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An unusual route to science

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As a child, I was inspired by the devoted service to humanity and innovative surgical skills of my father, a doctor. I was determined to follow in his footsteps and be a surgeon. How did I become a Fellow and a Senior Scientist of the Indian National Science Academy? It is this unusual journey that I want to share with you. Pursuit of knowledge and academic excellence were major driving forces during my school years. My boarding school, where all the teaching was in the vernacular, instilled in me a sense of discipline and an enquiring mind. I got admission to the Christian Medical College in Vellore through an all-India competitive selection. I loved my training and the interaction with patients and enjoyed the challenges of my postings, especially in surgery.

After graduation and marriage to a classmate, I decided to continue working at Christian Medical College, where I hoped to do further training in surgery. But my surgical teachers discouraged me, saying the career was difficult for a woman (it was the 1960's!). At this time I got an opportunity to work in pathology and to my pleasant surprise I found that there were many challenges in the laboratory. Finding answers to them gave ad-

equate fulfillment to my enquiring mind, so I decided to be trained as a pathologist.

At the end of my training the department put me in charge of setting up a newly acquired electron microscope, and opened up the world of sub-cellular structure in tissues to me. For one who was familiar with tissues by light microscopy at magnifications of up to 1000 times, using the electron microscope at magnifications approaching 200,000 was a fascinating and uncharted world. I felt that the sub-cellular details revealed by the electron microscope would answer many questions of structure-function relationships. That was where I wanted to work. Ultrastructural pathology was a new field in India in 1967 and it was a challenge to train myself.

In 1970 I got an opportunity to work with Prof. Jerry Trier, a leading expert on gastrointestinal mucosal ultrastructure at Boston University. I was the only woman among twenty-four Fellows in the department! Those eighteen months honed my skills and taught me the value of hard work, meticulous precision, perfect quality and logical thinking, all of which became second nature to me. In 1971 my paper, selected for the Plenary Session of the American Gastroenterology Association, was the only one presented by a woman that year, a situation that has changed dramatically now. The work I did on the epithelio-mesenchymal interactions in the developing murine intestine is still cited.

Back at Vellore while working in diagnostic pathology, I chose gastrointestinal ultrastructural studies as my research area with the newly established Department of Gastrointestinal Sciences. I was able to publish my first paper on the ultrastructure of the small intestinal lining (mucosa) in healthy controls and patients with Tropical Sprue, a malabsorption syndrome, in one of the leading medical journals, *Gastroenterology*. I was excited and challenged to do better when this paper was judged the best paper in biomedical sciences published from India between 1972 and 1976. As the first gastrointestinal ultrastructural pathologist in India, it was exciting to work with a multidisciplinary team in the new department to unravel structure-function relationships in several gastrointestinal diseases with the electron microscope.

In 1973 Ian Holmes from Melbourne and Tom Flewett from Birmingham discovered the rota virus as a common cause of winter diarrhoea in infants, using direct electron microscopy of suitably prepared faecal samples. With their help I established the methodology at Vellore and showed that the rota virus was a significant causative agent of infantile diarrhoea in different parts of India. Our group became pioneers working to solve this important public health problem of our country. The World Health Organisation recognized my contributions and invited me to serve on their Steering Group on Viral Diarrhoeas. This gave me many insights into early studies of viral diarrhoeas of humans. The Vellore Christian Medical College appointed me to be their first Career Research Chair in 1981, allowing me more time for research. I obtained my Ph.D. in 1983, was elected to the Fellowship of the Royal College of Pathologists in 1996, and the Indian National Science Academy in 1998.

How did I become a scientist? I used the opportunities that were available and found positive aspects in whatever I did. I was fortunate that a field became available that was relatively new in India and that I realized its potential. The nurturing atmosphere of the Christian Medical College was very important in that they encouraged everybody to pursue and develop their dreams. A critical factor was the constant support and encouragement of my husband, who established and developed the Department of Gastrointestinal Sciences. The active cooperation and encouragement of the multidisciplinary team with which I worked and the ready availability of funds to support our research from the Wellcome Trust in U.K. were very important. Four decades later, the situation in India has changed and research grants are available on a competitive basis for good research ideas but in the 1960's it was a different story. I can honestly say that I have never felt discriminated because I was a woman. In all professional settings I was a peer among peers.

Fifty-two years ago when I started as a medical student my ambition was to become a surgeon. From that to what I am now is an unusual journey. My inherent need to know what was behind the apparent face of disease was what really made me a

researcher. Circumstances place different and difficult choices before you. My temperamental inclination to find the best way forward in any situation helped me travel to where I am. The two major turning points were my realisation that the laboratory contributes immensely to the welfare of the patient and my embracing the field of sub-cellular pathology where I could be a pioneer. It has been an exciting journey that continues. One last word. We unfortunately live in a globalized world and not a global village, and the temptation to move to greener pastures is strong. There are many challenges in our country in science and public health and I believe we have the opportunity to work on them, contribute and find satisfaction, if we look positively at things and go forward in quest of knowledge.