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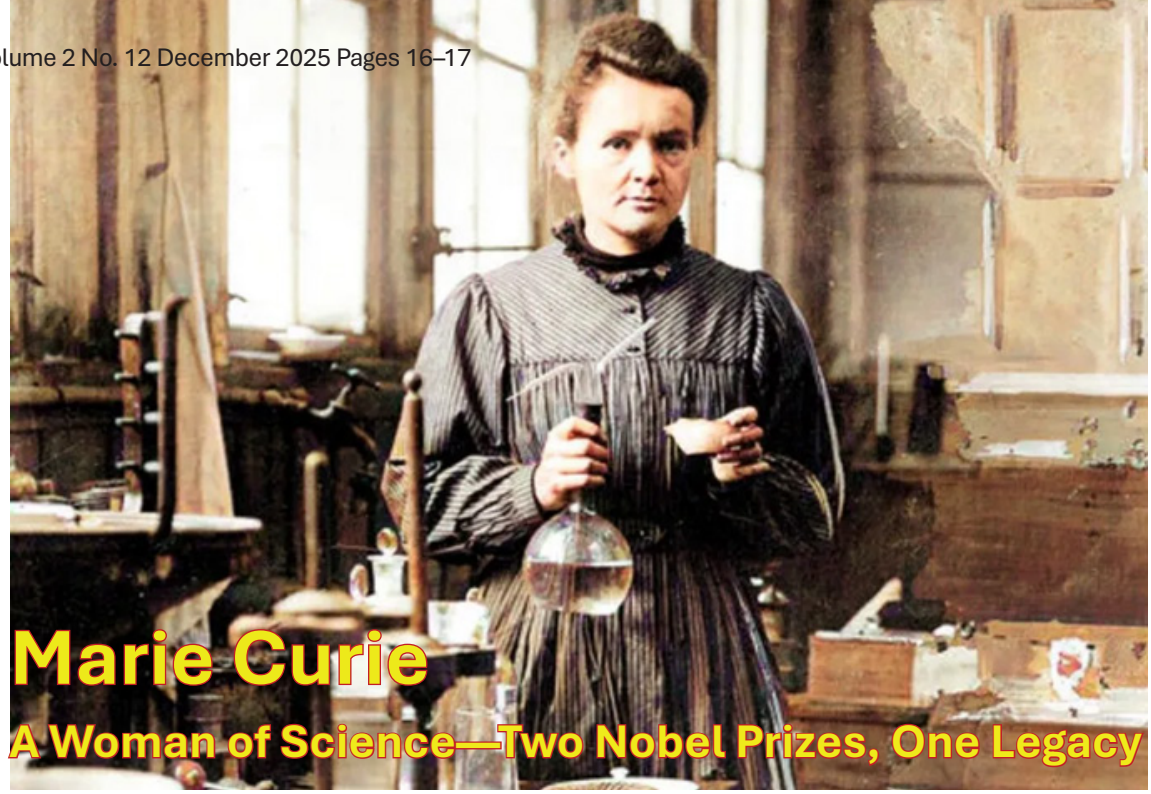

Marie Curie

A Woman of Science—Two Nobel Prizes, One Legacy

Maria Salomea Skłodowska-Curie (7 November 1867 – 4 July 1934) was a Polish-born physicist and chemist whose pioneering work on radioactivity reshaped physics, chemistry and medicine. She was the first woman to win a Nobel Prize, the first person to receive two Nobel Prizes, and—uniquely—to win in two different scientific fields (Physics, 1903; Chemistry, 1911). A naturalised French citizen who retained a strong Polish identity, Curie founded the Radium Institutes in Paris (1920) and Warsaw (1932), created mobile radiography units during World War I, and left a lasting scientific and cultural legacy.

Early life and education

Born in Warsaw, then part of the Russian Empire, Maria Skłodowska was the youngest of five children in a family of teachers committed to Polish culture and education. Her parents' involvement in nationalist uprisings had cost the family property and prospects, and the early deaths of her mother and elder sister left a profound mark on her life. Forbidden by the gender barriers of the time from enrolling in formal higher education in Poland, she attended the clandestine Flying University and undertook practical training in a chemistry laboratory in Warsaw under her cousin Józef Boguski.

In 1891, at age 24, she moved to Paris to continue her studies at the University of Paris (the Sorbonne), supporting herself by tutoring and living in austere conditions. She earned degrees in physics (1893) and in mathematics (1894), and began laboratory work that would become foundational to the study of radioactive phenomena.

