

Peterson, Karl Mikhailovich | Encyclopedia.com

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(b. Riga, Russia [now Latvian S.S.R.], 25 May 1828; d. Moscow, Russia, 19 April 1881),

mathematics.

Peterson was the son of a Latvian worker, a former serf named Mikhail Peterson, and his wife, Maria Mangelson. In 1847 he graduated from the Riga Gymnasium and enrolled at the University of Dorpat. The lectures of his scientific tutor Ferdinand Minding provided an occasion for Peterson's writing his thesis "Über die Biegung der Flächen" (1853), for which he received the degree of bachelor of mathematics.

Later Peterson moved to Moscow where he worked first as a private teacher then, from 1865 until his death, as a mathematics teacher at the German Peter and Paul School. Becoming intimately acquainted with scientists close to N. D. Brashman and A. Y. Davidov, Peterson took an active part in the organization of the Moscow Mathematical Society and in its work. He published almost all of his writings in *Matematicheskii sbornik*, issued by the society.

In 1879 the Novorossiiskii University of Odessa awarded Peterson an honorary doctorate in pure mathematics for his studies on the theory of characteristics of partial differential equations, in which, by means of a uniform general method, he deduced nearly all the devices known at that time for finding general solutions of different classes of equations. These studies were to a certain extent close to the works of Davidov (1866) and N. Y. Sonin (1874). However, Peterson's principal discoveries are connected with differential geometry.

In the first part of his thesis Peterson established certain new properties of curves on surfaces and in the second part he continued Gauss's and Minding's works on the bending of surfaces. Here he for the first time obtained equations equivalent to three fundamental equations of Mainardi (1856) and Codazzi (1867-1869), which involve six coefficients of the first and the second quadratic differential forms of a surface. Peterson also proved—in different expression—the theorem usually bearing the name of Bonnet (1867): the geometrical form of the surface is wholly determined if the coefficients of both quadratic forms are given. Minding found the thesis excellent, but these results were not published during Peterson's lifetime and found no development in his articles which were printed after 1866. Brief information on Peterson's thesis was first given by P. Stäckel in 1901; a complete Russian translation of the manuscript, written in German and preserved in the archives of the University of Tartu, was published in 1952.

In his works Peterson elaborated new methods in the differential geometry of surfaces. Thus, he introduced the notion of bending on a principal basis, namely, bending under which a certain conjugate congruence of curves on the surface remains conjugate; such congruence is called the principal basis of a surface. Peterson established numerous general properties of conjugate congruences and studied in depth the bending on a principal basis of surfaces of second order, surfaces of revolution, minimal and translation surfaces. All these surfaces and some others constitute a class of surfaces, quite interesting in its properties, named after Peterson.

Although Peterson did not teach at the university, his ideas initiated the studies of B. K. Mlodzeevsky and, later, of his disciples Egorov, S. P. Finikov, and S. S. Bushgens. Peterson's discoveries also found a somewhat belated reputation and extension in other countries, for example, in the works of Darboux and Bianchi. Outside the [Soviet Union](#), however, his remarkable studies on the theory of surfaces are still mentioned but rarely in the literature on the history of mathematics.

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II. Secondary Literature. On Peterson and his work, see (listed chronologically) P. Stäckel, “Karl Peterson,” in *Bibliotheca mathematica*, 3rd ser., **2** (1901), 122–132; B. K. Mlodzeevsky, “Karl Mikhailovich Peterson i ego geometricheskie raboty” (“Karl Mikhailovich Peterson and His Geometrical Works”), in *Matematicheskii sbornik*, **24** (1903), 1–21; D. F. Egorov, “Raboty K. M. Petersona po teorii uravnenii s chastnymi proizvodnymi” (“Peterson’s Works on Partial Differential Equations”), *ibid.*, 22–29— the last two appear in French trans. in *Annales de la Faculte des sciences de l’Universite de Toulouse*, 2nd ser., 5 (1903), 459–479; D. J. Struik, “Outline of a History of Differential Geometry,” in *Isis*, **19** (1933), 92–120; **20** (1933), 161–191; S. D. Rossinsky, “Karl Mikhailovieh Peterson,” in *Uspekhi matematicheskikh nauk*, **4**, no. 5 (1949), 3–13; I. Y. Depman, “Karl Mikhailovich Peterson i ego kandidatskaya dissertatsia” (“Peterson and His Candidature Dissertation”), in *Istoriko-matematicheskie issledovaniya*, **5** (1952), 134–164; I. Z. Shtokalo, ed., *Istoria otechestvennoy matematiki* (“History of Native Mathematics”), II (Kiev, 1967); and A. P. Youshkevitch, *Istoria matematiki v Rossii do 1917 goda* (“A History of Mathematics in Russia to 1917”; Moscow, 1968).

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