

# His intoxicating principle

**B**ANGALORE, early '60s. The Czechoslovak ambassador in India was around to present his country's highest award for science to Sir C.V. Raman. After the ceremony, attended by many prominent citizens, a function was arranged to meet the distinguished scientist. I was present at this function. Where alcoholic drinks were being passed around.

I gravitated towards a small group of men consisting of the guest of honour, the Czechoslovak ambassador and a few others. On such occasions conversation does not flow readily. When you have a man like Sir C.V. Raman to talk to, you normally do not make an opening and say something like: "Dr. Raman, it is a great pleasure meeting you and we congratulate you on receiving the Czechoslovak award. We hope more such awards will follow from many other countries. Incidentally, I am X and this is my good friend, Mr. Y. Nor can

formulae for alcohol and lime-juice respectively. He had made polite conversation and put the questioner at ease.

Raman lived and breathed the subjects that were near and dear to him. Whether it was musical acoustics, the colours in nature, the molecular scattering of light in water, or a host of other subjects, it would often appear that Raman treated these not only as areas of specialised knowledge where challenges existed, but even as colleague of sort who invited him to a common endeavour, to come and discover what lay hidden - in a fascinating game of intellectual hide and seek. And, then, together they would traverse the dark tunnel, as it were, until the first ray of light showed at the end of it when the joy of achievement was shared, even childishly, between the seeker and the sought!

Raman belonged to a group of outstanding physicists, who, during the early years of this century, individually contri-

Sir C.V. Raman did not drink alcohol. Even so, he was forever intoxicated - in his all-powering love for science. Science to him was an obsession, which had him probe into every beauty that fascinated him in nature, says Brig. R.B. Nayar (retd).



you begin by talking about the weather. You would rather not discuss current politics with Sir CV if you knew that politics and politicians were not quite his cup of tea. In fact, as I came to know later, he had his choicest invectives for the purveyors of the political trade. Raman, of course, was never tongue-tied, being a professor, and a dynamic speaker in his own right, but at this very moment, the Raman small talk was not yet forthcoming.

As we stood frozen with glasses in our hands. I let an absurd remark escape my lips in the shape of an enquiry as to what exactly the Nobel laureate had in his glass. Dr. Raman was quick to react, and in good humour too. "I know you are sipping an alcoholic drink - whisky maybe. Mine is non-alcoholic, but don't you know, they are essentially the same things. Except that their molecules have a slightly different arrangement of carbon, hydrogen and oxygen atoms." And, promptly, he gave the chemical

buted much to our knowledge of the physical universe.

Very simply stated, Raman's own work which led to the discovery of the Raman Effect in 1928 had to do with the appearance of additional lines in the light spectrum when scattered by molecules of a substance, solid, liquid or gas. In fact, Raman had laid the foundation for this achievement, when in 1919, he started working on the scattering of light. Two years later, the Mediterranean Sea, with its blue opalescence caught his attention and this led him years later, to formulate the theory or the Effect named after him.

Like the many famous scientific discoveries of the past, the scientific world was only too willing to acclaim Raman's new theory and make further studies of it in order to examine its ramifications on other branches of physics in particular and science in general. For example, Einstein commented that Professor Raman was the first to recognise and demonstrate that

the energy of a photon can undergo a partial transformation within matter. Raman's theory also helped establish one of Einstein's views "that a beam of light could also act as a fusillade of minute bullets". The new discovery delighted analytical chemists and experimental physicists alike as it would help solve many problems that existed in their respective fields. What Raman himself would not have anticipated is the range of application the Raman Effect made possible in the year that followed.

Though Raman is best known by his prize-winning discovery, his long, productive life produced innumerable scientific papers and treatises on widely ranging subjects - Many of these had an aesthete's angle to them'. The study of colours the study of crystals and gems, the study of stringed instruments-violin and veena; the study of vibration of the stretched membranes of the mridangam and so on.

