Principles of Geometry. Vol. III. *Solid Geometry.* By H. F. Baker. The Cambridge Press, 1923. xix+288 pp.

The first two volumes of this series on *Foundations* and *Plane Geometry* have not been reviewed in the BULLETIN.* The first deals with the underlying ideas of projective geometry, the treatment deviating sharply from the traditional British method of heaping projective geometry on top of metric geometry. The second deals with conics, circles, and non-euclidean geometry; it might be described as a successful feat in showing what can be done with the incidence relations of the "ordered framework" of the first volume. The algebraic counterpart is available when necessary for testing results, and consideration is given to the logical basis of the algebraic symbols, but let us quote from the preface: "It (the volume) suggests the question whether, in the case of distance, as in many other cases, we may not have derived from familiarity with physical experiences, a confidence which a more careful scrutiny can only regard as an illusion. . . . It will be of importance if the reader come to see how deep lying are the questions involved in the use of coördinates, and the assumption of distance as a fundamental idea."

With the third volume on *Solid Geometry* the author assumes that the reader appreciates his views on foundations, coordinates, and distance, and says no more of them; but the book, and particularly Chapter II, must be read in the light of these earlier considerations. Chapter I is on quadric surfaces; Chapter II on the relations of quadric surfaces to an arbitrary absolute conic; Chapter III on cubic curves in space; Chapter IV, which is on a somewhat different footing, is entitled: The general cubic surface, introductory theorems.

In relatively few but concise pages various definitions of quadric surfaces and of cubic curves are given, and the essential properties and constructions are brought out. The algebraic representation is not suppressed, but the reader is never allowed to forget that he is studying geometry by synthetic methods. The less essential relations and properties are included under the "examples," nearly 200 in number, which occupy considerably more than half of the pages of the first three chapters. Some of these are left to the reader, but many of the more substantial type are solved in detail:—examples involving such topics as normals to a quadric, Moebius tetrads, geodesics on a quadric surface, and special cubic transformations. The fourth chapter is at once intimately related to the preceding chapters and introductory to the theory of cubic surfaces, which is promised us in a later volume. Here we find such topics as the double-six, the figure of 27 lines, definitions of a cubic surface, the Hessian surface, representation of cubic surfaces on planes and on quadrics. It is to be hoped that when this scholarly series is complete, the content and purport of these books may be more critically examined. The author implies that the series is especially suited to the physicist and engineer. This is surely

* Since this was written, vol. II has been reviewed by F. S. Woods, this BULLETIN, July, 1925, p. 370.