The third part of the work covers 248 pages, and considers the integral calculus and its applications. The integral is defined as the limit of a sum, making the definite integral properly the foundation of the whole subject. The connection with the primitive of the simple differential equation $dy = f(x)dx$ is immediately brought out, and some of the formulas of differentiation, as $d \cdot uv = vdu + udv$, are interpreted in integration, this one leading to integration by parts. The calculation of mean values is given as an example of the use of the definition. A chapter follows on general methods of finding indefinite integrals. Chapter three extends the notion in some directions, as that of improper integrals, line integrals, double and triple integrals, leading up to the formulas of Green and Ostrogradsky, although singularly the complete formula of Stokes is omitted at the point where it would have naturally come in. A chapter is given to elliptic functions, one to Fourier series, one to geometric applications, one to applications to mechanics. In the latter the notions of vector fields, curl, divergence, flux, vector lines and tubes, work, circulation, level surfaces, and potential are brought in. The approximate calculation of integrals has a chapter. The last two chapters consider differential equations, total and partial, and though quite elementary, the author has nevertheless given the student a good working basis. The accompanying problems of the manual of exercises reenforce the text materially.

The author states that he considers the needs of the student who has to study by himself, with little or no assistance. This no doubt accounts for the very plain treatment, and would suggest that in general a text written for students will be clearer than one written for the use of teachers. Of course a certain amount of rigor in books written for teachers is demanded, but rigor does not always lead to usable knowledge. Professor Zoretti is to be congratulated on his success.

JAMES BYRNIE SHAW.

College Algebra with Applications. By E. J. WILCZYNSKI. Edited by H. E. SLAUGHT. Boston, Allyn and Bacon, 1916. xx+507 pp.

THIS algebra, unlike the traditional college algebra, possesses unity, the centralizing theme being the function concept. The book opens with an excellent chapter on the number system of algebra, which is developed by means of the geometry of directed line segments. This chapter is followed by chapters on linear functions and progressions, quadratic functions and equations, integral rational functions of the nth order, fractional rational functions, irrational functions, the exponential function and logarithms, linear functions of more than one variable, permutations and combinations, probability, determinants, quadratic functions of two independent variables and simultaneous quadratic equations, sequences and series with a finite number of terms, limits and infinite series. There is an appendix which contains a short table of logarithms and a mortality table.

Throughout the book much emphasis is laid on the applications of algebra to problems in physics and chemistry. Such topics as the measurement of time, length and mass; the theory of the vernier and slide rule, logarithmic paper and scales; the notions of velocity, acceleration, density, specific gravity, force, uniform motion, etc., are fully discussed in the text, thus making it unnecessary for a student to have had a course in physics and chemistry.

The author's explanations are very lucid, but I wish to call particular attention to his treatment of complex numbers, partial fractions, and the notorious stumbling block "mathematical induction," where by means of some well-chosen examples he drives home the fact that both parts of the proof are equally important.

The author has introduced some analytics and some calculus in order to weave his subject matter about the function concept. He defines the slope of a line, finds the equations of lines, defines and derives the derivative of a rational integral function, applies derivatives to Taylor's expansion, maxima and minima, the finding of approximate irrational roots (Newton's method), etc.

Throughout the book appear many historical references which add greatly to the interest of the subject matter.

The reviewer believes that had the author omitted a few of the interesting but less important topics, and had he inserted more exercises, but preserved the unity which he has so carefully worked out, his book would serve better the needs of the average American college. This is an admirable book of reference and should be owned by every progressive teacher of mathematics.

F. M. Morgan.