of the second order admitting of a three-parameter group is effected by possible operations involving no more than quadratures in the most unfavorable cases. In most cases the introduction of the canonical variables can be avoided and the integration performed by operations purely algebraic, if the integration problem be referred to that of the equivalent linear partial differential equation which admits of necessity of the extended group $U_1'f$, $U_2'f$, $U_3'f$; here again the most unfavorable case exacts no more than a quadrature.

The concluding chapter shows how the application of the methods of the book may be made to differential equations of the third order in two variables having known infinitesimal transformations and to partial differential equations of the first order in four variables admitting of three-parameter groups. If the first derived group of the latter has fewer than three parameters the integration is affected by three quadratures, the first two or last two of which are independent; if the first derived group has three parameters the integration of a Riccati equation is demanded.

A paragraph relative to the meaning and importance of the theories in exposition here for the general theory of differential equations, calling attention among other points to analogies with Galois' theory of algebraic equations, concludes this, the introductory volume of Lie's published works.

EDGAR ODELL LOVETT.

PRINCETON, N. J.,
5 *November*, 1897.

SHORTER NOTICE.

Famous Problems of Elementary Geometry. An authorized translation of F. KLEIN'S *Vorträge über ausgewählte Fragen der Elementargeometrie*, by WOOSTER WOODRUFF BEMAN and DAVID EUGENE SMITH. Boston and London, Ginn and Company, 1897. 12mo, pp. ix+80.

Whatever opinion one may hold privately as to the desirability of translations in general, the appearance of a readable English version of Professor Klein's pamphlet* can excite no feeling other than that of satisfaction. This lucid exposition of the historical and actual significance of the three great problems of Greek geometry is addressed to all interested in the teaching of elementary mathematics,

*Leipzig, B. G. Teubner, 1895.

and ought to be in the hands of all; hence we gladly record the fact that Professors Beman and Smith have given us a version that can be read with pleasure. Here and there the translators have perhaps overstepped the legitimate bounds of freedom in the matter of rearrangement; for example, the alteration made in the order of the proof in Part I., Ch. IV., § 6, seems unnecessary. On the other hand, in Part II., Ch. IV., § 1 (p. 68), they might with advantage have availed themselves of the license that they have rightly taken elsewhere, instead of attempting to translate the statement of the nature of the transcendence of e literally; the apparent anacoluthon in the sentence as it stands makes it almost unintelligible without reference to the original. This however seems to be about the only awkward turn in the version, to which as a whole can be given the high praise that no one would suspect it of being a translation from the German. The pages are of a convenient size, and attractive in appearance; the printing is singularly free from errors, and the few obvious ones in the original have been corrected. The little volume in its present dress deserves to be widely circulated among mathematical students at a comparatively early stage of their work.

CHARLOTTE ANGAS SCOTT.

NOTES.

WE have to record the death of ERNST SCHERING, professor of mathematics and director of the magnetic observatory at the University of Göttingen. He died at Göttingen, on November 2, at the age of sixty-four years.

THE mathematical seminar at Göttingen is concerned for this semester with dynamics, much attention being given to the differential equations. The seminar, which is under the guidance of Professors KLEIN and HILBERT, is in connection with Professor KLEIN'S course on mechanics, mention of which was omitted in our list of Göttingen lectures in the BULLETIN for November (see p. 81).

AT the Collège de France, in Paris, two mathematical courses were announced for the term which began December 6th. Professor C. JORDAN offered a course in theory of differential equations; and Professor J. HADAMARD, formerly of the Faculty of Sciences of Bordeaux, but recently appointed deputy professor of mechanics at the Collège de France, offered a course on the curves which satisfy the differential equations of dynamics.