5. Note on a Modification of the Apparatus employed for one of Ampère's Fundamental Experiments in Electrodynamics. By Professor Tait.

My attention was recalled by Principal Forbes's note (read to the Royal Society on January 7th), to his request that I should at leisure try to repeat Ampère's experiment for the mutual repulsion of two parts of the same straight conductor, by means of an apparatus which he had procured for the Natural Philosophy Collection in the University. Some days later I tried the experiment, but found that, on account of the narrowness of the troughs of mercury, it was impossible to prevent the capillary forces from driving the floating wire to the sides of the vessel. I therefore constructed an apparatus in which the troughs were two inches wide, the arms of the float being also at that distance apart. Making the experiment according to Ampère's method with this arrangement, I found one small Grove's cell sufficient to produce a steady motion of the float from the poles of the pile; in fact, the only difficulty in repeating the experiment lies in obtaining a perfectly clean mercurial surface.

Two objections have been raised against Ampère's interpretation of this experiment, one of which is intimately connected with the subject of Principal Forbes's note. This is the difficulty of ascertaining exactly what takes place where a voltaic current passes from one conducting body to another of different material. It is known that thermal and thermo-electric effects generally accompany such a passage. To get rid of this source of uncertainty, I have repeated Ampère's experiment in a form which excludes it entirely. In this form of the experiment the polar conductors and the float form one continuous metallic mass with the mercury in the troughs; the float being formed of glass tube filled with mercury, with its extremities slightly curved downwards so as nearly to dip under the surface of the fluid; and the wires from the battery being plunged into the upturned outward extremities of two glass tubes, which are pushed through the ends of the troughs so as to project an inch or two inwards under the surface of the mercury. A little practice is requisite to success in filling the float and immersing it in the troughs without admitting a bubble of air. This float, being heavier than the ordinary copper wire, plunges deeper in the fluid, and encounters more resistance to its motion, but, with two small Grove's cells only, Ampère's result

was easily reproduced, even when the extremities of the float rested in contact with those of the polar tubes before the circuit was completed. It is obvious that here no thermo-electric effects can be produced in the mercury, and I have satisfied myself that the motion commences before the passage of the current can have sensibly heated the fluid in the tubes.

The other class of objections to Ampère's conclusion from this experiment, depending on the spreading of the current in the mercury of the troughs, is of course not met by this modification. I have made several experiments with a view to obviate this also, but my time has been so much occupied that I have not been able as yet to put them in a form suitable for communication to this Society.

The following Gentleman was admitted as a Fellow:—

JAMES LORIMER, Advocate.

The following Donations to the Library were announced:—

On the Causes of Death in the Scottish Widows' Fund Life Assurance Society, from January 1853 to January 1860. By James Begbie, M.D., F.R.S.E.—*From the Author.*

Proceedings of the Royal Horticultural Society, Nos. VI. XVI., 1860; XXI., 1861.—*From the Society.*

Monthly Notices of Astronomical Society, Vol. XXI., No. 3.—*From the Society.*

Transactions of the Linnean Society, Vol. XXII., Part 4; XXIII., Part 1, 4to.—*From the Society.*