

Zeuthen, Hieronymus Georg | Encyclopedia.com

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(b. Grimstrup, West Jutland, Denmark, 15 February 1839; d. Copenhagen, Denmark, 6 January 1920)

mathematics, mechanics, history of mathematics.

The son of a minister, Zeuthen received his earliest education in Grimstrup and at the age of ten entered the [secondary school](#) in Sorø, where his father had been transferred. From 1857 to 1862 he studied pure and applied mathematics at the University of Copenhagen. After passing the examination for a master's degree, he received a stipend in 1863 to travel to Paris for further study with Chasles. Having become familiar with his writings, Zeuthen followed Chasles's lead in his own work on enumerative methods in geometry and also in undertaking research on the history of mathematics.

Zeuthen found in enumerative methods in geometry ("number geometry") a fertile area for research. His first work on this subject was his doctoral dissertation at the University of Copenhagen, *Nyt Bidrag til Laeren om Svstemet af' Keglesnit* (1865), which was also published in French in *Nouvelles amuses de mathematiques* (2nd ser., 5 [1866]) as "Nouvelle methode pour determiner les caracteristiques des systemes de coniques." In this work Zeuthen adhered closely to Chasles's theory of the characteristics of conic systems but also presented new points of view: for the elementary systems under consideration, he first ascertained the numbers for point or line conics in order to employ them to determine the characteristics. [Arthur Cayley](#) presented a thorough discussion of the relationships and an exposition of the entire theory in "On the Curves Which Satisfy Given Conditions" (*Philosophical Transactions of the Royal Society*, 158 [1868], 75-143).

The first decade of Zeuthen's scientific activity was devoted entirely to enumerative methods in geometry, and his works were published in *Tidsskrift for Mathematik*, of which he was editor from 1871 to 1889; he was also a contributor to *Mathematische Annalen* and other European scientific journals. A summary of this work was presented in *Lehrbuch der abzählenden Methoden der Geometrie* (1914); and as a leading expert in the field, he was chosen to write "Encyklopädiebericht fiber abzählende Methoden" for the *Encyklopädie der mathematischen Wissenschaften* (11 1, pt. 2 [1905], 257-312).

In 1871 Zeuthen became assistant professor and in 1886 full professor at the University of Copenhagen, where he remained until his death, serving as rector in 1896. While at the university he also taught at the nearby Polytechnic Academy and for many years was secretary of the Royal Danish Academy of Sciences.

After 1875, in addition to teaching, Zeuthen wrote on mechanics, geometry, and the history of mathematics. In his first major work on this subject, "Kegelsnitlaeren in Oltiden" (1885), he presented an exposition of [Apollonius of Perga](#)'s theory of conic sections, in which he showed that Apollonius had employed oblique coordinates in deriving the properties of conics. Zeuthen also found in his work the projective production of the conics from two pencils of lines.

In a second, larger work (1896), Zeuthen traced the development of mathematics to the [Middle Ages](#), presenting the influences of the Greek tradition that were transmitted to medieval mathematics through the Arabs and the rediscovery of the original works. He continued his historical studies in *Geschichte der Mathematik* in 16. und 17. Jahrhundert (1903), a large portion of which is devoted to Descartes and Viète, with regard not only to algebra and [analytic geometry](#) but also to the history of analysis, the development of which Zeuthen traced from its beginnings to Newton and Leibniz. Zeuthen also emphasized the importance of Barrow's works in the emergence of this discipline.

Although in these works Zeuthen naturally drew on the findings and references of other authors, his results were based essentially on careful study of original texts. Moreover, he strove to attune his thinking to the ancient forms of mathematics, in order to appraise the value of the resources and methods available in earlier periods. Although he was criticized for not providing full details concerning his sources, it is widely conceded that Zeuthen was the foremost historian of mathematics of his time, perhaps superior to Moritz Cantor and Siegmund Günther.

Zeuthen saw things intuitively: he constantly strove to attain an overall conception that would embrace the details of the subject under investigation and afford a way of seizing their significance. This approach characterized his historical research equally with his work on enumerative methods in geometry.

A *Festschrift* was dedicated to Zeuthen on his seventieth birthday, and in honor of his eightieth birthday a medal with his likeness was struck.

BIBLIOGRAPHY

I. Original Works. A list of Zeuthen's 161 published writings is in M. Noether, "Hieronymus Georg Zeuthen" (see below), 15-23. Among his most important monographs are *Grundriss einer elementar-gometrischen Kegelschnittslehre* (Leipzig, 1882); "Kegelsnitlaeren in Oltiden," which is *Kongelig Danske videnskaberens Selskabs Skrifter*, 6th ser., 3. no, 1 (1885), 1-319, 2nd ed. by O. Neugbauer (Copenhagen, 1949); German trans. by R. Fischer-Benzon as *Die Lehrevon den Kegelschnitten im Altertum* (Copenhagen, 1886), 2nd ed. by J. Hofmann (Hildesheim, 1966); *Forelaesning over Mathematikens Histoire: Oldtig i Middalder* (Copenhagen, 1893), German trans. as *Geschichte der Mathematik im Altertum und Mittelalter* (Copenhagen, 1896), French trans. by J. Mascart (Paris, 1902); *Geschichte der Mathematik im 16. und 17. Jahr-hundert* (Copenhagen, 1903), also in German (Leipzig, 1903); and *Lehrbuch der abzählenden Methoden der Geometrie* (Leipzig-Berlin, 1914).

II. Secondary Literature. See Johannes Hjelms-lve, "Hieronymus Georg Zeuthen," in *Matematisk Tidsskrift*, ser. A (1939), 1-10; and Max Noether, "Hieronymus Georg Zeuthen," in *Mathematische Annalen*, 83 (1921), 1-23. Luigi Berzolari, "Bericht über die allgemeine Theorie der höheren ebenen algebraischen Kurven," in *Encyklopädie der mathematischen Wissenschaften*, III, pt. 2 (Leipzig, 1906), 313-455, contains many references to Zeuthen's work and results.

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