

From Learning to Doing

SCIENCE, EDUCATION AND PUBLIC SERVICE IN CHENNAI



Chennai, as the centre of the **Madras Presidency** in pre-Independence India, is special among Indian cities in its **contributions to science, mathematics, education and public service in health.**

Chennai's **Presidency College** is the only college in the country to have two Nobel Laureates among its alumni, the physicists C.V. Raman and Subrahmanyan Chandrasekhar. The biophysicist **G.N. Ramachandran** did his world-famous work while at **Madras University.**

Srinivasa Ramanujan, the mathematical genius, studied at **Pachaiyappa's College** and worked for a time at the **Madras Port Trust**, while waiting for his mathematics to be recognized. **Father Racine**, who headed the Department of Mathematics at **Loyola College** for many years, inspired many of India's best mathematicians in the first few decades after Independence.

Chennai's contributions to the field of medicine through education and public service also stand out. **Madras Medical College**, the **Voluntary Health Services**, the **Adyar Cancer Institute**, **SCARF** and the **National Institute for Research in Tuberculosis** have been pioneers in their respective fields. The **Madras Crocodile Bank Trust** and the **Chennai Snake Park** have made exceptional contributions not only to conservation but to education. Today, institutions such as **IIT Madras**, **Anna University**, the **Chennai Mathematical Institute** and the **Institute of Mathematical Sciences** extend Chennai's long-standing tradition of combining high-quality teaching with research.

These panels highlight some of Chennai's traditions in science, mathematics, education and public service, together with the people and institutions that helped to shape them.

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M.S. SWAMINATHAN

MS Swaminathan Research Foundation



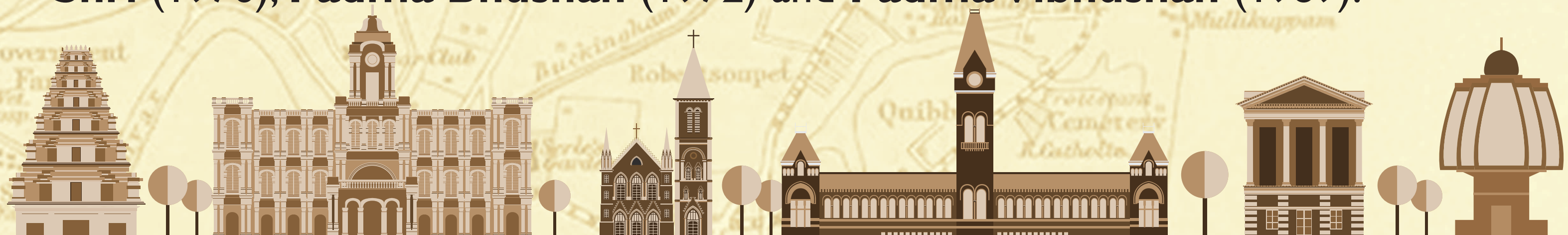
M.S. Swaminathan's work as a plant geneticist led to the development of **new varieties of wheat and rice**. His discoveries spear-headed India's **Green Revolution**, by which farmers, planting the newly developed high-yield crops, were able to sustain themselves as well as to **decrease India's dependence on imported grains**.

He is the founder and chairman of the **MS Swaminathan Research Foundation (MSSRF)**, based in Chennai. The MSSRF concentrates on **knowledge and rural technology-based skill empowerment** of mostly illiterate and unskilled rural women and men towards the **sustainable management of natural resources**.

Born in 1925, Swaminathan was educated in India and England, completing a PhD. from Cambridge University in 1952. Declining the offer of a faculty position in the USA, he returned to India in 1954.

To increase crop yield, Swaminathan investigated the **development of high dose fertilizer-responsive wheat varieties**, finding a hybrid wheat plant that was both sturdy and fruitful.

Swaminathan has held a large number of leadership positions in government and outside. He was awarded the **Ramon Magsaysay Award** for Community Leadership and the first World Food Prize. He is a Fellow of the **Royal Society of London**, the **U.S. National Academy of Sciences** and the **Chinese Academy of Sciences**, among others. He is also the recipient of the **Padma Shri (1976), Padma Bhushan (1972) and Padma Vibhushan (1989)**.



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SERVING THE UNDER-SERVED AND STIGMATIZED



Dr. Sarada Menon is a psychiatrist, social worker and the founder of the **Schizophrenia Research Foundation (SCARF)**. A graduate of **Women's Christian College**, she obtained her medical degree from the **Madras Medical College** in 1951, joining the **Madras Medical Service** in the same year.

The **first woman psychiatrist in India**, she joined the Institute of Mental Health in Kilpauk in 1959, becoming its first woman Superintendent in 1961. During her tenure, an outpatient department was opened and regional **psychiatric centres established at all district hospitals across Tamil Nadu**. SCARF, founded in 1984, is an internationally recognized NGO that provides **support and training towards the treatment of mental illness**. Dr. Sarada Menon was awarded the **Padma Bhushan** in 1992.

Dr. Suniti Solomon (1939–2015), and her student at the **Madras Medical College**, **Dr. Sellappan Nirmala**, tested and **confirmed India's first AIDS case** in 1986. They worked closely with sex workers and other high risk groups. Much ahead of their times in medical privacy, they famously refused to disclose the identities of the patients who had tested positive for HIV-AIDS.

In 1988, Dr. Solomon set up the **AIDS Resource Group** at the MMC, the **first voluntary HIV counselling and testing facility in India**. She founded the **YR Gaitonde Centre for AIDS Research and Education** in Chennai, a leading non-profit organization in HIV/AIDS treatment and counselling. For her contributions, Dr. Solomon was awarded the **Padma Shri** posthumously, in 2017.

