Joachimsthal, Ferdinand | Encyclopedia.com

Complete Dictionary of Scientific Biography COPYRIGHT 2008 Charles Scribner's Sons
9-11 minutes

(*b*, Goldberg, Germany [now Zlotoryja, Poland], 9 March 1818; *d*. Breslau, Germany [now Wroclaw, Poland], 5 April 1861)

mathematics.

Son of the Jewish merchant David Joachimsthal and Friederlike Zaller, Joachimsthal attended school in Liegnitz (now Legnica, Poland), where he had the good fortune to have Kummer as his teacher. In 1836 after completing his studies there, he went to Berlin for three semesters, where his mathematics teachers were Dirichlet and Jacob Steiner.

Starting with the summer semester of 1838, he spent another four semester as a student at the University of Königsberg (now Kaliningrad, U. S. S. R.). Most notable among his teachers there were Jacobi, Germany's leading mathematician after Gauss, and Bessel, foremost German astronomer of his day. Joachimsthal thus received the best available mathematical training.

After completion of these studies, he went to Halle to work for his doctorate under Otto Rosenberger, obtaining his Ph. D. on 21 July 1840. His dissertation, "De lineis brevissimis in superficiebus rotatione ortis," was graded *docta*, and he passed his oral examinations *cum laude*.

As was then still generally customary, Joachimsthal took the *Examen pro facultate docendi* and in 1844 joined the teaching staff of the Königliche Realschule in Berlin. Starting in 1847, he taught in Berlin at the Collège Royal Français, after 1852 with the rank of full professor. In 1845 he applied to the school of philosophy at the University of Berlin for accreditation to teach there. prior to this time, after taking his doctor's degree, Joachimsthal had become a covert from Judaism to the Protestant faith.

After being accepted as an applicant for university teaching credentials, on 7 August 1845 he delivered before the assembled department a trail lecture entitled *über die Untersuchungen der neueren Geometrie, welche sich der lehre von den Brennpunkten anschliessen* and on 13 August a public trail lecture entitled "De curvis algebraicis." *The Venia legendi* was conferred upon him that day.

From the winter semester of 1845-1846 to that of 1852-1853, in addition to his teaching, Joachimsthal lectured as *Privatdozent* at the University of Berlin to beginners in analytic geometry and differential and integral calculus; to advanced students of the theory of surfaces and calculus of variations; and to special students on statics, analytic mechanics, and the theory of the most important curves encountered in architecture. Profiting from his experience in Jocobi's seminar, he also held mathematical drill sessions, a relative novelty at Berlin. His effective teaching won the unanimous approval of the department. His lectures attracted more students than did those of Eisenstein, his brilliant colleague in the same field.

Meanwhile, Joachimsthal's prospects in Berlin were not at all promising. On 7 May 1853 he was finally promoted to full professor by the Prussian Ministry of Culture, after repeated urgings and commendations from his department at the university, and received an appointment in Halle as successor to Sohnke. By 1855 he had received a new offer and went as Kummer's successor to Bresalu, where his lectures were very popular. He taught, among other things, analytic geometry, differential geometry, and the theory of surfaces, in which—exceptional for the time—he operated with determinants and parameters. He gave special lectures on geometry and mechanics for students of mining engineering and metallurgy.

The average number of his listeners exceeded that of Kummer, who with Weierstrass was later to become one of the most sought-after teachers of mathematics. In 1860, for example, Joachimsthal had an audience of sixty-six attending his machanics lectures. By the time of his death, at the age forty-three, he had acquired a wide reputation as an excellent teacher and kind person.

His *Cours de géométrie élémentaire à l'usage des élèves du Collège Royal Francais* (1852) had demonstrated his talent as a textbook writer through its clear logical structure and insight (rarely found in accomplished mathematicians) into the difficulties facing beginners, and he was naturally expected to turn out equally valuable university texts.

Jacobi persuaded him to write an *Analytische Geometrie der Ebene* as a supplement to the *Geometrie des Raumes* that he himself was planning. Its was published posthumously in 1863. A printed version of his lecture during the winter semester of 1856-1857 on the application of infinitesimal calculus to surfaces and lines of double curvature was also published

posthumously in 1872. Reprinted several times, both books were in use for some thirty years, due largely to their clear, simple exposition and to the general applicability of their conclusions.

But the reputation of a teacher tends to be transitory, and Joachimsthal's contributions would have receded into oblivion had it not been for his outstanding original research. Those qualities of clarity, rigor, and elegance that made him one of the most eminent teachers of his day were also characteristic of his own work. One of his favorite fields of study was the theory of surfaces. He dealt repeatedly with the problem of normals to conic sections and second-degree surfaces.

