Statistical Method. By Truman L. Kelley. New York, The Macmillan Company, 1923. xi + 390 pp.

There is throughout this book such a close coordination between the theoretical developments and the practical applications as to make it fairly obvious that the mathematical problems were suggested largely by the work of the author on practical problems of statistics. The method of the book is inductive, starting with quantitative data to be described, and developing the appropriate mathematical methods for the suitable description and elucidation of various kinds of data. The book seems remarkable with respect to the large number of topics treated in the given space. This seems to have been made possible in part by using in the earlier parts of the text a good many concepts whose meanings are developed later. In general, this plan involves considerable departure from logical sequence, but the method is made practicable by the use of forward references.

The first five chapters of the book together with Chapter VIII on correlation are suitable reading for the beginning student with but little knowledge of mathematics. In these chapters elementary statistical methods are explained for the benefit of biologists, economists, educators, psychologists and others who use statistical data in their work. Moreover the treatment is so well illustrated by concrete examples as to make an appeal to those who have data to analyze, and the book will tend to promote a higher standard of statistical practice in this country. While the beginner will thus find the book of interest, a large part of the book is planned for the advanced student, and he will find here a wealth of material for his purposes, whether his main interest be in the theory of statistics or in applications to fields such as economics, biology, psychology or education.

The book presents a good many new formulas and adaptations of known formulas to particular purposes. In the preface the author expresses the very commendable view that he can see "no value except at times a slightly greater ease of manipulation, in using a measure whose probable error cannot be calculated if one with a known probable error and serving the same purpose exists." In harmony with this view the book gives a large number of determinations of probable errors. The determinations of these probable errors was surely a very difficult undertaking on the part of the author and he should be complimented on his courage. The author requests the critical analysis by fellow statisticians of his determinations of probable errors, and "such charity in reporting shortcomings as may be due one who has acted upon the policy that as shrewd an estimate as possible of the probable error of a statistical constant is better than no estimate at all." While there is much to commend this attitude in discussing applied problems, it would seem very important to indicate the fact when there is any considerable doubt as to the validity of the formulas for the probable error.

On page 91, there is a statement which implies that the arithmetic mean and the median are the two most important averages. It would seem safer to limit such a statement to certain purposes. For example, the geometric mean is surely very important for some purposes. On page 154 there seems to be an oversight in the usage of the word "slope". The slope being the tangent of the angle with the positive direction of the x-axis, we note that the slope of the one line would be r and of the other $1/r$ when standard deviations are equal. At the top of page 159, a conclusion seems to be drawn without a clear statement of the hypotheses. It would seem better to say: "It can be easily shown that the deviations x and $y-r(\sigma_2/\sigma_1)\,x$ are uncorrelated. If we assume that these uncorrelated deviations are independent in the probability sense, then the probability of the joint occurrence of the assigned deviations is $z = z'\,z''$. In the chapter on frequency curves, the book follows the ideas of Pearson on generalized frequency curves rather closely. On pages 146–150 the author gives his views of the relation of moments to certain unstable types of distribution.

Nearly half of the book is very properly given to the subject of correlation. The treatment begins with Galton's original ideas, but is extended in many directions and includes the recent developments of the subject. Dr. Kelley's own contributions to the treatment of correlation have naturally given color to the treatment of certain of the advanced aspects of the subject. Special attention should thus be directed to the methods which facilitate the computation of partial and multiple correlation coefficients, including the method of successive approximation devised by Dr. Kelley for finding the regression coefficients when a large number of variables are involved.

The Kelley-Wood table of the normal probability functions with respect to assigned areas is given at the end of the book and will be found useful. The following typographical errors occur:

p. 31, line 13 from bottom, Table I should read Table VII.
p. 31, line 6 from bottom, 65.5 should read 66.5.
p. 33, lines 5 and 6, the words "ordinates" and "abscissas" should be interchanged.
p. 40, chart 16, block labeled 264 should be labeled 246.
p. 77, line 12, .26215 should read .26315.
p. 79, formula 22. The radical sign should extend over the delta square.
p. 79, formula 23a, 5th line from the bottom $2\,\mu^2$ should read μ_2.
p. 89, line 5, $n(n-1)\,(n-2)$ should read $n(n-1)$.
p. 91, line 26, $78.5° - 80°.5$ should read $78°.5 - 83°.5$.
p. 92, line 21, "o" should read "of".

p. 95, formula 46, the last equality sign and the middle minus sign should be deleted and a minus sign should be placed before the last x.
p. 184, line 10, "by formula [12]" should read "by formula [121]".
p. 207, table 39, "test Y reliability .2" should read "test Y reliability .4".
p. 210, formula 161c. The exponents of the r's under the radicals should be deleted.
p. 215, line 19, 5.0—should read 4.0.
p. 240, formula 198, kappa minus 1 in the denominator should read kappa minus 2.
p. 258, formula 213, .6457 should read .6745.
p. 294, table 61, the constants .2200 and .2399 are incorrect.

The reviewer has received most of these corrections from the author.

H. L. RIETZ

Einführung in die mathematische Behandlung der Naturwissenschaften. Tenth edition. By W. Nernst and A. Schoenflies. Berlin, R. Oldenbourg, 1922. xii + 502 pp.

Physics and astronomy are no longer the only pure sciences which depend largely on mathematics. At least thirty years ago the necessity of a knowledge of mathematics for work in other natural sciences had come to be recognized by investigators. Research in theoretical chemistry can no longer be carried on nor understood by one ignorant of the ideas of the calculus, and in other fields the need of a mathematical formulation of problems is increasing.

The book by Professors Nernst and Schoenflies is a text and reference manual for the use of scientists in general and chemists in particular. It represents the mathematical equipment beyond trigonometry which, in the opinion of the authors, should be the possession of the modern chemist. The first edition, which appeared in 1895, was a text on elementary calculus with as much analytic geometry as was necessary for the purpose. In the sixth edition in 1910 there was added some explanation of analytic geometry of space, vectors, foundations of analytic mechanics, and partial differential equations. The tenth edition, appearing about a year ago, contains further material on the theory of heat, relativity, and crystal structure.

From the point of view of the teacher of mathematics the book is written with much less care than are most American texts. But it is altogether probable that a meticulous mathematician could not write a book which would make the same appeal to a student of the natural sciences. The wealth of illustrative material which is possible when it is assumed that the reader has studied some physics and a considerable amount of chemistry gives to the mathematical ideas a reality and vitality which they cannot possibly have otherwise. The examples in analytic geometry are built around the laws of Boyle, Mariotte,