

Editorial

Pratibha Jolly and T N C Vidya, Guest Editors

Commemorating the International Women's Day, this special issue celebrates the aspirations of women and their manifold contributions to science. These are exciting times for being in science. Young women and men from diverse backgrounds are progressively aspirational and determined to carve a successful career in science. However, in this quest, women encounter a multitude of gender gaps. Statistics show a huge differential in the foothold women have in higher academia in comparison to men. Another gap, perhaps correlated, exists in the publication space. There is yet the need to provide a nudge and proactively urge women scientists to tell their stories, document and publish their work. There is also the need to catch them early in their careers, give them opportunities and a level playing field to communicate science. Women's ways of 'knowing and doing' have immense potential to enrich the landscape of science. It is this perception and commitment to gender inclusion that underpins the need for the second special issue of *Resonance*, dedicated to writings by women scientists.

With this as our mandate, we present herein an eclectic collection of articles to give a prismatic view of the contribution of women scientists in diverse fields.

The featured scientist of this issue is Professor Maryam Mirzakhani, the only female recipient of the Fields Medal, the most prestigious award in mathematics, often equated with the Nobel Prize. Her contributions to algebraic topology and geometry, especially understanding dynamics on hyperbolic surfaces, speak eloquently of women's potential to contribute to the frontiers of mathematics. So comprehensive and full of complexity is Maryam's work that it was difficult for us to identify who could write on it and review it. The touchstone article by Nikita Agarwal, Riddhi Shah, and Geetha Venkatraman elegantly portrays



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Maryam's life – from schooling in Iran, development of ardent interest in mathematics to path-breaking research at Stanford. Indeed, her life and work – poignantly cut short by cancer in 2017 – epitomize the accomplishment, resilience, and passion women scientists bring to the pursuit of advancement of knowledge even under daunting circumstances.

We also feature Dr. Soumya Swaminathan, former Director General of the Indian Council of Medical Research, whose recent appointment as the Deputy Director General for Programmes at the World Health Organization is a milestone for the country. The first Indian to hold this position, she takes head on the challenge of formulating policies for creating a healthier world. A paediatrician and a globally recognized researcher on rampant diseases such as tuberculosis and HIV, she talks to Subhadra Menon about her journey and the challenges in combatting these diseases.

The general articles in this issue cover a range of themes of contemporary interest.

Prerna Sharma describes her research in the emerging field of self-assembly of colloidal particles. Her work is highly interdisciplinary and has a profound impact on exotic phenomena like living crystals. A condensed matter physicist who appeared in the under thirty Forbes List in 2015, she is someone to watch out for.

Vandana Bhalla's article on supramolecular chemistry describes the kinds of interactions and energetics involved between participating molecules in supramolecular complexes, and how supramolecular chemistry has led to the development of molecular machines. Sunaina Surana and Yamuna Krishnan (an Infosys Prize 2017 awardee), describe an actual DNA nanomachine – a nano-sized molecular machine that they used as a pH sensor inside live worms to measure the pH of organelles. This was the first demonstration of a DNA-based sensor providing information from inside live organisms.

Nandini Chatterjee Singh and Hymavathy Balasubramanian, work, interestingly, at the interface of neurobiology and music. Tracing



the study of the perception of music, and the role of psychophysiology in understanding the impact of music on emotion, they explore the emotional responses associated with Hindustani *rāga* music.

Shomita Mukherjee and Uma Ramakrishnan discuss the role of molecular tools in understanding phylogeography and in informing conservation biology by describing case studies on the Jungle Cat, Leopard Cat, and Tiger.

Ankila Hiremath traces the history of the study of invasive alien species and details the case of *Lantana camara*, a highly successful invasive plant in the Indian subcontinent. In the context of our rapidly changing environment, the study of invasion biology is very important in informing conservation and management decisions. Our planet is also changing, albeit on a slower time scale. Kushala Rajendran describes how abrupt physical changes within Earth result in seismic activity with drastic consequences. She details studies on plate tectonics and measurement of earthquakes.

Deepa Khushalani addresses one of the greatest challenges facing scientists in the twenty first century, namely, the production of clean and affordable energy that is paramount to the survival of modern human civilization. She describes how photocatalytic water splitting under solar light can lead to sustainable hydrogen production to address the energy needs for the future.

Shruti Sharma, Simran Semwal, and Darshana Joshi, in the feature Classroom, narrate a unique outreach programme aimed at popularizing science among school children, under the banner of VIGYANShala (Vision India: GenY Applied Science Network). They describe several exciting lecture demonstrations and hands-on activities.

Prajval Shastri brings forth the rich tapestry of history and philosophy of science as she reviews Priyamvada Natarajan's book *Mapping the Heavens: The Radical Scientific Ideas That Reveal the Cosmos*. Sindhu Radhakrishnan reviews *Parava*, a commercial regional film that is unusual in portraying human-animal interactions in an extremely nuanced and mature manner, counter



to imagination, the animal being a pigeon.

Shobhana Narasimhan challenges the reader with a Crossword designed especially for this issue; the clues are largely based on women in science. Unnati Akhouri, an Inlaks scholar, steps in as the guest cartoonist. The cartoon on topography is pulled from her blog that provides access to her creative graphical vignettes and comics in physics. Shruti Gupta has contributed the photographs for the inside back cover – Birds in the Backyard – a departure from Flowering Trees that has been featured regularly.

To close the loop, the story of the start of any project needs to be narrated to its end. As with the last special issue in March 2017, this one began with a nudge from Professor Ram Ramaswamy, President of the Indian Academy of Science and a great supporter of women in science. We thank him, Professors R Nityananda, N Sathyamurthy, B Sury, and the editorial staff of *Resonance*. They were always a mouse click away. Last but not the least, we thank our contributors and reviewers without whose enthusiasm this issue would not have taken shape.

