Celebrating

INDIAN WOMEN IN SCIENCE

An Incredible Journey

सत्यमेव जयते

DEPARTMENT OF BIOTECHNOLOGY

Ministry of Science & Technology, Government of India

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Page 4 : Photo - Legacy Center Archives, Drexel University College of Medicine
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Page 6 : https://thebrokeninkpot.wordpress.com/2016/01/25/first-indian-female-physician-incredible-tale-of-kadambini-ganguly/
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Page 9 : Water Colour, Courtesy, The Hindu
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Dr. Renu Swarup
Secretary
Department of Biotechnology
Ministry of Science and
Technology, Govt. of India

MESSAGE

Women Scientists play an important role in the socio-economic development of a Nation. For over 100 years women scientists in India have proven their strength and made great contributions to the scientific growth of the country. It is important to celebrate the journey of women in science in India. On International women's day, it is important to remember, acknowledge and showcase the stories of these women scientists who have contributed to the development of science through their outstanding work.

With this objective, the Department of Biotechnology in Partnership with India International Centre, New Delhi, are organising a Photo Exhibition entititled "Celebrating Indian Women in Science: An Incredible Journey". This exhibition reflects on the inspiring journey of women scientists over years who have been part of the scientific community of India and contributed in different fields of science to the scientific development of the country.

I am sure this exhibition will be very interesting and well appreciated by all. It would also inspire many young minds to take up science as a career.

Dr. Renu Swarup

Dr. (Mrs.) Manju Sharma
Former Secretary to the Govt. of India
Department of Biotechnology
Distinguished Women Scientist Chair
NASI, Allahabad

MESSAGE

The advances in Science and Technology have become an integral part of the development of a nation. In this march towards a better society and nation, women form a formidable workforce that remains yet underutilized. Provided women are given the opportunity through education, excellent mentoring, and training, there would be a quantum jump in the nation's progress. As far as possible, awareness building, training programmes and entrepreneurship development with technological interventions, all these must be focused almost in a mission mode. Unique challenges, obstacles, procedural issues, cultural paradigms, finances, sensitization of women etc. form basis of discussion in many forums. However, for overall sensitization of the society, there is a need to showcase the success of women who broke barriers and to do that we need to communicate with the general population, the success stories not from today but from the times that did not favor women as professionals. These are inspiring stories that one needs to respond to. The current endeavor of showcasing of women in science by the Department of Biotechnology in collaboration with the India International Centre having an exhibition "Celebrating Indian Women in Science: the Incredible Journey" is a laudable effort towards inclusiveness of women to be involved in scientific activities of the country. The programme of the Department of Biotechnology to benefit women during these years has given very promising results and in future also it will continue to generate enthusiasm and the will power to harness biotechnology for the welfare of women.

Dr. Manju Sharma

Dr. Suraksha Diwan
Scientist 'E'
Department of Biotechnology
Ministry of Science & Technology
Government of India

MESSAGE

Women scientists have been playing an important role in scientific growth of India. Their outstanding contribution to science and societal growth has been remarkable. It is very important that we acknowledge and make public aware of contribution of these great women scientists of India. The exhibition "Celebrating Indian Women in Science: An Incredible Journey" in partnership with India International Centre from 7th to 15th March, 2019 will showcase journeys of these women scientists and inspire young minds of India. This will motivate them to take science as a career and contribute to socio-economic growth of India.

Dr. Suraksha Diwan

Chandrima Shaha, Ph.D
Professor of Eminence and
Former Director
National Institute of Immunology
New Delhi

PREFACE

It is with great pleasure that I acknowledge Dr. Renu Swarup, Secretary, Department of Biotechnology (DBT) to have given me the responsibility to curate this exhibition on “Celebrating Indian Women in Science: an Incredible Journey”.Personally, the designing of this exhibition has given me the opportunity to go into depth about the lives of many prominent Indian women scientists of the early 20th century and I believe that the stories of these women scientists have inspired and would continue to enthuse generations to come.

This collaboration between the DBT and India International Centre to sponsor this exhibition is both timely and relevant. This showcasing of Indian women in science is envisioned to embed a sense of history as a part of growing up of young women and demonstrate the achievements of the scientists in a space that was primarily dominated by men in the early 1900's but gradually populated by women in present days. However, women participation remains low even today and we hope with efforts such as these, the enthusiasm to have a career in science is encouraged.

This is a prelude to an endeavor of building a collection of lives and achievements of women scientists, where we present the profile of a section of women working in diverse fields. We wish that we could present a larger collection with much detailed life sketches but logistic issues have prevented us from doing so. We hope to keep alive this endeavor to chronicle many other achievements in the backdrop of the history of development of Indian science.

I would like to thank Dr. Suraksha Diwan for coordinating the efforts on behalf of DBT. Of course without the conducive patronage of Secretary, DBT this would not have been possible. We express our gratitude to the India International Centre for providing the most desired venue for the exhibition. I hope that young women, their families and school children will take inspiration from this. Even if we have succeeded in going a few paces ahead, we will know that our vision of bringing this to the mainstream society has succeeded.

Chandrima Shaha

Contents


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Women Who Broke The Glass Ceiling

Anandi Gopal Joshi

(1865 - 1887)

Anandi Gopal Joshi became a mother when she was only 14. Her baby died in ten days due to lack of medical care and facilities. This huge trauma triggered her desire to do something for the healthcare in India.

