Schröder, Friedrich Wilhelm Karl Ernst | Encyclopedia.com

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(*b*. Mannheim, Germany, 25 November 1841; *d*. Karlsruhe, Germany, 16 June 1902)

mathematics.

Schröder was the son of Heinrich Schröder, who did much to foster the teaching of science in secondary and college-level schools and also strongly influenced his son to choose a scientific career. Schröder's mother, the former Karoline Walter, was the daughter of a minister. Her father tutored Ernst until he was fifteen, providing him with an excellent basic education, especially in Latin. In 1856 Schröder enrolled at the lyceum in mannheim, from which he graduated in 1860.

Schröder then attended the University of Heidelberg, where he studied under Hesse, Kirchhoff, and Bunsen. He passed his doctoral examination in 1862 and spent the next two years studying mathematics and physics at the University of Königsberg under Franz Neumann and F. J. Richolot. Soon afterward, at Karlsruher, he took the examination to qualify for teaching in secondary kschools. He then went to the Eidgenössische Polytechnikum in Zurich, where he qualified as a lecturer in mathematics in 1865 and taught for a time. In 1874, after teaching at Karlsruhe, Pforzheim, and Baden-Ba-den, Schröder was offered, on the basis of his mathematical publications, a full professorship at the Teachnische Hochschule in Darmstadt. In 1876 he accepted a post at the Technische Hochschule in Karlsruhe, of which he became director in 1890. He most often lectured on arithmetic, trigonometry, and advanced analysis.

Schröder was described as kind and modest. A lifelong bachelor, he was an ardent mountain climber and cyclist, and learned to ski when he was sixty years old.

Schröder published more than forty mathematical works, including seven separately printed essays and books. They deal almost exclusively with the foundations of mathematics, notably with combinatorial analysis; the theory of functions of a real variable; and mathematical logic. Particularly noteworthy was his early support of Cantor's ideas on set theory, which he was one of the first to accept.

Through his writings on theoretical algebra and symbolic logic, especially *Algebra der Logik*, Schröder participated in the development of mathematical logic as an independent discipline in the second half of the nineteenth century. This is his real achievement, although his contribution was not recognized until the beginning of the twentieth century. Three factors accounted for the delay; the immature state of the field during his lifetime; a certain prolixity in his style; and, above all, the isolation imposed by his teaching in technical colleges. As a result he was an outsider, at a disadvantage in choosing terminology, outlining his argumentation, and in judging what mathematical logic could accomplish.

Despite Schöder's relative isolation, his work was in the mainstream of the conceptual development of mathematical logic, the chief figures in which were Boole, de Morgan, and C. S. Pierce. Other new ideas that Schröder adopted and elaborated were Peano's formulation of the postulates of arithmetic (1889) and the abstract conception of mathematical operations vigorously set fourth by Grassmann and Hankel. With respect to the philosophical problems raised in the formation of mathematical logic, Schröder was guided primarily by Lotze and Wundt, who closely followed Aristotle in questions of logic.

The terminology and contents of Schröder's "logical calculus" are now primarily of historical interest. His ideas, however, furnished the fundamental notion of mathematical logic: the partition of objects into classes. His work constituted a transitional stage that helped to prepare the way for the development of mathematical logic in the twentieth century.

BIBLIOGRAPHY

I. Original Works. Schröder's writings are listed in poggendorff, III, 1212–1213; IV, 1353–1354; V, 1131–1132. They include *Lehrbuch der Arithmetik und Algebra* (Leipzig, 1872); *Formale Elemente der absolute Algebra* (Baden-Baden—Stuttgart, 1874); *Operationskreis des Logikkalküls* (Stuttgart, 1877): *Vorlesungen über die Algebra der Logik*. 3 vols. in 4 pts. (Leipzig, 1890–1905; 2nd ed., New York, 1966), II, pt. 2, edited by E. Müller: *Uber das Zeichen. Festrede bed dem Direktoratswechsel an der Technischen Hochschule zu Karlsruhe am 22. November 1890* (Karlsruhe, 1890); and *Abriss der Algebra der Logik*: pt. 1, *Elementarlehre* (Leipzig, 1909), and pt. 2, *Aussagentheorie, Funktionen, Gleichungen und Ungleichungen* (Leipzig, 1910), both parts edited by E. Müller.

II. Secondary Literature. See J. Lüroth, "Nekrolog auf Ernst Schrôder," in *Jahresbericht der Deutschen Mathematiker-Vereinigung*, **12** (1903), 249–265, with portrait and bibliography:and Lüroth's obiturary and bibliography in Schröder's *Vorlesungen* über die Algebra der Logik, II, pt. 2 (1905), iii-xix.

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