Conversation of Eugene Dynkin with Sergei Kuznetsov, Ithaca, New York, July 25, 1999
Attended: Irene Dynkin and Olga Kuznetsov (wives)
Part A

E.D. I normally start by asking about the roots.

S.K. Roots? Sounds interesting.

E.D. Unfortunately, there is very little I can tell. As you know, my father was a victim of Stalin purges. He perished in 1937, and my mother was in constant fear that she might follow suit, and that I would be sent to an orphanage. This was a common procedure. All the archive records were destroyed, and we were even afraid to talk about him.

S.K. I know you have only one photograph of him, which you have enlarged.

E.D. Yes. Well, let me see. What do I know about him? My father was a gifted man. He finished a *Realschule* in Odessa and later passed the *Gymnasium* exams without attending lectures;[1] these exams were required of all university applicants. He somehow managed to get into the university, not an easy thing for a Jew at the time.

S.K. When did it happen?

E.D. It was the beginning of the 20th century. He was born in 1888. He married my mother in 1913, and they went to Germany for their honeymoon. I still treasure several postcards with the sights of Berlin. Later he started working as a paralegal assistant, a necessary step for an aspiring lawyer. WWI broke out shortly after. Then came the revolution. During the Civil War he worked in the Red Army offices but remained a civilian. Afterwards he worked as a legal adviser in various Soviet establishments. As for my mother, she finished dental school but did not work in her profession before my father's arrest, so that she had to work as an intern for two years without compensation in order to reestablish her qualifications.

S.K. When did they settle in St. Petersburg?

E.D. When my father graduated from the university, they rented an unassuming (by the standards of the time) five-bedroom apartment. By the time I was born, they had only two rooms left; another family occupied the other three.

S.K. Do you remember that place?

E.D. Yes, of course. It was the Fourth Rozhdestvenskaya Street. It was later renamed into the Fourth Soviet Street. I visited there twice since moving to the US. Only the façade of this building now remains. The houses damaged during the siege of Leningrad were meant to be reconstructed with their original facades. However, in 1989 and in 1993 there was nothing there but the façade.

S.K. Is your mother from Odessa as well?

E.D. No, both of them are from Belarus. Persecutions against my family began soon after my birth. When I was two years old, we wound up in Shlisselburg, where my father worked as a legal consultant at a gunpowder factory. Things could have turned out much worse, were it not for my mom's friend, Raisa Semyonovna Khazanova. As young woman, my mom used to help her conceal illegal literature. Now Khazanova was a secretary of Tomsky, one of the Bolshevik leaders.[2] I used to call her aunt Raya and used to say the she was my favorite aunt. Later, after

[1] *Realschule* is a type of secondary school (in some parts of Europe), which offered a science-centered curriculum, as opposed to the *Gymnasium* with its emphasis on classics and humanities.
[2] http://en.wikipedia.org/wiki/Mikhail_Tomsky

the arrest of his close friends Bukharin[3] and Rykov,[4] Tomsky committed suicide, and aunt Raya ended up in the Gulag.

After a while we returned to Leningrad. There was another family in our apartment, the Prusakovs. The head of the family, a former menshevik, became a member of the communist party and the head of one of state establishments. They had a son, Vova, my age. We grew up together. When we were no longer in Leningrad, his parents were arrested, while Vova himself perished later during the siege.[5]

When I was about 6, I had a home tutor, Maria Savelyevna Schwarz, a member of the old intelligentsia. She taught both of us, me and Vova, but I think she liked me more. When I turned 6, she dedicated a poem to me, and I remember it to this day.

When I was 6 or 7, I had an accident: I fell and, as a result, developed bone tuberculosis. At first, I had a cast on my leg. Then I was walking with crutches. I went to school rather late. I went into the 3rd grade. Before that, I was being homeschooled. Twice as a child I visited a resort for children in Eupatoria, Crimea. The first time I went with my mom. We stayed in the guesthouse 'Mother and Child'. Second time, I went with Vova, and we stayed in the health center for children with bone tuberculosis. He wasn't sick, but his father used his connections to arrange a place for him. For two weeks or so we were placed in quarantine and played 'intellectual' games: geographical name games and the like. Vova was not proficient in those. But he started winning when I proposed to name tram routes in Leningrad.

When I was 4, Vova's mom used to read to us *The Adventures of Tom Sawyer*, which remains my favorite book to this day. At 5 I learned to read myself. I read all the works of Jules Verne and was an avid reader of Dickens and Jack London. Later I turned to *Entertaining Physics*, *Entertaining Algebra*, and other popular books by Perel'man.

In 1933 I started the 3rd grade and became involved in school related activities: I was the editor of the student wall newspaper. Vova started school together with me. (He was also homeschooled by Maria Savelyevna.) In the very first days I had to step in for him, when some other kids bullied him. In accordance with the ideals of chivalry, which I learned from books, I intervened in the fight, and, since I didn't know how to fight, I was badly mauled. Then came 1934. On the 1st of December Kirov[6] was assassinated. The radio broadcasts that day featured only public personalities, who extolled Kirov and condemned his murderers. I took pains to memorize the names of these 'great men'.

Then, in March of 1935, late at night the NKVD[7] searched our apartment and took away my father. He and my mother were ordered to go to exile in Turgai, a small town in Kazakhstan, 300 km away from the railroad. We left some of our belongings to our friends and acquaintances. The books of Perel'man was my most treasured possession, and I remember copying excerpts from them.

The exile imposed on my parents was administrative, so that they were not transported under convoy. They sent me to my mom's sister in Moscow, aunt Eva. I stayed with her family

[3] http://en.wikipedia.org/wiki/Nikolai_Bukharin
[4] http://en.wikipedia.org/wiki/Rykov
[5] http://en.wikipedia.org/wiki/Siege_of_Leningrad
[6] http://en.wikipedia.org/wiki/Sergey_Kirov
[7] Soviet secret police agency, a forerunner of the KGB.

until the end of the school year. Aunt Eva and uncle Ruva had a daughter, Valya. She was one year younger than I, and we went to the same school. We lived in a working class neighborhood, Taganka, and the kids were somewhat rowdy. However, they always treated me well. I remember how a boy, sitting at the same desk as I, warned me, 'Just don't tell anybody that you are Jewish'.

