

Leonid Kulikov

Leonid Kulikov was born on the 2nd of November 1914 in the family of a railway worker in the town of Nikitovka, Donetsk region. After graduating from high school, he entered a vocational school of chemistry. When he was 14 years old, he lost a leg in an accident and had to use prosthesis for the rest of his life. This accident did not crush the spirit of the teenager, who was able to cope with the tragic misfortune and to continue his studies. After graduating from the vocational school, he worked for some time as a librarian in the town of Slavyansk.

In 1934 L. Kulikov was admitted to the Moscow State Pedagogical Institute (currently the Moscow State Pedagogical University, MSPU), majoring in physics and mathematics. His brilliant mathematical talent was highly appreciated by many leading scientists teaching there. Upon graduation from the Institute in 1938, he commenced his graduate studies at the Department of Algebra. His academic advisor was Dr. G. Shapiro. Kulikov, as a graduate student, participated in the algebraic seminar led by Dr. O. Schmidt, whom he considered to be his mentor. Kulikov's fascination with algebra and group theory was triggered by Dr. Schmidt's monograph *Abstract Group Theory* (1916), which young Leonid perused even before he entered the Institute.

In May 1941, Leonid Kulikov successfully defended his Ph.D. thesis titled *On the Theory of Abelian Groups of Arbitrary Cardinality*. This work immediately received high evaluations from the mathematical community and made the author well known worldwide. After finishing his graduate studies in 1941, Leonid Kulikov started teaching at the MSPU Department of Algebra. During the Moscow bombing raids in 1941, Leonid Kulikov, together with his colleagues, often stood watch on the roof of MSPU's main building in order to protect it from incendiary bombs.

During the period from 1942 to 1946 he was an Associate Professor with the Department of Higher Mathematics at the Ivanovo Textile Institute. From 1946 to 1949, Leonid Kulikov worked as an Associate Professor at the Department of Algebra of Leningrad State Pedagogical Institute named after Herzen. During this time, he was also working on his Doctor of Science degree, conducting research at the Leningrad branch of Mathematical Institute named after Steklov with the USSR Academy of Sciences. His research consultant was the distinguished Soviet mathematician Dr. A. A. Markov.

In 1951, L. Kulikov defended his Doctor of Science thesis titled *Generalized Primary Groups* at the Department of Mathematics and Mechanics of Leningrad State University. The outstanding Russian algebraists A. G. Kurosh and A. I. Maltsev were his official opponents.

From 1950 to 1955, Leonid Kulikov headed the Higher Mathematics Department of Leningrad Institute of Avionics. In 1955, he was transferred to Moscow to work as a senior scientific researcher for the Mathematical Institute named V. A. Steklov, where he worked for seven years. Dr. Kulikov became a full professor at the Algebra Department of MSPU in 1962. From 1963 to 1989, he served as the Department Head, creating a close-knit faculty team committed to achieving excellence in their work. For many years Dr. Kulikov was Chairman of MSPU's Special Committee for awarding mathematics degrees.

Leonid Kulikov continued working as a full professor at the Algebra Department until 1996, when his deteriorating health forced him to retire. On February 11, 2001, after a serious and prolonged illness, he passed away.

Dr. Kulikov had been actively involved in scientific research for more than 50 years. Although he regularly obtained new scientific results, he never intended to have a lot of publications, and often presented these results in scientific seminars as well as at all-USSR and international conferences. Kulikov's brilliant mathematical results are now considered classic knowledge in algebra and have become part of

algebraic science's heritage. His ideas and methods have formed the basis of modern Abelian group theory. In fact, Abelian group theory became a separate branch of modern algebra thanks to Kulikov's works. In 1954 the famous Hungarian mathematician Dr. Tiboi Szele wrote: "Today it is quite obvious that the most important contribution to the theory of infinite Abelian groups was made by Dr. L. Y. Kulikov, and Dr. Kulikov is the world's leading scientist in this field."

Characterizing the scientific contribution of Leonid Kulikov, the outstanding Soviet algebraist and academician A. I. Maltsev wrote in 1964: "Dr. L. Y. Kulikov is one of the most brilliant algebraists today, one of the founders of modern commutative group theory. His contribution to this area cannot be overestimated. This can be easily ascertained just by looking at the chapters on commutative group theory in the monograph *Groups Theory* by A. G. Kurosh or *Abelian Groups* by L. Fuchs. The name of Kulikov can be seen in almost every paragraph. Most fundamental theorems or their modern formulations belong to Kulikov." Later in 1971, Maltsev again emphasized in his article "On the history of algebra in USSR in its first 25 years" published in *Algebra and Logic*, the journal of the USSR Academy of Sciences, Siberian Branch (Vol. 10, No. 1), that "Kulikov has made an especially important contribution to commutative group theory, the current face of which in many aspects has been determined by his works."

Note that in the period from the 1920s to the 1950s Abelian groups were researched also by outstanding foreign and Russian mathematicians such as H. Prüfer, H. Ulm, F. W. Levi, R. Baer, T. Szele, J. Loś, L. Fuchs, I. Kaplansky, L. S. Pontryagin, A. G. Kurosh, A. I. Maltsev, L. A. Kaluzhnin, E. S. Lyapin, and S. V. Fomin. Each of them also made significant contributions to Abelian group theory.

