

Igor' Fomich Shchegolev (Obituary)

It is painful to think that Igor' Fomich Shchegolev has passed away. We have lost a friend, colleague, outstanding scientist, and man of lofty human qualities. For all those who happened to meet with him, if only once, Igor' Fomich Shchegolev witnessed an example not only of selfless devotion to science but, first and foremost, also of good-will to all those around him.

Igor' Fomich Shchegolev was a person of versatile interests, endowed with an acute sense of civic duty. Even those who were on intimate terms with him could never guess how Igor' Fomich Shchegolev managed to combine his scientific work (in which he seemed to be wholly absorbed) with teaching (he was professor at the Department of General Physics, Moscow Physical-Technical Institute), intense public and political activities, enthusiasm for mountaineering (he was awarded the title of Master of Sport), and informal meetings with friends. Incidentally, many of his friends had no idea that Igor' Fomich Shchegolev was a well-known scientist (he was an extremely modest person), but they were unquestionably aware of his kindness, good nature, gentle disposition, love for music, painting, and literature, coupled with a broad knowledge of life.

Another uncommon feature of this man was his rare combination of strict principles and high demands in science with exceptional gentleness and good-will, which immediately marked him as a man of culture and intellect. Due to this, Igor' Fomich Shchegolev was always able to find a way out of apparently hopeless situations and reconcile the conflicting interests of his opponents in a most unpredictable fashion.

I F Shchegolev was born on October 4, 1929 to the family of an office employee in the city of Baku. In 1951, after graduating with honours from the Physics Faculty of the M V Lomonosov State University, Moscow, he was trained as a nuclear physicist which was at that time looked upon as a popular and promising occupation. He began to work in the laboratory headed by professor N E Alekseevskii at the Institute of Physics Problems under the USSR Academy of Sciences. After a short time, he became an authority on low-temperature physics of solids, an entirely new field for him. In 1961, he defended his dissertation of Candidate of Science based on the results of NMR studies in metals. He was then invited by N N Semenov to work in the Institute of Chemical Physics under the USSR Academy of Sciences.

After studying with N E Alekseevskii and P L Kapitza, I F Shchegolev never sought easy ways in science. He used to categorize all scientists into two groups. Those comprising the larger one might have experience with a research technique but would choose to wait for a problem to be solved with this



Igor' Fomich Shchegolev
(1929–1995)

method (like a frog sitting still with its tongue held out and waiting for a gnat to fly past). Fewer scientists are capable of raising a problem and thereafter developing methods for its solution. I F Shchegolev certainly belonged to this smaller group. Being aware of the difficulties encountered by those who embarked on the latter path, he was nevertheless convinced that it was the sole path to success.

In retrospect, one arrives at the conclusion that I F Shchegolev must have been a very courageous and resolute man when he ventured to realise the idea of high-temperature superconductivity in the early sixties, that is almost 20 years before this phenomenon was actually observed, because at that time it appeared to be an act of folly without any real prospects for development until many years of strenuous efforts had elapsed.

The project was based on a recent idea of Little who postulated the existence of high-temperature superconductivity in small-dimensional systems. A potential candidate for experimentation might be an organic compound of long or flat molecules specifically arranged to ensure metal-like conductivity.

The main difficulty was that natural compounds with such property were unavailable, hence the necessity to create them. Furthermore, perfect monocrystals suitable for physical experiments had to be obtained and characterised. Screening of such materials was to reveal those with metal-like conductivity. Provided that all these problems were solved successfully, it would then be possible to try and answer whether organic superconductors occur in nature. Implementation of this project required coordinated joint efforts of highly skilled theorists (to know where to look for the desired compounds), chemists (to synthesise and analyse new materials), crystallographers (to create perfect crystals and elucidate their highly complicated structures), and experimental physicists (to investigate the physical properties of erratic, unstable and very small crystals).

This ambitious project and its successful realisation continues to strike the imagination the more so since the work is known to have been done in an atmosphere of fierce competition with far better equipped American, Japanese, French, and other Western laboratories and by people who had almost no opportunity to gain access to cutting-edge data from abroad.

This became possible because Igor' Fomich Shchegolev managed to bring together his students and associates and concentrate their efforts on the implementation of the project, assisted by his intuition of a scientist based on deep knowledge, ability to enter into a new field of research and immediately feel at home there, as well as his aptitude for recruiting associates and inspiring them with his ideas. He alone was the person who could not only understand but also teach any member of this multidisciplinary team. In fact, anyone who happened to be in touch with I F Shchegolev, whether a first-year university student or venerable professor, a turner or laboratory assistant, organic chemist or theoretical physicist, in some way or other benefited from their personal contact with this man, i.e. learnt something valuable from him.

Summarising the results obtained after 20 years of scientific research, Shchegolev's team produced several types of organic superconductors with the quality of the crystals being so high that it was possible to study their electronic properties and deduce an inference relating to the Fermi surface.

Igor' Fomich Shchegolev once again demonstrated his non-trivial ways and ideas only three years after the discovery of organic superconductivity, an essentially new field in solid state physics.

Acknowledged by the global scientific community as a leader in this area of research, I F Shchegolev came to think that the problem had been basically solved and that his participation was no longer needed to complete the work. In 1968, he joined the Institute of Solid State Physics, the USSR Academy of Sciences, to head the Laboratory of Superconductivity which had been his intention since 1963. As it turned out, within a year after this move, the phenomenon of high-temperature superconductivity was first discovered, which drew the attention of many specialists throughout the world.

His unique knowledge and expertise accumulated by this time during work on new organic superconductors earned I F Shchegolev wide acclaim in the world of science as a recognised authority in this new, rapidly developing field. He and his co-workers demonstrated the primary role of the surface barrier in magnetic field penetration into perfect crystals with high-temperature superconductivity.

Never segregating himself, I F Shchegolev took an active part in the organisation of research on high-temperature superconductivity not only in his Laboratory and Institute but also in different regions of the country.

I F Shchegolev was a man of generous nature, and his kindness and readiness to help those in need were limitless. Though a bearer of high academic rank and honorary titles (Full Member of the Russian Academy of Sciences, member of the Council of the European Physical Society), burdened with numerous duties (head of the laboratory, deputy director of the Institute of State Physics, Russian Academy of Sciences, head of Section 1 of the State Programme on high-temperature superconductivity, member of the Editorial Board of the *Journal de Physique*, etc.), I F Shchegolev never refused to talk with anyone who needed his advice in scientific, organisational, public or personal affairs. He was truly sensitive to the well-being of others.

Till his last, I F Shchegolev worked hard, made new plans, and would undoubtedly have done a great deal more for science and all of us were it not for surprise post-operative myocardial infarction he suffered on June 22, 1995 that suddenly brought to an end the life of this wonderful man.

His bright personality and warm-heartiness inspired those around him with enthusiasm, making them better, wiser, purer, and kinder.

Bidding farewell, we shall always hold the memory of I F Shchegolev in our hearts. We thank the lucky star that brought us together with him.

*A F Andreev, A S Borovik-Romanov, V F Gantmakher,
L P Gor'kov, V V Kveder, L V Keldysh, V N Kopylov,
Yu A Osip'yan, V V Ryazanov, V B Timofeev,
V E Fortov, I M Khalatnikov, N A Chernoplekov,
R P Shibaeva, E B Yagubskii*