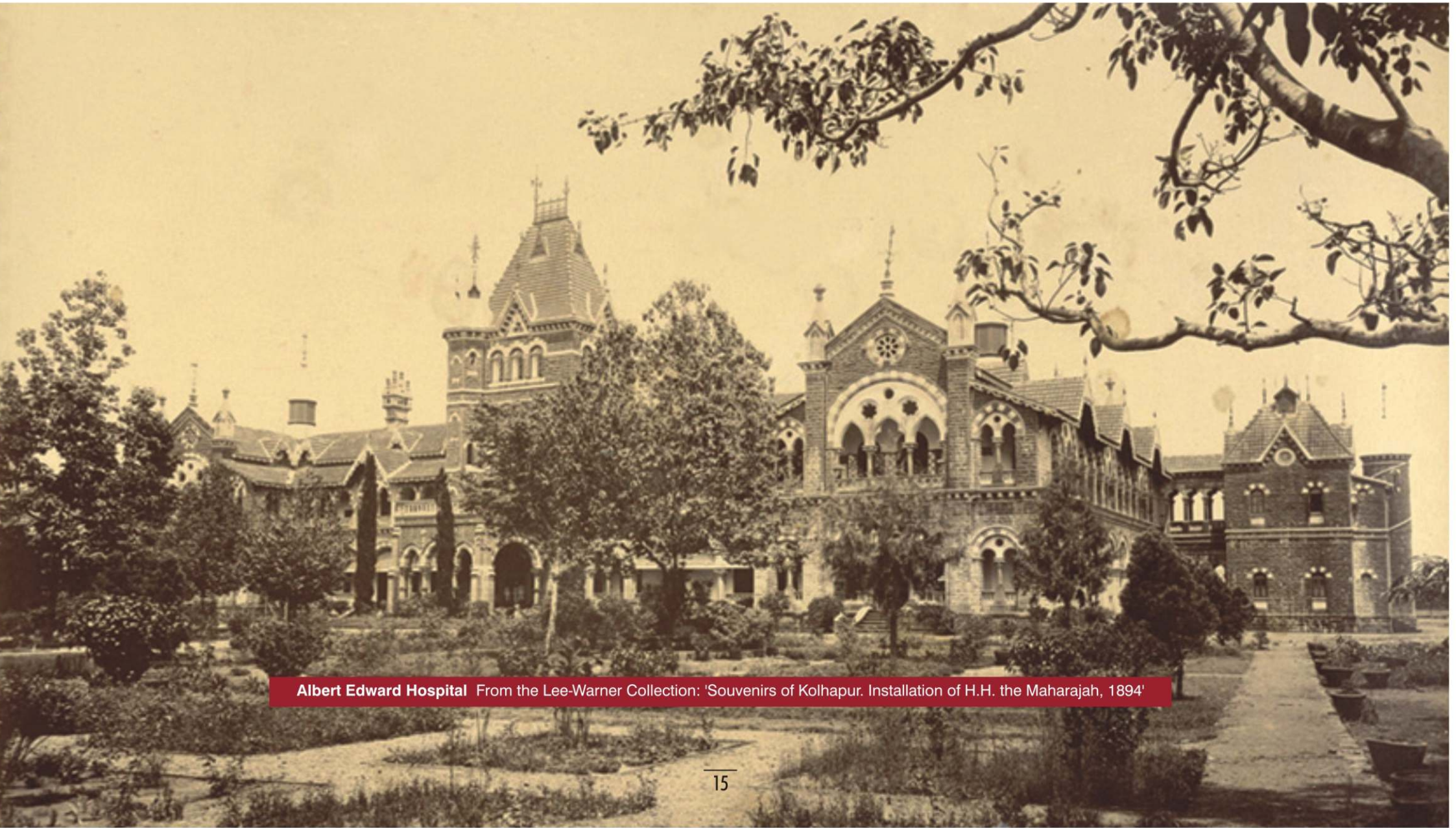
In 1883, Anandibai began her medical training in the United States at the Women's Medical College of Pennsylvania.

She graduated with an MD in 1885 and became the physician-in-charge of the female ward of the local Albert Edward Hospitalin the princely state of Kolhapur in 1886.

She died in1887of tuberculosis even before she turned 22.

Her unfulfilled dreams were to become reality in later years by women who took inspiration from her.

Dr. Anandi Gopal Joshi, Seranysore, India;
Dr. Kei Okami, Tokio, Japan;
Dr. Tabat M. Islambooly, Damascus, Syria
(October 10, 1885)

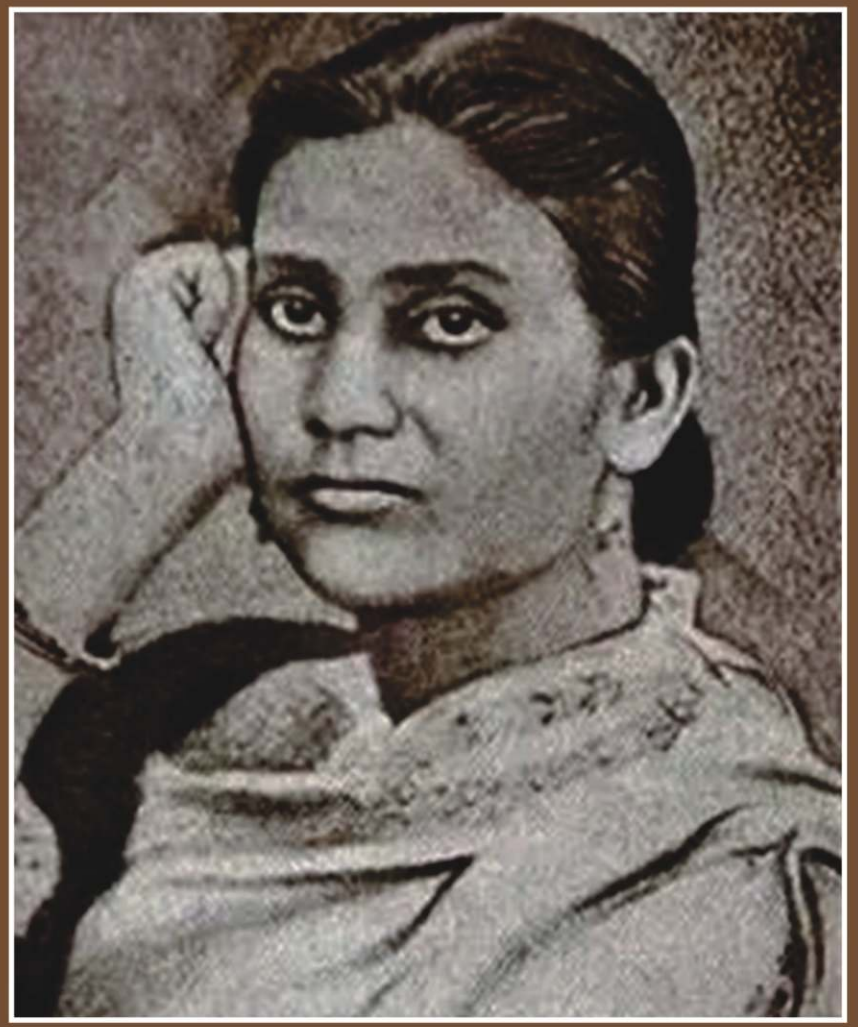


Albert Edward Hospital From the Lee-Warner Collection: 'Souvenirs of Kolhapur. Installation of H.H. the Maharajah, 1894'

Kadambini Ganguly

(1861 - 1923)

A doctor who broke the myth



Kadambini Ganguly from Bengal practiced as an independent physician in 19th century India breaking into a primarily male bastion.

She graduated in western medicine from Calcutta Medical College in 1886. Ganguly became one of the first two women in India to be eligible to practice medicine, the other being Anandi Gopal Joshi.

Kadambini earned three Licentiate Post Graduate Diploma in Medicine and Surgery from the colleges of Edinburgh, Glasgow and Dublin.

Involved in India's freedom struggle she became the first woman to be on the dais at a session of the Indian National Congress.

Her notable societal contribution was her involvement to improve the conditions of female coal miners in Eastern India.

Ever on duty, she died in 1923 after return from a house call when medical aid failed to reach her.

Medical Collage Hospital, Kolkata

Janaki Ammal

(1897 - 1984)

The pioneering botanist

Janaki Ammal's notable work is the development a sweeter variety of sugar cane. Every time we take sugar, Janaki Ammal lives on in spirit because her research is what added that extra bit of sweetness to our sugar.