On a Fokker Friendship flight

from Bangalore, I found myself sitting near Dr. Raman, with the aisle separating us. I leaned over to wish him good morning and said to him that my wife and I had happened to listen to his interesting talk at the Raman Institute in Bangalore on "Gems and Gemmology". His face lit up immediately and he repeated "Gems and Gemmology! Ah, a very interesting subject! We are just scratching the surface of this fascinating branch of Optics - a lot more has to be learnt!" This was one of the numerous subjects to which Raman devoted his attention during the period he was Director, Indian Institute of Science, from 1933 to 1948. Raman was greatly interested in the physics of diamonds, and it is during the study of imperfections in diamonds that X-ray topography was discovered in the same laboratory. Raman had wanted to start an institute of his own with his savings, but his hopes were shattered when he lost a great deal of money in investments which turned out to

be unsound. Undaunted, he went about asking for contributions to raise an institute justifying his act saying "Our greatest men were beggars - the Buddha Sankara and Gandhi". This was a difficult task, as he would not ask for any Government subsidy or grant.

To come back to the Fokker flight, Raman showed unbounded enthusiasm for the subject, the same spirit, perhaps which enthused his listeners.

During that 40-minute flight, Raman made himself heard over the drone of the aircraft; he poured forth on a variety of subjects. Here was the professor we had seen a few weeks earlier at his Institute who with the aid of a slide projector and blackboard to which he often turned to illustrate a point using mathematical equation, demanding total attention from his audience explaining to a lone audience sans any accessories. As his lone audience, I had a feeling which can be best described as mixture of importance and total inadequacy. On the one hand, here was this eminent man of science finding me suitable to receive his profound observations; on the other, these were being scattered like seeds on arid ground.

As Raman traversed from one field to another, it was a mixture of fact, observation, commentary and criticism; these were blended by his immense enthusiasm for the subject and his extraordinary ability to make science fascinating to his listeners. From scientific phenomena he went into the scientific cause and now laid his sights on how the cause of science was being ignored in this country; how science was administered by bureaucrats and politicians who often laid down the law and who, in fact, had no business to get anywhere near its holy portals; how pseudo-scientists who claimed to know a lot did more harm than good to the scientific cause. He was not prepared to forgive the top-most people in the Government for their sins against science. It was quite obvious that Raman had strong reasons to feel sore with the Establishment; that someone important had said or done something to hurt him and that his all-too sensitive mind was reacting to the same on this flight.

"You are welcome to come and see me in Bangalore" he said to me as the aircraft landed. "I shall indeed, sir" I said, handing him my visiting card and wondering what another person-to-person talk with him was going to turn out into.

Taking one look at my card he raised both his eyebrows and his voice and said, "You are a military officer - and I have been preaching to you sedition and criticising the Government all the time!" He asked me what exactly I did in the army. 'An engineer' I said with some apprehension.

While Raman shook hands to take leave of me, his eyes retained their penetrating gleam. Of what he had said regarding "non-scientific" interference in the husbanding of science and his caustic comments on some very important people, he had meant every word. He was a man of strong feelings and firm convictions and would rather express them plainly than cloak them in diplomacy. "Goodbye, young man, till we meet gain" he said affectionately while shaking hands.

As Raman walked down the tarmac, a fairly large crowd of admirers collected at the airport awaited to receive him. He was to deliver an address at a university. As garlands of pink, yellow and white flowers were placed around his neck, I recalled the occasion in the 30s when the Nobel Laureate had come to address our college. I remembered him saying - if a brick fell from the top of a scaffolding on a man's head down below, mathematically it only meant that the line of action of gravity on the brick and the line of the man's motion had just met, maybe with dire consequences to the man and the brick.

Raman died in November 1970, his whole life having been devoted to the pursuit of science, this alone remained his 'Intoxicating Principle'. His pursuit was not only of nature's secrets, but also of the beauty underlying them. If science is the 'study of facts or truths systematically arranged', in Dr. Raman's view, it did not run counter to art, which is really the 'realm of what is beautiful'. While the aesthete in him reacted pleasantly to a beautiful sight or a delectable sound, the scientist in him urged him to make a study and unravel the scientific principle hidden behind that beauty.

A story is told of the late scientist-artist Dr. Homi Bhabha, he had painted a picture of Raman's and presented it to him saying that it was the picture of a scientist by a scientist. Raman suggested a different description: "It was," he said, "the picture of an artist by an artist."

The first article on C. V. Raman appeared in Science Express dated November 8, 1988