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MSC 01A70ON THE CENTENARY OF THE BIRTH OF
ACADEMICIAN A. D. ALEXANDROV

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ABSTRACT. This is a short tribute to the memory of Aleksandr Danilovich Alexandrov (1912–1999) which was distributed at the Fourth Geometry Meeting Dedicated to the Centenary of A. D. Alexandrov in St. Petersburg, August 20–24, 2012.

The state of my health makes it obligatory for me to stay in Novosibirsk for some time. I asked Semën Samsonovich Kutateladze to undertake the task of rendering to your attention my thoughts about the occasion we celebrate.

I welcome all participants of the conference and hope that this meeting will be full success.

This is the centenary of the birth of Aleksandr Danilovich Alexandrov who was an outstanding mathematician and a brilliant and attractive person. We are all not eternal, and no one writes commendable mathematical papers if he is a centenarian. But my feelings are still full with some pain of the fact that A.D. has passed away. He possessed the unique understanding of life, had a far-sighted vision of the universe, and enjoyed the quality that was listed in the slang of the recent totalitarian past as an *active life standpoint*. These traits alongside with his buoyant temperament made the personality of A.D. enchanting.

My acquaintance with A.D. happened in the spring of 1948. Professor Dmitriï Konstantinovich Faddeev arranged a problem solving competition among the first and second year students of the Mathematics and Mechanics Department. The list of tasks contained a geometrical problem that was labeled as suggested by A.D. The statement of the problem was supplemented with the comment that the solution of the problem had been unknown. I think that this comment was some hoax of A.D.

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since the problem had turned out rather simple and I had solved it quickly. Then I caught A.D. in a corridor of the department and showed my solution to him at a windowsill. "It's OK," he told me.

In September of the same year I began attending A.D.'s seminar. At that time the topic under study was A.D.'s book *Intrinsic Geometry of Convex Surfaces*. I had narrated the story elsewhere a few times, and so I will not dwell upon it now.

The happiest period of my life seems to be the span of time from 1949 to 1954 which embraces the last three years as a university student and the three years as a postgraduate. These years I had the opportunity to communicate with such a marvelous mathematician as A.D., I mastered mathematics, and the new results simply poured out of me.

I will tell the following story. It was in the spring of 1949 when Akram Yakubovich Yusupov, a student of A.D. from Bukhara, made a talk at A.D.'s seminar. A.D. had suggested in 1946 to construct some theory of curves that would embrace the theory of curves of the standard course of differential geometry, but would apply to the curves of a much more general nature. A.D. outlined a rough draft of the theory in his talk at a meeting of the Moscow Mathematical Society. A short notice of this appeared in *Russian Mathematical Surveys* in 1947. The task to be carried out by A. Ya. Yusupov was to make A.D.'s rough draft into a complete theory. Yusupov suggested a thought that was welcome in principle by A.D. But to perform A.D.'s task was unsurpassable for Yusupov for his lack of due education.

Yusupov gave a proof of one theorem of the theory of curves at one of the meetings of the seminar in the spring semester of 1949. After Yusupov had finished his talk, I suggested another proof of the theorem. "This is the real proof,"—said A.D. and continued, addressing me: "You will write an article with exposition of the theory of curves for *Russian Mathematical Surveys*!" I had started to fulfill this task right away, but I managed to cope with the arising difficulties only after the lapse of three years in the spring of 1952.

I had to pass an obligatory "Kandidat" examination in philosophy in June of 1952. I was very afraid of the exam and even panicked slightly. It was completely impossible to read all that was required. In dismay I decided to make a short break for mathematics. I happened to encounter an article by V. A. Zalgaller which proved some theorem about the length of a curve. Suddenly I asked myself whether there are similar theorems about other integral characteristics of a curve, namely, about integral curvature and integral torsion. The moment I posed the question I saw the answer. I reported my results at the nearest meeting of the geometrical seminar. After listening me, A.D. said: "How beautiful are these relations!"

Beautiful but completely useless formulas are galore in mathematics. In this case it turned out that my formulas enabled me to perform what I had tried in vain during three years and completed the theory of curves à la Alexandrov. In particular, I had found easy solutions to some problems posed to me by A.D. I also reported this at a meeting of the seminar.

Some time after I observed that the relation for integral curvature which I discovered was already established independently by the two mathematicians: Istvan Fari and John Milnor. Sixty years later I found out that the arguments of Fari had a serious flaw. He used the Dominated Convergence Theorem by Lebesgue. But Fari never justified the applicability of this theorem. It so happened that the Fari relation was fully proved by me. Milnor's reasoning was O.K. The original article

by Fari appeared in French which language I am insufficiently acquainted with. Recently I had found a translation of the Fari article in the Internet and everything became clear to me. But the difference in the classes these two mathematicians belonged to was evident from the very beginning.

