

Student Life

To Do Mathematics:

The Odyssey of a Soviet Emigré

GETTING INTO the Soviet Union's prestigious mathematics department at Moscow University is difficult enough (perhaps comparable to getting into Caltech for an American student), but for Jewish students it's virtually impossible. Moscow's reputation for anti-Semitic discrimination is not just an invention by disgruntled unsuccessful candidates. Over the past few years the fact that Jewish students must pass much harder entrance exams than other applicants has been carefully documented by two Soviet mathematicians. Last summer they were arrested and charged with anti-Soviet agitation.

Zinovy Reichstein, now a third-year undergraduate at Caltech, began his college studies as a statistic of this discrimination. In 1978 he was one of four or five Jews who actually passed the special math entrance exams, but he still wasn't accepted at Moscow University. Twice he had participated in the national mathematics Olympiad (as the third highest scorer in his home republic of Russia in 1977 and second in 1978), and he was recognized as one of the outstanding young mathematicians in the country. But he still wasn't accepted. "It's quite a common story," he says.

Reichstein was allowed to enroll in the Institute for Railroad Engineers, which had a small applied math department — not much of a consolation for an aspiring theoretical mathematician. But that institute at least had the advantage of being in Moscow, and for a semester Reichstein balanced a full curriculum there with studying on his own and sneaking into the informal evening seminars at Moscow University on the other side of town. These math seminars are led by some of the top Soviet mathematicians and, he says, were worth the risk of getting caught

without proper university identification.

Even with these seminars on the sly, one semester of the railroad institute was enough for Reichstein. "I just had no choice. I was told I had to be a railroad engineer, and if I graduated from my college, they would probably send me to some place in Siberia or somewhere else for two or three years. I would be able to survive; I'd be able to eat every day. I'd have a job, but I wouldn't be able to do mathematics, and that's what I wanted to do. And I didn't think I would ever be able to be happy without doing it. My parents didn't think so either."

They felt so strongly, in fact, that they decided to try to emigrate. It was a difficult decision. Once a Soviet citizen applies for an exit visa, his professional life is over. Zinovy's father, a mathematics teacher, lost his job just one week after applying for a visa to Israel, the only officially allowed destination. His mother, a patent attorney, was fired a couple of weeks later.

"Once you apply there is no way back," Reichstein remembers. "It's one of the most irreversible things I've ever dealt with. If you get out of the country, that's fine, but if you don't, you just die there. If you are in Moscow, it's a little bit easier, because there are many people who are in the same situation, and they support each other somehow, at least morally. But in my city (Jaroslavl, 120 miles northeast of Moscow), most people just didn't want to deal with us."

The Reichsteins were lucky. Their timing was fortunate, and they got out during the peak of Jewish emigration in 1979, arriving in Vienna in August. They remained there for six months with little to do but learn English. In order to practice writing English and to develop any tenuous American contacts at all,



Zinovy's father wrote about his son to Hans Schneider at the University of Wisconsin, a friend of a friend to whom he had earlier sent some papers on linear algebra for publication. Schneider is editor of the journal *Linear Algebra and Its Applications*. Schneider immediately fired off a letter to his friend John Todd, professor of mathematics (now emeritus) at Caltech, about the "obviously gifted" young man — "I don't expect you to move mountains, but it occurred to me that Caltech might actually be on the lookout for people of his caliber."

Caltech was. Only a couple of weeks later Zinovy was rather startled to receive a "huge parcel of booklets and application forms" from the California Institute of Technology, a place he had never heard of. Since all Russian mathematics of note is concentrated in Moscow, he had presumed it was the same in the United States. And Harvard was the place he had heard of. Caltech sounded a bit technical, and he had already had enough of that sort of thing at his railroad college. He picked up on the American way of college applications pretty quickly, however, and when another friend of a Moscow friend (at Harvard, no less) informed him that he should lose no time applying to Caltech, he did so. He took the SAT exams with his minimum of English and thought he did "reasonably well on the math considering that I couldn't even read all the problems."

