

## Satyavati M. Sirsat (1925–2010)

Satyavati Motiram Sirsat was born on 7 October 1925 in Karachi. Her father, a professor of English at the St Xavier's College, Bombay, was a voracious reader and a Sanskrit scholar. He passed on these traits to his children. Later he shifted to shipping to join the Bombay Steam Navigation Company and therefore, the family had to travel to many countries, exposing them to different cultures at a very young age. Sirsat's mother, however, settled in Chennai to take care of the children. Both her parents were theosophists, and so Sirsat was educated at the Beasant Memorial School of George and Rukmini Arundale who had brought about a resurgence of ancient Indian art and music. She thus developed a love for cultural heritage, literature and languages at a young age. She was well versed with South Indian dance and classical music. She could speak besides her mother tongue Gujarati, many Indian languages like Tamil, Kannada, Hindi and Marathi, and was fluent in English and French.

Sirsat received her Bachelor's degree in microbiology in 1947 from St Xavier's College, Mumbai. As she recalled in her brief memoir, she was fascinated by the book *The Microbe Hunters*, by Paul de Kruif and was thus attracted to the study of microbes and biological research. Thereafter, she joined V. R. Khanolkar, the chief of laboratories, and chief pathologist at the Tata Memorial Hospital for Cancer for her postgraduate studies. Here she developed a broad-based scientific interest in oncology.

In 1948, the Ministry of Health, Government of India, decided to make the Department of Pathology at the Tata Memorial Hospital into a full-fledged Cancer Research Institute (CRI). As a senior doctoral student, Sirsat became associated with the new research centre. After obtaining her Ph D in 1958, Sirsat went to the Chester Beatty Research Institute in London to learn electron microscopy, where she had the opportunity to interact with Hans Selye, Albert Szent-Györgyi, Linus Pauling, Alexander Haddow, Charles Oberling and William Astbury, scientific stalwarts of the time. Returning from the UK, she fulfilled the exciting task of establishing the electron microscopy laboratory at the Indian Cancer Research Centre as it was then called

(now ACTREC). This was the first biomedical laboratory in ultrastructural cytology and diagnostic molecular pathology in India. Many young students flocked to her laboratory attracted by the mind-boggling power of the electron microscope and an opportunity to work with leading biomedical electron microscopists of India. Her main interest was in the study of cancer cells and their interaction with the surrounding stromal milieu. She studied the ultrastructure of collagen fibres and epithelial mesenchymal relationships in experimentally induced and human cancers. Her ultrastructural studies also helped in accurate diagnosis and therapy of cancers that were difficult to diagnose by light microscopic observation.



Sirsat pioneered ultrastructural studies to understand alterations at the level of the plasma membrane of cancer cells and specific alterations at junctional complexes using techniques available then. Her work has been in the area of oral pre-cancer. She focused on studying cellular alterations in oral leucoplakia and oral submucous fibrosis and frankly malignant oral cancer, rampant in India due to the habit of lime-based paan and tobacco-chewing. Her major contribution was the recognition of oral submucous fibrosis as a distinct entity endemic and distinct among the Indian population and elucidation of pathogenesis underlying the precancerous condition. She studied the role of viruses in causation of human

breast cancer. Although viral etiology of breast cancer was disproved in later studies, the importance of her study is evident from her publications in journals such as *Nature*, *Nature New Biology* and the *Journal of National Cancer Institute*. For this project expertise was required in molecular biology that was not available at CRI. She collaborated with Dan Moore and later closely with M. R. Das at the Tata Institute of Fundamental Research, Mumbai. This was the first time anyone from CRI had tried to study molecular aspects of cancer. Unfortunately, she could not bring the technology to her own laboratory.

Sirsat served on the Editorial Boards of several journals, including *Journal of Biosciences* and *Indian Journal of Experimental Biology*. She served on the advisory committee on collagen of the Central Leather Research Institute, Chennai and founded The Electron Microscope Society of India, where she served as President from 1967 to 1972. The awards she received include the Shakuntaladevi Amirchand Prize of the Indian Council of Medical Research, Trans Asian Award for Biological Electron Microscopy and the Bharatiya Vidya Bhavan's Citation for Lifetime Award for Science and Humaneness. Sirsat had the distinction of being a postgraduate guide in microbiology, applied biology and biophysics at the same time. She was elected fellow of the Indian Academy of Sciences in 1975.

