

Learning from space and teaching from space



SPEAKING OF SCIENCE

D. BALASUBRAMANIAN

July 24 has turned out to a Monday of sorrow, since it was on that day that India lost two of its sons – two outstanding men of science, namely, the space scientist Dr. Udupi Ramachandra Rao (U.R. Rao for short), who made India a space-faring nation, and the scientist educator Dr. Yash Pal, who brought science to the homes of many across India.

The fortnightly science journal, *Current Science*, published from Bengaluru, carries a series of articles termed 'Living Legends in Indian Science'. Drs U.R. Rao and Yash Pal were two such legends who improved India through their scientific contributions. Dr. V. Jayaraman of the Indian Space Research Organization (ISRO) has written a detailed life history of Dr. Rao and his contributions to India's space efforts in the 10 June 2014 issue of *Current Science* (which is available free on the web). Some sentences from this article are worth repeating here. Dr. Rao, born in 1932, wrote several scientific articles in 1963 when he was 31 years of age. When he published another paper in 2011 (when he was 79), a fellow scientist, Dr. Ron Cram, apparently remarked: "Is this same U.R. Rao who was publishing science pa-

pers back in 1963? Or is it his grandson?" Such was Dr Rao who, until almost the last day of his life went to work daily at the ISRO headquarters in Bengaluru.

Aryabhata to Mangalyaan

Dr. Rao's entry into space science began with his Ph.D. degree under the mentorship of Dr Vikram Sarabhai, who persuaded India to enter the space age and use satellite technology. After spending a few years in the US, working in areas of astrophysics and satellite studies, Rao returned to India in 1966, but right after that, he was asked by Sarabhai to prepare a blueprint for developing satellite technology in India. This he did with enthusiasm and built the first Indian satellite, called Aryabhata (named after the 5th century Indian mathematician), along with its smaller size models, within 36 months and within the stipulated budget. To quote Jayaraman again: "Rao says -Yes, I had a young team, though inexperienced, was very committed. Their unmatched enthusiasm, dedication, hard work, and the tremendous confidence, and their 'never say impossible' altitude were contagious, and became part of ISRO culture later".

With Rao at the helm, several satellites were made – Bhaskara 1, 2, Rohini and the communication satellite called Ariane Passenger Payload Experiment or APPLE. Carrying the satellite APPLE on a bullock cart (in order to check for electromagnetic compatibility) captured the continuity between Old and New India! It is this combination of mastering high end technology with an eye for economy and effi-