His published writings (the first of which appeared in 1843) show him to have been influenced primarily by Jacobi, Dirichlet, and Steiner. Although never prolific, he always went deeply into a subject, seeking to discover connections between isolated, ostensibly unrelated phenomena. In treating a problem of attraction, for example, he gave a solution constituting an application of the Abel method for defining a tautochrone.

His striving for general validity and his critical acumen emerged also in treatises in which he took up problems dealt with by other mathematicians, such as Bonnet, La Hire, Carl Johann Malmsten, Heinrich schröter, Steiner, Jacques Charles Sturm, whose solutions he strengthened. As in his lectures, he was primarily concerned in his writings with analytic applications in geometry. Not only did he use determinants himself but explicitly indicated their possible applications in geometry. His use of oblique coordinates also deserves special mention.

Today his name is associated with joachimsthal surfaces, which possess a family of plane lines of curvature within the planes of a pencil; the Joachimsthal theorem concerning the intersection of two surfaces in three-dimensional real Euclidean space along a common line of curvature; and a theorem on the four normals to an ellipse from a point inside it.

Joachimsthal's contributions were substantial and lucid. His marked predilection for mature, polished exposition was expressed in consant recasting, revising, and rewriting; so that many planned works never reached completion. In addition, during the few years of his greatest potential, when he was teaching in Berlin as *Privatdozent*, he lived surrounded by an unprecedented galaxy of luminaries within his field (Dirichlet, Jocobi, Steiner, Eisenstein, and Borchardt).

BIBLIOGRAPHY

I. Original Works.Most of Joachimsthal's writings not published independently appeared in the *Journal für die reine and angewandte Mathematik* between 1843 and 1871. A bibliography of most of his published works is given in Poggendorff, I, 1196, and III, 692. Works not mentioned there are found in *Nouvelles annales de mathématiques*,**6** (1847); **9** (1850); and 12 (1853); and in *Abhandlungen zur Geschichte der Mathematik*,**20** (1905), 76-79. See also Royal Society, *Catalogue of Scientific Papers*, III. 548-549, and VIII, 27. Also worthy of mention is his "Mémoire sur les surfaces courbes," in *Collège Royal Français, Programme* (Berlin, 1848), pp. 3-20; and his foreword in Friedrich Engel, *Axonometrische Projectionen der wichtigsten geometrischen Flächen* (Berlin, 1854).

Some of the works listed in Poggendorff appeared as preprints in school and university publications before reaching a wider public in the *Journal für die reine and angewandte Mathematik*.

A collection of Joachimsthal's papers is to be found partly in the archives of Humboldt university, Berlin, German Democratic Republic, and in those of the Martin Luther University of Halle-wittenberg in halle, German Democratic Republic.

II. Secondary Literature.Borchardt published a brief obituary in the *Journal für die reine and angewandte Mathematik*, **59** (1861), 124. The only detailed biography, by Moritz Cantor, in *Allgemeine deutsche biographie*, XIV Leipzig, 1881), 96-97, is the source of most biographic references to Joachimsthal, such as those in Karl Gustav Heinrich Berner, *Schlesische Landsleute* (Leipzig, 1901), p.221; and S. Wiininger, *Grosse Jüdische National-Biographie*, III (Chernovtsy, 1928), 317.

Additional information is given in Rudolf Sturm, "Geschichte der mathematischen Professuren im ersten Jahrhundert der UniversitäBreslau 1811-1911," in *Jahresbericht der Deutschen Matematikervereinigung*, **20** (1911), 314-321; this appeared in virtually the same from in *Festschrift zur Feier des hundertjährigen Bestehens der Universität Breslau*, II, *Geschichte der Fächer* (Breslau, 1911), 434-440.

Joachimsthal is mentioned also in Wilhelm Lorey, *Das Studium der Mathematik an den deutschen Universitüten seit Anfang des 19. Jahrhunderts* (Leipzig-Berlin, 1916), pp. 87, 88, 120; max Lenz, *Geschichte der Königlichen Friedrich-Wilhems-universitäl zu Berlin*, II, pt. 2 (Halle, 1918), pp.155 and 156: Heinrich Brandt, "Mathematiker in Wittenberg und Halle," in *450 Jahre Martin-Luther-Universität Halle-Wittenberg*, II (Halle, 1952), 449-455.

Kurt-R. Biermann