ALEKSANDR D. ALEXANDROV (1912–1999)

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Life's Signposts. Aleksandr Danilovich Alexandrov was born in the Volyn village of the Ryazan province on August 4, 1912. His parents were high school teachers. He entered the Physics Faculty of Leningrad State University in 1929 and graduated in 1933. His supervisors were Boris Delauney (1890–1980), a prominent geometer and algebraist, and Vladimir Fok (1898–1974), one of the outstanding theoretical physicists of the last century. The first articles by Alexandrov dealt with some problems of theoretical physics and mathematics. But geometry soon became his main speciality.

Alexandrov defended his PhD thesis in 1935 and his second doctorate thesis in 1937. He was elected to a vacancy of corresponding member of the Academy of Sciences of the USSR in 1946 and was promoted to full membership in 1964.

From 1952 to 1964 Alexandrov was Rector of Leningrad State University. These years he actively and effectively supported the struggle of biologists with lysenkoism. Genetics had been in the syllabus of LSU in the 1950s whereas this happened in the other domestic universities only in 1965. The name of Rector Alexandrov is connected with the uprise of the new areas of science such as sociology and mathematical economics which he backed up in the grim years. Alexandrov was greatly respected by established scholars as well as academic youth. "He led the University by moral authority rather than the force of direct order," so wrote Vladimir Smirnov (1887–1974) in the letter of commendation on the occasion of Alexandrov's retirement from the position of Rector.

In 1964 Mikhail Lavrentyev (1900–1980) invited Alexandrov to join the Siberian Division of the Academy of Sciences of the USSR. Alexandrov moved with his family to Novosibirsk where he found many faithful friends and students. By 1986 he headed a department of the Institute of Mathematics (now, the Sobolev Institute), lectured in Novosibirsk State University, and wrote new versions of geometry textbooks at the secondary school level. Alexandrov opened his soul and heart to Siberia, but was infected with tick-borne encephalitis which undermined his health seriously. From April of 1986 up to his death on July 27,1999, Alexandrov was on the staff of the St. Petersburg Department of the Steklov Mathematical Institute.

Contribution to Science. Alexandrov's life business was geometry. The works of Alexandrov made tremendous progress in the theory of mixed volumes of convex figures. He proved some fundamental theorems on convex polyhedra that are celebrated alongside the theorems of Euler and Minkowski. While discovering a solution of the Weyl problem, Alexandrov suggested a new synthetic method for proving the theorems of existence. The results of this research ranked the name of Alexandrov alongside the names of Euclid and Cauchy.

Another outstanding contribution of Alexandrov to science is the creation of the intrinsic geometry of irregular surfaces. He suggested his amazingly visual and

powerful method of cutting and gluing. This method enabled him to solve many extremal problems of the theory of manifolds of bounded curvature.

Alexandrov developed the theory of metric spaces with one-sided constraints on curvature. This gave rise to the class of metric spaces generalizing the Riemann spaces in the sense that these spaces are furnished with some curvature, the basic concept of Riemannian geometry. The research of Alexandrov into the theory of manifolds with bounded curvature prolongates and continues the traditions of Gauss, Lobachevsky, Poincaré, and Cartan.

The Mathematics Subject Classification, produced jointly by the editorial staffs of Mathematical Reviews and Zentralblatt für Mathematik in 2010, has Section 53C45 "Global surface theory (convex surfaces à la A. D. Aleksandrov)". None of the other Russian geometers, Lobachevsky inclusively, has this type of acknowledgement. Alexandrov became the first and foremost Russian geometer of the twentieth century.

Retreat to Euclid. Alexandrov accomplished the turnround to the ancient synthetic geometry in a much deeper and subtler sense than it is generally acknowledged today. The matter is not simply in transition from smooth local geometry to geometry in the large without differentiability restrictions. In fact Alexandrov enriched the methods of differential geometry by the tools of functional analysis and measure theory, driving mathematics to its universal status of the epoch of Euclid. The mathematics of the ancients was geometry (there were no other instances of mathematics at all). Synthesizing geometry with the remaining areas of the today's mathematics, Alexandrov climbed to the antique ideal of the universal science incarnated in mathematics.

Alexandrov overcame many local obstacles and shortcomings of the differential geometry based on the infinitesimal methods and ideas by Newton, Leibniz, and Gauss. Moreover, he enriched geometry with the technique of functional analysis, measure theory, and partial differential equations. Return to the synthetic methods of *mathesis universalis* was inevitable and unavoidable as illustrated in geometry with the beautiful results of the students and descendants of Alexandrov like Misha Gromov, Grisha Perelman, and Alexei Pogorelov (1919–2002).

Alexandrov and the Present Day. Alexandrov emphasized the criticism of science and its never-failing loyalty to truth. Science explains "how the thingummy's actually going on" with greatness and modesty, using experience, facts, and logic. The universal humanism of the geometer Alexandrov, stemming from the heroes of antiquity, will always remain in the treasure-trove of the best memes of the humankind.