ON CAYLEY'S THEORY OF THE ABSOLUTE.

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In the following pages I attempt to show, as a matter of purely pedagogic interest, how simply and naturally Cayley's theory of the Absolute follows from a small number of very elementary geometrical conceptions, without any appeal to analytical geometry. Where assumptions are made, the fact is frankly stated; the few points where more advanced mathematical reasoning is needed for the actual proof are clearly indicated; my contention is not that every step in the rigorous proof can be presented under the guise of elementary mathematics, but that it is quite possible to develop the theory so as to be intelligible and interesting to average students at a much earlier stage than is customary.

Let any simple diagram be drawn on a sheet of paper, *e. g.*, a circle with a straight line cutting it in two points. Let this sheet of paper be held at some distance away, in such a position as to be slightly oblique to the line of sight. A difference will now present itself, of such a nature as to suggest that the properties of the figure are of two distinct kinds. It will be as evident as before that there is a straight line, and a curve cut by the line in two points; but it will not be perfectly evident that the curve is a circle, it will appear as an oval curve. Similarly, if we have two straight lines intersecting at right angles, the fact that there are two intersecting straight lines will be evident under whatever aspect the figure may be viewed, but the angle between them will not appear to be a right angle. The same effect will be observed if, keeping the diagram fixed, the position of the eye be changed. Thus we see that the properties of a plane figure are of two distinct kinds; some are purely relative, dependent on the point of view; others are more intimately connected with the figure itself, they have no relation to the point of view. The effect of changing the point of view is considered in the mathematical theory of projection, which must now be briefly explained.

Given any figure in a plane (1), and a point V not in this plane, let V, the centre of projection, be joined to all the points of the given figure, A, B, C, etc., and let the points in which these joining lines cut a second plane (2) be denoted by A', B', C', etc. To an eye at V, with no