directions of the asymptotes, and the coefficient of the next lower power of r which does not identically vanish for these values of $l : m$, will, on being equated to zero, give the asymptotes.

This also shews clearly the reason of the occasional failure of the common rule, when terms of the second highest dimension are wanting, viz.: equate to zero the terms of the highest dimension. The rule succeeds when the expression of the highest dimensions consists of factors occurring singly, but may fail when the same factor occurs in it more than once.

2. *On a Reduction of Curves of the Second Order:*

In the modern system of analytical geometry, as pursued by Salmon, Puckle, and others, the curves of the second order, as represented by the general equation in Cartesian rectangular coordinates, are first separated into central and non-central, and the further reduction of the equation is then effected by transformation of coordinates, which is a rather long and troublesome process. It has occurred to me that this reduction might be simplified by following the course taken by Euclid with regard to the circle, namely, by seeking whether there exists a line (or lines) with regard to which the curve is symmetrical. For this purpose let us take the curves separately.

I. Central curves, $C^2 - AB$ is not zero, and the equation referred to the centre takes the form

$$Ax^2 + By^2 + 2\,Cxy = F.$$

Let the curve be cut by the line

$$\frac{x-\alpha}{l} = \frac{y-\beta}{m} = r, \; (l^2 + m^2 = 1) \;\ldots\ldots\ldots\ldots (1)$$

then we obtain a quadra. · for the values of r at the points of section, by substituting for x, y, in the equation to the curve, and the coefficient of the simple power of r in this, is

$$Al\alpha + Bm\beta + C\,(l\beta + m\alpha),$$

and if this vanish, the values of r are equal and opposite, and (α, β) will be the middle point of the chord of section. Now this condition is

$$(Al + Cm)\,\alpha + (Bm + Cl)\,\beta = 0 \;\ldots\ldots\;\ldots\ldots\ldots (2)$$

and if $l : m$ be given, the locus of this equation is a straight line through the origin.