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CONDUCTED BY

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AND

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"Nec aranearum sane textus ideo melior quia ex se fila gignunt, nec noster vilior quia ex alienis libamus ut apes." JUST. LIPS. *Monit. Polit.* lib. i. cap. 1.

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tense green, having in the middle a red image equally intense corresponding to the small square. This fact evidently depends upon the same cause as the preceding one.

I shall terminate by a few words on the analogy admitted by Sir David Brewster between accidental colours and harmonic sounds. This philosopher considers as well as myself the accidental colours as an impression spontaneously generated in the organ. Now, it is admitted in physics that the harmonic sound has its origin in the sonorous body itself, which, besides the principal vibration, executes accessory ones. Moreover, the accidental impression continues after the disappearing of the direct impression, and nothing of the sort manifests itself with regard to harmonic sounds. The analogy in question appears to me therefore very remote.

The last objections that came to my knowledge have been raised by Mr. Osann, in the journal of Mr. Poggendorff*. But that article contains, with respect to my work, such inaccuracies, that they disfigure it and render it absurd: here is an example, of which the reader may judge upon good grounds. Mr. Osann describes in the following manner my experiment on the combination of two complementary accidental colours †:

"Place on a black ground a rectangle of paper, the halves of which are painted with two complementary colours, for instance red and green, and each one marked in the middle with a black point. *If you look for some time at this coloured rectangle, and afterwards shut your eyes completely, there will appear in its place a black image with a red point on one side and a green point on the other.*"

I think it needless to extend further the examination of this article, and to answer the objections therein contained.

LXVII. *On the polarized Condition of Platina Electrodes, and the Theory of secondary Piles.* By A CORRESPONDENT.

To the Editors of the Philosophical Magazine and Journal.

GENTLEMEN,

AS so much interest has been lately excited by the peculiar *polarized* condition into which platina electrodes may be thrown, the following results, obtained a few months since,

* *Annalen der Physik und Chimie*, vol. xxxvii. 1836, p. 291, and following.

† See at the beginning of my present article, on the subject of the anonymous author's objections.

may perhaps be not uninteresting to some of your numerous readers. During a long series of experiments upon the theory of secondary piles, I had occasion to obtain and to verify the result announced by Mr. Golding Bird in the Philosophical Magazine for November 1838, namely, that the negative platina electrode of a voltaic arrangement which has been used in the decomposition of water, will give out less gas than the positive electrode under the influence of an equal negative current. I afterwards found,

1. That the *negative* platina electrode will in certain cases, and often most unexpectedly, give out *more* hydrogen than the *positive* electrode; that frequently when the two plates have been together active for some time (both giving out hydrogen) in a simple zinc and platina circuit, such as that described by Mr. Golding Bird, the (originally) negative electrode will evolve *least* gas in the first half of the experiment and *most* in the last.

2. That in this latter condition a delicate galvanometer will show the negative electrode to be *then negative* as it was before invariably *positive* to the other plate.

3. That this condition depends upon the relative cleanliness of the two electrodes. After scraping bright the surface of the negative electrode, or the one giving out least hydrogen in most cases, it gave off *still less* gas. If a similar operation were performed upon the positive electrode instead, the relative quantities of hydrogen evolved at the two plates approached *nearer to an equality*; finally, by using a negative electrode of which the surface was much discoloured, and a very bright positive electrode, I obtained the effect of *most* hydrogen evolved from the negative electrode, the latter being at the same time *actually* negative to the other plate. Thus, we may understand how it happens that the secondary current from two platina plates which have been repeatedly used to decompose water as negative and positive electrodes respectively, becomes gradually feebler and feebler, and at last altogether disappears.