O.K. Did you follow his advice?

E.D. Nobody asked me. I hadn't experienced anti-Semitism while in school in Leningrad.

My mother spoiled me. My father used to say, 'What kind of person are you raising? He is not going to have any property?' True, my aunt's family treated me well, but I didn't feel the kind of warmth I was used to at home. When I turned 11, uncle Ruva gave me a notebook. This was nothing like the birthday celebrations I used to have at home, and so I felt miserable. But soon I reunited with my parents in Kazakhstan. Things seemed to work out pretty well. The initial place of exile, Turgai, was changed to Chelkar. However, they were allowed to stay for a while in Aktubinsk, which was the administrative center of the region. My father worked there as a lawyer in various establishments. I was admitted to a school for kids whose parents worked on the railroad. It was a very good school, much better than the one in Leningrad, let alone the one in Moscow. I studied there for half a year until the school received a directive restricting the access of children whose parents had nothing to do with the railroad. I was transferred to a town school but refused to go there and so did not attend any school at all for half a year.

During this time things took a turn for the worse. My parents were supposed to be transferred to Chelkar after all, and I was very anxious about it. But in the end it didn't happen. I went to the 6th grade in my old school, where I was readmitted by the headmaster, who must have been quite impressed with my persistence. I graduated from this school.

I vividly remember that horrible day (November 19, 1937) when my father was arrested again. As if following some kind of quota, the authorities detained everyone on our street. They arrested not only exiles but others as well. It was a very difficult time for me in all respects. From the early childhood I was being raised believing that there will be a bright future for all humankind. I tried to justify what was going on around me with the saying 'you can't make an omelet without breaking eggs.' I felt rejected. Kids at school said that I would not be admitted to college without joining Komsomol. I applied together with my classmates. All of them were accepted right away, whereas my application had to undergo the scrutiny of the regional Komsomol Committee. It wasn't approved. I felt an outcast and withdrew into myself, finding refuge in reading the poetry of Pushkin. I was in the 7th grade then.

I was a good student. From the 6th grade and on I had straight A's, and in high school my teachers allowed me to do virtually anything I wanted in class. In Russian language class I used to read *The Russian Syntax* of Vinogradov. In chemistry I read *The Foundations of Chemistry* by Mendeleyev. At the end of the 8th grade my teachers suggested that I skip the 9th grade.

O.K. Many years later you suggested the same thing to Sergei.

S.K. Yes, and I skipped it as well.

E.D. So I skipped the 9th grade and graduated from high school at the age of 16. It was in 1940. I found myself engaged in various activities. In 1937 the Soviet Union commemorated the one hundredth anniversary of Pushkin's death. It was before my father's arrest. On this occasion I wrote a poem, which was published in a local newspaper. The poem was rather vapid, but the rhyme and rhythm were impeccable. I used some quotations from Pushkin. I sent

the poem to Pionerskaya Pravda[8] but received a courteous refusal, 'Dear Zhenya, we publish only the best poems, while your poem has quite a few shortcomings'. That was the end of my literary career.

An important stage in my high school education was a report on Shakespeare assigned to me by my literature teacher, Alexandra Nikolaevna Kazanskaya. She was a very demanding teacher, and to get an A in her class was almost impossible. But I managed to win her over with my report. In preparation, I read a pile of books on Shakespeare, including the scholarly debates about the authorship of his dramatic works. Rehearsing my report over and over again, I learned it by heart and recited it flawlessly. After that I received only A's in her class. She was one of those who helped me skip the 9th grade.

A much more interesting personality was my teacher of mathematics, Aleksey Vasil'evich Nekrasov. He graduated from the St. Petersburg University before the revolution. After the revolution he was exiled to Kazakhstan, and, having served his term of exile, became a school teacher (he wouldn't be able to do that while officially an exile). He gave me a book on the evolution of the number concept, and I was supposed to prepare a report on the subject. He told me, 'I doubt you will ever become a creative mathematician, but as for the history and philosophy of mathematics you may have a chance.'

In 1939 the Soviet Union celebrated the 60th birthday of Stalin. The entire country was possessed by the fervor to express adulation for the leader. In high school, we were preparing a handwritten socio-literary magazine. Our chief editor was Sasha Brodsky, who wrote much better poetry than I did – even though he was clearly not on par with his namesake, Joseph Brodsky. And so he, Shura Bondarenko, and I were preparing this magazine. Naturally, everyone supported our endeavor. When I went to Moscow later that fall, I was commissioned to buy paintbrushes and water-colors for our project. While I was trying to appeal the rejection of my admission to Komsomol, the war broke out in Europe. The event seems to have changed Stalin's attitude toward the children of 'the enemies of the people'. So when I came to the Central Committee of Komsomol, they rescinded their decision.

The 185 year anniversary of the Moscow State University was celebrated throughout the country.

O.K. How is that an anniversary?

E.D. A strange date indeed, but it was celebrated nonetheless. At the time I was already very seriously interested in mathematics, and I decided to apply to the Department of Mechanics and Mathematics. Alexey Vasil'evich recommended that I study the textbook of Granville and Luzin on differential and integral calculus. Written by Granville and revised by Luzin, it was a textbook for technical colleges that was often reprinted in Russia. The edition that I read contained a very odd claim: inasmuch as integration is the opposite of differentiation, we can use differential formulas for calculating integrals, and that there is a need to come up with something similar for finite sums. But the fact is that the opposite of

[8] A newspaper for kids between the ages of 9 and 14. (http://en.wikipedia.org/wiki/Pionerskaya_Pravda).

summation is subtraction, which I used for calculating the sum of powers and some other expressions. Obviously, there was nothing new about it.[9]

When I graduated from high school, I went to Moscow to apply to the State University. Since I graduated with the highest honors, instead of the entrance exam I was scheduled to have an interview with one of the professors.[10] My interviewer was Alexander Osipovich Gelfond,[11] a world-known mathematician who had solved one of the problems of Hilbert. I showed him a notebook with my calculations of finite sums. Not only was I admitted, but to my utter surprise my name was mentioned in *Pravda*[12], which reported on the admission process to the Moscow State University:

> "Particularly outstanding is the 16-year old holder of the highest honors diploma Dynkin (Aktubinsk) who has been granted admission to the Department of Mechanics and Mathematics following a special verdict of the All-Union Committee of Higher Education."

