

## BOOK REVIEWS

*Advances and Applications of Mathematical Biology.* By N. Rashevsky. Chicago, University Press, 1940. 18+214 pp. \$2.00.

As the title indicates, the book under discussion deals with the more recent progress made by Rashevsky and his group in the systematization of what they have termed physico-mathematical biology. The problems with which the author is primarily concerned are those already delineated in his fundamental work published about two years ago, viz.: (a) cellular metabolism and growth, (b) conduction of nerve impulses and (c) neuropsychological reactions. In the present volume one finds that the analytical method first employed has been somewhat simplified and additional examples are given of the agreement between actual observations and some of the conclusions derived from mathematical reasoning. In the case of cellular diffusion, for example, the author has succeeded in developing formulations which are not restricted by the postulate that the cells are spherical. The elimination of this restriction obviously opens the way to a more general application of the author's rationalizations. Thus, he is enabled to outline with greater precision his concepts regarding the effects of diffusion forces on cell division.

This and the preceding book will probably interest the mathematician mainly because they reveal the kinds of important and vital problems that can be tackled with rather simple analytical tools. The biologist will undoubtedly be stimulated by the fresh ideas emerging from some of the mathematical developments, even though the unverifiable nature of some of the postulates will for the present hinder the experimental or observational evaluation of all the deductions that can be reached.

ANTONIO CIOCCO

*Sur les Valeurs Exceptionnelles des Fonctions Méromorphes et de Leurs Dérivées.* By Georges Valiron. (Actualités Scientifiques et Industrielles, no. 570.) Paris, Hermann, 1937. 55 pp.

One of the outstanding methods of the present century in the theory of functions of a complex variable is that of normal families of functions, a method which has well known applications to the study of convergence of sequences of analytic functions, the distribution of functional values of functions analytic or meromorphic in a circle or in the entire finite plane, conformal mapping, the theorems of Picard, Landau, Schottky, and so on. Each new condition for normal-

ity of a sequence of functions has yielded new information on one or more of these topics.

At least two decades ago, Montel conjectured that a family of functions  $f(z)$  analytic in a region is normal there provided  $f(z)$  fails to assume the value zero and  $f'(z)$  fails to assume the value unity. This conjecture was discussed at least orally by many mathematicians, and was finally proved in 1935 by Miranda. Miranda had been preceded by Bureau, who obtained some related theorems by the use of the Nevanlinna theory of meromorphic functions but who did not establish Montel's conjecture. Miranda's work was based also on the Nevanlinna theory and on Bureau's results. Valiron subsequently introduced the direct methods that he had previously employed in the study of the theorems of Picard and Borel to obtain wide generalizations of Miranda's theorem.

The fascicle before us is devoted to a systematic exposition of this body of material, together with many new generalizations and complements. There are close connections with the theorems of Picard, Landau, Schottky, and Bloch. The proofs are far more than pure existence proofs, for they involve specific inequalities of a numerical nature on the modulus of the functions  $f(z)$ .

The treatment is clear, pleasing, suggestive—an admirable exposition of a field of current interest and importance. May there soon be made in this country systematic provision for the encouragement of the writing of similar essays and for their publication!

J. L. WALSH

*Complex Variable and Operational Calculus with Technical Applications.* By N. W. McLachlan. Cambridge, University Press, 1939. 11+355 pp. \$6.50.

Since the time of Heaviside several books on operational calculus have appeared on the market. The majority of them deal almost exclusively with the electrical applications. This is due, no doubt, to its origin in the pioneer work of Heaviside. With very few exceptions these books treat the subject in a formal and heuristic manner leaving much to be desired from the standpoint of mathematical rigor. Several mathematicians have helped to place the subject on a more substantial basis and thereby extend its usefulness. The author has based his treatment of the subject on the Laplace transform and the Mellin inversion theorem in line with modern developments. Except in a few places a sufficient degree of rigor has been maintained throughout the book to meet the needs of the engineer and applied mathematician.