"Note on the Action of Copper Sulphate and Sulphuric Acid on Metallic Copper." By ARTHUR SCHUSTER, F.R.S. Received November 14,—Read December 7, 1893.

Mr. Gannon in the foregoing paper refers to some unpublished experiments made by me a few years ago. These experiments were conducted for the purpose of satisfying myself that, as seemed *a priori* probable, the diminution of weight observed when metallic copper is exposed to the action of sulphuric acid or sulphate of copper is due to the presence of free oxygen in the liquid. Copper gauze was taken in order to deal with as large a surface as possible, and rolled up so as to fit into a piece of glass tubing. After the copper had been carefully washed, dried, and ignited in hydrogen, it was immersed in dilute sulphuric acid, the air above the acid was removed as far as possible, and the tube containing the gauze was then sealed hermetically. At the end of a fortnight a few tubes prepared in this way were opened and weighed after being subjected to exactly the same treatment as previous to immersion, that is to say, the copper was washed, dried, and ignited in hydrogen. The diminution in weight observed under these circumstances was insignificant. I cannot, unfortunately, now find the record of the actual weighings, but the quantities involved were about the same as in the next set of experiments. On January 26, 1891, four spirals of copper gauze were placed in a solution containing 20 per cent. of cupric sulphate, 5 or 10 per cent. by weight of sulphuric acid being added to the aqueous solution. The conditions thus approximated to the solutions which are used in the electrolysis of copper. The tubes were exhausted and sealed up: two of them were opened on February 2, and the two remaining ones on February 9; the weighings were taken after drying and ignition in hydrogen. The results are shown in the accompanying table:—

Time of immersion.	Amount of sulphuric acid.	Weight before immersion.	Weight after immersion.
7 days	10 per cent.	17·512	17·510
7 „	5 „	14·357	14·356
14 „	10 „	14·267	14·265
14 „	5 „	18·471	18·468

It will be seen that the diminution in weight is quite insignificant compared to what takes place in the presence of air, and may be due to some remnant of oxygen left. The late Mr. Hoskyns Abrahall, however, suggested that it might also be due to the formation of copper sulphide; and this suggestion was supported by the fact that traces of sulphuretted hydrogen were given up when the copper, after

immersion, was heated in hydrogen. The action would be represented by the formula

$$4Cu + SO_3 = CuS + 3CuO.$$

The above experiments prove that nearly the whole effect which is observed when copper is immersed in a solution of sulphate of copper or sulphuric acid is due to the presence of oxygen in the solution.

February 1, 1894.

Sir JOHN EVANS, K.C.B., D.C.L., LL.D., Vice-President and Treasurer, in the Chair.

A List of the Presents received was laid on the table, and thanks ordered for them.

I. "Insect Sight and the Defining Power of Composite Eyes." By A. MALLOCK. Communicated by LORD RAYLEIGH, Sec. R.S. Received November 28, 1893.

The optical arrangement of the simple eyes of Vertebrates is well understood, but as regards the action of the composite eyes of Insects and Crustacea less certainty has hitherto prevailed.

In the former class of eye a single lens, or its equivalent, forms an image on a concave retina, built up, as a sort of tesselated pavement, of the sensitive terminations of the fibres of the optic nerve, and, if the lens is perfect and the pupil large enough, the definition is limited by the distance apart of the nerve-terminations, for, in order that two objects may appear as two to the eye, they must subtend at least such an angle that their images as formed by the lens shall not fall on the same nerve-termination.

In the human eye the distance between the sensitive points on the retina is such that it subtends about a minute of arc at the optic centre of the lens, and in good eyes the optical part of the apparatus is sufficiently perfect to allow of this degree of definition being attained over a small part of the field of view.

For reasons, however, which will be given presently, such definition as this is not to be looked for in composite eyes.

The general plan on which all composite eyes are constructed is that of a convex retina having a separate small lens in front of each sensitive part, together with an arrangement of screens which allows