She received a D.Sc. (1931)after her stint as the first Oriental Barbour Fellowat the University of Michigan.

Ammal Joined the John Innes Horticultural Institute at London during 1940 to 1945.

In 1951, a personal invitation from Pandit Jawaharlal Nehru inspired her to return to India.

She served as the Director General of the Botanical Survey of India.

Dr. Ammal was conferred the Padma Shri in 1977.

There is a small flowered variety of the Magnolia plant named after her: the Magnolia kobus Janaki Ammal.

She died in 1984 while working at a laboratory in Chennai aged 87.

Irawati Karve

(1905 - 1970)

Studying humans

Irawati Karve was a stalwart of Indian sociology at a time when it had just been institutionalized in the country.

In 1930, the Berlin University conferred on Iravati Karve the D. Phil degree for outstanding research in anthropology.

In 1939 Dr. Karve was appointed Head of the Department of Sociology and Anthropology at the Deccan College Post-graduate Research Institute of Pune.

Irawati Karve's study on the 'Kinship Organization in India' revolutionised and simplified future research on the subject. She used language patterns and geographical divisions to study the variations in kinship structures across the expanse of the country.

Her prominent work, 'Yuganta: The End of an Epoch', is a historical rendering of the Mahabharata. The characters are not treated as fictional – instead their circumstances and actions are explained using socio-political cues. Yuganta was awarded the Sahitya Akademi Award for Marathi in 1968, making Karve the first female author from Maharashtra to receive it.

At Iravati Karve museum of anthropology, Pune


Women Who Left Their Mark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Kamala Sohonie

(1912 - 1998)

The nutritional values of plants

Kamala's niche was in the study of nutritional elements in common foods such as milk, legumes and pulses. This had great relevance to Indian societal needs as the poorest people consumed these food items.

Sohonie was in a tussle with Prof. C. V. Raman who did not want women at the Indian Institute of Science. Finally, he relented and Kamala worked with M Sreenivasayya, a pioneer in microbiological research in India. Her dedication encouraged Prof. Raman to induct women in research.

While at Cambridge (1936) she discovered an enzyme in potato called cytochrome C and explained its role in plant respiration. Her 40-page thesis was much appreciated. She was the first Indian woman to receive a Ph.D in any branch of science.

Her work in India showed that introduction of 'Neera', a health drink in the diet of tribal malnourished adolescent children and pregnant women resulted in significant improvement in their overall health. Kamala Sohonie received the Rashtrapati Award for her work.

Asima Chatterjee

(1917 - 2006)

Chemist Par Excellence

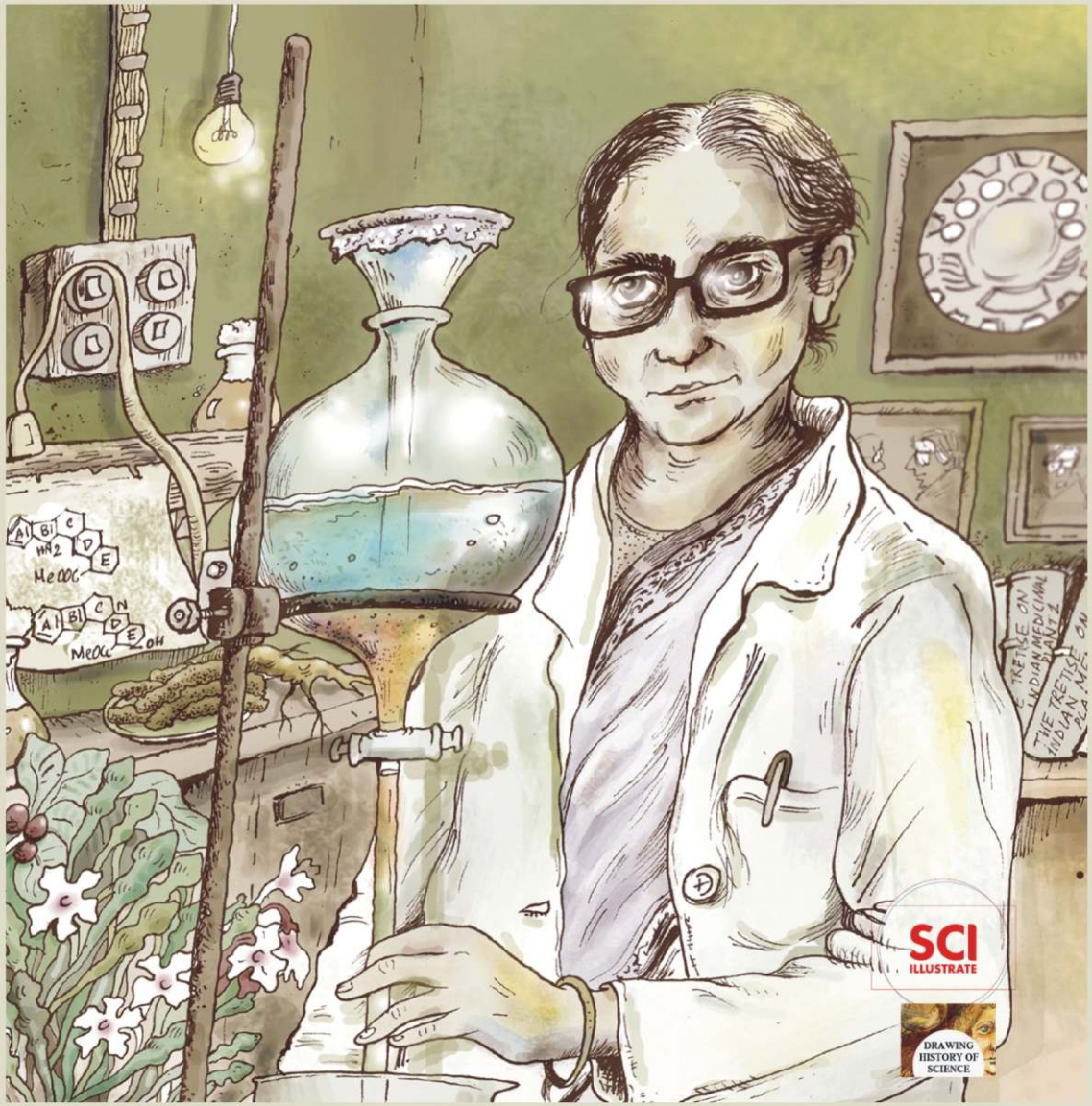
Ashima Chatterjee was noted for her work in the fields of organic chemistry and phytomedicine.

She was the first woman to receive a Doctorate of Science from an Indian University in 1944.

She also authored a considerable volume of work on medicinal plants of the Indian subcontinent.

In 1961, she became the first woman to be awarded the Shanti Swarup Bhatnagar Prize.

