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MATHEMATICAL LIFE

I. I. GORDON WHO WAS AN ADRESSEE OF L. S. PONTRYAGIN* (INTRODUCTORY NOTES)

E. I. Gordon#

I put before the readers the letters of the eminent mathematician academician Lev Semenovich Pontryagin to my father Izrail Isaakovich Gordon. These letters were written between 1937 and 1969, and contain many interesting facts, pertaining not only to the history of mathematics but also to Russian life during that period. That is why these letters are—I think—of interest not only from the point of view of the history of mathematics, but also as a true-to-life account of the relevant period.

It is well known that L.S. lost his sight at age 13. He did not use the alphabet for the blind and typed his papers on an ordinary typewriter. Hence there are many grammatical mistakes in the original letters. Of course, these mistakes have been corrected in the printed versions of the letters.

The purpose of my introductory remarks is to tell about the recipient of Pontryagin's letters and about other people and events mentioned in them. Since the letters cover a very long period, it is not surprising that, in time, the relation of L.S. to various people mentioned in the letters changed. Sometimes he makes very harsh statements about some people. As a rule, such statements reflect momentary states of mind rather than his considered view of the people in question and characterize his way of speaking. The letters are uncut printed versions of the originals.

I.I. was the first graduate student of L.S. He entered graduate school in 1932 and graduated in 1935. The small age difference between student and teacher (two years) and their youthfulness helped them to become close friends. (It is well known that at 24 L.S. was already a world-famous mathematician.) Their friendship continued until 1969. During all this time they wrote letters to one another. Only three of Pontrygin's letters from the period before WWII have survived. Apparently, this is due to the fact that I.I. and his family were evacuated from Voronezh to Kazakhstan and their house in Voronezh was completely destroyed during the war. I have a copy of a single letter of I.I. to L.S. (This letter contained a question on the proof of the well-known Andronov–Pontryagin theorem, which arose when he was writing the book [12]. According to I.I. quick answer by L.S. allowed to overcome his difficulties).

* The letters of L. S. Pontryagin to I. I. Gordon, Istorico Matematicheskie issledovanija (Investigations in the history of Mathematics). Russian Academy of Science, Institute of the History of Science and Technology, second series, issue 9 (44), 2005, p. 27–208.

#Gordon E. I. (2005) I. I. Gordon who was an addressee of L. S. Pontryagin (Introductory notes), Ibid, pp. 14–26. Translated from Russian by Abe Shenitzer.

I.I. was born on June 16, 1910 in Grodno into the family of the engineer Isaak Israilevich Gordon. His father was a graduate of the famous German Polytechnic in Karlsruhe and was therefore permitted to live outside the Jewish Pale of settlement. For a while the family lived in Petersburg, where I.I.'s mother died in 1913. Then the family moved to Kharkov, for I.I. Senior, a committed bolshevik and member of the VKP(b)*, occupied an important post in the Ukranian Narkompros**. To run ahead, I mention that his intercession for a repressed friend resulted in his exclusion from the party. He was saved by some miracle, and to the end of his life (he died in 1972 at the age of 94) remained a committed Communist.

In 1927, I.I. graduated from a technical school in Kharkov and went to Moscow to study mathematics at Moscow State University. At that time he was a committed member of the Komsomol, a very natural thing for a 17-year-old Jewish youth. But during his very first year at MSU, he was expelled from the Komsomol as a trotskyite. All soviet students were taught in a course of the history of the CPSU that "on the occasion of the celebration of the tenth anniversary of the Great October Revolution a brazen trotskyits sortie was organized: the trotskyites demonstrated and used trotskyite, rather than bolshevik, slogans." During a subsequent meeting of the Komsomol they were all expelled from the Komsomol. Of course, as a committed bolshevik, I.I. condemned the trotskyites and shared the view that they should be expelled from the Komsomol. But when the question was posed at the meeting whether the trotskyites should be allowed to explain their position, I.I. thought it obvious that they should be allowed to do so. When a vote was taken, it turned out that I.I. was the only one to vote yes. Then the secretary of the Komsomol organization Dimitrii Abramovich Raikov, who later became a famous mathematician, expelled him from the Komsomol. I.I. told me that in those years, Raikov was such a fanatical Communist that he was compared with members of the Committee for Public Safety of the French Revolution. Later, in the 1930's, Raikov was himself expelled from the party and sent to Voronezh. For two years he taught at Voronezh University but was later acquitted and readmitted to the party. Then he returned to Moscow.

