

How the Work of Marie Curie Restricted the Advancement of Future Female Scientists

Kayla Huber

Department of History
Lake Forest College
Lake Forest, Illinois 60045

When asked to create a list of the most significant scientific figures, names such as Einstein, Galileo, Stephen Hawking, Issac Newton, Marie Curie, and Darwin would certainly be present. The tremendous contributions of such privileged white men, birthed from the tedious labor of those below them, will be remembered from now until humans deplete all of their resources. But there is one oddity present on this list: a woman. Marie Curie was truly a trailblazer, pioneering the act of isolating radioactive isotopes as well as identifying the elements of polonium and radium. Without question, Curie deserves to be granted iconic status for her significant work within the fields of physics and chemistry. However, such recognition proceeded to overshadow the efforts of other women scientists and justified the inequalities bestowed upon them within the workplace. What would culminate into the “Marie Curie Effect” served as a unique hindrance to female scientists of the early 20th century.

Marie Curie's path to success was fraught with barriers. Born to a family that supported her academic endeavors but lacked the funds to send her to a Polish university, Curie was forced to attend the secret ‘Floating University.’ She soon opted to become a full-time governess for seven years, which enabled her older sister Bronia to attend medical school. Following her graduation, Bronia invited Curie to move to Paris in order to study at Sorbonne University. For the next four years, Curie “lived in a mean abode, unheated, with very few comforts of home. Marie hardly ate or slept. She was engrossed in her studies and knew she had to catch up with the other students in mathematics, attend lectures, and study for exams” (Sheffield, xvii). By 1894, Curie had earned bachelor's degrees in both physics and mathematics.

Marie proceeded to marry Pierre Curie in July of 1895, which ordinarily would be the end to any civilized woman's scientific career. However, Pierre perceived her to be a woman of genius and pursued his research alongside his wife. Even more remarkably, Curie became the first woman to earn her Ph.D. in physics for her work in radioactivity following the birth of her first daughter. However, merely identifying radium and polonium was not evidence enough for the larger scientific community. Posed with the task of producing pure forms of such elements, Pierre and Marie worked side-by-side in an unequipped and shoddy shed. The extremely “delicate work of attempting to chemically extract the element from tons of pitchblende was ruined or interfered with due to these impossible working conditions. But the Curies persevered, spending every possible moment in their laboratory shed and constantly exposing themselves to radioactivity” (Sheffield, xviii-xix). The Curies may have sacrificed their health, but for no small reward.

In 1903, Marie officially became the first woman to be awarded the Nobel Prize in physics (along with Pierre Curie and Henri Becquerel). In 1911, Marie went down in history as the second person to earn the Nobel Prize twice, this time in chemistry for her work with radium and polonium (The Nobel Foundation). Following Pierre's tragic death, Marie “became the

first woman to teach at Sorbonne and the first woman to hold a full science professorship at a university [...] By 1910 she had written and published her 1,000-word Treatise on Radioactivity, summarizing the progress in radioactivity since her first observations in 1897” (Sheffield, xix-xx). Marie extended her brilliance by creating portable X-ray machines to be used on the battlefields of World War I and donating to philanthropic causes. Despite her failing health, she worked tirelessly in her laboratory until her death in 1934.

Marie Curie died an icon and a scientist of legendary proportions. She conducted revolutionary research in a time that largely limited women to the domestic sphere. A culmination of factors allowed for her success, namely a supportive husband, childcare provided by Marie's stepfather, research facilities granted by Pierre's fairly liberal university, and Marie's unyielding passion for her research. However, Marie Curie's profound accomplishments had an unintended affect upon effect on generations of female scientists to come. Henceforth, women who desired to pursue higher education and research were held to an impossible standard: “Department chairman [...] asserted that every female aspirant for a faculty position must be a budding Marie Curie. They routinely compared American women scientists of all ages to Curie and [...] justified not hiring them on the unreasonable grounds that they were not good as she, twice a Nobel Laureate!” (Rossiter, 127).

In order to overcome the “Marie Curie Effect,” female scientists proceeded to perform tedious work for obscenely long hours and for low wages. A prime example is Williamina Fleming who began working in Edward Pickering's famous astronomical observatory in 1881. Fleming was one of the finest “computers” Pickering had ever hired, as she devised her own star classification system and is accredited with identifying hundreds of stars, nova, and nebulae. However, her meticulous analysis of photographic plates stood in stark contrast to the work performed by her male colleagues: “Her salary was based on a seven-hour day, but she typically worked nine hours or more, while men left on time. She observed that many of the men ‘took things easy’ at work. They operated at a slower pace by day and went home to wives who catered to them at night” (Cannon, 98). Despite her efforts, Fleming's requests for an increased salary were routinely dismissed.

In a final attempt to demonstrate her worth, Fleming began conducting extra analysis of variable stars at home. However, this work was perceived as something equal to that of a hobby and was largely unrecognized. Fleming continued on, though “the long hours she labored wore her down physically and emotionally during her final decade at the observatory [...] Nurses had to exercise an arm she could barely move, so that she could complete assigned work on the plates. Ceaselessly, she continued until 1911, when, by all accounts, she had worked herself to death” (Cannon, 99). Nearly all of Fleming's work was published under Pickering's name. Her experiences within the observatory depicted an unfortunate reality, one in which nothing female scientists did would ever be enough. Women were either fortunate to be born on the right end of the bell curve or bound for mind-numbing work that was not deserving of reward.

While women were largely barred from conducting their own research and were reserved for performing menial tasks, they often formulated novel ideas. Henrietta Leavitt was also fortunate enough to be graced by the presence of Edward Pickering in 1893. While recording her observations of the Magellanic Clouds, two irregular dwarf galaxies, Leavitt noticed

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that one could use a star's pattern of luminosity in order to calculate distance and magnitude. She acknowledged that "the implications were enormous, but Leavitt was paid to measure and record, nothing more. In a brief paper she furnished for the Harvard Annals in 1908 she made it clear that she understood her place. Only in passing did she suggest that the longer periods of the brighter variables were 'worthy of notice'" (Cannon, 103). Due to her inferior status, Leavitt effectively passed the torch onto other men in order to calculate the size of the Milky Way galaxy.

Marie Curie's immensely successful career may have closed the door for women who followed her in pursuing science, but is she truly to blame? Suzanne Sheffield keenly notes that, "Patriarchal society in general, and male scientists specifically, have worked, both consciously and unconsciously, to keep women out of science" (Sheffield, xiii). When the argument that women physically could not handle the intellectual strain of hard science could no longer be made, other justifications had to be devised in order to limit the mobility of women in an otherwise male-dominated field. Labeling successful women as pure oddities and average women as incapable of making any significant contribution were effective means of putting women 'in their place' during the early 20th century.

Just as there is no questioning the iconic status of Marie Curie, there is no questioning the fact that other female scientists are equally deserving of such recognition. However, I would like to make an appeal to mediocrity. What we need is the recognition and advancement of not only excellent women, but mediocre women. Just as every male physicist is not evaluated by the work of Albert Einstein, every female scientist should not be discounted unless she displays the aptitude of Marie Curie. Let it be noted that of every male scientist to ever exist, only a select few made it onto the list of 'greats.' If history has shown us one thing, it is that scientific progress has been the product of both banal labor as well as brilliant insights by a select few individuals.

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