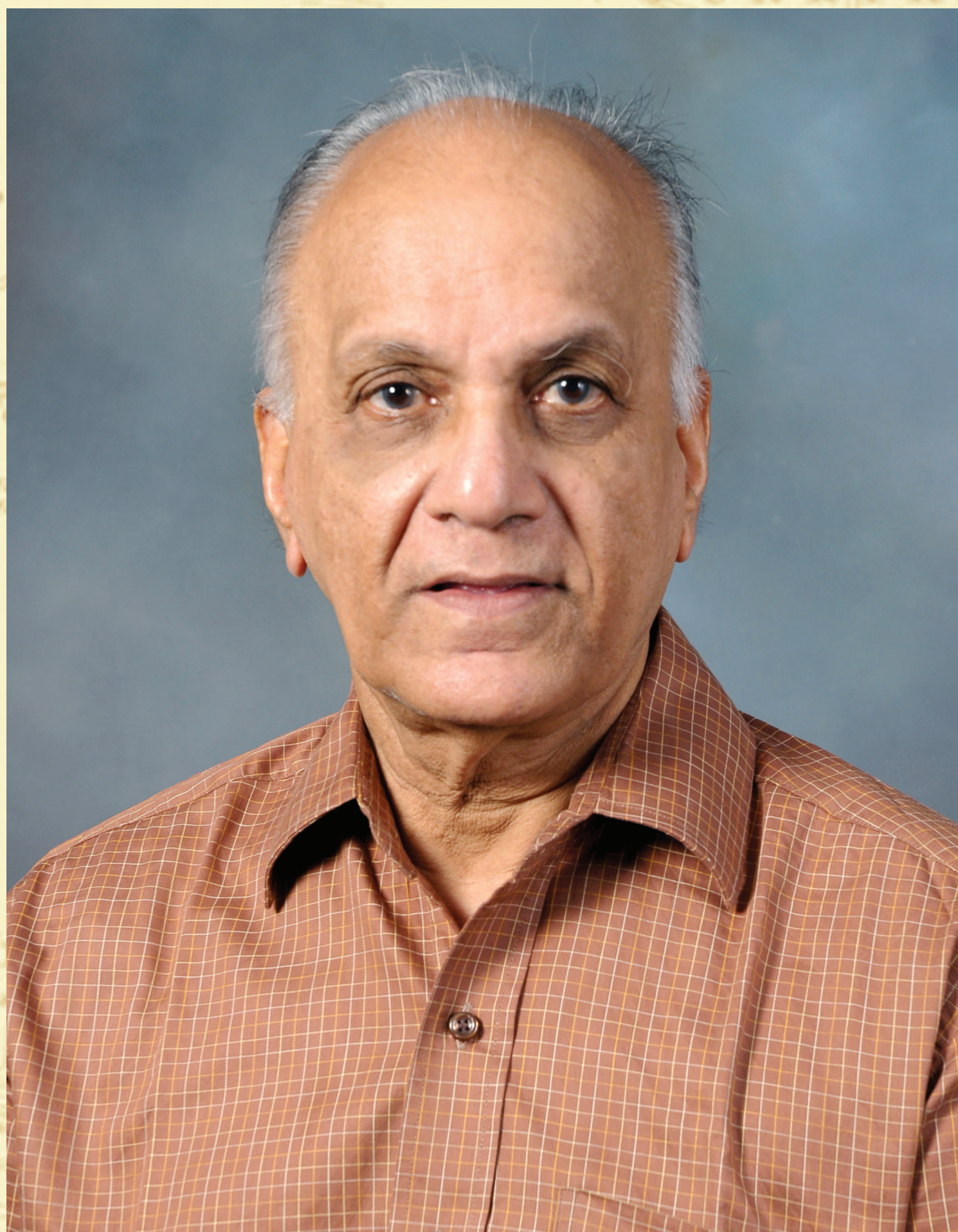


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C.S. SESHADRI The Chennai Mathematical Institute



C.S. Seshadri (b. 1932) was among the students inspired by **Father Racine** at **Loyola College**. Following a bachelor's degree from **Madras University**, he joined as a research scholar at the Tata Institute of Fundamental Research (TIFR) in Mumbai, going on to become one of its best-known faculty members.

Returning to Madras in 1984, Seshadri headed the mathematics group at the **Institute of Mathematical Sciences** until 1989, when he moved on to found what is now known as the **Chennai Mathematical Institute (CMI)**. He served as the Director of CMI until 2010.

Seshadri is recognised for several **fundamental research contributions in the field of algebraic geometry**. One of these, the **Narasimhan-Seshadri theorem**, discovered by the two authors in their early thirties, has proved to be a paradigm for links between different areas of geometry.

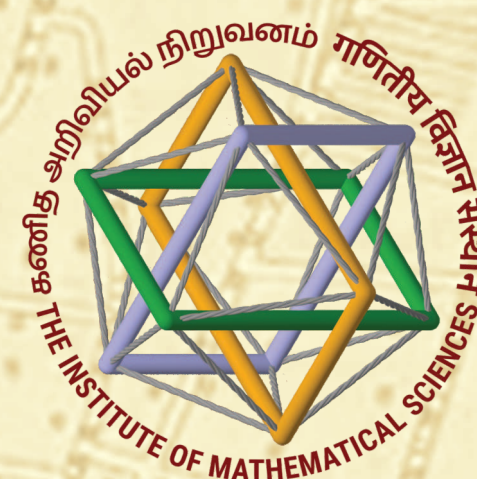
Seshadri's move to found CMI was driven by the conviction that **teaching, research and scholarship** should go hand in hand for the well-being of all three. Now, less than three decades since it was started, CMI has a strong **international reputation for its combination of research and undergraduate education**.

Among Seshadri's honours are the **Shanti Swarup Bhatnagar Prize** (1972), the **Padma Bhushan** (2009) and the **Rathindra Puraskar of Viswa Bharati** (2008). He was elected a **Fellow of the Royal Society** (1988) and made a **Foreign Associate of the National Academy of Sciences, USA** (2010).



