BOOKS & ARTS

Bridging the gender gap in Indian science

A set of biographies reveals the trials and triumphs of India's women researchers, says **Asha Gopinathan**.

Lilavati was the clever daughter of the twelfth-century Indian mathematician Bhaskara II. A well-known mathematician in her own right, she inspired generations of Indian women. Bhaskara's famous book on mathematics was named after her, and he addressed many of its verses to her. *Lilavati's Daughters* spotlights women based in India who have pursued research in science, engineering and mathematics from the late nineteenth century to today.

A collection of 98 short biographies, the book stems from a project initiated by the Women in Science panel of the Indian Academy of Sciences, Bangalore, to provide young girls with inspiring role models (see www.ias.ac.in/womeninscience). The diverse personal stories span many disciplines and regions of India — and are inspiring.

The earliest chronological entry is for Anandibai Joshi, the first Indian woman to go abroad and study to become a doctor. From 1883 to 1886 she attended the Women's Medical College in Philadelphia and was awarded an MD degree for her thesis *Obstetrics Among Aryan Hindoos*. Unfortunately, she contracted tuberculosis and had to return to India. She received no treatment: Western doctors refused to treat a brown woman and Indian doctors would not help her because she had broken societal rules. Joshi died in 1887 at 22 years of age.

Thankfully, not all the women in the book had such tragic lives, although many had to overcome obstacles to achieve success. Physicist Anna Mani, who worked with the Nobel laureate C. V. Raman, was not awarded a doctorate despite publishing several single-author papers. Yet she went on to become the deputy director-general of the Indian Meteorological Department and, after retirement, set up a factory to manufacture instruments to measure wind speed and solar energy.

Many of those highlighted were the first to break into male-dominated professions: Asima Chatterjee was the first Indian woman to be awarded a DSc; E. K. Janaki Ammal was elected a fellow of the Indian Academy of Sciences the year it was founded; Kamala Sohonie was the first female director of the Institute of Science, Mumbai; and Bimla Buti is a former director of plasma physics at the International Centre for Theoretical Physics in Trieste, Italy.

It is interesting that many of these women

Attending a science summer school encouraged geneticist Sudha Bhattacharya to become a researcher.

scientists came from ordinary middle-class families. Most grew up not in the nation's big cities but in rural areas, where getting an education in any discipline, let alone in science, is difficult. In rural Punjab, mathematician R. J. Hans-Gill had to pretend to be a boy and wear a turban to attend school — a secret that was kept between her family and the headmaster. Biologist Chitra Mandal was accompanied to school in rural Bengal by her grandmother because the teacher would not let the four-year-old in without someone to look after her.

Almost all of the women speak of the premium their families placed on education and the support and encouragement each received from family members. Mothers are

especially significant — poorly educated ones as well as some who were scientists themselves. Dedicated teachers, both at school and college, were also influential. They spotted and nurtured talent and lit sparks of curiosity in the minds of these young girls. In post-independence India, government schemes such as the National Science Talent Search scholarship have helped many women, including geneticist Sudha Bhattacharya, now a professor at Jawaharlal Nehru University in New Delhi, to pursue their dreams by allowing them to study at a good university and to meet eminent scientists and peers from

across the country during summer camps.

The road to the top is never smooth. Many of the women acknowledge sexism in their professions, a lack of institutional support, double standards in measuring their achievements, social bias due to caste, self-imposed limitations, negative stereotypes surrounding single women and the multiple roles that married women with families have to juggle. They have used many strategies for survival. But most important is their passion for their work.

The motivations of these female scientists are often surprising. Not everyone in the book aspired to win the Shanti Swarup Bhatnagar Prize for Science and Technology: only a handful has won this coveted award. Instead, they have put their energies into teaching and communicating science, taking their research out of the lab to change people's lives.

Each of these essays is special. They tell of vibrant women who combine a tough life in the sciences with other interests such as cricket, dance, music or literature. Had I received this book as a young girl, I would have been captivated. I hope that *Lilavati's Daughters* will be translated into many languages and grace libraries worldwide. It is a wonderful resource for both mentors and mentees. ■

Asha Gopinathan is a neuroscientist based in Trivandrum, Kerala, and a member of the International Network of Women Engineers and Scientists.

e-mail: dendron.15@gmail.com

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