

Marie Skłodowska-Curie and Irène Curie-Joliot

Extraordinary Careers



MAGDALENA GAWIN

The Tadeusz Manteuffel Institute of History, Warsaw
Polish Academy of Sciences

magda.gawin@wp.pl

Dr. Magdalena Gawin is a historian studying Polish intelligentsia over the centuries

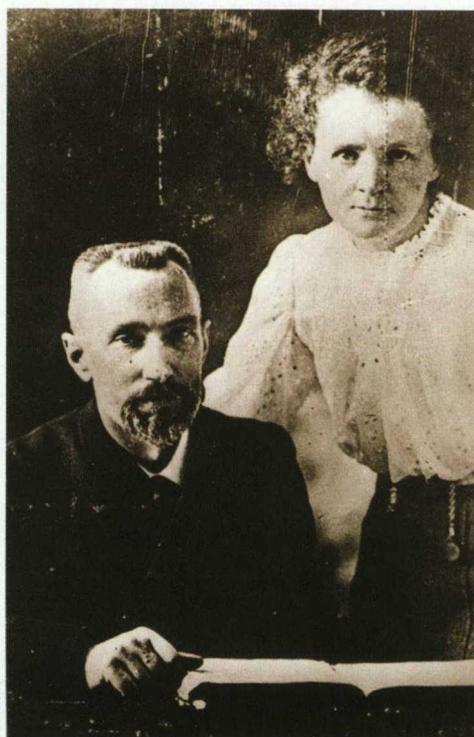
There has only been one occasion in the history of the Nobel Prize when a mother and daughter were awarded a total of three prizes. This feat was achieved by Marie Skłodowska-Curie and Irène Curie-Joliot

Marie Skłodowska-Curie was the first ever double Nobel Prize laureate, having been awarded the prize in physics in 1903 (together with her husband Pierre Curie) and in chemistry in 1911. Irène Joliot-Curie followed in her mother's footsteps, albeit on a slightly more modest scale; she shared the chemistry prize with her husband in 1935. Their scientific careers have been inimitable in the history of the Nobel Prize: there has never been another occasion, before or since, that this most prestigious scientific prize has been awarded first to a mother and then to a daughter. Although they were both suffragettes, their lives did not follow the feminist dogma of an eternal battle of the sexes. Rather than hampering their ambitions, their respective marriages were an integral part of their creativity and achievements.

Marie and Pierre

Marie Skłodowska was born in 1867 in Warsaw, under Tsarist rule at the time, to an intelligentsia family. She was the youngest of five siblings, and she soon experienced profound grief; her eldest sister died when Marie was just ten years old, and her mother passed away a couple of years later. She exhibited extraordinary talent from her earliest years; however, the customs at the time dictated that she was restricted to obtaining a diploma from a girls' boarding school or gymnasium. Neither

the then-Russified University of Warsaw nor the universities across Galicia admitted women, so Marie attended science courses held as part of Warsaw's Flying University. She spent a few years working as a governess, and as soon as she gathered sufficient funds, she left for Paris. In autumn 1891, she bought the cheapest train ticket, and took a folding chair and blankets on a three day journey in an unheated carriage. In Paris she took a tiny cheap room on the sixth floor of a tenement building in the Latin Quarter, near the university. Almost all her money went on rent, so she ate whatever she could afford – mainly eggs and fruit – often in lieu of lunch having a hot chocolate or a piece of bread. She couldn't afford heating, so in winter she covered up with blankets plus a pile of clothes while her tea froze in the mug on the desk. In her autobiography, she factfully described her good relationship with the Polish ex-pat community in Paris. However, she largely withdrew from social life towards the end of her first year at university.