It was a sudden transformation from an outcast into a specially selected student of the main university in the country. I was lucky in that, having skipped a grade, I studied in the university up until the beginning of the war. If it had not been for that, I would have lost 4 years in the best case.

After the article in Pravda, I was expecting to become the star of the department. However, very soon I realized that to be the star in the Department of Mechanics and Mathematics of MSU was not the same as to be the star in an Aktubinsk high school. I met and made friends with many students who had attended mathematical high school circles hosted by the Moscow State University, were winners of the mathematical Olympiads, and who knew much more than I did. The person who had the most influence on me was Sasha Kronrod.[13] He was a very charming person who liked to look after the younger students. He used to give me problems on sets and functions. For example, he once asked me to describe the structure of closed rings of continuous functions on a compact metric space. Of course this is a well-known theorem.

Tumarkin taught a very well developed but not very inspiring class on analysis. Delone taught analytic geometry. He was a lively teacher with unconventional behavior. He used to invite freshmen to his house and share with them all kinds of gossip. I remember his story about how the Soviet mathematicians were allowed to attend the International Congress in Oslo because at the time Trotsky lived in this city.

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[9] In his memoir V.A. Efremovich writes that Luzin did a disservice to a very good textbook by Granville by introducing "philosophical observations … with rather paradoxical formulations" (see Conversations with a Moscow mathematician: http://www.uniyar.ac.ru/index.php/).

[10] The honors diplomas were later replaced with the traditional gold medals.

[11] http://en.wikipedia.org/wiki/Alexander_Gelfond

[12] The official publication, or "organ", of the Soviet Communist Party, *Pravda* became the conduit for announcing official policy and policy changes and would remain so until 1991 (en.wikipedia.org/wiki/Pravda).

[13] http://en.wikipedia.org/wiki/Alexander_Kronrod

Gelfand taught algebra.

O.K. He must have been very young.

E.D. He was 27 years old. Besides that, Kolmogorov started teaching a special course on the set theory. As a rule it is not easy to follow Kolmogorov, particularly so without preliminary background. I was reading Hausdorff's *Set Theory* all week in order to understand the previous lecture and to prepare for the following one. This was my main focus in the first semester. In the second semester, the dominant influence was Gelfand. The course he taught was a sort of introduction to functional analysis. He presented linear algebra as a theory of linear operators in a finite-dimensional Hilbert space. It was a novelty at the time. His book, published shortly after the war, was based on the material presented in this class. I was fascinated by this course. But I must admit that Gelfand's pedagogical approach was quite peculiar. He used to call on one single student out of 200 and ask questions, ridiculing every single error. It seemed that he derived pleasure from offending people.

O.K. He still likes doing it.

E.D. Once, having not clearly explained the connection between the transformation of coordinates and linear operators, he called on me and discovered that I didn't understud it very well. Still, after he noticed me, he invited me and Kronrod to his house. While his mother was serving soup, he suggested that we help him in writing a textbook on linear algebra. To begin with, we had to write the introduction explaining the concept of a vector — first intuitively and then axiomatically. We had written only a page or two by the time the war began. The book was finished after the war with the help of other collaborators.

The day the war started we were preparing for our physics exam. We learned about the German invasion from the speech by Molotov. I remember how that evening I and Sasha Kronrod were walking the streets of Moscow, and he said that he would join the army as a volunteer. Then we, students dug out ditches near the dorm to hide from air raids. By that time my mom's term of exile expired, but she couldn't settle in big cities nor could she live closer than 100 km (= 60 miles) to Moscow. Since she wanted to be closer to me, she settled in a small town of Mordves in Tula region, where she worked as a dentist. Irene was assigned to that same town after medical school. We met there. At 17 I was not subject to draft and had nothing to do in Moscow in the summer. When Irene went to Moscow on some business, my mom asked her to bring me with her.

I.D. Moscow was constantly bombarded at the time, and I was very anxious.

E.D. She found me in Ostankino, where I lived in the dorm and took me to Mordves with her. I remember that I grabbed a few books on mathematics to take with me.[14] It was in July. MSU was evacuated into Central Asia, so that there was no reason for me to go back to Moscow. Meanwhile, the Germans were advancing, and in October they came close to Moscow. Mordves was situated on a strategic rail route connecting Moscow with Donets Basin.[15] The Germans wanted to block that route. The Soviets started to evacuate Mordves. My

[14] E.D. Russian translations of courses of Mathematical Analysis by La Vallée-Poussin and Goursat (http://en.wikipedia.org/wiki/Charles_Jean_de_la_Valle-Poussin , http://en.wikipedia.org/wiki/Edouard_Goursat) accompanied me in evacuation and later in emigration. I still have them on my shelf.

[15] A heavily industrialized and important coal mining region in Eastern Ukraine.

mom and I received evacuation IDs. As to Irene, they wanted to leave her with the guerilla fighters.

O.K. Why?

E.D. Well, she was a doctor, and she was young. My mom went to the secretary of the regional Committee of the Communist Party whose daughters used to be her patients, trying to convince him not to do that. Finally, her arguments prevailed, and Irene received her evacuation ID as well. Since the railroad no longer functioned, the three of us, along with the pharmacist and her son, were provided with a horse and a cart. None of us had any idea how to handle this horse.

I.D. We barely managed to harness it …

E.D. Having traveled for a few km, we met some collective farm workers, who were supposed to drive their livestock east. We gave them our horse, and they took us with them. If the pharmacist had not had a store of pure spirits with her, they would not taken us. So we traveled with those herdsmen for a long time, spending nights in village huts.

