

with the concluding sentence of the preface: "The field is indeed a most fascinating one, and I believe a course of this character must be given in all our colleges and universities if we are to be fair to our students." The reviewer believes that departments of mathematics, where they have competent instructors, should take the lead in organizing such courses. This book could well furnish a part of the basis for such a course.

R. D. CARMICHAEL

DICKSON ON MODERN ALGEBRA

Modern Algebraic Theories. By L. E. Dickson. Chicago, New York, Boston, Sanborn, 1926. ix+276 pp.

At last English speaking students have a clear, concise guide to the essentials of each of the great branches of modern algebra, written by an authority who has himself enriched several of them by his own outstanding contributions. This publication of Professor Dickson's matured synopsis of modern algebraic theories is a notable event for American mathematics in at least two respects. First, the book will doubtless be for many years the vade mecum of successive generations of graduate students seeking to penetrate the wide and increasingly significant domain of modern algebra. Second, it may suggest to other publishers that it pays to serve mathematics by the publication of something better than inflated advertising matter and mediocre sophomore texts which live their two or three semesters and become liabilities. As it is but seldom that an American publishing house shows sufficient interest in the advancement of science to bring out a work of the calibre of this book, it is to be hoped and expected that the mathematical public will express its appreciation of the publisher's farsighted enterprise in a tangible manner.

Linear algebras, and certain other advanced parts of modern algebra are not discussed in the present treatise; for these the reader is referred to the author's *Algebras and their Arithmetics* (soon to appear in amplified form in a German translation). Presupposing only a knowledge of the rudiments of the calculus and of the elementary theory of equations, *Modern Algebraic Theories* gives rapid, crystal-clear introductions to algebraic invariants, "higher algebra" as usually understood in America, the Galois theory of algebraic equations, the theory of finite linear groups including Klein's theory of the icosahedron and equations of the fifth degree, and group characters.

In the first chapter of only 23 pages the leading concepts of algebraic invariants in the non-symbolic notation are laid down so swiftly that on pp. 17-20 the author obtains the fundamental systems of covariants for the binary p -ic, $p < 5$, exhibits the syzygies between them, and on page 23 reaches the solution of the quartic equation from the canonical form of the binary quartic, having defined and proved the covariance of Hessians, Jacobians and discriminants on the way, all with a minimum of computation. Only the essentials are treated; the swarms of insignificant minutiae in which less experienced writers revel, are ignored. The second chapter drives