Relativity, A systematic Treatment of Einstein's Theory. By J. Rice. London, Longmans, Green and Co., 1923. xvi + 397 pp. $6.00.

The Mathematical Theory of Relativity. By A. Kopff. Translated by H. Levy. New York, E. P. Dutton (printed, however, in Aberdeen). viii + 212 pp. $3.20.

These two books illustrate very well indeed the two tendencies of the flood of books on relativity that is now flowing from the presses of British publishers. On the one hand, we have a few books of great value, such as Eddington's *Mathematical Theory of Relativity.* On the other hand, we have innumerable translations of German expositions of "*Einstein*" that pay no attention to current progress in this field.

Mr. Rice's book is of the first type. In spite of a few instances of poor proof-reading, it contains a somewhat novel treatment of the restricted theory, an excellent development of the general theory, and a most valuable comparative study of the work of Einstein, Weyl, and Eddington. In an addendum, it contains a brief but interesting account of Einstein's recent amendment to his general theory, which appeared in the Berlin SITZUNGSBERICHTE of March, 1923. In short, this volume would be a valuable addition to the library of anyone interested in the problems on which Einstein and others have made noteworthy progress.

The volume by Kopff is an English translation of one of a multitude of German works on "*Einstein*" rather than on *relativity.* Kopff has presented the now classical theory in a scholarly manner. The book needed, however, an editor as well as a translator, the English edition being full of footnotes referring exclusively to German sources. For those to whom this work would be of value, the German edition would be a less expensive volume of equal value.

C. N. REYNOLDS, JR.

Die Buntordnung. By Arnold Kowalewski. Heft 1. *Entstehung und mathematischer Ausbau der Buntordnungslehre.* Leipzig, Wilhelm Engelmann, 1922. 53 pp.

The subtitle of this work describes it as "mathematical, philosophical, and technical considerations concerning a new tactical idea". The new idea is as follows: To arrange the $\left|{n \atop p}\right|$ combinations of n things (elements) taken p at a time in a row in such a way that every set of k successive p-ads in the row shall contain no common element. Such an arrangement the author calls a diversified row (Buntreihe) of degree $k-1$. If such a row of degree $k-1$ is possible, while one of degree k is not possible, the row is called the "most diversified" for the given n and p. For given n and p the problem is naturally to find the most diversified rows. The solution of this problem is said to be of importance in experimental psychology (where the problem was indeed suggested) and in many other domains, including analysis situs.

The idea seems to the reviewer not without interest. Unfortunately the present booklet leaves the reader in doubt as to how far a general theory has or can be developed. The author confines himself here to a popular exposition of the more elementary aspects of the problem for small values of n and p and gives numerous special examples of diversified rows, diversified rings, etc. For a more complete account of his investigations he refers to a series of seven articles published in the SITZUNGSBERICHTE DER WIENER AKADEMIE DER WISSENSCHAFTEN beginning in 1915. The author, who is apparently a psychologist, should not be confused with the mathematician Gerhard Kowalewski.

J. W. YOUNG

Lehrbuch der Analytischen Geometrie. Zweiter Band: *Geometrie im Bündel und im Raum.* By Lothar Heffter. Leipzig and Berlin, B. G. Teubner, 1923. xii + 423 pp.

The first volume of this text on analytic geometry appeared in 1905, with L. Heffter and C. Koehler as joint authors. (See this BULLETIN, vol. 13, pp. 247–249.) In the preface to the second volume, the author expresses regret that the original plan of the first volume was modified and suggests that the first twenty articles be supplemented by his pamphlet, *Die Grundlagen der Geometrie als Unterbau für die analytische Geometrie* (1921).* He also states that in the present volume he has been especially concerned in trying to clear up the ambiguity that is often associated with the word "metric".

This volume opens with the geometry of the totality of lines and planes through a point. This completes Part II, *Geometry of two dimensions,* which was begun in volume I. Geometry in space of three dimensions occupies the remaining five-sixths of the book. The first seven chapters (125 pages) deal with projective geometry. Projective point and plane coordinates in space, projective theorems concerning points and planes, and projective coordinates of the straight line in space precede the general and special projective properties of the surfaces of the second order and second class and polarity. "Affine" geometry is disposed of in four chapters (75 pages) before the treatment of "Aquiform" geometry (seven chapters, 144 pages). This includes the principal axes and principal planes of surfaces of the second order, focal properties of central surfaces of the second order and of the paraboloid, systems of these surfaces, and biquadratic space curves.

Groups of exercises are inserted at intervals throughout the book. There are some references and there is a good index. The many figures are well drawn, and the subject matter is clearly presented.

E. B. COWLEY

* See this BULLETIN, vol. 28, p. 224.