In the 1960-70's there were four schools of Abelian group theory in USSR: Tomsk school led by I. Kh. Bekker, Leningrad school led by A. V. Yakovlev, and two schools in Moscow: MSU school led by A. P. Mishina and MSPU school led by L. Y. Kulikov. Leonid Kulikov led a scientific seminar on Abelian groups in MSPU from 1963 to 1994. This seminar was recognized all over the USSR and played a significant role in the development of Abelian group theory in USSR and Russia. Practically all Russian specialists (about a hundred in total) and many foreign specialists took part in this seminar. Information on the later development of Abelian group theory in Russia can be found in a paper by A. A. Fomin "Abelian groups in Russia," *Rocky Mountain J. Math.*, Vol. 35, No. 4 (2002), pp. 1161–1180.

Leonid Kulikov was also a highly responsible teacher working on his lectures with great diligence. While preparing materials for his lectures he always tried to find shorter and more original proofs of theorems, optimizing the delivery structure. Every word in his lectures was thoroughly selected.

L. Y. Kulikov led an active social and pedagogical life. In the 1970's when the new curricula for high schools were introduced, he paid great attention to improving the methods of training mathematics teachers. As the Chairman of the Scientific Methodological Council of the USSR Ministry of Education's Principal Higher Education Directorate, Leonid Kulikov led the project for planning new courses and programs for mathematical and physics/mathematical faculties of pedagogical universities in the USSR. Under his supervision and with his direct participation a new course in algebra and number theory was created. In accordance with this program Leonid Kulikov wrote a textbook, which still remains the main course book on algebra and number theory for pedagogical university students.

A scientist's role can be reflected not only in the value of his research, but also in his followers. Leonid Kulikov had many followers. Even those who only had short conversations with him recalled him with a great gratitude and asserted that these conversations significantly impacted their scientific career.

Leonid Kulikov dedicated a lot of his time to mentoring future scientists and teachers, working with graduate students and generously sharing many of his scientific ideas. Under his supervision many Ph.D. theses had been defended, related not only to Abelian group theory, but also to other areas of algebra, as well as the methodology of teaching mathematics.

Under the supervision of L. Y. Kulikov, the following twenty Ph.D. students have successfully defended their theses in algebra: N. Y. Antonova, Y. Y. Vedel, A. A. Gvaramiya, A. V. Grishin, V. A. Degtyarenko, A. N. Eraskina, A. M. Ivanov, N. Kvan, R. Kelberer, S. I. Komarov, N. I. Kryuchkov, A. I. Moskalenko, S. V. Rychkov, N. A. Serdjukova, A. U. Soyfer, A. G. Solonina, V. B. Trukhmanov, V. Kh. Farukshin, Y. M. Firsov, and A. A. Fomin.

Three of his Ph.D. students have defended theses in mathematical teaching methodology: E. P. Beresneva, V. V. Kryuchkova, and L. Kh. Tsybikova.

Later A. A. Gvaramiya, A. A. Fomin, A. V. Grishin, A. G. Solonina, and N. A. Serdjukova became Doctors of Science. Of the younger scientists, E. I. Kompantseva and A. V. Tsarev defended their Doctor of Science theses as well, and they also belong to the scientific school of L. Ya. Kulikov.

Leonid Kulikov was respected by colleagues and graduate/postgraduate students. He was a man of principle, but also one who was trusting and easy to get along with. He was unselfish and fully devoted to mathematics and teaching.

Family played an important role in Leonid Kulikov's life. From his college years until the end of his life, he was always together with Ludmila, his beloved and devoted wife, friend and assistant. Together they brought up three children. The love for mathematics and commitment to teaching were always important for their family. That is why their children decided to continue the work of their father, devoting themselves to mathematics. His elder daughter, Tatyana Yanchenko, has been working as a school teacher of mathematics all her life. His son, Vladimir Kulikov, is a Ph.D. of physics/mathematical sciences and associate professor at the Department of Probability Theory of Financial University with the Government of the Russian Federation. His younger daughter, Irina Timofeeva, is a Doctor of Science and professor at the Department of Mathematical Analysis of MSPU.

Leonid Kulikov's heritage includes outstanding scientific results. He trained a lot of followers (scientists), created a scientific school, and left good memories in the hearts of his students and colleagues.

