On the geometrical Representation of the Powers of Quantities, whose Indices involve the Square Roots of negative Quantities. By the Rev. John Warren, *M.A. late Fellow and Tutor of Jesus College, Cambridge. Communicated by the President.* Read June 4, 1829. [*Phil. Trans.* 1829, *p.* 339.]

The author, in a former paper, read to the Society in February last, had discussed various objections which had been raised against his mode of geometric representation of the square roots of negative quantities. At that time he had only discovered geometrical representations for quantities of the form $a + b\sqrt{-1}$, of geometrically adding and multiplying such quantities, and also of raising them to powers either whole or fractional, positive or negative; but he was at that time unable to represent geometrically quantities raised to powers, whose indices involve the square roots of negative quantities (such as $a + b\sqrt{-1}^{m+n\sqrt{-1}}$). His attention has since been drawn to this latter class of quantities by a passage in M. Mourey's work on this subject, which implied that that gentleman was in possession of methods of representing them geometrically, but that he was at present precluded by circumstances from publishing his discoveries. The author was therefore induced to pursue his own investigations, and arrived at the general result stated by M. Mourey, that all algebraic quantities whatsoever are capable of geometrical representation by lines all situated in the same plane. The object of the present paper is to extend the geometrical representations stated in his former treatise, to the powers of quantities, whose indices involve the square roots of negative quantities. With this view he investigates various equivalent formulæ suited to the particular cases, and employs a peculiar notation adapted to this express purpose; but the nature of these investigations is such as renders them incapable of abridgement.

An experimental Examination of the Electric and Chemical Theories of Galvanism. By William Ritchie, *A.M. F.R.S. Rector of the Royal Academy at Tain.* Read May 7, 1829. [*Phil. Trans.* 1829, *p.* 361.]

After observing that the theory of galvanism originally proposed by Volta, and generally termed the Electric theory, is still the universally received doctrine among continental philosophers, the author adduces several experiments proving the fallacy of the principles on which that theory is founded. He points out the inconclusiveness of the reasoning by which it has been inferred that dissimilar metals, by being simply placed in contact with one another, are instantly thrown into opposite electric states; for in all the experiments which have been made with a view of establishing this fundamental principle of the electric theory, the metals have been exposed to the oxidizing action of the air, which is a constant source of electric disturbance, and the operation of which has been strangely overlooked. The

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