inserting the calendar for 1911 and an article on the determination of the orbits of planets and comets.

The part devoted to physics starts with a most excellent article by Willy Wien, of Würzburg, which is almost popular in nature and yet so fundamental in treatment as to be worth many a perusal. The various fields of physics are covered by articles and many tables of constants and coefficients, admirable for reference, are included. Fundamental principles expressed in mathematical language abound. In fact, throughout the book the authors, owing to the lack of space, cannot elaborate much.

An article on radioactivity by Greinacher, of Zurich, is of the same character as the one on relativity by Willy Wien.

Several articles on chemical subjects are included; the fields of technology touched upon are those dealing with the theory and design of electrical machinery. All are treated from the viewpoint of the mathematics in the case.

Of the special articles we mention the obituary notice of the late Minkowski by Hilbert and Weyl, of Göttingen, and the article on the present tendencies in the teaching of mathematics in Germany by Lietzmann, of Barmen.

For both the fields of mathematics and physics fairly complete lists of journals, proceedings, recent books, and firms dealing in apparatus are given at the end of the book. A mortuary record for 1909–1910 and a list of teachers in the Hochschulen of Germany are added. Of course, a complete index closes the volume.

Ernest W. Ponzer.


The recent untimely death of Professor Bonola lends unusual interest to this book. In a review of the original Italian edition which appeared in the Bulletin in 1910 I spoke of the desirability of having "an English edition of so valuable and interesting a work." This want is now well supplied by Professor Carslaw's translation. In a new appendix (the fifth) the translator has also materially improved the book by adding a discussion of a subject which seemed con-
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 sanc­
tioned 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 Rationelle, Traité élémen­
taire de la Science de l'Espace—Traduction Française par
Paul Barbarin, avec une preface de C. A. Laisant.

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 sur­
faces, 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

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