On a voltaic current obtained with bismuth in a magnetic field

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To cite this article: Dr. G.P. Grimaldi (1889) On a voltaic current obtained with bismuth in a magnetic field, Philosophical Magazine Series 5, 27:168, 440-441, DOI: [10.1080/14786448908628380](https://doi.org/10.1080/14786448908628380)

To link to this article: <http://dx.doi.org/10.1080/14786448908628380>

Published online: 29 Apr 2009.

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of the carbonic acid with the probable errors; in the third, the quantities of gas dissolved, also with the errors; and in the last, $\frac{P}{P_1}$ and $\frac{A}{A_1}$, again with the errors.

The errors are put in parentheses.

20.53	410.25 + (1.5)	0.67281 - (0.00029)	$\frac{P}{P_1} = 4.057 + \begin{pmatrix} 0.001 \\ 0.023 \end{pmatrix}$
20.59	101.11 $\pm$ (0.2)	0.16723 + (0.00002)	$\frac{A}{A_1} = 4.023 + (0.001)$
13.04	478.05 - (0.78)	0.84427 + (0.00018)	$\frac{P}{P_1} = 2.442 + (0.011)$
13.04	918.5 + (1.5)	0.33244 + (0.00023)	$\frac{A}{A_1} = 2.540 - (0.002)$
7.08	452.93 - (0.2)	0.84818 - (0.00029)	$\frac{P}{P_1} = 2.442 + (0.008)$
7.1	185.5 - (0.7)	0.33395 - (0.00013)	$\frac{A}{A_1} = 2.540 + (0.002)$

We see that if carbonic acid does not rigorously follow Dalton's law when dissolving in carbon disulphide, the deviations are very small and are of the same order as those which it shows in respect to the law of Mariotte. At low temperatures its absorption is greater, and at high temperatures less, than that indicated by Dalton's law.—*Comptes Rendus*, April 1, 1889, p. 674.

ON A VOLTAIC CURRENT OBTAINED WITH BISMUTH IN A
MAGNETIC FIELD. BY DR. G. P. GRIMALDI.

The experiments made by Nichols* on the influence of magnetism on the passivity of iron led me to investigate whether there was anything analogous in the case of bismuth.

After many fruitless attempts I made the following experiment with favourable results.

A wide U-tube contains a dilute solution of bismuth chloride in hydrochloric acid; in the vertical limbs dip two wires of chemically pure bismuth very carefully polished.

One of these wires with the tube containing it is placed between the conical pole-pieces of a Faraday's electromagnet of medium size, in such a way that the surface of the liquid is in the most intense part of the field. The two wires are joined up to a very sensitive Thomson's galvanometer with astatic needles. On closing the circuit a current is observed in the galvanometer which might be thought to be a primary one due to a diversity of the two bismuth wires. This current, which at the outset varies rapidly, diminishes

* Silliman's Journal, vol. xxxiv. 1837, p. 419, and vol. xxxv. 1888, p. 290.

after a certain time, becoming less inconstant, and may be compensated by means of a shunt containing a standard element, and the galvanometer brought back to zero. If, then, the electromagnet is excited with a very powerful current, a *permanent deflexion is observed in the galvanometer*; if the magnetizing current is opened, especially if this be done with a certain rapidity, the galvanometer returns to zero*.

I shall publish as soon as possible the results of a special investigation of this phenomenon; for the present I restrict myself to indicating in this note the most interesting results hitherto observed.

The current produced by magnetism, and which I shall call *galvanomagnetic*, is independent of the direction and of the intensity of the primary current. Whatever be the direction of this, the galvanomagnetic current, through the bismuth fields hitherto examined, is in the galvanometer from the magnetized bismuth to the nonmagnetized one, and in the liquid from the nonmagnetic metal to the magnetic one.

While the primary current varies greatly in intensity and also in direction, the galvanomagnetic current maintains in general an almost constant intensity, and also *remains unchanged* when the primitive current passes through zero in changing its sign.

The intensity of the galvanomagnetic current depends greatly on the state of the surface of the bismuth, and to have regular results it is necessary to carefully polish the bismuth wires. To give an idea of the magnitude of the electromotive force of the galvanomagnetic current, I may mention that in the various experiments hitherto made under good conditions with various wires, and in various modifications, it has varied from $\frac{1}{12000}$ to $\frac{1}{2400}$ of a Daniell, the magnetic field being produced by a Faraday's apparatus of mean size excited by a current of 8 to 12 amperes, and with conical poles 7 millim apart.

With a less powerful magnetizing current the results are smaller; with a circuit of two amperes the galvanomagnetic current is scarcely appreciable.

The direction of the galvanomagnetic current is independent of the direction of the field; its intensity has sometimes varied a little when the field was reversed and sometimes remained constant.

This research was carried out in the Physical Institution of the Roman University with the means placed at my disposal.—*Rendiconti della R. Accademia dei Lincei*, January 6, 1889.

* It is unnecessary to say that the galvanometer was so distant from the electromagnet that it was out of the sphere of its influence. It was also ascertained that if the circuit was closed when the tube and the bismuth wires were excluded, the magnetic field did not produce any current.