I.D. Those peasants were in no hurry at all. They were saying, 'Why should we be afraid of the Germans. We have livestock. We'll give it to them, and they won't do anything to us. The opposite.' They were moving slower and slower, whereas the Germans were advancing really fast. At one point we heard that they were very close. But then we met pilots, who were transporting east on two trucks some parts of machinery for maintenance. One of them had his wife with him. I and Vera Yakovlevna approached him, lamenting our misfortune. He was a good person. He said, 'Sure, get in, but only in the back of the truck.' And so we rode in the back of the truck, even though it was freezing cold.

Part B

E.D. We drove for about two weeks. Occasionally, the trucks would get stuck in the mud. Finally we reached Penza, from where one could take a train. However, the train station was congested with people sleeping side by side on the floor. Many of them were infested with lice.

I.D. After spending three days and three nights there, we boarded a train consisting of livestock wagons.[16] Changing trains every now and then, we plodded eastward for another two weeks. The trains would stop unexpectedly and not move for hours, and just as unexpectedly they would start off. We had to endure cold and hunger.

E.D. In mid-November we finally arrived to Perm (then called Molotov). This was our preferred destination, because the Ministry of Aviation Industry — and uncle Ruva's family along with it — were evacuated there.

I.D. My grandmother and cousin were also evacuated there from Moscow.

E.D. My relatives were given a room in a very good house, in an apartment of some local official. They occupied a walk-through room. It was obvious that we could not stay there for a long time. In a couple of days I enrolled in the local university and got a bed in the dorm, in a room shared with maybe five other students. My mom stayed with her sister.

[16] During the war, livestock wagons were used for transporting people without any significant modification.

University buildings had no heat. The dorm was located in a barrack. Cold and hunger made it difficult to study. Only one university building was heated because it became the headquarters of the Ministry of Coal Industry evacuated from Moscow. Sometimes, in order to warm ourselves, we would slip into their library. After a while I was lucky to get a bed in a room that was adjacent to a kitchen serving the dining hall. Although it was much warmer, the room was swarming with bed-bugs. There was no way to fight them.

A distinguished member of the faculty was Sophia Alexandrovna Yanovskaya, the only professor of the Moscow State University who moved to Perm. She also lived in the dorm, in one room with her ailing son and two other women from Moscow who worked in other departments. She had a bad case of diabetes, while her son, Ima, 3 years my elder, suffered from schizophrenia.

In the spring semester of 1942 Yanovskaya was teaching a course on mathematical logic. Besides me, the class was attended by three other students from Moscow: Busya Pilchak, Olya Oleinik, and Misha Postnikov. Later Busya defended her dissertation under the guidance of S. A., while Olya and Misha went on to become professors of the Moscow State University. All three of them were younger than I. Following the tradition of the Moscow University, I organized for them a kind of mathematical circle.

To allow me continue with my studies of mathematics, S. A. assigned me to organize the mathematical library. Most books were piled on the floor in a small room. Among them were the works of Gauss[17], Weierstrass[18] and other famous mathematicians of the 19th century. As was the case with other valuable books, they belonged to the library of the University of Tartu, which had been evacuated to Perm during WWI. Thus I acquired a place for my studies.

I remember the incessant feeling of hunger. Still, I was in a much better situation than most of my friends. My mom began working as a nurse in a hospital in order to qualify for a worker's ration card. She subsequently swapped it with mine which allowed for a considerably smaller food ration. The most difficult was the period until the spring of 1943. Yet I did my best studying mathematics in the small library room. I set a problem for myself and got down to solving it. The task was to describe all closed subgroups of a finite-dimensional vector space. The answer is clear: it is the sum of the net and the subspace. I proved it, only to discover later that the problem had been discussed and solved in the 19th century by Kronecker,[19] Jakoby,[20] and Weierstrass. I wrote down my solution, and Sophia Alexandrovna sent it to Gelfand. Gelfand didn't reply, but when at the end of 1943 I came back to Moscow, he invited me to join a small group of young people in what later developed into the famous Gelfand seminar.

At the end of the spring/beginning of the summer of 1943 the Ministry of Coal Industry returned to Moscow. Their building was given back to the university. S. A. received two adjacent rooms there. She and her son occupied one of them. The other was given to me and my mom. After that we lived as one family up until the death of S. A. and even after. My mom and I usually administered the penicillin injections that she depended upon.

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[17] http://en.wikipedia.org/wiki/Carl_Friedrich_Gauss

[18] http://en.wikipedia.org/wiki/Karl_Weierstrass

[19] *en.wikipedia.org/wiki/Leopold_Kronecker*

[20] http://en.wikipedia.org/wiki/Carl_Gustav_Jacob_Jacobi

My mom was strongly advised 'to lose' her passport which contained restrictions imposed by the NKVD.[21] Thanks to Busya's father, who managed to strike a deal with the local police, she received a new, 'clean' passport. (The loss of documents was not something unusual given the wartime chaos).

In the meantime the Moscow University returned from evacuation. To recall to Moscow a professor who had been evacuated separately from the university was not an easy task: S. A. had left Moscow with her sister's family. One of her university colleagues succeeded in obtaining the necessary documentation through her husband, who was the head of the Perm regional Soviet administration. This colleague was on good terms with S. A., just like everyone around her. In addition, it was important for her and for her husband to know that S. A. was a veteran member of the party who had worked in the underground. I was authorized to return with her, while my mom stayed in Perm working in the hospital and taking care of the sick Ima.

When we got back to Moscow, additional problems arose. Before the war S. A. occupied a room in an apartment on Leningrad Road. The remaining two rooms were occupied by her sister's family. It turned out that, as a result of the house-manager's machinations with the apartment fees, that S. A. regularly sent from Perm, she forfeited the right to her room. The room was now occupied by some functionary. For a few months, while the battle to reclaim this room was being waged, we stayed with her brother. Finally, thanks to the influence of some prominent mathematicians, she got her room back.

