

## 2009 Interview

"Why did you turn to teaching?"

I've often been asked that question, but there is no easy answer. I think that one reason why I became a scientist was that I thought I could work in relative peace and quiet, without having to deal with a lot of people. But that's because I didn't really know at the time what was involved. It turns out that in order to be a successful scientist it helps to be gregarious and outspoken. Great communication skills are essential. If other people don't know and understand what you do and why you're doing it then there is little room for advancement.

This is relevant because I used to be very shy. These days I may have been diagnosed with something like social anxiety syndrome or selective mutism. But I tried not to let that affect me in the sense that I was ambitious and felt that I wanted to get a good education and do something with my life that was beyond the ordinary. Initially I wanted to be a physician. When I went to college it seemed to my dismay that everybody and his brother and sister wanted to be a doctor as well. But after two years I still hadn't filed with the pre-med office, which told me something. One day I found myself walking through the health science building going through corridors and passing closed door after closed door until I found a door that was open. Inside was Nick Delihis, who agreed to become my undergraduate mentor. I worked in his laboratory studying bacterial ribosomes for two years learning how to use the tools of the trade and start to think like a scientist. When I graduated in 1977 I found a job in Manhattan at the Rockefeller Institute as a technician in Jim Darnell's group working on adenovirus. At the time recombinant DNA technology was just being developed. People were beginning to learn about the genome and how it's organized and how it behaves. It was a very exciting time. I could see the excitement of the scientists there who were constantly chatting with each other about their discoveries and publishing their research results in scientific journals. It seemed that no matter where you turned somebody was doing something significant. That is what I wanted to do. So I studied for and took the Graduate Record Exam, scored extremely well and applied to nine schools to study microbiology and immunology. On the strength of my GREs I was accepted by all the schools except Stanford, which put me on an alternate list. I chose the University of Minnesota Medical School's microbiology program, which had a good reputation and was in a part of the country that I was attracted to. So I ended up going to medical school, in a sense, after all.

The first year of grad school was incredibly difficult for me and I slept very little. I had a huge microbiology tome to learn for a written qualification exam at the end of the year. If I couldn't pass the test I would be kicked out of the program. But they generously gave us two attempts, which was fortunate because I did not pass the first time around. In fact I made the cutoff in percentage score, but the committee felt I could benefit from more study. So I studied almost nonstop for two months, took the exam again and this time passed with flying colors. That gave me some confidence that if I put in enough effort I could succeed. In fact, during that period I made quite an important discovery which became the basis for my graduate thesis and to my amazement is still being worked on 23 years after I defended.

I graduated in 1985 after five and a half years and started my postdoc work in a genetics lab elsewhere at the university. In the meantime I married another grad student and waited for her to complete her program. Although my first job was not very successful I managed to talk my way into a fellowship at the National Cancer Institute in Maryland. It was a very high pressure situation - I worked long, stressful hours and it was both physically and emotionally draining. But I learned a lot and grew as a person and as a scientist. At the same time I began to question whether this was what I wanted to do with my life. What were my motivations? Did the people I worked shoulder-to-shoulder with have different driving forces? I've always wanted to help people in some way. I thought that by becoming a scientist I could give something back to society. But most people in my group were working on

questions that were only tiny pieces of the vast puzzle related to cancer. I realized that only rarely these days could a single individual make any obvious impact.

When I started teaching high school I was anxious to incorporate many of the things that I had learned in research to provide a high level education for my students. I had a sense of going beyond the textbook in developing a new kind of curricula. That led to the biotechnology course I taught last year. I believe that the most effective kind of knowledge comes from doing, from actively using one's hands and mind to solve problems - and so this course was intensely hands-on and we did some advanced stuff.

Back when I was a high school student we had very few opportunities for specialized education. No advanced programs, no studies abroad, no internships in research labs. Today there are excellent opportunities for this kind of learning at the high school level. Some students are awake to this fact and are taking advantage of exciting programs like the Denis Sullivan expedition last year to Bermuda in which students from Bay View spent a week learning how a schooner operates and being exposed to marine science issues and research methodologies.

I once had a student who, realizing that I was spending a lot of my own money on equipment and supplies, said "Why would you want to spend anything on us?" And I thought this child does not think that he is worth it. I want every student to feel that he or she is worth it. When I teach I am aiming for a high level of achievement. In my program I push students to try to do things they never thought they could do. Any student who gets an A or a B in my course should evaluate their academic abilities in that context - it is not trivial. Sure, I do keep in one corner of my mind the idea that grades are not important to everyone - it depends on what your goals are. But if you want to get into college, trade school or professional school then good grades are a reflection of your competency and you must play that game.

Last year the principal presented me with a challenge I almost turned down because for me it was so far out in left field - to teach a course in robotics. After some thought, however, I agreed to it and as long as I was already plunging into the deep end of the pool, heck why not start a team? Thankfully, Lauren Baker, who is the technology curriculum director for MPS, helped me figure out how to get started and we were able to raise \$15,000 from NASA, Rockwell and GE to fund the Redcat Robos team.

This brings me back to the original question of why did I become a teacher? Yes, I love whiz bang and as a science teacher I am having my cake and eating it too. But I also became a teacher because I want to help young people glimpse their potential and just as importantly realize that barriers to our ambitions are only there to keep out those who don't want it badly enough.