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ROMULUS WHITAKER The Snake Man of India



Cedric Bregnard



Gautam Menon



Romulus Whitaker

Romulus Whitaker is a leader in conservation ecology and education in the field of Indian herpetology. He founded the **Madras Snake Park** in 1972 and the **Madras Crocodile Bank Trust** in 1976.

The Madras Snake Park works closely with **local Irula communities**, reviving traditional knowledge to study snake behaviour and habitat. The Crocodile Bank has been a key player in the **revival of the three species of critically endangered Indian crocodiles**, the mugger, the gharial, and the saltwater crocodile.

Whitaker produced the acclaimed wildlife documentary “**The King and I**”, on the king cobra, the largest venomous snake in the world, for the **National Geographic Channel**. He has produced, directed and appeared in a number of other documentaries on Indian snakes and crocodiles.

In 2005 Whitaker won the **Whitley Award** for outstanding leadership in nature conservation. He used the money from the award to set up the Agumbe Rainforest Research Station in Karnataka. A species of Indian boa, ***Eryx whitakeri***, is named in his honour.

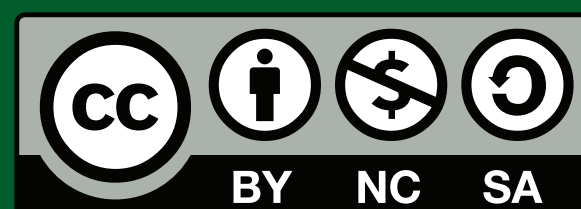
Born in the USA but now a naturalized Indian citizen, Whitaker lives in Chengalpattu. He has consistently maintained that effective conservation can only happen with good research as its basis.

For his contributions to wildlife conservation, Rom Whitaker was awarded the **Padma Shri** in 2018.



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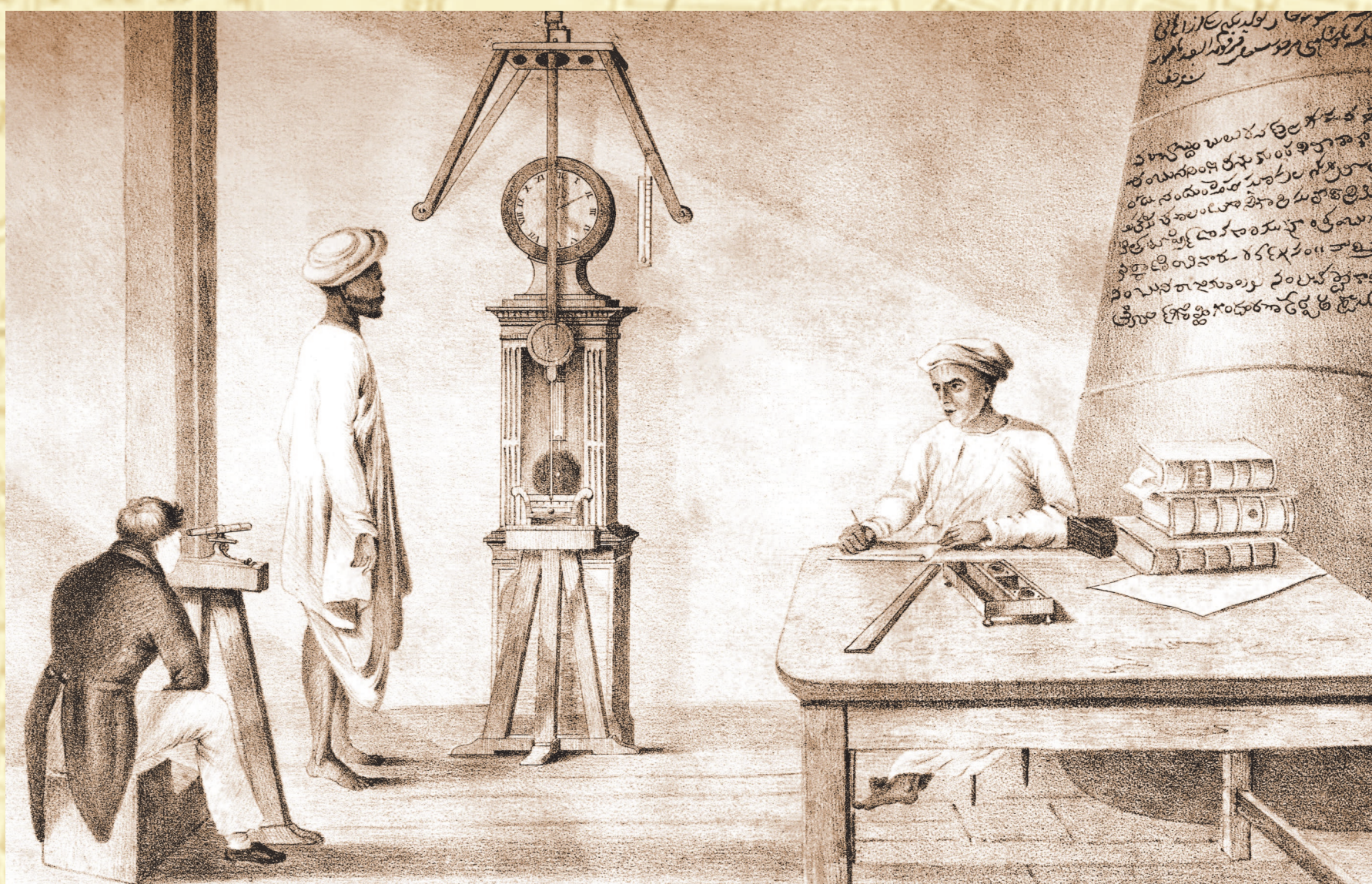


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THE MADRAS OBSERVATORY



John Goldingham, Madras Observatory

Discovery and observations of a new Planet (Asia).
By Norman R. Pogson, Government Astronomer at Madras

A new planet, between the 11th and 12th magnitude, was discovered here on the night of April 17th. — No ring micrometer being in the observatory and the planet not leaving illumination, the method of *Bogulaniski* was employed, with two comparison stars and a single thick bar. I enclose

herewith a series of observations thus made, conjointly, by me and also by my fourth assistant *Ragunoota Chary*, whose aptitude for observation and calculation affords me much satisfaction.

