Le Calcul des Probabilités—Son Évolution Mathématique et Philosophique. By L.-Gustave du Pasquier. Paris, Hermann, 1926. 21+304 pp., two tables.

Du Pasquier has written a delightful book in which the classic theory of probability centering around the so-called Theorem of Bernoulli is given in some detail, with an adequate setting in history, logic, and philosophy. Well chosen examples illustrate the use of the probability integral—for which two tables are given in the appendix—but the author is not interested primarily in technique. Nor has he found space for a mathematical treatment of generalized frequency functions, although he mentions the work of Pearson and others, and admits (p. 258) the inadequacy of the Gaussian function for biology. One of his chief purposes is to trace historically the ideas underlying the concept of probability—ideas very hazy at first, clarified to some extent by J. von Kries who insisted upon a "cogent reason" for cases declared to be "equally likely," made more lucid by means of the theory of ensembles used to determine "zones de comportement" (p. 217), and given a finishing touch by R. von Mises* who by the use of an infinite sequence as a "Kollektiv" with its accompanying "Verteilung" eliminates "equally likely cases" as a primary idea.

In Chapter V, six interpretations of probability are unfolded, designated: psychological, practical, logical, empirical, inductive, and interpretation by the zones of comportment. The view is held (pp. 188, 197, Chap. VI) that objective probability or "chance" exists, independent of human knowledge. Furthermore, even complete knowledge does not destroy probability—contrary to the view of Lourié (p. 203) that probability is the science for systematizing ignorance. The examples chosen to support Du Pasquier's contention are taken from the seemingly fortuitous behavior of numbers such as those forming the rth decimal place of the logarithms of consecutive integers. But later (p. 284) the author finds that such examples do not involve the "irregularity" demanded by the Second Postulate of von Mises—so they cannot be admitted to full standing as a "collectif," but must rank as a "syllepte" (p. 286).

The interesting applications in Chapter VII to the kinetic theory of gases, reversible and irreversible phenomena, entropy, etc., have a certain philosophic aroma. We are told (p. 229) that the phenomenon of fluctuation in the density of a gas adds a temperament to the inflexible determinism which rules the material universe.

Chapter VIII is devoted to the exposition of the theory of R. von Mises, setting forth the two postulates which determine a Kollektiv, and explaining the simple operations for deriving cumulative frequency functions from given cumulative frequency functions, "Verteilungen." This is well written, —in the statement of Postulate II, however (p. 266), there appears "ne soient pas nulles" instead of "nicht beide null." The concluding Chapter IX

* *Grundlagen der Wahrscheinlichkeitsrechnung,* Mathematische Zeitschrift, vol. 5 (1919), pp. 52–99.

on mathematical probability and experience discusses further the postulates of von Mises and also logical systems.

The book, throughout, is written in an entertaining style, free from many details that would be uninteresting to the average reader. Although the reviewer was unable to verify the formula in the middle of page 123 and the one at the foot of page 128, the book seemed to be exceptionally free from misprints and infelicities. It will be welcomed by those who are interested in the foundations of probability.

E. L. DODD

Curve Sghembe Speciali Algebriche e Trascendenti. Volume II: *Curve Sferiche, Curve Definite da una Relazione fra Flessione e Torsione, Curve Particolare situate sopra Superficie Assegnate.* By Gino Loria. Bologna, N. Zanichelli, 1925. 255 pp.

The second volume of the treatise on special space curves* treats both algebraic and transcendental curves. Those having tangents belonging to a linear complex base are discussed at length, followed by an outline of those belonging to quadratic and higher complex. Differential properties and methods of proof are particularly featured. Over a fifth of the volume is devoted to spherical curves; it is fairly exhaustive and is well written. Another fifth is given to curves defined by intrinsic equations. The last and longest chapter discusses curves on given surfaces, including helices, lines of curvature, geodesics, and asymptotic lines. The application of the latter to ruled surfaces contained in linear congruences does not take account of a number of important articles.

Extensive references are given, and a list of all the authors quoted in both volumes is given at the end. This feature is a particularly valuable one for bibliographic purposes. The proof reading has been very well done, except that German titles in the footnotes must occasionally suffer.

VIRGIL SNYDER

La Série de Taylor et son Prolongement Analytique. By J. Hadamard and S. Mandelbrojt. Scientia, No. 41. Deuxième édition, revue et mise au courant des progrès récents. Paris, Gauthier-Villars, 1926. 104 pp.

The systematic study of the singularities of analytic functions was begun by Hadamard. In 1901, a very valuable account of his own investigations together with those of other early workers, as Fabry, Leau, LeRoy, Borel and others, was presented by Hadamard in his now classic little book *La Série de Taylor et son Prolongement Analytique* published in the Collection Scientia (No. 12).

This work has now been revised and brought up to date by Hadamard, with the assistance of the brilliant young mathematician Mandelbrojt, who has published in the last few years a number of valuable papers bearing on the subject. In this edition, the authors present in addition to the

* The first volume was reviewed in the Bulletin, vol. 31 (1925), p. 557.