In 1927, I.I. was readmitted to the Komsomol by some very high instance. After completing a year's work at MSU he went to Leningrad, for he could not find an apartment or even a room for living in Moscow.

In Leningrad, I.I. studied together with, and became a close friend of, Georgii Rudolfovich Lorentz. Later Lorentz became a famous expert in approximation theory. He emigrated from the USSR during the war and worked for many years at the University of Texas in Austin. In his recently published recollections [1], Lorentz mentions the fact that I. M. Vinogradov taught a course that dealt with his research, and that he and I. I. Gordon were the only listeners. The lectures took place in Vinogradov's home. After completion of his university studies, I.I. worked for a year as an assistant at LSU (Leningrad State University)—he ran practice sessions for G. M. Fikhtengolts—and in 1932 became a graduate student at MSU (by then he had no trouble earning a living). Initially he wanted to study number theory, but his examiner at the entrance examination was L. S. Pontryagin, and the encounter with Pontryagin directed his interest to topology. L.S. became his supervisor.

I.I. obtained his first result [2] in the joint seminar of Lyusternik, Pontryagin, and Shnirelman. In it he proved that on any n-dimensional manifold there is a function with $n+1$ critical points. This showed that the lower bound on the number of critical points of a smooth function on a manifold, obtained earlier by Lyusternik and Shnirelman, was exact. For this paper I.I. won the first prize in a competition of papers by graduate students.

*The first abbreviation of CPSU—Soviet communist party.

**State Department of Education

In 1935, I.I. defended a candidate dissertation*. He was one of the first to defend a dissertation after the introduction of scholarly degrees in the USSR. The dissertation was later published in the Annals of Mathematics [3]. In it, simultaneously with Kolmogorov and Aleksandrov and independently of them, I.I. introduced a construction of a cohomological ring. All three lectured on this topic at the famous international topology conference in Moscow in 1935 (J. Alexander. On rings of complexes and combinatorial topology of integration theory; A. N. Kolmogorov. On homology rings in closed sets; I. I. Gordon. On invariants of the intersection of a polyhedron and its complementary space. Ed.) In this connection, the famous Swiss topologist H. Hopf wrote: "For many reasons, the year 1935 turned out to be an especially important landmark in the evolution of topology. In September of that year there took place in Moscow "The First International Conference on Topology." The independent lectures of J. Alexander, I. Gordon, and A. N. Kolmogorov initiated the theory of cohomology. (The theory goes back to S. Lefschetz, who introduced the notion of a pseudocycle in 1930.)

What impressed me, and, of course, other topologists, most was not the emergence of cohomology groups—after all, they are just groups of characters of ordinary homology groups—but the possibility of defining multiplication of arbitrary complexes and more general spaces, that is, the emergence of *cohomology rings*, which are generalizations of the ring of intersections in the case of manifolds. Before this development we thought that such a situation could arise only because of the local "Euclideanness of manifolds" [4, p. 11].

Gordon's constructions of multiplication of cohomologies differs of those of Alexander and Kolmogorov. Their constructions are identical. Later, H. Freudenthal [5] proved that the isomorphism of the Gordon and Alaxander–Kolmogorov rings (in this connection see the paper of L.S. of 1 April 1937).

In spite of the fact that I.I.'s dissertation was at the time a rather remarkable event in topology, it was approved by VAK** only in 1938. The delay was connected with political problems. As noted, I.I. was expelled from the Komsomol as a trotskyite in 1927 by a primary instance but reinstated by some higher instance. On 1 December 1934 one of the Soviet communist leaders, S. M. Kirov was killed***. His murder was blamed on trotskyites and zinovevites who were subjected to extensive and intensive repressions. The first to be shot to death without trial were scores of prisoners serving sentences resulting from their being accused of counter-revolutionary activities. Lists of the executed were printed in Pravda under the heading: "In response to the murder of Comrade Kirov, the following enemies of the people were shot to death..." Then there was a purge in the party, followed by a purge in the Komsomol. In the case of the Komsomol, all those who were ever penalized were automatically expelled. One of the expelled was I. I. Gordon. After that, the accusation of being a trotskyite pursued him practically until the outbreak of the war. After the war, when filling out questionnaires, he did not mention that he was expelled from the Komsomol. He thought that he got away with this because the relevant archives were lost during the war. By some miracle he survived and evaded the gulag.

