

Toeplitz, Otto | Encyclopedia.com

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(*b.* Breslau, Germany [now Wrocław, Poland], 1 August 1881; *d.* Jerusalem, 19 February 1940)

mathematics.

Toeplitz' father, Emil Toeplitz, and his grandfather, Julius Toeplitz, were both Gymnasium teachers of mathematics; and they themselves published several mathematical papers. In Breslau, Toeplitz completed the classical Gymnasium and then studied at the university, where he specialized in [algebraic geometry](#) and received his Ph.D. in 1905.

The following year Toeplitz moved to Göttingen, where he stayed until he obtained an appointment at the University of Kiel in 1913; he became professor ordinarius in 1920. In 1928 he accepted a chair at the University of Bonn, but soon after Hitler's rise to power in 1933, he was dismissed from the office by the National Socialist regime. For the next few years he was involved in organizational work for the declining Jewish community in Germany. In 1938 he moved to Jerusalem, where he was administrative adviser to the Hebrew University; he also continued to teach in a private seminar, in which he reported the results of his work with G. Köthe.

Toeplitz' chief interest was the theory of infinite linear, bilinear, and quadratic forms, and of the associated infinite matrices, as a framework for concrete problems of analysis. It appears that this interest was sparked by the influence of Hilbert's work on integral equations, which was in the process of publication when Toeplitz arrived in Göttingen; but it was also not unrelated to Toeplitz' earlier work. Thus, following Hilbert, Toeplitz transferred the classical theories on linear, bilinear, and quadratic forms in n -dimensional space as far as possible to the infinite-dimensional cases; and he applied the results to the theory of integral equations and to other areas of analysis, such as Fourier series and complex variable theory.

In 1927 Toeplitz published "Integralgleichungen und Gleichungen mit unendlich vielen Unbekannten," written with E. Hellinger, with whom Toeplitz had closely collaborated. Among the important notions and methods that are given in the article, one of the major concepts was that of a normal bilinear form, which is basic in operator theory.

In the 1930's Toeplitz' mathematical research was based on a more general point of view. With G. Köthe, Toeplitz aimed at the development of a general theory of infinite-dimensional coordinate spaces. By this time S. Banach had published his "Théorie des opérations linéaires," but Toeplitz, having himself contributed much to the emergence of a general theory of linear operators, was critical of the work of Banach and his associates, which he considered too abstract. On the other hand, by deemphasizing the importance of the norm in their theory of coordinate spaces, Toeplitz and Köthe helped to develop the even more general theory of locally convex spaces. As an offshoot of his general interest, Toeplitz established, quite early in his career, the "Toeplitz conditions," which are fundamental in the theory of divergent sequences.

Toeplitz was deeply interested in the history of mathematics and held that only a mathematician of stature is qualified to be a historian of mathematics. In particular, he investigated the relation between Greek mathematics and Greek philosophy. He also wrote "Die Entwicklung der Infinitesimalrechnung" (1949), which was intended as an introduction to the calculus on a historical basis: the work is an example of Toeplitz' concern for the teaching of mathematics at the high school and college level. With H. Rademacher, Toeplitz also wrote *Von Zahlen und Figuren* (1930), one of the most successful attempts to bring higher mathematics before the educated public.

Toeplitz was a typical German-Jewish intellectual, who, while retaining an interest in Jewish matters, felt himself to be a part of his country of birth.

BIBLIOGRAPHY

Toeplitz' major works are *Über Systeme von Formen, deren Funktionaldeterminante identisch verschwindet* (Breslau, 1905); "Über allgemeine lineare Mittelbildungen," in *Prace Matematyczno-fizyczne*, **22** (1911), 113–119; "Integralgleichungen und Gleichungen mit unendlich vielen Unbekannten," in *Encyklopädie der mathematischen Wissenschaften*, **2**, pt. 3 (1927), 1395–1597, written with E. Hellinger; *Von Zahlen und Figuren* (1930), written with H. Rademacher; and "Die Entwicklung der Infinitesimalrechnung," in G. Köthe, ed., *Grundlehren*, LXI (1949). See also Poggendorff, V, 1261–1262; VI, 2672; VIIA, 695.

On Toeplitz and his work, see H. Behnke and G. Köthe, “Otto Teoplitz zum Gedächtnis,” in *Jahresbericht der Deutschen Mathematikervereinigung*, **66** (1963), 1–16.

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