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No choice but to learn

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One glowing blue dot in an all-black background. It may divide to become two, or just stay one, or even decide to die. Its a wondrous sight – the nucleus of *Entamoeba histolytica* going through its cycle of replication and division.

Entamoeba histolytica is a protozoa that has the potential to cause dysentery and liver abscesses in humans. Apart from causing disease, this parasite has many other fascinating attributes that excite biologists. In evolutionary terms, it represents a ‘primitive’ eukaryote; it has a simple two-stage life cycle and is not ‘free-living’. Although the development of drugs such as metronidazole has drastically reduced the incidence of deaths due to *Entamoeba* infection, the biology of the parasite is not well elucidated. For the past eighteen years I have been working on the molecular mechanisms that regulate cell division in this organism.

When this often stressful, sometimes frustrating, but always exciting journey in science began I endured many uncertainties in choosing this as a life path. I was born into a business family of the Marwari community, where a career path for women was unheard of when I was young. My mother, herself a pathbreaker, decided to study applied psychology and follow a career in educat-

ing special children with mental retardation. This decision of hers changed my life even before I was born. I was encouraged to pursue studies and fine arts with equal vigour. As a result, of my own interest and will, I was equally engaged in studying human physiology and performing classical dance.

When I stepped into a Ph.D. programme to study the biochemistry of the *Vibrio cholerae* cell surface, it began to dawn on me that it would not be easy to carry on both professions in tandem. However, I was unwilling to let go of either profession even after the birth of my daughter in 1981. Family and friends suggested that my success in classical dance should, for obvious reasons, result in my choosing it as a career. I was indecisive, because even though I was good at Kuchipudi and enjoyed performing, I felt I was not given the creative freedom to bring my own personality to my dance.

To add to this confusion, I was failing miserably in my research at (IICB) Kolkata. Experimental results were open-ended, funding was limited and more importantly, my ideas were very hazy. I thought I understood less than my colleagues and was constantly plagued by doubts of my own scientific ability. The less I understood, the greater the challenge and, consequently, the greater my desire to excel in research. Unable to give up either profession, I continued to dance and carry on my research (along with bringing up a little daughter) until I published two papers in international journals and finished my Ph.D.

Prof. Bimal Bachhawat, Director of (IICB) in 1985, would often treat graduate students to tea and samosas and share our concerns, when he found us working on weekends. During several such sessions, he ensured that I thought of going abroad for post-doctoral training. He understood my difficulties with family pressures but did not accept them and I ended up writing a few applications for post-doctoral positions. Before, I knew it, I was offered two positions, and then I faced the most difficult time with my family. Additionally, I was torn between my daughter's welfare and my desire to continue research. It was all finally resolved but my troubles did not end. Two years at New York University, spent almost entirely in the lab just blew away when another group pub-

lished my results before I could write my paper. I had to return; I could not stay away from my daughter any longer, knowing that I faced failure as a scientist.

However, I got a second chance with Prof. B.B. Biswas at Bose Institute to set up a lab studying the biology of *Entamoeba histolytica*. I started with isolating DNA replication origins from *E.histolytica* and published my first paper in record time – and have never looked back.

In the mid-eighties, the common goal was to develop vaccines against pathogenic organisms and therefore research was targeted to the identification of useful antigens. However, my foray in trying to tame genetic manipulation of *Plasmodium falciparum* during my tenure as a postdoctoral fellow, showed that we needed to understand DNA replication, cell division and regulation of gene expression before a successful vaccine would be designed. When I set up my lab at Bose Institute, I focused on studying cell-cycle regulation in *E.histolytica* specifically, because it appeared to lack any checkpoint control mechanisms.

Friends and well-wishers often chided me, saying that basic biology should be studied in traditional “model” systems. But in my desire to learn, I did just the opposite. In the absence of commercially available tools and reagents we learnt to design our own. It is now possible that in the near future we will be able to unravel a mystery: how does the amoeba survive without tight checkpoint control? That may well be a cornerstone in identifying how it survives in the human host. Regardless, what we have found while researching the biology of this tiny pathogen has inspired me with awe at the wonder that is nature.

The journey is difficult – obtaining grants, publishing papers, ensueing the success of Ph.D students and making sense of the data we generate. I keep questioning the relevance of what I am doing in the larger scheme of things, but ultimately, the biology of *E.histolytica* beckons tantalizingly and I keep chasing my research ideas. *E.histolytica*, has taught me to be aware of my limitations and yet strive beyond my abilities. It is far more difficult to do experimental science in India than in developed countries and therefore to publish, but a sense of contribution to infrastructure

development and successful manpower training sustains me in moments of self-doubt.

Halfway down the road, I have no regrets that I ultimately gave up dance when I went away to the US. Arguably, I had several lucky breaks that ensured a career in science, but I think even if I had not got the opportunity at Bose Institute, I would have developed my skills in a different aspect of science.

I knew so little that I had no choice but to learn. And I continue to learn, watching the amoebae under a microscope, their nuclei marked with a fluorescent dye as they grow and divide. And sometimes don't divide.