Lehrbuch der Ballistik. By C. Cranz. Berlin, Julius Springer, 1925. xiv+ 711 pp.

This is the fifth edition of the author's first volume on ballistics, and it is confined to exterior ballistics. It is dedicated with appropriate courtesy to the late General A. von Kersting, the founder and first director of the Military Academy (1903–1912) who, during the first two years of the World War, rendered valuable service to German military technique as President of the Artillery Proving Commission. Proper acknowledgements are made to Major Becker for his work on ballistic wind and ballistic density, and to Professor O. von Eberhard who was the first to prove by actual computations the possibility of a trajectory of more than 100 km. in range.

Whatever might have been in the mind of Dr. Cranz in selecting the title of the book, the importance of its contents may be best described to the American reader by giving it the title *A Compendium of Exterior Ballistics*. The reviewer knows of no other volume on this subject that contains so much information together with such a thorough and masterly treatment of the subject. There are 539 pages of text and 267 pages of bibliography, ballistic tables, and ballistic diagrams. The references to literature are carefully assified as having special bearing upon definite articles. The bibliography alone makes the book highly desirable for a library.

In the first part of the book the author discusses in detail the trajectory in vacuo with numerous illustrations of the path of a projectile fired from an elevation and from an inclined plane. These are interesting and, of course, elementary. If the reviewer is at liberty to give his real impressions of the contents of a book, possibly I may be pardoned for saying that one of these examples struck me with surprise. The problem is as follows: "Is it possible to throw a stone from the top of the Great Pyramid out over the base." After reading that its altitude is 137.2 m. and that the side of its square base is 227.5 m. one remains somewhat at a loss to know what the problem really is until he meets the statement that the velocity of throwing from the hand is assumed to be 24m/s which, he explains parenthetically, is the mean of thirty tests made upon as many different persons. He does not state how these tests were conducted, nor does he describe the physical characteristics of the persons who did the throwing. He shows that it is possible to clear the pyramid with an initial velocity of about 20m/s provided that the stone is thrown at the proper angle and he concludes that it is possible to throw a stone clear of the pyramid with " a certain amount of skill." Merely to throw a stone 20 m/s requires very little skill. Certainly the thirty persons would be poor candidates for a baseball team if the average velocity with which they throw a stone is about 65 f/s. The baseball player, I should think, throws with a velocity of 150 f/s to 165 f/s. Skill in this case consists in throwing at 20 m/s from the very restricted area at the top of the pyramid.

He follows the usual course of deriving the differential equations of the trajectory and then presenting the different methods of integrating these equations and of constructing the trajectory graphically. A number of graphical processes are described beginning with that of Poncelet in 1848