# OBITUARY: M. S. NARASIMHAN

M. S. Narasimhan passed away in Bangalore on Saturday, 15 May 2021. He had been battling cancer during the past year. Narasimhan would have turned 89 on 7 June.

Narasimhan was a world-renowned mathematician of extraordinary depth and breadth. He made fundamental contributions to diverse areas of modern Mathematics ― Algebraic Geometry, Differential Geometry, Representation Theory and Partial Differential Equations.
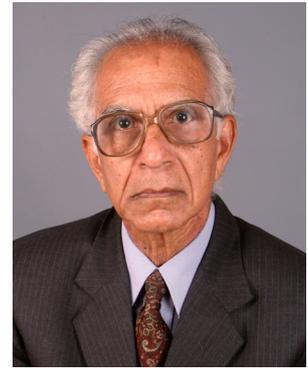
(1932 – 2021)

Narasimhan was born on 7 June, 1932 in a small town in Tamil Nadu. He did his undergraduate studies at Loyola College, Chennai. Here he was introduced to modern mathematics by Fr. Racine, a Jesuit priest, who himself had been a student of the legendary French mathematician Elie Cartan. Following Fr. Racine's suggestion, he (and his classmate C. S. Seshadri) joined the newly founded Tata Institute of Fundamental Research (TIFR), Mumbai, in 1953. They were among the first graduate students of the School of Mathematics, headed by K. Chandrasekharan.

Narasimhan began his research career in Analysis and Partial Differential Equations. During his three year postdoctoral stay in France, mentored by Laurent Schwartz, he mastered the new deformation-theoretic work of Kodaira and Spencer. This played a crucial role in his subsequent research work in Algebraic Geometry, a subject to which he devoted much of his attention after returning to India as a faculty member at TIFR in 1960. Narasimhan and Seshadri shot to worldwide fame and attention in 1965 with the proof of a theorem (named the Narasimhan-Seshadri Theorem in their honour) that makes a deep and unexpected connection between two different areas of modern mathematics.

The Narasimhan-Seshadri Theorem and the Harder-Narasimhan filtration (which was discovered in later work with German mathematician G. Harder) have been vastly generalised in the decades following their first appearance, and stand as the fundamental examples of paradigms with wide applicability.

Narasimhan worked in TIFR till his retirement from there in 1992, at the age of 60. He led a group of researchers in the new field of moduli of vector bundles on curves, which emerged out of his work with Seshadri, and from the work of the American algebraic geometer David Mumford. He and his collaborators (most notably S. Ramanan and G. Harder) and students were responsible for a major portion of the most basic and fundamental work in this area for some decades, and TIFR came to be recognised as one of the top centers of mathematics in the world.

Some of the most famous work by Narasimhan in this period came from his collaborations with mathematicians such as Kotake (Analysis), Ramanan (Algebraic and Differential Geometry), Okamoto (Representation Theory) and Harder (Algebraic Geometry). He was an inspiring advisor and guided a number of graduate students — K. Gowrisankaran, M.S. Raghunathan, S. Ramanan, M.K.V. Murthy, V.K. Patodi, G.A. Swarup, R.R. Simha, R. Parthasarathy, S. Kumaresan, T.R. Ramadas, N. Nitsure, S. Subramanian, and F. Coiai — many of whom went on to become outstanding mathematicians in their own right .

After his retirement from TIFR, Narasimhan joined the International Center for Theoretical Physics (ICTP) at Trieste, and served as the Head of the Mathematics group at ICTP. There he mentored a number of talented young mathematicians from diverse countries. After his retirement from ICTP, he settled in Bangalore. There he was associated with the Centre for Applied Mathematics of TIFR, the Indian Institute of Science and ICTS.

Narasimhan received the Shanti Swarup Bhatnagar Prize in 1975. He was elected a Fellow of major academies, including the Indian National Science Academy, the Indian Academy of Sciences, and the Royal Society, London. He was awarded the TWAS prize in mathematics in 1987, and the King Faisal International Prize for Mathematics in 2006. The Government of France honoured him with the award of 'Chevalier de Ordre National du Merite' in 1989, and the Government of India honoured him with a Padma Bhushan in 1990. The Tata Institute made him an Honorary Fellow in 1994.

Narasimhan was the Founder-Chairman of the National Board for Higher Mathematics (NBHM) of the Government of India, and played an important role in the International Mathematical Union, including a term as the President of the Commission on Development and Exchange, where he was able to help nurture mathematics in developing countries.

All along, he continued his role as a guide and a mentor for the Indian mathematical community. Coming within a year of the death of his famous collaborator and friend C. S. Seshadri, Narasimhan's passing away signals the end of an era for Indian mathematics.

Narasimhan is survived by his wife Sakuntala, an eminent musician, journalist and consumer advocate, daughter Shobhana, a distinguished physicist at the Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, and son Mohan, a management professional.