	Madr. M. T.	App. α	App. δ	Log. of Parallax $\times \Delta$		Comparisons No.	Stars	Observer
				α	δ			
1861 April 17	12 ^h 53 ^m 40 ^s	15 ^h 51 ^m 14 ^s 76		9,265a		5	ab	P.
17	14 7 37	15 51 13,56	—16° 6' 22" 9	6,704	0,620	10	z	z
18	11 50 39	15 50 50,72	16 -1 12,7	9,502a	0,578	12	z	z
19	13 49 27	15 50 20,72	15 55 7,0	9,568a	0,617	9	z	z
20	11 46 44	15 49 53,93	15 49 50,1	9,586a	0,579	8	z	z
20	13 20 12	15 49 51,84	15 49 26,6	9,584a	0,614	12	z	R.
21	11 59 5	15 49 22,97	15 43 55,3	9,431a	0,587	13	eb	P.

The private astronomical observatory set up by William Petrie in Egmore in 1786 was among the first western-style observatories outside Europe. This later became the Madras Observatory. It was built on the banks of the Cooum River but was later shifted to Kodaikanal to start the Solar Observatory there.

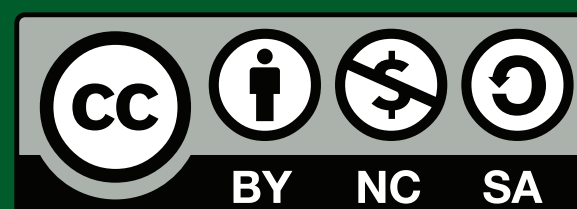
At that time, astronomy was driven as much by colonial needs of navigation and map-making as by scientific curiosity. An important achievement of the observatory was to measure the latitude and longitude of Madras accurately, as a reference for British India. Observations at the observatory led to Taylor's "Madras General Catalogue of 11015 Stars" in 1844.

The astronomer Norman Pogson arrived in Madras from England in 1861. He worked at the Observatory for thirty years, until his death in 1891, taking no leave during the entire period. He made numerous discoveries and was the first to find evidence for the element Helium, then yet to be discovered, from observations of the total solar eclipse of 18 August 1868, made at Masulipatnam. He is buried at St. George's Cathedral, Chennai.

Chintamani Ragoonatha Chary (1822–1880), trained by Pogson, was the first Indian to be elected a Fellow of the Royal Astronomical Society. He campaigned to reform the tables used in traditional Indian systems of astronomical calculations. He also wrote popular articles on astronomy in several regional languages.



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ACCESSIBLE HEALTH CARE



Dr. Muthulakshmi Reddy (1886–1968) was the **first woman admitted to the Madras Medical College** in 1907. She helped found the **Adyar Cancer Institute** in 1952. The Institute **provides quality and affordable cancer treatment**, treating close to 80,000 patients a year. Dr. Reddy was also a social reformer and a champion of girl's education. She was awarded the **Padma Bhushan** in 1956.

Dr. V. Shanta has been associated with the Cancer Institute since its very early years and is currently its chairperson. Dr. Shanta is a recipient of the **Magsaysay Award** (2005), the **Padma Shri** (1986), the **Padma Bhushan** (2006) and the **Padma Vibhushan** (2016).

Dr. Krishnaswami Srinivas Sanjivi (1903–1994) was a medical doctor, social worker and the founder of **Voluntary Health Services**. VHS has been **providing free medical care to about 70% of its patients** since its inception. Dr. Sanjivi received the **Padma Shri** (1971) and the **Padma Bhushan** (1976).

Chennai's tradition of **high-quality affordable eye care** owes much to **Dr. S.S. Badrinath** who started **Sankara Nethralaya**, a not-for-profit eye hospital and research centre, in 1977. Dr. Badrinath was awarded the **Padma Shri** (1983), the **Dr. B.C. Roy National Award** (1991) and the **Padma Bhushan** (1999).

Dr. R. Venkataswamy founded the **Institute for Research and Rehabilitation of Hand and the Department of Plastic Surgery at Government Stanley Medical College and Hospital**, which performs around 10,000 hand surgeries each year. He was awarded the **Padma Shri** (2019).