4. That the secondary currents between the two electrodes is considerable in proportion as the water electrolysed by the plates has been pure, that is, as the matter evolved upon them has been purely *gaseous*. Thus a constant battery was connected during ten minutes with a decomposing apparatus in which stood the platina plates, and which was filled with a quantity of acidulated distilled water. When the connexion with the battery was broken the secondary current was 54°, estimated by the deflection of the galvanometer needle. A solution of sulphate of copper was then electrolysed for ten

minutes in the same way. At the end of that time a deposition of copper was formed upon the negative electrode. A secondary current of only 15° was obtained. This current varied in many experiments from 15° to 21°, as that obtained from the plates in the pure aqueous fluid from 50° to 54°. In general the secondary current in the sulphate of copper was only one third of that developed in the distilled water, after partial electrolysation. When a solution of nitrate of silver was exposed for ten minutes to the action of the battery, a secondary current varying from 9° to 12° was obtained. With a solution of sulphate of zinc (after the electrolysation of which a mixture of very impure oxide of zinc, and zinc appear upon the negative electrode) the secondary current was 20°. Even these currents, feeble as they were, I cannot help attributing solely to the gaseous combinations going on at those portions of the platina which remained exposed. The following experiment shows how very small a portion of the platina surface which has been active in the electrolysation of water is sufficient to the production of a far greater secondary current than any of those above mentioned.

The platina plate to be used as the negative electrode was divided into two portions, one of which was one eighth of the whole plate, which itself was not quite half an inch long and but the fifteenth of an inch in breadth. The two divided portions were so placed together during a few minutes' connexion with the battery as to form one electrode; connexion was broken; a secondary current of 54° was obtained; seven-eighths of the plate were then carefully and quickly removed; the current instantly fell to 30°; the removed portion was replaced; the needle was deflected 50°.

The current resulting from the *combination* of the gases oxygen and hydrogen upon the clear platina surface was often sufficient to *decompose water for some minutes*. Immediately that the connexion between the two plates was made this singular effect was produced, oxygen streaming up from the negative electrode and hydrogen from the positive.

5. The water electrolysed does not, as some have supposed, assist in the production of a secondary current by the oxygen which it holds in solution after electrolysation *independently* of that portion upon the surface of the positive electrode, as may be proved by changing the solution in which the plates have been active as electrodes of the battery, or by substituting for the positive electrode after electrolysation a fresh platina plate. In the latter case there is no secondary current. In the former the current will be the same, whether obtained through the partially electrolysed water,

or through a new alkaline or acid, or saturated saline solution.

I cannot help thinking that the theory of secondary piles, of which the functions seem to depend on chemical changes so very minute, will, when rightly understood, afford the best refutation of the doctrines of the *electromotists*. The beautiful experiments of Schœnbein and Matteucci have surely prepared the way for the establishment of such a theory!

I remain, Gentlemen, yours, &c.

J. B.

LXVIII. *Proceedings of Learned Societies.*

GEOLOGICAL SOCIETY.

President's Anniversary Address: continued from p. 387.

IN attempting a sketch of the subjects which have occupied the attention of the Society during the year, I should wish to retain that distribution of the science of geology according to which I arranged my remarks in the Address which I had last year the honour of reading to the Society; I mean the primary division into *Descriptive Geology* and *Geological Dynamics*; the former implying a description of the rocks of the earth's surface according to an established classification of strata and formations; and the latter dealing with the study of those general laws and causes of change by which we hope to understand and account for the facts which Descriptive Geology brings before us;—in short, the present condition and the past history of the earth's crust. But as the laws of permanence and change, with regard to organized beings, differ very widely from the dynamics of brute matter, we may conveniently make a separate study of the relations of organic life to which geology conducts us, and may mark it by the name *Palæontology*, by which it is commonly known. I will add, that it still appears to me convenient, for the present, to divide Descriptive Geology into two portions,—the Home circuit, in which the order of superposition has already been established with great continuity and detail; and the Foreign region, in which we are only just beginning to trace such an order. I shall also, as before, take the ascending order of strata. According to this arrangement of the science, I shall venture to bring to your recollection a few of the points to which our attention has mainly been called during the past year.

DESCRIPTIVE GEOLOGY.

1. *Home (North European) Geology.*—When I stated that Descriptive Geology has for its task the reference of the rocks of some portion of the earth's surface to an established classification into strata and formations, it was implied, that the more common employment of the descriptive geologist must be to refer the rocks which he examines to some classes *already fixed and recognized*; but it could hardly fail to occur to you, that from time to time the leaders