Kagan, Benjamin Fedorovich | Encyclopedia.com

Complete Dictionary of Scientific Biography COPYRIGHT 2008 Charles Scribner's Sons
5-6 minutes

(*b*. Shavli, Kovno [Kaunas] distrist [now Siauliai, Lithuaninan S.S.R.], 10 March 1869; *d*. Moscow, U.S.S.R., 8 May 1953)

mathematics.

The son of a clerk, Kagan entered Novorossysky University, Odessa, in 1887, but was expelled in 1889 for participating in the democratic students' movement and was sent to Ekaterinoslav (now Dnepropetrovsk). In 1892 he passed the examiniations in the department of physics and mathematics of Kiev University. He passed the examinations for the master's degree at St. Petersburg (1895), becoming lecturer at Novorossysky in 1897 and professer in 1917. Besides teaching at Novorossysky, Kagan gave higher education classes for women and presented coures at a Jewish high school. HJe edited *Vestnik opytnoi fiziki i elementarnoi matematiki* ("Journal of Experimental Physics and Elementary Mathematics") in 1902–1917 and was a director of a large scientific publishing house, Mathesis.

Kagan's first important work was devoted to a very original and ingenious exposition of Lobachevsky's geometry. Next he considered problems of the foundations of geometry, proposing in 1902 a system of axioms and definitions considerably different from all previously suggested, and particularly different from that of Hilbert. This system was based on the notion of space as a set of points in which to every two points there corresponds a nonnegative number— distance—invariant in respect to a system of point transformations (movements) in this space; the point, the principal element from which other figures are generated, is not defined. A very complete construction of Euclid's geometry on such a basis is in the first volume of Kagan's master's thesis, defended in 1907; the second volume contains a detailed history of the doctrines of the foundations of geometry. In 1903 Kagan presented a new demonstration, remarkable in its simplicity, of Dehn's well-known theorem on equal polyhedrons (1900). Since he was interested in Einstein's theory of relativity, Kagan also began studies in tensor differential geometry which he pursued intensively in Moscow, to which he moved in 1922

For almost ten years Kagan was in charge of the science department of the state publishing house, and for many years he supervised the department of mathematical and natural sciences of the *Great Soviet Encyclopedia*. But his principal efforts were directed to Moscow University, where he was elected professor in 1922; in 1927 he organized a seminar on vector and tensor analysis, and from 1934 he held the chair of differential geometry. At Moscow, Kagan created a large scientific school with considerable influence on the development of contemporary geometrical thought; his disciples include Y. S. Dubnov, P. K. Rashevsky, A. P. Norden, and V. V. Wagner. Kagan himself was concerned mainly with the theory of subprojective spaces, a generalization of Riemamnnian space of constant curvature.

Kagan also wrote studies on the history of nonEuclidean geometry and published a detailed biography of Lobachevsky. He was the general editor of the five-volume edition of Lobachevky's complete works (1946–1951).

In 1926 Kagan was raised to the rank of honored scientist of th eRussian Federation; in 1943 he was awarded the U.S.S.R. State Prize.

BIBLIOGRAPHY

I. Original Works. A bibliography of Kagan's writings is in Lopshitz and Rashevsky (see below). They include "Ocherk geometrichesckoy systemy Lobachevskogo" ("Outline of Lobachevsky's Geometrical System"), in *Vestnik opytnoi fizik i elementarnoi matematiki* (1893– 1898), also published separately (Odessa, 1990); "Ein System von Postulaten, welche die euklidische Geometrie definieren," in *Jahresbericht der Deutschen Mathematikervereinigung*, **11** (1902), 403–424; "Über die Transformation der Polyeder," in *Mathematische Annalen*, **57** (1903, 421– 424; *Osnovania geometrii* ("Foundations of Geometry"), 2 vols. (Odessa, 1905–1907); Über eine Erweiterung des Begrigies vom projectiven Raume und dem zugehörigen Absolut," in *Trudy seminara po vektormomu i tensornomu analysu* ("Transactions of the Seminar on Vector and Tensor Analysis"), I (Moscow-Leningrad, 1933), 12–101, reper. in Kagan's *Subproektivnye prostranstva* ("Subprojective Space"; Mascow, 1960); *Lobachevsky* (Moscow Leningrad, 1944; 2nd ed., 1948); *Osnovy teoril poverkhnostey u tensonrnom izlozhenii* ("Foundations of the Thory of Surfaces Exposed by Means of Tensor Calculus"), 2 vols. (Moscow-Leningrad, 1947–1948); *Osnovania geometrii* ("Foundations of Geometry"), 2 vols. (MoscowLeningrad, 1946–1956); and *Ocherki po geometrii* ("Essays on Geometry"; Moscow, 1963), a volume fo collected papers and discourses.

II. Secondary Literature. See A. M. Lopshitz and P. K. Rashevsky, *Benjamin Fedorovich Kogan* (Moscow, 1969); I. Z. Shtokalo, ed., *Istoria otechestvennoy matematiki* ("History of Native Mathematics"), II–III (Kiev, 1967– 1968), see index; and

A. P. Youschkevitch, *Istoria matematiki U Rossii do 1917 goda* ("History of Mathematics in Russia Until 1917"'; Moscow, 1968), see index.

A. P. Youschkevitch