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An austere beauty

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The response of people, when they learn that I am a career mathematician has long been one of the following: “How fascinating, I have always loved mathematics and used to be quite good at it in my school years”; or “That was the subject I feared and hated most, how can someone be doing mathematics all of one’s life?” After the commercial success of John Nash’s life story, there is a third response: “Interesting, I saw the movie ‘A beautiful mind’, it is about a mathematician who was slightly crazy, and I loved it.” It is often difficult, at a social level, to convey the pleasure of a life-long fascination with knowledge, and even more so when it is mathematical knowledge!

There was no academician in my immediate family but I was fortunate to be born in a family which revered education and knowledge. My attitude to academics was shaped by my grandmother, who all through her life lamented the fact that she was not fortunate enough to have had a full education. Her thirst for learning and knowledge however stayed with her all her life and she instilled it in me and my brother. I grew up being hardly conscious of a life beyond one that encompassed the mind.

I was born and brought up in Bangalore which is home to one of the premier Science institutes in the country. I was competitive

in my school years and was indeed lucky to have had teachers who were very dedicated during my high school years. My love for mathematics started early on in my primary school, when I realised that one could do well in this subject by just understanding it! Among my happy memories of the summer vacations are those that I spent in the city library reading and also of the times when we got the text books for the next year. I would quickly try to understand and work through the early math chapters before school started. The other subject we would run through much faster and more easily was english.

In the late 1970's, there was no career counselling and information was not as freely available or accessible as it now is. Engineering was not the rage that it is now. However, it was clear that a successful degree in a good engineering college, preferably in computer science, meant that one's career was comfortably made! There were not many women doing engineering and I was torn between pursuing a degree in the pure sciences and an engineering degree! When I was discussing this with one of my seniors in my pre-university years, he asked me if I liked abstract thinking. I said I loved it and then his immediate response was that I should then continue to do mathematics rather than engineering! This helped me make up my mind and I did not even apply to any of the engineering or medical colleges after my pre-university results were out. I still remember that many of my classmates and friends thought I was crazy, especially as securing admission in the best professional colleges would have been trivial.

I got married before I graduated and then continued to do my Master's degree in mathematics, by correspondence. I was still unaware that a research career in mathematics was possible, the level of information dissemination was quite abysmal then even in cities! We moved to Bombay and here a few people vaguely mentioned 'Tata Institute of fundamental Research', however knowing little beyond the name! It was a sheer stroke of luck that I chanced upon the advertisement of TIFR calling for admissions to the Ph.D degree... I did my Ph.D there under the supervision of Professor Parimala Raman and have continued to work there after my Ph.D.

My thesis subject was the algebraic theory of quadratic forms over fields; an area with connections to various other fields in pure mathematics. But in the last decade, I have been working in the area of arithmetic geometry, especially that of elliptic curves. Elliptic curves are very special, with an enormously rich structure, multi-layered, with connections to complex geometry, topology and number theory. From the number theoretic point of view, they are greatly fascinating, being the mysterious arena in which there is so much intrinsic structure, yet with many deep conjectures and open problems! Of course, these days elliptic curves are rather fashionable because of their applications to cryptography, but their study goes back to a few centuries! How can one convey the purity of structure and the accompanying beauty that one encounters as mathematical problems yield themselves to solutions? The following quotation from Bertrand Russell comes to mind:

“Mathematics, rightly viewed, possesses not only truth, but supreme beauty – a beauty cold and austere, like that of sculpture, without appeal to any part of our weaker nature, without the gorgeous trappings of painting or music, yet sublimely pure, and capable of a stern perfection such as only the greatest art can show.”

Mathematics underpins many of the research in the Sciences and also much of the technology. Yet I think that scientists in general, and mathematicians in particular, are not good at promoting their subjects or in conveying the excitement of research! Many bright young students in India get sucked into the Information Technology madness, and perhaps feel frustrated after a few years when they discover that their minds are not challenged enough! The intellectual freedom that academics have is something very valuable. Of course, with it comes the responsibility, frustrations etc, but the challenge, should we seek it, is there, beckoning us constantly. Patience, discipline and rigour, especially in mathematics, are essential in a scientific career. Often, one can spend frustrating days and weeks not seeing the path to solve a problem. When one finally sees it, that joy and the eventual beauty of all parts of the intellectual puzzle fitting together so intrinsically, makes one feel that it was worth all the periods of frustration!

Another invaluable facet of an academic career is the

collaborative component. It is deeply rewarding to be able to share ideas with other researchers from around the world and work together. Both at a professional level and at a personal level, such experiences enrich our lives and bring people together in a manner that is becoming more and more rare in other areas in today's strife-torn world!

Finally, I want to say a few words about being a woman in Science. When the Harvard controversy erupted few years back (the President of Harvard university is supposed to have made some comments about women being unsuitable for Science), the accompanying discourse rarely touched upon the fact that Society is not yet fully ready for women to be in Science! I am very conscious that in India, women have multiple contextual roles to play, and am also constantly struck by the fact that women do it with dexterity and ease, across sections of society! For women, a scientific career perhaps offers more flexibility in combining a career with a family life. Scientific policies could be shaped towards making them sensitive to the problems of women. I truly feel that there is a whole new world in science waiting to be discovered and claimed by women.