Marriage and early research

In Paris she met Pierre Curie, a physicist whose experimental skills complemented her own. They married in 1895 and formed a close personal and scientific partnership. Influenced by Wilhelm Röntgen's discovery of X-rays and Henri Becquerel's finding that uranium salts emitted penetrating rays, Marie chose uranium rays as the topic of her doctoral research. Using an electrometer developed by the Curie brothers, she measured electrical conductivity induced by radioactive emissions and argued that the radiation originated in the atom itself—an idea that helped undermine the notion of indivisible atoms.

Discoveries: polonium, radium and "radioactivity"

Systematic measurements showed that some minerals (notably pitchblende) were far more radioactive than could be explained by their uranium content alone. Marie concluded these ores contained previously unknown, highly radioactive elements. In 1898 the Curies announced the discovery of two new elements: polonium (named for her native Poland) and radium. They coined the term "radioactivity" to describe the spontaneous emission of radiation by certain elements. Extracting radium from tonnes of ore was painstaking work: by 1902 they had separated measurable amounts of radium compounds and, in 1910, Marie produced pure radium metal.

Academic recognition and the Nobel Prizes

Marie Curie earned her doctorate from the Sorbonne in 1903. That December the Royal Swedish Academy of Sciences awarded the 1903 Nobel Prize in Physics jointly to Henri Becquerel and the Curies "in recognition of the extraordinary services they have rendered by their joint researches on the radiation phenomena." Marie's name was added to the prize after advocacy on her behalf, making her the first woman laureate. In 1911 she received the Nobel Prize in Chemistry "in recognition of her services to the advancement of chemistry" for the discovery of polonium and radium and her work isolating radium. She thus became the first person to win two Nobel Prizes and remains one of the few laureates recognised in more than one discipline.

Tragedy, professorship and the Radium Institute

In 1906 Pierre Curie was killed in a road accident. Overwhelmed by grief, Marie accepted her late husband's chair at the University of Paris—the first woman to become a professor there—and devoted herself to continuing their work. She campaigned for proper facilities and, with support from institutions including the Pasteur Institute, established the Radium Institute (Institut du Radium), later Institut Curie, which became a major centre for research in physics, chemistry and medicine. The institute trained scientists who later won Nobel Prizes and advanced radiological therapeutics.

World War I and applied radiology

During World War I, Curie recognised the urgent need for radiological aid to wounded soldiers. She learned radiology, procured X-ray equipment, and developed mobile radiography units—"petites Curies"—that brought X-ray services to field hospitals, significantly improving surgical outcomes. She also trained operators and devised techniques for using radium in medical treatments. Her wartime innovations treated an estimated million soldiers and demonstrated the practical medical applications of radioactivity.

Personal life and public controversies

Marie and Pierre Curie had two daughters: Irène (born 1897), who later won a Nobel Prize with her husband Frédéric Joliot, and Ève (born 1904), who became a writer and humanitarian. Despite her renown, Curie faced xenophobia and gender bias in France; she was twice the target of hostile press campaigns—most notably in 1911 when a scandal over an affair with physicist Paul Langevin (then separated from his wife) inflamed public opinion and was exploited by her opponents. Nevertheless, the Nobel Committee awarded her the 1911 Prize in Chemistry, and she continued to command international esteem.

Health, death and scientific safety

At the time the harmful effects of prolonged exposure to ionising radiation were not understood. Curie frequently handled radioactive materials without protection—carrying samples in her pocket and storing them in desk drawers—and operated unshielded X-ray equipment during the war. She died on 4 July 1934, aged 66, of aplastic anaemia, a condition believed to be caused by long-term radiation exposure. In 1995, Marie and Pierre Curie's remains were reinterred in the Paris Panthéon—the first woman honoured there on her own merits—with lead coffins because of lingering radioactivity. Many of her personal papers and belongings remain too contaminated for handling.

Legacy and honours

Curie's scientific discoveries transformed science. Demonstrating that atoms could emit energy spontaneously helped reshape physics and prompted further work that led to modern atomic and nuclear theory. Her methods and commitment laid the groundwork for the use of radioactive isotopes in research and medicine—especially cancer therapy. She curated a culture of scientific openness, refusing to patent radium-isolation processes so that research could progress unhindered.

Her name endures widely: the unit curie (Ci) commemorates the Curies' contributions; the element curium (Cm) was named in their honour; institutes, fellowships (Marie Skłodowska-Curie Actions), universities, schools and awards bear her name; and she appears on stamps and banknotes worldwide. Her family continued her scientific lineage—her daughter Irène and son-in-law Frédéric Joliot-Curie shared a Nobel Prize for chemistry in 1935—extending a multi-generational scientific legacy.

Marie Curie combined extraordinary experimental skill, rigorous thought, and moral modesty. She lived simply, gave generously of her prize money to colleagues and students, and insisted that honours and resources serve institutions and science rather than personal gain. Her life remains a powerful example of perseverance against social barriers, and of how fundamental research can yield dramatic benefits for humanity.