I wish to note that in spite of his having been expelled from the Komsomol as a result of the charge of trotskyism, I.I. could, and did, rely at the time on constant assistance of both Pontryagin and P. S. Aleksandrov. It should be pointed out that, "assistance" has two

*The candidate degree is equivalent to our Ph.D degree, Trans.

**Higher Certifying Commission of the state department of education. All Candidate Science and Doctor Science Degrees granted by Universities in the Soviet Union had to be approved by VAK. The same procedure is used in Russia now.

***It is well known that the assassination of Kirov was organized by Stalin, who used it for extermination of his political opponents.

meanings, "ordinary" and "formal". Thus L.S. and P.S. helped I.I. to find employment, wrote excellent letters of recommendation for him and in addition, tried hard to ensure approval of his candidate dissertation by VAK, in spite of his being a "politically questionable person." L.S. and P.S. submitted to VAK a very positive testimonial relating to I.I.'s candidate dissertation. Had I.I. been arrested, this could have had dismal consequences for both of them. What follows is the text of one of their references.

Reference

I.I. Gordon completed successfully his training for research work at the Mathematical Institute of Moscow University (beginning in 1921, this was the scientific and research institute of mathematics and mechanics; beginning in 1935, this was the scientific and research institute of mathematics (headed by A. N. Kolmogorov), Ed.) and defended a very interesting dissertation on homological properties of complements of polyhedrons in n-dimensional space for which he was awarded the degree of a candidate of the mathematical sciences. Before that, while still a graduate student, I. I. Gordon completed a paper which won the first prize in a competition of papers by graduate students. This paper was published in the Proceedings of the second all-Soviet mathematical conference to which it was submitted by the author. I. I. Gordon's dissertation was published in the American journal Annals of Mathematics at the invitation of its editors.

I. I. Gordon's papers deals with difficult current questions of topology and its applications and show that their author has a creative mathematical talent. They show that I. I. Gordon is a very substantial mathematical researcher.

I. I. Gordon gave a lecture on his investigations at the First International Topology Conference, which took place in Moscow in September 1935.

In addition to being a gifted young scholar, who has already embarked in a fully creative manner on the road to independent scientific research, I.I. Gordon is also a university teacher with high scientific culture and good pedagogical qualities. We can attest that his teaching work at Moscow University was very successful.

In summary, the undersigned regard I. I. Gordon as a talented young mathematician who has already made a valuable contribution to science and one who provides solid reasons for expecting him to achieve further solid successes. Also, he is undoubtedly a valuable university worker who has the essential qualities to give competent lectures in many advanced areas of mathematics which require the lecturer to have very high mathematical qualifications.

Corresponding member of the USSR Academy of Science and doctor of mathematical sciences

P. [S.] Aleksandrov

Professor of Moscow State University and doctor of mathematical sciences

[L. S.] Pontryagin

Crimea, Bati-Liman, 17 September 1936

(The reference was written by P. S. Aleksandrov by hand. The signatures of P. S. Aleksandrov and L. S. Pontryagin were verified by the learned secretary of the Mathematical Institute for Scientific Research on 4 November 1936. The document is kept in the personal archive of I. I. Gordon.)

Were P.S. and L.S. aware that supporting a "trotskyite" spelled danger for them? Hard to say. It seems to me that they never understood this or, simply, never gave it a thought.

I once asked I.I. whether he realized that there was the threat that he might be arrested at any moment. He replied that he never thought of this, although after 1934 he changed his views, and to the end of his life his attitude vis-a-vis the Soviet authorities was one of total enmity. He told me: "At that time I gave it no thought, just as you don't think of death every day." It is possible that such a defensive reaction of the organism is the basis of all courage, and throughout his life, I.I. was a remarkably fearless person. At that time there were people in I.I.'s milieu who reacted altogether differently. For example, in 1938 I.I. moved to Voronezh and got to know his future wife who, at the time, also had problems with the NKVD*. At that time, Nikolai Vladimirovich Efimov. I.I.'s friend from the time of their graduate days, and his wife Roza Yakovlevna Berri, tried to talk I.I. out of associating with her. They told him that both of them had damaged reputations and it was possible to attribute to them the creation of a counter-revolutionary organization.

