tary treatment of pencils and ranges of conics; the different kinds of conics are discriminated for cases of real and imaginary points and the pencil and range are investigated separately, little use being made of the principle of duality.

In the fourth section, of 112 pages, the polar system of the plane and the net of conics are discussed in some detail.

The book, as a text book, has the defect so often found in books compiled from lecture notes—namely, a lack of continuity in notation. This is especially noticeable in the treatment of fundamental points, which are denoted by four or five different sets of letters in as many articles. Professor Sturm has improved the edition greatly in this respect and has modernized the terminology. There are one or two misprints, for instance on page 132, and there is some slight confusion in the proof given on page 60, but the edition seems on the whole remarkably free from errors.

ISABEL MADDISON.

Compositions d'Analyse, Cinématique, Mécanique et Astronomie, données depuis 1889 à la Sorbonne pour la licence ès sciences mathématiques. Par E. VILLIÉ. Paris, Gauthier-Villars, 1898. 8vo, x + 299 pp.

AN American reader will probably peruse this volume more for the insight it gives as to the standard required from French students just finishing their courses in mathematics, than for the matter it contains. The questions are those set in the final examinations for students who have finished the training which corresponds to a college course here, and who expect to go out immediately and teach. The candidate who can successfully grapple with such problems in a limited time must have had a good preparation and be well equipped, as far as knowledge goes, for the profession of teaching mathematics.

M. Villié has previously published two similar volumes of worked-out problems; the present one contains the solution of questions set since 1889. To American and English students, these volumes will be perhaps superfluous, our text books generally doing what is needed in that direction; in France, so far as may be gathered from their mathematical publications, this part is left to the instructor and the volume before us doubtless serves a very useful purpose. In analysis we have chapters containing solved problems in integration, differential equations, orthogonal

trajectories, radii and lines of curvature, asymptotic and geodesic lines, and imaginary variables. The last will be of assistance to any instructor, consisting as it does, of various well chosen examples in integration round a circuit. In the portions containing kinematics and mechanics we find problems similar to those given by, for example, Routh in his various books. The fourth section contains numerical problems in spherical astronomy.

The admirable clearness of explanation and care of details are to be highly commended.

ERNEST W. BROWN.

Keplers Traum vom Mond. Von LUDWIG GÜNTHER. Leipzig, B. G. Teubner, 1898. xxii + 185 pp.

WE should consider Herr Günther's edition of Kepler's "Dream" rather incommensurate with the importance of his text if it had not evidently been a labor of love on his part. The German translation (the Latin of Kepler is not given) occupies 19 pages, that of Kepler's notes perhaps another 50 pages, the editor being responsible for the rest. The work, or rather scientific romance, is little known and it cannot be said to be of importance except in so far as it shows what stage Kepler had reached in astronomical ideas. Its interest is, in fact, less historical than antiquarian. As a romance it would hardly find many readers at the present day, being chiefly details of the appearance of the sky as seen from the moon. The editor is scarcely fair in comparing it with the well-known tale of "Julius" (!) Verne—the first inspiration of many a schoolboy—which he dismisses with a contemptuous remark. The fullness of the notes on astronomical and other matters will satisfy the most exacting of critics.

ERNEST W. BROWN.

A Short Table of Integrals. By B. O. PEIRCE. Boston, Ginn and Co., 1899. 8vo, 134 pp.

THIS is a revised and much enlarged edition of the author's well-known table of integrals, forming a very useful handbook of formulæ which in many cases are too long and complicated to remember. It constitutes a labor saving volume of considerable value. There are 897 formulæ in all. These include the indefinite integrals of many rational and irrational algebraic and transcendental functions, formulæ of reduction, and the more important definite integrals. There are also numerous auxiliary formulæ, for