# Bortkiewicz (or Bortkewitsch), Ladislaus (or Vladislav) Josephowitsch | Encyclopedia.com



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(*b*. St. Petersburg, Russia, 7 August 1868; *d*. Berlin, Germany, 15 July 1931)

*mathematics*.

Bortkiewicz's mother was Helene von Rokicka; his father was joseph lvanowitsch Bortkewitsch, a member of the gentry from the Kovno [now Kaunas] province of Russia who was a colonel, an instructor in artillery and mathematics, a notary, and an author of several textbooks on elementary mathematics and works in economics and finance.

Bortkiewicz graduated from the Faculty of Law of the University of St. Petersburg in 1890 and took a postgraduate course in Political economy and statistics. He also studied at Strasbourg (1891–1892) under G. F. Knapp, at Göttingen (1892) under W. Lexis, and at Vienna and Leipzig. In 1893 he defended his doctoral dissertation in philosophy at Göttingen. Bortkiewicz was a *Privatdozent* in Strasbourg and lectured in actuarial science and theoretical statistics in 1895–1897; in 1897–1907 he was a clerk in the general office of the Railway Pension Committee in St. Petersburg. Simultaneously, from 1899 to December 1900, he taught statistics at the prestigious Alexandrowsky Lyceum. In 1901 he became extraordinary professor of statistics at the University of Berlin, where he spent the rest of his life, becoming ordinary professor of statistics and political economy in 1920. He was a member of the Swedish Academy of Sciences, the Royal Statistical Society, the American Statistical Association, and the International Statistical Institute.

Bortkiewicz's publications concern population and statistical theory; mathematical statistics; and application of the latter and of probabilities to statistics, to actuarial science, and to political economy. Following Lexis' reasoning, Bortkiewicz was a proponent (almost the only one) of connecting statistics with the theory of probabilities and mathematical statistics. This idea was featured in an empirical "law of small numbers" (law of rare events, which formerly, beginning with Jakob I Bernoulli, were considered "morally" impossible and were discarded as such): The small numbers of events in large series of trials are stable in time; oscillations of the numbers of such events are accounted for by the Lexis criterion ($Q$ quotient). The most important feature of this law, contrary to Bortkiewicz's opinion, appeared to be its connection with the Poisson law of large numbers and the popularization of the Poisson distribution. The $Q$ quotient was regularly used by Bortkiewicz (who, moreover, deduced its expectation and standard deviation) in the same way that the $x^2$ criterion is used now. His other works in the theory of probabilities and mathematical statistics pertain to radioactivity, the theory of runs, and order statistics (he was a pioneer in the latter).

Noting the concrete and social nature of statistical deductions, Bortkiewicz recommended that legislation be based on them. His works are distinguished by independent opinions (dissenting with V.J. Buniakowsky, G.F. Knapp, M.E.L. Walras, and others), rigorous deductions, and voluminous references of international scope. At the same time, being comprehensive and not accompanied by a summary, they make hard reading.

Bortkiewicz was one of the main representatives of the "Continental direction" in mathematical statistics and its application to statistics, but he left no monographs, and the German scientists were only marginally interested in his works. He did not create a school but was closely associated with A.A. Tschuprow.

His last days were marred by a heated argument with Gini, an Italian statistician, who accused Bortkiewicz of plagiarism. Original correspondence on this alleged plagiarism is appended to Andersson's obituary (see bibliography).

# BIBLIOGRAPHY

I. Original Works. The only more or less comprehensive enumeration of approximately 100 of Bortkiewicz's works is in the obituary by T. Andersson (see below). These works include a few books, papers (including rather lengthy ones in various journals), and reviews. Seven of his papers (1889–1910) are in Russian; the other works are almost exclusively in German. Among his writings are *Das Gesetz der kleinen Zahlen* (Leipzig, 1898); *Die radioaktive Strahlung als Gegenstand wahrscheinlichkeitstheoretischer Untersuchungen* (Berlin, 1913); *Die Iterationen* (Berlin, 1917); "Variabilitatsbreite beim Gauschen Fehlergesetz," in *Nordisk statistisk tidskrift*, **1** (1922), 11–38, 193–220; and "Varistionsbreite und mittlerer Fehler," in *Sitzungsberichte der Berliner mathematischen Gesellschaft*, **21** (1922), 3–11.

Three of his papers are available in English trans. by the W.P.A., published in the early 1940's together with trans. of related works, notably those of W. Lexis: "Kritische Betrachtungen zur theoretischen Statistik" (1894–1896), trans. as "Critical Comments on the Theory of Statistics"; "Homogeneitat und Stabilitat in der Statistik" (1918), trans. as "Helmertsche Verteilungsgesetz für die Quadratsumme zufälliger Beobachtungsfehler" (1918), trans. as "Helmert's Law of Distribution for the Sum of Squares of Random Errors of Observation." The W.P.A. trans. are accompanied by a short bibliography of Bortkiewicz's works. At least two of his works in economics are also available in English.

Information about the St. Petersburg period of Bortkiewicz's life and about his father is in the U.S.S.R. State Historical Archives, Leningrad. Information about his life in Berlin is in the archives of the Humboldt University, Berlin.

II. Secondary Literature. Information on the life and works of Bortkiewicz (with reference to his obituaries) is in *Kürschners deutscher Gelehrten-Kalender* (Berlin-Leip-zig, 1931), 274; *Reichshandbuch der deutschen Gesellschaft***I** , *Handbuch der Persönlichkeitten in Wort und Bild* (Berlin, 1930), 188, with portrait; *Neue deutsche Biographie*, II (Berlin, 1955), 478; and Poggendorff, VI, pt. 1. The most comprehensive obituary is T. Andersson, in *Nordisk statistik tidskrift*, **10** (1931), 1–16, published simultaneously in English in *Nordic Statistical Journal*, **3** (1931), 9–26. The latest published biography is E.J. Gumbel, in *International Encyclopedia of the social Sciences* (New York, 1968).

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