Her work led to the development of an epilepsy drug called Ayush-56 and several anti-malarial drugs that are marketed by various companies.



This artwork is a part of the Indian Women in Science initiative by Sci-Illustrate Stories, in collaboration with Drawing History of Science.

Anna Mani

(1918 - 2001)

Pioneer Indian Meteorologist

Anna Mani's passion for climate science made her take remarkable ventures.She Worked with Sir C. V. Raman for her doctoral thesis from 1940-1945.

Anna joined India Meteorological Department in 1948 and developed the programme to make India self sufficient in designing and manufacturing its own weather instruments.

She was responsible for organizing wind speed measurements at over 700 sites using state-of-art equipment round the year.

Internationally, Ms. Mani had several key positions within the World Meteorological Organization. An elected member of the Commission for Instruments and Methods of Observation advisory working group, she published two books, The Handbook for Solar Radiation Data for India and Solar Radiation over India that became landmark publications.

Anna Mani started a company in the industrial suburbs of Bangalore that made precision instruments to measure solar radiation and wind speed.

Anna Mani in Payeme, Switzerland, 1956. *Courtesy:* World Meteorological Organization

Rajeshwari Chatterjee

(1922 - 2010)

First woman engineer from the State of Karnataka

Rajeshwari Chatterjee's contributions encouraged many women to join engineering. Acknowledging her groundbreaking contribution to the field of microwave and antennae engineering in the country, the Union Ministry of Women and Child Development named her as one of the 'first women achievers of India'.

A month short of India gaining its independence, Rajeshwari Chatterjee travelled to the United States and gained her Master's and Ph.D degree from the Department of Electrical Engineering at the University of Michigan.

She was a professor and later Chairperson of the Department of Electro-communication Engineering at the Indian Institute of Science, Bangalore, where she taught electromagnetic theory, electron tube circuits and microwave technology.

She received the Mountbatten prize from the Institute of Electrical and Radio Engineering in UK, J.C Bose Memorial prize from the Institution of Engineers and Ramlal Wadhwa Award for the best research and teaching work from the Institute of Electronics and Telecommunication Engineers.

Rajeshwari Chatterjee in her laboratory.
Courtesy: Indira Chatterjee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Women Who Inspire

Archana Sharma

(1932 - 2008)

Renowned cytogenetist

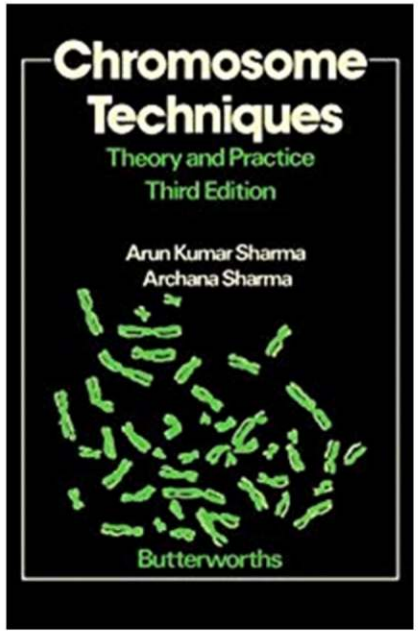
Prof. Archana Sharma contributed to the study of chromosomes by evolving a new technique of chromosome visualization. Her much appreciated work is the book entitled Chromosome Techniques: Theory and Practice.

Her research and findings on chromosomal study on flowering plants showed a new way of classification.

A founding editor of 'Nucleus', an international journal of cytology and allied topics, she was known for her dedication to the subject she loved.

She was awarded the Padma Bhushan, Shanti Swarup Bhatnagar Prize, Birbal Sahni Medal, G. P. Chatterjee Award and the FICCI Award for her contributions.

She died in 1983.



Bimla Buti

(b. 1933)

Physicist specializing in plasma physics

Prof. Buti did her PhD with Nobel Laureate Prof. Subrahmanyan Chandrasekhar at University of Chicago.

She worked at various NASA centers including Goddard Space Flight Center, Ames Research Center, Jet Propulsion Laboratory.

In India, she did her research at Physical Research Laboratory, Ahmedabad from 1970-1993; eventually becoming the Dean of Faculty. At PRL, she started experimental Plasma Physics programme.

Between 1985—2003, Prof. Buti was the Director of Plasma Physics at International Centre for Theoretical Physics, Trieste, Italy.

She was the first Indian woman Physicist Fellow of Indian National Science Academy and also the first Indian woman scientist fellow of The World Academy of Sciences.

She founded Plasma Science Society and was its president during 1992-1993.

She founded Buti Foundation (www.butifoudation.org) in 2003 and has instituted many awards for young scientists and women scientists.

Mahtab S. Bamji

(b. 1934)

Nutritionist

Dr. Mahtab S. Bamji was selected to receive the Living Legend Award of the International Union of Nutritional Sciences in 2017.

She made significant contributions in the field of nutritional biochemistry. Her studies helped understand the aetiology of Vitamin B deficiencies. She worked on understanding the biocemical/molecular basis of clinical manisfestations of Vitamin B deficiency.

With a Ph.D from the Indian Institute of Science, Bangalore and post doctoral trainings in Tufts University Boston and Johns Hopkins University, Baltimore, she joined the National Institute of Nutrition, Hyderabad in 1965.She retired as Director Grade Scientist from the same institute.

She contributed to various national projects directed to reducing malnutrition and improving nutrition status during her long stint at the National Institute of Nutrition.

Currently, she contributes to the efforts of improving the nutrition and health status of poor farmers and villagers on the outskirts of Hyderabad.

Darshan Ranganathan

(1941 - 2001)

Organic Chemist

Ranganathan was known for reproducing natural biochemical processes in the laboratory. She was a specialist in designing proteins to hold a wide variety of different conformations and designing nanostructures using self-assembling peptides.

She was Deputy Director at IICT, Hyderabad.

As an organic chemist from India who was known for her work in bio-organic chemistry, including pioneering work in protein folding. She was also recognized for her work in supramolecular assemblies, molecular design, chemical simulation of key biological processes, synthesis of functional hybrid peptides and synthesis of nanotubes.

Her books included 'Challenging problems in organic reaction mechanisms, Art in biosynthesis: the synthetic chemist's challenge, Further challenging problems in organic reaction mechanisms. She also edited an ongoing series titled "Current Organic Chemistry Highlights".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Bhatnagar Laureates

Indira Nath

(b. 1938)

Noted Immunologist
Bhatnagar Award, 1983

Area of work

Her major contribution deals with mechanisms underlying immune unresponsiveness in humans and nerve damage in leprosy. She has also worked on a search for markers for viability of the Leprosy bacillus. She started working on immunology when the subject was still in its infancy.

