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## The enthusiasm of a novice

Rajani A Bhisey

I was fortunate to have been born to parents who actively participated in the struggle for India's independence and were also academically oriented. A few years after release from rigorous imprisonment, my father became interested in the synthesis of textile dyes that until then were imported. In our home there was a chemistry table at which my father used to work. He let his kid smell harmless organic chemicals, and amused her by showing change in the colour of phenolphthalein after it was added to an alkali. This was my first fun-filled acquaintance with science. At school, what I really liked was languages, and algebra. After passing the high school examination with distinction, an aptitude test suggested by my father resulted in my opting for science. Reading '*Microbe Hunters*' a book from his collection led me to opt for Microbiology for B.Sc. degree. In 1960, when I passed B.Sc. examination, the university of Bombay did not offer M.Sc. courses in microbiology, therefore I had to think of obtaining M.Sc. degree by research.

The knowledge of electron microscopy obtained due to my fascination with the world of tissue cultures described by a senior doing M.Sc. at the Cancer Research Centre, helped me gain admission for research there, which was to become my vague

throughout my life. The institute provided highly charged academic environment and also the joy of mastering unknown techniques. But there was time for recreational activities as well. Raju Bhisey, a young, bright research Ph.D. fellow was my badminton partner. He won my heart but not many badminton matches.

My master's work lingered on, in fact there was nothing we could do at the Ultrastructure department for a couple of years, as the 1962 war with China had impoverished the country and there was no foreign exchange available for purchasing chemicals and simple accessories like grids, required for doing electron microscopy. After obtaining M.Sc. degree in 1965, I was recruited as a Scientific Assistant at the Cancer Research Institute. The job provided a little more money and I was also allowed to register for Ph.D. degree. Around that time, my husband obtained the position of a postdoctoral associate at the Institute for Cancer Research at Fox Chase Philadelphia, USA. Naturally, our son and I accompanied him to USA. This resulted in a break in pursuing my doctoral work. But I used the opportunity to gain expertise in different aspects of electron microscopy. In the laboratory of late Dr. Jerome J. Freed at Fox Chase Cancer Center, I looked at the cell surface of cultured cells by doing histochemistry at ultrastructural level. Regrettably, nearly 2 years of hard work failed to produce any significant results.

After returning to India, I worked hard and obtained Ph.D. degree under the guidance of Dr. Mrs. S. M. Sirsat, a pioneer in electron microscopy. Soon came the time for developing my own area of research. My intention was to explore the mechanisms involved in skin tumor promotion, and environmental carcinogenesis in the hope of understanding how some benign lesions develop and progress to cancer in humans. I soon realized that animal models needed to be developed for determining whether certain products of common usage suspected to cause cancer in humans are carcinogenic in animals. I concentrated on the development and characterization of a mouse model that would be sensitive to skin carcinogenesis. Several years later with the help of my colleagues we could use these mouse strains to demonstrate carcinogenic potential of chewing products such as *paan* masala and gutkha.

Yet another opportunity to diversify came along when Dr. M. G. Deo, then Director CRI, gave me the responsibility of setting up a genotoxicity laboratory. The idea was to develop expertise in monitoring genotoxic hazards among the people exposed to hazardous chemicals. Technical expertise had to be acquired in assessment of human exposure to chemicals, cytogenetics, and genotoxicity assays. Simultaneously, I had to identify a target population that was highly exposed to genotoxic agents. I decided to study the health and genetic hazards caused by occupational exposure to tobacco among workers who are exposed to exceptionally high levels of tobacco dust and volatile components.

With the enthusiasm of a novice, I took the short route to the Indian Tobacco Company for monitoring workers in their cigarette factory. My visit was totally unsuccessful. I was back to square one. We found that maximum amount of tobacco dust was inhaled by the tobacco processors, the majority being women. Having identified the worker population in Nipani in Karnataka, I tested our logistics with a field study, with a base camp in Shivaji University, Kolhapur. It was obvious that maximum amount of tobacco dust was inhaled by the tobacco processors, the majority being women. Having identified the worker population, and chalking out a programme, the question was where could we conduct our laboratory work? Upon my request, the vice chancellor of Shivaji University kindly allowed us to set up a temporary laboratory at the Department of Biochemistry, Shivaji University, Kolhapur. The field study tested our logistics, and patience, yet it provided much satisfaction from the interaction we had with the workers. Our efforts in two tobacco factories lasting more than a decade indicated that *bidi* industry workers incur considerable genetic damage and are at high risk for development of respiratory diseases and cancer. In this case, social contacts and concerns I had, helped me identify the worker population.

Simultaneously, experimental work using animal, cell culture and human material provided clear evidence that tobacco addicts absorb tobacco mutagens and experience oxidative damage to macromolecules. However, the reality is that among millions of heavy tobacco addicts, only some develop cancer. My work

on genetic polymorphism in tobacco metabolizing enzymes led us to demonstrate that heavy chronic tobacco users who lack the GSTM1 gene that encodes the carcinogen detoxifying GST mu enzyme are at high risk for oral cancer when compared to those who have the allele. Once again my students made me proud when this data was selected by the International Agency for Cancer Lyon, France as one of the very few large and conclusive studies for meta-analysis of the link between this gene and head and neck cancer risk.

My husband and I worked in different areas of cancer but debated and discussed scientific issues. The atmosphere was academic at our home. Our children too imbibed our love for knowledge. I had wonderful colleagues and the Cancer Research Institute provided valuable infrastructural strength. I owe a lot to my students, from each one of them I learnt something valuable, our group discussions brought forth new ideas and questions. I must confess my tremendous gratitude towards my less fortunate sisters, bidi rollers and particularly tobacco processors with whom I could share home made *Bhakri* and vegetable in terribly dusty atmosphere which they patiently suffered. Without their support and that from innumerable people, human studies we made would not have been possible.