My mom didn't have the Moscow *"propiska"*,[22] and to obtain such a permit for her was an unsolvable problem. After repeated refusals, a letter, signed by a number of important scientists, was sent to the nominal head of the country, Mikhail Ivanovich Kalinin.[23] The letter argued that S. A. Yanovskaya's important research and even her life depended on the continued support of the nurse, who became her mainstay during evacuation. Obviously, on their own these arguments were not compelling. But some of the people who signed the letter were held in high regard by the communist leadership. One of them was Otto Yulievich Schmidt,[24] the hero of the Chelyuskin expedition and the head of the GUSMP.[25] Incidentally, he also played an important role in our battle to reclaim S. A.'s room. And so Kalinin granted the residence permit to my mom. Kalinin didn't have any actual power. He couldn't help even his own wife, whom Stalin had sent to GULAG. However, since the petition had no political implications, he had no problem granting it. Once the decision was rendered, our problems got resolved with the speed of lightning. Such miracles did happen a few times in my life!

When my mom and Ima arrived, the four of us settled in one room. S. A. claimed that, for a research mathematician, the period of life before twenty-five is the most fruitful, and that any time lost at this period is irrecoverable. Wishing me to succeed, she let me work at her desk

[21] Predecessor of KGB (http://en.wikipedia.org/wiki/NKVD#History_and_structure)
[22] Permit for permanent residence in Moscow.
[23] http://www.britannica.com/EBchecked/topic/310205/Mikhail-Ivanovich-Kalinin
[24] http://en.wikipedia.org/wiki/Otto_Schmidt
[25] General Directorate of the Northern Sea Route (Glavsevmorput, GUSMP) - a state organization created in 1932 for national economic development in the Arctic and to ensure navigation on the

and worked at the dining table herself. All the while the war was raging on. The heat in the apartment was intermittent, and so we set up a small potbelly stove.[26]

S.K. What about the army?

E.D. Every year the medical commission declared me unfit for military service, sometimes due to my severe nearsightedness, sometimes due to the consequences of the bone tuberculosis, which I had contracted as a child.

But let's get back to mathematics. In the beginning of 1944 Gelfand commenced his seminar. Only a few people participated in it. At the time Gelfand started working on infinitedimensional unitary representations of Lie groups. I was assigned to talk about the works of Cartan,[27] Weyl,[28] and van der Waerden[29] on the classification of simple Lie groups. I couldn't quite wrap my head around van der Waerden's complex calculations and came up with my own approach to the final stage of this classification. A short paper presenting my approach was submitted to the *Mathematicheskii Sbornik* in 1944. There I introduced schemes of simple roots, now commonly referred to as *Dynkin diagrams*.

S.K. Was there also an article co-authored with Dmitriev before that?

E.D. No, this was later. It just happened so that it was published earlier but was in fact written the following year. I wrote my first mathematical paper in my fourth university year, and it was awarded the second prize in a student paper competition. The first prize was awarded to Rodnyanski's paper on planar continuums. Its subject was much more congenial to the research interests of Pavel Sergeevich Alexandrov, the chair of the jury.

In my fifth year I worked in Kolmogorov's seminar on Markov chains. The main subject was processes with continuous time parameter in a finite or countable state space. In his seminar Kolmogorov formulated a number of unsolved problems. Kolya Dmitriev and I were working independently on his problem: to describe the set *M(n)* of all characteristic numbers of stochastic *nxn* matrices. We solved it by two different methods. Following the advice of Kolmogorov, we decided to publish two papers as co-authors. Dmitriev published a brief note in *Doklady*[30] where he presented his method, while I published a detailed article in *Izvestiya*[31] where I gave a more complete description of *M(n)*. The complete description of this set was given a few years later by Karpelevich.[32]

Kolya Dmitriev was a very interesting person. He entered the university at the age of 15. In the fall of 1941 he was evacuated together with the university to Ashkhabad. Hunger was everywhere, and Kolya, who was quite good at abstract thinking, figured out that it would be

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[26] Small iron stove heated by wood.

[27] http://www-history.mcs.st-and.ac.uk/history/Biographies/Cartan.html

[28] http://www-history.mcs.st-and.ac.uk/history/Biographies/Weyl.html

[29] http://www-history.mcs.st-andrews.ac.uk/Biographies/Van_der_Waerden.html

[30] *Doklady Akademii Nauk SSSR* was a Soviet journal that was dedicated to publishing original, academic research papers. Today, it is continued by *Doklady Akademii Nauk*. http://en.wikipedia.org/wiki/Proceedings_of_the_USSR_Academy_of_Sciences.

[31] Izvestiya *Akademii Nauk SSSR*, *Matematicheskaya Seriya*

[32] I talked about the history of this problem and the contribution of Karpelevich to its solution at the meeting of the Moscow Mathematical Society held in honor of his memory. A video recording of my talk is included into the present collection.

possible to maximize one's calorie intake by exchanging all other rationed foodstuffs for butter. This didn't end well. He fell sick as a consequence.

O.K. This is a very sad story. I've heard it from Kronrod.

E.D. Kronrod also took part in the seminar. He contributed to the discussion of Kolmogorov's problems, but this did not result in a publication. When the war began, he enlisted in the army. Since he spoke German, he worked with a powerful sound amplifier used to broadcast to German positions. During his service he was wounded a number of times and by the end of 1943 was in bad health. However, despite his pleas, the army would not let him go. Luckily, Sophia Alexandrovna was able to help him. At the time the head of the Department of Science of the Central Committee of the Communist Party was a certain Suvorov, who prior to that had worked in her seminar and felt very much obliged to her. When she approached him, he phoned the Central Political Department of the Soviet Army and solved the problem. Consquently, Kronrod was placed at the disposal of the Moscow State University. It was one of many of Sophia Alexandrovna's charitable deeds.

O.K. This saved Kronrod.

E.D. The note in the *Doklady* was published earlier than my article on the simple roots. Again Kolya and I were runners-up in a student paper competition. What happened to Kolya next surely deserves mentioning. We both started our PhDs under Kolmogorov, but after a year Kolya disappeared. Many years later I learned from Sakharov's[33] memoirs that Kolya had made significant contributions to the creation of the Soviet hydrogen bomb. According to Sakharov, Kolya solved many of the mathematical problems faced by the creators of the bomb, and so everyone considered him a genius. He never defended his dissertation, but nevertheless received the highest government award, that of the Hero of the Socialist Labor.[34] Andrei Dmitrievich writes about him with much warmth. It was only after Stalin's death that Kolya resurfaced in Moscow and visited me. Naturally, he said nothing about his work. Even the location was a state secret. Our life paths took us in different directions.

