

spicuous by its absence from the original, namely, the Klein-Poincaré representation of a non-euclidean plane on a euclidean plane by means of a system of circles orthogonal to a given circle.

In another new appendix (the fourth), the author shows very neatly how to construct projective geometry on the basis of Lobachefskian metrical geometry by adjoining ideal points, lines and planes. This meaning of the word "ideal" is sanctioned by common usage. In the fifth appendix, however, the term "ideal line" is used in a totally different sense, namely, for a circle which images or represents a straight line. This "double entendre" seems perhaps a trifle unfortunate. The translator has produced a very readable and satisfactory English version of the best historical introduction we have to the elements of non-euclidean geometry.

ARTHUR RANUM.

Dr. George Bruce Halsted—Géométrie Rationnelle, Traité élémentaire de la Science de l'Espace—Traduction Française par PAUL BARBARIN, avec une préface de C. A. LAISANT. Paris, Gauthier-Villars, 1911. iv + 296 pp.

FROM the time of Farrar and Bowditch a number of French mathematical works have been translated into English, but although several American mathematicians have had their works translated into German, to Dr. Halsted belongs the honor of being the first to be translated into French. Novelties in geometry appeal to the French—witness their creations in connection with the geometry of the triangle, nomography, geometrography, anallagmatic curves and surfaces, and how Méray's somewhat radical work is coming to its own. As could, then, be almost predicted, when the first edition of Professor Halsted's book appeared in 1904 under the title "Rational Geometry, a Text-Book for the Science of Space based on Hilbert's Foundations," it was sympathetically received in France. Barbarin, already well known by his writings on non-euclidean geometry, wrote among other notices (of the first and second editions of Dr. Halsted's book) a ten-page review for Darboux's *Bulletin*.*

In Germany the work was not received so whole-heartedly and Dehn's somewhat vigorously expressed criticisms† (di-

* Sér. 2, vol. 31 (1907), p. 309-319.

† *Jahresbericht der Deutschen Mathematiker-Vereinigung*, Nov., 1904, vol. 13, p. 592-596.