Sirsat played a vital role in establishing the Life Sciences Department at the University of Bombay, continuing to teach and participate in the activities of the department in its formative stage and thereafter for several years. She was associated with many universities in the country and the Indian Association of Cell Biology. She was a source of wisdom, warmth and joy in the proceedings of the conferences.

Sirsat was a tremendously outgoing person who could make friends with young and old. She was extremely well read and had a huge collection of books that included authors of humour, science, art and philosophy, besides science journals that she subscribed. Her memory was phenomenal. I still remember how she would ask me to find a particular reference telling me from memory, the

year, volume and page and, of course, the name of the author. Writing a paper and a thesis with her was a learning experience and a great joy. She was also an artist and showed us a number of her water-colour paintings.

After retiring from CRI in 1985, she worked for 17 years at the Bharatiya Vidya Bhavan Ayurvedic Centre on ancient insights and modern discoveries. Her knowledge of Sanskrit proved invaluable while she worked on a project on cancer nosology of the 'Vridhatrayi' – Charaka, Sushruta and Vagbhatta. Post-retirement, Sirsat continued to serve her alma mater the Tata Memorial Centre as Chairman of the Medical Ethics Committee.

A great humanitarian, she was drawn to the care of terminally ill patients. She worked closely with Lucito D'Souza to start a safe haven – India's first hospice, Shanthi Avedna Ashram in Mumbai, where terminally ill cancer patients find hope for a peaceful end. She was the founder trustee-counsellor of the hospice since 1986. The hospice movement was dear to her heart and she continued to be associated with it for as long as her strength permitted.

All of us who had the good fortune to be associated with Sirsat truly admire her versatility and understanding of science, literature, music and dance, and her motherly warmth. Her passing away has created a void not only in her family, but

the scientific community that remains indebted to her pioneering efforts in modernizing cancer research in India. She has authored a book titled *Death, the Final Freedom* with Lancelot Pereira, which speaks about peaceful death. Sirsat who helped and cared for terminally ill patients in their last journey, passed away peacefully on 10 July 2010.

RAJANI A. BHISEY

7, Yug Prabhat Co-operative Housing Society,  
Siataldevi Temple Road, Mahim,  
Mumbai 400 016, India  
e-mail: rajani.bhisey@gmail.com

## Vinod Bhakuni (1962–2011)

The Indian scientific community lost an accomplished colleague on 15 July 2011 when Vinod Bhakuni died of a sudden heart attack in Lucknow.

Bhakuni worked at the CSIR-Central Drug Research Institute (CDRI), Lucknow, where he headed the Division of Molecular and Structural Biology. Beginning as a Ph D student with C. M. Gupta, he had worked and taught at the Institute since 1984. After pursuing a postdoctoral fellowship in the laboratory of Ernesto Freire at the Johns Hopkins University, USA for two years, Bhakuni returned to a faculty position at CDRI.

Bhakuni was among the leading biophysicists of the country. He was deeply interested in understanding protein folding, intermediates and stability in order to gain insight into protein-folding pathways and their future applications. His initial work on several proteins demonstrated the importance of ionic interactions on protein stability and oligomeric conformation. He also worked on binding mechanisms of hydrophobic dyes and different alkaloids on cytochrome *c*, catalase and other proteins and deci-

phered their folding patterns and pathways. During the late nineties, a much cited work from his laboratory provided evidence for the role of the hydrophobic dye, ANS, in protein refolding. The



unique stoichiometry of the cofactor in serine hydroxyl methyl transferase (SHMT) of *Mycobacterium tuberculosis* was first demonstrated by his group. He further characterized SHMT from different sources to decipher its mechanism

of action and folding patterns. More recently, his interests geared towards understanding the mechanism of action of hyaluronate lyases (HLs) from *Streptococci* and bacteriophages. His group successfully deciphered the mechanism of action of HLs, characterized their cofactor requirements and identified suitable inhibitors.

Bhakuni's research contributions were recognized by many awards, including the CSIR Young Scientist Award in 1996, the Bhatnagar Prize in 2006, and fellowships of the three Indian science academies.

Bhakuni is survived by his parents, wife Neelam, son Abhyudai and daughter Harshita. The many students he mentored carry forward his scientific legacy.

SOHAIL AKHTAR  
SAMAN HABIB\*

Division of Molecular and Structural Biology,  
CSIR-Central Drug Research Institute,  
Lucknow 226 001, India  
\*e-mail: saman\_habib@cdri.res.in