librium and of natural systems (whether physical or economic) and collated with the very general viewpoint of Royce and of C. S. Peirce (whose maturer work Keynes does not cite), might be worthy of at least a bibliographic reference by an author who is setting up a category of probability. However, it would be unreasonable to expect any discussion of categories to reach nearer the date of issue than about 50 years, just as one can hardly expect the full treatment of the necessary and sufficient conditions justifying a new analytical method to follow right on the heels of the introduction of such a method by the physicist (Fourier, Heaviside).

E. B. WILSON

BLASCHKE ON DIFFERENTIAL GEOMETRY

Vorlesungen über Differentialgeometrie und geometrische Grundlagen von Einstein's Relativitätstheorie. Volume 1, *Elementare Differentialgeometrie.* By W. Blaschke. Berlin, Julius Springer, 1921. x + 230 pp.

This volume is the first of a series of three which the author plans to publish under the first part of the title given above. It is devoted in part to the classical theories of the differential geometry of curves and surfaces, and in part to some very interesting special chapters of these theories with which the author himself has been especially occupied. In his preface Professor Blaschke says that this first volume contains a presentation of the properties of curves and surfaces which are invariant under the group of motions, that the second will be devoted to affine differential geometry, and that a third will present the geometrical theories of Riemann and Weyl, which are so closely related to the Einstein theory of gravitation.

There are two interesting features of the book that attract one's attention at the very start. The first is the consistent use of vector notations. All of us who have lectured on differential geometry have doubtless been impressed with the great economies in presentation which these notations would afford. I have myself hesitated to use them in lecture courses because of the loss of time necessitated at the beginning of a course by explanations to hearers who have had no experience with vector notations, and because of the slight element of awe and mystification which these notations seem to arouse in the minds of those who have had only a limited acquaintance with them. After reading Professor Blaschke's book, I have grave doubts of the correctness of my attitude. The properties of vectors which one needs in differential geometry are few and simple, and he has demonstrated that they may be clearly and concisely explained as the occasions for their use arise. When one considers the many applications of vector analysis in other domains as well as in geometry, it seems clear that we should acquaint our students with the elements of the subject at the earliest possible moment. Mathematical physicists usually shy away from abstract mathematical notations, as they did from the non-euclidean theories of space before the recent revolution. Is it not curious that they should be the leading advocates of the vector analysis notations