



**A Linus Pauling Research Professor who has made an exceptional contribution to the field of nanoparticles, Prof C N R Rao's work on transition metal oxides has influenced applications such as colossal magneto resistance and high-temperature superconductivity**

# Man with a mission

BHARAT RATNA  
PROF C N R RAO TELLS  
RAMYA SRINIVASAN HIS  
REVOLUTIONARY SCIENTIFIC  
WORK CAN BE SUMMED UP IN  
JUST ONE WORD: DISCIPLINE

**T**owering bamboo shoots and the sound of quietly flowing water draw you into the hallowed portals of the Jawaharlal Nehru Centre for Advanced Scientific Research (JN-CASR) in Bengaluru. It's the perfect introduction to a modern shrine, whose rite of passage revolves around a test as tough as it is pure: knowledge.

Max Ehrmann's *Desiderata* greets visitors to the spotless reception area of the stone-clad building, which houses the International Centre for Materials Science. Also framed are Swami Vivekananda's words, "Knowledge alone will make man perfect." Together, they are a fitting prologue to the life and work of Prof C N R Rao, globally renowned scientist and this year's recipient of the Bharat Ratna.

Tempering his words with a wry smile, it is Prof Rao who shoots the first question. He asks what 'silver' means and whether the conversation will be recorded. "I don't trust the memory of youngsters. I can recall a lot of things from books and papers but I realise that this generation needs to be reminded of everything," he chuckles, setting the tone for the interview. Known as the scientist who famously dismissed computers as "distracting", Prof Rao has lived his life by two watch words: 'simple' and 'straightforward'. Cutting through the clutter has always given him an edge in his field of research: solid state and structural chemistry.

The seeds of his brilliance were sown early by his unconventional parents, who had the courage to home-school their only child, till middle school, at least. This, at a time when homeschooling was still decades away from becoming an alternative to formal education. "My parents felt school was a waste of time and believed they could offer me more as I was years ahead of my level," says Prof Rao, matter-of-factly. "My mother was my teacher



Fotocorp

Prof Rao and wife Indumati being greeted on their arrival at Bengaluru after receiving the Bharat Ratna

**"I was doing my research on spectroscopy, and there was not a single good spectrometer available in the entire country! I used to borrow one from Dr C V Raman's lab"**



With granddaughter Suguna and pet dog Simba

and I spent hours in her company listening to stories. She was excellent at arithmetic and my father taught me English, stressing the importance of learning idiomatic usage and not grammar alone. When I told my parents I wanted to study in Banaras, I was barely 17. They fully supported my decision. In retrospect, my wife Indumati and I still wonder how my parents could have given me so much freedom in my formative years." The quest for education as well as excellence is deep-rooted in Prof Rao's family and this weighed in the lad's favour. His father worked in the then Mysore state education department and had a master's degree in history, economics, politics and education, while his mother observed spiritual discipline.

Even at the age of 80, Prof Rao's childlike excitement for science and research sparkles as he describes his journey. "I wrote my seventh grade exams at the age of 10, and finished my graduation at 17." He says the legendary Dr C V Raman was a big inspiration and had once visited his school to deliver a lecture to the students. Dr Raman had also asked his teacher to bring a few students across to his lab at the Indian Institute of Science and he was among the group. "Dr Raman spent an hour telling us about his work in the lab and I was transfixed. I had a natural inclination towards science even at that tender age."

After he graduated, Prof Rao went on to acquire a master's degree in science in Banaras Hindu University and, by then, his commitment to chemistry was unwavering. "I scored second in my MSc because I was not good at mugging," he laughs, betraying a hint of regret at not having ranked first. He wrapped up his doctorate at Purdue University in the US in under three years and published a staggering 30 papers during that time. "I would come

up with some idea and write a paper on it and it would be accepted by leading journals. It never failed to surprise me."

At the age of 25, Prof Rao had a choice of either pursuing his studies in the US or returning to India—he chose the latter. He returned to Bengaluru and joined the Indian Institute of Science as a lecturer. "In those days, the plight of science in India was pathetic. Here I was, doing my research on spectroscopy, and there was not a single good spectrometer available in the entire country! I used to borrow one from Dr C V Raman's lab, and once travelled all the way to Aligarh to take some measurements from an instrument there. Beg, borrow, steal was the idea! Despite all this, I managed to publish many papers back then," says Prof Rao, who went on to win the Dan David Prize, widely regarded as being tougher to win than the Nobel Prize.

