

# Molin, Fedor Eduardovich I

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(*b.* Riga, Russia, 10 September 1861; *d.* Tomsk, U.S.S.R., 25 December 1941)

*mathematics.*

Molin graduated from the same Gymnasium in Riga at which his father was a teacher. He then entered the Faculty of Physics and Mathematics at Dorpat University (now Tartu University), from which he graduated in 1883 with the rank of candidate and remained in the department of astronomy to prepare for a teaching career. In the same year he was sent to Leipzig University, where he attended the lectures of [Felix Klein](#) and Carl Neumann. Under the guidance of Klein he wrote his master's thesis ("Über die lineare Transformation der elliptischen Functionen"), which he defended in 1885 at Dorpat, where he then became *Dozent*.

During this period Molin became acquainted with the works of Sophus Lie and began to study hyper complex systems. His most profound results in this field were presented in his doctoral dissertation, which he defended in 1892. Despite his outstanding work, Molin was unable to obtain a professorship at Dorpat and in 1900 moved to Tomsk, in west-central Siberia, where he found himself cut off from centers of scientific activity. He occupied the chair of mathematics at Tomsk Technological Institute and from 1918 was professor at Tomsk University. In 1934 he received the title Honored Worker of Science.

Molin obtained fundamental results in the theory of algebras and the theory of representation of groups. In his doctoral dissertation, which concerned the structure of an arbitrary algebra of finite rank over a field of complex numbers  $C$ , he showed that a simple algebra over  $C$  is isomorphic to a complete ring of matrices. He also introduced the concept of a radical (the term was introduced by Frobenius) and showed that the structure of an arbitrary algebra is reduced essentially into the case where factor algebra by a radical decomposes into a direct sum of simple algebras. Cartan later obtained the same results, which he introduced into the case of an algebra over a field of real numbers. In 1907 Wedderburn extended Molin's and Cartan's results into the case of an algebra over an arbitrary field.

Studying the theory of representation of groups, Molin explicitly introduced a group ring and showed that it is a semisimple algebra broken into the direct sum of  $S$  simple algebras, where  $S$  is the order of the center. This proved the decomposability of the regular representation into irreducible parts. Molin showed that every irreducible representation of the group is contained in the regular representation. He also demonstrated that representations of groups up to equivalence are determined by their traces. At the same time analogous results were obtained in a different way by Frobenius, who later became acquainted with Molin's research and valued it highly.

## BIBLIOGRAPHY

I. Original Works. Molin's writings include "Über die lineare Transformation der elliptischen Functionen" (Dorpat, 1885), his master's thesis; "Über Systeme höherer complexer Zahlen," in *Mathematische Annalen*, **41** (1893), 83–156, his doctoral dissertation; "Eine Bemerkung über endlichen linearen Substitutionsgruppen," in *Sitzungsberichte der Naturforscher-Gesellschaft bei der Universität Jurjew*, no. 11 (1896–1898), 259–276; "Über die Anzahl der Variabelen einer irreductibelen Substitutionsgruppen," *ibid.*, 277–288; and "Über die Invarianten der linearen Substitutionsgruppen," in *Sitzungsberichte der Preussischen Akademie der Wissenschaften zu Berlin*, **52** (1897), 1152–1156.

II. Secondary Literature. See N. Bourbaki, *Éléments d'histoire des mathématiques* (Paris, 1969), 152, 154; and N. F. Kanunov, *O rabotakh F. E. Molina po teorii predstavlenia grupp* ("On the Works of F. E. Molin on the Theory of the Representation of Groups"), no. 17 in the series *Istoriko-Matematicheskije Issledovania* ("Historical-Mathematical Research"), G. F. Rybkin and A. P. Youshkevitch, eds. (Moscow, 1966), 57–88.

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