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EC Nobel Prize Essay

Sir Chandrasekhara Venkata Raman

Chandrasekhara Venkata Raman, or C.V. Raman, was born on November 7, 1888 in Trichinopoly, India. He was born into an environment highly conducive to success in physics; his father lectured in mathematics and physics. In 1902, as just a young teenager, he enrolled in Presidency College in Madras. Just two years later in 1904, C.V. Raman had passed the B.A. Examination. By 1907, he attained his M.A. degree with highest distinctions. After college, C.V. Raman joined the Indian Finance Department as the Assistant Accountant General but still made an effort to continue his scientific research. Chandrasekhara Venkata Raman went on to become a physics professor at Calcutta University.

C.V. Raman went on to a string of successful business and teaching endeavors. He became the director of the new Indian Institute of Science at Bangalore and also taught physics there. In 1943, Raman and Dr. Krishnamurthy started their own company, dubbed Travancore Chemical and Manufacturing Co. Ltd, which established four factories in southern India. C.V. Raman was named the first National professor by Independent India in 1947. He retired the next year to establish the Raman Research Institute in Bengaluru, which now publishes India's Current Science. In 1929, Chandrasekhara Venkata Raman was knighted and by the next year he had won the Nobel Prize.

The discovery that led to Chandrasekhara Venkata Raman's Nobel Prize in 1930 in physics was the Raman effect. In 1921, C.V. Raman took a sea voyage to Europe. When he was there, he noted the blue color of the glaciers and of the sea. He wanted to find the reason why the ice and the water were blue. Raman conducted various experiments studying the scattering of

light from water and blocks of ice and attempted to explain the phenomenon. When Raman got news that Professor Compton won the Nobel Prize based on his work researching the scattering of x-rays, C.V. Raman hypothesized that the same principles could be applied to light.

In his experiment, Raman used light from a mercury arc to penetrate transparent materials, which fell upon a spectrograph where the spectrum was recorded. He discovered new lines in the spectrum called "Raman Lines". Different Raman lines indicate different molecules. The effect is a result of deflection from frequency shifts and scatters light when it hits molecules. It is not a very strong impulse; the light that bounces off may only be 1/100,000 of the beam itself. The Raman effect is mostly has to do with vibrational transitions that give larger shifts that are observed in solids, liquids, and gases. Because gases naturally have a low concentration of molecules, they produce much fainter Raman effects. The Raman effect is more easily observed on denser solids and liquids.

The Raman effect has been highly useful to the scientific community. It is very helpful when analyzing the molecular structure of chemical compounds. The research and effects of the Raman effect can also be closely related to the experiments of Ernest Rutherford. Within ten years of the discovery of the Raman effect, the structures of 2000 compounds were studied. In conjunction with the development of the laser, the Raman effect is a useful instrument for scientists today.

The awarding of the Nobel Prize to C.V. Raman is especially significant because Raman was the first nonwhite person to win a Nobel Prize in physics, and also the first Asian. At a time when science was dominated by white European men, Venkata Raman paved the way for Indian scientists and scholars, and for that matter, scientists of all different ethnicities and cultures to attain greatness in scientific fields. This was further proven when Chandrasekhara Venkata

Raman's nephew, Subrahmanyan Chandrasekhar won his own Nobel Prize for Physics for his discoveries relating to evolutionary stages of stars in 1983.

Despite the fact that C.V. Raman's immediate environment was very conducive to scientific development because of his father's occupation, overall India was not exactly a hub of discoveries in physics. Raman clearly overcame that and built his own laboratories and pioneered both the course of the Nobel Prize and that of physics itself into a terrain where Indians or Chinese or South Americans or anyone for that matter could win themselves a prize through their own hard work.

In addition to his Nobel Prize, Chandrasekhar Venkata Raman received a multitude of honorary doctorates as well as memberships to scientific societies. Throughout his life, Raman studied transverse vibration of bowed strings, studying the harmonic nature of Indian instruments like the tabla and the mridanga. He also studied the diffraction of light by aural waves of ultrasonic and hypersonic frequencies and their effects on w-rays or on infrared vibrations inside crystals that are exposed to regular ordinary light. Through his studies he formed a new approach to fundamental problems in regards to crystal dynamics. Raman and his lab associates researched the properties of diamonds and the optical patterns of lustrous substances. C.V. Raman clearly had an inclination towards other studies involving light, photons, and visual patterns; evident as he researched composition of human vision, electrical and magnetic anisotropy, and optics of colloids.

After living a long and thoroughly full life, Chandrasekhara Venkata Raman died of a heart attack on November 21, 1970. His parting words to aspiring scientist were "scientific research needed independent thinking and hard work, not equipment." This quote reflects Raman's attitude that any one person can make a great scientific discovery even without the very

best facilities; all one needs is a questioning mind and a fair amount of resourcefulness. C.V. Raman himself fully personified this viewpoint, because despite the fact that surely superior facilities and equipment for conducting research in Physics existed in research centers in Europe, Raman carved out his own monumental discovery in Physics that earned him one of the highest honors in science: the Nobel Prize.

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