Ann Martin

Mr. Kyle Smith

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Luis Walter Alvarez in 1968

Every year, the Nobel Prize is awarded in different categories. The most well known is the Nobel Peace Prize, but little do people know, there is actually a prize in the physics category too! While there have been an immense amount of awards given out to physicists all over the world, one of the most groundbreaking and intriguing winners is Luis Walter Alvarez. Luis Alvarez was born in 1911 in San Francisco, California (Luis). When Alvarez was a little boy, he enjoyed his tools, machines, and technology (Luis). Physics was his favorite subject in school and he easily excelled in it, unlike chemistry, which he enjoyed but it didn't come as easily. He spent most of his time at the University of California in Berkeley when he wasn't serving for the United States in World War II (Sullivan). In the midst of Alvarez's career, he joined his son, Walter, supporting his "controversial theory that one or more extraterrestrial impacts killed off the dinosaurs and hundreds of other species 65 million years ago" (Sullivan). When viewers opposed this, Alvarez "ridiculed skeptics of his theory" and was outspokenly critical (Sullivan). By the time Alvarez passed, the debate over the meteorite causing the dinosaurs to go extinct was no longer being debated (Luis). It ended up being "completely accepted that Alvarez's team was right" about their meteorite theory (Luis). Alvarez stood by his theories and discoveries in his lifetime, which is what makes him one of the most inspiring and independent physicists in history. In addition to all those great accomplishments, Alvarez worked with Lawrence H. Johnson to create a "radar beam narrow enough for someone on the ground to help an aircraft

blinded by fog to land" (Sullivan). In the war, he was in charge of three different radar systems which included the "microwave early warning system, the Eagle high altitude bombing system, and a blind landing system of civilian as well as military value" (Nobel Prize). In addition to this, Alvarez contributed to the creation of the atomic bomb (Sullivan). In 1945, "the bomb was dropped on Hiroshima, destroying the entire city" (Luis). After his return from World War II, Alvarez continued his learning experience at the University of California. His studies and hard work definitely paid off, since they resulted in winning the Nobel Prize. His life ended on September 1st, 1988 in his home state, California (Sullivan). He died due to complications in the surgeries attempting to cure his esophagus cancer (Sullivan).

When Alvarez met Ernest Lawrence his entire future changed. Lawrence granted Alvarez the job to "help run the cyclotron, a machine that studies atoms" in the radiation lab (Luis). In the radiation laboratory, "he built a hydrogen bubble chamber, with which he discovered that atoms and other particles when traveling through liquid hydrogen leave a track of bubbles" (Luis). This bubble chamber was what allowed Luis Alvarez to detect the reactions of various particles, specifically the subatomic particles (Luis).The bubble chamber allowed for the discovery of many new atomic particles, which was a giant step for the science field. These subatomic particles were later identified as quarks (Nobel Prize). Alvarez was awarded the Nobel Physics Prize in 1968 because of his "decisive contributions to elementary particle physics, in particular the discovery of a large number of resonance states, made possible through his development of the technique of using hydrogen bubble chamber and data analysis" (Nobel Prize). This builds off of the Nobel Physics Prize awarded in 1960 for the invention of the bubble chamber by Donald Arthur Glaser (Nobel Prize).

Alvarez conducted his research in California, the state where he was born. Alvarez "worked concurrently in the field of optics and cosmic rays" (Nobel Prize). When Alvarez first started college, only the proton and the electron had been discovered (Luis). By the time he finished and earned his degree, two new particles had been identified, the neutron and the positron (Luis). He belonged to the radiation laboratory in the University of California. In this radiation laboratory, his "main efforts have been concentrated on the development and use of large liquid hydrogen bubble chambers, and on the development of high speed devices to measure and analyze the millions of photographs produced each year by the bubble chamber complex" (Nobel Prize). He mostly studied cosmic rays, the use of balloons, and superconducting magnets (Nobel Prize). Alvarez was also awarded the Nobel Prize because these subatomic particles he discovered have "extremely short lifetimes and occur only in high-energy nuclear collisions" and are now known as resonance particles (Luis). There are no specific geopolitical factors that influenced Alvarez's work. He accomplished these things after his return from World War II, where he felt very guilty for killing all the people in the city he bombed (Luis). He even wrote a letter to his son wishing that the "powerful and destructive atom bomb would inspire people to prevent future wars" (Luis).

Luis Alvarez was successful throughout entire adult life and career. He was involved in World War II with a secret project for the government (Luis). When he created the atom bomb, he created the hope that they could be the "first country able to build the power to win the war" (Luis). As for the time period when Alvarez won the Nobel Physics Prize, there is nothing to influence his work. The invention of bubble chamber won the Nobel Prize in 1960 and without this, it would have been impossible for Alvarez to come to the conclusions that he did (Nobel Prize). Prior to this, in 1938, Alvarez discovered that "some radioactive elements decay by

orbital-electron capture" which means an orbital electron "merges with its nucleus, producing an element with an atomic number smaller by one" (Luis).

Glaser, the inventor of the bubble chamber, gave Alvarez the inspiration he needed to create this experiment that won him the Nobel Prize. His "idea was that the liquid hydrogen would boil wherever a high energy particle passed through it, leaving a trail whose path would allow the particle's properties to be calculated" (Luis). About a year later, Alvarez had a "small scale liquid hydrogen bubble chamber" at his campus in Berkeley (Luis). As expected, this something small grew into something much bigger. In 1956, a chamber noticeably larger than the first was in operation (Luis). This is the chamber that was used to reveal "a variety of new particles and resonance states" at the end of the 1950s (Luis). It wasn't until 1968 that the Nobel Peace Prize was awarded, though.

Luis Alvarez and his group carried out this experiment with the hopes of finding exactly what they found. There was no alternative motive or search for something else. They began the search after Alvarez had a chat with Glaser over lunch about the bubble chamber (Luis). Alvarez and his group did the experiment the way they did because of the information given to Alvarez from Glaser. Alvarez completed this experiment simply for the love of physics and the yearning to know about the unknown. Luis would thank his father for the keen advice to "sit every few months in [a] reading chair for an entire evening, close [his] eyes and try to think of new problems to solve" (USA). Alvarez actually took this advice and, ultimately, it got him all the way to the Nobel Prize!

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