Career

MBBS from the All India Institute of Medical Sciences, Nuffield Fellowship at UK, Head of the new Department of Biotechnology at AIIMS. DSc (hc) from Pierre and Marie Curie University, Paris. She was invited as Dean of School of Medicine in Asian Institute of Medicine, Engineering and Technology in Malaysia and subsequently as Director of Blue Peter Research Centre (Lepra Research Centre), Hyderabad.

Honours

Padma Shri by Government of India, L'Oréal-UNESCO Award for Women in Science, Shanti Swarup Bhatnagar Prize.

Sudipta Sengupta

(b. 1946)

Former Professor
Jadavpore University, Kolkata
Bhatnagar Award, 1991

Area of work

Structural Geology. She conducted pioneering geological studies in the Schirmacher Hills of East Antarctica. She visited Antarctica for research two times.

Career

Carried out research work for 3 years at Imperial College, London, spent training at Institute of Geology of Uppsala University, Sweden. Worked with Geological Survey of India and retired as Professor, Jadavpore University. The main inspiration for her to be a scientist comes from her father, who himself was a scientist and inculcated in her the love for science at an early age.

Honours

National Mineral Award, Antarctic Award, D. N. Wadia Medal of INSA. She is a Fellow of the Indian Academy of Sciences and West Bengal Academy of Science and Technology.

Manju Ray

(b. 1947)

Honorary Visiting Professor
Emeritus Scientist, Bose Institute
(Bhatnagar Award, 1989)

Area of work

Anticancer drug development, Tumor biochemistry and bioenergetics, Molecular Enzymology and Enzyme Bio-technology and Metabolic regulation.

Career

Formerly Senior Prof & Dean, IACS, Indian Association of Cultivation of Science.

In her own words

My PhD work involved the study of ketoaldehyde and its biological activity. Later I was interested by the pioneer work of Prof AlbertSzent-Györgyi, Nobel laureate where he described the role of a keto aldehyde as an anticancer agent. This motivated me for the development of a non-toxic anticancer drug.

Honours

Indian National Science Academy Young Scientist Medal, Life Time Achievement Award by Indian Chamber of Commerce, Dr I.C. Chopra Memorial Award in Pharmacology & Drug development, Dr. Jnan Chandra Ghosh Memorial.

Raman Parimala

(b. 1948)

Mathematician
(Bhatnagar Award, 1987)

Area of work

Raman Parimala is an Indian mathematician known for her contributions to algebra. She achieved many firsts in the field, including the first example of nontrivial quadratic space over an affine plane – an achievement that is said to have surprised the experts in the field.

Career

Ph.D. from the University of Mumbai, She was the Arts & Sciences Distinguished Professor of Mathematics at Emory Universityand Professor at Tata Institute of Fundamental Research, Mumbai.

Honours

Fellow of the Indian Academy of Sciences; Indian National Science Academy and American Mathematical Society; Honorary doctorate from the University of Lausanne; Srinivasa Ramanujan Birth Centenary Award; TWAS Prize for Mathematics.

Shashi Wadhwa

(b. 1948)

Former Head of
Department of Anatomy and Dean
AIIMS (Bhatnagar Award, 1991)

Area of Work

Developmental neurobiology, quantitative morphology.

Inspiration

My interest in biology began at high school to be further strengthened during Intermediate by my Zoology teacher in College of Home Science at Jabalpur, MP. Therein started my journey into the developmental neurobiology of the human brain. How the visual and auditory pathways develop in the human foetuses and age through adulthood, became my interest. Later my curiosity got directed into finding out how sounds of varying intensity and type impacted the developing auditory pathways.

Career

Medical course (1965 to 1970), Human Anatomy during postgraduation (1973 to 1975) at AIIMS, New Delhi. Professor at Department of Anatomy and Dean, AIIMS.

Honours

B. K. Bachhawat Lifetime Achievement Award, elected fellow of the National Academy of Medical Sciences.

Vijayalakshmi Ravindranath

(b. 1953)

Professor and Chairman, Centre for Neuroscience,
Indian Institute of Science, Bangalore (Bhatnagar Award, 1996)

Area of Work

Neuroscience

Career

Prof. Ravindranath obtained her Ph.D. from the University of Mysore in 1981. In 1986, she completed her Post-Doctoral training at the NCI, NIH, USA. She established the National Brain Research Centre and initiated a unified approach to understanding the human brain, integrating mathematical and computational science. She was Director from 1999 to April 2009.

Honours

She is an elected Fellow of Indian National Science Academy, Indian Academy of Sciences, National Academy of Sciences, National Academy of Medical Sciences, Indian Academy of Neurosciences and Third World Academy of Sciences. Om Prakash Bhasin Award, J. C. Bose Fellowship, and the fourth highest civilian award in India, Padma Shri.

Rama Govindrajan

(b. 1962)

Faculty, International Centre for
Theoretical Sciences
Tata Institute of Fundamental Research
(Bhatnagar Award, 2007)

Area of work

Her group works on how gradients of density and viscosity, and thermodynamic effects brought about by phase change affect in a deep way the tendency of a laminar flow to go unstable. They also work on cloud fluid dynamics, and are trying to understand how vortex dynamics affects entrainment and droplet growth. We also work on mixing in the Bay of Bengal, and are beginning to model the Indian monsoon.

Inspiration

Rama Govindarajan went from an all-girls school to an almost all-boys college (IIT Delhi) to do her BTech in Chemical Engineering. She liked mathematics but pursued engineering because earning was an incentive. After working as an engineer, she realized that scientific research is what she would really like to do.

Career

Faculty at TIFR Centre for Interdisciplinary Sciences, Hyderabad; Faculty, Jawaharlal Nehru Centre for Advanced Studies, Scientists, Scientist, National Aerospace Laboratories, Bengaluru.

Honours

Outstanding scientist award given by the National aerospace laboratories, the CNR Rao Oration award.

Sujatha Ramodorai

(b. 1962)

Professor of Mathematics and
Canada Research Chair at
University of British Columbia, Canada
(Bhatnagar Award, 2004)

Area of work

Sujatha Ramdorai is an algebraic number theorist known for her work on Iwasawa theory.

Inspiration

My grandmother instilled in me the Love of Learning. Mathematics was a subject that appealed to me from a very young age. The sheer magic of how different pieces fit perfectly together to create something of great beauty and grandeur, along with the role that abstraction played in Mathematics made me want to immerse myself in this subject. The joy of discovery and constant learning were other inspiring factors.

Career

Ph.D from Tata Institute of Fundamental Research, Alexander von Humboldt Fellow.

Honours

ICTP Ramanujan Prize.

Charusita Chakravarty

(1964 - 2016)

Former Professor of Chemistry, IIT, Delhi
(Bhatnagar Award, 2009)

Career

Ph.D. (University of Cambridge, 1990) in Theoretical Chemistry.

Area of work

Charusita's research was largely in the study of water and its anomalous properties, ionic liquids, phase transition in classical and quantum clusters, diffusion in constrained media and related phenomena, using a range of simulation tools. She also worked extensively on excess-entropy scaling relationships for the diffusivity and viscosity of different fluids using molecular dynamics simulations.

