



37

Science and the art of detection

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When I think back on the reasons for my becoming an experimental research scientist in biology, I find many were accidents of fate. In our family it was taken for granted that girls studied and went on to a career. Marriage came along somewhere but was not considered an essential end-point to one's studies. My two elder sisters studied chemistry and physics, and both my parents spent most of their working lives teaching and working in a University. Growing up in this environment, the idea of becoming an academic seemed natural. The big question was which academic stream to join when I finished school. My own inclination was to pursue an undergraduate degree in physics; this desire was driven mainly by a good physics lady teacher at school. Luckily, this did not happen. My school in Aligarh did not have a mathematics teacher qualified to teach us higher secondary level maths; without maths no good university would admit one to an undergraduate degree in physics. The other available options were chemistry or biology and biology was already beginning to seem more interesting to me.

I joined a zoology honours course at Miranda House, Delhi University. All our teachers were women. They taught us with great

enthusiasm and tirelessly took us through the long experimental component. The course structure had its high and low points. The best part was the wide range of subjects taught. I spent a good bit of my time reading physiology, development, ecology and evolution in the college library. I realized that we were missing out on molecular biology and genetics – very little of either subject was taught in those days at the Bachelor's level. This was the reason why I decided to move for my Master's degree to the newly founded School of Life Sciences (SLS) at Jawaharlal Nehru University in New Delhi.

The M.Sc. course at SLS was again a mixed bag. But thanks to an inspirational teacher for molecular biology (H. K. Das) and a growing interest in genetics (egged on by P.C. Kesavan) I finally knew at the end of my M.Sc. that molecular genetics was the field I wanted to work in. During my Master's I spent two summer schools at T.I.F.R., Mumbai doing experimental molecular biology. But the mix of genetics and molecular biology that I hoped to work in didn't seem to exist in any lab that I knew of in India. Along with some of my friends I decided to start applying to universities in England – at that time the U.S. still seemed very far from home. While making my applications to U.K. universities I realized for the first time that belonging to a minority could lead to discrimination. What came as a bigger shock was that the discrimination came from a woman teacher! A lesson I have learned from this experience has been to consciously try and be supportive of other woman scientists, be they students or colleagues.

I finally went to a lab at Cambridge for a Ph.D., where I studied gene organisation. At Cambridge I understood what was meant by experimental rigor; from listening to seminars by some of the best biologists at that time I also learnt to think about biology as a whole. On completing my Ph.D. I took the unusual step of coming back to T.I.F.R., Mumbai for a post-doctoral position. I still wanted to work on an interesting biological problem that could be addressed using molecular genetics. T.I.F.R. had groups that offered the possibility of working on olfactory genes in *Drosophila* that no one else in the world was studying as yet. It was an exciting time when I worked at tracking a gene down to the mo-

lecular level – a bit like a detective novel! The molecular biology unit at T.I.F.R. was a very special place and the intellectual training in genetics that I received from Obaid Siddiqi's students, Kavita Arora and Veronica Rodrigues, has lasted my entire career.

After completing the molecular cloning of an olfactory gene I was thinking about how to use *Drosophila* molecular genetics to address more general problems in biology. I had just got married, my husband was going to work in Boston for his post-doc and I met up with Kalpana White who was visiting T.I.F.R. She was very helpful and advised me to write to Michael Rosbash at Brandeis which was in the Boston area. I wrote to Michael saying I wanted to look for the period gene in mammals. After six months when it became clear that this project was going nowhere in my hands, I decided to try something different – reverse genetics in *Drosophila*. Michael was most supportive and encouraging of this new project which was to look for the *Drosophila* receptor for inositol 1,4,5-trisphosphate (InsP₃). Since the gene had been recently cloned in the mouse, no one really understood the physiological context in which it functioned. I used the newly discovered method of PCR to clone the *Drosophila* gene in Brandeis and then brought the project back to my lab at the National Centre for Biological Sciences in Bangalore, of which I was a founder member while I was still at TIFR, Mumbai. It seemed an ideal project with which to start my own lab. We could do genetics to make mutants, we could do molecular biology with the mutants and finally we could use the mutants to look at cellular function, development and physiology.

My lab still works on this problem and we are now busy trying to relate InsP₃ receptor function in *Drosophila* with human diseases like diabetes and neuro-degeneration. The best part of working in science is the freedom to take on a problem that interests you intellectually. The tough part is balancing the long hours of work with raising a family. A supportive family is a must. And just when you think you have done both you realize there is another part to science – the networking required to stay visible nationally and internationally. Most existing networks are male-

dominated and women need to work harder and more systematically at entering these. Or no one will ever know about the wonderful scientific breakthroughs you may have achieved quietly in your lab!