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Successfully combating prejudice

Sipra Guha-Mukherjee

I decided to study botany because it was my favorite subject in school. As a school student I was awed by the contribution of Sir Jagdish Chandra Bose, and fascinated by his work that showed that plants were living organisms and had a metabolism similar to that of animals. His hypothesis that ascent of sap in plants is due to pulsatory activity of an inner layer of cortical cells (a theory no longer tenable) infused a huge excitement in me, as earlier I used to think that plants were inert objects which could never respond to any external stimuli. As a student in classes five and six, I developed a strong determination to find the locations of the “heart” and “brain” of plants and to understand the way they functioned. In classes nine to eleven when we studied botany more seriously, I was taught several phenomena regarding plants but nothing about how plants respond to external stimuli.

After finishing school, I joined the B.Sc. (Botany) Honors course at Delhi University. It was an amazing experience as the whole department was vibrant and throbbing with activity. The teachers were so inspiring that all the students in our class looked forward to their lectures. B.D. Sanwal, H.Y. Mohan Ram, S.C. Maheshwari, I.K. Vasil all were excellent teachers who later rose to

top positions in their respective fields. My major inspiration came from Prof. P Maheshwari, a world-renowned plant embryologist, who headed the department. P. Maheshwari made it his mission to inculcate students' interest in Botany by applying various teaching innovations. The whole department was in the birth pangs of the plant tissue culture. The intellectual ferment had a major effect on all of us.

My doctoral research under the guidance of B. M. Johri dealt with the tissue culture of flowers of *Allium cepa*. For postdoctoral research I joined S. C. Maheshwari in the same department. This was a very rewarding period. I worked on various aspects of biochemistry of differentiation in plants, effects of plant hormones on transcription, and stumbled upon production of haploids through anther cultures of *Datura innoxia*. I felt very privileged as I was at the right place at the right time. Our culturing anthers of *Datura* was an extension of several projects in my scientific career. I have written a detailed account of the discovery of anther culture in a turning point article published by the journal *In Vitro Plant*, Volume 35, 1999.

I continued my post-doctoral studies at Michigan State University with Robert S. Bandurski and later with J. E. Varner at the AEC Plant Research Laboratory where, I mainly worked on subunit structures of Aspartate transcarbamylase and isozymes of peroxidases. Although my work on haploid production was published in *Nature*. I did not find any enthusiasm or even appreciation of this work amongst fellow scientists there. This was primarily due to the excitement of new discoveries in molecular biology that overshadowed all other good research, a trend that still continues.

In Europe the situation was different. I was invited to present my work at the EMBO symposium on Haploids in Italy in 1971. The next symposium on Haploids was held in Guelph, Canada, where again I was invited to present a paper. At the XV International Congress of Genetics held in New Delhi in 1983, I met Professor Hu Han, Director of the Institute of Genetics of Academia Sinica, China, who appreciated our work on anther culture and remarked that our work was responsible for a substantial

change in the agricultural economy in China. This was one of the greatest moments in my life. He invited me to Beijing, China, to attend an International Symposium of Genetic Manipulation in Crops in 1984 which was the third international symposium on Haploids.

While I was teaching at West Virginia University in the U.S., in 1972, I was invited to take up a faculty position at the newly established School of Life Sciences at Jawaharlal Nehru University, New Delhi.

I was very happy to get this opportunity. At JNU, no one interfered with my work we also had the freedom to frame our own syllabi, I got adequate grants from U.G.C. C.S.I.R., DST and DBT to support my research. My decision to continue postdoctoral work both at Delhi University as well as in the U.S despite the negative pressures was most crucial in shaping my scientific career.

My decision to opt for higher studies was frowned upon by my relatives and friends, and I received no encouragement or appreciation from them. Even scientists like P. Maheshwari and B. M. Johri thought it improper to appoint a woman scientist as a faculty member in the department. With this bias in place, no woman scientist could rise above a certain level and thus we felt mentally inferior to male scientists.

Even in the U.S. the situation was not very different. I felt I was swimming against the tide. Despite the negative attitude of society and of most male scientists towards women's role as research scientists, I did get inspiration and encouragement from some senior scientists who helped me sustain my interest in research. Without the support of such people there would be a scarcity of women scientists today. Most notable amongst them is Dr. M. S. Swaminathan, who in his mild way always inspired and profusely encouraged me to strive ahead in my research goals. It was unfortunate that I could not find any role model amongst women scientists because they were not well-known personalities. Men mostly ignored them. Great women scientists like Madame Curie or Rosalind Franklin were too distant to influence my career in India.

In those days I did not hear about any woman in India who had made a mark in science. In later years, whenever I discussed this aspect with my teachers I heard that although women were as intelligent as men they could not achieve the same level of success because of their different social commitments.

Today when I look back, I feel fortunate about the events and achievements in my career. I have no regrets and if at all I could change anything I would certainly like (while continuing with my research!) to also understand the psyche of many of my contemporary scientists and administrators and their attitude to women. I feel a lot of precious time was wasted, smoothing ruffled feathers and pacifying many important fellow scientists, administrators and vice chancellors. It is important to eliminate the damage caused by such attitudes so that coming generations of women scientists will not have to waste time combating them.