

which fell in the last 50,000 years. This is one of the patent methods of dating the time of fall of stone meteorites; the other method developed subsequently is based on the isotope  $\text{Be}^{10}$ . In collaboration with his student B. M. P. Trivedi, Goel made the first measurements of production of  $\text{Na}^{22}$  and  $\text{H}^3$  in silicate targets with a view to interpret cosmogenic effects in meteorites. This work, which he completed in 1973, is considered as a reference for determining cosmic-ray production rates as a function of depth in meteorites. He was the principal investigator for lunar sample studies from the time of *Apollo 14* mission. He devel-

oped and applied the neutron activation method for measurement of nitrogen content of lunar samples and meteorites. These measurements are extremely difficult, but the creditability and usefulness of his measurements have been recognized. Last but not least, he was actively engaged in conducting hydrological work of national importance. He was considered an expert by the International Atomic Energy Agency (IAEA) in this field. He was deputed by IAEA to Sri Lanka to investigate the use of radio isotopes on hydrology and was deeply involved in the study of meteorites and isotopic anomalies

therein. Goel was elected a Fellow of the Indian Academy of Sciences in 1977 and of the Meteoritical Society in 1966.

Goel was suffering from prostate cancer before he breathed his last on 9 August 2004 in Lucknow. He is survived by his wife, a son and two daughters.

N. SATHYAMURTHY

*Department of Chemistry,  
Indian Institute of Technology,  
Kanpur 208 016, India  
e-mail: nsath@iitk.ac.in*

## RECOLLECTIONS

### Science and Music: Truth and Beauty

I read with interest the editorial on the above subject<sup>1</sup>. Right from my school days I have been a fan of M.S. and one of her songs which I liked to hear often was 'Needu Charanamule' in the raga 'Simhendramadhyamam'. This song seemed to have impressed Rabindranath Tagore so much that he composed a Rabindrasangeet piece in the same tune and the words of this begins with 'Baje Karuna Shure'.

There is an interesting background to the origin of this song. Some years back I met one Michael Nixon in Chennai and he was then doing research on Carnatic music guided by Savithri Rajan, a renowned veena player and musicologist. She and Michael Nixon founded the 'Sampradaya' group for research on old traditions in Carnatic music. Michael told me that 'Needu Charanamule' was not composed by Thyagaraja though it has his 'mudra'. It was actually composed by Krishnamachariar, brother of the famous Tiger Varadhachariar. Krishnamachariar was an accomplished musician, but was not as well known as his illustrious brother. Krishnamachariar realized that Thyagaraja surprisingly had not composed any song in the raga 'Simmendramadhyamam' and so wanted to rectify this lacuna by composing 'Needu Charanamule' and inserting Thyagaraja's 'mudra'.

Chandrasekhar, about whose essays on Truth and Beauty the editorial mentions, was not only fond of Carnatic music but also of classical western music as well as art and literature. He gave an interesting lecture on 'Newton and Michaelangelo' at the meeting of Nobel Laureates in Lindau<sup>2</sup>.

When my wife and I visited him at his apartment in Chicago he played for us two of his favourite records, one 'Music of the Minstrels' and the other, the recording of the rehearsal of the 36th Symphony (also called the Linz Symphony) of Mozart conducted by Bruno Walter. Bruno Walter was a friend of Chandrasekhar and the Professor told us that during one of his dinners with Bruno Walter, the Professor talked to him with his usual high intensity on Newton and hearing this the conductor asked him whether Newton was to Science what Bach was to Music and Chandrasekhar quipped 'This is the only comparison I shall tolerate'.

Apart from many honours in his lifetime, Chandrasekhar's contribution to astrophysics was also recognized by the launching of the X-ray observatory 'Chandra' in 1998 named after him. At that time, *Chicago Sun-Times*<sup>3</sup> had a column which said 'In all his years on the University of Chicago faculty from 1937 until his death in 1995, India-born Subrahmanyan Chandrasekhar never sought public attention for his work and the astonishing insights that gave him rank with Albert Einstein and Stephen Hawking among the greatest physicists of this century'. The paper also quoted British Astronomer Martin Reiss's comment on Chandrasekhar which said 'he probably thought longer and deeper about our Universe than anyone since Einstein'.

Both M.S. and Chandrasekhar were known for their kindness, humility and simplicity. A friend of mine who was an amateur singer in Carnatic music and had

some training in vocal singing used to tell me that her lifetime ambition was to sing a song with M.S. accompanying her on the tanpura. Believe it or not, when she went to M.S.'s residence and told her about her ambition, M.S. immediately played on the tanpura to my friend's singing!

My wife and I had seen off Chandrasekhar and his wife many times at Bombay airport after their stay in India. Every time he told me that I should not tell anyone at the counter about him as he did not want any special treatment which he used to call as 'fall-outs'.

During one of his visits to India, my wife and I had a conversation on Einstein and to my remark that I had heard that Einstein was a very humble person, Chandrasekhar referred to a comment made by Bernard Shaw on Mahatma Gandhi namely 'Gandhi is a humble man, but he knows he is Gandhi alright' and said similarly Einstein knew that he was Einstein alright. Needless to say, the same applied to M.S. and Chandrasekhar as well.

1. Balam, P., *Curr. Sci.*, 2004, **87**, 1639–1640.
2. Lecture given at the 44th meeting of Nobel Laureates in Lindau, on 28 June 1994.
3. *Chicago Sun-Times*, 23 December 1998.

S. RAMANATHAN

*Great Eastern Chambers,  
Sector 11, CBD Belapur,  
Navi Mumbai 400 614, India  
e-mail: s\_ramanathan@hikal.com*