After completing his graduate studentship, I.I. began work at the university of Saratov. He was offered employment by Gavriil Kirillovich Khvorostin, the rector** of the university between 1935 and 1937. He said that he wanted to turn his university into a "Göthingen on the Volga." That is why he offered positions to such famous mathematicians of the older generation as I. G. Petrovskii and A. Ya. Khinchin, and to "young hopefuls" such as Vietor Vladimirovich Wagner and I. I. Gordon. V. V. Wagner was born in Saratov and worked all his life at Saratov State University. He became a famous algebraist and geometer. Wagner belonged to the large group of graduate students who defended their dissertations but was one of only two who were granted the degree of doctor of mathematical sciences on the basis of their defense. This was in 1935. The friendship of V. V. Wagner and I. I. Gordon continued throughout their lives. I.I.'s archive contains many letters of this remarkably interesting man who knew at least ten European languages and was a connoisseur of history and literature.

I.I. Gordon lived in Saratov between 1936 and 1937. He told me a great deal about this period. I rely on my memory for the most interesting fragments of his account.

The windows of I.I.'s room faced the famous Saratov jail. The street before the jail was full of women who wanted to catch a glimpse of their husbands in the windows of the jail. On a "beautiful" day all this came to an end—at night the jail windows were covered by shutters known as muzzles—inclined shutters that let light penetrate into the cells but made it impossible for their occupants to see the street.

In the streets, one encountered many exiled Leningradians. They stood out in the crowd due to their intelligent and aristocratic "capital" appearance. I.I. mentioned a certain old bolshevik, a red professor (a member of N. I. Bukharin's Institute of the red professoriat) deported from Moscow, who also quietly vanished from sight. The red professor invariably walked alone and always had his red emblem medal pinned on his chest.

I.I. lived in a house with 28 apartments. In the 26 of them at least one of a family members was arrested. A guard sat in the entrance. Every day when I.I. passed the guard, the latter whispered: "today they took away so-and-so." One day, when I.I. was leaving the house, he noticed a new guard. The new guard told him that the old guard was arrested.

It seems that the fact that the university management hired scholars from other cities was detrimental to the allocation of fiats to local workers. This angered some of them and resulted in their starting various intrigues (it was not only "Moscovites" who "turned ugly over flat shortages" as it was mentioned by Voland in the popular novel "Master and Margarita" by M. Bulgakov). I.I. remembered that one day, after a meeting of the learned council, Rector

*the abbreviation for the State Security Department later famous as KGB.

**the Russian analog for the university president.

Khvorostin quoted Yesenin's "You can't manage a brute with a dry branch."* I.I. was the first victim of these intrigues—his "trotskyism" came to light and the rector was forced to dismiss him. He went to Moscow to obtain a reinstatement in Moscow. At that time the Moscow metro had just been opened, and I.I. remembered the depressing effect on him of a sign on the metro door which read: "No outlet". Nevertheless, his dismissal was judged unlawful. Not only was he reinstated but he was paid for half a year of forced unemployment. I remind the reader that this was 1937.

But I.I. did not work very long. At the end of 1937, rector G. K. Khvorostin was arrested and subsequently died in prison. After his arrest, I.I. was immediately dismissed. The dismissal had the following wording: "to be dismissed as a former trotskyite, offered work by an enemy of the people." This time there was no hope for reinstatement. What saved the day was the fact that the number of unemployed who lost their positions for similar reasons was staggering. It seems that a decision was taken on a very high level of government that as long as these people were free (the free people were probably a minority) they should work. M. E. Koltsov** wrote an article in "Pravda" about the "overcautious persons" (this fact was described by L. K. Chukovska in her famous novel "Sofya Petrovna"). Then I.I was called to the Narcompros and asked to choose a place of employment. He wanted to return to the University of Saratov (which shows that he did not fully understand what was happening and failed to understand the danger that threatened him). While his interlocutors did not rule out his request, they amicably advised him to give it up. Then he chose Voronezh university, where N. V. Efimov was in charge of the division of geometry. According to I.I., N.V. was terrified by the fact that his division would employ so politically compromised a person but he could not do anything, for he remembered his friendship with I.I. which dated back to the days of their graduate studentship. Later Wagner told I.I. that members of the NKVD asked him about I.I. But at the time the NKVD did not look for people in other towns. Why mess about elsewhere if one could always find a victim on the spot? It seems that this saved I.I. from being arrested. Had he stayed in Saratov, his arrest would have been unavoidable.

