
Vibha
Swatantrata Ka
Amrut Mahotsav
Vigyan
Vidushi
Indian Women Scientists
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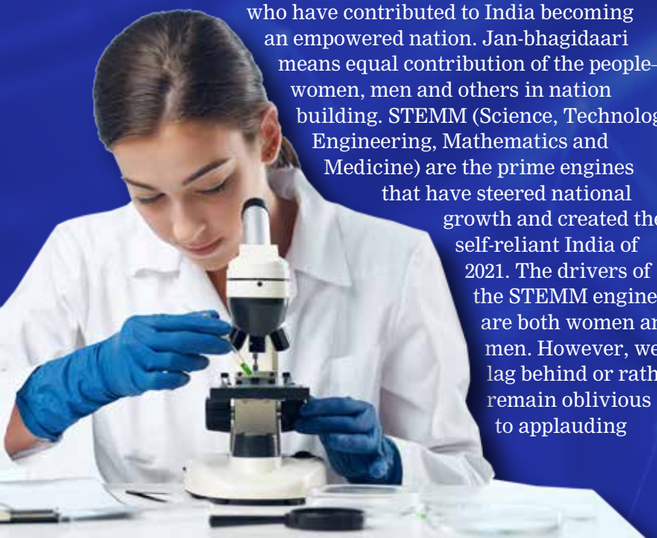
PRASAR

Resource Book on Profiles of Indian Women Scientists

While the world is witnessing 'winds of change' for women scientists, India is also not lagging behind. In 2015, the United Nations resolved to celebrate 11 February every year as 'International Day for Women and Girls in Science', which further invigorated the global mission for justice and equality. In 2020, India celebrated National Science Day with 'Women in Science' as the focal theme. An equally enthralling announcement came when 11 chairs were established in the names of women scientists from India at institutions across the country. Such reverence is most deserved and was long due.

India is celebrating 'Swatantrata (Azadi) Ka Amrut Mahotsav (SwAM) as a Jan-Utsav in the spirit of Jan-Bhagidari dedicated to its citizens who have contributed to India becoming an empowered nation. Jan-bhagidaari means equal contribution of the people— women, men and others in nation building. STEMM (Science, Technology, Engineering, Mathematics and Medicine) are the prime engines that have steered national growth and created the self-reliant India of 2021. The drivers of the STEMM engine are both women and men. However, we lag behind or rather remain oblivious to applauding the role of women researchers. Women have mostly been perceived as followers, colleagues and not as pathfinders and leaders. This notion is not true but an outcome of socio-cultural conditioning with its roots deeply embedded in ever pervasive patriarchy. As a part of the SwAM activities, we perceive this resource book as an instrument to project the accurate picture at the horizon and present a compilation of biographies showcasing stellar accomplishments of Indian women STEMM researchers from 1947-2021. These women have demonstrated Jan-bhagidaari in true sense for building and strengthening the scientific enterprise' of the 21st century India.



If one tries to map successful women researchers to pre and early post-independence era, the outcome would be a patchy, sparingly populated timeline. However, the patches bask in their own glory; each one representing a woman who dared to dream of not only getting educated but also showcasing professionalism and leadership in science. For e.g. . E.K Janaki Ammal reorganised the Botanical Survey of India, Rajeshwari Chatterjee became the first women faculty at IISc and Asima Chatterji, the first women to be awarded D.Sc. degree of any Indian University.

In contrast, the timeline for the first two decades of this millennium appears more populated with many young women scientists leading institutions and winning the major science awards in India. Aditi Sen De, a quantum computation physicist and Jyotirmayee Dash, an organic chemist who works on developing anti-cancer therapeutics were awarded the SSB prize in 2019 and 2020 respectively. The book aims to showcase the professional journeys of these women with compelling narrative of how the workspaces for women got constructed and how they had evolved over the last 75 years.

Our young girls need to know about pre-independence status of women education to be able to connect the past, appreciate our present and create the best of the future. An exciting example is Bethune college in Kolkata that came up in the late 19th century and has produced the youngest Shanti Swarup Bhatnagar prize winner (2019)— the mathematician Neena Gupta who solved the 'Zariski Cancellation Problem'. The book will weave together several intertwining threads such as modernization of education, revival of women education and the rise of colonial science during the late 19th century. For example – the mention of Anandibai Joshi, the first female to receive training in western medicine abroad is incomplete without the acknowledging the herculean efforts of Jyotiba Phule, who stirred a movement for women's education in mid 19th century. Similarly, though the Calcutta medical college was established in 1835, it took almost 50 years for Kadambini Ganguly to make history by being the first female graduate in medicine in 1883. The narrative will allow our readers to take a leap to the landscape of medical research in 21st century India, to tell the pride instilling tales of clinician scientists such as Soumya Swaminathan who stepped up to the position of Deputy Director General at World Health Organisation in 2017 and Gagandeep Kang who became the first women to be elected to the Royal Society in 2019.