Marie Skłodowska-Curie and Pierre Curie shortly after their marriage, 1895

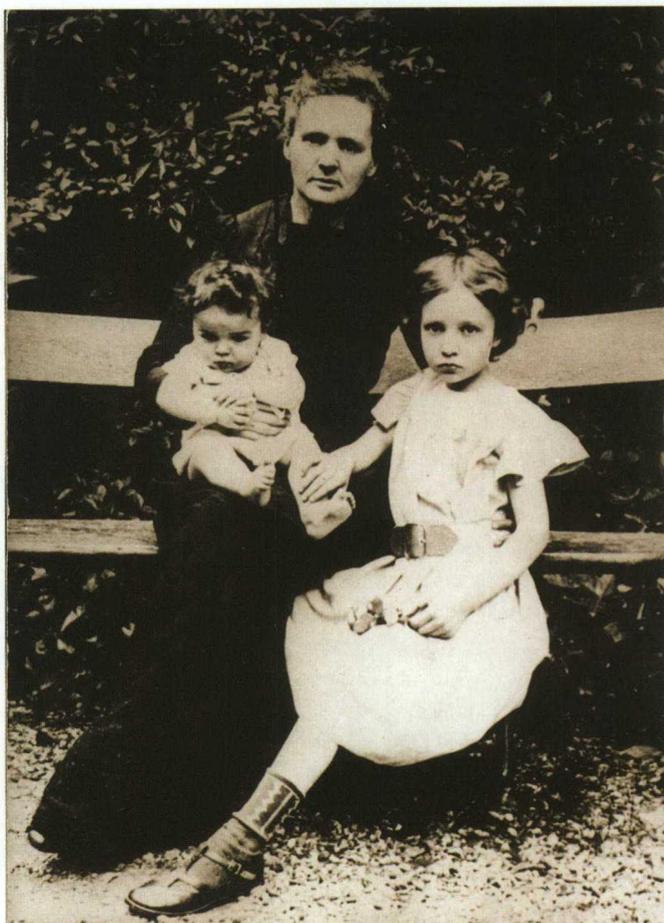
Two years later, Skłodowska was awarded a degree in physics, coming top of her class, and graduated in mathematics a year later, this time getting the second highest result. The same year, in 1894, she met the love of her life: the handsome yet slightly detached from reality 35-year-old Pierre Curie. “The kindred of our spirits was quite amazing in spite of our national differences,” Marie reminisced on their meeting later. In spite of his significant scientific achievements, Pierre was shy, and like Marie he kept well away from academic intrigues. And they had more in common than their talents: they scorned an ostensible work style and the turmoil that went with it, and instead valued tranquility and focus. Their deep friendship turned into a mutual fascination, and they married in summer 1895, Marie taking a double-barreled surname.

Lab work and personal life

The birth of the Curies’ first daughter Irène in 1896 did not cause a major distraction to the rhythm of their work in the shed they called their laboratory, where they both conducted research into a curious phenomenon they gave the working name “Marie”: radioactivity.

On 18 July 1898, the couple announced the discovery of a new element, hitherto absent from Mendeleev’s periodic table: “If the existence of this new metal is confirmed, we suggest that it should be called polonium after the name of the country of origin of one of us.” In December the same year, they announced the discovery of another radioactive element – radium. They spent the following five years entranced in their work, producing a method of isolating new elements. They were as yet unaware that they were working on harmful substances, even though they had both lost weight and their health suffered. On 10 December 1903, the Royal Swedish Academy of Sciences awarded the couple the Nobel Prize in physics. The Curies’ second daughter, Ève, was born a year later; when the girls were 10 and three years old, their father died in a street accident.

Following Pierre’s death, Marie took over his physics chair at the Parisian Sorbonne, becoming the first woman to hold the position. She wrote in her personal diary, “I should also like to tell you that I was nominated to take over your department, and that there were fools who congratulated me on it.” Frequently critical of the education system, she and a group of her



friends organized The Cooperative – an informal group of academics teaching their children more than was available in Parisian schools. Marie taught physics, Jean Perrin taught chemistry while his wife Henriette taught history and French, and Paul Langevin was the mathematics tutor.

Marie Skłodowska-Curie and her daughters Irène and Ève, 1906

The affair between Skłodowska-Curie and Langevin was likely to have started around 1910; the latter’s estranged wife forwarded the lovers’ letters to an editor of a tabloid newspaper, soon published to the outraged delight of the public.

A scandal ensued; countless publications pronounced Marie to be corrupt and immoral, accusing her of poisoning French science – which she supposedly infiltrated by deception. The publicity surrounding the affair fed into a wave of venomous anti-female propaganda and pseudo-moralizing. Newspapers claimed that by overstepping the traditional boundaries, all suffragettes were doomed to end up in the moral gutter.

Echoes of the scandal had barely died down when Reuters announced on 7 November

Marie Skłodowska-Curie and Irène Curie-Joliot

1911 that Marie was awarded the Nobel Prize for chemistry. As early as 1907 the Nobel Committee for Chemistry stressed in its report the significance of Skłodowska-Curie's achievements, after she obtained a sample of radium pure enough to publish the element's atomic number. In 1910 she successfully isolated metallic radium. And yet she was so widely hated by the press, the news of her having been awarded the Nobel Prize was pushed to the back pages.

Suffragettes

Until the First World War, Skłodowska-Curie travelled under an assumed name and jealously guarded her privacy. However, the outbreak of the war spurred her into action: she organized mobile radiography units in France - frequently operating them herself - for the treatment of wounded soldiers.

In the early 1920s, when Europe was still mourning its dead and recovering from its war wounds, the US was booming. While Skłodowska-Curie's laboratory had a mere

Marie paved the way for other women scientists back when their abilities were still widely doubted

gram of radium to work with, various American institutions had 55 grams of the element at their disposal. Thanks to the continuing support of the journalist Marie Mattingly Meloney, Skłodowska-Curie was able to approach generous American donors. Meloney believed that Skłodowska-Curie's presence in the US would encourage more women to take up higher education.