Awards

B.M. Birla Award, elected Fellow of Indian Academy of Sciences and Indian National Science Academy.

Mitali Mukerji

(b. 1967)

Chief Scientist, CSIR-IGIB, Delhi
(Bhatnagar Award, 2010)

Area of work

She played a major role in setting up functional genomics at IGIB, studies on hereditary ataxias, Alu repeats in human genome and population genomics as convener of the Indian Genome Variation Consortium project. She has developed the area of Ayurgenomics that provides an innovative framework for integration of Ayurveda with genomics for stratified medicine.

Inspiration

Her experience in research during her Ph.D prompted her to pursue a career in science in India.

Career

She did her PhD from IISc, Bangalore, where she elucidated the mechanism of activation of cryptic operon in E.coli.

Honours

CSIR Young Scientist's Award, DBT young woman scientist award.

Vidita Vaidya

(b. 1970)

Professor, Tata Institute of Fundamental Research, Mumbai (Bhatnagar Award, 2015).

Area of work

Her primary areas of research are neuroscience and molecular psychiatry.

Inspiration

My earliest interest in science goes back to dinner table conversations about the mysteries of the natural world with my parents. This coalesced into a fascination for the intimate workings of the brain, which grew into a career path through an undergraduate degree at St. Xaviers College and a PhD at Yale, where I was lucky to have exemplary mentors. Over the past 19 years of running my lab at TIFR, I have realized that what sustains a life-long journey in science is a sense of wonder, an awareness of the privilege it is to get the chance to ask questions for the sheer joy of it, and the support of family that makes it possible to walk through tough times.

Career

Doctoral degree in Neuroscience from ; postdoctoral work was done at the Karolinska Institute in Sweden and at the University of Oxford in UK.

Honours

National Bioscience Award for Career Development.

Aditi Sen De

(b. 1974)

Professor
Harish Chandra Research Institute, Allahabad
(Bhatnagar Award, 2018)

Area of work

Quantum Information and computation; Quatum optics; Foundations of quantum mechanics; condensed matter physics.

Inspiration

Science attracted me because I realized that I can understand several phenomena happening everyday in nature and am able to answer many things in life logically.

Career

Along with Profs. Ujjwal Sen and Arun K. Pati she started the quantum information and computation group at HRI in 2009. She did doctoral work at the University of Gdansk and subsequently was a Alexander von Humboldt postdoctoral fellow in Hannover, a Ramon y Cajal fellow in ICFO- The Institute of Photonic Sciences, Barcelona, and an Assistant Professor in the Jawaharlal Nehru University, Delhi.


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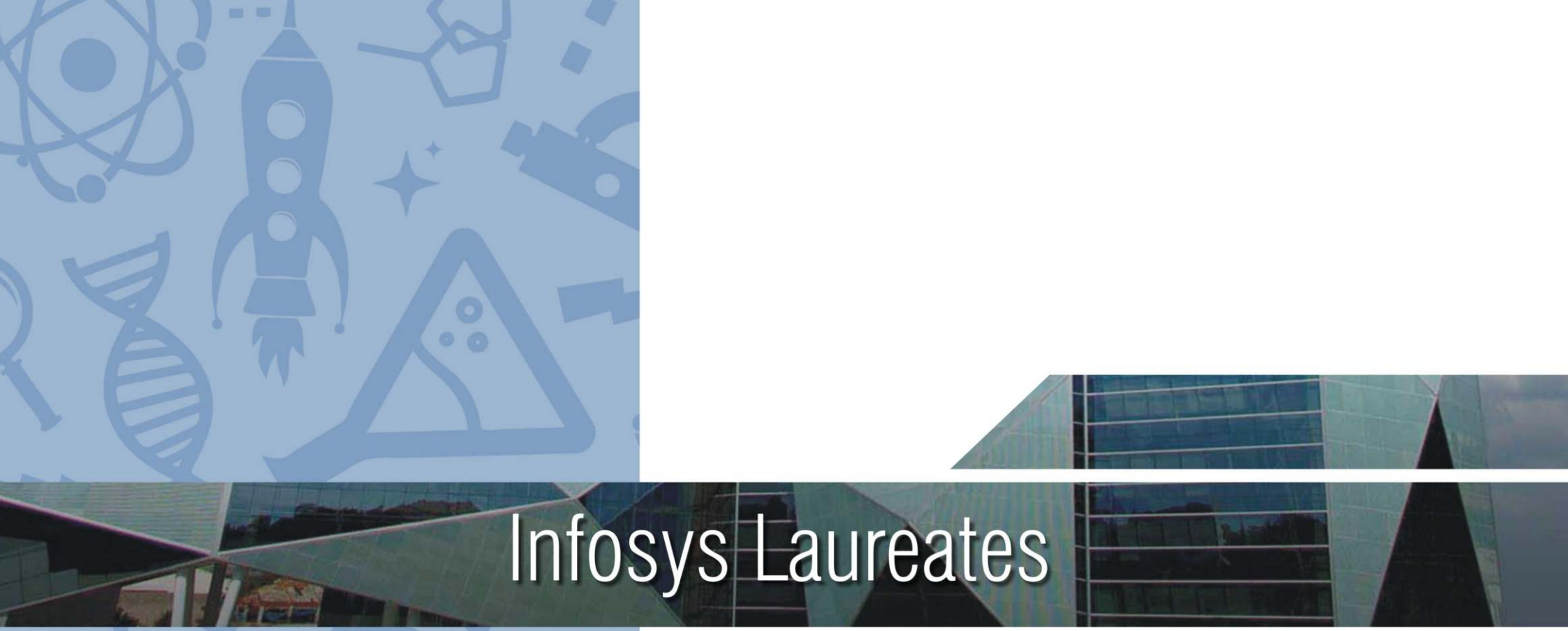

Infosys Laureates

ShubhaTole

(.b 1967)

Prof. & Principal Investigator
Tata Institute of
Fundamental Research, Mumbai

Area of work

My research interest is on how the brain is constructed in the embryo, how the circuits that enable our behaviors are formed and shaped during development. My lab at TIFR discovered how the "learning and memory center" forms in the brain, and how the development of the retina, and the cerebral cortex, is regulated.

Inspiration

My fascination with how the world around us came to be, and how we humans came to be within it, led to my interest in physics and biology. Ultimately, it was the "universe within" that won out- I was gripped by the complexity of the brain.

Career

Ph.D from California Institute of Technology, post-doctoral research at the University of Chicago.

Honours

Wellcome Trust Senior International Fellowship, the Swarnajayanti Fellowship, the National Woman Bioscientist award RAIN award from the Society for Neuroscience, United States, the Infosys prize and Bhatnagar Award, 2010.

