

vol. 25 (1902), pp. 59–84, 85–96, 261–268; vol. 27 (1905), pp. 77–102, 173–188, the present reviewer established the existence and derived the equations of about two hundred sextic ruled surfaces, including all those in the book under review, and about eighty others which under Mr. Edge's basis of classification should be counted as distinct types. No criterion was found, to establish the completeness; thus far, no other forms have been published.

Of the specific omissions, the following have distinct double curves:

two double cubics and two double conics	$p=0$;
four double conics+two double generators	$p=0$;
double cubic and three double conics	$p=1$;
double quartic, two double conics and a double generator	$p=1$;
double quartic, double conic, double directrix and two double generators	$p=1$.

Then there are fourteen other forms without rectilinear directrices, having tacnodal or oscnodal curves. Thus, of the four double conics, two may approach coincidence, forming a tacnodal conic, or three may approach coincidence, forming an oscnodal conic. Of the large number of omissions of those having a directrix line which may or may not be a generator, a frequent sample is that caused by a compound involution.

For ruled surfaces having a directrix line, the reviewer is inclined to feel that the methods of Wiman and of Sisam, *American Journal of Mathematics* (vol. 29 (1907), pp. 48–100), are at least as powerful and as comprehensive as those developed by the author. Since all these papers are featured in the *Encyklopädie* (III C 8; Art. 52), the author should at least have mentioned them. There, if the reviewer has established his reasons for protesting the content of one paragraph, he now wishes to emphasize that Mr. Edge has produced an excellent book that will be of very great value in the study of various branches of algebraic geometry.

VIRGIL SNYDER

HITHERTO UNPUBLISHED TREATISE OF STEINER

Allgemeine Theorie über das Berühren und Schneiden der Kreise und der Kugeln worunter eine grosse Anzahl neuer Untersuchungen und Sätze vorkommen in einem systematischen Entwicklungsgange dargestellt. By Jakob Steiner. Edited by Rud. Fueter and F. Gonseth. Zürich and Leipzig, Orell Füssli, 1931. 8vo, xviii+345 pp. Price in marks: paper, 10.80; cloth 12.80.

This is an original manuscript written by Steiner more than a century ago. It now appears in print for the first time. It is published under the auspices of the Swiss Naturalist Society with the assistance of the Escher-Abegg Foundation for Scientific Research at the University of Zürich. It appears as volume five in a series of publications of the Swiss Mathematical Society.

Jakob Steiner (1796–1863), the great Swiss geometer, wrote this treatise on the circle and the sphere probably during the years 1823–26 while a private teacher in Berlin. The manuscript consists of 360 carefully written pages with title, book and chapter headings, evidently all prepared for immediate publication. For some reason, however, it was never published. The editors suggest