Alexandrov of Ancient Hellas

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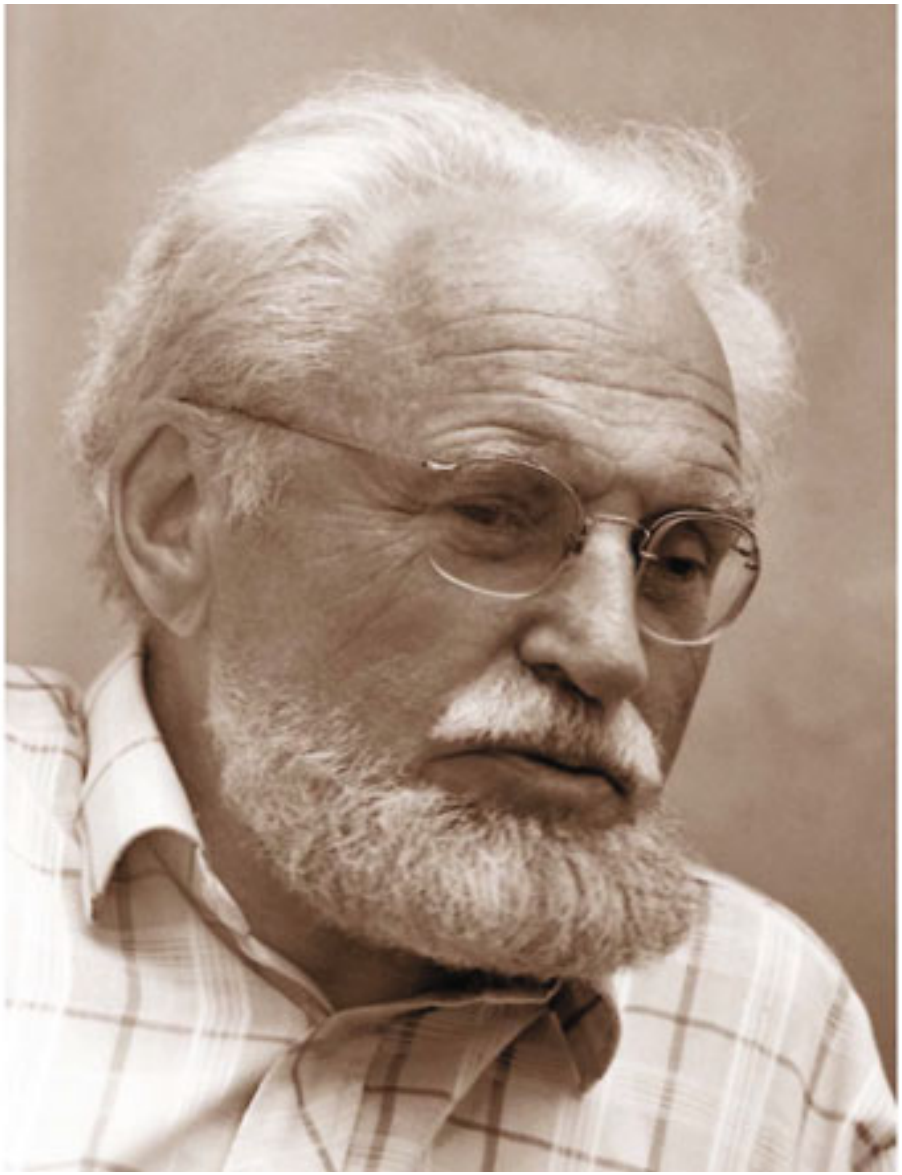
Aleksandr D. Alexandrov (1912–1999)



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- 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.

Battle Oblivion

- Geometry is immortal, and so its past achievements are as handy today as at the time of invention. Practically each educated human can recall a bit of plane and solid geometry à la Euclid. But none of us know anything about Euclid's life and personality. There is no denying that geometry becomes more human with time, and we know much more about Gauss than Euclid.
- This conference will slightly expand our knowledge of Alexandrov's world line, his personal traits, beliefs, and his geometrical contributions to be fully advertised in the lectures and talks of this ejoyable week.
- Warmth of humans obeys the law of entropy, but the alive can battle oblivion. Let negentropy prevail.

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.

Rectorship

- From 1952 to 1964 Alexandrov was the 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.

Siberia

- 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.

