. from the 8th to 12th, after that varying from S.W. to N.W. Temp. from 19th to 29th inclusive unusually high, reaching on 21st 79° in the shade. Turtle doves arrived on 3rd, numbers of white butterflies on 5th, orange-tipped ditto first seen on 6th ; apple in blossom on 10th, lilac on 12th, oak in leaf on 16th, and hawthorn in flower on 22nd.

Orleton.—Another dry month, with a large proportion of sunshine, the earth becoming parched and the grass crops scanty ; nearly all the R fell between the 10th and 16th ; several sharp frosts in the night of the first week ; no T heard, or L seen. On 22nd, fine at sunrise, cloudy from 7 a.m. till noon, then fine. Lofty veil of clouds after 5 p.m. from N.W. and cold.

Wigston.—A very dry month ; the rainfall during the 5 months ending May 31st is the smallest I have registered, being only 5·63 in.; during the same period last year we had 14·06. The years nearest this are 1863, 6·18, and 1868, 7·71. No grass in the pastures ; on good ground the corn looks well ; the bloom on the fruit trees has been very abundant.

Grimsby.—Very dry month ; pastures, meadows, and spring corn suffering greatly. A person killed by L at Coningsby on the 1st. Apple began to blossom on 7th ; hawthorn in flower on 20th.

Derby.—Again we have to record a deficiency of rainfall ; a relief of the drought was indicated on the 29th, but it passed off, and the bar. again rose ; the weather, however, has been most enjoyable. Temp. slightly above the mean, and no N.E. wind or frost ; country looking beautiful.

Manchester.—An excessively dry month, not over one-third of the average R.

York.—T S on 1st.

North Shields.—H on 1st, aurora on 2nd, T on 28th and 29th; strawberry in blossom on the 18th.

WALES.

HAVERFORDWEST.—The great drought broke up on the 17th, when one of the heaviest rainfalls occurred; 2·60 in. in 19 hours. The weather continued foggy and cold till the last week, when a few warm days were noted; on the whole an ungenial month. Scarlatina still prevailing.

CEFNFAES.—A dry cold month; vegetation backward; herbage for cattle and sheep scarce upon the hills; wind generally N. and N.E.

SCOTLAND.

DUMFRIES.—H on 1st, T on 30th; the first 10 days cold and droughty; on the 11th much R, and weather showery till the 23rd; end of month very fine, except the last two days, which were showery. Rainfall below, and temp. above the average of the last five years. Hawthorn in blossom on the 20th, eleven days later than last year. The crops at the end of the month very promising, and grass abundant. On Sabbath, 22nd, the sun had a singular appearance; the day was fine, but with a thick vapoury sky, and the great luminary had a strong resemblance to the moon, but was not so bright, having a silvery-grey look; his disc was visible in that state for several hours, but his rays never pierced the vapoury atmosphere.

HAWICK.—1st, cold and stormy day, ice on dog troughs at night. Squally westerly winds from the 11th to the 15th; R every day from the 11th to the 23rd, but except on the 12th, ·53 in. only, in small quantities. There has been no frost except on the first three nights, and there is every prospect of an abundant fruit harvest. The hay crop looks promising; the laburnams and hawthorns are laden with blossom, and the whole country is looking most beautiful.

AUCHENDRANE.—This May, with a mean temp. above that of the month, has been seasonable and fertilizing, with sufficient R to supply all the demands of both vegetation and rivers.

CASTLE TOWARD.—The first part of the month dry, with some frosty nights, but in the middle showery and mild, and towards the close, 26th and 27th, very warm, bar. falling from 30·46 to 29·42 in last six days. About a mile of natural terrace is very gay with native plants. Chesnuts and whitethorn in flower on 18th, all about 10 days later than last year; several pyramid hollies, thickly studded with fruit, forming a striking contrast with the whitethorns, which are about the same size. I have not seen hollyberries hang on so late in the season before, and they appear as if they would continue for some weeks to come.

DEANSTON.—Gale and wind on 1st from N.E., very cold; dry till the 11th, with some frost at night, but bright sun during the day, and hot from 6th to 11th, when R fell, and some T and L on 13th; fine mild growing weather on to the end of the month, crops looking very well. On the evening of the 30th, T and L, with heavy R. Hay crop apparently will be heavy and good, as indeed pasture in general.

