Elements of Projective Geometry. By G. H. Ling, George Wentworth, and D. E. Smith. Boston, Ginn and Company, 1922. vi + 186 pp.

Although there is no date on the title page, nor in the preface, this book, according to the notice of the copyright by Ginn and Company, was apparently published in 1922. The omission of the date of publication, however, does not matter, since the contents and treatment are such that the *Elements* might have been written in Steiner's time. Indeed the topics and their presentation are in the main those of the early period of synthetic geometry, which is well known to critical students of projective geometry.

Within its elementary restricted domain the book is written clearly and concisely and may serve very well as a first introduction to a modern university course in projective geometry. The reviewer is nevertheless of the opinion that such an introductory and elementary treatise could be written with a view to its bearing upon the foundations of geometry and on the channels which lead to the fountainheads of contemporary geometric science. Even in an elementary course an occasional and opportune outlook into higher domains is invigorating and creates in the ambitious student a desire to penetrate deeper into the subject.

Welcome features of the book under review are the large number of exercises and a short chapter on the history of projective geometry. Clifford's term *cross ratio* seems to us preferable to Chasles' *anharmonic ratio*. Harmonic is a more or less mystic designation for $(ABCD) = -1$, and anharmonic is a negative definition for an infinite number of cross ratios which are not equal to -1. In the short historic sketch the important fact ought to be pointed out that von Staudt made the first successful attempt to establish the foundations of projective geometry (Geometrie der Lage) by introducing the concept of "Wurf" = throw of four collinear points independent of metric concepts (cross ratio of metric segments). After the remarkable developments by Poncelet, Steiner, Moebius, Chasles, etc., von Staudt's geometry of position was by far the most important step in the early critical development of projective geometry.

ARNOLD EMCH

Elementary Vector Analysis. By C. E. Weatherburn. London, G. Bell and Sons, 1921. xxvi + 184 pp.

The author's object in this book is to present the simpler portions of vector analysis and to apply them to portions of mechanics. He adheres to the notation of Gibbs. He gets as far as differentials and integrals, but does not bring in the notions of curl, convergence, and other ideas that belong to the general study of fields. The definitions are geometric for the scalar and the vector products, the vectors being always thought of as lines, or geometric vectors. A summary at the end of nineteen pages makes it very easy to find formulas and definitions. The geometry of curves in space is treated briefly, kinematics and dynamics of a particle, systems of particles, rigid kinematics, rigid dynamics, rigid statics.

The book should serve as a simple introduction to these subjects treated by way of the vector methods, and for the purposes in view is admirably adapted to the student's needs.

JAMES BYRNIE SHAW