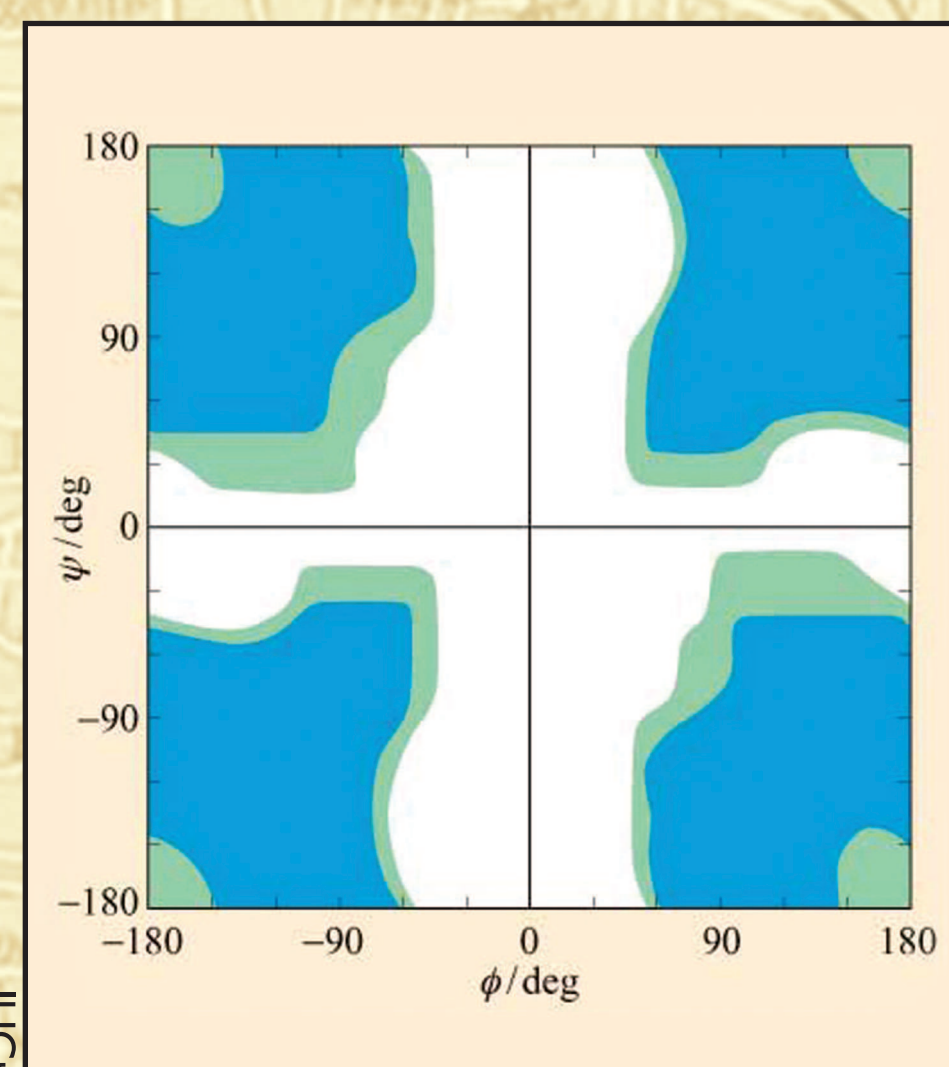
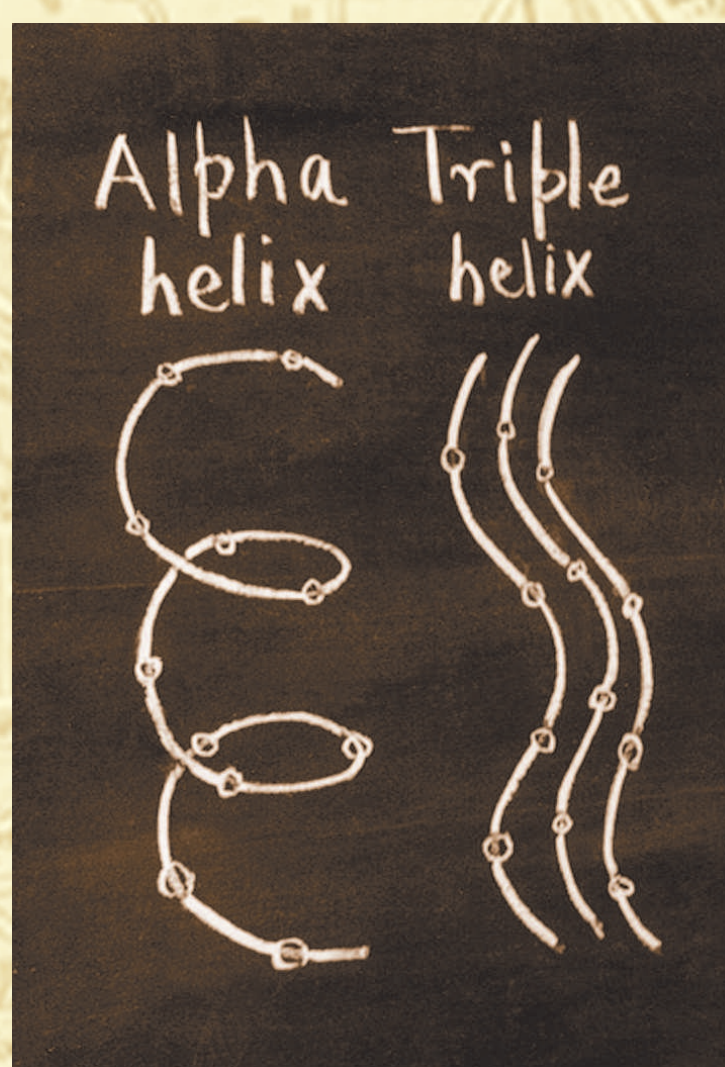


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G.N. RAMACHANDRAN and the Madras Group



G.N. Ramachandran (GNR) made world-famous **contributions** to the fields of **biophysics** and **biochemistry** in the mid-20th century, while he was at **Madras University**.

Born in 1922, GNR studied at the Indian Institute of Science and at Cambridge University. In 1952, he moved to Madras University to head the Department of Physics, where his interest shifted to describing the structures of biological molecules. The group he established, called the “**Madras Group**”, was to make world-famous contributions to the field. The international conferences GNR organized brought many famous biophysicists from all over the world to Madras.

GNR, together with **Gopinath Kartha** proposed a **triple helical structure** for **collagen**, the protein that goes to make tendons and connective tissues. His next contribution, along with **Sasisekaran** and **Ramakrishnan**, was to show what limits the shapes of proteins, in the “**Ramachandran Plot**” now used by **protein scientists worldwide**. Finally, he also showed how the three dimensional shape of an object could be reconstructed from a series of flat pictures, an idea used in imaging and tomography.

In 1970, GNR founded the Molecular Biophysics Unit at the Indian Institute of Science, Bengaluru, remaining there till his death in 2001. Ramachandran was awarded the **Shanti Swarup Bhatnagar Prize** in 1961. He was made a **Fellow of the Royal Society** in 1977 and was awarded the **Ewald prize** in 1999.



