cellent material in the author's two volumes, *Funktionentheorie*, Erster Teil; Zweiter Teil. These are Numbers 668 and 703 in the Sammlung Göschen.

A student entering upon the study of a new subject needs many exercises to test his understanding. There are none in this book, but the author's two volumes, *Aufgabensammlung zur Funktionentheorie* (Nos. 877, 878) will provide ample material.

G. E. RAYNOR

Sur la Théorie Mathématique des Jeux de Hasard et de Réflection. By René de Possel. (Actualités Scientifiques et Industrielles, No. 436; Conférences du Centre Universitaire Méditerranéen de Nice, publiés sous la direction de M. Paul Vallery, I.) Paris, Hermann, 1936. 41 pp.

Chapter I describes how the three factors, reflection, hasard, and wile, enter the "game of society," by use of several games.

The next chapter explains games of batons. Piles of batons or sticks are before the players who can remove, when their turn comes, a number of sticks less than or equal to a given number; the player who takes the last stick loses. More complicated cases of this game are analyzed by means of expressing the numbers involved in the system of notation with 2 as base.

The third chapter states a theorem concerning games of combinations in which one player wins or there is a draw.

Chapter IV contains the usual definitions of probability, mathematical expectation, and equitable games. Mathematical expectation is applied in detail to the roulette wheel.

In the last chapter the author defines the "game of society" and outlines how to study the influence of reflection, the influence of hasard, and the influence of wile, which enter into games. Maxima and minima of the mathematical expectations of the player have an important role in this part. Applications of these maxima and minima are made for several games.

W. D. BATEN

Biologie Mathématique. By V. A. Kostitzin. Paris, Libraire Armand Colin, 1937. 223 pp.

In an appreciative preface, Vito Volterra points out that while numerous books have been published in recent years on the applications of mathematics to biology, it remained for M. Kostitzin to produce a synthetic and didactic work drawing together the researches on this subject. As is stated by the author, this book is fundamentally different from the manuals of mathematics with similar titles that have been prepared for students of biology. While he recognizes the utility of such books for reference purposes, the author is not enthusiastic about selecting certain chapters of one science for the benefit of workers in another. He says that each science has its peculiar language and logic and that it is only by preserving these that the applications of science can have their full force. Carrying this thought further, the author says that if a biologist needs chemistry he had better study that science and not read a few chapters especially adapted for biologists. Similarly, to be able to apply the methods of mathematics it is necessary to study what constitutes the science of mathematics—its ideas—and not some of the processes of calculation.

The author states that mathematics has entered the natural sciences through the door of statistics, but that statistics yields to analysis here as in all of the rational sciences. The role of statistics is to blaze the trail, to establish certain empirical laws, and to facilitate the passage from statistical to analytical variables.

This book devotes a part of one chapter to a discussion of frequency polygons and correlation. Then the author gives an example of two related series of values with a correlation coefficient of zero, and concludes that while the failure of the method of correlation in this case does not prove that it is useless, it indicates limitations in its usefulness and gives an added argument for the analytical method.

The book is principally a study of the growth and decline of various biological "populations." The method is to construct one or a set of differential equations or integro-differential equations representing variations of the population with time. As a rule these equations cannot be solved in their general forms, but the author finds that many conclusions of importance can be drawn from the solution of the equations in particular cases, or for critical values of parameters involved, and from the simpler equations that are recognized as only approximately correct.

Among the problems discussed are the growth of "closed" populations, the effect of poisoning due to metabolic products, relations between different species competing for the same food supply, species that feed on each other, symbiosis, and parasitism. Other chapters discuss the growth of organisms, embryonic and post-embryonic growth, forms of living beings and evolution.

The book shows, as Volterra points out in the preface, that the author is acquainted with the most modern resources of analysis, that he has an aptitude and ability at solving mathematical problems that have resisted earlier students, and a grasp of fundamental problems in biology.

R. B. Robbins