Shortly after I.I.'s arrival in Voronezh was an event of greatest significance for me, the author of these lines—Izrail Isaakovich got to know his future wife, my mother, Nina Aleksandrovna Gubaŕ. They got married in the summer of 1938.

N. A. Gubaŕ was born in Petrograd into a family of doctors on July 29, 1915. After the revolution and the civil war the family ended up in Voronezh. N.A.'s father, an excellent therapeutic doctor, died at the age of 42. N.A.'s older brother, Mikhail Aleksandrovich, was arrested in 1933 and sentenced to 5 years in a prison camp for being a member of a theosophical circle. The judge explained to him that "at this time your circle is not counter-revolutionary, but we can't wait until it is transformed." Just as my parents, so too, M. A. Gubaŕ was lucky. After serving his sentence, he was freed in 1938, readmitted to the medical institute from which he graduated before the war, served during the war as a sanitary inspector, and then, for the rest of his life (he died in 1969), he did research in military hygiene, was a colonel in the medical service, and a doctor of sciences. The luck I write about consisted in the fact that he was not arrested a second time, as were most of political convicted prisoners that were released at that time.

N. A. Gubaŕ was a graduate of the department of mathematics of Voronezh University. Then Voronezh was a rather impressive mathematical center. As mentioned earlier, D. A. Raikov taught in Voronezh between 1933 and 1935. After completing his graduate studentship and defending his dissertation, N. V. Efimov was appointed chair of geometry.

*In Russian "dry branch" sound similar to his last name—"khvorostina".

**A popular Soviet journalist, who was arrested and shot to death a couple of years later.

Boris Abramovich Fuks was chair of functions of a complex variable, and Maksimillian Mikhailovich was chair of analysis. Victoria Semenovna (Vitya) Rabinovich was acquainted with L. S. Pontryagin back in Moscow. He mentioned her in his autobiography [6]. L.S., as well as L. A. Lyusternik, delivered lectures in Voronezh on a number of occasions.

At the time all of these people were very young and students and teachers formed a single group. N. A. Gubaŕ recalled that when N. V. Efimov was supposed lecture and was not, in class, students ran to his apartment at the university to wake him up. Fellow students of N. A. Gubaŕ were: Roza Yakovlevna Berri, Anna Aleksandrovna Gurevich, who later married Vladimir Abramovich Rokhlin, and Aleksandra Ivanovna Tsvetkova, who later married Aleksander Grigofevich Sigalov. All of them maintained friendly relations with L. S. Pontryagin and are frequently mentioned in his letters.

One other student belonging to this group was Vladimir Ivanovich Sobolev, later a well known expert on functional analysis. Sobolev and L. A. Lyusternik were the joint authors of the first Russian textbook on functional analysis (L. A. Lyusternik, V. I. Sobolev, Elements of Functional Analysis, Moscow, 1951 (Ed.)).

I wish to say a few words about yet another student in this group, a man whose life was difficult and interesting. He was Nikolai Aleksevich Zheltukhin. He was arrested when he was a third year student. His arrest was the result of a denunciation by one of the comrades who reported the fact that Zheltukhin was critical of the collectivization and hunger in Ukraine. He told us what had happened to him when he visited us at home in Gorkii, in the 1970s. I tell his story from memory. First he ended up in camps in the Arkhangelsk district where he worked in forest clearing. There he felt that his strength was giving out [2]. Somebody told him that if a prisoner invented something, he could send a description of his invention to a special section of the NKVD, and it could happen that the person in question would be transferred to one of the so-called, "sharashka's", special secret research institutes, in which prisoners worked. Living conditions in the "sharashka's" were incomparably better than in the camps (see A. I. Solzhenitsyn's "ln the first circle"). When it comes to his scientific interests, N. A. was at the time a pure mathematician, and had written a paper on descriptive set theory. But when he was still a schoolboy he read an article about tractors in the journal, *Technology for the Young* and figured out that a certain mechanism described in the article could be adapted to planes. N.A. didn't take his invention very seriously but saw no other chance of survival. He described his invention and dropped it in the mailbox on a pine tree. To his amazement, he was transferred to "sharashka" and worked under S. P. Korolev, the future inventor of spacecraft. His invention was evaluated by academician B. S. Stechkin. He was a prisoner at the time but headed a commission which evaluated inventions. Since Stechkin he tried to save as many people as possible, he would often come up with the conclusion, "It makes sense to send for the author" even if the "invention" was worthless (this benevolent activity of B. S. Stechkin is also described in "In the first circle"). N.A. told us that he once ran into Stechkin and had the check to ask him whether he remembered his—Zheltukhin's—invention and what he thought of it. Stechkin replied: "Of course, I remember. You, my friend, wrote rubbish. What will take place is cooling, not heating." And went on to explain why. H. A. Zheltukhin's subsequent scientific lot was very successful. A few years after the end of the war, he was freed, worked for the rest of his life in the Institute of Mechanics in the Novosibirsk Academic Village, and became a corresponding member of the Academy of Science of USSR.

