

In addition to the many Academy fellowships, medals, awards and professorial chairs that he received, he served with great distinction as the President of the Indian National Science Academy (2007–2009) and was conferred the Padma Shri by the Government of India in 2004. His home state of Kerala honoured him with the highest scientific awards, recognitions that he prized. In turn he served the state in many advisory capacities. Vijayan was always close to his roots frequently talking about life in Kerala.

For almost a decade before his passing, Vijayan was slowly exposed to the ravages of motor neuron disease. He never allowed his increasing physical disability to divert him from the activities that he loved: research, mentoring students and acting as a passionate advocate for the cause of basic science in India. Despite considerable restrictions to his mobility, he continued to come to his laboratory on the second floor of the MBU building at IISc with a regularity that was inspiring. Always a good writer, clear and forceful, Vijayan turned to Malayalam to first pen his account of his early years in Kerala. Encouraged by his ability to recollect and narrate, Vijayan wrote a complete account of his life in a memoir published in 2020 by INSA, Delhi

and reviewed in this journal (*Curr. Sci.*, 2020, **118**, 1997–1998). In trying to gather my thoughts for these reflections on Vijayan's life, I could not but marvel at his prodigious memory and the sense of fulfilment that seemed to permeate through the pages of his memoir. His skills as a writer are clearly on display in his description of the complexities of Kerala's social structures and his early experiences, as he flirted with the idea of a career as a political activist. Vijayan had a world view much broader than is common amongst professional scientists in India. In his memoirs he reflects on Darwinism and Marxism: '*Over decades Darwinism was creatively enriched and elaborated and remains the centrepiece of biology. Marxism to an extent became the ideology of the establishment with the advent of the Soviet Union and other socialist states. That substantially stunted the development of Marxist theory and its capacity to absorb new experiences. One casualty in the process was the near disappearance of Marxian humanism from the discourse. Even in the Oxford days, I used to feel the need for deliberate steps to free Marxism from the authoritarian framework and enrich it through creative intervention. This is particularly important in the present age of globalised, aggressive,*

*predatory capitalism*' (Vijayan, M., *A Life Among Men, Women and Molecules*, INSA, 2020, p. 58). Despite the constraints of his later years, Vijayan wrote several times in the columns of this journal, forcefully and compellingly, arguing for enhanced public support for science. Even a few months ago he presented a case for reforming the administrative and financial structures that are intended to promote science in India, but which often, sadly, exercise an inhibitory function. He summed up with a touch of regret: '*The approach of many of us has been to take full advantage of the positive features of Indian science, while trying to eliminate (it turns out rather unsuccessfully) the negative features*' (*Curr. Sci.*, 2021, **121**, 346–347).

Vijayan was a proud, loving, and devoted husband and father. He leaves behind his wife Kalyani and daughter Devayani. He also leaves behind a host of students, associates, friends, and colleagues whose lives he touched and enriched. It was a privilege to have known and worked with him.

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## T. V. S. R. Appa Rao (1941–2022)

Dr Tamirisa Venkateswara Sree Rama Appa Rao, a legend in the field of structural engineering passed away on 17 February 2022 in Hyderabad.

Rao, born on 7 February 1941, had a brilliant academic track record and an outstanding professional career. In 1962, he obtained first rank with a gold medal from Andhra University with a Bachelor's Degree (Honors) in Civil Engineering. Rao then earned the East-West Center Fellowship and pursued post-graduate studies at the University of Hawaii, USA; and obtained a Master's degree in structural engineering. In 1968, he obtained his Ph.D. degree from Cornell University, USA. During 1967–68, he worked as a post-doctoral research fellow at Cornell University, and thereafter had a brief stint as a consultant in the US.

Returning to India in 1969, Rao joined the team of the then Director, late G. S.

Ramaswamy at the Structural Engineering Research Centre (SERC), located on the campus of the CSIR-Central Building Research Institute in Roorkee. In the mid-1970s, SERC shifted to its present campus in Chennai. Seldom does an outstanding



young scientist morph into an institution-builder, manager and formulator of administrative policies, whose legacy will continue to be cherished and admired by the scientific community. Most would agree that Rao was indeed an exceptional personality. The few who may hesitate, would have to admire the resoluteness of a young engineering student who decided that he would go to the US for further studies, and return to head a research institution in a short time. This was a shining example of his commitment to contribute to the country's R&D efforts. His first research contribution as an SERC scientist on the stress hybrid technique of finite element method presented at the First International Conference on Structural Mechanics in Reactor Technology at Berlin, Germany, was the forerunner for further research in this area by scientists at the Massachusetts Institute of Technology, USA, and other institutions.

