

ON 85th ANNIVERSARY OF YURIY L. ORLOV

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In 2011 we have celebrated 85th Anniversary of Yuriy Leonidovich Orlov. He was a talented Russian mineralogist and field researcher, expert in mineralogy of diamond. Being an exceptional expert of precious stones, he was a lead expert of the Ministry of Finance of the USSR. Yuriy L. Orlov contributed a lot in the Museum development. 2 photos and 3 references

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Yuriy Leonidovich Orlov (1926 – 1980) was a Doctor of Geological and Mineralogical Sciences, the most prominent specialist in mineralogy of diamond and precious stones, the author of 50 published papers, including 3 monograph studies. He was a director of the Fersman Mineralogical Museum of the Academy of Science from 1976 to 1980.

Yuriy L. Orlov was born in a family of a clerk on February 4th, 1926 in Moscow. He spent his childhood in Arbat street (in the center of Moscow) where he entered a public school in 1933. Having talent in music, he was fascinated by playing accordion. He did not give up his passion with years and joined musical school in 1938. His family was evacuated to Ufa during the World Second War in 1941 – 1942. He continued musical education in the Ufa musical college. Orlov was involved to ten-grade musical school at the Moscow Conservatory after he returned to Moscow in February 1943. He graduated from school in 1945 but did not continue his musical carrier taking his father's advice to join the M.I. Kalinin Institute of noneferrous metals and gold (Figure 1). Yuriy L. Orlov graduated from the Institute in June 1950 with the Diploma of mining geologist and was commissioned as a principal geologist to geological party №41 of Vladimirskaya expedition of Union Trust №2 under the Ministry of Geology and Protection of Mineral Reserves. Then he was moved to township of Pashiya in Chusovskoy region of Perm area to work as a head of mineralogical thematic expedition №60 of the same Trust, where he worked till 1955.

Yuriy L. Orlov started his work on research programs in 1953. He collected the unique stone material on mineralogy of diamonds from the Urals, the subject he was very interested in. He was appointed to a chief of the theme geological party №44 of the

Central expedition of Union Trust №2, which carried out research on Siberian diamonds. This allowed Orlov to enlarge his area of interest and initiate comparative study of mineralogy of the two diamondiferous provinces. The new appointment made him move to Leningrad, where he started his research. He drew attention to paragenesis, morphology and inclusions in diamonds. The results of this research were published in a number of papers, which immediately became classified materials because of the topic. Orlov also led research on physical-chemical properties of various morphological types of natural diamond crystals, which was carried out in the Central expedition. The results of the study had a wide practical application.

Yuriy L. Orlov successfully obtained his Candidate thesis on inclusions in diamonds from the Urals and origin of rounded shapes of its crystals at the end of his remote post-graduate studies at M.I. Kalinin Institute of base metals and gold in January 1956. Professor Georgiy P. Barsanov, the director of Fersman Mineralogical Museum, was a scientific supervisor of this study.

Orlov, a talented scientist and experienced mineralogist, was passionate about diamond studies and all his following research was dedicated to the studies of the mineral.

Liquidation of the Union Trust №2 and lack of appropriate housing for his increased family in Leningrad, forced Orlov to move back to Moscow in April 1956. His family grew, the second son, Sergey was born in Orlov's family in June 1955, and the elder son turned 4 years old.

Professor Georgiy P. Barsanov highly valued the abilities, consistency and professionalism of young scientist and hired Orlov to



Fig. 1. Yuriy L. Orlov – 3rd year student of M.I. Kalinin Institute of nonferrous metals and gold. Moscow, 1948.

work at the Fersman Mineralogical museum of the AS as a junior scientist. Orlov continued studying diamonds from the collections of the Ministry of Finance of the USSR (MinFin), the All-Union Trust "Aerogeology" (VAGT) and Ministry of Geology of the USSR. He completed a comprehensive summary on diamonds from various deposits in Ukraine, Western Siberia, the Urals, Yakutia in collaboration with members of a theme geological party of All-Union Geological Institute (VSEGEI, Leningrad) at the time he worked at the museum. All work on diamond research by the order of the Ministry of Finance of the USSR was completely classified at that time. That is why many scientific papers written by Yuriy L. Orlov were not published for wide audience. Orlov was involved in the studies of rare metal pegmatites from Eastern Transbaikalia and Pamir during the first years of his employment at the museum at the suit of the director, professor Georgiy P. Barsanov along with diamond studies. He stressed solving problems of typomorphic properties of minerals from pegmatites and the rare earth variety of vesuvianite, discovered by him.

Yuriy Leonidovich was engaged in a museum work, took part in creation of the-

matic expositions on processes of mineral formation, precious and lapidary stones and synthetic minerals. He actively participated in teaching and popularization of science, educational work, delivering courses to university students and specialists. Orlov made a big effort in replenishing the museum's collections with precious stones and diamonds. Number of specimens increased with growth of the number of localities of their origin (Borisova, Pavlova, 2007). He led a range of research studies of natural stones and syngenetic inclusions in them with electron paramagnetic and nuclear magnetic resonance (EPR and NMR) spectroscopy with the objective to identify the original deposit and genetic type of a stone.

Besides being a well-known diamond specialist and expert in precious and lapidary stones, he also was an excellent teacher and storyteller. He could gain interest of any audience.

Apart from his research activities Yuriy L. Orlov took an active part in compiling a large reference book "Minerals" and wrote 16 articles for the chapters "Silicates" and "Haloids". He also wrote some articles for the new reference book "New Construction Materials" published by *Bolshaya Soviet Encyclopedia* Publisher.

