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Marie and Pierre Curie

In 1903, the Nobel Prize was awarded to Marie and Pierre Curie for their work with radiation. The couple made great strides in physics and revolutionized the field of study for their generation and for generations to come.

Marie Sklodowska was born in Warsaw, Poland in 1867 to two Polish educators who instilled a desire for knowledge in their daughter. Her father first taught her and introduced her to physics and chemistry, both fields in which she would later receive Nobel Prizes. The family valued education, even though higher educational opportunities were not available for their daughter in Poland. Driven by a passion for physics and mathematics, Marie hoped to study under France's top mathematicians and physicists at the elite Parisian school, the Sorbonne. Upon graduating from the Sorbonne and establishing herself in the medical field, her sister financially aided Marie in her desire to study at the Sorbonne. At the age of 24, Marie finally arrived in Paris. She faced many obstacles, including living in a little attic where it was painfully cold, lacking skills to understand French, and having been separated from her fields of interest for six years. Nevertheless, her desire to learn drove her onward in her studies. In 1893, she received her degree in physics from Sorbonne, graduating at the top of her class. She went on to receive a teaching diploma.

Shortly after her graduation, she met Pierre Curie. He was eight years her senior and had already established himself as an international physicist. He was employed by a laboratory at the School of Industrial Physics and Chemistry, where he observed the relationship between crystals, magnetism, and temperature. He was not well established in the scientific community in France, nor had he received an education from a selective, notable school. His father was his teacher. He completed his thesis for his doctorate degree on different forms of magnetism and their relationships with temperature, which later became known as Curie's Law. Upon meeting his wife, common interests in idealism and science transcended into personal relations. They wed in July 1895 in Sceaux. They had two children, Irene and Eve.

At this time in history, various scientists were making significant contributions, which influenced the entire scientific community. Among these influential scientists were Becquerel and Rontgen. Becquerel worked with and discovered radioactivity. However, his results were not as celebrated as Rontgen. Rontgen discovered x-rays, which aroused the scientific community. These discoveries would influence the Curies in their observations to come.

Marie Curie took it upon herself to research the uranium rays brought to attention by Becquerel and Rontgen. A significant component of her study was the use of an electrometer to measure electrical current, which was discovered by Pierre and his brother. Her research yielded the results that thorium and uranium emitted the same type of rays and that the radiation's strength only related to the amount of the substance being tested. She also discovered that elements with similar chemical compounds possess different physical and chemical characteristics. Finally, Marie recognized that a

substance's radiation corresponds to its interior atomic structure. She also noted that only uranium and thorium emitted this form of radiation.

Her next hypothesis was to observe natural ores containing uranium and thorium and see if a new, radioactive element was present in small quantities of the ore. Excited by the brilliant idea, Pierre embarked on this quest with his wife. Laboratory conditions were difficult. Together they discovered that fractions of bismuth or barium were present with high radioactivity levels, and if the bismuth or barium was removed, a residue remained with even higher radioactivity levels. They named this new element radium, from its high levels of radioactivity, and suggested it behaved similar to pure barium. They continued to work for years in the laboratory. The Curies refined large amounts of pitchblende (mineral), successfully isolated chloride salts, and refined radium chloride. These accomplishments led them to the discovery of polonium. This new element was named after Marie's home country of Poland.

After years of laboratory research, both Marie and Pierre began to decline in their health. Pierre had difficulty standing and his legs shook often. Marie's skin also reflected their dedication to their cause (disfigured and unnatural). These symptoms were most likely caused by the over-exposure to radioactive materials. Outside of their laboratory, radioactive materials, such as radium salt, were everywhere, from their bedside table to Pierre's pocket.

The science power-couple received the Nobel Prize in Physics in 1903 for "the extraordinary services rendered by joint researches on the radiation phenomena discovered by Professor Henri Becquerel" (Nobel Prize). A mere three years later, Pierre died after being run over by a horse-drawn carriage. Two years following his death,

Marie became the first women professor at Sorbonne. With the collaboration of Andre Debierne, she was successfully able to accomplish the production of pure radium chloride decigrams (a tenth of a gram of radium compound in pure state) and the isolation of the metallic form of radium. In 1911, Marie was once again awarded a Nobel Prize. However this time, it was in the field of chemistry and came with much controversy. This time around, she was awarded this prestigious honor for “the discovery of elements radium and polonium, by the isolation of radium and the study of the nature and compounds of this remarkable element” (Nobel Prize). The controversy came from the question of whether or not she was being recognized twice for the same discovery. 1911 was a challenging year for Marie. Not only did she face criticism with her Nobel Prize, but she was also rejected from l’Académie des Sciences and scrutinized by the attitude of the French society and media.

In 1914, Marie’s mission to pilot a department in the Radium Institute, a collaboration of the University of Paris and Pasteur Institute, was disrupted by the start of World War I. However, Marie made the most of this pause in her career. She played an active role in the war by using x-rays to aid wounded soldiers. She set up radiology cars and trained young women to use them to help tend to wounded soldiers. Marie herself even drove one of the vans. The Radium Institute was reopen in 1918, and Marie assumed her position. Around this time, Irene Curie, her daughter, and her husband would go onto also work in a laboratory and discover artificial radioactivity together. They received the Nobel Prize in Chemistry in 1935. Marie sadly did not get to see them receive this honor. Leukemia took her life in July of 1934.

In conclusion, Marie and Pierre Curie made significant contributions to the world of science. They worked with radioactivity and successfully discovered two new elements: radium and polonium. Through their innovations, they helped pave the path for future physics discoveries and contributed to what we study today.