Rao has made a unique and strategic contribution for evaluating the safety of nuclear power plants by testing a pre-stressed concrete true model of the Madras Atomic Power Project, a nuclear reactor containment vessel – first of its kind in India and one among the few in the world.

Rao took over as the fourth Director of SERC on 28 February 1995. During his term as the Director, he encouraged cutting-edge R&D while nurturing young scientists to take up innovative programmes. He initiated the process of establishing a world-class wind engineering laboratory and an earthquake engineering laboratory. While the former was established through UNDP, the latter was built with support from the Department of Atomic Energy, Government of India (GoI). As a societal scientist through his Project Directorship of the UNDP Action Plan, Rao successfully organized the transfer of technology for cyclone disaster mitigation to grassroot-level artisans/skilled workers. The industry interactions rose to a different level under his leadership and so was the demand from the industry seeking powerful yet simple and cost-effective solutions. Rao encouraged nominations of young scientists to represent in various BIS Committees that provided many of the technologies/processes developed at SERC get due recognition. He mentored several scientists and guided them with timely suggestions. After 32 years of illustrious service in the Council of Scientific and Industrial Research (CSIR), Rao superannuated in 2001 and continued to serve SERC as an Emeritus Scientist.

Rao's nearly four-decade-long professional journey took him to several uncharted territories. His areas of contribution include computer-aided analysis and design of complex structures such as ship structures, natural draught hyperbolic-parabolic RCC cooling towers, offshore structures,

pressure vessels and reactors, risk and reliability-based design of structures, computer software development, FEM for advanced structural analysis, integrated software packages for design of structures, damage assessment and vulnerability analysis of structures in cyclone-prone areas and earthquake-resistant design of structures and high performance concretes. He served with distinction and provided inspiring leadership/direction as Chairman/Co-Chairman/Member of several international committees representing the Indian scientific community and making significant contributions, and in national committees resulting in outstanding and far-reaching decisions and results. He commanded many national and international events. During 2005–07, Rao's contribution to establishing of the state-of-the-art Centre for Disaster Mitigation and Management at VIT University, Vellore jointly with R. K. Bhandari, resulted in a number of knowledge products in the area of disaster mitigation, and auto-certification series for training of professional trainers. He was also a highly valued member of the team responsible for the growth of the National Network of Retrofitting Clinics.

Towards nurturing excellence in science and technology (S&T) and for building international partnerships in the field of structural engineering, Rao visited many countries, including USA, Germany, Canada, Bulgaria, Japan, DPR Korea, Malaysia and Thailand. He was on the Editorial Board of the international journal *Engineering Structures*.

Rao has received several awards, rewards and recognitions. Cornell University invited him to serve as a Visiting Associate Professor during 1976–77. In September 1989, he was Visiting Scholar at Stanford University, USA. Rao was one of the distinguished experts of the special

S&T delegation deputed to Bulgaria by the GoI during the eighties. Rao was the Chief Technical Advisor to the prestigious UNDP Project computerizing the Construction Design and Calculation Centre of DPR Korea. His paper on 'Analysis for ship-water interaction effects' earned him the Aerospace Engineering Division Gold Medal of the Institution of Engineers (India) in December 1995. The Rotary Club of Madras Metro presented him with the Vocational Excellence Award in 1998. The very next year, he won the CSIR Foundation Day Technology Award for Engineering Technology, for contributions in the field of computational technology and software development. A year later, he received the CSIR Shield for 'Engineering Technology' in the area of structural engineering. In November 2003, Rao received the Indian Building Congress Medal for his paper on 'Integration of computer and IT applications'. In 1990, he was elected as a fellow of the Indian National Academy of Engineering. Rao has published over 125 papers in national and international journals, and several monographs.

Appa Rao has been a tremendous source of inspiration for all of us with his unbounded kindness, high sense of integrity, and tireless and undaunted dedication to service. He was soft-spoken, extremely caring and an excellent human being. His demise is a great loss to the scientific community as a whole.

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