

GEORGIY PAVLOVICH BARSANOV AS I REMEMBER HIM

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I am most likely one of few people who has known Georgiy Pavlovich Barsanov for more than 60 years. Once when I was doing my post-graduate studies under his supervision he asked me "Erika, when did we meet? You always have been floating before my eyes".

I cannot say for sure the time when I started "to float before his eyes" but I remember perfectly how I first saw him. It was soon after the war. I was looking at minerals in showcases in the museum and Georgiy Pavlovich was descending the stairs to the museums hall. He was walking with crutches after recovering from a severe battle injury. It took him a lot of effort and his face was drawn. For some reason I have hidden behind the showcase because I did not want him to see me.

In 1947, as a first year student of the Moscow State University I headed a school hobby group. In the beginning it was held at Sverdlovsky district Schoolchildren's Palace. Later I got tired of coming there with all rock samples and slides and I transferred the group to the department. Sometimes I took them to the museum.

As far as I remember, meetings of the All-Union Mineralogical Society often took place in the museum, as well as the museum mineralogical seminar that still continues to function there. I participated in their meetings with pleasure.

One year later, I found a love that has lasted my whole life! My beloved is quartz. I was amazed by everything in the mineral: the simplicity of the composition and complexity of the structure (oxide by chemistry and silicate by structure), the enormous industrial value and the beauty of its crystals, the omnipresence and rarity of industrial quality samples. Everything was striking! I read about it and looked at it, looked and read. There was only one place to look at my subject – Fersman Mineralogical Museum.

I read articles on quartz by G.G. Lemmlein published in the *Doklady Akademii Nauk SSSR* (Reports of Earth Sciences). The articles were written in telegraphese and I was totally confused. Nikolay Alexeevich Smolyaninov, the chair of mineralogical department, advised me to ask Georgiy Glebovich Lemmlein personally and wrote him a note.

G.G. Lemmlein worked in the Institute of Crystallography of the Academy of Science and I imagined him as a grey-haired old man with large beard. I came to the Institute of Crystallography, found the office, knocked at the door and came in. I was struck by the sight of a big room, the floor covered with a carpet of several layers of printed articles. A fairly young brown haired man with a modern hairstyle was crawling on the floor trying to put in order the prints. I paused not knowing what to do because there was no space to step. "Are you looking for me? Come on in and sit down", Georgiy Glebovich invited me. I watched my steps. Walking along the wall to a table, I tried not to step on "the science". Georgiy Glebovich read the note, talked with me, and offered me an opportunity to work on the problem of quartz coloration in his laboratory. I immediately agreed. You bet! I could not even dream of such good fortune!

After graduating from Lomonosov Moscow University in 1951, I was appointed to work in the IGEM (the Institute of Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry of the Academy of Science) at the department of non-metallic minerals, lead by Valeriy Petrovich Petrov. Georgiy Pavlovich knew V.P. Petrov from studying with him in Tbilisi. I headed a school hobby group in the museum from the very beginning of the work in the IGEM with the blessing of Georgiy Pavlovich. I remember well some colleagues who worked in the museum in 1950s. The first one was Malva Alexandrovna Smirnova. I met her long before she came to the museum because we started studying together in the same department at the university. I also frequently encountered Natan Il'ich Ginsburg, Valentina Vasilyevna Yakubova, Maria Efremovna Yakovleva, Valeriya Alexandrovna Kometova...

I remember Alexander Nikolaevich Labuntsov. One instance is etched in my memory: a certain young man came to consult with him. Alexander Nikolaevich referred the man to Ekaterina Evtikhievna Kostyleva because she had better knowledge of the subject. "What do you know? She is such a horrid woman!" – said the guest out loud. "Do you think so?" –

humbly replied Alexander Nikolaevich, — "You know, I have not found that despite living with her for many years".

I remember Moisey Davidovich Dorfman, the permanent scientific secretary of the mineralogical seminar. He used to invite me to the meetings until recently. It is very unfortunate that I have not been able to attend the meetings in recent years.

V.P. Petrov changed the theme of my investigation three times in IGEM. Besides that I had to perform tasks for the SOPS (Council for studying industrial forces of the country). I had to do research on refractories, white clays and so on. Besides my main studies I had a deviation to the side interest — quartz. It was my "forbidden" love! I studied it little by little, wrote small articles on inclusions in quartz, its associations and regularities of intergrowth with other minerals. As a rule those papers were published in the Proceedings of the Mineralogical Museum. V.P. Petrov called them my "scientific waste".

I worked in the department of non-metallic ores of the IGEM for 9 years. I finished writing a thesis on defects in muscovite crystals. I passed the qualifying examinations for the Candidate Degree, had papers published, and the thesis was case bound. I handed the thesis to V.P. Petrov, the head of the department. He put the work in his drawer and locked it there for two years. Regarding questions about the fate of my thesis, he replied that he had handed it to a prominent specialist on muscovite, for reference. I waited.

