30[01A45].—A. W. F. EDWARDS, *Pascal's Arithmetical Triangle*, Oxford Univ. Press, New York, 1987, xii+174 pp., 24 cm. Price $37.50.

As an impressive culmination of meticulous research into original sources, this definitive study constitutes the first full-length history of the Arithmetical Triangle, reputedly the most celebrated of all number patterns. Its origins are herein traced to Pythagorean arithmetic, Hindu combinatorics, and Arabic algebra.

The elements of this triangle evolved historically in three equivalent forms; namely, figurate numbers, combinatorial numbers, and binomial coefficients. The different aspects of these numbers were first combined by Blaise Pascal in his *Traité du triangle arithmétique*, written in 1654 and printed posthumously in 1665. He was the first to consider the properties of this array as pure mathematics, deduced from the fundamental addition relation independently of any binomial or combinatorial application.

Dr. Edwards discusses in detail this creative treatise and shows, in particular, how it influenced Wallis, Newton, and Leibniz in the early development of analysis. Special attention is given to Wallis's ingenious derivation of his well-known infinite product by means of interpolation in an analogous triangular array of reciprocals of figurate numbers.

The modern theory of probability originated in the extensive correspondence between Pascal and Fermat concerning the previously unsolved problems called, respectively, the Problem of Points and the Gambler's Ruin. The solutions obtained by Pascal and Fermat have been described in detail in two previously published papers by the author, which are herein reprinted as appendices. Dr. Edwards establishes that the basic solution of the first problem is properly attributable to Pascal instead of Fermat, contrary to tradition.

The origins of the binomial and multinomial distributions are also traced to Pascal's treatise, as revealed in the correspondence of Leibniz, John Bernoulli, De Moivre, and Montmort.

A concluding chapter is devoted to a discussion of James Bernoulli's famous work, *Ars conjectandi*, which is chiefly noted for containing the first limit theorem in probability. Apparently, James Bernoulli independently derived the binomial distribution, unaware of Pascal's treatise, to which his attention was first drawn just before his death in 1705 by Leibniz.

Each of the ten chapters of this carefully written book is supplemented by explanatory notes and bibliographic references. In addition, there is a comprehensive list of nearly two hundred sources and an index of the names of more than one hundred persons appearing in this historical account.

This scholarly book should be of special interest to students and teachers of the history of mathematics and statistics.

J. W. W.