Actually he did very well indeed. Caltech sent Reichstein word of his acceptance in New York, where he was then supporting his family by working as a delivery boy. Reichstein entered as a fresh-

man in the fall of 1980, a decision he hasn't regretted, since it turned out not to be a railroad college at all. He thinks now "that the Caltech undergraduate school is the best in the country, at least for the kind of training I would like to get."

It's very different from Moscow University though, which accepts 450 students per year in math alone. There is certainly some benefit to being at the national Mecca for mathematicians there. "They are all there together, and that's probably the main advantage — that you only have math majors around. In terms of mathematical education it may be very useful because people always discuss problems there. People can talk about mathematics whenever they want."

Although Reichstein probably wouldn't mind being able to talk about mathematics whenever he wanted, he also is aware of the disadvantages too. The Soviet curriculum is rigidly standardized — no electives at all — and it's almost all math, except for a few political and "history" courses. At Caltech he found the idea of having to take two years of physics initially unappealing, but in retrospect he is pleased about it. He even admitted to John Todd that going to physics class was sort of like attending a concert. Lab courses he still thinks he can live without, but the most positive new direction for Reichstein is the exposure to humanities. He has even considered a double option — math and literature.

A double option would be hard to accomplish in three years however, and Reichstein hopes to graduate a year early. He was exempted from freshman math and by mid-year was also excused from Math 2 and went on to abstract algebra and advanced calculus. Is Russian secondary school training so much better than American that he was that far ahead? No, says Reichstein, whose opinion seems to belie American fears that Soviet schools are turning out hordes of superscientists while American youth languishes in the age of permissiveness. In general, he says, most Soviet and American high schools are "equally bad — just terrible — at least in the way they teach mathematics and science." And American high schools are probably better than their Russian counterparts in the teaching of humanities, he thinks.

But there are specialized schools in the USSR with nonstandard curricula in certain areas such as math. Although "anything that's nonstandard is very difficult to do in the Soviet Union" and the govern-

ment doesn't quite approve, mathematics "enthusiasts" have managed to establish special programs and seminars at certain schools and organize the Olympiad competitions. Most of this activity, and the best schools, are centered in Moscow, but there was one such specialized mathematics high school in Jaroslavl that Reichstein was able to attend.

Reichstein's experience with the Olympiad contests was welcome to Caltech's team in the national Putnam Mathematical Competition. In his freshman year he received honorable mention — approximately the 40 highest scores among the 2,000 contestants nationwide that year. This past year he just missed the honorable mention cutoff but was one of the top members of the Caltech team, which finished sixth. He feels he might be getting a bit too old for this sort of thing.

It's probably less a matter of age than of changing interests and involvement in more advanced math. During his first summer here he worked on a classic problem in algebraic geometry under Jack Conn, assistant professor of mathematics — work that was, according to Conn, somewhat more esoteric than what most undergraduates get into. This past summer, with a Richter grant, Reichstein worked under Professor Herbert Ryser on a problem in combinatorics. Although he is interested in "algebraic geometry — Lie groups, algebraic topology, differential topology — that sort of thing" and plans on going to graduate school, as an undergraduate he mainly wants to get a good general math education. "Now I'm just interested in doing mathematics and learning about it and thinking about it."

Reichstein is fluent in English now, and his father is teaching math at Susquehanna University in Pennsylvania. But adapting to a new country still presents problems. Zinovy's grandparents and an uncle have also managed to emigrate, but he misses his close friends in Moscow and writes long letters "home." Still he has no doubt that the decision to leave was the right one.

"In the Soviet Union I realized clearly that I couldn't do mathematics there, that I couldn't survive as a mathematician. But even more important, I didn't think I would be able to survive there as a human being. I really like this country; I feel it's the right place for me. Most of my moral values were formed in Russia, but they are so similar to those here I couldn't believe it. It was hard to explain in Russia. Here I don't have to." □ — JD