Since I had mentioned the philosophy exam, it is in order to tell the end of the story. Recently I saw a video record of a sermon of some Christian priest Father Aleksandr. He explicated a new Christian view of miracle. Imagine that you walk to some place where you are expecting to have much trouble—*your face will meet a table*, as a Pidgin Anglo-Russian saying goes. But in fact you are welcome rather cordially with a candy. This is a real miracle by Father Aleksandr. Such a miracle happened to me: I got B for the exam! The result of the exam did not influence the amount of scholarship, but if one got C then the re-examination was obligatory. I disclose that the first question of the exam was about the content of the only lecture of philosophy for postgraduate students which I attended. So the outcome of B was impossible without some impact of sublime forces. For the sake of clarity, I must note that the event did not make me religious. By the way, the miracles in the sense of Father Aleksandr but with the opposite sign happened to me many times. It is not a rare event when you made something seemingly in the best of all possible ways after much effort to accomplish all perfectly. In result you receive no commendation you expected but your face meets a table once again. Forgive my little distraction.

I will not dwell upon the biographical data of A.D. since they are presented rather fully in the biobibliographical booklet printed this year and available in the Internet. In this regard, I want to acknowledge the efforts of Kutateladze whose energy and affection helped to compile the booklet.

The first scientific publications of A.D. were devoted to some problems of mathematical physics. But from 1936 on practically all of his scientific interests were in the realm of mathematics.

He was elected to a vacancy of a corresponding member of the Academy of Sciences of the USSR in 1946. From 1952 to 1964 Alexandrov was the Rector of Leningrad State University. In 1964 he was elected a full member of the Academy of Sciences and moved to Novosibirsk where he worked in the Institute of Mathematics (now the Sobolev Institute) and Novosibirsk State University. In 1986 Alexandrov left Novosibirsk and returned to Leningrad. He passed away in summer of 1997 and was buried at Bogoslov Cemetery in St. Petersburg.

Alexandrov owned the first class results in geometry, partial differential equations, real function theory, and mathematical crystallography. He paid much attention to the geometrical problems of foundations of relativity and achieved significant progress in this area.

Alexandrov's studies in geometry started within the theory of mixed volumes of convex bodies in which he significantly developed the results by H. Minkowski and other classics of this science.

One of the most brilliant results of Alexandrov is his solution of H. Weyl problem on realization of a convex surface with a given intrinsic metric. It is for this research that he was awarded with the Stalin Prize of the Second Degree in 1942.

The works of Alexandrov on the theory of irregular surfaces developed the geometrical conception of space, which makes them everlasting. These contributions

by Alexandrov deserve commendation along with the achievements of the best geometers such as N. I. Lobachevsky, B. Riemann, and É. Cartan.

A.D. was an extraordinarily gifted person. He raised to the summits of science and was an outstanding sportsman who received the title of the USSR Master of Sports in Mountaineering. A.D. was a capable polemicist and no one could beat him in any public dispute.

A few words are in order about A.D.'s stay in Novosibirsk. He was welcome and acclaimed at the beginning. Crowds of people visited his public lectures mostly on the general issues of life and science. But soon the bosses and their "dish-leasers" became envious of A.D.'s public influence. He encountered ribaldry, mockery, and even abuse. A.D. revealed stoicism of a warrior and overcame all attacks with dignity and honor.

The epoch of stagnation in the USSR was marked with a rather grim atmosphere of the intellectual life of the country. The then country was an instance of the realm of mediocrity. Chaps of no merits used their party connections to control practically all sides of academic life. The group of geometers together with a few allies from the other mathematical departments was a small detail besieged by adversaries. Only the broad back of A.D. made us stay in relative security.

I must emphasize that A.D.'s creative activity never declined in Novosibirsk. He wrote articles about science and morality, allotted much time and effort to improving education in high school, joined the biologists that were indignant of the publications of Academician N. P. Dubinin who denied the applicability of some laws of biology to humans, etc. His booklet on science and religion of 1972 is still actual now when the President of the Russian Academy of Sciences has proclaimed publicly that science needs an alliance with religion.

All his life up to his terminal day A.D. stood at the viewpoint of Communism. If asked whether he believed in Communism, he always answered that for him it is not a matter of belief but a matter of science. Also A.D. perfectly understood the rotten nature of the political system of the USSR and never concealed his negative attitude to the regime.

Academician Aleksandr Danilovich Alexandrov went through a long and exuberant life. He was a great citizen of his great country.

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