N. A. Gubaŕ was more than once called to the NKVD in connection with Zheltukhin. She refused to give any depositions, behaved in a provocative way, but somehow was not arrested. All that happened was that the NKVD wrote a letter to the university about her

improper behavior. She was not even expelled from the university (she was not a member of the Komsomol). All that happened was that she was criticized at a meeting. Nevertheless, many of her friends were later afraid to associate with her, and, until the arrival of I. I. Gordon in Voronezh, she was, as I mentioned, isolated.

I.I. and N.A.'s first son, Aleksandr, was born shortly before the outbreak of the war. When the evacuation of Voronezh University to Siberia was ordered in September 1941, their family, as one with a tiny baby, was among the first to be evacuated. (As a candidate of science, and a person with poor eyesight, I.I. had a "white ticket" and was not a subject for the draft into the army.) When their train stopped in Petropavlovsk (Kazakhstan), they heard a radio announcement about a change in the evacuation order of Voronezh University. It made no sense to travel farther, and, according to the conditions of the war time, it was impossible to return to Voronezh. They were employed as high school teachers of mathematics and physics in a village named Bolshe-Izyum in the Petropavlovsk district. Living conditions in Bolshe-Izyum were extremely difficult, and their family suffered constant hunger. L. S. Pontrygin, who was evacuated to Kazan, was well aware of their difficulties and of the difficulties of many of his other friends, and did all he could to help. The letters show that he tried to obtain for I.I. a position in a university, a matter of utmost difficulty. With the help of his relatives, who had been evacuated to Omsk, I.I. obtained a position at the Omsk Polytechnical Institute. However, he had to have permission to leave his school job, a step firmly objected to by the director of the school. There were just two men in the school, and in the Kazakhstan backwater a white ticket would not have helped I.I. avoid call-up to a reserve regiment (The horror of such regiments is described in the novel by V. P. Astafyev "Damned and killed."). If I.I.were freed from call-up then the director would be called up. L.S. made tremendous efforts to help, and secured the assistance of S. L. Sobolev, head of the Steklov Institute, and of S. V. Kaftanov, the prime minister of the Soviet Goverment at that time. I.I. went with his little son to Omsk and N.A. remained in the Bolshe-Izyum school until the end of the school year. The director of the school was not called up.

I.I. Gordon's family lived in Omsk for a little longer than a year. In the fall of 1944, I.I. obtained a position at the university of Gorkii (now Nizhnii Novgorod). This was due to L.S.'s recommendation of academician Aleksandr Aleksandrovhic Andronov (L.S. was his friend from 1932, Ed.). I.I. and N.A. lived in Gorkii to the end of their lives. After the war, I.I. produced a few more papers on topology [7, 8, 9]. He taught many courses at the mechanical-mathematical and radio-physical Departments. He would sometimes teach six courses a term. Many of his students, who themselves became famous scholars, gratefully recall his lectures and speak of him with warmth and respect.

Nina Aleksandrovna Gubar studied qualitative theory under supervision Evgenya Aleksandrovna Leontovich Andronova, got her candidate of science degree and work until retirement as a docent (associate professor) in the department of mathematics of the Gorkii institute of water engineering.

For a long time life in Gorkii was not easy either. It was only from 1962 that the family enjoyed acceptable living conditions—a small two-bedroom apartment (so-called "khrushchevka") for a family of five. In that same year, I.I. suffered a heavy heart attack, followed by extremely heavy complications. In this case L.S. payed a vital part. He helped I.I. twice to obtain accommodation in a very in a very good academic sanatorium near Moscow. Of course, this helped I.I. to recover after his heart attack and live for over twenty more years.

