
**Lilavati's Daughters: The Women Scientists of India.** Rohini Godbole and Ram Ramaswamy (eds). Indian Academy of Sciences, Bangalore 560 080. 2008. 369 pp. Price: Rs 300.

This anthology of 98 biographical and autobiographical essays is a venture of the Women in Science (Wis) panel of the Indian Academy of Sciences, Bangalore, to address the issue of invisibility of women in science and to provide role models for young budding women scientists within their own country. *Lilavati's Daughters* acknowledges the struggle of Indian women scientists and applauds their accomplishments. The book is aptly titled. The name 'Lilavati' is drawn from the classical treatise written by a highly accomplished 12th century mathematician, Bhaskaracharya, wherein he addresses many complicated mathematical problems to his daughter, Lilavati. Historical facts suggest that Lilavati herself was quite proficient in mathematics and her invincible spirit is being personified today in the form of her successors – the women scientists of India.

The book describes the experiences/lives of about 100 women scientists, wherein each essay is either narrated by the scientist herself or by her husband/colleague/student, if she is no more. These hundred women scientists representing a diverse group of mathematicians, physicians, chemists, geo-scientists, ecologists, biologists, physicists, computer scientists and meteorologists span the early-Victorian era to post-modern era. The beauty of the book lies in its simplicity. Each essay typically runs to about 3–4 pages and since there is no formal format to write the essay, each scientist has told the story in her own manner. Some have penned down their tales with the skill of an accomplished writer, some with the flair of a scientist and a few with the zest of an amateur. The common thread running through their stories is their passion for science which kept them going even in their weakest hour.

The book opens with the story of a pioneer cytologist, E. K. Janaki Ammal (born in 1897), who was bestowed with an honorary LLD degree by the University of Michigan in 1956, in recognition of her contributions to botany and cytogenetics. Each subsequent essay is a personal journey of an individual woman scientist from her childhood onwards. These women belonging to different socio-economic and cultural backgrounds, step back in time and retrace their career paths. Some of these women were brought up in families where education was a norm and others had to struggle to get admission into a school. Recollecting their early days, they emphasize the positive impact that their role models had on their choices for a scientific career, early on in their lives. Each story is unique in its own way and each one of these scientists was able to achieve professional recognition in her field.

As you travel through the book, you come across an awe-inspiring story of a woman scientist who chose to make some substantial research contributions and finish her Ph D despite being diagnosed with cancer of the stomach and the abdominal region (B. Vijayalakshmi). Other inspiring reflections include a scientist who had to dress-up like a boy so that she could go to school (R. J. Hans-Gill), and another who continued doing research in whatever spare time she got between her family obligations and teaching responsibilities, and was finally able to submit her Ph D thesis 20 years after her M Sc (Kusum Marathe). These real-life stories also evoke a myriad of emotions; sadness for not being able to get a Ph D degree despite publishing five single-authored papers from her graduate work (Anna Mani), the feeling of injustice when a girl student had to sit on 'satyagraha' to get admission in a research institution and then work for a year on probation to prove herself as 'research material' before she could do research for her M Sc degree (Kamala Sohonie), the desire to balance family and profession when she had to hop from fellowship to fellowship just to stay in the same city as her husband (Darshan Ranganathan), the sacrifice when she decides to go for a conference leaving her six-month-old son behind (Shikha Varma) and the sense of accomplishment when a girl who got married at a tender age of nine and was almost illiterate then, received a standing ovation for being the 'first woman doctor of India' during her graduation ceremony in USA (Anandi Gopal).

Some of the stories in the book raise important questions that need to be addressed by policy makers. For example, Joyanti Chutia, Director of the Institute of Advanced Study in Science and Technology (IASST), Guwahati, mentions that the biggest challenge of her life has been to get funding to keep her institute alive, which is the only one of its kind in the entire northeastern region. Lack of infrastructure in Indian universities is a major impediment for doing research. Qudsia Tahseen shares her experience in her essay entitled 'Journey to success', where she reminisces that she got her own independent laboratory fourteen years after joining the university. Prabha Chatterji in her essay entitled 'Waiting for sparks' emphasizes the need of taking the National Science Talent Search fellowship to every nook and corner of India, so as to enable students from small villages to enter into the fascinating realm of science. Many narrators question the 'unwritten policy in Indian science of not offering faculty positions to both husband and wife in the same institute'. Similarly, many women scientists mention about the discrimination they had to face at the hands of other women scientists.

These essays collectively describe the issues, challenges and experiences of Indian women scientists in the past and also shed light on the problems faced by contemporary women scientists. In the book, women scientists dwell upon the difficult choices they had to make to sustain their career/family, and each tale is a recount of the journey of their dreams, expectations, hardships and professional highs and lows. Most of the narrators in the book admit that they faced discrimination, at one level or another, in their scientific career just because they were women. There are a few exceptions to this too. While on one hand, many were not given the rightful promotions or privileges/awards accorded to their male counterparts, or were permitted to work only on temporary positions with lower salaries, the other end of the spectrum is represented by scientists who never felt

disadvantaged throughout their career just because they were women.