Return to St. Petersburg

- 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.
- Alexandrov created 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. The research of Alexandrov into the theory of manifolds with bounded curvature prolongates and continues the traditions of Gauss, Lobachevsky, Poincaré, and Cartan.

Retreat to Euclid

- Alexandrov wrote in 1981 that "the pathos of contemporary mathematics is the return to Ancient Hellas." His favorite slogan was "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. Alexandrov enriched the methods of geometry by driving mathematics to its universal status of the epoch of Euclid.
- Alexandrov overcame many local obstacles and shortcomings of the differential geometry based on the infinitesimal methods and ideas by Newton, Leibniz, and Gauss. He enriched geometry with the technique of functional analysis, measure theory, and partial differential equations. Return to Euclid was inevitable as illustrated with the beautiful results of the students and descendants of Alexandrov like Misha Gromov, Grisha Perelman, Alexey Pogorelov, and Yuri Reshetnyak.

Geometry and Alexandrov's Outlook

- Geometry appeared as a result of human activities. Geometry was invented to organize human's life and change it for the better. Human is the starting point, the creator, and the aim of life. The general outlook of Alexandrov was determined by his scientific views that were formed in studying geometry. It is not by chance that the ideas of Karl Marx's "Theses on Feuerbach" enchanted Alexandrov.
- Synthesizing geometry with the other areas of mathematics, Alexandrov elevated to the antique ideals of the unique science and placed the scientific stance in the center of his ethical views.
- Alexandrov opposed religious belief and scientific search. The human with the earthly needs rather than an ideal abstraction occupies the center of Alexandrov's outlook. The human seeks for truth and creates the circumstances of life. The human is the source and the aim of life.

Traits of Alexandrov's Personality

- Alexandrov was not a man of the past, but he was not ashamed of the past. He was able to discern his own misconceptions and eliminate them. He never concealed his own mistakes but tried his best to repair them if possible. He was interested in what they had done rather then what they had been doing. He never made a vain boast and always hated meritocratism. His attitude to truth was dynamic and based on principle.
- Everyone trusts themselves, whatever circumlocution notwithstanding. Alexandrov was capable of extending the practice of trust to the others, using the presumption of decency which acts up to the first infringement. Alexandrov himself was a man of honor whose statements deserved acceptance without proof in much the same way as one's own words. Alexandrov put trust higher that proof.

Alexandrov's Ethics

- Alexandrov hated all crooks, "marxism-borne" popes and inquisitors who used science for mean and greedy ends. There is a precipice of repulsion between science and power. Power confronts freedom which is the essence of mathematics. Alexandrov viewed science as the tool that liberates humans from material burdens and untether them intellectually.
- Geometry taught Alexandrov universal humanism. He liked the words of Paul the Apostle and repeated that "there is neither Greek, nor Jew" in geometry. Humanism, responsibility, and scientific stance are the ingredients of the perfect morality by Alexandrov. Human is the source and aim of everything. That is the essence of universal humanism. Human is responsible for everything. That is the meaning of responsibility. The scientific stance as human's statement free of subjectivism is that which makes the foundation of morality.

The Scales of Alexandrov's Personality

- 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 love and hatred to Alexandrov stem from the same sources. His reviews and opinions were welcome and appreciated, but his approaches and areas of research were silenced if not scorned.
- During the years of Gorbi's *perestroika* Alexandrov was accused in confessing lysenkoism but decorated with the Order of the Red Banner of Labor for his efforts in safeguarding and propelling genetics and selection in the USSR. So were the scales of Alexandrov's personality.
- Alexandrov's staunch principles made predictable and tragic his fate. The defense of truth is a heavy cross and a lonely service. Alexandrov often felt himself a "red carpet clown." Misunderstanding and mockery are the rewards of an alive hero. Time shows all in due proportion. Alexandrov will remain in history as a noble knight of science.

Alexandrov and the Present Day

- Alexandrov's life spanned the rise and fall of the Soviet Union. Complicated if not paradoxical ideology of communism views the individual freedom as necessity understood within a collective. Collectivism tends to transform into the hegemony of standardization and totalitarianism in much the same way as individualism brings about the tyranny of absolutism and globalization. Dictatorship, as the simplest form of universal subordination, becomes the inevitable instrument of individualism and collectivism. Alexandrov's ideas oppose rational egoism, abstract objectivism, and mystical dogmatism. Humanization of science as the vector of its progress is the most attractive ingredient of Alexandrov's views of the future of science and society.
- 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 humankind.