However, studies of diamond, its' paragenesis and morphology were the main interest of Yuriy L. Orlov. He examined and studied enormous number of diamond crystals from all placer deposits of the former Soviet Union, primary deposits of Yakutia, South Africa, Congo, Brazil and other countries. He found dissolving nature of rounded diamond crystal shapes based on numerous studies. Yuriy L. Orlov investigated growth of diamond crystals and aggregates, zoned structure of aggregates, surface features of the facet dissolution as an indicator of diamond origin. He described inclusions in diamonds, correlation of mechanical properties of its crystals and their aggregate structure, morphological features of diamond crystals and more.

Yuriy Leonidovich Orlov worked very passionately and fruitfully. He published more than 50 scientific papers on diamonds in sources opened for public.

His monograph "*Morphology of Diamond*" was published in 1963. Author described pri-

mary diamondiferous rocks, various morphological types of diamond crystals and facet surface relief, compared shapes of growth and dissolution on diamond crystals, discussed his opinion on the origin of the mineral (Orlov, 1963). Yuriy L. Orlov was promoted to become a senior scientist in May of the same year.

Book "*Morphology of Diamond*" was highly valued by specialists and was awarded Alexander E. Fersman award of the Academy of Science of the USSR in 1967.

Scientific research of Yuriy L. Orlov was always connected to the needs of industrial organizations, which needed solutions of the practical problems in exploration for diamonds and their industrial application. Orlov created a scientific foundation for the instruction manual "Technical conditions for industrial classification of diamond crystals" during his work as a scientific consultant at the Central Scientific Research Laboratory of the Ministry of Finance of the USSR. This manual was used as a document to regulate the diamond grading process. He also used to head research of methods of objective identification of natural precious stones and their distinction from synthetic analogues and imitations. During the period of 1967-1968 he was awarded with three author certificates for invention to protect diamonds from corrosion during production of the diamond cutting tools. These inventions had a big positive economic effect in the industry. Yuriy L. Orlov, as a lead specialist in scientific and practical applications of a raw diamond material, actively worked on introduction of synthetic diamonds to the industry.

Yuriy L. Orlov, an experienced geologist, mineralogist and expert in solid-state physics, suggested an integrated approach to geological environment of diamond deposits, their origin and research on unique properties of the mineral. His book "*Diamonds of the Area of Lena River*" was exceptionally thorough among his fundamental works published in 1970s. He described crystal types and polycrystalline aggregates, dissolution and corrosion of crystal surface occurred during their formation and auto-metamorphism of diamond bearing rocks, syn-genetic and epigenetic inclusions in diamonds of different deposits etc.

At the same period, Yuriy L. Orlov worked on the monograph reviewing diamond mineralogy. He arose questions of crystal structure, chemical composition, crystal morphology, real structure defects, paragenesis and origin and types of deposits of the mineral. The book "*Mineralogy of Diamond*" was published as a result of this work in 1973 (Orlov, 1973). Geological and mineralogical community connected to exploration and research of the mineral welcomed it.

Yuriy L. Orlov successfully defended his thesis for degree of Doctor of Geological and Mineralogical Sciences in 1975.

Theoretical research of Orlov was closely related to his practical activity as a most experienced expert and advisor on diamond mineralogy, precious and lapidary stones. He led a large science administrative work as a scientific secretary of the Mineralogical museum since his appointment to this position on January 23, 1962. His educational activities included and were not limited by theme lectures for the staff of *SoyuzYuvelirTorg* (i.e. The State Jewelry Trade Co.) and the Ministry of Finance of the USSR, lectures on diamond mineralogy for the students of Sergo Ordjonikidze Moscow Geological Exploration Institute and work with postgraduate students. Yuriy L. Orlov was a member of Scientific Diamond Council of the State Committee on Science and Engineering at Council of Ministers of the USSR, a member of Council on Problems of Super Hard Synthetic and Natural Materials and Highly Efficient Tools with Them, Interagency Commission on material selection to the Diamond Fund of the USSR and other committees of Academy of Science and the Ministry of Finance of the USSR. He, as a member of Council of the Presidium of Academy of Science, took a regular part in organizing and holding exhibitions out of the country as a director, scientific advisor and leader of lecturer groups. He worked in Poland, Czechoslovakia, Canada, Japan, Germany, Italy, Britain, United States and France.

Research on diamond mineralogy, which was directed by Yuriy L. Orlov, was awarded with the Badge of the Honor Order for its scope, depth and practical industrial application twice in 1971 and 1973.



Fig. 2. Yuriy L. Orlov, 1976.

Yuriy L. Orlov was appointed to the director of the Fersman Mineralogical Museum by the order of Presidium of the Academy of Science in 1976 and held the position till his passing on August 30, 1980.

Yuriy L. Orlov was an outstanding scientist of his time who was able to narrow and solve significant scientific problems and was the one

of the best experts in diamond mineralogy. He proved himself as a scientist raised on the ideas of Vladimir I. Vernadsky and Alexander E. Fersman in his works, which had a great influence on the modern ideas on origin of diamonds. His monographs became classic and are used as reference books by mineralogists and specialists in a wide range of areas.

Yuriy Leonidovich Orlov worked at the Fersman Mineralogical Museum for almost 25 years. He is remembered by his colleagues not only as a talented scientist and the unique expert on diamonds and precious stones, but also as a wonderful and kind person. He had a distinct positive attitude to life, openness and big heart. Being a well-educated person, he was glad to speak about fine and applied arts, literature and, of course, had a very good knowledge of music.

Yuriy Leonidovich is remembered and valued by his colleagues and pupils. Mineralogists from the Fersman Mineralogical Museum named a mineral **orlovite** $\text{KLi}_2\text{TiS}_4\text{O}_{11}\text{F}$, recently discovered in moraine of Darai-Pioz glacier in Tajikistan, after him.

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