When he was seriously contemplating moving back to the US, Prof Rao received an offer from IIT - Kanpur, as head of the Department of Chemistry. "I set up the best chemistry department in the country in IIT Kanpur. Even today, there is no other place in India that can beat it. Anyone who is something in the field has worked there," he says, almost like a proud parent. Recognition first came from Dr C V Raman, who had read a book on spectroscopy authored by the young scientist. "Dr Raman commented that anyone who could write a book like that should be a member of the Indian Academy of Sciences." After that, international awards and medals poured in, the first among them being the Marlow Medal by the Faraday Society. (Prof Rao is still the only Indian recipient of the Marlow Medal.) On receiving the Bharat Ratna, Prof Rao recalls, "I received the call from the Prime Minister himself when I was at Thiruvananthapuram airport. But I only fully understood the impact when I landed at Bengaluru airport and was greeted by a virtual stampede."

Prof Rao's genius and passion had taken root in childhood. Still, it is not easy to comprehend publishing 1,600 research papers and authoring 48 books. As if sensing disbelief, he smiles, "Discipline..." He wakes up at 4:30 am every day and says

the morning coffee he shares with his wife at 5:30 am is "one of the most important things in life".

Despite his age, Prof Rao still writes every day for an hour. As he finds "gadgets distracting", he handwrites everything and never uses a computer. "I only have a laptop for making presentations. Otherwise I have no use for them. When you write on paper, your thinking speed is in sync with your speed of writing. On the computer, you tend to type a lot of nonsense," he quips. However, he is quick to clarify that he doesn't have an aversion to IT. "I only find it unfair that a majority of talent is sucked into this field at the expense of all others because it offers more money. We still have only a small number of PhDs in computer science." He adds with heartfelt regret, "Bengaluru is the worst affected city of this trend, where moneymaking seems to be the main goal. I have got students from across the country, predominantly from Bihar and Bengal, working with me but I have not received a single student from this city yet." Our illustrious silver attributes this "moneymaking" trend to our college education. "Science education is fine even up to schooling. But there are a lot of second-grade colleges and once you get in there, the cracks start to show."

Scientist par excellence he may be but Prof Rao has other interests too, evident as he deftly shifts from discussing M S Subbulakshmi to Madhva and Sankara philosophy. He also loves the Stieg Larsson trilogy. "You should watch Peter Brook's *Mahabharata*," he recommends. "It is the best interpretation of the epic." His table is stacked with music CDs as he is a classical music enthusiast. Asked to name his favourites, he quickly reels off the names of the veterans of South Indian Carnatic music. "I like Maharajapuram Santhanam, Madurai Mani Iyer and Semmangudi Srinivasa Iyer. But, nowadays, I find Hindustani classical more appealing. No one is better than Pandit Bhimsen Joshi."

The conversation veers towards his beliefs and Prof Rao says, "I do believe in God and philosophy, but I don't care for rituals. Although I was born into a Brahmin family, my father took a path-breaking decision

and decided not to do my *upanayanam* [sacred thread ceremony]. They didn't even get a horoscope done for me." He adds that his eclectic bent has earned him membership of the Pontifical Academy in the Vatican.

Indeed, education and learning are a way of life, not only for Prof Rao but his entire family. His wife Indumati graduated in English literature, worked as a teacher and later wrote a thesis on the education of underprivileged children in Oxford University. In fact, he and his wife have co-authored a series of books for children to make chemistry friendly for students. Prof Rao's love for education has seen him champion reforms in science education. As chairman of the Science Advisory Council to the Prime Minister of India, he is the driving force behind the five IISERS (Indian Institute of Science Education & Research) in the country and has helped design their policy guidelines. Incidentally, IISER - Pune, is headed by Dr K N Ganesh, who is also Prof Rao's son-in-law.

Contrary to what one might assume, Prof Rao does take time off from his work for family vacations. "I enjoy going to the Himalaya for holidays with my entire family." In his autobiography, *Climbing the Limitless Ladder*, he mentions, "My wife has been a terrific partner. I have not gone shopping with her but we have common interests in literature, music and theatre. Prof H C Brown used to say that he did only two things in life: one was to do good research and the other was to keep his wife happy. I have strictly followed this principle."

Does he still actively engage in research? He quickly retorts, "Of course! I don't involve myself with administration and only focus on the science.... I recently published a couple of papers on artificial photosynthesis and have worked on a book that should be out soon." However, at the age of 80, is he contemplating retirement at any point? The evergreen scientist laughs, "I would like to quote [Atal Behari] Vajpayee, who was once asked the same question. He said, 'When I am not even tired, there is no question of being retired.' Ultimately, I hope I pass away sitting and working in my lab."



## MILESTONES

- Awarded the Dan David Science Prize for being the 'world's foremost solid state and materials chemist' (2005)
- Padma Shri (1974); Padma Vibhushan (1985); Karnataka Ratna (1985); and Bharat Ratna (2014)
- One of only three scientists to receive the Bharat Ratna; along with Nobel Laureate and physicist Dr C V Raman (1954) and aeronautical engineer and former President of India Dr A P J Abdul Kalam (1997)
- Served as Chairman of the Science Advisory Council to the Prime Minister of India