I was recommended for a PhD program by Kolmogorov, Gelfand, and Petrovski. I still treasure the official document signed by Gelfand and Petrovskii. Although I continued working on Lie groups, I chose Kolmogorov as my adviser.

S.K. But why? Kolmogorov was not an expert in this field.

E.D. I had the option of working with Gelfand, but he liked to humiliate people, and I wasn't accustomed to that. Kolmogorov, on the other hand, conceived of mathematics as a single whole and encouraged his students to work in various fields.

Lie algebras remained my main research subject for quite some time. Yet I also published several papers on the theory of probability and mathematical statistics. My work on sufficient statistics received international recognition.

I defended my dissertation ahead of time. Wishing to keep me in the university and understanding the difficulties involved, Kolmogorov used his influence to sway the votes of the Scientific Council in favor of hiring me for a vacant position at the Probability Chair[35] which was

[33] http://en.wikipedia.org/wiki/Andrei_Sakharov

[34] http://en.wikipedia.org/wiki/Hero_of_Socialist_Labour

[35] Every faculty member in the Mathematics and Mechanics Department belongs to one of specialized Chairs. Those include the Chair of Probability Theory and the Chair of Algebra.

announced for an open competition. However, the Ministry of Higher Education had plans of its own and decided to send me to the Vitebsk Pedagogical Institute. I remember how Andrei Nikolaevich put on all his badges of honor and went to the Ministry to plead on my behalf. I was waiting in the corridor while he tried to explain to some top official that the decision of the Ministry was at odds with the law governing academic appointments. When Kolmogorov had left, I brought myself to ask this official, 'So how did it go?' He said, 'Well, he is a member of the Academy of Sciences'. In 1948 the Ministry decided not to pick a fight with an academician, and so I was hired as a senior instructor at Kolmogorov's Chair. Things might have turned out differently a few years later. I must confess that my decision to work with Kolmogorov instead of Gelfand was also influenced by the fact that my career prospects with Kolmogorov looked brighter. I have to say that at some point Kolmogorov became aware that the Algebra Chair was a more natural place for me at that time. Its head Kurosh was ready to make efforts to this end, but somehow it didn't work out—possibly because Kolmogorov had a much better chance to succeed. During my term at the Probability Chair, I taught several times basic courses on algebra, and among my students were Vinberg, Freidlin, Schur, Kirilov, and Arnold.

After a year I was promoted to the rank of docent.[36] In those days the promotion process was faster. Teaching a special course on Markov processes, I studied all the literature in the field, and so Markov processes gradually replaced Lie algebras as the main focus of my research. Starting from 1955, stochastic processes and probability methods in mathematical analysis became the main field of my research. Still, both of my dissertations — candidate's (defended in 1948) and doctor's (defended in 1951) — were devoted to Lie groups and algebras. Both times Gelfand and Malcev served as my official opponents. The third opponent of my doctoral dissertation was Kolmogorov. In his response he emphasized that my solution of the classic problem formulated as early as the 19th century by Sophus Lie, required, aside from new ideas, a massive amount of calculations.[37]

S.K. You told me some stories about university life during the first postwar years. It would be worthwhile to preserve them.

E.D. Yes. One of them has to do with the re-attestation of the faculty, which took place in 1949 or 1950. Headed by Ogibalov, the committee in charge of the procedure was drafting personal profiles of each faculty member at the Department of Mechanics and Mathematics. Those of Kolmogorov and Alexandrov said that their 'teaching contains elements of formalism'. The statement was tantamount to a political accusation fraught with big troubles. Thanks to Petrovskii, I think, the accusation was expunged. S.A. used to tell me that Ogibalov was the most terrifying person. Linked to KGB and the top Moscow Party circles, not only did he zealously implement their policies, but he tightened them up on his own accord while staying out of spotlight.

S.K. I also remember that you told me about some kind of explosion.

E.D. It happened in 1945 or 46, soon after the war. During the session of the Moscow Mathematical Society, suddenly a pungent odor spread over the corridor. It was claimed to be a

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[36] Roughly corresponds to an Associate Professor in the USA.

[37] Obviously, I used only pencil and paper. Only minor corrections were made after a subsequent computer check.

tear gas bomb. PhD students (my friends and I included) were invited one by one to the KGB headquarters on Lubyanka Street. S. A. thought that KGB staged the incident as a pretext for reestablishing a network of secret informers within the university. She recommended tell them that I was so absorbed in mathematics that I was oblivious to anything around me and so would not be of any use to them. I did exactly as she told me, and they didn't insist. We had to sign a statement that we would not disclose the content of our conversations. However, we shared the information with close friends.

S.K. Maybe you could tell us about the Second School.[38]

E.D. Well, that's quite a leap. My work with high school students started way back, soon after I returned from the evacuation. In 1943-4 and 1944-5 I supervised a section of the mathematical circle at the Moscow State University. On Sundays university professors gave lectures to high school students. After the first lecture in the beginning of the academic year, section leaders would compete among themselves and try to attract students to their sections by telling them about their plans. I competed with Sasha Kronrod and Isaak Yaglom. Many students joined Kronrod's section, a few joined mine. At first I had 10 students, but by the end of the year there were only three left: Uspenski, Friedlander, and Rosenknop. I had a notebook where I wrote down all the problems I gave and the names of those who solved them. The following year my section was the most popular. Many students of Kronrod switched to my section. (I am not quite sure, but possibly because Sasha was no longer involved in this project.) Among new participants were Chentsov, Karpelevich, Yushkevich, Berezin, Minlos, Balash. By the end of the year there were about fifteen. We worked on the four-color problem, arithmetic, modulo *p*, random walks, and many other subjects. Subsequently, this material was used for a book *Mathematical Conversations* co-authored by me with Volodya Uspenskii, a former member of my section. The book ran through several editions in Russian and was translated into a number of languages, including English and German. In the fall of 1945 I became a PhD student, and some students in my section were admitted to the Department of Mechanics and Mathematics. I organized a seminar for them. Uspenski, Karpelevich, Chencov, Balash were joined by new students. The most active among them was Dobrushin. Berezin, Yushkevich, Minlos and a number of others were still in school. I wanted to preserve my section, and I assigned Uspenskii to teach it. Apparently, it didn't meet for a long time, but the following year some of the participants joined my seminar. The seminar worked for several years under different names: Selected Problems of Modern Mathematics, Selected Problems of Algebra and Analysis… Then it split into two seminars: Probability Theory and Lie Groups. From time to time I would organize additional seminars for beginners. They served as a source of new recruits for the big seminar. In short, that was the beginning of my teaching career.[39]

[38] In the 1960s Moscow Second School had a special mathematical program initiated by I. M. Gelfand and run by Professors of Moscow State University with collaboration of their students. E. B. Dynkin ran this program in 1964-65 and 1965-66 academic years.

