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Natasha Raikhel

For many years Natasha Raikhel trained as a professional pianist in her home of Leningrad. She was good, but she dispassionately realized that she would never be one of the truly great pianists of her generation. So she declined to enter Leningrad's music conser- vatory in favor of studying biology.

Raikhel's father was a surgeon and her mother an x-ray technician, so biology felt like a comfortable choice, although she had never formally studied it. Once Raikhel decided to forego the conservatory, she immediately began a rigorous program of private instruction to prepare for the university.

Raikhel earned her MS from Leningrad State University in Biology in 1970, and her Ph.D. in cell biology from that city's Institute of Cytology of the Academy of Sciences. As a Jew, her achievements were hard-fought because the Soviet system restricted opportunities for its Jewish citizens. Nonetheless, Raikhel became an Assistant Research Scientist at the Academy of Sciences in 1975.

Despite the hardships of Soviet life, it was, for Raikhel and her husband Alex, comfortable—and, they thought, stable. They had a beautiful apartment in downtown Leningrad and were able to travel throughout the country. But in 1978 the plane in which they were returning from an expedition and vacation crashed in a potato field between Moscow and Leningrad. Many people died, but the Raikhels and their son Eugene, aged 3 1/2, survived. This defining moment made the couple realize that life was too short to accept anything less than the best possible life for their son. Six months after the accident, the family applied for permission to emigrate. When permission came, the KGB gave them four days to get out.

So on a Spring day in 1979, the Raikhels found themselves three of a trainload of refugees bound for Rome. Unemployed and unable to speak Italian, they contacted the only person they knew, an American scientist, Jerome Paulin, a University of Georgia researcher on sabbatical in Rome, who had previously spent a sabbatical in Leningrad, where his desk sat next to Natasha Raikhel's.

Raikhel recalls her renewed acquaintance with Paulin with deep gratitude: "I'd only once been allowed to leave the Soviet Union, to attend a meeting in Finland, so we were un- known to everyone. It was very hard to find jobs when no one knew us." Paulin gave Natasha Raikhel a job in his lab in the Zoology Department of the University of Georgia and helped Alex Raikhel find a job in the Entomology department at the same institution.

Three months after arriving in Rome, the family left Europe for the U.S., just four months before the Russians invaded Af- ghanistan, closing down Russian emigration for the next ten years. The family had $25 in their pocket.

Upon their arrival in Athens, Georgia, the first thing they experienced was the crushing heat of summer in the South. "We got off the plane in Georgia and thought something was wrong," she remembers. "We had never experienced such heat and humidity. Russia has no such climate."

Alex Raikhel described their early days in Georgia "like a fish in an aquarium surrounded by very friendly faces, yet the glass was thick. I longed to break it and have some interaction and some communication instead of just understanding the meaning of the words."

Athens, Georgia was very isolated in the late 1970s and the Raikhels had no extra money to travel, so they threw themselves into their work, seeking to establish them- selves in the American system. After over six years in Georgia, they felt that they had each become marketable, so they entered a joint search for new professional challenges and to open a new chapter in their American life. By 1986, they found themselves at Michigan State University, where Natasha took a position as Assistant Professor in the Plant Research Laboratory and Alex Raikhel as Associate Professor in the Department of Entomology.

Today, Raikhel's research at Michigan State deals with two projects: her long-term interest is to understand the mechanism of trafficking in plant cells, particularly through the secretory system to the vacu- ole, a vital organelle for all plant cells. Not unexpectedly, the vacuolar biogenesis system in plants generally resembles that of yeast in terms of the components and pro- teins involved. However, plants seem to be significantly more complex: in addition to having more than one type of vacuole, they contain multiple members of key gene families (vacuolar protein sorting receptors, SNAREs, etc.) An obvious question is whether the existence of multiple gene family members indicates simple redundancy, or the use of tissue-specific isoforms, or the adaptation of individual components to distinct sorting pathways. Raikhel's lab has identified vacuolar sorting signal(s) that so far seem to be unique to plants; they have shown that indeed at least two inde- pendent pathways to the vacuole exist in plants. In the past few

years, Raikhel's lab has identified varieties of genes that mediate vesicular trafficking machinery in plants. The preliminary data hint at interesting differences between plants and yeast in the function of certain components.

A second and newer research interest of Raikhel focuses on understanding both the biochemical pathways that result in cell wall biosynthesis and the regulatory events that control them. This is a collaborative project with fellow plant cell biologist Ken Keegstra. "Our immediate objectives are to investigate the biosynthesis of xyloglucan, the major hemicellulosic polysaccharide in dicots. Our first efforts have focused on fucosyltransferase, an enzyme that adds fucose, a terminal sugar, in xyloglucan," says Raikhel.

Raikhel's advice to students and young biologists is simple: consider plant biology as a field of study because, as she explains, "plants can live without us but we cannot live without plants."

Shortly after the move to Michigan, the Raikhels had a second son, Andrew, and the family thrived. But three years later, Raikhel learned she had breast can- cer. With help from her husband, both sons, and several very close friends, Raikhel became determined to attack her disease aggressively, demanding the harshest possible protocol: surgery, two regimens of chemotherapy, and over a month of daily treatments of radiation. "Throughout those eight difficult months, the people in my lab were great," she recounts appreciatively. "They continued to come to my office with questions and plans for experiments, just as be- fore, which brought a sense of normalcy to my life. My last radiation treatment was Halloween 1998. For cancer survivors, two years' survival is a milestone. I feel great!"

Recently Raikhel has taken on a new challenge with her appointment as Editor-in- Chief of the largest and oldest plant journal, Plant Physiology, while maintaining her research and her teaching.

ASCB member and Raikhel colleague Chris Somerville of the Carnegie Institu- tion of Washington at Stanford reflects on Raikhel's life and work: "Natasha has an inspiring enthusiasm for science that is only slightly more pronounced than her enthusiasm for music and art. I think this reflects her underlying passion for the kind of creativity that lies at the heart of both great art and great science. We have traveled to many places in the world together where we have visited galleries, attended concerts, or participated in scientific conferences, and I never tire of having her explain to me why a painting, a concerto, or an experiment is beautiful or important. She also has the gift of seeing the best in other people: her students and postdocs are full of promise and her colleagues are always well-intentioned. I inevitably feel very energized and optimistic after talking with her. I think these are some of the qualities that helped her to both escape the oppressive circumstances in the Soviet Union and to make an important scientific contribution here."

Raikhel's son, Eugene, earned his un- dergraduate degree from the University of Michigan. After working as a science writer, he has returned to graduate school in anthropology. Eugene speaks Russian and, free of ambivalent memories of a country that he doesn't remember save as a tourist, has returned numerous times to his native land. Andrew, who "has decided there are too many Andrews in the world so now goes by his middle name, Vincent," says his mother, is a happy American eleventh-grader who is interested in composing music.

Time not spent on science is first focused on her very close friends and family, including her mother and sister, who now live in Boston.

Natasha and Alex Raikhel are making up for the opportunity to explore the world that had previously been denied them by their religion, their nationality, their finances, and their health. Their travels have taken them to Japan, Australia, and throughout Europe.