LOGIERAIT.—A very favourable month, and vegetation making rapid progress.

BALLATER.—A dry and rather cold month; vegetation made but little progress till the last week, when, with an increase of temp. and seasonable showers, a marked improvement took place. A very violent gale from the northward began at 6 p.m. on 19th; cuckoo first heard on the 7th, swift seen on the 27th.

ABERDEEN.—H on 2nd and 16th, T on 13th and 16th; fog on 5th, 27th and 29th; a warm, dry, but rather rough month; crops advancing wonderfully; winds from N. and S.W. above the average, none from N.E. Estimated pressure rather above the average.

INVERNESS.—The great deficiency in the rainfall still continues, and has now extended over four months. The scarcity of water is being felt in several districts.

LOCHBROOM.—A very fine month, suitable to the farmer, and propitious to the agriculturist; it has been such a contrast to the last, that it is hoped it may make some amends for the bad effects of it, except in the deaths among the sheep, particularly the lambs, which hence are very scarce and dear in the hill country.

IRELAND.

DOO CASTLE.—Wet and rough two-thirds of the month, which greatly retarded the second covering of potatoes and other farming operations; showers of H on the 1st, 13th and 16th. Curious appearance of sun from 9 a.m. to 3 p.m. on

22nd, changing from red to pale violet; there was a dense and peculiar cloud passing high up from the earth; horizon clear.

WARINGSTOWN.—Very fine and genial; crops very promising; spring, though late, very rapid when it set in.

LECKPATRICK.—Fine month; two great depressions of bar. in second and last week, accompanied by south-easterly gale and R. Rainfall since the beginning of the year deficient by about two inches of the average for that period; weather most favourable for all growing crops.

A GUIDE TO SUMMER TEMPERATURE.

To the Editor of the Meteorological Magazine.

SIR,—The following law is, I think, sufficiently interesting to merit attention.

When the rainfall of January or February is below an inch, and the mean temperature of the month in which the dry weather occurs is above the average (say above 36° if the month is January, and above 38°·7 if February is the dry month), the warmth of the period from April to August inclusive is *always* equal to, or above, the Greenwich average of 99 years, which is 55°·7 The following table contains *all* the instances that have occurred relative to this law since 1796.

The rainfall amounts for 1806 and 1807 are taken from Luke Howard's tables, the remaining rainfall amounts, as well as the monthly mean temperature values, are from Mr. Glaisher's tables.

Years.	Rainfall in January.	Mean temperature of January at Greenwich.	Mean temperature of April to August.	Difference of mean temp of April to August from mean of 99 years, which is 55°·7
	inches.	deg.	deg.	deg.
1859.....	0·8	40·4	58·5	+ 2·8
1822.....	0·6	39·8	57·8	+ 2·1
1835.....	0·7	38·0	57·4	+ 1·7
1858.....	0·8	37·5	57·1	+ 1·4
1807.....	0·7	36·7	57·0	+ 1·3
1864	0·9	36·5	56·1	+ 0·4
	February.	February.		
1806.....	0·7	41·5	56·1	+ 0·4
1834.....	0·4	40·2	57·9	+ 2·2
1852	0·9	40·8	56·4	+ 0·7
1857...	0·2	39·2	58·3	+ 2·6
1859.....	0·9	43·1	58·5	+ 2·8
1862... ...	0·5	41·1	55·7	0·0
1863.....	0·5	42·1	56·4	+ 0·7

In the above list of summers ruled by the month of January, the following very remarkable fact will be perceived. The warmth of each summer is almost exactly proportionate to the warmth of the preceding January. For instance, January, 1859, was the warmest of all, and was followed by the warmest summer. The year 1822 had the next warmest January and the next warmest summer, and so on to 1864, at the end of the list, when the mean of January was only a little in excess of the average, and the mean of the following summer was above the average to a correspondingly slight extent.—I am, &c.,

Barnsbury, June 4th, 1870. GEORGE D. BRUNHAM.