

## An encounter with Gel'fand

I was Gel'fand's student for six months in the winter of 1969–1970, and am very happy to have this opportunity to honor him. A great inspiration and source of strength for many years, he had a transformative effect on my career.

I am British (as you might have guessed). After undergraduate study at the University of Edinburgh I had spent two years as a graduate student at Cambridge, solving a well known problem about von Neumann algebras. My husband was writing a PhD on Innokenty Annesky, a somewhat obscure but well regarded Russian Symbolist poet, and he needed to study in the Moscow Archives. My advisor suggested that I also apply for a British Council scholarship to Moscow, which I did, but he never suggested that I make a plan of what to do while there. So when I got to Moscow and was asked in the Inotdyel office who I wanted to study with, I was completely unprepared for the question. I said the first name that came to mind, which luckily was Gel'fand. (I knew his name because some years earlier I had studied some of his books on Distribution theory.) They called him up, and we arranged to meet. How will I recognize you? he asked. I explained what I looked like and he told me what he looked like. No doubt we met sometime just before his seminar.

He wanted to know why I was in Moscow (at that time there were not many foreign visitors) and I explained about my husband David. He asked what I'd done, and I told him of my work in von Neumann algebras. He said: Well I am much more interested in the fact that David is studying Annensky than that you have solved this problem about von Neumann algebras. Then he gave me his recent paper on Gel'fand Fuchs cohomology to read: it was called the *Cohomology of the Lie Algebra of Vector Fields on a Manifold*, and I had been so narrowly educated that I didn't know what cohomology was, what a Lie algebra was, what a vector field was, or what a manifold was.

So he told me what to do. I went to Kirillov's lectures on Lie groups (I could understand Russian but not speak it); I studied in the library — I remember reading a very well thumbed copy of Eilenberg and MacLane and thinking how strange it was that I was reading this classic math book in English at a table in the Moscow University library; and of course I went to the seminar. That was wonderful. I gave a talk on my work, with Gel'fand translating — one of my English sentences followed by about 10 of his Russian ones. He also talked to me before the seminar — he called it his English lesson — about all kinds of mathematics. He was trying to explain to me how certain ideas emerged, how they were interrelated. Of course I didn't understand very much at all, but I was amazed at the way he thought about what he was doing. He said, for example, that in some series of papers he'd been groping for an idea that didn't quite come into focus, so he tried again some years later with a completely different approach. I'd never imagined that mathematics might be thought of as anything other than a collection of definite, though perhaps very beautiful, theorems.

One week he talked to me for over an hour before the seminar. People kept coming in and saying "Come on, everyone's waiting." But he wanted to finish his explanations. I felt rather uncomfortable at this, and made some excuse for the next week. That was obviously not the right thing to do, and I didn't see him for a while, until a few weeks

later I gave him a translation that I had made of an article he'd written on Biology and Nature. "Why did you do this?" he asked. I think he was a bit suspicious of me, at that point. I said he'd asked me to translate it so I could send it to my father (who was a distinguished geneticist, interested in the ideas of René Thom.) Gel'fand, of course, thought that René Thom had the completely wrong approach to biology, and wanted his own views to be better known in the West. So by that translation I got back into his good graces. We resumed meeting, but not at the seminar. Instead, he occasionally invited me to his house.

I don't remember much of the mathematics he taught me then, though certainly we did talk about math. But I remember him reading Pushkin with me; he translated the play *Mozart and Salieri* for me, obviously thinking of himself as Mozart; he played some Bach records, he made tea — I remember he had a treasure trove of little packets of special teas that people had sent him from all over Russia. He also invited my husband David to supper once or twice, and told us stories about Mandelstam's widow (whom he'd known) and various Jewish anecdotes. Once he took me shopping: he bought and gave me all the good classical records he could find. Very cheap, they contained wonderful performances by Russian musicians that he thought I should hear. He said that this too was "teaching me mathematics". I was a would-be mathematician married to a would-be poet, and it was very important to me that he tried to reach me in this way.

When I got back to Britain I had quite a difficult time. I'd completely changed my field, and for several years didn't really have anyone to work with. But Gel'fand kept in touch, sent me New Year's cards, even occasionally with a brief personal note. He told people like Atiyah and Singer about me, and it was clearly on his recommendation that I spent a year at MIT, another very important milestone in my career. So he mentored me in every way he could. I visited Moscow again in 1983 (going for a week or so with the Haefliger and with Jack Milnor.) I gave another talk at his seminar, but he thought the topic was uninteresting. Afterwards, he advised me to finish my papers and then move on. So I gradually moved towards symplectic geometry. I gave another talk at his seminar here in Rutgers around 1995, and this one he did like.

I also remember that once we were in New York City together (I don't remember exactly when this was, but sometime before he moved here). He took me to the Frick museum (which at that time I didn't know) and showed me Rembrandt's self portrait, how its eyes follow you as you walk around looking at it. I am sure he thought that Rembrandt was seeing him. — But that's okay. I like people who have large ideas.

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