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SCIENCE, EDUCATION AND PUBLIC SERVICE IN CHENNAI



“A SMALL INSTITUTE WITH A BIG HEART” The Institute of Mathematical Sciences



The founder-director of the **Institute of Mathematical Sciences (IMSc)**, **Alladi Ramakrishnan**, was a central figure in physics research in Madras post-independence. The Institute was born from **the theoretical physics seminar group which Ramakrishnan ran out of his home**.

A conversation between the Nobel Prize Laureate Niels Bohr and Jawaharlal Nehru led to IMSc's founding. When Bohr was asked what struck him most about his visit to India, he mentioned Ramakrishnan's group and urged that the government support its work. IMSc was inaugurated in January 1962, with Subrahmanyan Chandrasekhar giving the inaugural lecture. It is now an **internationally known centre of research**, not only in mathematics and physics, but also in areas such as computer science and computational biology.

IMSc has figured in many important contributions to science and mathematics. In number theory, **R. Balasubramanian's** work led to the complete solution of the **400-year old Waring's conjecture**. He was awarded the **Padma Shri** (2006). **G. Baskaran** made fundamental contributions to the theory of **high-temperature superconductivity** and **R. Simon** to the theory of **quantum optics**. **E.C.G. Sudarshan**, the famous **particle physicist**, was the director of IMSc for several years. He was awarded the **Padma Bhushan** (1976), the **Padma Vibhushan** (2007) and the **Dirac Medal** of the ICTP (2010).

The **institute has a rich tradition of science communication** and constantly reaches out to the city that is its home, communicating the spirit and excitement of science and mathematics.



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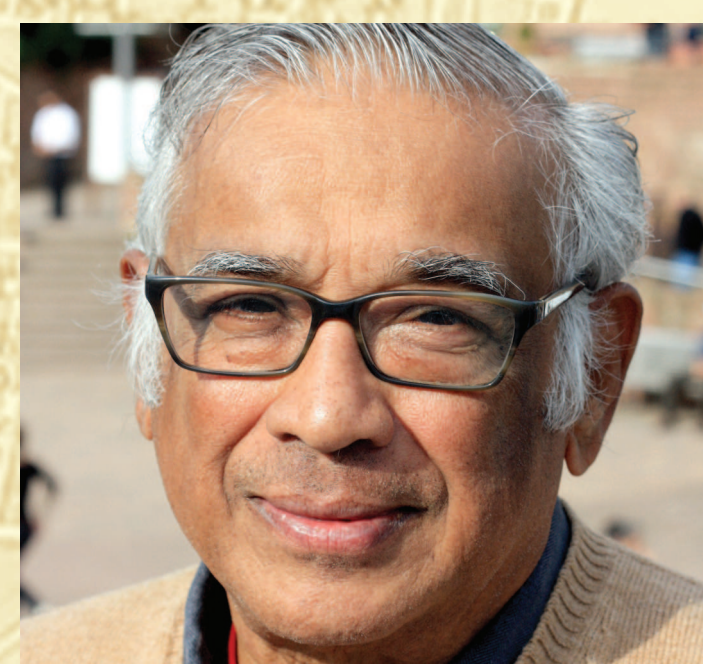
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PRESIDENCY COLLEGE



Chandra X-ray Observatory



Markus Fössel

The **Presidency College** is the only institution in the country to have **two Nobel Laureates** among its alumni, the physicists **C.V. Raman** and **Subrahmanyan Chandrasekhar**. **S.R. Srinivasa Varadhan**, another alumnus, was awarded the **Abel Prize** in Mathematics in 2007, as well as the **National Medal of Science** (USA) in 2010. He is the only mathematician of Indian origin to be awarded the Abel prize, an honour modeled after the Nobel.

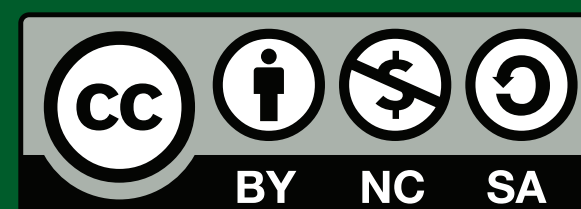
The college nurtured several outstanding Indian scientists in their formative years.

The Presidency College is one of the oldest government arts colleges in India. Established as the Madras Preparatory School in 1840, it was later upgraded to a high school and then to a graduate college. It is one of the two Presidency colleges established by the British in India, the other being the Presidency College, Kolkata. It is considered the fore-runner of Madras University. In 1870, the college moved to its present location in Kamaraj Salai, opposite Marina Beach.

Its alumni also include **several Indian scientists** who have been awarded the **Shanti Swarup Bhatnagar Prize**, India's highest scientific honour, as well as the **Padma Shri**. K. Ananda Rau, S. Minakshisundaram, K. Chandrasekharan, V.S. Varadarajan are some prominent mathematicians who studied at the Presidency College.

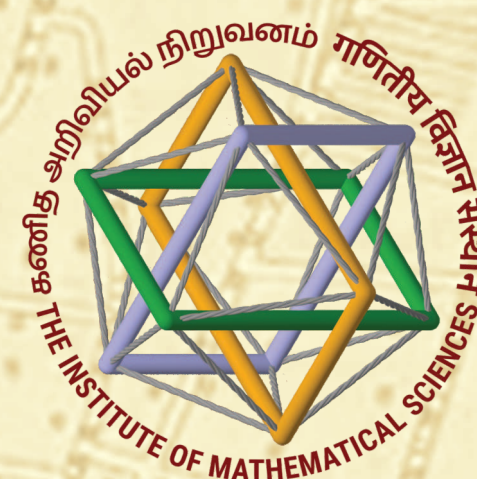


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FATHER CHARLES RACINE and Indian Mathematics



Much of the deepest Indian work on geometry in the last seven decades can be traced to the influence of a **French Jesuit priest, Father Charles Racine**. He arrived at **Loyola College** to head its mathematics department in 1939. He died in 1976 in Chennai.

