

Marie Curie: pioneer of radioactivity, twice winner of the Nobel Prize

This year marks the 150th anniversary of the birth of Marie Skłodowska Curie, undoubtedly the most famous female scientist in history. The remarkable story of her life and achievements has been the subject of innumerable articles, a couple of films and several major biographies. The biography written by her daughter Eve, first published in 1937, 3 years after her mother's death, has been an inspiration to generations of science and medical students. I well remember reading it as a student in the science sixth form at school in 1942 and resolving to work still harder at my books and in the laboratory.

Maria Skłodowska was born in Warsaw, then part of the Russian Empire, in 1867. She was the fifth and youngest child of husband and wife teachers. Maria's father taught physics and mathematics, which were the subjects to be studied by Maria. When the Russian authorities proscribed the laboratory teaching of physics in Polish schools, Maria's father brought home his equipment to give his children practical instruction. At that time, higher education was not officially available to women in Poland, but both Maria and her elder sister Bronisława enrolled in a clandestine 'flying university', which admitted female students.

Bronisława left for Paris to study medicine, supported by money Maria earned as a governess; the plan being that the elder girl would assist the younger in due course. In 1891, Maria enrolled in the University of Paris, living in a garret and living on money she earned by giving tutorials, obtaining her degree in physics in 1893 and then started to work investigating the magnetic properties of various steels.

In 1894, Marie (she was now using the French version of her name) was introduced

to Pierre Curie, an instructor at the School of Physics and Chemistry, and they married a year later. Neither wished to have a religious wedding, and for many years Marie used the blue dress that she wore at the wedding as her laboratory garb.

In 1896 Henri Becquerel demonstrated that uranium salts spontaneously emitted radiation and Marie decided to research this phenomenon. For this purpose, she used a sensitive electrometer that had been developed by Pierre Curie and his brother

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some years previously. Together with her husband, Marie began to study the uranium-containing minerals, pitchblende and chalcocite. The electrometer showed that pitchblende was four times more active than uranium and chalcocite twice as active, suggesting that these two minerals contained traces of some other substance much more active than uranium.

The subsequent research by the Curies is part of the folklore of science. Working in a hut in the grounds of the School of Physics and Chemistry, which had previously served as a dissecting room, by July 1898 they were able to announce the existence of an element which they named 'polonium', in honour of Marie's home country. In December of that year, they reported the existence of another element, which they named 'radium'. It was not until 1910 that Marie could isolate pure radium. The international unit of radioactive emissions was named the 'Curie'.

In December 1903, the Nobel Prize in Physics was awarded to Henri Becquerel, Pierre Curie and Marie Curie 'for their joint researches on the radiation phenomena discovered by Professor Henri Becquerel'. Marie was the first woman to receive this award.

In April 1906, Pierre Curie was knocked over by a horse and cart as he crossed the road in a rain storm and sustained a fatal head injury, leaving Marie widowed with two young daughters. The following month, the Physics department of the University of Paris offered Pierre's vacant chair to Marie. In 1911 came another first. The Royal Swedish Academy of Science announced the award of a second Nobel Prize, this one for Chemistry, to Marie Curie in recognition of 'her services to the advancement of chemistry by the discovery of the elements radium and polonium, by the isolation of radium and the study of the nature and compounds of this remarkable element'.

In August 1914, the Radium Institute (now the Curie Institute) was opened in Paris for research in physics, chemistry and radiation, but its work was delayed by the outbreak of war and was not resumed until 1919.

During the war, Marie realized the need for X-ray centres in close proximity to the front line. With enormous energy, she equipped lorries with X-ray machines, developing equipment and trained technicians as mobile units and became Director of the Red Cross Radiology Service. She was assisted by her 17-year-old daughter, Irene, who was herself to become a distinguished physicist, marry a physicist and gain with her husband yet another Nobel Prize!

In 1925, Marie visited Warsaw for the foundation of the Warsaw Radium Institute, which opened in 1932 with her sister Bronisława (with whom Marie had lived in those early days in Paris) as its first director.

By now Marie was a sick woman, suffering from years of exposure to radiation, whose malign effects were unknown in those early days. She had bilateral cataracts, skin changes and died in July 1934 from aplastic anaemia – her bone marrow virtually destroyed.

Sixty years later, in 1995, the remains of Marie and her husband Pierre were transferred to lie side by side in the Pantheon in Paris. [BJHM](#)

Conflict of interest: none.

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