Once I visited Volodya Fin'ko, a colleague of the department. He graduated from the MSU a year after me. I noticed the familiar spine of my thesis on his bookshelf and asked him how he happened to have it. He said, "the boss gave me a work that was completely out of my field." Volodya had not even read the author's name because it was "out of subject" for him. I had to go to V.P. Petrov and ask him what happened. He replied: "the thesis was not good enough for defense. It was obsolete!" I noticed that it was his fault it became obsolete. "Why did you use dated material? Write for a daily newspaper," he said.

I was bitterly hurt. The resentment became even stronger with the fact that V.P. Petrov switched the topic of my study from muscovite to clay half a year before this happened. According to the vivid expression of V. Fin'ko, clay "was completely out of my field".

I went to Georgiy Pavlovich. Who else could console my resentment and bitterness? Georgiy Pavlovich suggested I enter the postgraduate



Fig 1. G.P. Barsanov in his room at the Lomonosov Moscow State University. 1970s.

program under his supervision. I considered coming to the MSU with my muscovite studies and agreed right away. I had plenty of time and thought I would revise the thesis and add new material... However Georgiy Pavlovich tapped on my "scientific waste" sitting on a desk and said: "Erika, we will do a study on quartz." I was very happy that at last my "forbidden" love had become "legal"!

Georgiy Pavlovich was interested in whether the low temperature α -quartz or high temperature β -quartz originally occurred in pegmatites in general and particularly in graphic intergrowths. Transition of β -quartz into α -quartz occurs at 573°C. It means that all quartz on the earth's surface represents its α -variety. Georgiy Pavlovich thought that quartz in pegmatites was originally the high temperature variety. This idea needed to be proved.

Georgiy Pavlovich from the first days of my postgraduate studies acquainted me with teaching. My first class consisted of soil science students. Their course started with crystallography. I was shocked because I found that I had forgotten everything! Georgiy Pavlovich told me: "Erika, you cannot forget it. Take a book, browse through it, take crystal models, look at them thoroughly, turn them around, and go." What else could I do? I browsed, looked and went. Then it started: 8 hours of preparation followed



Fig. 2.
E.Ya. Gur'eva, post-graduate student of G.P. Barsanov

by 2 hours of lesson! There was no single sample or crystal students saw that would miss my thorough observation from every side. I was lucky that soil science students had a brief course.

I was dreaming to pass through examinations as quickly as possible and proceed with quartz studies, which I realized would be a big technical problem. I had to pass exams on special subjects such as general mineralogy and mineralogy of quartz. I assumed the exam would be administrated in the traditional way. Georgiy Pavlovich anticipated my assumption, "What exam on general mineralogy are you talking about? Your students examine you every week on this subject!" It was the truth! My next group consisted of geology students: 16 boys and one girl. When I have entered the auditorium for the first time, no one stood up to greet me. Three boys at the last row of desks were smoking, sitting with their feet on the desks and blowing rings of smoke to the ceiling. "Be so kind as to stand up," I said, "and you by the wall stop smoking!" My words yielded no response. "Well, lets waste time now so you will not have time closer to exams," – I said and took care of my own business. In a little while later, the female student said: "All right guys, that's enough of playing the fool". All stood up and the lesson went on. Those students exasperated me bringing samples for mineral identification to every lesson. I was afraid of coming to the class. Once the students stuffed a crack in granite with a soft piece of bread colored with blue watercolor and asked what mineral it was.

I remember one student brought a sample which I did not recognize from first glance. "Where is it from?" I asked. "From the Carpathians," he answered. I came to the window and looked attentively at the small green

segregations. Aegerine! From the Kola Peninsula! They were not a classical crystals associated with bright eudialyte, but very plain grayish-green and eroded. I turned back to the students. The owner of the sample walked away. I explained to the rest of the students about the sample and added "this is not from Carpathians but from the Kola Peninsula. Carpathian samples I will show him on the examination!" After that instance the students did not dare to examine me.

Once I could not come to the class because of an examination for the Candidate Degree. But I did not have the actual examination again. Georgiy Pavlovich objected: "Do you want an exam with examination paper and three questions? No! You will make a report on the chair meeting describing quartz in general and specifically, your work questions." My report lasted for 30 – 40 minutes and was followed with answering questions and then examination protocol was finished. This decision was very wise. First, this way was much more serious than plain "examination paper and 3 questions". Secondly, it was a rehearsal of the thesis defense.

I looked through the collections of the Mineralogical Museum and ones at the chair before resuming work with quartz in pegmatites. Crystals of β -quartz were well formed hexagonal bipyramids of grey color. I was surprised by the fact that the commonly used symmetry formula for them was L_66L_2 (P6₄22). The low temperature quartz crystal formula: L_33L_2 is understandable; the crystal has trapezoidal faces. This faces are absent in high, or β -quartz. I looked through the bibliography in Russian and English. There were no any references of trapezoidal faces in β -quartz. I went to ask Georgiy Pavlovich. He took an interest in it and checked the bibliography in French and, I think, in Spanish. The result was the same.

