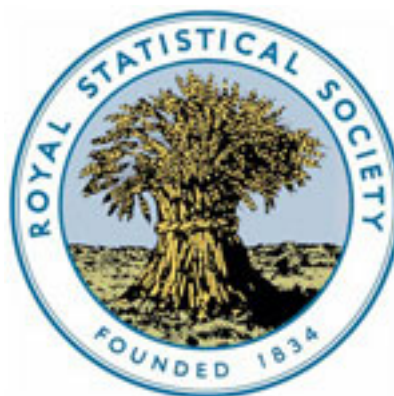Éléments de la Théorie des Probabilités by Emile Borel
Review by: J. M. K.
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illustrations, in making the meaning of these various terms and much of their significance clear to any careful and intelligent reader. It is made perfectly plain that very diverse groups of facts may be statistically described by "curves of error," although the authors leave undiscussed the natural question whether and, if so, why such curves can be expected to arise on *a priori* grounds. Since the book has been written with the purpose, as expressed in the preface by Sir Francis Galton, " of familiarising educated persons with the most recent developments of the new school of statistics," by explaining the technical terms and elementary ideas of that school, it is, perhaps, hardly fair to suggest that the book barely goes far enough in its treatment of the practical side of statistics. For instance, in dealing with correlation, the method " which would be employed in practical work " is not described, but the reader is referred elsewhere for a knowledge of it. The methods actually described in the book, especially the graphic method, while serving the authors' purpose of explaining the idea of correlation, are rather crude, and may yield very inexact results, so that we think reference could have been usefully made to the formula $r = \Sigma xy/\sigma_1\sigma_2 n$ and its use exemplified without entering into the mathematics of the coefficient. We advance this criticism, however, not to disparage what is actually a useful introduction to statistics, but rather to indicate that there still remains room for an elementary book which shall go farther than the present one without engaging in the mathematical complications of the science.

A.D.W.

3.—*Éléments de la théorie des probabilités.* Par Émile Borel. vii + 191 pp., 8vo. Paris: Librairie Scientifique A. Hermann et Fils, 1909. Price 6 fr.

M. Borel's new treatise on the mathematical theory of probability possesses all the elegance and lucidity which one expects from a French mathematician of his eminence. His admirably enlightened account of the accepted analysis of the subject does not, however, pursue any very novel line of thought. It would have been interesting to learn what comments a first-rate mathematician, coming to the subject without prejudice, would find to make on the logical presuppositions of the current theory ; but M. Borel only displays his knowledge of the preliminary difficulties, which lie thinly concealed beneath an indisputable superstructure of mathematics, by his skill in avoiding them. A foreign criticism also of Professor Karl Pearson's mathematical investigations in probability and the theory of error would have been very valuable at the present time, and well within M. Borel's own province ; but he contents himself by mentioning, in passing, their existence. He pursues, in fact, the orthodox French lines, lines which have been worked over and over again, and where one can no longer expect in the latest writer anything beyond a little more elegance and a little more lucidity than in his predecessor. It must be sufficient to say that M. Borel is sounder than M. Poincaré, but not so solid as M. Bertrand.

The most interesting part of the volume is Book II., in which

what is usually known as the theory of geometrical probability is discussed at some length. Here, however, as elsewhere, the author is inclined rather to avoid than to solve the difficulties, and to avail himself with disappointing readiness of the mathematician's right not to discuss the truth of his assumptions. Apart from this, the completeness of the mathematical discussion is somewhat marred by the absence even of an allusion to Czuber's method of *Mittelwerte*, of which the present writer would have been glad to have seen an independent discussion.

M. Borel's treatise can be strongly recommended to readers who wish to obtain an outline account, of a moderately advanced character, dealing with the accepted analysis of mathematical probability. But those who are already well acquainted with the literature of the subject, will not find in it very much that is new to them.   J.M.K.

4.—*The nation's income. An outline of national and local taxation.* By F. W. Raffety and W. H. Cartwright Sharp, M.A., L.L.B., Barristers-at-Law. 123 pp., 8vo. London: Thomas Murby and Co., 1909.

Few people who have not devoted considerable trouble to the subject could give an adequate account of the methods of national and local finance, and of the collection and appropriation of revenue; aud this unpretentious little book will be of considerable use to the non-expert who likes to have complicated matters explained in simple language. An outline statement is given of the method of parliamentary control of taxation, which is followed by a brief but sound discussion of the principles of taxation, and a full detailed account of the taxes in force and the amounts received in 1907-08. The proverbial rashness of prophecy is illustrated by the sentence: "It is therefore unlikely that such a Bill [as the Finance Bill] will ever be rejected [by the Lords]." The history and treatment of the National Debt is clearly expounded; but we could have wished that the section on local taxation had been fuller, especially as to the relation between central and local accounts and to the statistics of the latter. The final chapter on revenue and protective taxes was, we suppose, necessary in the scheme of the book, but it is slight, and therefore inconclusive.

We hope that the book will reach a second edition, and that opportunity will be taken of correcting inaccuracies. The deduction of a life insurance premium before income-tax is paid is not unrestricted (p. 44), nor is the choice of paying tax on the results of the current year instead of on the average of the previous three open except in special circumstances (p. 49); a great part of income-tax under Schedule E is not collected at the source (p. 49). It is quite doubtful whether so much as 8 per cent. of the total income which should be subject to tax evades it ultimately in these days of strict assessment (p. 46). It is strange to include the whole cost of maintenance of the post office in the cost of collecting revenue; it would have been more interesting to show the remarkable cheapness of the collection.   A.L.B.