

# Preface

*Oh Lilavati, intelligent girl, if you understand addition and subtraction, tell me the sum of the amounts...*

This is the third printing of Lilavati's Daughters, the collection of essays on Indian women scientists, which was brought out in 2008, after having been in the making since 2006. One of the initiatives of the **Women in Science (WiS) panel of the Indian Academy of Sciences**, the project arose while the issue of the under-representation of women in the sciences in India was being discussed. We thought that it might be both interesting and inspirational for young children to learn more about Indian women scientists.

The first idea was to put together a collection of biographical sketches of influential Indian women scientists of earlier generations, to underline the fact that it is possible to find role models within the country; one does not have to look only towards the Curies, the Franklins and the Hodgkins (impressive scientists though they all are) to find women scientists of substance. We felt that it was important, especially for young girls with research ambitions, to know of women who functioned and achieved their goals in the Indian social and academic environment.

But how relevant is this in today's context? Especially when India – and the world – has changed so much in the recent decades. Inspired by *One Hundred Reasons to be a Scientist*, a volume of essays put together by K R Sreenivasan, Director of the

International Center for Theoretical Physics, Trieste, in which about a hundred highly reputed scientists from all over the world talk of what attracted them to science as youngsters and kept their interest alive, this collection of biographical sketches evolved to include autobiographical sketches from women who are doing science *now*, at different levels and with different degrees of success.

And so *Lilavati's Daughters: The women scientists of India* came to be. Lilavati was the daughter of the twelfth century mathematician Bhaskaracharya, for whom he wrote the eponymous treatise (from which the fragment of verse quoted in the previous page is taken). Although legend has it that she was never married, as the first woman student of mathematics in India, she has innumerable descendants ... the Indian women of science.

We wanted this collection of essays to mirror our cultural diversity, and to cover a range of disciplines so that any woman student could gain from the insights and experiences of other women to whom they can relate at many levels. What passions drive those who do science, what tribulations did they go through, what helps ... and what hinders, along this journey on the path of science?

During the course of putting together this volume and interacting with the various contributors, we realised how true many of the normal adages about women professionals are. Most of Lilavati's daughters are from middle class families where education is given a high premium. Many also talk of how they were given opportunities equal to their brothers. A large number of the contributors to this volume have had other women achievers (although not necessarily in science) in their families: Iravati Karve and her two grand-daughters, Priyadarshini Karve and Chanda Nimbkar, as well as Purnima Sinha, her daughter Supurna and niece Sudeshna all figure in this book, for instance. In fact, in the former case, both Priyadarshini and Chanda happen to be the grand daughters of the doyen of women's emancipation in Maharashtra, Maharshi Dhondo Keshav Karve.

Our aim of being truly representative may not have been as successful as we had hoped. The somewhat skewed regional and

social bias within the Indian scientific community as a whole is one of the many reasons for this. Many shining examples are conspicuous by their absence. Some were not in sympathy with this effort, feeling that such exercises do more harm than good. Some have not been able to make the time, in spite of wanting to write. And we may simply have missed some. We hope to make up for these omissions in part, by having a separate website for Lilavati's Daughters on the Women in Science homepage where these and other essays will be separately available to read. Your observations on the names we might have missed may be made by going to the WiS webpage: <http://www.ias.ac.in/womeninscience/>

In the end, we hope that this set of nearly one hundred essays gives some flavour of what it takes to be a woman scientist in India today. Negotiating through the diversity of cultures, regional distinctions, languages and traditions in order to pursue a career in science has its complexities. And its rewards.

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**Addendum:** We are thankful that this book was received with so much enthusiasm. In this reprinting we have corrected as many typos and other errors as we could find, and have changed some of the photographs as well.

In the time between starting the project in 2006 and the second printing now, we are saddened by the loss of two of the scientists who contributed to the book – Sipra Guha-Mukherjee passed away on 15 September 2007 and Anjali Mookerjee on 30 May 2009. We feel privileged to have known them, and that they are a part of Lilavati's Daughters.

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**At the time of third printing:** We have taken this occasion to correct some of the errors of omission still left in the second printing. We must say that we feel really overwhelmed by the

fact that the book is now in its third printing. We believe this testimony to the growing collective realisation of the issue of participation in science by women. We followed up this collection of essays by a smaller book, called 'A Girl's Guide to a Life in Science', wherein we included edited version of a small number of essays from Lilavati's Daughters. This was meant for younger audience and in fact the essays were extended to include a description of the science as well as some illustrations. This has been jointly published by the Indian Academy of Sciences and Zuboon publication. But we find that the attraction of these first person narratives penned by these scientists, which appeared in Lilavati's Daughters is still very strong. Here is wishing that the journey on the road towards increased participation by women in science, in which LD, GGLS are but some tentative and early steps, moves on at a faster pace.

In between the second and the third printing we have lost a few more of our contributors.

Satyavati M Sirsat passed away on 10 July 2010, Rajeshwari Chatterjee on 03 September 2010 and Priti Shankar on 17 October 2011.

We are saddened by the loss but happy that their stories live on, among other things, also through 'Lilavati's Daughters.'

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# Acknowledgements

A large number of people have helped us in this endeavour and we would like to take this opportunity to express our sincere thanks to them. Tina Franco, P. K. Jayanthan, Sharvari Navale, Saashi Subodh and Ruth Vanita edited many of the essays at different stages. We would like to express our thanks to Mr G Madhavan of the Indian Academy of Sciences for his help in making this project a reality. The staff of the Indian Academy of Sciences, Mrs R. Pushpavathi, Ms M. K. Anitha and Mrs M. Srimathi in particular, have worked tirelessly to see to its completion. A big thank you also to our artists Mr Trinankur Banerjee and Mrs Jayati Naravane. We also wish to express our gratitude to the Bhandarkar Oriental Research Institute (BORI) in Pune who provided us access to some of the old manuscripts related to Bhaskara's Lilavati, excerpts from which adorn the cover.

We would particularly like to thank all our contributors. A number of friends and colleagues helped by putting together sketches of the women scientists who are no more. This required considerable archival effort, and it was enriching to learn from them of the early days, when the barriers that women needed to cross were huge.

The women scientists who wrote the autobiographical essays have shared their personal stories and insights, and have been most generous with their time. Without them, there would be no book.

Thank you!