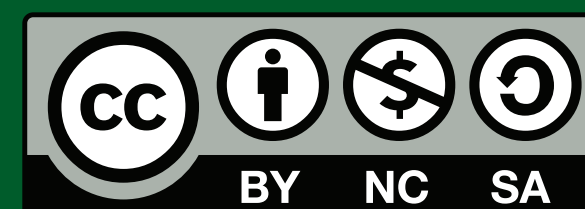
Before his arrival in India, Father Racine had close contacts with the eminent French mathematicians of that time who were remaking mathematics from its foundations upwards. The spirit of this “French Revolution” was transmitted by him to the **many young Indian mathematicians he mentored**. The first of these was **S. Minakshisundaram**, who went on to write important papers that stimulated later fundamental work by the Indian mathematician **V.K. Patodi**.

Even more decisive was Father Racine’s influence on his students, many of whom went on to become **the first generation of mathematicians at the Tata Institute of Fundamental Research (TIFR)** in Bombay, at that time the pre-eminent research centre for mathematics in India. Among these were K.G. Ramanathan, M.S. Narasimhan, C.S. Seshadri, Raghavan Narasimhan and C.P. Ramanujam.

In 1962, the French Government conferred upon Father Racine the title ‘**Légion d’honneur**’ for his contribution to mathematics and service to the cause of education in India.



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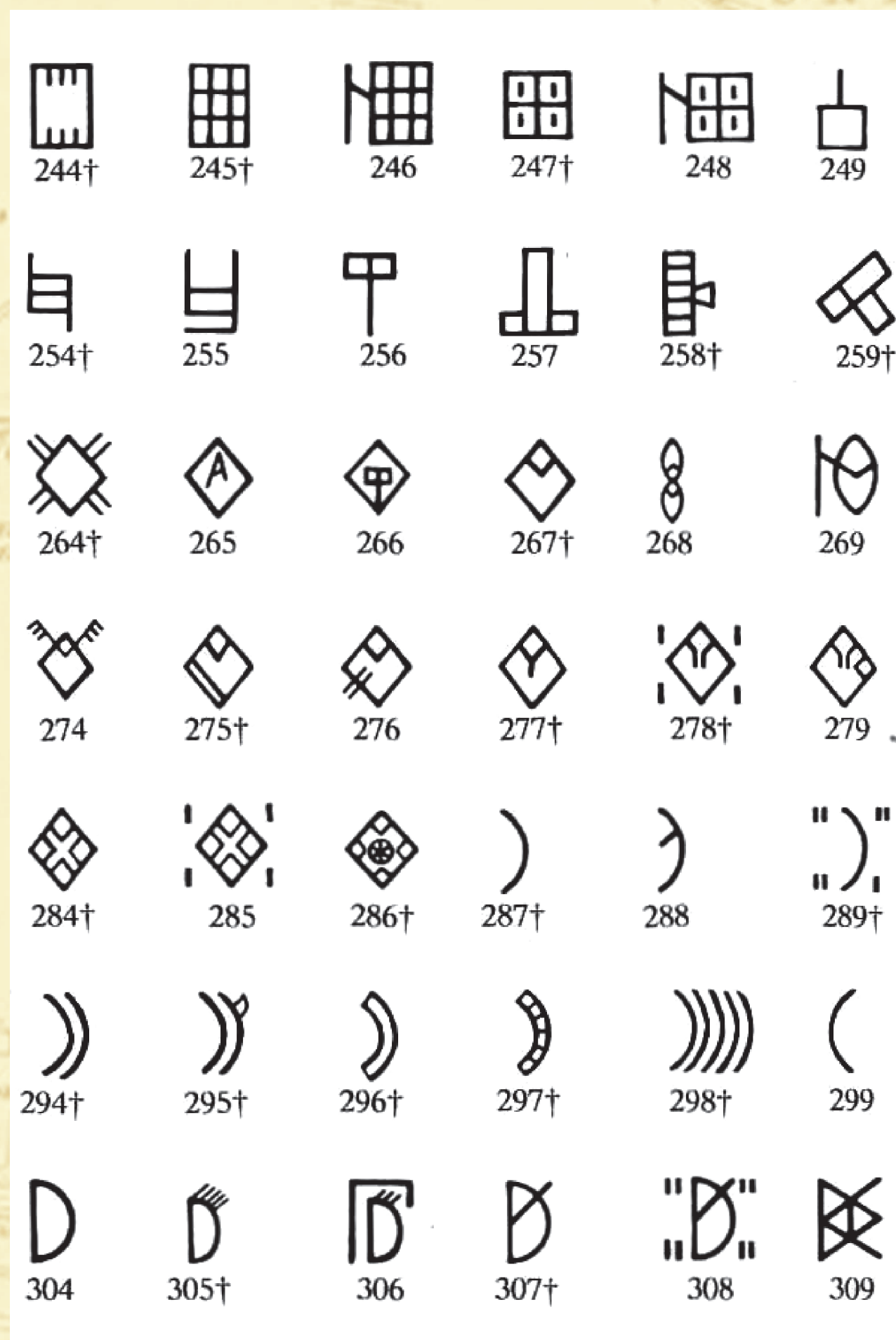
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IRAVATHAM MAHADEVAN

Interpreting Ancient Scripts



Iravatham Mahadevan (1930–2018) is known for his contributions to the **decipherment of the Tamil-Brahmi script** as well as for his work on the **Indus Valley inscriptions**. Among his various articles and books, “Early Tamil Epigraphy: from the Earliest Times to the Sixth Century A.D.” (2003) covers all the known Brahmi Tamil epigraphs and establishes a methodology for interpreting them.

