

## LETTERS TO THE EDITOR.

\*.\* Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

## Electric measuring apparatus.

In the *American journal of science* for March, Professor Trowbridge describes a form of differential cosine galvanometer, in which the action on a magnet of a strong current, moving through the fixed vertical circle of a large tangent galvanometer (of one metre radius), is balanced by the opposite effect of a weak current from a Daniell cell moving in a reverse direction through the coil of a cosine galvanometer, the fixed and movable coils having a common centre. By moving the coil of the cosine galvanometer about its horizontal axis, it is easy to secure a balance, and thus to determine the magnitude of the strong current. An obvious and simple modification of this apparatus consists in substituting for the cosine galvanometer an ordinary tangent galvanometer, with a coil of small radius having a number of turns of wire in circuit with a battery and rheostat. By varying the resistance in the circuit, a balance can be reached, and the strength of the current found. A mirror galvanometer thus arranged, and in direct circuit with a battery and very high resistance, or in derived circuit with a battery and tangent galvanometer, might sometimes be useful, as in studying slow variations in strong currents. Another instrument, which is likely to prove valuable for measuring strong currents, is a new form of differential cosine galvanometer, recently devised by Mr. R. H. Pierce, while a student at the Massachusetts institute of technology. The current is caused to pass in opposite directions through two concentric circles of nearly the same radius, as in Brackett's differential galvanometer; but the inner of these is capable of moving upon a horizontal axis, as in the ordinary cosine galvanometer, and it is revolved until a convenient deflection is secured. A simple formula then gives the strength of the current. CHAS. R. CROSS.

## The magnetic declination in 1728.

I notice, in your issue of Sept. 18, a note, over the signature 'C. A. S.,' criticising certain statements in regard to the northern boundary of North Carolina, contained in bulletin No. 13 of the U. S. geological survey. A more careful perusal would have shown the writer that the points criticised are contained in an extract from 'Geology of North Carolina,' by Prof. W. C. Kerr, 1875, and that the author of the bulletin is not responsible for them.

HENRY GANNETT.

Washington, D.C.,  
Sept. 21.

## Composite portraiture.

Shortly after the publication of my article on 'Composite portraiture' (*Science*, Aug. 28), my attention was called to an article by Mr. W. E. Dekenham in the *Photographic news* of April 24, 1885, wherein is figured an arrangement for combining optically more than two photographs, which corresponds very nearly with what I had in mind when I penned the last sentence of my article. I have since thought of other methods of solving the problem, but have not had the opportunity of putting them to a practical test. I was glad to find in the same journal (April 17) that Mr. Galton had been giving his attention to the same subject. He says, "There is nothing respecting composites that I should more

gladly hail than the invention of a simple optical method of combining many images into one, so as to judge of the effect of a photographic composite before making it."

I also omitted to refer in my article to an important application of the stereoscopic method of combining two images; namely, in getting the composite of two other composites, as Mr. Galton does in his 'Inquiries into human faculty' (frontispiece), and more recently, in his composites representing the Jewish type. JOSEPH JASTROW.

Philadelphia, Sept. 18.

## Lower Silurian fossils at Canaan, N.Y.

The words 'these limestones,' in the report of Professor Hall's remarks on my paper at the Ann Arbor meeting of the American association, published on p. 220 of *Science* for Sept. 11, seem to imply that Professor Hall claimed to have known forty years since of Lower Silurian fossils in the Taconic limestone of Canaan, Columbia county, N.Y. In a recent letter to me, he states, that, in the expression, he had no intention of implying that he knew at that time of fossils at Canaan; that he referred to his knowledge of fossils at Hoosic, in a limestone which he regarded as of the same age with that of Canaan. The existence of fossils at Hoosic also, forty miles north of Canaan, is additional evidence with regard to the Lower Silurian age of the rocks of the original Taconic system of Emmons. J. D. DANA.

New Haven, Sept. 22.

## Aquatic respiration of soft-shelled turtles.

In your otherwise excellent abstract of our paper on the aquatic respiration of soft-shelled turtles (*Science*, vol. vi. p. 225), not quite enough information is given in the paragraph containing the table to sufficiently explain it. We should be glad to have that paragraph read: "The following table shows the results of the analyses. In the first column is given the total amount of free oxygen taken from the water (10 litres) in ten hours by a turtle weighing 1 kilogram. The second column contains the quantity of carbon dioxide that could be formed from this oxygen; and the third column contains the actual amount of carbon dioxide added to the water by the turtle, the excess of which, over the amount that could be formed from the oxygen taken from the water, is given in the fourth column."

	O.	CO <sub>2</sub> .	Actual CO <sub>2</sub> .	Excess CO <sub>2</sub> .
July 11 . .	71 mg.	97 $\frac{3}{8}$ mg.	231 mg.	133 $\frac{3}{8}$ mg.
Aug. 8 . .	32 "	44 "	212.7 "	168.7 "
Aug. 9 . .	39 "	53 $\frac{5}{8}$ "	168.7 "	115 $\frac{3}{40}$ "

S. H. AND S. P. GAGE.

## AMERICAN FLASH LANGUAGE AGAIN.

SINCE writing the paper on this subject which appeared in *Science*, vol. v., p. 380, I have succeeded in finding another glossy similar to that given by Henry Tufts, about 1798, and included in that paper. I am in-