Sanghamitra Bandopadhyay

(b. 1968)

Director, Indian Statistical Institute, Kolkata

Area of work

Her research areas include computational biology and bioinformatics, soft and evolutionary computation, pattern recognition and data mining.

Inspiration

I was born in a culturally and educationally inclined family. As a young student, I was terrified of subjects like history, geography, chemistry and biology. I liked languages, maths and physics. Studying physics was a natural choice, but after my BSc I decided to take up computer science. This was a turning point. I loved what I studied, and flourished. The next turning point was deciding to pursue masters in IIT Kharagpur, away from home despite tragedy striking my family. My career fell in place, and one thing led to the other.

Career

Master's degree in computer science from the Indian Institute of Technology, Kharagpur, Ph. D. from the Indian Statistical Institute.

Honours

Infosys Prize in Engineering and Computer Science, the TWAS prize in Engineering Sciences and Bhatnagar Award, 2010.

Yamuna Krishnan

(b. 1974)

Professor, Department of Chemistry
University of Chicago

Area of work

Organic chemistry

Inspiration: Born to an architect father and a literary mother, I was fortunate to grow up in an environment where both science and the arts were cherished. As a child I was very curious and so I started to conduct experiments myself, anything possible with the resources of my mother's kitchen and father's garden. Both my parents encouraged this by getting me books, a microscope and even a small chemical laboratory, which created in me a zest for experimenting. My driving force has always been to create, out of a set of meaningless, individual components, a collective entity with new and unusual functions.

Career

MS and PhD from Indian Institute of Science, Bangalore. Post doctoral studies at University of Cambridge. Associate Professor at the National Centre for Biological Sciences, TIFR, Bangalore.

Honours

Infosys Prize;Indian National Science Academy Young Scientist Medal; Innovative Young Biotechnologist Award from the Dept. of Biotechnology; Fellowship of Wolfson College, University of Cambridge UK; Chemical Sciences Emerging Investigator Award, Royal Society of Chemistry and Bhatnagar Awwd, 2013.

Gagandeep Kang

(b. 1962)

Executive Director, Translational Health Science Technology Institute (THSTI)

Prior to joining THSTI, Prof. Kang was at the Christian Medical College in Vellore. She has built a strong inter-disciplinary research program that studies transmission, development and prevention of enteric infections and their sequelae. She has worked on programmes of vaccine preventable diseases including rotavirus, cholera, typhoid and dengue, for two decades, and has established a strong training program for students and young faculty in clinical translational medicine aiming to build a cadre of researchers studying relevant problems in India.

She was awarded Woman Bioscientist of the Year, DBT; Fellow, Royal College of Pathologists, London; Abbott Oration Award, Indian Society for Gastroenterology; Fellow, American Academy of Microbiology; Fellow, Indian Academy of Sciences; Dr. Y. S. NarayanaRao Oration Award, Indian Council of Medical Research; Fellow, National Academy of Sciences; Ranbaxy Research Award for Medical Research; Fellow, Indian National Science Academy.


Celebrating
INDIAN WOMEN
IN SCIENCE
An Incredible Journey

Women in Physics & Space Science

Rohini Godbole

(b. 1952)

Physicist

She is a professor at the Centre for High Energy Physics, Indian Institute of Science, Bangalore. Ph.D in 1979 from the State University of New York at Stony Brook, USA, D.Litt. SNDT Women's University, Mumbai.

Area of work

Worked extensively on different aspects of particle physics phenomenology.

Others

Has been a staff associate at ICTP, a visiting professor at University of Dortmund (Germany), CERN (Geneva), DESY(Hamburg) and University of Utrecht (Netherlands).Van der Waals Chair at the University of Amsterdam. Worked on a variety of programmes to raise awareness about women in science. Co-edited the books 'Lilavati's Daughters: Women Scientists of India' (2005) and 'A Girl's Guide to a Life in Science'.

Honours

She was conferred the Padma Shri, elected fellow of all the three science academies in India and also the World Academy of Sciences.Distinguished Alumnus Award of IIT-B, S.N. Bose Medal of the INSA for theoretical physics, Meghnad Saha Award for Physics of the Asiatic Society of India, J C Bose Fellowship of the Government of India.

Tessy Thomas

(b. 1963)

Director General
Aeronautical Systems Cluster
Laboratories

Inspiration

From school days onwards, she was interested in mathematics and physics and was fascinated by activities of the Thumba Rocket Launching Station and also used to wonder seeing aircraft flying so high. After completing her engineering from Govt. Engineering College, Thrissur, she joined Pune's Institute of Armament Technology to pursue a masters degree in guided missiles which led to the scientific world which she had dreamt.

Career

B. Tech in Electrical Engineering from Calicut University, ME in Guided Missiles from Institute of Armament Technology (now Defence Institute of Advanced Technology), Pune in 1986 and PhD in Missile Guidance from Jawaharlal Nehru Technological University (JNTU), Hyderabad in 2014. She has been associated with Agni Programme right from its developmental flights. She has designed the guidance scheme for long range missile systems which is used in all Agni missiles.

Honours

DRDO Award for Path breaking Research/Outstanding Technology Development; DRDO Scientist of the year Award; Lal Bahadur Shastri National Award for Excellence in Public Administration Academics and Management India Today Woman of the Year Award Distinguished Woman Scientist Award; Outstanding Woman Achiever award. Fellow of Indian National Academy of Engineering.

Ritu Karidhal

Senior Scientists, ISRO

Area of work

She had a key role in realizing the Mars Orbiter Mission (MOM), which created history of being the first mission to reach Mars in its first attempt. Being the Project Manager and Deputy Operations Director for MOM, she with her team, was responsible to execute the critical operations of Leaving Earth and Capturing Mars, which could be realized flawlessly.

Inspiration

She always had the fascination about space, collecting news articles related to any space activities by ISRO or NASA was one of her hobbies during her school days. The dream of joining the space agency came true when she joined ISRO.

Career

M.Sc. in Physics from Lucknow University, M.Tech from Indian Institute of Science, Bangalore. Presently she is working for ISRO's first Landing Mission on Moon i.e. Chandrayaan-2.

Honours

Young Scientist Award, ISRO Team Award, ASI Team Award, Women Achievers in Aerospace, Birla Sun Achievement Award.

A Cancer Biologist, A Biochemist and A Molecular Biologists

Kamal Ranadive

(1917 - 2001)

She received her doctoral degree at the Bombay University and did her post doctoral studies at Johns Hopkins University in Baltimore.

Her studies on breast cancer that had drawn special attention in 1946 where she tried to correlate the course of the disease with heredity and child-bearing.

In the 1960s, she established India's first tissue culture research laboratory at the Indian Cancer Research Centre in Mumbai.

She was a founder member of the Indian Women Scientists' Association.

She was awarded the first Silver Jubilee Research Award of the Medical Council of India and the G. J. Watumull Foundation Prize in micro-biology.