Georgiy Pavlovich advised me to contact N.V. Belov on this question. I came to his office and asked why L_66L_2 was the symmetry formula for β -quartz. "What do you expect?" asked Nikolay Vasilyevich. "I expected 7 more mirror planes of symmetry and a center of symmetry," I replied. Nikolay Vasilyevich put his hands on his hips: "What makes you so clever?" "I'm from the Chair of Mineralogy", I replied, "a postgraduate student of Georgiy Pavlovich". "So, if you are a postgraduate student and more over one of Georgiy Pavlovich, you should know that if there is a trapezoidal face present, there can be neither planes nor center of symmetry!" – he exclaimed. "I know, but there

is no trapezoidal face," I defended myself.

N.V. Belov had a thought and said: "Write to Shubnikov." I wrote. In return, Alexey Vasilyevich (Shubnikov) sent me a sketch of β -quartz structure that he calculated. According to the structure its formula was $L_6\delta L_2$. This drawing by Shubnikov I included in my thesis.

I started studying quartz twin crystals. Works by E.V. Tsinzerling from the Crystallography Institute helped me a lot with understanding this subject. α - and β -quartz have different twinning but it does not change during polymorph transition. It was easy to observe on macro crystals. Thin sections were a different matter. I had to etch quartz grains with fluoric acid after having covered adjacent feldspar with paraffine in advance. It was very easy to destroy thin sections. It took a lot of thin sections and polished sections which I prepared all by myself. I am grateful to N.A. Smolyaninov who forced us, fifth-year students, despite of our strong resistance, to learn how to make thin sections. He told us: "I understand that you may not have the need to make them, but you need to know how to judge the quality of the work."

There is a volume change of the quartz when α - β -transition happens. Formation of cellular texture occurs in quartz as a consequence. I had to make a number of micro photographs to prove it because the difference between twin patterns and peculiarities of cellular structure is hard to explain in words. I also had to do a lot of optical microscopy.

Georgiy Pavlovich allowed me to use A.E. Fersman's collection on pegmatites from the museum when I started the work. "You would not make such a collection until the end of your days," said Georgiy Pavlovich with irony, "I suggest Alexander Eugen'evich would agree with your participation in this work." As a supervisor, Georgiy Pavlovich was an easy person to talk with and very attentive. He was not a person who would push. He never said "Do this, do that...". Sometimes he just said: "Why would you not try this?" He had a light hand giving advice and I thought that it was me who hit upon the idea! Only later did I realize that it had been a prompt from Georgiy Pavlovich. I had studied pegmatites from various deposits and obtained the result: quartz in graphic textured pegmatites was initially a high temperature β -polymorph. The supposition of Georgiy Pavlovich was proved to be true!

Georgiy Pavlovich in my memory was a very intellectual person. When I used to enter his office, or more correctly, flew into it; I immediately sat down to prevent Georgiy Pavlovich

from standing up. He was very witty. Once, a final-year student came to his study. He was boastful and swanky and said "I have bought myself a motorcycle". "What for?" asked Georgiy Pavlovich. The student replied "I want to travel the world". "This one, or the other?" Georgiy Pavlovich asked.

While preparing for the defense of my thesis, I went on teaching students. Georgiy Pavlovich was a dean of the Geological faculty in that time, and every thing concerning students was keenly interesting for him. I briefly told him about our classes, said: "Everything is good, as usual, I obscure students brains..." Once Georgiy Pavlovich said to me: "Erika, if you obscure the brains even for a couple of students — it will be a good deal!"

Naturally, I could not finish the dissertation in three years. Georgiy Pavlovich proposed me to the department committee that I continued working in the department and they accepted. Some people did not believe that I would succeed when I had started work on the thesis. Even G.G. Lemmlein questioned whether it was a topic for the post graduate thesis during one of our meetings. Only Georgiy Pavlovich believed in my success and backed me up in everything. When it was close to the defense I told him about it. Georgiy Pavlovich laughed and said: "God knew who he had given the understanding to!" By the way, the polished and etched samples of quartz were stored for a long time in Georgiy Pavlovich's office on the lower shelf of the bookcase.

The defense was successful. Three colleagues from the department of non-metallic ores of the IGEM listened to my defense. They shared how V.P. Petrov received the synopsis of my thesis and showed it to everyone at the institute saying: "What an excellent job my pupils do!" Georgiy Pavlovich didn't pay attention to this event, he even took the anecdote with a good sense of humor.

I have fond memories of New Year's celebrations for the children at the University. I brought my son Sergey in the morning, and left him on the 27th floor in the museum. Then we had lunch together in the professors dining hall. Georgiy Pavlovich came with his daughter Tanya and we went down to the party. Georgiy Pavlovich took the children by the hands and they entered the circle dance... I watched them and was so happy. It was very nice, so cheerful and touching!

In my memory Georgiy Pavlovich stands out as a wise, very kind, intelligent and excellent man with a good sense of humor.