

logarithmic concept of time ahead and time past.

The existence of relaxation times follows both from a subsequent accommodation by society of the effects of a

historical event, and from failing memory. Clearly these two causes are not always distinct.

Yours faithfully,  
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# Obituary

## C. V. Raman



MODERN science started taking root in India only in recent times. Sir Chandrasekhara Venkata Raman, who died in November at the age of eighty-two, was the outstanding figure during the last half century in this renaissance and, in more than one sense, he may be regarded as its originator and leader. Great as his personal contributions to science have been, greater have been his achievements in training and inspiring a large number of brilliant, self-reliant and distinguished Indians who have made significant contributions not only to pure physics but also to areas such as meteorology, seismology, geology, soil physics and mathematical physics. It is common knowledge that Raman himself had no training in foreign laboratories. He started his scientific career without any external stimulus and attained great eminence by his own individual effort. Many of his pupils and associates did likewise. The fact that they had built up flourishing and distinctive research schools without relying too much on foreign assistance reveals the profound influence exerted by the great leader on his colleagues.

He was born at Trichinopoly in south India in 1888 and was educated at the Hindu College, Visakhapatnam, where his father was professor of mathematics, and at the Presidency College, Madras. Even as an undergraduate, Raman did original work in acoustics and in optics, and his first scientific publications appeared as early as 1906 in *Nature* and in the *Philosophical Magazine* when he was in his eighteenth year. In the decade that followed, by a strange turn of events, he was an officer of the Indian

Finance Department till 1917, but kept up scientific interests, studying the dynamics of vibrations and sound, and the theory of musical instruments. Those early studies culminated in his publishing in 1918 an article of some 158 pages dealing with the theory of the musical instruments of the violin family. He also contributed some years later an article on the theory of musical instruments to the *Handbuch der Physik*.

The year 1921 was important in his scientific career, as then began his work on the scattering of light. By 1924 he made significant contributions and was invited to open a symposium on the scattering of light at the Toronto meeting of the British Association. In fact, his researches in the seven years that followed dealt with different aspects of the scattering of light and led to the discovery early in 1928 of the phenomenon that now bears his name—the Raman effect. The effect can be seen when monochromatic light is diffused or scattered by matter. It occurs because, while most of the scattered light has the same frequency as the incident light, a definite fraction undergoes a change in frequency by exchanging energy with the matter.

While the discovery of this phenomenon was his outstanding contribution during the many years of his scientific work, he made significant contributions to allied areas such as ultrasonics, diffraction of light, photoelasticity, X-ray diffraction, magnetism and magneto-crystalline action, electro and magneto-optics, crystal dynamics and so on. He also had a deep and aesthetic appreciation of nature and a scientific interest in the colours of birds, beetles and butterflies that evolved, in his later years, into a study of the colours of flowers and other natural objects. In addition, he made extensive contributions to the physics of vision and human hearing.

To realize the impact of the discovery of the Raman effect on the subject of physics as a whole, one should note that with the more recent discovery of the laser, the Raman effect has again become an area of great interest to physicists. The laser has introduced a new age of excitement in the field of light scattering, one in which it has become possible to study issues only accessible to strong sources of illumination such as those provided by lasers and in which a new effect has appeared, the Laser-Raman effect.

Honours were showered on Pro-

fessor Raman during his lifetime. They are too numerous to be cited here. Honorary degrees from universities, fellowships from learned societies and medals and certificates from scientific institutions of many countries were received by him in large numbers, indicating the brilliance and originality of his researches, the truly international character of the recognition which his work received and the permanent place which his contributions have earned for him in the history of world science. He was awarded the Nobel Prize for Physics in 1930, two years after he discovered the Raman effect.

But for a brief period of about ten years during which he served as an officer of the Indian Government, he devoted all his life and all his energies to fulfilling his one ambition which was to secure a prominent place for India on the scientific map of the world. He has succeeded in a fair measure in achieving this objective. His singular and unswerving devotion to science, his uncompromising attitude towards any attempt made to draw him out of his chosen path, his refreshingly independent way of looking at things, his unique ability to expound intricate scientific discoveries to large audiences and, above all, his fine and delicate sense of humour are so well known, that his colleagues who knew him intimately admired him as much for these qualities as they admired him for his contributions to science. Many institutions and universities in India have benefited by his influence, advice and support. He was the Founder President of the Indian Academy of Sciences and continued to be its president till his death. In that capacity, he was looking after the Proceedings of the Academy, which were published with unflinching regularity during the past forty years. He was also the president of *Current Science*, a fortnightly journal published from Bangalore.

After retirement from the Indian Institute of Science, he worked at the Raman Research Institute in Bangalore, an institute founded by him and to which he gave all his property including the money he received with the Nobel award. The Raman Research Institute today houses, among other things, an unusual collection of precious stones, gems and other rare items of great scientific interest and value. The institute together with the traditions which he established remain as his great legacy.