It is critical to provide our millennial girls a glimpse of the professional lives of women scientists born out of the Indian soil. Such stories will resonate more closely with the challenges, fear and doubts that spur out of the socio-cultural conditioning in young girls interested in pursuing science. The narrative will paint varied shades in the personalities of contemporary women researchers — the virtues they believe in, the traits they have inculcated, their low points, risks are undertaken and the ingenious solutions and strategies they have adopted to overcome barriers for furthering their interest in science. We have taken a special note of maintaining the diversity of role models by selecting women scientists from various disciplines e.g., Space sciences (Tessy Thomas and Ritu Karidhal Srivastava), Mathematics (Sujatha Ramdorai), Computer Science (Sanghamitra Bandopadhyaya), Neuroscience (Vatsala Thirumalai), Geologist (Sudipta Sengupta), and Science Administration (Manju Sharma and Renu Swarup). Such diversity will inspire the young girls to break boundaries of disciplines which is a significant feature and problem of gendered science.

The book is aimed at sending a message to the policy makers, S&T leaders, and other decision making bodies to keep up the recent traction that they have built up to promote 'Women in Science'. *We hope that the tell-tale ignites the 'Will and Resolve' in the society to appreciate the contribution of women as who they are and not in the light of the commonly used phrase 'A woman is as worthy as men'.* This 'attitude shift' sounds a bit utopian, but even a modest achievement in this direction will be our true celebration of SwAM for women in science.

THE PIONEERS
Those who treaded the unconventional path

Anandibai Gopalrao Joshi
(1865 – 1887)
First Indian female to study and graduate with a degree western medicine from the United States, 1886. She is believed to be the first woman to set foot on American soil from India.

Kadambini Ganguly
(1861-1923)
The first Indian women to get admission to Calcutta Medical College (1884), becomes India's first female doctor & practitioner (1886) of western medicine in the whole South Asia.

Mary Poonen Lukose
(1886-1976)
The first female Surgeon General in India, 1938. She became the first woman obstetrician of India.

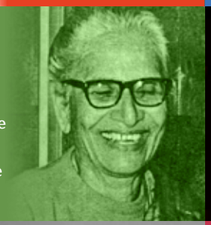
Bibha Chowdhary
(1913-1991)
First woman high energy physicist of India and The First Woman Scientist at the TIFR (1948), was honored by the International Astronomical Union by naming a white yellow dwarf star after her.

Edavaleth Kakkat Janaki Ammal
(1897-1984)
Renowned botanist & plant cytologist, made significant contributions to genetics, evolution, phytogeography and ethnobotany. First director of the Central Botanical Laboratory at Allahabad, 1952

Kamala Sohonie
(1911-1998)
A renowned botanist and plant cytologist who made significant contributions to genetics, evolution, phytogeography and ethnobotany. First director of the Central Botanical Laboratory at Allahabad, 1952

Asima Chatterjee
(1917-2006)
First woman to be awarded a Doctor of Science by an Indian University (Culcutta) in 1944. She is the first woman to be elected as the General President of the Indian Science Congress

Iravati Karve
(1905-1970)
First Indian female anthropologist. She founded the Department of Anthropology at the University of Pune in 1963. She also held the post of the Vice-Chancellor of SNDT University.



Debala Mitra
(1925-2003)
First Indian archaeologist served as Director General of the Archaeological Survey of India, 1981. She explored and excavated several Buddhist sites.

Purnima Sinha
(1927 – 2015)
An Indian physicist who receives a doctorate in physics under the guidance of Prof Satyendra Nath Bose. She did tremendous work in the field of x-ray crystallography of clay minerals.

Rajeshwari Chatterjee
(1922-2010)
Women Engineer who pioneered research in microwave engineering. She is the first woman engineer at IISc who joined the Department of Electrical Communication Engineering (ECE)

Anna Mani
(1918-2001)
First woman joined the Meteorological department in Pune, 1948. She significant pioneer contributions in the field of solar radiation, ozone and wind energy instrumentation.

