as H. J. S. Smith, and Vandiver's numerous contributions to the same end. Last there is the recent work of Dickson, which bids fair to be epoch making, on *Algebras and their Arithmetics*,* where the classic theory of algebraic numbers finds a simple and profound generalization.

With the books of Landau and Dickson, the report of Hilbert and that of the present authors now available, it is to be hoped that algebraic numbers, one of the major divisions of modern mathematics, will not much longer remain in learned obscurity, but will take its rightful place as one of the chief glories of any liberal mathematical education.

E. T. BELL

VOLUMES II AND III OF DICKSON'S HISTORY

History of the Theory of Numbers. By L. E. Dickson. Vol. II, *Diophantine Analysis,* xxv + 803 pp. Vol. III, *Quadratic and Higher Forms,* (with a chapter on the class number by G. H. Cresse). iv + 313 pp. The Carnegie Institution, Washington, 1923.

Since the time of Gauss, the theory of numbers has developed in a number of different directions. Let us examine this development prior to the year 1890. Dirichlet and Riemann founded the analytic prime number theory; Kummer, Kronecker, and Dedekind created the theory of algebraic numbers; Eisenstein, Hermite, Smith, and Minkowski developed the arithmetic theory of forms; Jacobi, Eisenstein, Kronecker, Smith, and Hermite applied the theory of elliptic functions to various problems. It will be noted that, in the main, this progress centered about a few great names. The discoveries of these men did not excite the attention of other mathematicians in many cases because the contents of the original papers were often complicated and difficult to read, and few suitable texts were provided to meet the needs of the beginner.

In considering the period between 1890 and 1900, however, a decided change is noted. In this interval appeared the *Lehrbuch der Algebra* of Weber and Hilbert's *Bericht über die Theorie der Algebraischen Zahlen.* These works and the original papers of the same authors appear to have exercised a profound influence on a number of able young mathematicians. In another line, Hadamand and de la Vallée Poussin obtained epoch making results in the theory of the Riemann zeta function, with applications to the asymptotic distribution of prime numbers. Minkowski founded a geometry of numbers which has bearing on many parts of the number theory. Dickson initiated his extensive contributions to the subject by developing the theory of finite fields,

* This sentence was written by the reviewer before the award to Professor Dickson of the Cincinnati Prize. See page 90 of this issue. THE EDITORS.