None of the women in *Lilavati's Daughters* regrets her decision to opt for science and contemplates that if she has to restart her career today, she will choose the same profession again. Put plainly, these women scientists have enjoyed their lives in science and are proud of their accomplishments and the success of their young colleagues/students. Throughout the book, quotes such as 'Research for me is a way of life' (Renu Khanna-Chopra), 'Even on a bad referee report day I am happy I do science' (Rama Govindarajan), 'All the gender-biased adversities have made me stronger and even more ambitious to succeed, and I do science without regret and apology' (Bindu Bambah) and 'I cannot remember a time when I did not want to go to my lab – it is my dream place and I never feel bored' (Chitra Mandal), sum up their joy in doing science.

The book has no specific agenda, no conclusion and the short essays have not been organized in any particular fashion, but many stories do point towards the issue of gender bias in the positions of power within the scientific community and emphasize the importance of having female role models in this arduous profession of science. This book provides tangible examples of career paths of successful women scientists, which will certainly aspire young girls to achieve their dreams.

The book does have some typographical errors here and there, but you tend to neglect them as you cruise along. The only reservation I have about the book is the lack of representation of women scientists from the industrial sector. Success in industry and academia is measured by different yardsticks; while it is a team achievement in the industry, academia focuses on individual accomplishments. Reflections on the career paths and the challenges faced by women scientists employed in the industry would have offered more food for thought. Despite this, the book serves its purpose by bringing visibility to the unsung heroines of Indian science and by acknowledging their contributions to science, both as researchers and as mentors.

Overall, the book is well indexed, well composed, easy read and highly inspirational and deserves a place in your personal collection as well as on the bookshelf of every college and university library. The book is a must-read for future generations of scientists who will be inspired by the lives of these remarkable Indian women scientists. Despite having no manifesto, *Lilavati's Daughters* successfully drives home the point that a more conducive work environment for women researchers will help them reach their full academic potential and will allow the nation to tap the entire scientific talent pool.

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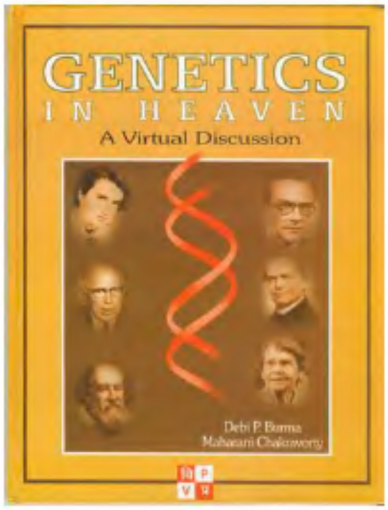


**Genetics in Heaven: A Virtual Discussion.** Debi P. Burma and Maharani Chakravorty. Vigyan Prasar, A50, Institutional Area, Sector 62, Noida 201 307. 2008. 95 pp. Price: Rs 100.

This little book of about one hundred pages presents a historical account of the development of genetics from the times of Charles Darwin and Gregor Mendel, up to the period when the human genome was sequenced, spanning little more than a century and a half. The unusual feature of this book is the novel style of narration. It is written in the form of informal conversations between Darwin and Mendel, imagined to take place in Heaven. Other luminaries of the past (also imagined to be in Heaven) such as Barbara McClintock, Oswald Avery, Erwin Chargaff, Francis Crick, Rosalind Franklin, Rene Dubos and J. B. S. Haldane are brought in to participate in the conversation, as and when necessary. Some who have not made it to Heaven yet are contacted through an ingenious device called the Time Telescope (with its audiovisual attachments!), invented by none other than Galileo Galelei (another Heaven-dweller), whom Darwin and Mendel are imagined to meet in Heaven. These doyens include Joshua Lederberg (an earthling at the time of writing of the book), James Watson, Paul Berg, Frederick Sanger, John Sulston, Craig Venter and others. Through their conversations the story of genetics is unfolded. This style is indeed novel and many basic concepts and anectodotal titbits are presented. Even professionals could find bits of information that they may not be aware of. Although it is claimed that the book could be read and understood even by laymen with some interest in and exposure to science, the language is technical and esoteric, very much so in places. I wonder how much a lay reader would gain by reading this book. However, serious students and teachers of genetics might find this book a good supplement to regular textbooks. A major drawback of this book is the complete absence of illustrations, which could have been of great help in grasping the concepts. In a lighter vein, I wish Darwin and Mendel had bumped into another illustrious 'swargvasi', namely Leonardo Da Vinci who, with the help of Galileo and his gadgets, could have located the source of necessary material and come up with excellent illustrations. As everyone knows, Da Vinci was good at scientific drawings when he was an earthling!

The authors could have been less uncomplimentary towards Watson and Crick (W–C) and refrained from calling them (through the words of Rosalind Franklin) as Mr Wicked and Mr Crook (p. 30). Even Darwin and Mendel (who meet Watson just a few pages earlier in the narrative) are depicted to describe him as arrogant and upstart (p. 47). All this could have been avoided. The authors (again through the words of Chargaff and Franklin) are critical that the W–C duo got the Nobel Prize without doing any experiment. True, Chargaff and Franklin provided information on base equivalence in the DNA and the possibility of a