



XV. Notice of certain meteorological phænomena observed at Swansea

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are amongst the reciprocal electrical phenomena of the clouds, distinct from, though allied to the water-spout, is, perhaps, well-known; and I was myself once witness to an appearance of this sort, between a higher and a lower cloud, that had the strongly electric aspect before they had resolved themselves into nimbus. It was a bent narrow column of dark vapour, which I could distinctly observe to be in rapid rotatory motion, passing from one cloud to the other, continuing for some minutes, and then gradually disappearing. During this time it emitted no sound, and had no visible connexion with the earth whatever.

The above theory of hail-stones will be further corroborated if we consider the form of the stones in this instance, viz. a sphere flattened at its poles, as the result of a rotatory motion; especially if it be a law, as perhaps it is, *that all solids in rapid gyration acquire per seipsos a rotation on their own axes.*

I am, dear Sir, yours, &c.

Pulborough, Dec. 16, 1839.

P. J. MARTIN.

XV. *Notice of certain Meteorological Phenomena observed at Swansea.* By J. W. G. GUTCH, Esq.

To the Editors of the Philosophical Magazine and Journal.

GENTLEMEN,

THINKING that the following notice may prove interesting to some of your meteorological readers, I forward it for insertion in your valuable publication.

On the morning of the 20th of November, an unusual rise in the barometer was observable, as sudden as it was great. At 5 p.m. on the 19th, my barometer stood at 29·75; at 9 a.m. on the 20th at 29·99, being a rise of 0·24. At 9 a.m. on the 21st it sunk to 29·99, being a fall of 0·70; and so sudden a rise and fall I have not had occasion to record in my registry, now kept for the last four years. The wind during the whole period was a dead calm; the weather cloudy and hazy, with occasional light showers. A similar phenomenon was observed by my friend Mr. Addison of Malvern. The sudden *fall* of the barometer was noticed by that gentleman on the 20th, and the rise on the 21st, and like mine unaccompanied with wind, and at Malvern no rain fell. The explanation of this sudden rise and fall I am yet to learn, and should be glad if any of your correspondents could elucidate the subject.

On Wednesday, Nov. 6, the most brilliant meteor occurred that has been observed here for a great length of time, illu-

minating perfectly the principal street of the town: this occurred about 10 p.m.

On Monday, Nov. 10, at 1 p.m., the wind, which had been *perfectly calm* all the morning, suddenly rose, and with great violence blew for a minute or two at a pressure of four pounds to the square foot, and veered at the same moment direct from E., at which the vane had been standing all the morning, to W. continuing from that quarter for the remainder of the day, and immediately on so doing subsiding again to a complete calm.

This morning, Dec. 18, we were visited with a gale of wind surpassed only in violence by that of the 8th of May last. I send you the following table, drawn up from the actual markings of my self-registering anemometer and pluviometer.

Date.	Hour.	Pressure in Pounds on Square Foot.	Amount of Rain in 1000th of an Inch Cistern or Receiver 1 foot square.
Tuesday, Dec. 17.	10 a.m.	$\frac{1}{2}$	
	11	1	
	11 30 min.	3	
	12	3	
	1	$1\frac{1}{2}$	
	2	4	
	3	3	
	4	$1\frac{1}{2}$	
	5	5	
	6	2	
	7	2	
	8	6	
	9	6	From 9 to 10 0.03
	10	5	
	11	5	11 to 12 0.03
	11 30 min.	7	12 to 1 0.02
	12	9	1 to 2 0.03
	1	9	2 to 3 0.03
	2	10	3 to 4 0.02
	3	9	4 to 5 0.01
	4	10	5 to 6 0.02
	5	13 !!	6 to 7 0.01
	6	8	
	7	7	
	8	8	
	9	6	9 to 10 0.01
	10	4	10 to 11 0.01
	11	3	11 to 12 0.01
	12	4	

Being a total of 0.21 of rain fallen from 10 a.m. on Tuesday to 12 p.m. on Wednesday, the wind the whole time blowing from the S.E., only twice for a minute or two getting to the N. of E. viz. at 3 a.m. and 8 a.m. of December 18.

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It will be my endeavour to ascertain the other localities visited by this storm, as the former ones registered by my anemometer, and also by that used by Mr. Osler of Birmingham, would appear to have occurred at the time that might have been expected for each locality within the circle of the storm, thereby bearing out most fully Col. Reid's ingenious theory. The storm of Tuesday last was at its maximum at about a quarter to 5 a.m. of the 18th, being then at the pressure of 13 pounds on the square foot, or according to Dr. Hutton's table, travelling at the rate of about 60 miles per hour. The barometer on Tuesday at 9 a.m. stood at 29.82, it fell at 5 p.m. to 29.58; at 9 a.m. on Wednesday (to-day) to 29.27, and at 5 p.m. to 29.19, being a fall of 0.73 in the twenty-four hours.

Should the above remarks be worth your acceptance, they are most perfectly at your service.

I remain, Gentlemen, yours, &c.

Swansea, Dec. 18, 1839.

J. W. G. GUTCH.

XVI. *The Bakerian Lecture.—On the Theory of the Astronomical Refractions.* By JAMES IVORY, K.H., M.A., F.R.S. L. & E., Instit. Reg. Sc. Paris, Corresp. et Reg. Sc. Götting. Corresp.

[Continued from vol. xv. p. 507, and concluded.]

12. WE next proceed to inquire into the influence which the term multiplied by f' , before omitted, may have on the refractions.

Investigation of the integral Q_3 .

The expression of this integral is,

$$Q_3 = \int_0^m \frac{e \, dx}{\Delta} \left(8c^{-2x} - 8c^{-x} + 7xc^{-x} - 2x^2c^{-x} + \frac{x^3}{6}c^{-x} \right),$$

which is a negative quantity, as appears from the valuation of it in § 9: it will therefore contribute to distinctness if its sign be changed, in which case it will be thus written,

$$Q_3 = \int_0^m \frac{e \, dx}{\Delta} \left(-8c^{-2x} + 8c^{-x} - 7xc^{-x} + 2x^2c^{-x} - \frac{x^3}{6}c^{-x} \right);$$

and the formula for refractions will now be,

$$\delta \theta = \sin \theta \times \frac{\alpha(1+\alpha)}{\sqrt{5i}} (Q_0 + \lambda Q_1 - f Q_2 - f' Q_3).$$

Suppressing the tedious operations of reducing, we may