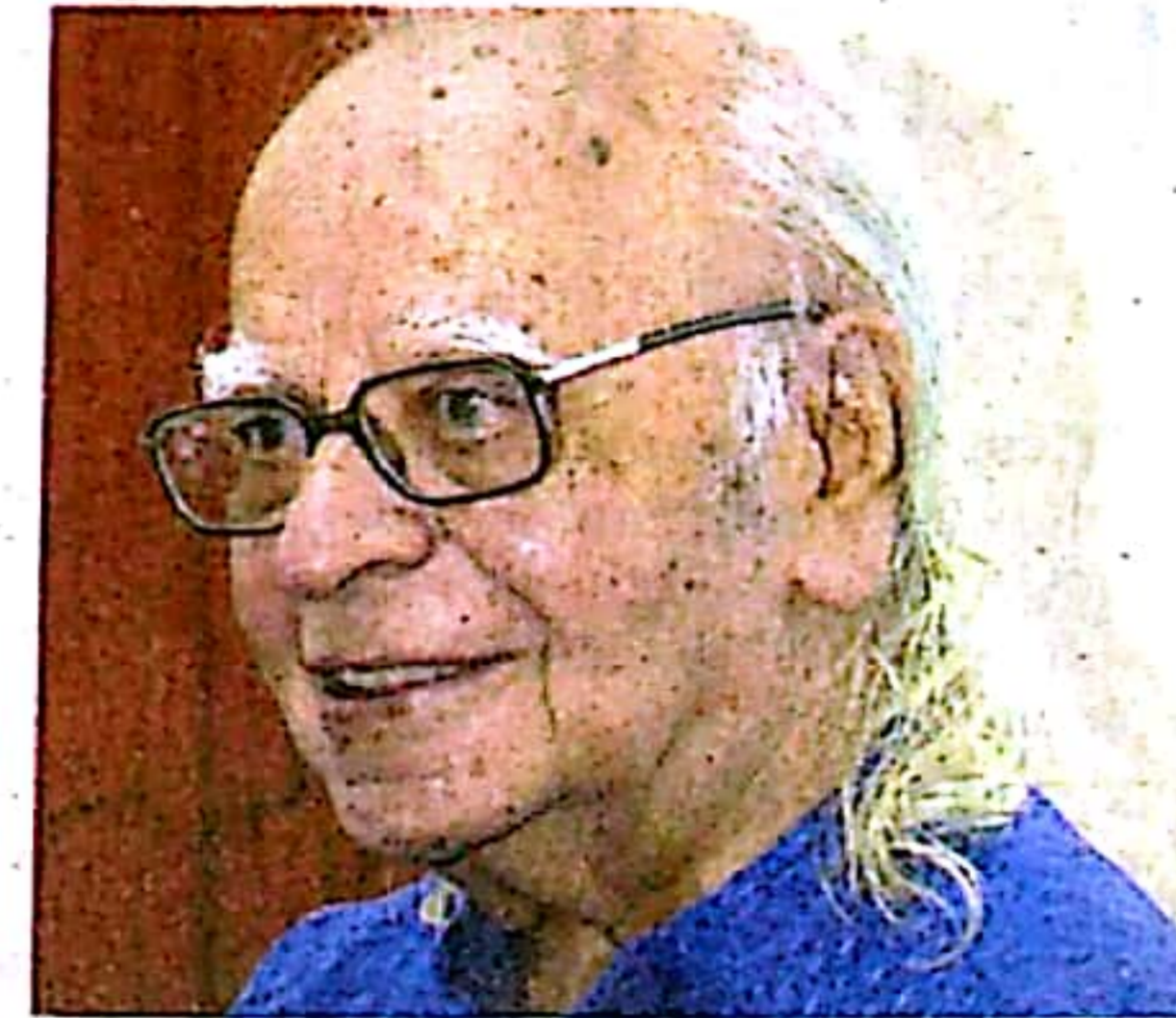


Dr. U.R. Rao typified calm and composure.

ciency that has catapulted Indian space efforts to stellar heights. Name another nation that has successfully sent a spacecraft to Mars at a cost of Rs 450 crores!

Propagating Science

While Dr. U.R. Rao, of Karnataka, typified calm and composure, his friend and comrade in arms, Dr. Yash Pal typified Punjabi exuberance. Prof. Ramanath Cowsik has written a beautiful article on this legend, in the 10 July 2015 issue of *Current Science*. Yash Pal, too, trained as a physicist and worked on cosmic rays at the Tata Institute of Fundamental Research, Mumbai, from where he was called by Dr. Satish Dhawan (who succeeded Dr. U.R. Rao at ISRO) to head the Space Application Centre (SAC) at Ahmedabad, and to launch the ambitious educational programme called Satellite Instructional Television Experiment or



SITE. He collected a group of eager youngsters, devised programmes on education, agriculture, health and hygiene and related topics. These were uploaded on the satellite ATS-6 and broadcast across over 2400 TV sets across urban and rural India. These were received enthusiastically by the viewers.

The SITE experiment was novel, first of its kind anywhere, and successful. How did the Yash Pal team manage to do it? Cowsik quotes Yash Pal thus: "A civilization that protects its young from the hassles of doing things themselves deprives them of great joy, and ultimately leads its society into a state of permanent dependence... Let us just do it ourselves". Recall that Dr. U.R. Rao said the same thing in different words.

Yash Pal moved on to take on further assignments and tasks for the government, including the chairmanship of the

University Grants Commission (UGC), Secretary of the Department of Science and Technology (DST), and others. Among the many initiatives and innovations he launched, public understanding of science became an important one. As the Chairman of UGC, he gave fillip to the recently established Educational Media Research Centres (EMRC), and using Doordarshan to broadcast regular programmes from them, called "Countrywide Classrooms," an initiative that continues to this day.

Quite apart from these, Yash Pal captured the hearts of millions of Indians through the TV series "Turning Point", where he would frequently come and answer questions from schoolchildren and explain science in the simplest of terms, remarkably successfully. For many children, he became known as Yash Pal Uncle (just as his hero Jawaharlal Nehru was called Chacha Nehru).

On a personal note, my wife Shakti and I have lost a caring and encouraging friend. She produced hundreds of programmes in science and arts for "Countrywide Classrooms," from the EMRC at the Central Institute of English and Foreign Languages, Hyderabad (now called the English and Foreign Languages University); and I used to appear often in "Turning Point," along with him. And Shakti's sister's husband, the late Dr. M.M. Chaudhri, produced "Turning Point" for quite a while.

In Dr. U.R. Rao and Prof. Yash Pal, we have lost two great leaders of science. One helped us go into space in order to learn about the universe, while the other used space to teach us. Though they are gone, their "can do" and "never say impossible" spirit lives on.

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