

## PERSON OF INTEREST

## MARIE CURIE BIOGRAPHY

(<http://www.mariecurie.org.uk/en-gb/who-we-are/marie-curie-biography/>)

*Marie Curie is remembered for her discovery of radium and polonium, and her huge contribution to the fight against cancer.*



Born Maria Skłodowska on 7 November 1867 in Warsaw, Poland, she was the youngest of five children.

After her mother died and her father could no longer support her she became a governess; studying in her own time to quench her thirst for knowledge. A passion she never lost.

Her sister offered her lodgings in Paris with a view to going to university; she grasped the opportunity and moved to France in 1891.

She immediately entered Sorbonne University in Paris where she read physics and mathematics – her insatiable appetite for learning meant she had naturally discovered her love of the subjects.

In Paris, in 1894, she met the scientist Pierre Curie and they married a year later. It was also around this time that she adopted the French spelling of her name – Marie.

### Work on radioactivity

The Curies became research workers at the School of Chemistry and Physics in Paris and there they began their pioneering work into invisible rays given off by uranium – a new phenomenon which had recently been discovered by Professor Becquerel.

He had shown that the rays were able to pass through solid matter, fog and photographic film and caused air to conduct electricity.

Marie also noticed that samples of a mineral called pitchblende, which contains uranium ore, were a great deal more radioactive than the pure element uranium. Further work convinced her the very large readings she was getting could not be caused by uranium alone – there was something else in the pitchblende. Since nobody had ever found it before, it could only be present in tiny quantities, and it seemed to be very radioactive. Marie was convinced she had found a new chemical element – other scientists doubted her results.

Pierre and Marie Curie set about working to search for the unknown element. They ground up samples of pitchblende, dissolved them in acid, and began to separate the different elements present, using the standard analytical chemistry techniques of the time. Eventually, they extracted a black powder 330 times more radioactive than uranium, which they called polonium. Polonium was a new chemical element, atomic number 84.

Investigating further, they found that the liquid left behind after they had extracted polonium was still extremely radioactive. They realised that pitchblende contained another new element, far more radioactive than polonium, but present in even smaller quantities.

In 1898, the Curies published strong evidence supporting the existence of the new element – which they called radium – but they still had no sample of it. Pitchblende is an expensive mineral, because it contains valuable uranium, and Marie needed a lot of it.

She got in touch with a factory in Austria that removed the uranium from pitchblende for industrial use and bought several tonnes of the worthless waste product, which was even more radioactive than the original pitchblende, and was much cheaper. Marie set about processing the pitchblende to extract the tiny quantities of radium. This involved working on a much larger scale than before, with 20 kg batches of the mineral – grinding, dissolving, filtering, precipitating, collecting, redissolving, crystallising and recrystallising.

The work was heavy and physically demanding – and involved dangers the Curies did not appreciate. During this time they began to feel sick and physically exhausted; today we can attribute their ill-health to the early symptoms of radiation sickness. At the time they persevered in ignorance of the risks, often with raw and inflamed hands because they were continually handling highly radioactive material.

In 1902 Marie eventually isolated radium (as radium chloride), determining its atomic weight as 225.93. The journey to the discovery had been long and arduous.

### Nobel Prize

In 1903 Marie and Pierre were awarded the Nobel Prize for Physics jointly with Professor Becquerel for their combined though separate work on radioactivity.

In the same year, Marie passed her doctorate thesis in Physics.

In 1906 Marie's life was struck by tragedy when Pierre was killed in a street accident. Her indomitable spirit, however, kept her working and she went on to succeed him in his Chair as Professor at Sorbonne as well carrying on lecturing where he had left off.

Her determination and remarkable endeav-

ours led to a second Nobel Prize in 1911, this time in Chemistry for creating a means of measuring radioactivity. Not long after, Sorbonne built the first radium institute with two laboratories; one for study of radioactivity under Marie Curie's direction, and the other for biological research into the treatment of cancer.

During the first world war, Marie Curie worked to develop small, mobile X-ray units that could be used to diagnose injuries near the battlefield. As Director of the Red Cross Radiological Service, she toured Paris, asking for money, supplies and vehicles which could be converted.

In October 1914, the first machines were ready, and Marie set off to the front. She worked with her daughter Irene, then aged 17, at casualty clearing stations close to the front line, X-raying wounded men to locate fractures, bullets and shrapnel.

After the war, Marie continued her work as a researcher, teacher and head of a laboratory and received many awards and prizes. Among them were the Ellan Richards Research Prize (1921), the Grand Prix du Marquis d'Argenteuil (1923) and the Cameron Prize from Edinburgh University (1931). She was also the recipient of many honorary degrees from universities around the world.

### Death and legacy

On 4 July 1934, in Passy, France at the age of 66, Marie Curie died of pernicious anaemia, a condition she developed after years of exposure to radiation.

She left two daughters, Irene (born 1898) and Eve (born 1904).

Irene, like her mother, entered the field of scientific research and, with her husband Frédéric Joliot, worked on the nucleus of the atom and together were awarded a Nobel Prize and credited with the discovery of artificial radiation. Irene too died of a radiation-related illness in 1956.

Eve became a journalist and writer. Irene's daughter Dr Hélène Langevin-Joliet (born 1927) also pursued a career in nuclear physics and became research emeritus of the National Centre for Scientific Research in Paris.

In 1995, Marie and Pierre Curie were reburied in the Pantheon – the Paris mausoleum reserved for France's most revered dead – on the orders of French President M. Mitterrand.

Marie Curie was the first woman to be awarded a place in the Pantheon for her own achievements.

Marie Curie's life as a scientist was one which flourished because of her ability to observe, deduce and predict. She is also arguably the first woman to make such a significant contribution to science.