12. Apart from their properties as transformations, the above transformations are of interest because of certain applications to plane curves, notably to spirals which it is hoped to bring out in a subsequent note.

Since finishing this note the writer finds that the *finite* forms of the transformations discussed were given by Laisant in the *Nouvelles Annales de Mathématiques*, 2d series, vol. 7 (1868), p. 318, in the solution of a problem proposed by Haton de la Goupillière, *Nouvelles Annales*, vol. 6 (1867), problem No. 803. The wide divergence between the properties and the points of view of the present note and the solution referred to seem to warrant its presentation to the Society. The above-mentioned volumes of the *Nouvelles Annales* are to be had in the Library of Congress.

BALTIMORE,
14 *April*, 1897.

CONTINUOUS GROUPS OF CIRCULAR TRANSFORMATIONS.*

BY PROFESSOR H. B. NEWSON.

(Read before the American Mathematical Society, at the Meeting of April 24, 1897.)

THE object of this paper is to present the outlines of a fairly complete theory of the continuous groups of linear fractional transformations of one variable. The method employed is quite different from the methods of Lie. Lie's classic theory is based upon the infinitesimal transformation; I shall make but little use of the infinitesimal transformation, but shall develop the subject from the consideration of the essential parameters of the transformation. The complex plane is chosen because it beautifully illustrates the methods. I have put together some old and some new facts and have sought to build up a general theory.

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* Several terms have been proposed to designate the linear fractional transformations of the complex plane. Möbius introduced the term "Kreisverwandtschaft." Mathews' Theory of Numbers, page 107, translates this as "Möbius' Circular Relation." Professor Cole, in *Annals of Mathematics*, vol. 5, page 137, refers to "Orthomorphic Transformation," following Cayley; this seems too general for the special case here considered, since it is applicable to all conformal transformations. Darboux, in his Theorie des Surfaces, vol. 1, page 162, uses "transformation circulaire." It seems to me that "Circular Transformation" is the best yet proposed, for the fundamental property is expressed in the name.