Kamal Ranadive
(1917-2001)
Established India's first tissue culture research laboratory at the Indian Cancer Research Centre in Mumbai, 1960. She was among the first to recognise the connection between cancer susceptibility and the interaction between hormones and tumour virus.

Milestones of Women in Indian Science

1848
Savitribai Jyotiba Phule
First female teacher of India who founded the first girls' school

1881
Lady Abala Bose
First Indian woman to study medicine at Madras University

1883
Chandramukhi Basu & Kadambini Ganguly
Calcutta University produces the first two women graduates in India

1886
Kadambini Ganguly
India's first female doctor & practitioner of western medicine in the whole of South Asia

Anandibai Gopalrao Joshi
First first Indian female doctor of western medicine

Ramabai Ranade
Set up first girls' high school in Pune

1888
Chandramukhi Basu
First female head of an undergraduate academic establishment in the South Asia

1894
Rukhmabai Raut
The second woman to both receive a medical degree and practice medicine

Rupa Bai Furdoonji
World's first female anesthetist

1910
Sarala Devi Chaudhurani
Established first women's organization Bharat Stree Mahamandal for promoting female education

1917
Jagadish Chandra Bose & Lady Abala Bose
Basu Bigyan Mandir (Bose Institute) established

1926
Begum Rokeya Sultana
Pioneer in Women's Educational Rights in India

1938
Mary Poonen Lukose
First female Surgeon General in India

1939
Kamala Sohonie
First Indian woman to receive a PhD in a scientific discipline

1939
Iravati Karve
First Indian female anthropologist

1943
Ayyalasomayajula Lalitha
India's first woman engineer

1944
Asima Chatterjee
First woman to be awarded a Doctor of Science by an Indian University – Calcutta University

1948
Anna Mani
First woman joined the Meteorological department in Pune

1948
Bibha Chowdhary
First woman High Energy Physicist of India and First Woman Scientist at TIFR

1949
Hansa Mehta
First women Vice-Chancellor of Baroda University

1952
Rajeshwari Chatterjee
Built the first microwave research laboratory of India at IISc Bangalore

Edavaleth Kakkat Janaki Ammal
The first Director of the Central Botanical Laboratory at Allahabad

1960
Kamal Ranadive
Established India's first tissue culture research laboratory at the Indian Cancer Research Centre in Mumbai

1961
Asima Chatterjee
First female recipient of a Shanti Swarup Bhatnagar Prize in Chemical Science Category

1961
Satyavati M Sirsat
Founder and President of the Electron Microscope Society of India

1968
Hiriyakkanavar Ila
First woman to receive the PhD from Indian Institute of Technology (IIT), Kanpur

1975
Archana Sharma
First female received the Shanti Swarup Bhatnagar Prize in the Biological Sciences category

1977
Edavaleth Kakkat Janaki Ammal
First Indian scientist to have received the Padma Shri Award

1978
Kiran Mazumdar Shaw
First Woman Science Entrepreneur

1981
Bimla Buti
First Indian woman Physicist Fellow of Indian National Science Academy(INSA)

1981
Debala Mitra
First woman Director-General of the Archaeological Survey of India

1983
Indira Nath
First woman immunologist to receive the Shanti Swaroop Bhatnagar Award in the Medical Sciences category

Sudipta Sengupta & Aditi Pant
First Indian women to visit the Antarctica

1991
Sudipta Sengupta
First woman geologist to receive the Shanti Swaroop Bhatnagar Award in the Earth Sciences category

1994
GV Satyavati
First woman Director General of ICMR

1995
Manju Sharma
First Woman Secretary of Department of Biotechnology

2001
Ketayun Ardeshir Dinshaw
Padma Shri for contribution in evolution of cancer treatment and radiation therapy

2005
Archana Bhattacharyya
First woman Director of Indian Institute of Geomagnetism, DST

2006
Sujatha Ramadori
First Indian Mathematician to win the prestigious ICTP Ramanujan Prize

2011
Tessy Thomas
First woman scientist to head a missile project in India

Renu Swaroop
Establishment of India's largest microbial resource centre, Microbial Culture Collection