[39] Recollections on these activities can be found on this site in the Interviews with Dobrushin, Karpelevich, Uspenskii.

Part C - July 28, 1999

S.K. Let's continue our conversation.

E.D. Last time, when I talked about my childhood, I said nothing about my nanny. Yet her role in my upbringing may be compared to that of Arina Rodionovna in the life of Pushkin. Her full name was Agrippina Anisimovna, but everyone used to call her Grusha.[40] She had been living with my family well before my birth and stayed with us while we were still in Leningrad. Being past her prime (so it seemed to me at the time), she liked to reminisce about the good old peaceful days, i.e. before WWI. Contrary to the official Soviet propaganda, she claimed that life had been quite good then: food supplies were abundant, and everything was cheap. Her husband, Vanya, was a woodworker specializing in red wood. They even had some savings, 2000 rubles, a hefty sum at the time. She was very fond of me and even thought that my parents did not spend enough time with me. I was also very much attached to her. She was illiterate and extremely religious. When I learned to read in the age of 6 or 5, I used to read the Gospels to her, imbibing the Christian faith in the process. Later, however, having read a lot of popular scientific literature, I realized that the existence of God is not supported by scientific evidence and became an atheist.

As a child I believed that communism is the bright future of all humanity. Even after my father had been arrested and murdered, I continued to perform at school events, concluding my speeches with the words 'Thanks to comrade Stalin for our happy childhood'. These words never failed to elicit bursts of applause from the audience, and I liked it. In the absence of any alternative, the systematic communist propaganda of this kind corrupted the young!

Skipping quite a few years, I shall now turn to some episodes of my university life in the postwar years.

In 1949 or 50 the party officials at the Department of Mechanics and Mathematics uncovered an 'anti-Soviet group', which comprised students of the fifth and final year who were recommended for PhD programs by their advisers. The group was titled *"Tesnoe Sodruzhestvo" ["Close Concord"]*. A substantial part of them were Jews. They discussed the well-known problems associated with that fact. Some of advisors also touched on the issue of anti-Semitism in their private conversations with students. Communist authorities, however, denied the existence of government sponsored anti-Semitism. Any assertions to the contrary incurred the charge of 'anti-Sovietism'. The 'anti-Soviet' character of the group was supported by the fact that, while celebrating their birthdays, members of the group did not toast Stalin's health.

O.K. How did they find out about it?

E.D. Students were summoned and interrogated one by one. They were threatened with expulsion from the university. One could imagine they had to answer the question about the toasts.

Next, the entire faculty was assembled. Some were accused of making political mistakes, a serious charge given the sense of hysteria holding sway in the country in the final years of Stalin's life. Not being associated with any of these students, I was just sitting and listening. Alexander Genadievich Kurosh[41] was compelled to say, 'Everyone knows how

[40] A diminutive for Agrippina.

[41] http://www-history.mcs.st-and.ac.uk/Biographies/Kurosh.html

sensitive I am about any expressions of anti-Semitism, and therefore you may be tempted to believe that I said these things. But in fact I didn't'. If S.A. had attended the meeting, she would have been in the same situation, but she was in the hospital. The main prosecutors were Gorbunov, the secretary of the party organization in the Department of Mechanics and Mathematics, and Lenskii. By the way, the latter said that luckily there was an honest person in this group who reported everything. Lenskii and Ogibalov, who both worked at the Chair of Plasticity in the Department of Mechanics, were apparently the stage directors of this 'show'. However, Ogibalov didn't speak, choosing to stay in the shadow in his usual way. I also remember the speech of Lev Abramovich Tumarkin, who accused Delone that his student, Shafarevich,[42] was politically passive and was not involved in any social activities. In our freshmen year Tumarkin taught a course on analysis. During one of the lectures he received a note congratulating him on joining the ranks of the communist party. He read this note aloud and said that this was a landmark in his life. He was dean before the war but, being Jewish, could not hope to advance his administrative career any further.

S.K. So what happened to these students?

E.D. Most of them were expelled just before graduation and for many years could not receive diplomas and work in their profession. A few were treated not so hard. They were not accepted for PhD programs but were allowed to graduate and find jobs in other institutes.

Here is another story from those times. In 1948 the annual session of VASKhNIL[43] condemned genetics as 'bourgeois pseudo-science'. Lysenko[44] gave a speech, which received the approval of Stalin. The Belorussian mathematician Yerugin was aspiring to play a similar role in mathematics. Distinguished Leningrad mathematicians, Alexander Danilovich Alexandrov[45] and Andrei Andreevich Markov,[46] in a session of Moscow Mathematical Society accused Kolmogorov in set-theoretical idealism.

O.K. Who would expect that from them?

