

Arcot Ramachandran (1923–2018)

Professor Arcot Ramachandran – the first Secretary of the Department of Science and Technology (DST), Government of India and architect of the first Science and Technology Plan for the country – breathed his last on 17 May 2018 at his residence in Bengaluru at the age of 95 years. His death is an irreparable loss not only to his family members, but also to his former students, colleagues and friends. Each one of them would reminisce about him – according to their association with him – as an affectionate family man, an educator, an accomplished scientist, or a committed and an efficient administrator.

Ramachandran was born in Madras on 6 April 1923. He obtained his Honours degree in mechanical engineering in 1943 from the University of Madras. He then pursued his graduate studies on heat transfer at Purdue University, USA under late Max Jakob and George Hawkins during 1945–49. On his return to India, Ramachandran joined as a faculty member at the Department of Mechanical Engineering, Indian Institute of Science (IISc), Bengaluru, which had already gained international reputation for research in the sciences. At that time, however, very little research work was being done in India in the field of heat transfer, as there were hardly any graduate programmes in engineering. During the period 1950–67, Ramachandran established a number of graduate programmes in mechanical engineering and industrial management. In particular, he set up a school of research in heat transfer which attracted a number of visiting scholars and professors. With regard to the basic research, he worked in the areas of pool and film boiling heat transfer, heat transfer from vibrating and rotating surfaces, free convection heat transfer, thermal entry length studies in annuli, and hydrodynamics and heat transfer in non-circular passages. The needs of a developing nation led him to focus his attention on problems of thermal power, such as the use of lignite as a fuel for power generation. He conducted extensive research on heat transfer problems related to production technology such as solidification, and thermal properties and characteristics of metals and non-metals as well, which helped him gain international recognition.

In the midst of his illustrious professional career, Ramachandran was invited to take over as the Director of the Indian Institute of Technology at Madras (IIT-M) in 1967. During his tenure there spanning a little over five years, he gave a major thrust to research by initiating and encouraging both basic and applied research in many fields of science and engineering. With his charming personality and capacity to take quick and



incisive decisions, he was directly responsible for the growth of IIT-M as a leading research institution. In the field of heat transfer, a new school of research was established by him at IIT-M. This school is now a recognized centre of excellence for research in heat transfer problems related to food processing, fluidized bed combustion, and passive and active solar thermal systems.

Apart from being a great academician, researcher and an excellent administrator, Ramachandran was a builder of institutions. As the founder-President of the Indian Society for Heat and Mass Transfer since 1974, he had shaped the Society into an effective vehicle of interaction between the heat transfer community in India and abroad. With his insight into the similarity of problems of the developing countries, he was instrumental in founding the Regional Centre for Energy, Heat and Mass Transfer for Asia and the Pacific, which is the first regional centre of excellence in the field to be established in cooperation with UNESCO, International Centre of Heat and Mass Transfer, and the national government. He has been a delegate to the Interna-

tional Assembly for Heat Transfer Conferences and was a member of the Scientific Council of the International Centre for Heat and Mass Transfer in Belgrade.

His achievements attracted the attention of international organizations and the national government. In 1973, he was invited to assume the position of Secretary in the newly established DST, and was later concurrently the Director-General of the Department of Scientific and Industrial Research. This department was then responsible for planning and direction of research and development in science and technology through a network of research laboratories, academic institutions and industrial organizations, both in the private and public sectors. During his tenure, the first Science and Technology Plan was approved. His other noteworthy achievements include establishment of the National Remote Sensing Agency, Ocean Science and Technology Agency, Science and Engineering Research Council, National Information System for Science and Technology and the Central Electronics Limited – an industrial undertaking for manufacturing ferrites for electronic instruments and solar cells. He was the architect of the National Programme for Research and Development in Renewable Sources of Energy. It was also during his tenure that fiscal incentives for research and development in industry were introduced by the Government of India.

Ramachandran played a leading role in engineering education at the undergraduate and graduate levels as chairman and member of various boards. He was Chairman of the Preparatory Committee for the United Nations Conference on Science and Technology for Development (1977–78). He was also Chairman of UNESCO International Conference on Education and Training for Engineers and Technicians, the Association for Engineering Education in South and Central Asia, the UNESCO Expert Group on Environmental Aspects of Engineering Education and ESCAP Experts Meeting on the Regional Centre for Transfer of Technology. Based on the recommendations of this group, the ESCAP Regional Centre for Transfer of Technology was established in Bengaluru in July 1978. In October 1978, he was appointed as the Under-Secretary General and Executive

PERSONAL NEWS

Director of the newly established United Nations Centre for Human Settlements (Habitat) with headquarters in Nairobi. He also had the additional charge of Administrator of the United Nations Habitat and Human Settlements Foundation. In a short span of six years, the Centre became fully operational and rendered assistance to several countries in Africa, Asia, West Asia, Latin America and the Caribbean. During his tenure as the Under Secretary General at the UN Centre for Human Settlements, he proposed the introduction of World Habitat Day, which was accepted, leading to observing the first Monday of every October as a special day to remind the world of sustainable progress with regard to environment. He was also instrumental in the proclamation of 1987 as the International Year of Shelter for the Homeless, as a part of the Global Strategy for Shelter for 1987. It was during his tenure in 1990 that the UN launched the Sustainable Cities Programme in 12 cities. He retired from the UN in 1993.

Ramachandran received many national and international honours in recognition of his outstanding achievements in pro-

fessional and related fields of activity. He was honoured by Purdue University with an Honorary Degree of Doctor of Engineering and the Distinguished Alumnus Award. He was awarded Honorary Doctorate by Stuttgart University (Federal Republic of Germany), University of Roorkee, Andhra University, Jawaharlal Nehru Technological University, Anna University, IIT-M and the University of Venice, Italy. The Institution of Engineers (India) elected him as Honorary Life Fellow and IISc bestowed upon him the Honorary Fellowship of the Institute.

Ramachandran was Fellow of the American Society of Mechanical Engineers, Institution of Mechanical Engineers (London), Indian National Science Academy, Indian Academy of Sciences and Indian National Academy of Engineering. He was a member of the editorial board of several technical journals, including the *International Journal of Heat and Mass Transfer*. He was the Editor-in-chief of the *Regional Journal of Energy, Heat and Mass Transfer*. He has also received several awards like Heat Transfer Memorial Award of the Ameri-

can Society of Mechanical Engineers (1986), World Habitat Trophy, Building and Social Housing Foundation of UK (1995), Shanti Swarup Bhatnagar Gold Medal (1998), Indian National Academy of Engineering Lifetime Achievement Award and Sir M. Visvesvaraya Lifetime Achievement Award in Engineering (1999), Padma Bhushan (Government of India; 2003) and World Federation of Engineering Organisations Award (2005).

For some of us who have been fortunate enough to have had a long association with him, Ramachandran's demise has left a great void. I, a former student and associate of Ramachandran, am sure that his students, colleagues and friends from all over the world will join the members of the science and technology community of India in paying rich tributes to the departed soul.

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