The therapeutics professor who took care of I.I. after his heart attack asked what preceded the heart attack. When this was told to I.I.'s department head Dmitrii Andreevich Gudkov, a remarkable person and mathematician, he commented that the heart attack was preceded

by twenty years of baiting. In fact, for many years the conditions in the department of mathematics of Gorkii University were very difficult. A very active group of second-rate mathematicians with leading party and administrative positions persecuted for various reasons the accomplished and highly qualified members (I wrote about this in my recollections of D. A. Gudkov [10].) I.I. provoked the intense anger of these people because of his independent character and the uprightness and directness of his opinions.

All difficulties notwithstanding, my parents life in Gorkii was happy and interesting owing to their remarkable friends. In the first place, I must mention their friendship with A. A. Andronov, who was not only an eminent scholar but also an extremely interesting, clever, obliging, and grateful person. Unfortunately A.A. died in 1952, age 51. Much has been written about him. Recently, Nizhegorod University published an interesting selection of documents relating to him [11]. After his death, his wife, E. A. Leontovich-Andronova became the head of the mathematical branch of his school. I.I. and E.A. wrote two monograps [12, 13] containing the fundamental results of the Andronov school on the qualitative theory of plane dynamical systems. This is not the place for describing all friends of I.I. and N.A. For me, these people were a splendid example of modern Russian intelligentsia.

I. I. Gordon died on April 22, 1985. N. I. Gubar' lived for another nine years. She died on 13 August 1994.

Contacts between I. I. Gordon and L. S. Pontryagin ended in 1969. The subsequent activities and key position of L.S. are well known and have been described many times by L.S. and many others. Comments on these matters do not belong to the present remarks.

The author is deeply grateful to V. M. Tikhomirov, who inspired him to publish Pontryagin's letters, to G. M. Polotovskii, and to his wife I. N. Gordon for their assistance in the preparation and publication of the letters.

References

1. *Lorentz, G.* Mathematics and Politics in the Soviet Union from 1928 to 1953, *J. of Approximate Theory*, 2002, vol. 116, no. 2, pp. 169–223.
2. *Gordon, I. I.* On the Minimal Number of Critical Points of a Real Function Defined on a Manifold, *Matematicheskii Sbornik*, 1938, vol. 4, pp. 105–113.
3. *Gordon, I. I.* On Intersection Invariants of a Complex and its Complementary Space, *Annals of Math.*, 1936, vol. 37, no. 3, pp. 519–525.
4. *Hopf, H.* Some Personal Recollections Pertaining to the Prehistory of Modern Topology, *Uspekhi Mat. Nauk*, 1966, vol. 21, no. 4, pp. 519–535 (in Russian).
5. *Freudenthal H.* Alexanderscher and Gordonscher Ring und ihre Isomorphie, *Annals of Math.*, 1937, vol. 28, no. 2, pp. 647–655.
6. *Pontryagin, L. S. The Life Story of L. S. Pontryagin, a Mathematician, Written by Himself*, Moscow, 1998 (in Russian).
7. *Gordon, I. I.* Classifications of Mappings of an n-dimensional Complex into n-dimensional Real Projective Space, *Izv. Akad. Nauk USSR, Math. series*, 1952, vol. 16, pp. 113–146 (in Russian).
8. *Gordon, I. I.* On the Question of Coverings of Spheres, *Uspekhi Mat. Nauk*, 1953, vol. 8, no. 5, pp. 147–152 (in Russian).
9. *Gordon, I. I.* Generalization of Kakutani's Theorem on a Continuous Function Prescribed on a Sphere, *Uspekhi Mat. Nauk*, 1955, vol. 10, no. 1, pp. 97–99 (in Russian).
10. *Gordon, E. I.* Recollections on D. A. Gudkov, Topology of Real Algebraic Varieties and Related Topics, *Amer. Math. Soc.*, Transl. Ser. Providence, 1996, vol. 173, pp. 11–16.
11. *Andronov, A. A.* Catalogue of the exhibition "XXth century, People, Events, Ideas" *A Mathematical Personality*, Nizhnii Novgorod, 2001 (in Russian).
12. *Andronov, A. A., Leontovich, E. A., Gordon, I. I. and Maier, A. G. Qualtitative Theory of Second Order Dynamical Systems*, Moscow, 1966 (in Russian).
13. *Andronov, A. A., Leontovich, E. A., Gordon, I. I. and Maier, A. G. Bifurcation Theory of Plane Dynamical Systems*, Moscow, 1967 (in Russian).