Mahadevan’s other well-known work, “**The Indus Script: Texts, Concordance, and Tables**” (1977) remains the only comprehensive, freely available record of the **Indus Script**.

After an undergraduate degree from Vivekananda College, and a law degree from the Madras Law College, Mahadevan joined the IAS in 1953. He took voluntary retirement in 1980 to **pursue a career in epigraphy, the science of writing**. He supported the **Dravidian Hypothesis**, that proto-Dravidian and Indus Valley inscriptions have a common origin.

He was also the Editor of the Tamil daily, Dinamani from 1986 to 1991. He established the **Indus Research Centre** at the Roja Muthaiah Research Library in Chennai and served as the **General President of the Indian History Congress** in 2001.

He was awarded the **Padma Shri** in 2009.



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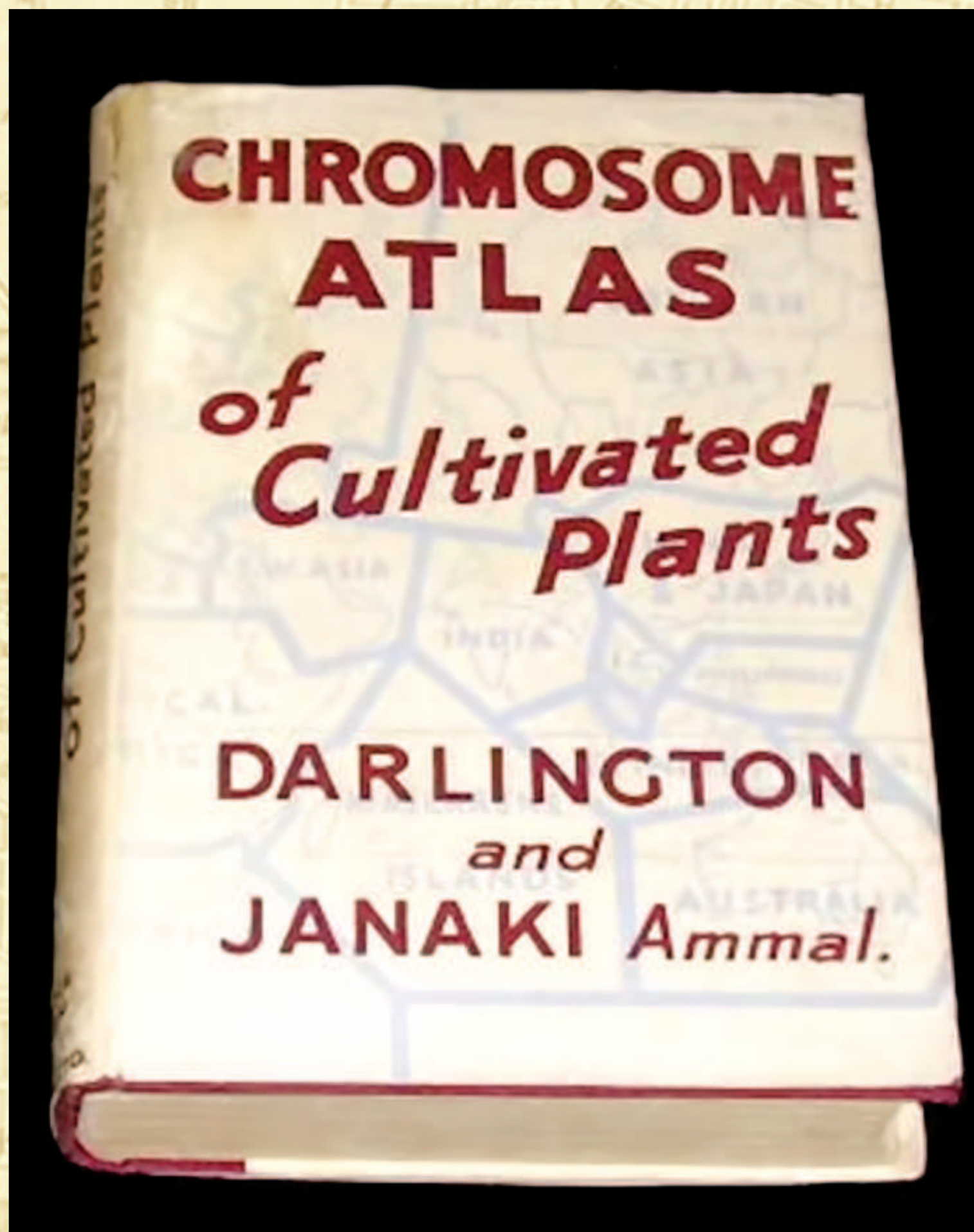


JANAKI AMMAL

India's first woman botanist



John Innes Archives



Janaki Ammal, born in 1897, was a leading **botanist and geneticist**. After studying at both **Queen Mary's College** and **Presidency College** in Madras, she began her career **teaching at the Women's Christian College** in its early years.

In 1931, Janaki Ammal received her PhD from University of Michigan. She was **one of the first women to earn a doctorate in Botany in the USA**.

Her career spanned a number of institutions in different countries, from the Sugarcane Breeding Institute at Coimbatore to the John Innes Horticultural Institution in London. She returned to India in 1951, at the request of Jawaharlal Nehru, to reorganise the **Botanical Survey of India**.

She moved back to Madras in 1970 to continue her work on medicinal plants at the **Centre for Advanced Study in Botany, University of Madras** in Maduravoyal, until her death in 1984.

Janaki Ammal was elected a **Fellow of the Indian Academy of Sciences** in 1935 and of the **Indian National Science Academy** in 1957. She was awarded the **Padma Shri** in 1977.

In 2000, the government set up the **E.K. Janaki Ammal National Award for Taxonomy** in her honour.