E.D. Well, Markov's behavior can be explained by the fact that he was a constructivist. I don't think he harbored bad intentions. He simply jumped at the opportunity to preach constructivism. A.D. Alexandrov on the other hand claimed that the direction of Kolmogorov's research was wrong and had to be changed. I remember that Andrei Nikolaevich asked me about the position of S.A. on this issue and whether she was prepared to support these accusations. Obviously, she wasn't. On the contrary, she tried to defend Kolmogorov, even though her own situation was difficult. I remember another session, which was convened in order that the mathematicians might draw conclusions from the resolution of the Central Committee with regard to biology. Yanovskaya had to give a talk on this issue. Refusing was out of the question. Faculty expected the worst and attended the session in large numbers. Even Sergei Natanovich Bernstein, who was sick and hadn't appeared in public for a long time, made

[42] http://en.wikipedia.org/wiki/Igor_Shafarevich
[43] http://en.wikipedia.org/wiki/VASKhNIL
[44] http://www.britannica.com/EBchecked/topic/353099/Trofim-Denisovich-Lysenko
[45] http://en.wikipedia.org/wiki/Aleksandr_Danilovich_Aleksandrov
[46] http://en.wikipedia.org/wiki/Andrey_Markov_(Soviet_mathematician)

an effort to show up.[47] S.A. came up with the following solution. She criticized the mathematical idealism, attacking only foreign scholars, who couldn't care less about it.

O.K. Ingenious!

E.D. Everyone recognizes her role in the development of Soviet mathematical logic, a field that she had to defend against encroachment by party ideologists. In particular, she managed to set up the Chair of Mathematical Logic in Mekhmat and to bring Markov as the head of this Chair. She developed a very warm relationship with him. The havoc wreaked upon biology had only minor consequences for physics and mathematics. Stalin wanted to have a nuclear bomb. To get it he needed physicists, who in their turn needed mathematicians.

I probably should say a few words about my only encounter with Lavrentiev. You may have heard about the role he played (alongside Sobolev and Khristianovich) in organizing the Siberian branch of the Academy of Sciences. According to Kolmogorov, Lavrentiev was a good friend of Khrushchev and even used to recommend him the best places to swim. Their friendship notwithstanding, Khrushchev didn't like Lavrentiev's idea of building separate cottages for academicians in Akademgorodok.[48] I met Lavrentiev in China on the way from Shanghai to Hangzhou. The two of us and our Chinese entourage were the only people in the coach. I was shocked that on our first meeting he immediately went into a tirade against Gnedenko — all the more so because I was more used to the attitude of Kolmogorov, who in our conversations would never say anything bad about anyone, even the mathematicians he clearly didn't like. No doubt, Gnedenko deserved some of the criticism leveled at him, but what amazed me most was the pleasure that Lavrentiev derived from describing Gnedenko's misfortunes in Kiev.

S.K. Maybe you could tell us about our admission to the Mekhmat after our graduation from the Second School. That year the number of prospective students doubled because of the change from 11 year to 10-year secondary education.

E.D. It was well known that the admissions committees didn't particularly like the graduates of mathematical schools, especially if they happened to be Jews. For this reason I was very much concerned about my students and tried to do everything within my power to help the best of them to enter Mekhmat.

O.K. Have you participated in the entrance exams?

E.D. Not in Mekhmat. Only specially trusted people were chosen for this task. I, as were many other faculty members, was delegated to do this in other departments.

Facing such prejudice and discrimination, I even wanted to appeal for help to Ella Maximova, the reporter from *Izvestiya* who published a long article about my experience in the Second School. But on second thought I realized that in matters of politics she would not be able to help even if she wanted to. There was no problem admitting Kuznetsov, but other worthy prospective students (e.g., Weiber, Shapiro, Gershman) were failed. I asked Andrei Leontovich, a student at the time, if his father, a famous physicist and academician, could help. I considered two possibilities: to oppose the policy of discrimination as a matter of principle or to fight for the most deserving candidates. Andrei replied that the latter was out of the question but that he would discuss the former with his father. He later told me that his father

[47] http://en.wikipedia.org/wiki/Sergei_Natanovich_Bernstein

[48] http://en.wikipedia.org/wiki/Akademgorodok

thought that the case was hopeless. I talked to Kurosh, but he said that it would not be fair to apply special criteria to the students of the Second School only because they were under the tutelage of Dynkin. Then I said, 'Imagine you are standing on the beach while several people are drowning. You can save some of them but not all. Would you decide not save any of them?' The argument seems to have made some impression upon him, but he refused to do anything. Girsanov approached Shidlovski, the secretary of the Mekhmat party organization. The latter said that the person to approach about this problem was the dean. The dean – Nikolai Vladimirovich Efimov was not involved into admissions process and was away in his dacha.

The finalresort was to approach Petrovsky. I went to his dacha, and he told me, 'I can't do much but as rector I am allowed to admit five candidates above the quota. Why don't you decide between you, Kolmogorov, and Gelfand who these five should be. Kolmogorov was in charge of the physics and mathematics boarding school, whereas Gelfand was head of the correspondence mathematical school. Ivan Georgievich accompanied me back to the train station, which was a few kilometers from his dacha, and while we were walking he said, 'You know, I never received any instructions with regard to the Jews.' Kolmogorov and Gelfand named their candidates, and I suggested that Weiber and Shapiro[49] be included. With this list I was soon on my way back to Ivan Georgievich. I arrived at about 7 or 8 a.m. He was woken up. It was clear he didn't feel well. He wrote a note to the prorector and handed it to me. This time he didn't walk me to the station.

Some of those who were not admitted to the Moscow State University got in to the Moscow Pedagogical Institute. I was trying to effect their transfer to the MSU. The first candidate was Sasha Baril. Petrovsky promised to transfer him at the first available opportunity. Sasha passed all his first year exams and was admitted to MSU as a second year student.

I conclude with another nice story. A professor of MSU, Fedorchuk was visiting the USA on the invitation of the wife of Rudin, the author of the famous textbooks on mathematical analysis. She is also a mathematician. For a few days, Fedorchuk came to Cornell. We work in different fields and I did not meet him on this visit. Later I learned that his father who had another family and did not bring him up was the chairman of the KGB. When I came to Moscow during perestroika, I decided to visit our old apartment in the MSU Faculty House on Lomonosov Avenue. I took an elevator to the eighth floor and asked the lady who opened the door, 'Is this Professor Dynkin's apartment?' She said, 'No, this is Professor Fedorchuk's apartment'. I apologized and walked back to the elevator. But at this moment the owner himself stepped out of the door and said, 'Dynkin left to America a long time ago'. I thanked him but did not reveal my identity.

[49] Now both are Professors at American universities.