Violet Bajaj

(b. 1917)

Search for knowledge took Violet Bajaj from Ranchi eventually to Bangalore. She was a contemporary of Rajeshwari Chatterjee and Anna Mani.

Initially she joined the Department of Chemistry of the Indian Institute of Science to study Organic Chemistry, which she did not like. So she shifted to Fermentation Technology.

Dr. Bajaj worked at Biochemicals Unit, set up under CSIR, from the 1950s until her retirement. The company's field was medical biochemical research, and Violet was in charge of quality control of all their products in which she excelled.

Today at 102 years of age, she fondly recalls the early days when very few women chose science as a career.

Maharani Chakravorty

(1937–2015)

She did her PhD on microbial protein synthesis from Bose Institute, Kolkata. She did her post-doctoral training in enzyme chemistry in the laboratory of B.L Horecker at the New York University school of medicine.

After the research, she returned to India and joined the Bose Institute. She undertook research on the regulations of metabolism in unicellular organisms.

Later, she joined the Department of Biochemistry at Banaras Hindu University. She organized the first laboratory course on recombinant DNA techniques in Asia and Far East in 1981.

She received the Kshanika Oration Award , Y.S Narayan Rao Award, Hari Om Ashram Alembic Research Award and Professor Darshan Ranganathan Memorial Award.

Women in Science Administration

Manju Sharma

Distinguished Women Scientist Chair of National Academy of Sciences

She is former Secretary to Govt. of India, Ministry of Science and Technology.

She is a nominated member of the State Planning Board, Government of Himachal Pradesh and Chairperson of the Vision Group of the State Government of Orissa for Biotechnology programmes and also a Member of the Biotechnology Advisory Council of the Govt. of Gujarat.

Dr. Sharma has been an elected member of the Executive Committee and Council of the Indian Science Congress Association and has served as Chairperson and Member Secretary of many important scientific Committees, Task Forces and Research Advisory. As General Secretary, Vice President, and later as President of The National Academy of Sciences (the only lady scientist to occupy the position of President in any of the Science Academies of India), she has served the Academy with great dedication, and has been responsible for organizing scientific discussions on many important subjects of national importance.

She has received the VASVIK Award; the Norman E. Borlaug Award; Distinguished Scientist Award of the Indian Science Congress Association; G.M. Modi Science Award; K.N. Bahl Memorial Gold Medal;Shri Om Prakash Bhasin Award; Fifth National Science and Technology Award; Asutosh Mukerjee Memorial Award; Fellow of the Third World Academy of Sciences. She has confirmed the Padma Bhushan in 2007, by Government of India.

G. V. Satyavati

Clinician

MBBS from the Mysore Medical College.

Her first doctorate was in Ayurveda, involving pioneering work on the discovery of lipidlowering effect of Gum guggul, brought her national and international recognition. Her second doctorate in Pharmacology was obtained while working on an ICMR project post.

She moved to Banaras Hindu University, Varanasi, for advanced studies in 1964.With scientific autonomy and encouragement and opportunities for creative work, 1971–1987 were her golden years at ICMR. In 1994, she was appointed Director General of the ICMR.

Soumya Swaminathan

Deputy Director General of
Programmes at the World Health Organization

She holds M.B.B.S. from Armed Forces Medical College and M.D. from All India Institute of Medical Sciences, New Delhi. She was Director of National Institute for Research in Tuberculosis. More recently she has been working as Secretary, Department of Health Research, Ministry of Health and Family Welfare, Director General of Indian Council of Medical Research, Govt. of India.

Swaminathan started a multi-disciplinary research group consisting of clinical, laboratory and behavioural scientists studying various aspects of TB and TB/HIV. This group was among the first to scale up the use of molecular diagnostics for TB surveillance and care and to undertake large field trials of community-randomised strategies to deliver TB treatment to under served populations.

She received the Ksanika Oration Award of the Indian Council of Medical Research, Life-time achievement award of Association of Applied Microbiologists, Tamil Nadu Science & Technology Award, Fellow of National Academy of Sciences, Fellow of Indian Academy of Sciences.

Renu Swarup

Secretary, Department of Biotechnology
Ministry of Science & Technology, Govt. of India

She is Chairperson, Biotechnology Industry Research Assistance Council (BIRAC).

A PhD in Genetics and Plant Breeding, Dr.Renu Swarup was Post Doc at The John Innes Centre, Norwich UK, under Commonwealth Scholarship.Joined DBT as a Science Manager. She was actively engaged as the convenor in formulation of National Biotechnology Vision and Strategy in 2001, 2007 and 2015.

She has been closely involved in Programmes related to Bioresource development and utilization, Energy Sciences and Women & Science. She was also a member of the Task Force on Women in Science constituted by the Scientific Advisory Committee to the Prime Minister. Dr. Renu Swarup has been instrumental in the planning and implementation of some major National programmes such as Spatial Characterization of Biodiversity, Second Generation Bioethanol, Drugs from Microbes, National Biopharma Mission.

Fellow of the National Academy of Sciences; Member, Organization for Women in Science for the Developing World; BioSpectrum Person of the Year Award; National Entrepreneurship Award; TiEWom ENABLER Award; Dr. P. Sheel Memorial Lecture Award; TWAS Regional Office Prize on Science Diplomacy.

Kiran Mazumdar Shaw

Entrepreneuer

She is the chairperson and managing director of Biocon Limited, a biotechnology company based in Bangalore, India and was the Chairperson of Indian Institute of Management Bangalore. She is on the Financial Times' top 50 women in business list. In 2015, she was listed as the 85th most powerful woman in the world by Forbes.

Kiran worked as a trainee brewer in Carlton and United Breweries, Melbourne and as a trainee maltster at Barrett Brothers and Burston, Australia. After a brief period as a trainee manager at Biocon Biochemicals Limited of Cork, Ireland, she started Biocon India in 1978 in the garage of her rented house in Bengaluru with a seed capital of ` 10,000.Although it was a joint venture, Indian laws restricted foreign ownership to 30% of the company. The remaining 70% belonged to Kiran Mazumdar Shaw.

The company's initial projects were essentially the purification of papain (an enzyme from papaya used to tenderize meat) and isinglass (obtained from tropical catfish and used to clarify beer).Soon Biocon India was able to manufacture enzymes and to export them abroad.

In 2010 Mazumdar-Shaw was named among TIME magazine's 100 most influential people in the world. She is on the 2011 Financial Times' top 50 women in business list. In 2015, she had risen to 85th in the Forbes ranking and she was voted global Indian of the year by Pharma Leaders Magazine in 2012. She received the Othmer Gold Medal, Nikkei Asia Prize, Ernst & Young Entrepreneur of the Year Award, 'Technology Pioneer' recognition by World Economic Forum. She also has received the Indian Chamber of Commerce Lifetime Achievement Award, the 'Corporate Leadership Award' by the American India Foundation.

She received the Padma Shri (1989) and the Padma Bhushan (2005) from the government of India.