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My journey into understanding how cells and organisms are made

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With biotechnology so much in the news these days it may be difficult to appreciate that for a late 70's high school student a career in biology was something not obvious. I was born into a family with a surfeit of engineers and grew up in an environment that greatly valued education. Even so no women in my immediate family had yet taken a career path so it was not obvious that I would turn out to be where I am. My aptitude for science was evident from high school. I had excellent teachers who recognized my eagerness to go beyond the curriculum and above what mattered for excellent board results. I was encouraged to give lectures to my class on the chemistry of photosynthesis and respiration. This was perhaps one of my earliest exhilarating moments that revealed the beauty and diversity of biology operating within the precise laws of physical sciences. My decision to take up biology, and not engineering or medicine, was initially incomprehensible to my immediate circle of family and friends! No one knew where studying biology would lead me, but perhaps my parents humored me thinking that I did not intend to

take up any specific profession any way.

I obtained a Bachelors degree from Delhi University where the faculty of Sri Venkateshwara College recognized from very early on my aptitude and commitment. I sat my first year University exams while suffering chicken pox in an “isolation room” created in the college. Such was their confidence in my potential! I went on to top the University bringing to my college one of its many “Firsts” in its early years as a South Campus college of Delhi University. My strengths were a near insatiable appetite for reading and quick comprehension. Subsequently, I did a master’s degree in the then “interdisciplinary subject”: Biochemistry, which was not offered at Delhi University or Jawaharlal Nehru University. The decision to leave home was easy for me but my grandmothers couldn’t believe that nothing in the vast curriculum of Delhi’s universities interested me! At Post Graduate Institute for Medical Education and Research, Chandigarh my interest in research was reaffirmed. I then narrowed down a couple leading Indian Institutions and some in USA to apply to for my further studies. Around that time I met Vijayraghavan who was pursuing his Ph. D. in biology at TIFR, Bombay, after his training at IIT Kanpur as a chemical engineer. From the outset he and his family actively encouraged my academic pursuits.

Once we were married and Vijay had decided to go to Caltech for his post-doctoral work it was clear that I should work towards securing admission in one of California’s highly ranked universities. This was no easy task but with rigorous preparation and perseverance I was admitted to Caltech for my graduate research with Prof. John Ableson. His was among the few leading labs working intensively on the mechanism of mRNA splicing. This is a process that we now know contributes greatly to how eukaryotic cells generate a large repertoire of functional molecules from defined inherited genetic material. The information in the inherited genome is first transcribed to a transient molecule called pre-mRNA from which functional segments are generated by “splicing”. Understanding the details of this process is important as derangements cause diseases and affect normal development. Exploring this process in a simple laboratory model would provide

clues on how genes may be regulated in other more complex organisms. I took a genetic approach using the bakers yeast where my hard work paid off. In this process I also learnt to hold my own in a highly competitive research field. The joy in making discoveries is compounded by an invigorating environment. At Caltech one learnt a lot in the formal seminars and as much by just being around the stalwarts in biology. The corridors, cafeterias and faculty club were always abuzz with excitement! I mingled with others working on cutting edge topics in bacterial genetics, neurobiology, immunology, developmental biology etc.! An important part of my training was learning to adopting a genetic approach to unravel a biological pathway; the art and science of which has stood me in good stead. Towards the end of my graduate work came decision making time as Vijay was returning to TIFR, Bombay. I had to identify my long-term objectives. I decided on plant biology as an area for my post-doctoral research and began my tryst with plants in the laboratory of Prof. Elliot Meyerowitz at Caltech. His team was breaking new exciting ground on the genetics of flowering using a remarkable weed- *Arabidopsis*. As many aspects of flower formation are evolutionarily conserved so the knowledge gained had a direct bearing on food crops. My teachers and my peers thus molded me before I returned to India as a Lecturer at the Indian Institute of Science.

At IISc, I began to research the regulation of gene expression using microbial and plant model systems. Our tools were largely genetic ranging from classical genetics to modern functional genomics. Our recent work on rice genes, which are related to genes in the model weed, illustrate how evolution can create diverse plant forms by networking conserved factors in different ways. Our work on RNA splicing is throwing new light on the complexity of gene expression. Building a research team with young aspiring scientists is the best part of being a researcher and a teacher. Of course, there are exasperating moments when much time is spent and little progress is made. Developing a patient yet rigorous approach is what pays off. One needs much fortitude in the real world of competitive grants and administrators. But none of these difficulties are unique to a science career. Such challenges

are commonplace if one aspires to be the best in the chosen area. In today's communication enabled world flexibility of work time is an enviable advantage that a scientist can use judiciously to juggle work and family life. I am privileged to get unconditional support from Vijay, and our immediate family, while I continue my career and we bring up our son. In general, Institutional support for women with families leaves much to be desired in most Indian establishments. But this is not an issue limited to career scientists. These issues plague most Indian establishments and require a combination of Institutional commitment to women's issues and a changed perception in society that values women at the work place. On the balance, the inner drive to excel in ones chosen profession counters any of the downsides of being a career scientist. There are great opportunities, many professionally and personally gratifying moments waiting to be discovered by a woman who takes to science as a career!