2015
Sanghamitra Bandopadhyay
First woman Computer Scientist & Director of the Indian Statistical Institute

2017
Soumya Swaminathan
First Indian to become WHO's Deputy Director General, and also its first chief scientist

2018
Aditi Sen De
First female physicist awarded the Shanti Swarup Bhatnagar Prize

2019
Gagandeep Kang
First Indian woman to be elected as a Fellow of the Royal Society

Neena Gupta
Youngest person to ever receive the Shanti Swarup Bhatnagar Prize at the age of 35

GC Anupama
First woman President of the Astronomical Society of India (ASI)

2020
Chandrima Saha
First woman president of the Indian National Science Academy (INSA)

Jyotirmayee Dash
Youngest woman scientist to receive Shanti Swarop Bhatnagar Award in Chemical Sciences

The Trailblazers of Indian Science


Anandibai Gopalrao Joshi
First Indian woman doctor


Edavaleth Kakkat Janaki Ammal
First director of the Central Botanical Laboratory


Kadambini Ganguly
First Indian woman doctor practitioner


Kamala Sohonie
Biochemist


Iravati Karve
Antropologist


Debala Mitra
Archaeologist


Purnima Sinha
Physicist


Bimla Buti
Plasma Physicist


Krishna Kamini Rohatgi Mukherjee
Photochemistry


Rajeshwari Chatterjee
Electrical Engineer


Kamal Ranadive
Biomedical Scientist


Sulabha Kashinath Kulkarni
Nanotechnologist


Dr. Seema Sharma
Particle Physicist


Bibha Chowdhary
First woman PhD in High Energy Physics

Anna Mani
Physicist


Sudeshna Sinha
Non-linear Physicst


Tessy Thomas
Electrical Engineer


Neelima Gupte
Statistical Physicist


Asima Chatterjee
Organic Chemist


Archana Bhattacharyya
Ionospheric Physicist


Shobhona Sharma
Molecular Biologist


Chanda Jog
Astrophysicist


Tanusri Saha-Dasgupta
Physicist


Mary Poonen Lukose
First female Surgeon General in India


Dr. Ritu Karidhal Srivastava
Aerospace Engineer


Annapurni Subramaniam
Astrophysicist


Rohini Godbole
Elementary particle Physicist


Pushpa Khare
Astrophysicist and Astronomy


Jyotirmayee Dash
Organic Synthesis


Gagandeep Kang
Microbiologist


Rama Govindarajan
Chemical Engineer


Hiriyakkanavar Ila
Organic Chemist


Indira Nath
Immunologist


N. Ratnashree
Astrophysicist


Darshan Ranganathan
Organic Chemist


Bushra Ateeq
Oncologist


Vijayalakshmi Ravindranath
Neuroscientist


Aditi Sen Dey
Quantum Computation


Lakshmi Kantam Mannepalli
Chemical Engineer


Prof. Sandhya Srikant Visweswariah
Biochemist

Dr Vatsala Thirumalai
Neurologist

Archana Sharma
Botanist

Sudha Bhattacharya
Molecular Biologist

Chandrima Saha
Immunologist

Shubha Tole
Microbiologist

Satyavati M Sirsat
Oncologist

Sudha Gajanan Gangal
Oncologist

Vidita Vaidya
Neuroscientist

Veronica Rodrigues
Biochemist

Prof. M.S. Shaila
Microbiologist

Charusita Chakravarty
Quantum Chemist

Manjula Reddy
Microbiologist

Manju Sharma
Biotechnologist

Meena Mahajan
Computer Engineer

Sulochana Gadgil
Meteorologist

Priyadarshini Karve
Meteorologist

Renee M. Borges
Ecologist

Soumya Swaminathan
Clinical Scientist

Dr. Uma Ramakrishnan
Molecular Ecologist

Priya Davidar
Conservation Biologist

Sudipta Sengupta
Structural Geologist

R Parimala
Mathematician

Chanda Nimbkar
Animal breeding

P Mohanty Hejmadi
Developmental Biology

Manju Bansal
Biophysicist

Saraswathi Vishveshwara
Biophysicist

Mythily Ramaswamy
Mathematician

Renu Swarup
Secretary DBT

Sunita Sarawagi
Computer Science & Engineer

Neena Gupta
Mathematician

G V Satyavati
Atherosclerosis and Thrombosis

Sujatha Ramdorai
Mathematician

Kiran Mazumdar Shaw
Biotech Entrepreneur

R J Hans-Gill
Mathematician

Ketayun Ardeshir Dinshaw
Medical Science

Priti Shankar
Computer Engineer

Sanghamitra Bandopadhyaya
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