A. A. Fomin and I. L. Timofeeva

LIST OF PUBLICATIONS OF L. Y. KULIKOV RELATED TO SCIENCE AND METHODOLOGY

1. "On the theory of Abelian groups of arbitrary cardinality," *Mat. Sb.*, **9 (51)**, No. 1, 165–182 (1941).
2. "On the theory of Abelian groups of arbitrary cardinality," *Mat. Sb.*, **16 (58)**, No. 2, 129–162 (1945).
3. "Generalized primary groups. I," *Tr. Mosk. Mat. Obshch.*, **1**, 247–326 (1952).
4. "About direct decompositions of groups," *Ukr. Mat. Zh.*, **4**, 230–275, 347–372 (1952).
5. "Generalized primary groups. II," *Tr. Mosk. Mat. Obshch.*, **2**, 85–167 (1953).
6. "About direct decompositions of one mixed Abelian group," *Publ. Math. Debrecen*, 512–516 (1956).
7. "The splitting conditions of a mixed Abelian group," *Usp. Mat. Nauk*, **13**, No. 3 (81), 247 (1958).
8. "Universally complete Abelian groups," in: *Proc. of the III All-USSR Math. Congress*, Vol. 1, Moscow (1956), pp. 26–28.
9. "Groups of extensions of Abelian groups," in: *Proc. of the IV All-USSR Math. Congress*, Vol. 2, Leningrad (1964), pp. 9–11.
10. "Structure of the Abelian extension group of an arbitrary Abelian group by a torsion group," *Usp. Mat. Nauk*, **19**, No. 2 (116), 228 (1964).
11. "Colloquium on Abelian Groups," *Usp. Mat. Nauk*, **19**, No. 2 (116), 225–232 (1964) (co-authored with A. P. Mishina and L. A. Skornjakov).
12. "Extensions and extension groups of torsion free groups of rank 1," in: *Int. Math. Congress: Abstracts*, Sec. 2, Moscow (1966).
13. An example of non-isomorphic groups of type 2 with isomorphic Ulm factors, in: A. G. Kurosh, *Theory of Groups* [in Russian], Nauka, Moscow (1967), pp. 169–171.
14. "Conditions under which groups of Abelian extensions are zero," in: *VIII All-USSR Colloquium on General Algebra*, Riga (1967).
15. "The extensions of algebraic compact groups," in: *Symp. on the Theory of Groups*, Batumi (1967).
16. "Subdirect decompositions of countable torsion free Abelian groups," in: *X All-USSR Algebraic Colloquium*, Novosibirsk (1969), pp. 18–19.
17. "Conditions under which groups of Abelian extensions are zero," *Uchen. Zap. MGPI im. V. I. Lenina*, **375**, 41–55 (1971).

18. “Basic submodules of modules on local principal ideal rings,” in: *XI All-USSR Algebraic Colloquium: Abstracts*, Kishinev (1971), pp. 148–149.
19. “On the subdirect sums of torsion free Abelian groups of rank 1,” in: *XII All-USSR Algebraic Colloquium*, Sverdlovsk (1973), p. 30.
20. *The Program of State Examinations on Mathematics for Discipline 2104* [in Russian], Prosveshchenie, Moscow (1973) (co-authored with V. T. Bazylev and P. P. Korovkin).
21. “Elements of theory of sets and logic,” in: *All-USSR Seminar for Teachers of Algebra and Number Theory*, Ulianovsk (1973).
22. “The group of extensions of Abelian torsion free groups by periodic groups,” in: *Proc. of the V All-USSR Symposium on Group Theory*, Krasnodar (1976), pp. 47–48.
23. “The group of Abelian extensions of rank 1 group by countable group,” in: *III All-USSR Symposium on Rings and Modules*, Tartu (1976).
24. “The group of Abelian extensions of pure subgroup of the additive group of p -adic integers by countable Abelian group,” in: *XIV All-USSR Algebraic Colloquium: Abstracts*, Novosibirsk (1977), p. 34.
25. *The Program of Algebra and Theory of Numbers for Discipline 2104*, Prosveshchenie, Moscow (1977) (co-authored with V. G. Lemlein).
26. *The Program of Algebra and Theory of Numbers for Discipline 2105*, Prosveshchenie, Moscow (1977) (co-authored with V. G. Lemlein).
27. “On the groups of extensions of Abelian groups,” in: *VI All-USSR Symposium on Group Theory: Abstracts*, Cherkassi (1978), p. 34.
28. “The group of extensions of Abelian group by torsion free group of rank 1,” *Vestn. Mosk. Univ. Ser. 1 Mat. Mekh.*, No. 5, 105–106 (1978).
29. *Algebra and Number Theory* [in Russian], Vysshaya Shkola, Moscow (1979).
30. “On the p -length of the group $\text{Ext}(F, A)$, where F and A are countable p -groups,” in: *IX All-USSR Symposium on Group Theory: Abstracts*, Moscow (1984), p. 149.
31. “IX All-USSR Symposium on Group Theory,” *Usp. Mat. Nauk*, **40**, No. 6 (246), 167–171 (1985) (co-authored with A. A. Fomin).
32. “On the p -length of the group of pure extensions of Abelian groups,” in: *XVIII All-USSR Algebraic Conference: Abstracts*, Kishinev (1985), p. 41.
33. *Collection of Problems in Algebra and Number Theory* [in Russian], Prosveshchenie, Moscow (1993) (co-authored with A. I. Moskalenko and A. A. Fomin).
34. “On the universal completion of Abelian group,” in: *Abelian Groups Symposium in Honor of the 80th Anniversary of L. Y. Kulikov: Abstracts*, Bijsk (1994), p. 5.