

Jacob Steiner and Julius Plücker

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6 May 2008

Jacob Steiner

Born in small village of Utzensdorf, Switzerland on March 18, 1796.

Jacob had three older brothers and an older sister.

A family of farmers.

Jacob Steiner

Figure: Jacob Steiner



Jacob Steiner

Learned to write at the age of 14.

Attended school at the age of 18.

Studied under Pestalozzi who was a Swiss educational reformer who taught mathematics.

Jacob Steiner

In 1834, Jacob was given chair of geometry at the University of Berlin.

This is where Jacob would meet Julius Plücker.

Jacob would hold the chair of geometry until his death in 1863.
Jacob died in Bern, Switzerland on April 1, 1863.

Julius Plücker

Julius was born June 16, 1801 in Elberfeld, Germany.

Family was merchants with French and German background.

Attended local gymnasium or school in Dusseldorf.

Julius Plücker

Figure: Julius Plücker



Julius Plücker

Julius attended University of Bonn, University of Berlin, geometry coursed at University of Paris, and submitted his doctoral dissertation at the University of Marburg.

Taught at University of Bonn five years as extraordinary professor. In 1833 took a position at University of Berlin.

Julius Plücker meets Jacob Steiner

Julius took the position at University of Berlin where Jacob Steiner was chair of geometry, the two men would contrast because Julius did analytical geometry and Steiner liked synthetic geometry and told Julius no analytical geometry. The next year Julius would leave and later become the chair of mathematics at University of Bonn where he would begin to study Physics along with Geometry.

Synthetic Geometry

Ernest P. Lane said “Synthetic geometry is pure geometry.” A great geometer Poncelet said, “He regretted that the argument used in synthetic geometry lacked generality.” Synthetic geometry is best described as projective geometry which uses points of infinity, lines, parallel lines, and can be constructed geometrically.

Analytical Geometry

Analytical geometry uses analysis to prove geometry. In analytical geometry there is a coordinate system that is used, where in synthetic, coordinates are not used at all.

Steiner's Works

Steiner's Roman surface which is defined as "of fourth degree and third class, and such that every tangent plane to it intersects the surface in two conics." Steiner was looking for a surface whose plane sections all were conics and not of degree 2 or a quadric surface. The surface had to be made up of conics and Steiner looked at surfaces who had degree four. One equation for it is:

$$(x^2 + y^2 + z^2 + w^2 - 2xy - 2xz - 2xw - 2yz - 2yw - 2zw)^2 = 64xyzw$$

Steiner's Works

Steiner produced a paper on the general properties of algebraic curves which related to curves and surfaces, the paper was fascinating but only contained results and no proofs. A geometer named L. Cremona proved them using synthetic geometry but only some of the theorems could be proven with analytical geometry.

Plücker's Works

Julius showed fascinating geometry as well, showing that every curve of degree n in the projective plane has in general

$$3n(n - 2)$$

inflection points. The definition of an inflection point is one where the tangent has at least three-fold contact with the curve. (No multiple points or cusps) Julius also did incredible work with cubic curves, algebraic curves around infinite points, and magnetism in physics.