The scientist's plans to travel to the US came to fruition in 1921. Skłodowska-Curie travelled with her daughters, Irène and Ève. The schedule was tense; the trip culminated with a ceremony at Carnegie Hall, attended by over three thousand female graduates of American universities. Susan Quinn, the scientist's renowned biographer, notes that in the year preceding Skłodowska-Curie's visit, just 41 women held PhDs in scientific disciplines; that number rose to 138 in 1932. It is widely believed that Skłodowska-Curie's visit made a major contribution to women's education. Her wealth of scientific achievement, the modest manner in which she carried herself, and her frankness helped destroy many stereotypes

concerning women's scientific ability (or supposed lack thereof).

Skłodowska-Curie's daughters blossomed into young ladies during the 1920s. Irène and Ève had very different interests and personalities. From her earliest years, Irène was very like her mother: she was quiet and focused, and she shared her parents' fascination with chemistry and physics. On the other hand, her younger sister was as charming as she was beautiful, and her talents lay in the arts. The relationship between the mother and daughters was a happy one: they lived together, took their meals together and travelled together.

Irène and Frédéric

In the mid-1920s, a major change occurred in the three women's lives: Irène married one of her and her mother's colleagues, Frédéric Joliot. When the two first met, Frédéric thought Irène to be cold and aloof, but after a while he discovered her hidden side: poetic, sensitive, serene. The similarities between the two married couples were striking: Pierre Joliot, like his late father-in-law Frédéric Curie, was more of a physicist, while Irène followed in her mother's footsteps and focused more on chemistry. The close scientific partnership between the Joliot-Curies (both Pierre and Irène opted to take this double-barreled surname) likewise resulted in a series of fascinating discoveries.

However, the younger scientists worked in a more highly competitive environment; they were beaten to their first finding by a laboratory which used their results to discover the neutron. In summer 1932, the American researcher Carl Anderson discovered a new particle in cosmic rays, which was named the positron. Anderson's experiments used a cloud chamber - a device used to detect invisible tracks left by particles by directing them through supersaturated vapor; the particles leave behind a trail of tiny condensation droplets.

The Joliot-Curies reviewed their own photos of particle trails, and realized that they also had evidence for the existence of positrons. They started bombarding various elements with gamma radiation emitted by polonium in order to see the new particles. They also started varying the distance between the source of radiation and the target. When gamma rays hit aluminum, they produced neutrons; as the source was moved further away, the emission of neutrons fell to zero, while the positron emis-



PAS Archives

Irène Curie and Marie Skłodowska-Curie in a lab at the Radium Institute in Paris, 1925

sion continued, decreasing at a rate similar to a naturally radioactive element. When the Joliot-Curies used a Geiger counter, it responded as expected. However, when the radiation source was moved further away, instead of being silenced, the counter continued clicking for a few more minutes as though ordinary aluminum became radioactive. The phenomenon took researchers by surprise, so their first step was to check whether the Geiger counter was working correctly. When it turned out that it was, they were certain they discovered artificial radioactivity. Frédéric told one of his colleagues excitedly, "We were late with the neutron, we were late with the positron - this time we're on time." Their discovery was of enormous significance - they demonstrated that elements can be "forced" to release some of their energy as radioactive decay. As a consequence, this meant that scientists would be able to create explosive changes by combining or splitting elements. The discovery was quickly appreciated by the Nobel Prize committee, which awarded the Joliot-Curies a prize in chemistry.

Although Skłodowska-Curie's reputation did not eclipse her daughter's discovery, it did obscure Irène as a historical figure. Why?

Perhaps because Skłodowska-Curie had paved the way for other women scientists back when their abilities in this area were still widely doubted. Perhaps because the success achieved by Marie, an unknown émigré, was more unexpected than that of Irène, daughter of renowned parents. Or perhaps because the French public opinion, which disdainfully regarded Marie as a "corrupt foreigner" during her affair with Langevin, was swayed enough by her patriotic attitude during the First World War to come to see her as "Prometheus' sister"? We do not know. Legends love figures who are both tragic and great. Marie fulfilled all the criteria: patriot of a non-existent state, a proud Pole, prematurely widowed, victim of a smear campaign, outstanding scientist. While her daughter's life was less well suited to become the stuff of romantic legend, it is worth remembering that the field of chemistry in the early decades of the 20th century was prominently illuminated by the names of two women: Marie Skłodowska-Curie, and her daughter Irène Joliot-Curie. ■

Further reading:

Giunn S. (1996). *Marie Curie: A Life*. New York: Da Capo Press.
Giroud F. (1981). *Une femme honorable*. Paris: Fayard.